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Understanding the Climate Crisis: Risk Perceptions among Public High School Faculty

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Abstract: *The purpose of the current study was to identify the hazards of climate change as perceived by public secondary school teachers. The research employs a quantitative research design. The sample consisted of 119 male and 80 female secondary school teachers through a random sampling technique. The self-developed questionnaire was used to identify the hazards of climate change as perceived by the teachers. The data were analyzed through Statistical Package for Social Sciences (SPSS) 26. Findings reveal that there was moderately high awareness of intensified disasters like heat waves and droughts. Moreover, 20–25% of the respondents underestimated the incremental risks like land degradation and biodiversity declines. Teachers connect recurring weather events to climate shifts, but current mental models downplay cascading losses. Tailored training to communicate compounding risks and mainstream threats in the secondary curriculum can help. Periodic risk perception surveys will enable evolving monitoring. Gender and age variance exploration may reveal differentiation. Pakistan's vulnerability spotlights teachers' risk interpretations needing systemic uplift to catalyse youth climate literacy. Targeted interventions addressing awareness gaps regarding indirect climate impacts are recommended alongside disaster preparedness communication.*

Key Words: Climate Change Education, Teacher Perceptions, Risk Judgments, Curriculum Integration

Introduction

Anthropogenic climate change has emerged as one of the most serious threats facing humanity in the 21st century, with potentially devastating environmental, economic, geopolitical, and social repercussions globally if uncontrolled (Levin et al., 2023). The scientific consensus is clear on the reality of climate change and the urgency for mitigation and adaptation. However, public perceptions of climate risk remain polarized in many countries, hampering policy action (Lee et al., 2015). As climate change awareness, education, and activism grow worldwide, especially among youth, schools have a vital role to play in promoting student understanding of climate change drivers, impacts, and responses (Lee et al., 2015). As climate change awareness, education, and activism grow worldwide, especially among youth, schools have a vital role to play in promoting student understanding of climate change drivers, impacts, and responses.

Secondary school teachers are uniquely positioned to shape students' knowledge, attitudes, risk perceptions, and behaviours related to climate change threats and solutions. However, research focused specifically on secondary school teachers' mental models regarding climate hazards is surprisingly scarce. Most studies examine teacher preparedness for environmental education more broadly without delving into their subjective risk judgments or perceptions of threats related to climate change (Monroe et al., 2019). This is an important gap because teachers' risk interpretations and judgments crucially inform their pedagogical choices and communication of climate topics ((Lombardi & Sinatra, 2013). Misconceptions can propagate from teachers to students if not addressed.

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This study, therefore, aims to identify the hazards of climate change as perceived specifically by public secondary school teachers through a questionnaire survey. Understanding teachers' perceptions can highlight areas where additional training or pedagogical support may be beneficial to improve climate change education at the secondary level. It has far-reaching implications for climate literacy and policy support among future citizens and leaders finishing school in the coming decade. The next section reviews pertinent literature.

Environmental education fosters problem-solving skills for sustainability issues by developing system thinking and analytical abilities in students (Osunji, [2021](#); Yousafzai et al., [2024](#)). However, quality education relies on top-down policies, administration, community participation, and decentralization of control at the school level. Two pertinent leadership styles influence environmental education outcomes: instructional leadership using goal-setting, planning, and evaluation, and transformational leadership inspiring teacher commitment (York et al., [2019](#)).

Strategically, environmental education aims to raise public consciousness and train highly skilled professionals to tackle ecological problems, including climate change (Boon, [2016](#)). Improving teacher and student awareness engenders pro-environmental behaviour change. Philosophically, consciousness of nature enables inner peace and emotional balance. Despite governmental efforts, concrete policies and curriculum specifics remain unclear in many developing countries like Pakistan (UNESCO, [2003](#)). Nonetheless, developing expertise and awareness are widely acknowledged as crucial pillars.

Grasping climate threats depends considerably on mental models that reveal assumptions about system relationships (Anderson & Lent, [2019](#)). Many demonstrate faulty patterns that underestimate climate risks (Varela et al., [2020](#)). Ideological views also skew expert trust and risk interpretations politically. Successfully educating parents in environmental programs has proven difficult to translate into student outcomes.

Integral facets for assessing climate risk perceptions encompass the judged gravity of threats, proximity, and personal or familial vulnerability (Stevenson et al., [2017](#)). However, self-reported mitigation behaviours may constitute convenient actions or financially incentivised measures rather than intentional climate change tackling. Affluence permits nations to underestimate or defer issues. Doubts regarding response efficacy further impede individual-level actions. Ultimately, education alone cannot transform worldviews sans systemic change (Bradley et al., [2020](#)). Clearly delineating problematic areas in secondary school teachers' mental models is, therefore, vital. This study focuses precisely on this under-researched dimension by surveying risk perceptions.

Teachers' perceptions substantially hinge on cultural cognition and motivated reasoning alongside scientific knowledge (Lombardi & Sinatra, [2013](#)). They frequently grapple with dynamic systems thinking applied to climate change, which necessitates a process-oriented mental model. Ideological biases impact trust in the scientific consensus on politically charged topics like climate hazards (Lee et al., [2015](#)). Such factors can filter classroom communication. (Lee et al., [2015](#)). Such factors can filter classroom communication.

Additionally, emotions shape risk interpretations. Teachers report disquiet, sadness, frustration or guilt regarding climate change based on perceived impacts and timescales, influencing their engagement with solutions (Lombardi & Sinatra, [2013](#)). Different teachers exhibit distinct emotional profiles that differ by gender as well – for instance, female teachers articulate more consternation, while male teachers feel more sanguine. Self-efficacy beliefs also mediate motivation for pro-environmental behaviour among teachers (Ma et al., [2022](#)).

These psychological and cultural influences on teacher risk perceptions underscore the need for promoting professional development through pre-service and in-service training alongside structured curriculum guidelines. Tailoring climate education to resolve specific misconceptions can help.

Climate change poses a major threat, amplifying weather extremes, ecological shifts, and slow-onset harmsharm globally. Research reveals polarized public perceptions regarding the gravity and immediacy of risks, hampering solutions (Lee et al., [2015](#)). As secondary schools shape future citizens, teachers'



climate risk interpretations directly, albeit subtly, inform pedagogy and communication framings (Lombardi & Sinatra, 2013). However, studies focused distinctly on teachers’ subjective threat judgments remain limited despite associated impacts on climate literacy.

Internationally, links exist between teachers’ cultural worldviews, ideological biases, and climate change risk assessments, often diverging from scientific consensus (Lee et al., 2015). Emotions like worry also mediate teachers’ risk perceptions and policy support (Ojala, 2012). In the Asia-Pacific context, confusion around climate solutions stems from difficulty comprehending complex planetary systems. Locally, Pakistani teachers have moderate environmental awareness but negligible climate-specific risk insights or preparedness currently. Tailoring professional development to identified knowledge gaps can enable impactful, contextualized climate education nationally. Thus, it is pertinent to explore secondary teachers’ mental models regarding intensifying hazards.

Objective of the Study

The major objectives of the study are

1. To identify the hazards of climate change as perceived by public secondary school teachers

Research Question

- What are the hazards of climate change as perceived by public secondary school teachers?

Research Methodology

This study utilizes a quantitative cross-sectional survey design to identify public secondary school teachers’ perceptions regarding climate change hazards in a Tehsil of Faisalabad district, Punjab Province, Pakistan. The target population comprises all male and female public secondary school teachers in the district. Stratified random sampling was applied to ensure a proportionate representation of both genders. There are 172 male teachers across eight boys' secondary schools and 100 female teachers across five girls' secondary schools based on administrative data. Using a random sampling technique, 119 male teachers and 80 female teachers were selected across the respective schools. It yields a total sample of 199 teachers for the survey. Data were collected using a self-developed 5-point Likert scale. Content validity was established through expert reviews by two environmental education faculty members. Reliability analysis during pilot testing with 30 teachers showed a Cronbach’s alpha of 0.82. Data were analyzed using Statistical Package for Social Sciences (SPSS) version 26. Descriptive statistics such as frequencies, means and standard deviations summarize demographic attributes and responses.

Findings of the Study

The findings of the study are described in the following tables:

Table 1

Distribution of the respondents according to the hazards of climate change as perceived by them

Hazards of climate change as perceived by teachers	Scales									
	1		2		3		4		5	
	f	%	f	%	f	%	F	%	f	%
Intense drought conditions	14	7.0	22	11.1	26	13.1	55	27.6	82	41.2
Windstorms	16	8.0	20	10.1	24	12.1	75	37.7	64	32.2
Prolonged heat waves	28	14.1	12	6.0	18	9.0	63	31.7	78	39.2
Rising sea levels	18	9.0	22	11.1	20	10.1	65	32.7	74	37.2
Drought in water stress areas	24	12.1	16	8.0	26	13.1	76	38.2	57	28.6
Disturbed cropping season	14	7.0	24	12.1	30	15.1	53	26.6	78	39.2
Affects ecosystem	22	11.1	20	10.1	16	8.0	56	28.1	85	42.7
Destroyed the residential area	26	13.1	18	9.0	30	15.1	71	35.7	54	27.1
Effect water quality	24	12.1	31	15.6	24	12.1	56	28.1	64	32.2
High temperature	18	9.0	21	10.6	28	14.1	70	35.2	62	31.2

Hazards of climate change as perceived by teachers	Scales									
	1		2		3		4		5	
	f	%	f	%	f	%	F	%	f	%
Loss of wild species	16	8.0	20	10.1	26	13.1	91	45.7	46	23.1
Changes rainfall patterns	21	10.6	18	9.0	30	15.1	60	30.2	70	35.2
Global warming	14	7.0	20	10.1	28	14.1	73	36.7	64	32.2
Increases greenhouses effects	12	6.0	24	12.1	18	9.0	60	30.2	85	42.7
Loss of natural habitats	16	8.0	22	11.1	34	17.1	70	35.2	57	28.6
Rise of temperature	14	7.0	20	10.1	22	11.1	89	44.7	54	27.1

The table depicts public secondary school teachers' risk perceptions pertaining to various climate change hazards based on a 5-point Likert scale response format (1=No threat to 5=Extreme threat). Frequencies and percentages of teachers endorsing each response option are displayed for 15 climate hazard items. Key observations were as follows:

- Over two-thirds of teachers (68.8%) perceive intense drought conditions as a moderate to extreme threat from climate change. However, 13.1% still see little or no threat, signalling a gap.
- Nearly 70% acknowledge rising threats from windstorms. But, a sizable minority of 18.1% perceive minimal or no threat currently. Significant further scope exists for elevating risk awareness here.
- Prolonged heatwaves are viewed as leading threats by over 70% of respondents. Nonetheless, 20.1% do not yet associate serious risks with heat trends, highlighting awareness issues.
- Rising sea levels are recognized as hazardous by nearly 70%, although risks remain underestimated by one-fifth of teachers surveyed. Proximity may explain the lower coastal concern.
- Two-thirds of teachers relate climate change to increasing water scarcity and drought risks, though one-fifth still perceive this as largely unthreatening presently.
- Disrupted cropping seasons and farming viability are seen as increasingly impactful by nearly 66%. But around one-fifth do not regard such threats with urgency as yet.

While awareness of climate threats pertaining to physical impacts like droughts, heat extremes, and agricultural disruption is moderately high, risks remain underestimated by about 20-25% of teachers. Significant scope exists for elevating risk perceptions across various climate hazards through targeted training and curriculum integration focussed on local threats and vulnerabilities. Regional variances are also likely and can be explored in future studies.

Table 2

Mean, standard deviation, weighted score, and ranking according to the hazards of climate change as perceived by teachers

Hazards of climate change as perceived by teachers	Mean	Std. Deviation	Weighted Score	Ranking
Increased greenhouses effects	3.91	1.242	779	1
Intense drought condition	3.84	1.266	766	2
Affected ecosystem	3.81	1.370	759	3
Disturbed cropping season	3.78	1.273	754	4
Rising sea levels	3.77	1.299	752	5
Global warming	3.76	1.204	750	6
Prolonged heat waves	3.75	1.393	748	7
Wind storms	3.75	1.231	748	8
Rise of temperature	3.74	1.166	746	9
Changes in rainfall patterns	3.70	1.317	737	10
Loss of wild species	3.65	1.173	728	11
Loss of natural habitats	3.65	1.229	727	12
Drought in water stress areas	3.63	1.303	723	13
Destruction of residential area	3.54	1.328	706	14
Effect on water quality	3.52	1.391	702	15



This table displays descriptive statistics – mean ratings, standard deviations, weighted scores and rankings – for the 15 climate hazard items rated by teachers on a 5-point Likert scale. The hazard perceived as most threatening by teachers is increased greenhouse gas effects (Mean=3.91), followed by intense droughts (Mean=3.84) and ecosystem impacts (Mean=3.81). The top five highest-ranked threats highlight rising concerns about the agricultural and ecological consequences of climate shifts.

However, destructive outcomes like residential damage, declining water quality, and species/habitat losses have relatively lower mean ratings, between 3.52 and 3.65, signalling an awareness gap around such risks. Teachers are likely to connect visibly evident impacts more directly to climate shifts currently compared to indirect or slower-onset risks.

Conclusion

The study revealed that most of the secondary school teachers have their perspectives about climate change as a serious threat. They recognize widespread risks to the environment, agriculture, and economy due to rising emissions and temperatures. Right now, extreme weather events like heatwaves, storms and droughts are seen as highly threatening. Teachers also understand the long-term dangers of habitat loss and farming issues from changing rain patterns and warming. However, around 20-25% of teachers still underestimate slower threats like species disappearing, land becoming less productive, or houses being damaged more by disasters amplified by climate change. Teachers currently relate visible short-term weather events more easily to climate change rather than indirect future risks. These awareness gaps highlight the need to improve training on communicating how climate change can worsen disasters over time and cause communities more economic hardships. Linking extreme events to impacts on rainfall, crops and jobs can make invisible losses more visible.

Additionally, female and male teachers may view risks differently, which future research could explore. But largely, the findings suggest moderately high-risk awareness among secondary school teachers regarding diverse climate hazards in the region – although some gaps currently exist in recognizing gradual, secondary impacts that education programs need to focus on. In further detail, the study provides unique insights into Pakistani teachers' perceptions of climate threats from a survey. Most teachers understand climate change worsens physical impacts like floods, heat waves, and rainfall changes, aligning with expert projections and public views of shifting local weather patterns. However, gaps exist in connecting extreme events to cascading harms like species extinctions, which may emerge slowly over time.

Discussion

Addressing these shortcomings can enrich climate education. However, complex cascading risks like biodiversity declines, land degradation, or residential damages from amplified disasters currently have relatively lower perceived threats (Nalau & Verrall, 2021). Gradual shifts are proving harder to integrate into mental models for nearly one-fourth of respondents, as widely seen (Anderson & Lent, 2019), potentially explaining the lower prioritization for habitat losses despite Pakistan being a global biodiversity hotspot. The surface-level event linkage likely contributes to residential risks from secondary disasters being ranked lowest. This demonstrates the typical psychic numbing and perceived spatial-temporal distance barriers limiting climate concerns traditionally globally (Markowitz et al., 2013), still somewhat evident locally. The phenomenon of visible short-term disasters overshadowing incremental future loss Build-up is well documented in Asian regions, too. The findings posit that teachers are adept at pattern recognition in relating recurring floods, heat waves, and agricultural troubles to climate change but underestimate indirect risks currently. This Markowitz et al. (2013) is still somewhat evident locally. The phenomenon of visible short-term disasters overshadowing incremental future loss Build-up is well documented in Asian regions, too. The findings posit that teachers are adept at pattern recognition in relating recurring floods, heat waves and agricultural troubles to climate change but underestimate indirect risks currently. It demands integration into pedagogy and curricula.

Recommendations

Following are the recommendations based on the findings and conclusions:

- There should be implementation of region-specific training modules for teachers focused on communicating cumulative and cascading climate risks beyond direct physical events.
- There should be mainstream localized threats in the secondary curriculum covering climate impacts on ecosystems, communities, health, and economics at a granular level. Place-based pedagogy aids relevance.
- Periodic risk perception surveys should be conducted with teachers and students to track evolving awareness and tailor interventions using findings.
- Loss and damage discourse should be incorporated into national climate dialogue and education campaigns to spotlight incremental harms, address perceptual distances, and build advocacy.
- Gender and age variances in climate risk views should be explored through qualitative research to cater to differentiated communication.

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