
Public perception towards climate change in India and the USA

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Abstract

Climate Change has become one of the pressing problems of the 21st century. Perceptions regarding climate change vary from nation to nation. This study was aimed at assessing perceptions towards climate change in India and the USA. This study utilizes quantitative data collection through a structured questionnaire and statistical methods to analyze the accumulated data. In this study, not a huge gap in perceived differences among the residents in India and the USA is being witnessed. Determinants like country of residence, age, type of locality, ethnicity, gender and the level of education, were not of major concern. However, variables like ‘class of society’ and ‘Regular following of climate change information’ had a significant influence on climate change awareness. Majority of the respondents in both the nations have shown their dissatisfaction towards climate change action steps taken by the concerned authorities and propose to promote clean and renewable energy alternatives. In summary, there is a need to understand one’s responsibility in tackling this issue.

Categories: Climate, Government, India, USA

Keywords: Climate change, perception, awareness, government, India, USA

Introduction

Climate change has become one of the most burgeoning topics of the 21st century. Earth's average temperature has risen by 1.5°F over the past century and is projected to rise another 0.5 to 8.6°F over the next hundred years (EPA, 2017). This change in temperature would result in dangerous shifts in our Earth's climate, which would be detrimental to all life on earth. An understanding and awareness of the climate change scenario among the residents of a country is important as it encourages adaptation and mitigation efforts (Sullivan and White, 2019). However, public perceptions of climate change vary from nation to nation (Capstick *et al.*, 2015). Past research has involved the use of surveys to understand more about how people think about climate change. A survey report entitled 'European Perceptions of Climate Change (EPCC)' (2017) shows that there is less concern for climate change in the United Kingdom while the French are more worried about this than Germans and Norwegians. It has also been shown that women are generally more worried than men on the issue of climate change (Shi *et al.*, 2016). A study concluded that the most important determinants of concern for climate change were gender, educational status, and marital status. However, no significant difference was found according to age groups and income in one study (Korkmaz, 2018). Public perceptions also fluctuate over time. Social Science research shows that in the USA, concern about climate change has fallen considerably since 2008 (Scruggs and Benegal, 2012). However, in many parts of the world in general, concerns over climate change have increased in recent years (Capstick *et al.*, 2015).

Another specific research conducted in China analyzed China's public perception of climate change in terms of several influence factors. They found that some individuals were willing to take action and had confidence that the government could deal with it, while others (27% of respondents) believed that climate change was just a natural consequence and didn't bother (Yu *et al.*, 2013). Public perceptions on climate change in the USA and Europe was captured by Lorenzoni and Pidgeon (2006). Though, limited research has been conducted on how the perceptions about climate change vary in developing and developed countries. India and the USA; both the nations are reeling under the impacts of climate change (Chinowsky *et al.*, 2011). Building off of past research, our research aims to capture perceptions towards climate change in both developing (India) and developed (USA) countries since it's important to understand that to take action in addressing this crucial aspect, some degree of involvement of citizens is necessary. The purpose of the present research is to have better insights on how these two countries with completely different economies and demographics perceive climate change. It will bring to hand a wider scope of research and mark the progress of climate change actions in the respective nations. This research analyzes how people think currently, how their perception varies and what steps can be taken in the future to slow down climate change.

Materials and methods

Study Area

Both the developing and developed countries are bearing the brunt of climate change (Chinowsky *et al.*, 2011). In this study, our main focus is mainly on a developed country; the USA and a developing country; India. The target audience is the general public of both the countries.

Data Collection and Analysis

This research was based on quantitative data collection. A structured survey questionnaire was designed consisting of a variety of questions to comprehensively capture the perception of the general public towards climate change. The survey questionnaire was divided into four sections; a) Demographics b) Their beliefs and concerns of climate change c) Causes and impacts of climate change in their region d) Their beliefs in the Government's /CBOs'/ Think tanks' role in climate change action (Table 1). The questionnaire was rolled out in the USA and India through social media platforms like Whatsapp, Facebook, LinkedIn, Instagram and Discord. Snowball sampling technique was used for this purpose for choosing the sample population (Figure 1). A total of 428 samples were collected; 306 from India and 122 from the USA.

The data collected from the questionnaire were analyzed using statistical techniques. Statistical software, SPSS has been used to conduct descriptive and inferential statistics. For the first section, bar graphs with error bars were made to visually represent the profile characteristics and check whether they are comparable. For the second section, parametric test (Logistic regression) and non-parametric tests (chi-square test, Fisher's exact test, Spearman's Rank Order Correlation (rho) were performed (Table 2). The third and fourth section has been visually analyzed through stacked bar graphs.

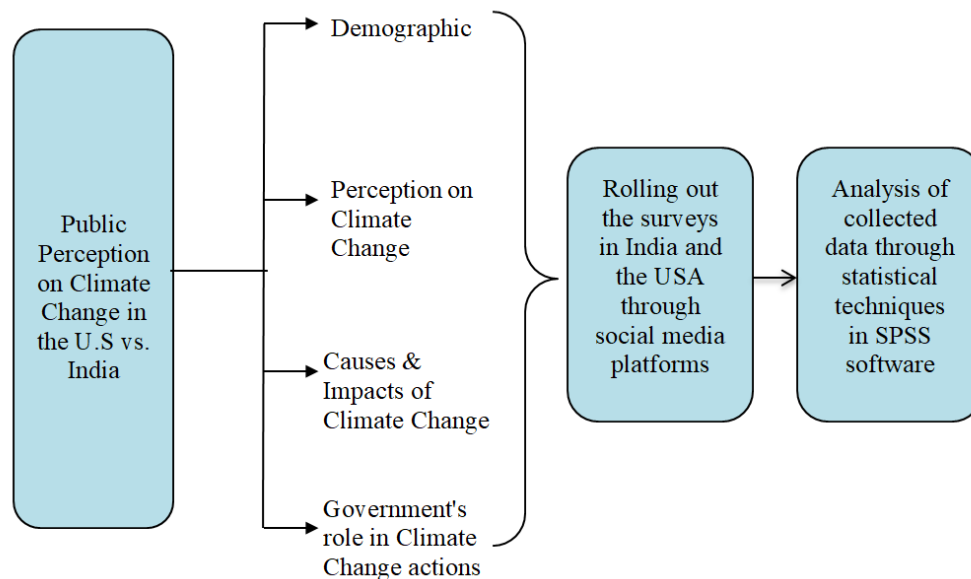


Table 1: Questionnaire

Section I: Demographics/ Profile Characteristics of the participants	
Parameters	Options
Country of Residence	a. India b) USA
Gender	a. Male b) Female c) Prefer not to say
Ethnicity	a. American Indian or Alaskan Native b) Asian c) Black or African American d) Hispanic/ Latino e) White f) I prefer not to say
Age	(Text question)
Types of locality	a. Urban b) Rural or countryside
Class of the society	a. Lower Class b) Middle Class c) Upper Class
Highest level of education completed/pursuing	a. 10 th standard or below (10 th grade or below) b) 12 th standard (High School) c) Under-graduate d) Post-graduate e) PHD or above
Section II: Belief and concern regarding climate change	
What is the most serious	a. Poverty b) Unemployment c) Climate Change and

problem existing in your country	its consequences d) Environmental Degradation e) Rising population
Are you aware about Climate Change	a. Yes b) No
According to you, what is climate change (Multi-select)	a. Rise in global temperature b) Global sea-level rise c) Rising pollution d) Melting glaciers e) Change in Earth's climate f) Change in rainfall pattern
Do you follow information regarding climate change regularly	a. Yes b) No
What are the different sources you follow to get updated on issues related to climate change (Multi-select)	a. Newspaper/ Magazines b) Television/ FM Radio c) Research Articles d) Social Media
How concerned are you on climate change	a. Not concerned at all b) Not really concerned c) Neutral d) Fairly concerned e) Very concerned

Section III: Causes and impacts of climate change

What are the major causes of climate change in your region?	a. Population increase b) Extensive use of fossil fuels c) Rapid deforestation d) Industrialization e) Global Warming f) High standard of living g) Modernization
How well do you agree that man-made activities are the primary causes of climate change?	1. Least Likely; 5- Most Likely (Scale type option)
How well do you agree that man-made activities are the	1. Least Likely; 5- Most Likely

primary causes of climate change?	(Scale type option)
Impacts of climate change experienced in the region (Multi-select)	a. Melting of glacier b) Displacement due to climate change c) Temperature rise d) Impact on agriculture e) Impact on livelihoods f) Health impacts g) Increase in disasters/ extreme weather events h) Sea level rise i) Changes in precipitation patterns
Section IV: Government's role in climate change action	
Are you aware about Paris Climate Agreement?	a. Yes b) No
Do you think that the government/ think tanks/ NGOs are doing enough to tackle climate change?	a. Yes b) No c) Not sure
What do you think the government's role should be in tackling climate change? (Multi-select)	a) Responsibility for climate action should be assigned to all departments b) Formulate Policies and Guidelines that demands immediate necessary actions c) Support small agricultural producers d) Promote clean and renewable energy e) Focus on resilient livelihoods and infrastructure f) Promoting sector specific adaptation and mitigation measures g) Promoting public awareness

Table 2: Tests performed between different variables

S.No	Name of statistical test performed	Variables chosen for the test	Description
1.	Logistic Regression	Independent variables: a) Country of Residence b) Gender c) Age d) Type of locality e) Class of society f) Highest level of education g) Do you follow information on climate	To assess which of these independent variables have a

		change regularly	significant influence on the dependent variable
		Dependent variable: Are you aware about climate change?	
2.	Fisher's exact test and Chi-square	a. Country of Residence b. Are you aware about climate change	To check if there is a significant association between country of residence and Are you aware about climate change
3.	Spearman's Rank Order Correlation (Rho)	a. Do you follow information regarding climate change regularly? b. How concerned are you on climate change?	To check if there is a significant relationship between these two variables

Results and Discussion

Demographics

Out of a total of 428 respondents, 71.5% of responses were captured from India while the USA constituted 28.5% with the overall majority being from the urban locality (77.8%). A majority of the respondents belonged to the middle class (84.8%) and a large proportion is young and middle-aged (90.89%). An equal proportion of the males (50.7%) and females (48.6%) participated in the survey. In terms of educational level, 45.1% are post-graduates, followed by under-graduates (24.8%) and High School students (15.9%). Table 3 shows the profile characteristics of the respondents. The error bars formed in the characteristics (Name of the Country, Type of locality, Gender, Age-group, and Level of education) are almost of the same height, indicating homogeneity of error for each group and that the groups are comparable (Figure 2).

Perceptions about Climate Change

Research in China shows that 93 % of the respondents were aware of climate change (Yu et al., 2013). Additionally, despite the concern and awareness of climate change, the importance of climate change is secondary in relation to other environmental, personal and social issues

(Lorenzoni and Pidgeo, 2006). In our study, 29.51% and 14.38% of the respondents reported climate change as one of the most serious problems in the USA and India respectively (Figure 3). The results show that 97.9% of the respondents are aware about climate change (100% and 97.06% of the respondents in the USA and India respectively) (Figure 4). A Fisher's exact test suggests that there is no significant association between awareness regarding climate change and the country of residence i.e India and the USA ($P > 0.5$). The Pearson Chi-Square test statistic ($\chi^2(1) = 3.665, P = 0.056$) also does not reach the significance (Table 3). However, a logistic regression shows that there is a significant influence of the independent variables 'Class of the society' and 'Do you follow information regarding Climate Change regularly' on the dependent variable 'Are you aware about Climate Change' ($\chi^2(7) = 21.974, p < 0.01$). The model explained 27.1% (Nagelkerke R^2) variance in awareness regarding climate change and was able to identify 98.1% cases accurately. Those who regularly follow information on climate change are likely to be 5.37 times more aware regarding climate change than those who don't follow (Table 4).

Table 3: Profile characteristics of the respondents

S.No.	Characteristic	Parameters	Percentage
1	Name of the Country	India	71.5%
		USA	28.5%
2	Type of locality	Urban	77.8%
		Rural/ Country side	22.2%
3	Gender	Male	50.7%
		Female	48.6%
		Prefer not to say	0.7%

4	Ethnicity	American Indian or Alaskan Native	0.93%
		Asian	78.27%
		Hispanic/Latino	1.64%
		White	3.74%
		Black	1.49%
		Prefer not to say	14.02%
5	Age-groups	<18 years	28.04%
		18-35 years	62.85%
		35-50 years	5.84%
		>50 years	3.27%
6	Class of society	Lower class	10%
		Middle Class	84.8%
		Upper Class	5.2%
7	Highest level of education completed/pursuing	10 th standard or below (10 th grade)	8.2%

	12 th standard (High School)	15.9%
	Under-graduate	24.8%
	Post-graduate	45.1%
	PHD and above	6%

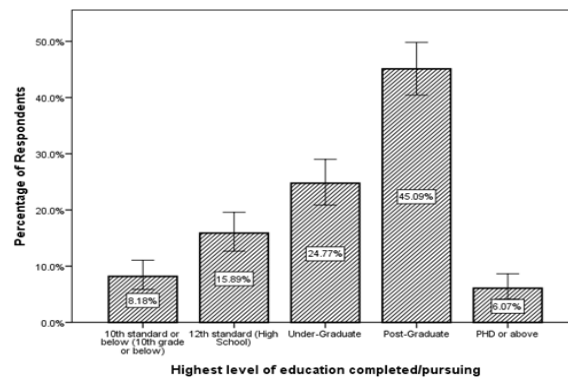
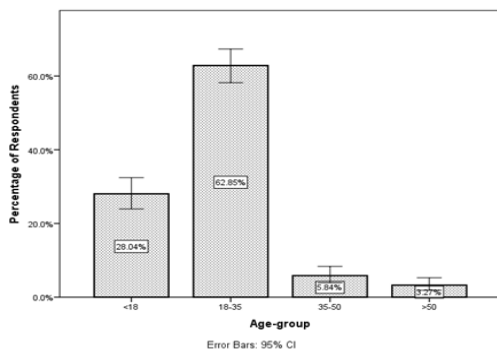
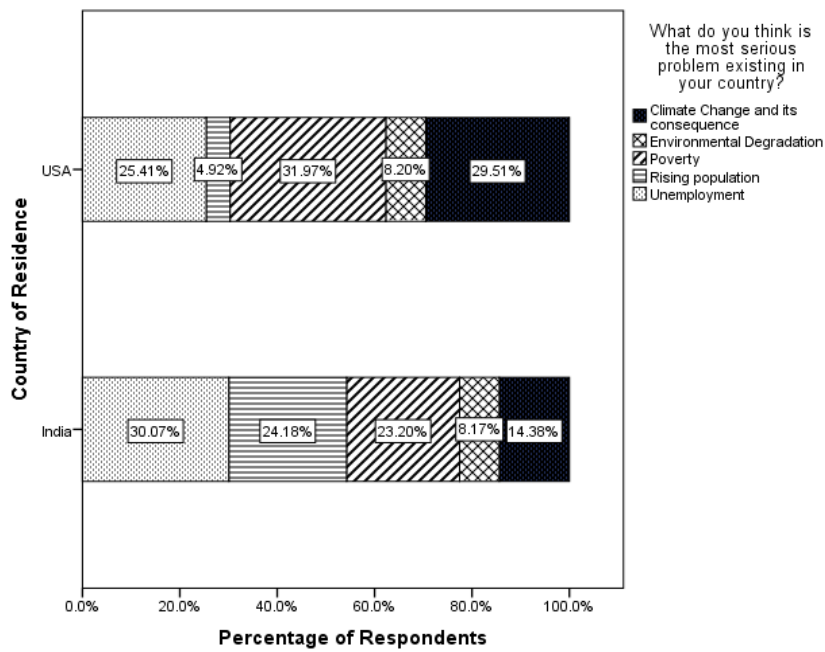
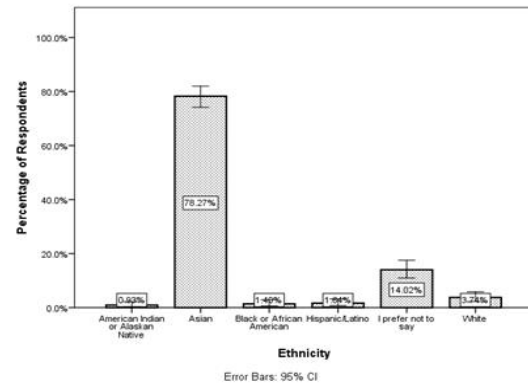
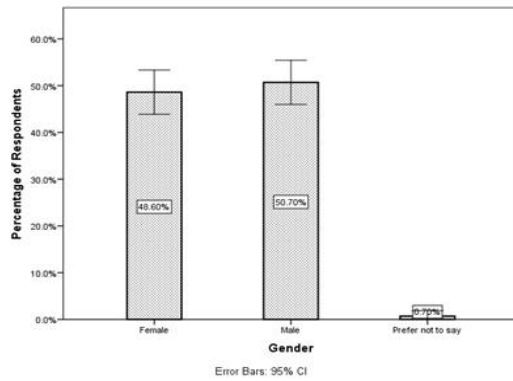
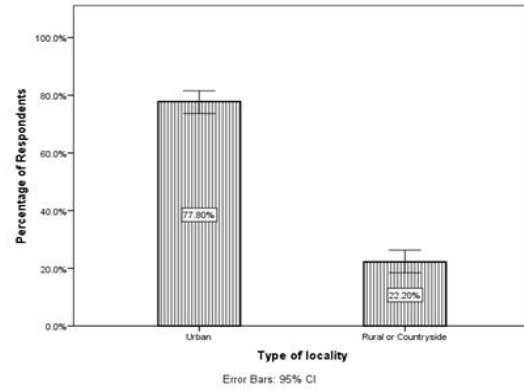
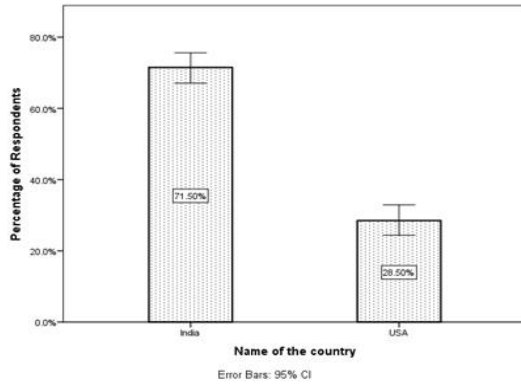


Figure 2: Bar graphs showing error bars of 'Profile Characteristics' with 95% C.I





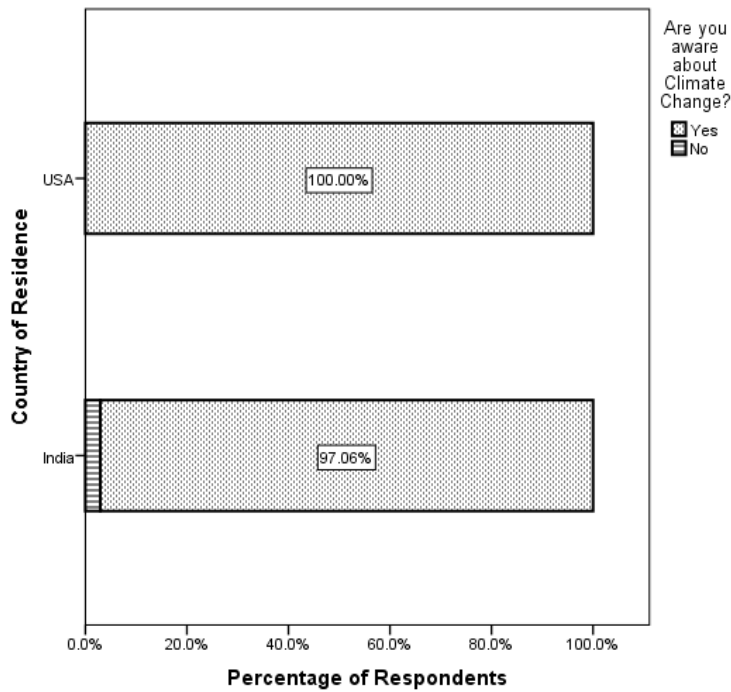


Table 3: Results of Chi-Square Test (Country of Residence & Climate Change Awareness)

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.665 ^a	1	.056	.066	.047
Continuity Correction ^b	2.376	1	.123		
Likelihood Ratio	6.116	1	.013	.050	.047
Fisher's Exact Test				.066	.047
N of Valid Cases	428				

Table 4: Results of Logistic Regression Analysis

Variables	<i>B</i> [95% C.I <i>B</i>]	S.E.	Wald	Odd Ratio
Country of Residence	19.037	3175.210	.000	185184700.646
Gender	-.345 [0.15, 3.22]	.774	.199	.708
Age in years	.022 [0.94, 1.11]	.045	.229	1.022
Type of locality	-.035 [0.20, 4.62]	.799	.002	.966
Class of society	2.335 [1.77- 60.06]	.898	6.754**	10.326
Highest level of education completed/ pursuing	-.471 [0.27-1.42]	.421	1.255	.624
Do you follow information regarding Climate Change regularly	2.027 [1.37- 42.15]	.875	5.374*	7.594
Constant	-27.163	3175.212	.000	.000

Omnibus $X^2(7)=21.974, p<0.01, R^2= 0.50$ (Cox & Snell) 0.271 (Nagelkerke)

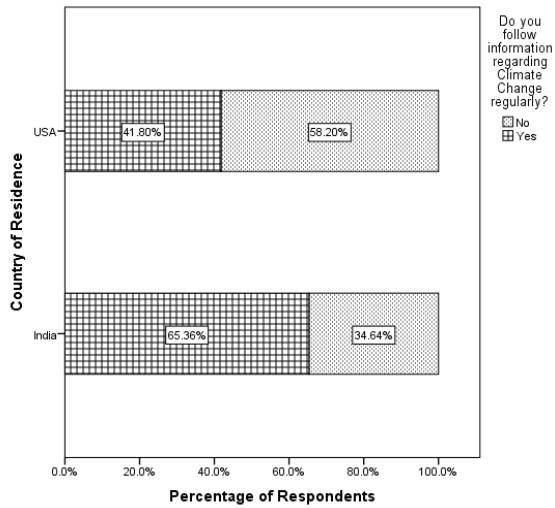
* $p < 0.05$, ** $p < 0.01$

95% C.I

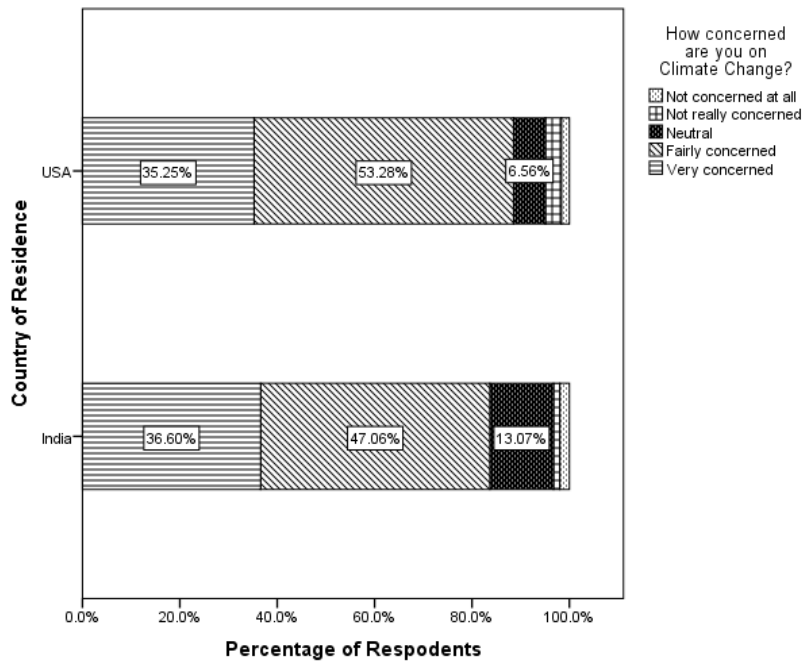
There also seems to be a relationship between regular following of the Climate Change information and the concern level of the respondents. A Spearman's Rank Order Correlation (Rho) suggests that there is a significant relationship between these two variables ($r=0.216$, $p<0.001$) (Table 5). Indians (65.36%) regularly follow Climate Change information more than those in the USA (41.8%) (Figure 5). However, not a huge difference is being reported between the concern level of the respondents towards Climate Change in the USA and India (Figure 6).

Table 5: Results of Spearman's Rank Order Correlation (Rho)

		Do you follow information regarding Climate Change regularly?	How concerned are you on Climate Change?
Do you follow information regarding Climate Change regularly?	Correlation Coefficient	1.000	.216***
	Sig. (2-tailed)	.	.000
	N	428	428
How concerned are you on Climate Change?	Correlation Coefficient	.216***	1.000
	Sig. (2-tailed)	.000	.
	N	428	428



*** $p < 0.001$



Climate Change was majorly perceived as Rise in global temperature (84.6%), Change in Earth’s Climate (81.3%), Melting glaciers (72.9%) and Global Sea Rise (70.1%) by the respondents. Social media (79.9%) and Newspapers/ Magazines (65.4%) were the more preferred sources of information than Research Articles (46.5%) and Television (38.3%). This is similar to findings in Turkey where 72% of the respondents said that they were provided information and awareness about climate change through the media (Korkmaz, 2018).

Causes and Impacts of Climate Change

Rapid Deforestation (80.1%), Industrialization (78.7%), Global Warming (78%) and Extensive use of Fossil Fuels (73.4%) were the most commonly cited causes of Climate Change. In our study, rapid deforestation was the most cited cause of climate change when in fact it’s in fact secondary to the burning of fossil fuels. This may indicate that individuals have a limited understanding of the human contributions to climate change (Lorenzoni and Pidegeo, 2006). About 19% of the respondents in the USA and 16% from India have collectively chosen these options (Increase in population, extensive use of fossil fuel, Rapid Deforestation, Industrialization, Global Warming, High standard of living, Modernization) as the major causes of climate change (Figure 7). Majority of the respondents (USA: 67.21%, India: 51.31%) agreed that anthropogenic activities are the primary/ most likely causes of climate change (Figure 8). However, the scenario reverses when it comes to its natural causes (USA: 3.28%, India: 5.56%) (Figure 9). Rise in temperature (83.2%), increase in frequency of extreme weather events (61.4%) and health impacts (54%) were the major impacts of climate change felt by the respondents.

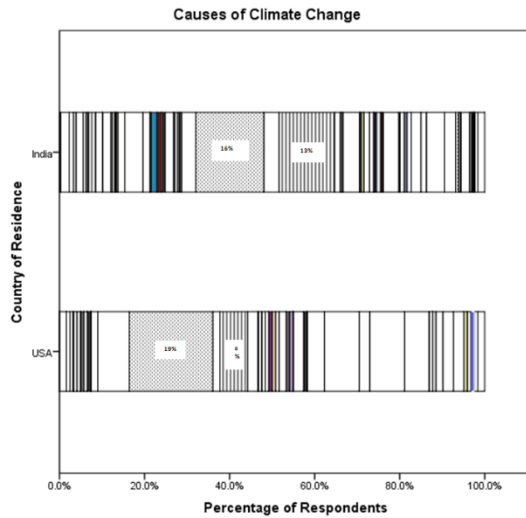
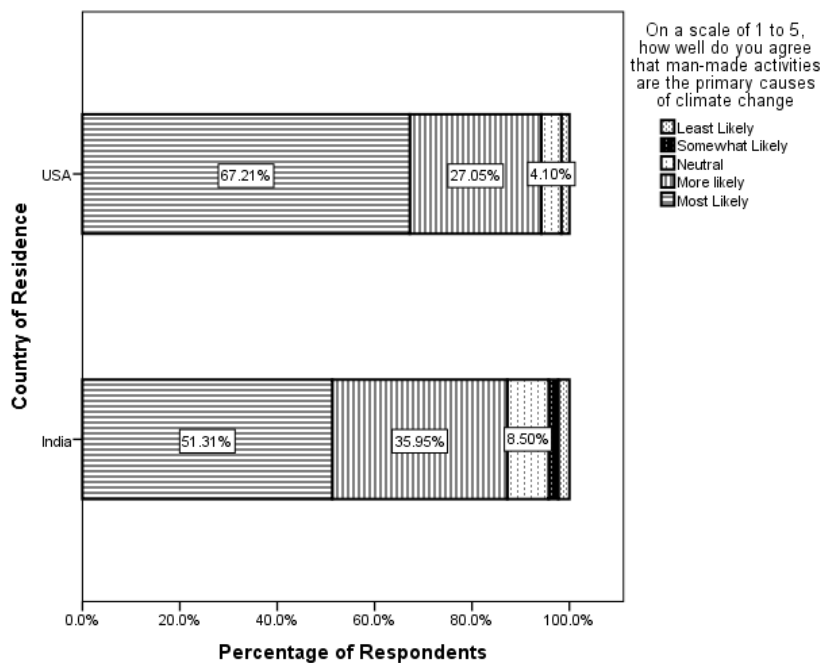
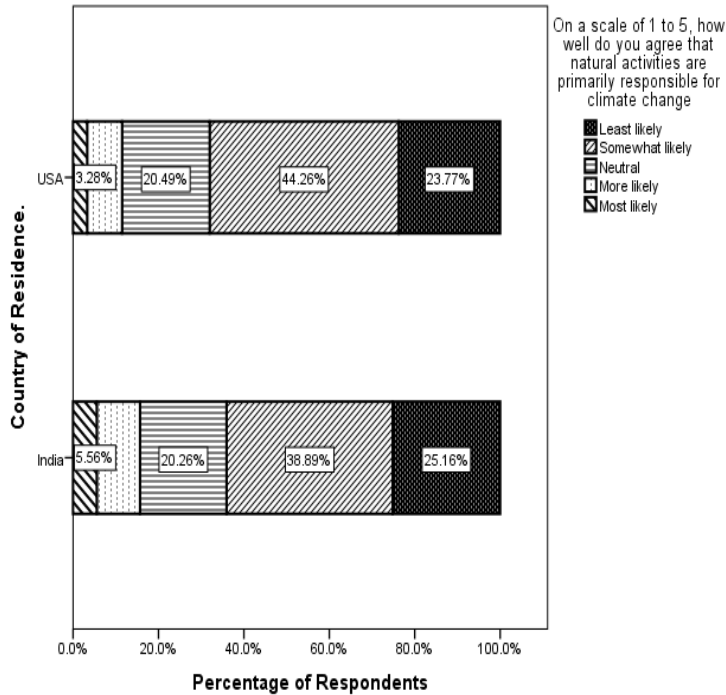


Figure 7: Causes of climate change (Dotted lines represent the percentage of respondents who have collectively chosen ‘Increase in population, extensive use of fossil fuel, Rapid Deforestation, Industrialization, Global Warming, High standard of living, Modernization’ options)





Government's Role in Climate Change Action

Results show that the awareness regarding the Paris Climate Agreement is more in the USA (78.69%) than India (66.67%) (Figure 10). Majority of the respondents from both the countries (USA: 72.13%, India: 62.42%) are not satisfied with the steps taken by the Government/ CBOs/ NGOs/ Think tanks in tackling climate change. However, almost an equal proportion of the respondents in both the countries are unaware about it (USA: 20.49%, India: 21.24%) (Figure 11). Majority of the respondents believed that the government can help promote clean and renewable energy (82.9%), promote public awareness campaigns on climate change (77.3%), formulate policies and guidelines for necessary action (75.7%) and assign roles and responsibilities to the several departments (71%). The respondents from both the states want their respective governments to majorly focus on clean and renewable energy (USA: 30.33%, India: 27.78%) as one of the main measures in combating climate change.

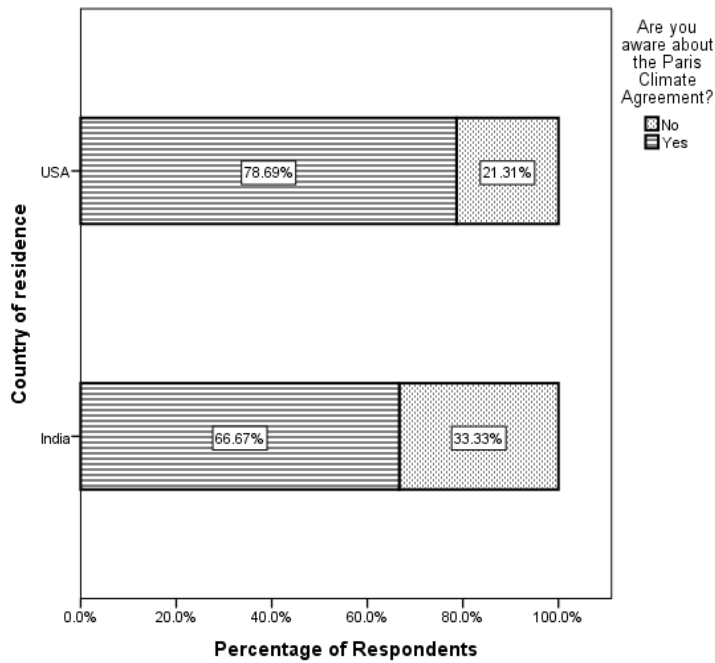


Figure 10:

Awareness regarding Paris Climate Agreement in the USA and India

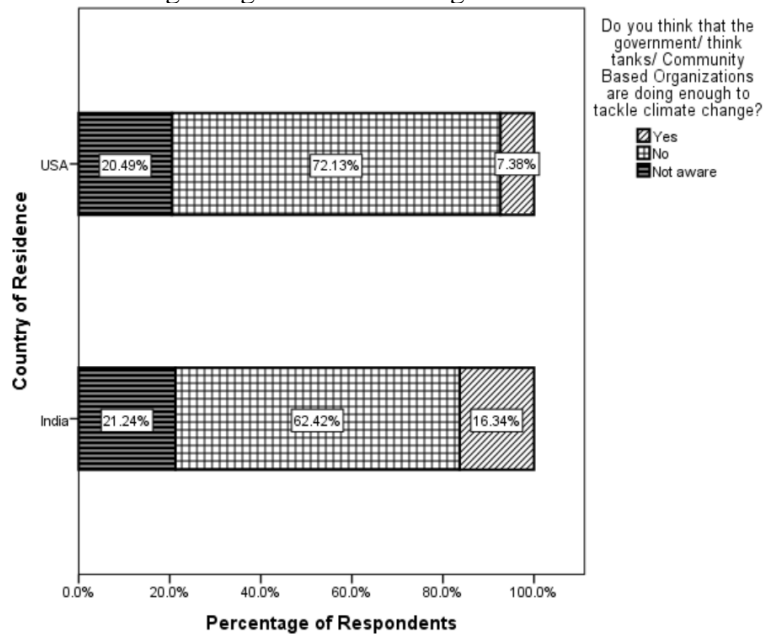


Figure 11: Government's/ Think tanks/ CBOs role in combatting climate change in the USA and India

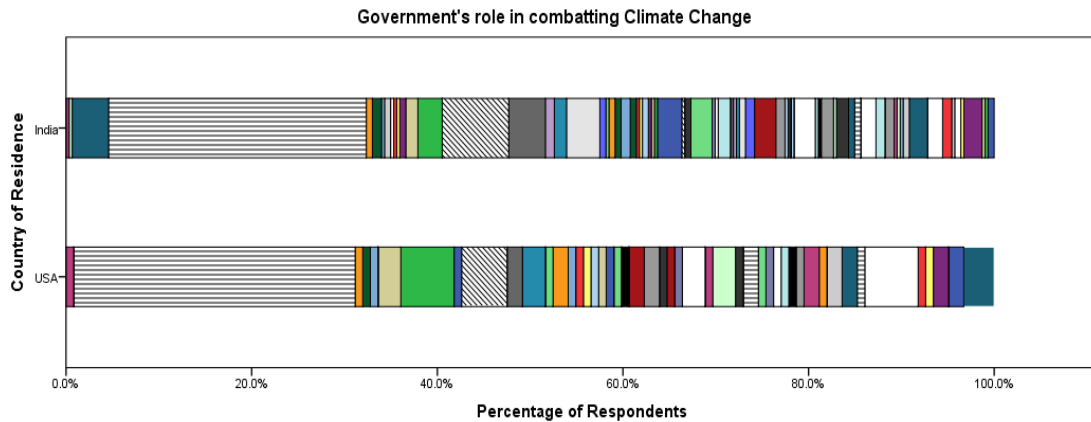


Figure 12: Role of the Government in combatting Climate Change in the USA and India (The lines represent the option 'Promoting clean and renewable energy')

Conclusion

In this study, we found that there is not a huge gap in perceived differences among the residents in India and the USA. In India, though a very minor proportion (2.4%) is still unaware about climate change, hence there is a need to spread awareness in this regard. Independent variables like 'Class of society' and 'regularly following the climate change information' had a significant influence on the dependent variable 'awareness regarding climate change'. Regular follow-ups of Climate change information have also significantly impacted the concern level of the respondents towards climate change. Determinants like country of residence, age, type of locality, ethnicity, gender and the level of education, were not of major concern. This indicates that climate change is being experienced by all the segments of the society. More respondents in the USA cited 'Climate Change' as one of the major problems however, in India it was less due to other burgeoning issues like population growth, poverty and unemployment.

Not much difference in the perceived causes and impacts of climate change has been recorded between India and the USA. Majority of the respondents from both the countries attribute anthropogenic interventions as the primary cause of climate change. The need of the hour is to take necessary steps in promoting 'Nature based solutions. Awareness regarding international treaties on climate change like the Paris Climate Agreement is more in the USA than India. A major proportion of the respondents in both the countries are not satisfied with the steps taken by the concerned authorities in combating climate change. However, the majority propose that the government has a significant role to play in promoting clean and renewable energy. In India, apart from this, the major focus is also on 'adaptation' and 'mitigation' plans. Hence, to deal with such a pressing concern of climate change, a more focused and dedicated effort is needed in this direction. The fight against climate change can only be won by the collaborative efforts of the common man, government, think tanks and the NGOs. In summary, there is a need to understand one's responsibility in tackling this issue.

References

- Capstick, S. *et al.* (2015) ‘International trends in public perceptions of climate change over the past quarter century’, *Wiley Interdisciplinary Reviews: Climate Change*, 6(1), pp. 35–61. doi: 10.1002/wcc.321.
- Chinowsky, P. *et al.* (2011) ‘Climate change: comparative impact on developing and developed countries’, *Engineering Project Organization Journal*, 1(1), pp. 67–80. doi: 10.1080/21573727.2010.549608.
- Environmental Protection Agency. (2017, January 17). Climate Change: Basic Information. EPA. https://19january2017snapshot.epa.gov/climatechange/climate-change-basic-information_.html
- Korkmaz, Mehmet. (2018). Public awareness and perceptions of climate change: Differences in concern about climate change in the west Mediterranean region of Turkey. *Applied Ecology and Environmental Research*. 16. 4039-4050. 10.15666/aer/1604_40394050.
- Lorenzoni, I., & Pidgeon, N. F. (2006). Public views on climate change: European and USA perspectives. *Climatic Change*, 77(1–2), 73–95. <https://doi.org/10.1007/s10584-006-9072-z>
- Scruggs, Lyle & Benegal, Salil. (2010). Declining Public Concern about Climate Change: Can We Blame the Great Recession?. *Global Environmental Change*. 22. 10.1016/j.gloenvcha.2012.01.002.
- Shi, J., Visschers, V. H. M., Siegrist, M. (2016): Knowledge as a driver of public perceptions about climate change reassessed. – *Nature Climate Change* 6: 759-762.
- Steentjes, Katharine & Arnold, Annika & Corner, Adam & Mays, Claire & Pidgeon, Nick & Poortinga, Wouter & Tvinnereim, Endre & Sonnberger, Marco & Böhm, Gisela & Ruddat, Michael & Poumadere, Marc & Scheer, Dirk. (2017). European Perceptions of Climate Change (EPCC): Topline findings of a survey conducted in four European countries in 2016.
- Sullivan, A. and White, D. D. (2019) ‘An assessment of public perceptions of climate change risk in three western U.S. Cities’, *Weather, Climate, and Society*, 11(2), pp. 449–463. doi: 10.1175/WCAS-D-18-0068.1.
- Yu, H., Wang, B., Zhang, YJ. *et al.* Public perception of climate change in China: results from the questionnaire survey. *Nat Hazards* 69, 459–472 (2013). <https://doi.org/10.1007/s11069-013-0711-1>