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PERCEPTION IN A CHANGING CLIMATE: A STATISTICAL ANALYSIS OF AWARENESS ACROSS INDIAN DEMOGRAPHICS

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Abstract: Climate change is one of the biggest problems of the modern age, and public perception and awareness are critically important to the development of effective mitigation policies. Climate change awareness and perception across different sections of the Indian population are analyzed in this study using a structured survey of 400 respondents. The survey assessed knowledge, personal experience, and concern regarding climate change, dividing age groups into 16–29, 30–50, and 51 years and above. The results indicate that while there is some variation in perceived effect by age groups, education level was the most statistically significant predictor of familiarity and concern, with higher education corresponding to greater awareness and knowledge of anthropogenic climate change. This study also found that the sources of information, such as media, education, and social networks, exert an effective influence on perceptions, with significant discrepancies observed across educational levels. These results underscore the significance of tailored climate communication strategies to successfully reach populations with lower educational attainment. By addressing demographic disparities in climate literacy, this research supports the development of targeted awareness programs essential for fostering public engagement and encouraging behavioral change in the context of climate adaptation and policy reform.

Keywords: climate change, awareness, education, India, statistical analysis, perception

Introduction

Climate change poses one of the most difficult challenges faced by mankind in the twenty-first century. Temperatures across the globe have risen by approximately 1.1 ˚C since 1880, with the 2010s being the warmest decade on record (Intergovernmental Panel on Climate Change [IPCC], 2021). Increasing temperature levels have raised the frequency of extreme weather events, rising sea levels, and ecosystem disruptions across the globe (Robinson et al., 2021). Public understanding and perception of anthropogenic climate change vary across regions and demographics, despite scientific consensus (Hornsey et al., 2016). which hinders climate action.

In India, climate change poses significant challenges. As home to 1.3 billion people, India acts as the third-largest emitter of global gases, occupying a pivotal position in the global climate dynamics (Dubash et al., 2018). Temperature data analysis study reveals that India has experienced an overall warming of 0.9 ˚C from 1901 to 2019, with the warming rate accelerating from 0.08 ˚C per decade during 1901–2019 to 0.18 ˚C during 1981–2019 (Kumar et al., 2023).

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Additionally, studies indicate that India is highly vulnerable to extreme weather events, like rising sea levels that threaten coastal communities (Krishnan et al., 2020). Recent research shows the severe human toll of heatwaves in India, with approximately 42,000 deaths attributed to extreme heat events between 2008–2019, averaging about 3,500 deaths annually (de Bont et al., 2024). The mortality burden varies significantly by region and demographic group, with southern India experiencing the highest number of heatwave-related deaths (19,000), and elderly populations being particularly vulnerable.

Despite these threats, studies conducted on the Indian population show varying levels of climate change awareness. Previous research indicates disparities between socioeconomic groups regarding their understanding of climate change (Leiserowitz et al., 2022). The differences in climate change perceptions among various demographics present an opportunity for research. Education has consistently been recognized as a key factor in fostering environmental awareness. However, the relationship between education and its impact on climate change perceptions among Indians has not been thoroughly explored. Understanding these variations across different demographics is necessary for creating targeted communication strategies and educational initiatives that enhances understanding of climate change.

There are significant reasons for studying and understanding climate perceptions in India due to its rapid development and population levels. Firstly, India's vulnerability to the effects of climate change necessitates an understanding of public opinion to plan policies effectively (Patnaik & Narayanan, 2015). Secondly, India's diverse socioeconomic landscape and culture provides insights into how demographic factors influence climate awareness and understanding in complex societal settings (Rao et al., 2019). Finally, findings from India can provide instructions and methodological parallels for other developing nations with complex societal branches that face similar climate challenges.

In this study, we aim to investigate and analyse climate perceptions among different demographics in India, while focusing on specific factors like age and education.
Our research aims to achieve the following objectives:

1. To identify and assess variations in climate change awareness, concern, observed climate impacts across three age cohorts (16–29, 30–50, and 51+ years) in India.
2. To analyse the relationship between educational attainment levels and climate change perceptions, including familiarity, understanding of cause, recognition of extreme weather events, and concern about future impacts.
3. To identify patterns in how people obtain knowledge about climate change (from news, social media, educational institutions, etc.) across different demographic groups.
4. To analyze public attitudes towards individual and government climate action, including reducing personal carbon footprints, supporting environmental policies, and willingness to engage in community climate initiatives.
5. To evaluate public perception on the consequences of climate change, with emphasis on which impacts (rising temperatures, extreme weather, food security, water scarcity, health impacts, etc.) are deemed most significant.

By addressing these objectives, we hope to contribute towards a more detailed understanding of climate change perceptions in India and help by providing recommendations on climate change pertaining to different demographic groups.

Literature Review

This section highlights the current scope of the literature on climate change, its perceptions, and awareness, helping to build the research questions mentioned above.

We began by first surveying global perspectives based on cross-national studies. One of the most comprehensive global efforts to understand individual willingness to act on climate change involved nearly 130,000 individuals across 125 countries. The study found that 69% were willing to contribute 1% of their income to climate action, and 89% supported greater political efforts, particularly in vulnerable nations. However, the authors observed a global state of pluralistic ignorance, where people underestimate the willingness of others to act a major challenge to a unified climate response (Andre et al., 2024). Complementing this, the 2024 Ipsos report, which surveyed respondents from 32 countries, reinforced the fact that vulnerable nations show growing concerns, while it also highlighted a notable decline in belief in individual action since 2021. It also stressed the growing cost skepticism associated with renewable transitioning that has been increasing in Europe. Respondents in the LATAM region showed demands for greater governmental action (Ipsos, 2024). Focusing on Europe, a previous study analyzing survey data revealed that climate awareness and denial are shaped by distinct factors, awareness aligning with education and values, whereas denial stems from detachment and certain worldview orientations (Fraembs & Drobnič, 2024). A Climate Perceptions Index was created to systematically measure global attitudes toward climate change, based on data from over 100,000 users in 107 countries. It shows that lower awareness levels lead to a stronger motivation for action due to perceived climate risks, while higher awareness may reduce the urgency to respond as climate threats become normalized (Htitich et al., 2024).

Moving on to research conducted in India, a comprehensive study examining climate change awareness, beliefs, and behavior among 2,178 Indian adults (18+) revealed that large majorities were concerned about environmental hazards affecting their local areas (71%–87%, such as floods and agricultural pests). Notably, 85% of participants reported personally experiencing the effects of global warming (Leiserowitz et al., 2022). Studies conducted among farming communities in rural India consistently revealed that despite farmers being aware of changing weather patterns like a warming climate, and the impacts of floods and cyclones, their overall awareness of climate change remained low despite being amongst the most affected (Datta et al., 2022; Kumar & Saxena, 2024; Raghuvanshi et al., 2017; Shelar et al., 2023). According to studies conducted in forest-heavy regions of India like Andhra Pradesh, Chhattisgarh, and Karnataka, projections made using the climate model of the Hadley Centre indicate that 62%, 73%, and 67% of forest grids are expected to transform (Chaturvedi et al., 2011).

Another less-discussed aspect of climate change research is the gap between awareness and action. A study of residents in Gurugram found that while many are aware of climate change, they often lack the understanding, resources, and motivation to address its impacts (Manchanda, 2024).

In addition to regional disparities, age has been consistently identified as a key dimension affecting climate change. A study based on UK national surveys from 2020 to 2022 recognized that while generational differences in climate-related beliefs have narrowed, emotional responses remain considerably higher among the youth population (Poortinga et al., 2023). Despite the narrowing of differences, older populations are often framed to be both vulnerable to climate impacts and disengaged from mitigation approaches (Ayalon & Roy, 2023). However, a recent Korean study using cross-sectional data

from 15,512 adults as part of the Korea Social Survey found that while younger generations were more aware of climate change, older adults were more likely to conserve water and electricity. Recycling behavior showed no age difference overall, though younger adults recycled more at low awareness levels, and older adults did so at high awareness levels (Shin & Kim, 2023).

In the Indian context, studies show mixed results regarding age and climate perception. Older Bhil individuals perceived lower climate risks (Kumar & Mohanasundari, 2025), while younger participants showed higher environmental concern (George et al., 2024). Another study found no significant age effects, with education and values emerging as stronger predictors (Iyer & Alphonsa, 2024).

Moving on to education, prior literature has identified educational attainment as a central factor contributing to disparities in climate change beliefs and attitudes (Morin-Chassé & Lachapelle, 2020; Poortinga et al., 2019; Weckroth & Ala-Mantila, 2022). Recent studies have further explored this divide. A study of the Dutch population found that lower subjective social status among less-educated citizens played a key role in shaping skepticism and distrust in climate science (Hoekstra et al., 2024). In India, research has highlighted significant challenges in climate education. One key issue is the limited integration of climate change topics beyond the science curriculum, with educational efforts often confined to secondary-level science classes (Jones et al., 2022). Another study found that while students generally recognize and express concern about climate change, there is a disconnect between environmental education (EE) and climate change education (CCE) in schools (Goel et al., 2023). Additionally, teachers face difficulties in addressing the uncertainties inherent in climate science while maintaining their belief in anthropogenic climate change. Their efforts are influenced by personal beliefs, limited resources, and the challenge of balancing scientific accuracy with the need to promote climate action (Puttick et al., 2024).

Existing literature shows that demographic factors like age and education strongly influence climate change perceptions in India. Despite increasing awareness, gaps remain in understanding causes, impacts, and translating knowledge into action. This highlights the need for context-specific research to explore how different groups perceive, learn about, and respond to climate change.

Methodology

A. Research Design

We conducted this quantitative cross-sectional survey to determine climate change perceptions across various demographic groups in India. We used the survey method to gather standardized data in an organized format from the sample population to allow statistical analysis of perception trends by age and educational levels.

B. Survey Instrument

A 17-item structured questionnaire was created to measure public awareness and perceptions of climate change among the target population, organized using four conceptual domains to secure comprehensive coverage of important variables. Domain 1 focused on demographic characteristics, such as age group, and baseline familiarity with climate change terminology, utilizing a 5-point Likert scale. Domain 2 assessed participants' knowledge of climate effects and causes with six questions, such as identifying

recent shifts in climate patterns, extreme weather events, and causal processes, using both 5-point Likert scales and categorical scales. Domain 3 examined information sources and media exposure habits, employing two items: one identified primary information sources through a multiple-selection format, while the other measured the frequency of coverage of climate change in mainstream media through a 5-point scale. Domain 4 measured attitudes, beliefs, and intentions to behave on climate action and policy in eight items, capturing concern levels, perceived efficacy of individual action, personal behavior change, judgments of government performance, policy support preferences, projected future consequences, and community involvement willingness, primarily with 5-point Likert scales. The questionnaire employed a mixed response format to optimize data quality and analytical potential, with Likert-type scales (ranging from 1= "Not at all" to 5 = "Extremely") used for attitudinal and perceptual measures, and binary (Yes/No/Not sure) and categorical response options incorporated for factual awareness items. All categorical responses were then assigned numerical codes to enable quantitative analysis without losing the hierarchical nature of ordinal scales, whereas nominal variables received proper numerical values for statistical handling.

C. Sample and Sampling Strategy

The study targeted Indian residents aged 16 years and older. To gather participants, three non-probability sampling techniques were used, which included convenience sampling, snowball sampling, and voluntary sampling. Both digital platforms and social media, along with traditional methods, were utilized to reach a target sample size of 400 respondents over three months.

Participants were classified into three age groups: 16–29 years for young adults, 30–50 years for middle-aged adults, and 51 years and above for older adults. Moreover, the educational status and occupation of participants were noted to allow analysis of the results based on various educational levels and types of employment.

D. Data Collection

Data was collected using Google Forms to facilitate wider reach and efficient data management. We initially pilot-tested the questionnaire before disseminating it via several digital media such as social media platforms, emails, and messaging apps. The survey lasted three months, starting from August 2024 until November 2024, collecting responses anonymously to maintain participant confidentiality. Informed consent was gained from participants, and participation was purely voluntary.

E. Data Analysis

We conducted rigorous descriptive and inferential statistical analysis to explore climate change awareness, perceptions, and attitudes among demographic groups. Descriptive statistics gave an overview of response patterns in terms of measures of central tendency (mean, median) and dispersion (standard deviation) for Likert-scale items and frequency distributions for categorical variables.

Several non-parametric tests were used to test variable relationships. Chi-square tests of independence ($\chi^2 = \Sigma(O - E)^2/E$) were used to identify statistically significant associations between categorical variables, such as climate change awareness and age group. If applicable, the strength and direction of these associations were further tested using Spearman's rank correlation (ρ)

for monotonic association, Kendall's Tau (τ) for tied ranks, and Cramer's V for nominal variables. We assessed group differences in concern levels, familiarity scores, and climate policy support using ANOVA. Post hoc tests (Tukey's HSD, Bonferroni correction) identified specific group differences when significant effects were detected. Binary logistic regression determined the most influential predictors of high climate change familiarity and concern.

Our study employed Exploratory Factor Analysis (EFA) to uncover latent data patterns after removing highly correlated variables ($r > 0.95$). Factor retention was informed by the Kaiser criterion (eigenvalues > 1) with Varimax rotation to enhance interpretability. All analyses were done in Python with pandas, scikit-learn, scipy, statsmodels, and other packages, with statistical significance set at $p < 0.05$.

F. Ethical Considerations

This study followed ethical research principles, including voluntary participation, informed consent, and data confidentiality. No personally identifiable information was collected, ensuring all responses remained anonymous.

Results and Discussion

Our study revealed various insights, offering an understanding of how Indians perceive climate change across different demographics.

The questions used assessed individuals' awareness of and perceived impact from climate change-related events across 400 respondents. Familiarity with the term "climate change" was met with 36–52% responses for "very" or more familiarity. Similarly, 54–78% of people observed changes in climate patterns over the last 3 years at a "Significant" or higher level. The perception of extreme weather events (e.g., heatwaves, floods) increasing in recent times was extremely high, with 88% saying they noticed extreme weather events, which was very similar to the response to the belief that recent heatwaves and floods are linked to climate change, as 81.3% responded with "Yes". Despite this, the responses to the question of awareness of human lives lost due to climate change were surprisingly low, with only 33–47% indicating being very aware or above.

Based on this breakdown, we can infer that while most people are aware of natural catastrophes and climate hazards affecting them directly, many remain uninformed about the underlying causes. For instance, over 80% of respondents were aware of recent extreme events being linked to climate change, yet only 36% to 52% demonstrated familiarity with the term "climate change" itself. This pattern is consistent with findings from other research studies, where individuals frequently recognize the impact of disasters but lack awareness of the contributing phenomena. A notable example is from studies involving farmers (Datta et al., 2022; Shelar et al., 2023) where they experienced significant impacts from floods and cyclones yet demonstrated limited understanding of climate change as the driving factor.

A. Education and Climate Change Awareness

Statistical analyses revealed a significant association between education level and familiarity with climate change ($\chi^2 = 64.36$, df = 20, $p < 0.001$). As shown in *Figure 1*, familiarity levels varied across education categories rather than being evenly distributed, with notable contrasts between high school and

higher education groups.

A one-way ANOVA further indicated significant differences in concern across education groups ($F = 8.10$, $p < 0.001$).

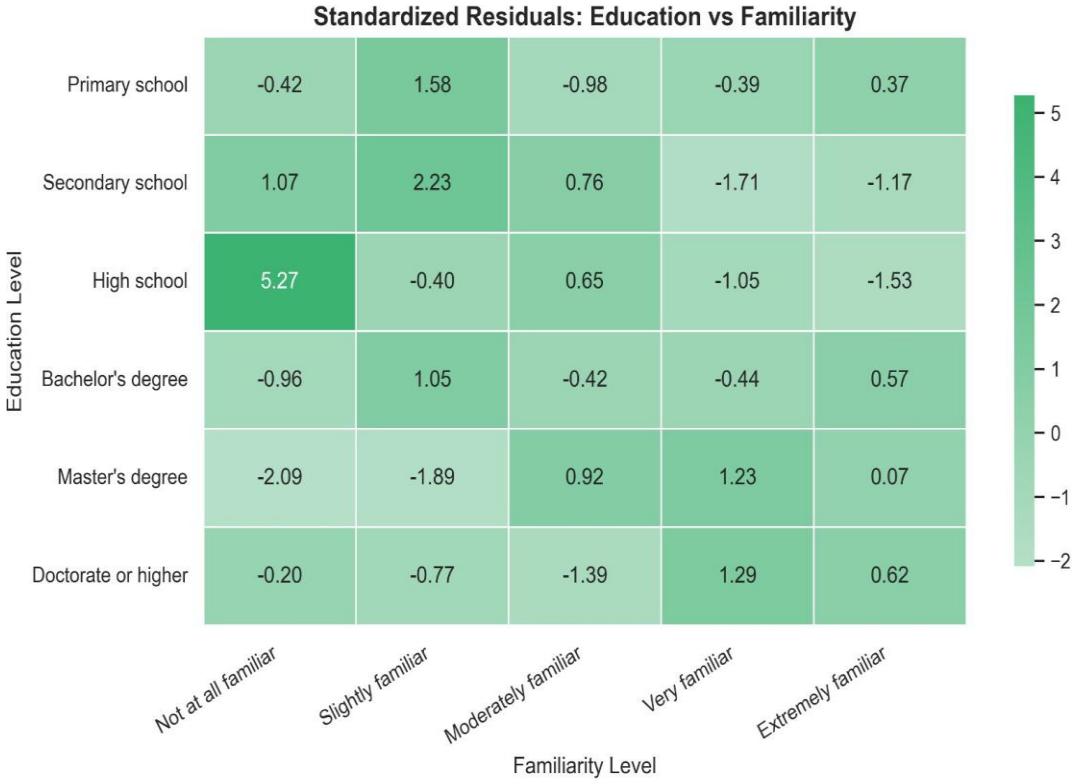

Figure 1: Association between education level and familiarity with climate change.

Table 1: Descriptive Statistics and Tukey HSD pairwise comparisons of concern Levels by Education

Education	n	Mean	SD
Bachelor's degree	223	3.76	1.27
Doctorate or higher	27	4.15	1.32
High school	41	3.10	1.59
Master's degree	97	4.09	1.11
Primary school	4	2.00	2.16
Secondary school	8	2.13	1.25
Significant Tukey HSD comparisons			
Group 1	Group 2	Mean Diff	*p*adj
Bachelor's	High school	-0.66	0.031
Bachelor's	Secondary school	-1.63	0.006
Doctorate	High school	-1.05	0.013
Doctorate	Primary school	-2.15	0.023
Doctorate	Secondary school	-2.02	0.001
High school	Master's degree	1.00	0.001
Master's	Primary school	-2.09	0.018
Master's	Secondary school	-1.97	0.001

Post-hoc Tukey tests, summarized in *Table I*, showed that respondents with postgraduate education (Master's or Doctorate) reported significantly higher concern compared to those with lower levels (Primary, Secondary, or High school).

In contrast, nonparametric correlations (Spearman's $\rho = -0.009$, Kendall's $\tau = -0.009$; both $p > 0.80$) revealed no significant monotonic trend, suggesting that familiarity does not increase linearly with education.

Taken together, these findings suggest that education is an important factor in shaping climate change awareness. Higher education groups consistently express greater concern and somewhat greater familiarity, though the effect is categorical rather than strictly linear.

B. Info Sources of Individuals Based on Education Levels

Statistical analyses revealed a strong association between education level and the primary sources of climate change information ($\chi^2 = 79.83$, df = 25, $p < 0.001$; see Fig. 2). Individuals with higher levels of education (Bachelor's, Master's, or Doctorate) were far more likely to obtain information from formal and authoritative channels, such as scientific publications, educational institutions, and government sources. In contrast, respondents with lower levels of education (Primary, Secondary, or High school) reported a stronger reliance on social media and interpersonal networks, such as friends

and family.

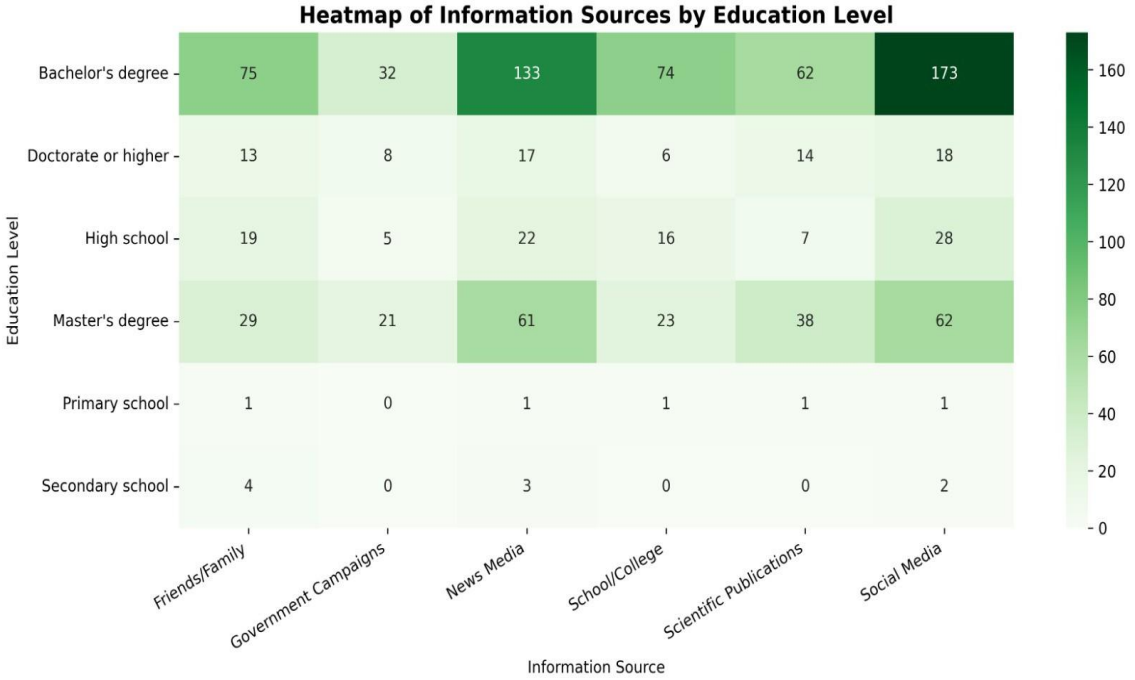

Figure 2: Association between education levels and respective information sources.

Pairwise post-hoc tests confirmed that these differences were especially pronounced between university-educated groups and those with Secondary or Primary school education (e.g., Bachelor's vs Secondary, adjusted $p < 0.001$; Master's vs Secondary, adjusted $p = 0.004$). By contrast, Doctorate holders did not differ significantly from Master's degree holders ($p > 0.79$), suggesting that the divergence lies primarily between higher education and lower schooling rather than within postgraduate levels. Taken together, these results highlight that education not only shapes familiarity and concern but also influences the credibility of the information sources on which individuals rely.

C. Support for Climate Change Policies Across Education Levels

A meaningful shift in climate outcomes requires broad public support for climate-friendly policies, restrictions on pollution, and large-scale adoption of renewable resources. To assess this, respondents rated their willingness to support climate policies on a 5-point scale (1 = Not at all willing, 5 = Extremely willing).

We conducted a one-way ANOVA, which revealed significant differences in policy support across education levels (F (4, 191) = 6.128, $p < 0.001$). Given this, Tukey's HSD test was conducted to identify specific group differences. Postgraduate education (Master's or Doctorate) was associated with significantly higher support for climate policies compared to lower levels of education (Primary, Secondary, or High school). School graduates, in particular, reported lower support relative to Bachelor's (mean diff = –0.68, $p = 0.002$), Master's (mean diff = –0.96, $p < 0.001$), and Doctorate holders (mean diff = –0.99, $p = 0.002$).

As shown in Fig. 3, median support levels increased with higher education, with postgraduate respondents

showing both stronger and more consistent support. There could be several reasons for the observed differences in policy support based on education level. Individuals with higher education (Bachelor's, Master's, Doctorate) may have greater exposure to economic and environmental issues, a better understanding of policy implications, and are more likely to be in professions that align with or benefit from climate-related policies. In contrast, individuals with lower levels of education (High School, Secondary, Primary) may lack access to similar information or opportunities for policy engagement.

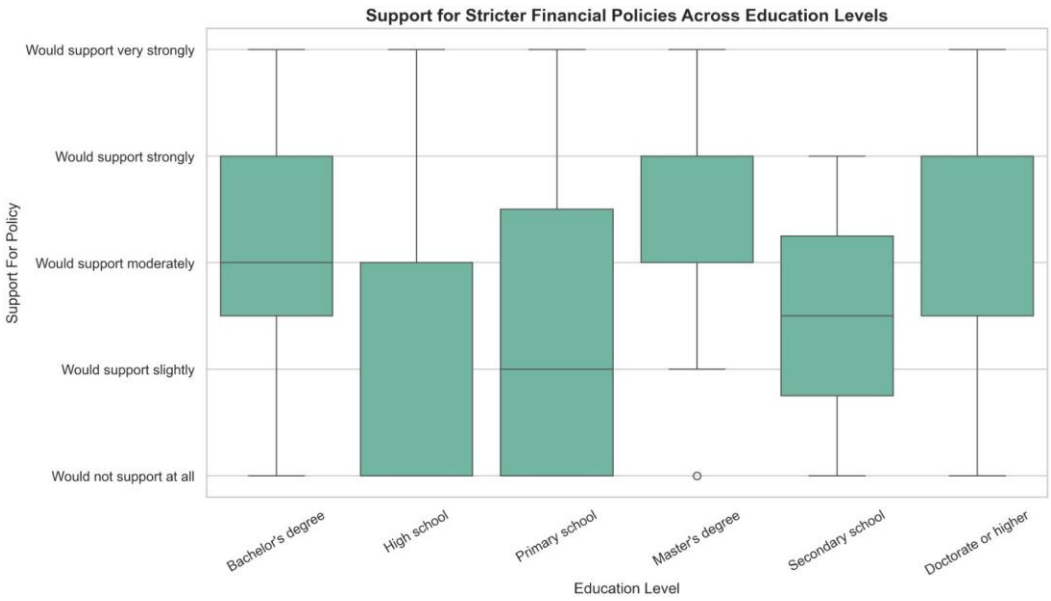

Figure 3: Distribution of climate policy support across education levels.

D. Perception of Individual Impact by Education Level

Actions are shaped by perception. When individuals believe their actions make little difference in addressing climate change, they are less motivated to act. To explore this, respondents were asked to rate the perceived impact of individual actions on a 1–5 scale, where *1 = No Difference at All* and *5 = Very Significant Difference.*

A one-way ANOVA revealed significant differences in perception across education levels ($F = 6.41$, $p < 0.001$). Post-hoc Tukey HSD tests identified that respondents with higher education consistently reported greater belief in the power of individual actions. In particular:

- Bachelor's degree vs. Primary school ($p = 0.0124$) → Bachelor's graduates rated individual impact significantly higher.
- Doctorate vs. Primary school ($p = 0.0043$) → PhD holders expressed a markedly stronger belief in individual impact.
- Master's degree vs. Primary school ($p = 0.0020$) →Master's graduates perceived substantially greater impact.
- Master's degree vs. Secondary school ($p = 0.0476$) → A notable difference also emerged here.
- Master's degree vs. High school ($p = 0.0043$) → Master's graduates rated impact much higher.

Mean scores further highlight the divide: respondents with only primary education reported the lowest perception of impact ($M \approx 1.5$), whereas those with postgraduate degrees (Master's, Doctorate) scored the highest ($M \approx 3.7$).

Figure 4 illustrates these differences, showing a clear upward trend in perceived individual impact with increasing education level.

In summary, education level strongly shapes perceptions of individual agency in mitigating climate change. Individuals with higher education demonstrate greater confidence in the meaningfulness of their actions, while those with limited formal education tend to underestimate their potential contribution. This suggests that enhancing climate literacy may be crucial for empowering broader participation in climate action.

E. Statistical Analysis of Age and Its Impacts on Climate Perceptions

To determine if age influences familiarity and awareness of the climate, we conducted a chi-square test for age group and familiarity. The result yielded a statistically insignificant result, with the *p*-value being more than 0.05, meaning that the age groups do not influence familiarity.

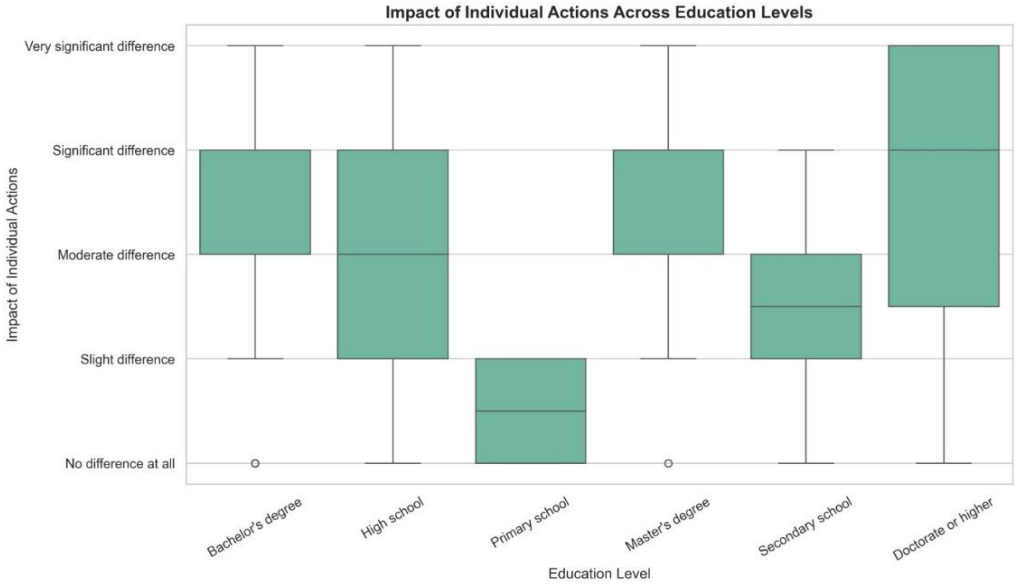

Figure 4: Perceived impact of individual actions on climate change by education level. Boxplots show that higher education is associated with stronger belief in the significance of individual contributions.

We then contrasted the concern level and the age group relationship. The mean concern level for all the age groups was fairly similar, with the 51+ age group registering a mean concern rating of 3.35 compared to 4.17 in the rest of the age groups. To further test the concern and age group relationship, we conducted a one-way ANOVA test, with the *p*-value being 0.0000, meaning the presence of significant differences within age groups. To analyze these differences, we used Tukey's HSD test, which confirmed the ANOVA test, with a mean difference of −0.8253 for the 51+ group and the 30–50 group (*p*-value =

0.0000). The difference was also present when contrasting the means within the 51+ group and that of the 16– 29 group, with a difference of −0.3868 (p-value = 0.0411), as shown in Table II.

Table 2: Concern Level by Age Group: One way ANOVA and Tukey HSD result

Age Group Comparison	Mean Diff.	p-value	Significance
51+ vs 30–50	−0.8253	0.0000	Yes
51+ vs 16–29	−0.3868	0.0411	Yes
16–29 vs 30–50	0.4384	0.0165	Yes

The major findings confirm that the 30–50 age group possesses significantly higher concern levels than both the 16– 29 and 51+ groups, and the 51+ group has considerably lower levels of concern than the two younger groups.

F. Future Impact Perceptions by Age

We also examined the effect of age group on people's perceptions of future impacts of climate change, on a 5-point scale of "No impact" to "Severe impact." One-way ANOVA revealed there was a significant age group difference ($F = 9.34$, $p < 0.001$). Post-hoc Tukey's HSD tests showed that the participants aged 51 and above reported significantly lower future impact perceptions than the two younger age groups: 16–29 (mean difference = −0.478, $p = 0.0003$) and 30–50 (mean difference = −0.5085, $p = 0.0007$, as illustrated in Table III). There was no significant difference between the two younger groups ($p = 0.965$).

Table 3: Future impact Perception by group: One Way ANOVA and Turkey HSD results

Age Group Comparison	Mean Diff.	p-value	Significance
51+ vs 30–50	−0.5085	0.0007	Yes
51+ vs 16–29	−0.4780	0.0003	Yes
16–29 vs 30–50	−0.0305	0.9650	No

Table 4: Eigenvalues and Variance Explained Factors

Factor	Eigenvalue	Variance (%)
Climate Concern & Action	5.37	19.6
Familiarity & Understanding	1.34	9.8
Extreme Weather Awareness	1.19	4.7
Media & Government Response	1.12	4.1
Personal Climate Actions	1.06	3.4

These findings imply that older participants report significantly fewer future impact perceptions than younger age groups.

G. Other Results

Factor analysis yielded five unique factors underlying climate change attitudes, and Climate Concern & Action was the most significant factor, accounting for 19.6% of the variance (see Table IV). The factor strongly loaded on action willingness (0.735), perception of future impact (0.709), and policy support (0.614), which shows that concern and knowledge translate into behavioral intentions. The four other factors, Familiarity & Understanding (9.8%), Extreme Weather Awareness (4.7%), Media & Government Response (4.1%), and Personal Climate Actions (3.4%), together accounted for another 21.9% of the variance, indicating the multidimensionality of climate beliefs.

Chi-square analysis revealed a significant correlation between awareness of loss of life and action willingness ($\chi^2 = 146.90$, $p < 0.001$, Cramer's $V = 0.303$), reflecting a moderate relationship in which larger awareness is linked to larger action willingness, as shown in Figure 5. Likewise, personal climate actions were strongly related to favoring tighter financial policies ($\chi^2 = 36.56$, $p < 0.001$), with Spearman's ($\rho = 0.175$, $p < 0.001$) and Kendall's ($\tau = 0.151$, $p < 0.001$) correlations affirming positive associations between personal commitment and policy support.

Correlation analysis between familiarity with climate change and perception of future impact on all measures was moderate and positive: Pearson ($r = 0.337$), Spearman ($\rho = 0.287$), and Kendall ($\tau = 0.246$), all significant at $p < 0.001$ (Fig. 6). Cross-tabulation also verified that higher familiarity levels consistently indicated higher future climate impacts and that lower familiarity levels had more mixed and lower impact appraisals.

Conclusion

Our research provides an in-depth analysis of India's demographic subgroups' response to climate change, clarifying

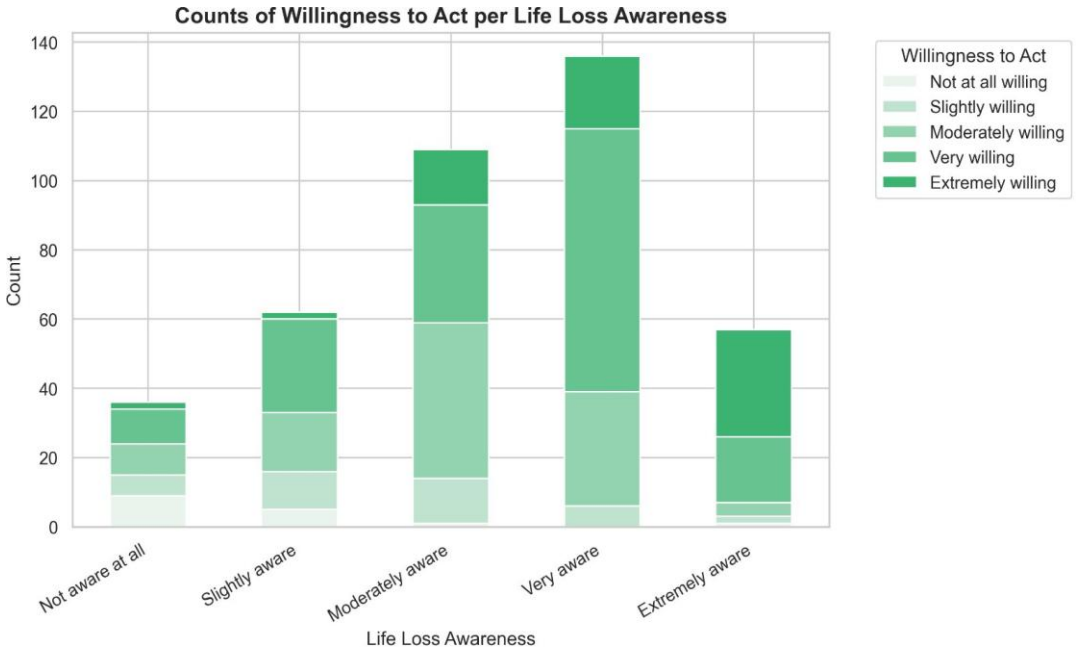

Figure 5: Relationship between awareness of loss of life and willingness to take action

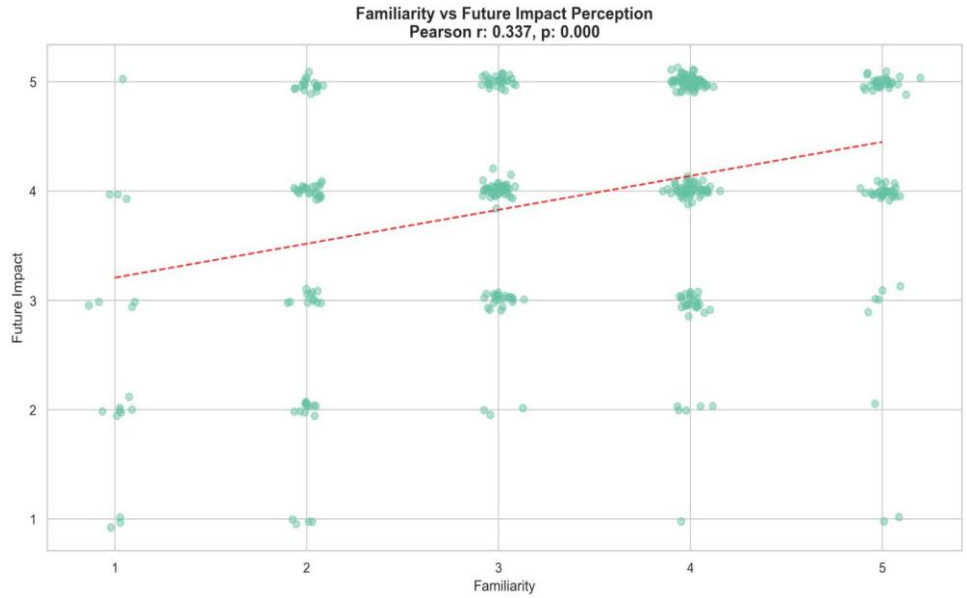

Figure 6: Scatter plot showing correlation between familiarity with climate change and perceived future impact. Pearson ($r = 0.337$), Spearman ($\rho = 0.287$), and Kendall ($\tau = 0.246$), all $p < 0.001$.

Patterns of significance to theory, practice, and policy. With 400 respondents, we identify that education is the strongest predictor of awareness, concern, and endorsement of climate policy, outperforming age in predictive power.

Respondents with bachelor's, master's, and doctoral degrees indicated much higher concern with the climate and stronger support for mitigation policy, and they were more certain they could make a difference. Meanwhile, respondents with only a schooling education indicated lower concern and weaker behavioral intentions, and this speaks to the necessity of closing educational gaps in climate literacy.

Age differences, while less marked, are also nuanced in trend. The 30–50 age group reported the greatest concern, and those 51+ reported lower perceptions of future climate effects and urgency. This intergenerational contrast implies that climate messaging needs to be designed not just for educational levels but for the various age-based frames of risk and responsibility.

Our factor analysis supports this result. The Climate Concern & Action factor, explaining 19.6% of the variance, captures the interrelated character of familiarity, concern, and willingness to act. The strong correlations we find between familiarity with climate and expected future impact, and between knowledge of impact and willingness to act, capture different channels through which education can promote effective action. These results have immediate implications for India's climate messaging campaigns. Literacy campaigns need to be constructed so that they can speak to less educated groups in familiar, culturally appropriate terms. In the meantime, age-group specific message adaptation—e.g., highlighting inter-generational responsibility for the environment among older adults or future danger for youth can increase age-group responsiveness. Most of all, the proven connection between awareness and action ensures that education spending and outreach can yield returns in real climate action.

Future Work

Our results indicate a number of areas for future study. Longitudinal studies need to track the trajectory of climate attitudes over time especially in reaction to educational campaigns and mounting climate disruptions. These studies will confirm the replicability of our present results and guide adaptive policy responses.

This research also needs to be extended to India's varied regions. Rural-urban comparative studies can establish how information exposure and climate influence perceptions. Mixed-methods studies can further explore how learning experiences influence climate knowledge and trust to understand the education gap better.

Lastly, intervention studies are required. Experimentation of specially created communication strategies in age and educational strata will ascertain the optimal means of translating awareness into long-term behavioral change.

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