

Exploring the Role of Education (Formal and Informal Learning) in Shaping Climate Change and Disaster Awareness in Sarawal Rural Municipality, Nepal

Pitambar Aryal*

PhD Scholar

Department of Social Science

DR. K.N. Modi University, Rajasthan India

<https://orcid.org/0009-0007-6338-8726>

pitambar.aryal@gmail.com

Meenu Gangal, PhD

Research Supervisor

Department of Social Science

DR. K.N. Modi University, Rajasthan, India

meenu.bed@dknmu.org

Tej Bahadur Karki, PhD

Research Co-Supervisor

Nepal Philosophical Research Center (NPRC), Kathmandu, Nepal

<https://orcid.org/0000-0001-5059-3519>

drtej.karki@gmail.com

Types of Research: Original Research

Corresponding Author*

Received: January 13, 2025

Revised & Accepted: March 13, 2025

Copyright: Author(s), (2025)



This work is licensed under a [Creative Commons Attribution-Non Commercial 4.0 International License](https://creativecommons.org/licenses/by-nc/4.0/).

Abstract

Over the past two decades, environmental temperatures have risen significantly, directly influencing climate change. Climate change (CC) and climate-induced disasters have extreme impacts on human beings and their occupations. In Nepal, the frequency of weather-related extreme events has doubled in the last two decades. Although Nepal contributes a negligible amount of greenhouse gases compared to industrialized nations, its people face severe challenges from climate change and its associated disasters. Vulnerable people are

disproportionally affected by climate change. Nepal has been losing a high percentage of GDP due to flood, landslides and other types of disasters. Education has a crucial role in developing individuals' understanding of climate change, its impacts, and the significance of preparedness, risk reduction, and timely response measures.

The southern region of Nepal is particularly vulnerable to climate-sensitive hazards such as floods, fires, droughts, heatwaves, and vector-borne diseases. Sarawal Rural Municipality in Nawalparasi West has been repeatedly affected by disasters like floods, fires, and droughts. Acknowledging these challenges, this study investigates the perceptions of 428 households of ward no 5, 6 and 7 with diverse educational backgrounds about climate change and its impacts. The analysis is based on their responses to eight key assertions, ranked via a five-point Likert scales.

Findings reveal a sound association between education level and understanding of climate change and climate-induced disasters. Interestingly, both literate and illiterate respondents acknowledged these impacts, likely due to firsthand experiences, as most of the respondents are farmers. The respondent cohorts included individuals with no education at all (illiterate) and no formal education (literate), those with primary-level education, and those with high school education or above. Notably, illiterate individuals—primarily engaged in agriculture—expressed higher agreement either strongly agree or agree on the effects of climate shift and disasters compared to respondents having higher educational backgrounds. Therefore, when designing and implementing climate change and disaster-related interventions, it is essential to consider education levels, real-life exposure, and lived experiences.

Keywords: Climate Change, Climate Induced Disasters, Vulnerability, Flood, Education.

Introduction

The global society has been witnessing rapid rise in earth temperature (McMichael & Boulter, 2007). According to the Climate Risk Index, from 1993 to 2022, floods, storms, heat waves, and droughts were among the most significant weather-related extreme events occurring globally. Over 9,400 extreme weather events have resulted in more than 765,000 fatalities worldwide and economic losses totalling \$4.2 trillion (Adil, Eckstein, Kunzel, & Schafer, 2025). Human activities primarily greenhouse gases attributable to global warming. Annual GHG emission from 2010 to 2019 was higher than any previous decade. 79% GHG emission comes from energy, industry, transport and building, and remaining 22% from agriculture, forest and land use. The susceptible groups who have contributed smallest amount to climate change (CC) are disproportionately affected by climate change and associated disasters (IPCC, 2023). Nepal has been losing a high proportion of GDP (Gross Domestic Product) due to flood, landslides and other forms of disasters (Aryal, 2023). The study on disaster risk reduction local knowledge in Nepal underscores that loss of lives and properties are attributable to lack of knowledge on risk reduction, preparedness and response measures including ineffective governance and lack of coordination among stakeholders. The study further highlights that

initiatives taken in the field of disaster risk reduction are not adequate to address prevailing disaster vulnerabilities in Nepal (Tuladhar, Yatabe, Dahal, & Bhandary, 2015).

Vulnerability of an individual depends on his/her age, sex, education and location as well as various other factors. Empowerment and building human resource capacity of society through formal education plays a critical role in vulnerability diminution (Muttarak & Lutz, 2014). Societal exposure and vulnerability determine the impact of disasters (Cardona, et al., 2018). The task of education in attending the impacts of climate change has been well recognized though existing capacity of education around risk mitigation and adaptation may require mainstream development thinking (ADPC, 2008). Educational response to climate change to be integrated relatively to boarder excellence reforms as education could be an important vehicle to clarify as well as demystify around environmental education and sustainable education, this study underscores that developing countries are dependent on climate sensitive economies and they are disproportionately exaggerated by the climate change and associated disasters therefore climate change to be a key priority for international development agenda (Bangay & Blum, 2009).

Nepal is susceptible to climate variability and change and southern parts of country are prone to flood risks and in vulnerability ranking Nawalparasi holds position of average risks ranking (MoE, 2010). Climate exposure and risk review indicated that climate change may aggravate extreme climate events mainly precipitation and temperature, this will lead to flood, heat wave, cold wave, heavy rainfall. Mostly Terai districts expected to have high intensity extreme events (MoFE, 2021). 968 people lost their lives and 3639 left injured due to disasters occurred during 2017 and 2018; a total of 6.84 billion Nepali rupees was lost (MoHA, 2019). There was massive landslides and floods from 26-28 September 2024, that claimed 224 lives, left 158 injuries and 24 missing; over 700 houses damaged and over 500 partially damaged, 11 hydro power, 6 irrigation project were damaged (NDRRMA, 2024). Mountainous topography, ecological and climatic transitions and over dependent on natural resources aggravating Nepal's vulnerabilities to climate change and climate induced disasters (Aryal, Gangal, & Karki, 2025). Due to resource and technological constraints, Nepal lacks adjustment capability to deal with confronts posed by climate generated ecological changes. National Adaptation Plan of Action (NAP) prioritize 64 programs to address climate change risks and vulnerabilities, consisting of 10 main thematic areas in which national capacity building, research and awareness raising is one of the key areas (MoFE, 2021).

There has been changes in rainfall pattern in all ecological regions of Nepal (Malla, 2008). Flash flood or flood inundation is major problem in southern parts of country, 80 percent rainfall occurs for four months (from July to September) period where people residing in those areas experienced flood (Shrestha, 2000). Disasters caused by climate alteration such as flood, mudslides, heavy rain, hailstorm, heat wave, cold wave and vector caused illnesses becoming common and frequent. Community perceives that climate change has negative impact in agriculture (Devkota & Lal, 2017). The study on indigenous knowledge on addressing climate change underscores that rainfall pattern has been changing such as sometime heavy rainfall and sometime no rain, short winter and long summer season, drying out of water sources and shortage of water, the study pointed out that it has impact on agriculture (Baul & McDonald, 2015). The study underpin that non formal education played a critical role in advancing climate change related innovation and preparedness compared to control groups (Coppock, et al., 2021). Education provides access to knowledge, information and communication that helps understand threats associated with disasters and helps undertake precautionary measures. For having comprehensive disaster preparedness and risk reduction, education has a greater role (Hoffmann & Blecha, 2020).

Given high vulnerability of climate induced disasters and their impacts in terai region, the Sarawal Rural Municipality of Nawalparasi West district of Nepal was chosen to carry out this study. The Sarawal rural municipality is situated in southern plain area adjoined with India, has a total population of 42,207 in which 74.5% population is literate. The literacy rate seems good however higher education is under the 7%. The data shows that males have better educational opportunities however majority of male are aboard for seasonal job (Government of Nepal, 2021). Ward no. 5, 6 and 7 have been affected by flood inundation almost every year. During rainy season, these wards are affected by water inundation problem causing major impact on agricultural field as well as transportation, drinking water and sanitation. Considering climate induced disaster vulnerabilities, this study examines role of education in shaping the level of awareness on climate induced disasters and their impact in their communities. 428 respondents were randomly selected to carry out the household level survey in which 311 and 117 were male and female respectively. Out of total respondents, 143 respondents were illiterate, 112 literate, 115 primary level and 58 high school and above (Field Study, 2024). The study elucidates that there is a significant association with educational background and their view and knowledge about climate change impact.

Materials & Methods

This study is grounded in a post-positivist worldview and employs a quantitative research design. Following a deductive approach, it assumes a single objective reality that can be explored and measured using well-defined instruments and tools. Data were gathered using a household survey applying a questionnaire. Considering the exposure to flood hazards, three wards namely 5, 6, and 7 of Sarawal Rural Municipality in the Nawalparasi West district were

selected for the study. Using Yamane's sampling formula, $n = N / (1 + N(e)^2)$, a total of 428 households were chosen through cluster random selection, with 122 from Ward 5, 158 from Ward 6, and 148 from Ward 7 (Yamane, 1967). Among them, 117 were female and 311 were male. Educational composition of respondents was 33.4% illiterate, 26.2% literate, 26.9% primary, and 13.6% high school and above. The study examined the relationship between respondents' education levels and their knowledge of eight key variables. These variables were assessed using a set of statements rated on a four and/or five-point Likert scale, ranging from "strongly agree" to "strongly disagree." The assertions are outlined below:

- More frequent occurrences of extreme weather events (flood, landslide, drought and fire)
- Reduced biodiversity
- Increased air pollution
- Variability in rainfall (duration, intensity-heavy, partial and no rain)
- Increased health risk, morbidity and mortality
- Changes in crop yield or livestock productivity
- Changes in livelihood and economic activities
- Changes in social dynamics and relationships

Based on these assertions, null hypotheses were formulated proposing that there is no association between education and their consciousness about climate change and disasters. The study also applied a reliability test.

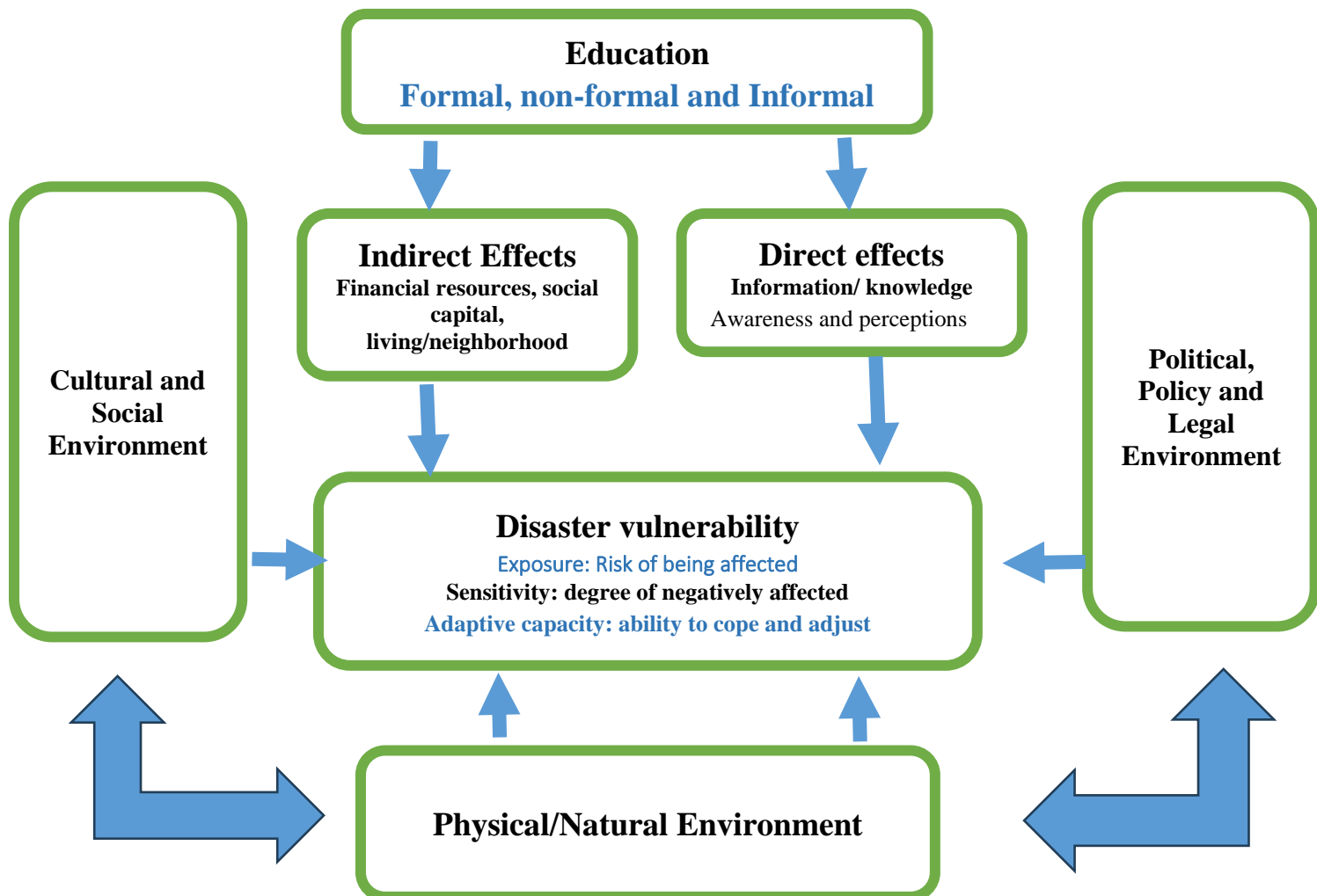
Reliability test

Reliability Statistics	
Cronbach's Alpha	N of Items
.843	8

While performing the Cronbach's Alpha test, obtaining a value of .834 signifies being reliable.

Conceptual Framework adapted from (Hoffmann & Blecha, 2020)

Education is critical in determining disaster vulnerabilities and enhancing resilience. It can be acquired through multiple pathways, including formal, non-formal, and informal means. Formal and non-formal education provide structured knowledge on risks, vulnerabilities, and coping capacities, equipping individuals with essential disaster risk reduction (DRR) skills. In contrast, informal education is shaped by social and cultural beliefs, family traditions, and lived experiences, influencing long-term behavioral adaptation.



The conceptual framework emphasizes that education is acquired through multiple pathways, each playing a central role in shaping a society's vulnerability, susceptibility, and exposure to various hazards. By fostering preparedness, risk reduction, and mitigation measures, education contributes to minimizing disaster risks. These learning pathways operate across both vertical and horizontal dimensions, enhancing access to critical information, knowledge, and skills related to disaster vulnerability while strengthening communities' adaptive capacity. However, education does not function as an independent variable; its impact is influenced by a range of interconnected factors distributed along vertical and horizontal axes. These factors include a country's resource availability, policy framework, legal environment, and physical and cultural contexts. Collectively, these elements determine the effectiveness of instruction in disaster risk reduction, ultimately contributing to the development of resilient communities (Hoffmann & Blecha, 2019).

Findings and Discussions

More frequent occurrence of extreme weather events (flood, landslide, drought, fire) *

Education qualification of respondent

Table 1: Occurrence of Extreme Weather Events

		Education qualification of respondent				Total
		Illiterate	Literate (informal education)	Primary (1-8)	High school (9-12) and above	
More frequent occurrence of extreme weather events (flood, landslide, drought, fire)	Disagree	1.4%	6.2%	3.5%		3.0%
	Neutral	5.6%	6.2%	6.1%	5.2%	5.8%
	Agree	31.5%	61.6%	53.0%	60.3%	49.1%
	Strongly agree	61.5%	25.9%	37.4%	34.5%	42.1%
Total		100.0%	100.0%	100.0%	100.0%	100.0%
Chi-Square Tests						
		Value	df	Asymp. Sig. (2-sided)		
Pearson Chi-Square		42.748	9	.000		

Data Source: Field Survey 2024

Table 1 presents that a significant proportion (49%) of respondents demonstrated agreement on the more frequent occurrence of extreme weather events whereas 42.1% strongly agree and 5.8% respondents are neutral, on the contrary, 3% of respondents are skeptical and disagree with this statement. While comparing responses with the level of education, it is surprising to note that 1.4 % illiterate, 6.2 % literate and 3.5% primary level education respondents disagree with this assertion. On the contrary, the education category of grade 9 to above didn't give any opinion on disagreement at all. 61.5 %, 25.9%, 37.4% and 34.5% of respondents comprising educational category of illiterate, literate, primary level of education and high school to higher education respectively strongly agree with the idea of frequent occurrence of extreme weather events.

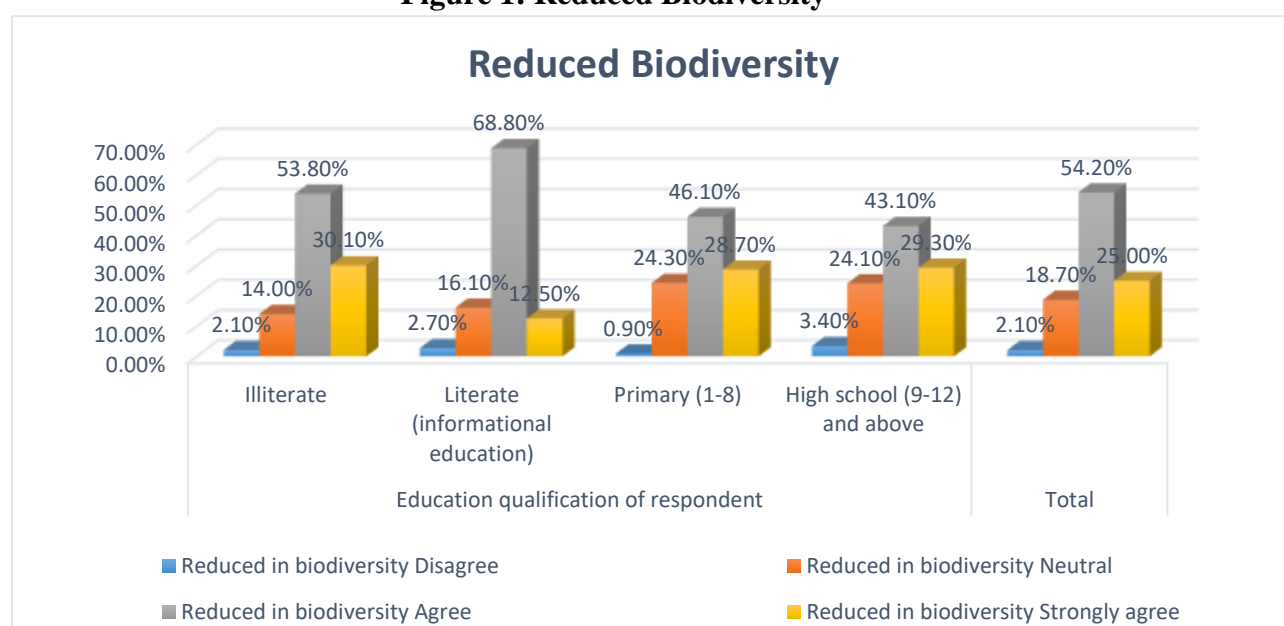
Interestingly, respondents of all educational levels (illiterate, literate, primary and 9 to above) have expressed almost same level of neutral point of view on this assertion such as 5.6%, 6.2%, 6.1 and 5.2% respectively. It could be presumed that age and exposure of respondents could be a confounding factor on level of awareness as experienced respondents may have a high level of exposure to extreme weather events compared to young age respondents.

The Chi-Square test shows ($\chi^2 = 42.748$, $p = 0.000$) that the p-value is less than 0.05 significant level, this indicates that the result is statistically significant hence the null hypothesis is rejected. The findings of p value postulate that there is an association between level of education and level of awareness/ knowledge on occurrence of weather related extreme events.

Reduced in biodiversity versus education qualification of respondent:

The study focuses on creating better understanding about people's awareness/knowledge of biodiversity as per their level of education.

Figure 1: Reduced Biodiversity



The above bar digram provides insight into how respondents with different educational qualifications perceive biodiversity loss. General trends in responses are outlined below:

While examining the responses on agree and strongly agree, most respondents across all education levels believe biodiversity have declined. The highest agreement is among those with informal education (81.3%) and illiterate respondents (83.9%). Respondents with high school education and above show slightly lower agreement (72.4%). Respondents with primary education (24.3%) and high school education (24.1%) have the highest proportion of neutral responses. On contrary, those with informal education (16.1%) and illiterate respondents (14.0%) are less neutral. When it comes to disagreement (Disagree and Strongly Disagree), very few respondents disagree, indicating that most perceive biodiversity loss as an issue. The highest disagreement is among high school graduates (3.4%). This also gives the impression that illiterate and literate cohort of study are farmers, and they have experienced climate change and disasters and their association with biodiversity loss.

The Pearson Chi-Square value is ($\chi^2=23.123$), with 9 degrees of freedom and a p-value of 0.006. Since $p < 0.05$ thus it postulates there is a statistically significant association between

educational qualification and perception of biodiversity loss. This suggests that education level influences how people perceive biodiversity changes.

Higher education levels have more neutral or disagreeing responses, indicating greater scepticism or a more nuanced understanding of biodiversity loss. Lower education levels show stronger agreement, which could suggest: a more direct reliance on biodiversity (e.g., agriculture, forest resources). Less exposure to conflicting information or scientific debates.

The findings have policy implications as environmental awareness programs should be tailored to different educational groups. Higher education curricula could incorporate more field-based evidence on biodiversity loss. Community-based education for lower education groups can strengthen their existing awareness.

Air pollution has increased

Table 2: Increased Air Pollution

		Education qualification of respondent				Total
		Illiterate	Literate (informational education)	Primary (1-8)	High school (9-12) and above	
Air pollution has increased	Strongly disagree	0.7%	0.9%	0.9%		0.7%
	Disagree	7.0%	7.1%	10.4%		7.0%
	Neutral	9.8%	27.7%	18.3%	10.3%	16.8%
	Agree	37.8%	51.8%	45.2%	51.7%	45.3%
	Strongly agree	44.8%	12.5%	25.2%	37.9%	30.1%
Total		100.0%	100.0%	100.0%	100.0%	100.0%
Chi-Square Tests						
		Value	df	Asymp. Sig. (2-sided)		
Pearson Chi-Square		47.294	12	.000		

Data Source: Field Survey 2024

The research question tries to examine the assertion on perception about increased air pollution as per their level of education which has been divided into four different categories. General trend of findings reveals that the perception about air pollution has increased is generally strong among respondents across all education levels. Most of respondents agree (45.3%) or strongly agree (30.1%) that air pollution has increased. A smaller proportion of respondents are neutral (16.8%), while disagreement (7.0% disagree, 0.7% strongly disagree) is relatively low.

When it comes to the influence of education level on their awareness level about increased air pollution, the Illiterate respondents showed the highest percentage on strongly agree (44.8%), indicating strong concern about air pollution. Literate (informal education): Shows the lowest proportion of strong agreement (12.5%), with a relatively higher proportion in the neutral category (27.7%). Primary (1-8) level respondents have shown higher agreement (45.2%) but also a noticeable neutral response (18.3%). Response of high school (9-12) and above on agreement remains high (51.7%), with strong agreement at 37.9%.

Reviewing the statistically significant level, the Pearson Chi-Square Test result ($\chi^2 = 47.294$) with degrees of freedom (df) = 12 and the p-value = 0.000 ($p < 0.05$). The significant p-value indicates that education level has a statistically significant impact on people's perception of increased air pollution. This means that respondents with different educational backgrounds perceive air pollution differently, rather than the variations being due to random chance.

Higher educational attainment correlates with higher agreement levels regarding increased air pollution. Illiterate respondents show strong agreement, likely due to direct exposure and lived experiences rather than formal education. The neutral response is highest among those with informal education (27.7%), possibly due to less access to scientific explanations or less awareness of air pollution trends. Policymakers should focus on environmental education programs, particularly targeting semi-educated and informal education groups, to enhance awareness and action.

Variability in rainfall (duration, intensity-heavy, partial, and no rain) * Education qualification of respondent

Table 3: Variation in Rainfall (Duration, Intensity, Partial and no rain)

		Education qualification of respondent				Total
		Illiterate	Literate (informational education)	Primary (1-8)	High school (9- 12) and above	
Variability in rainfall (duration, intensity- heavy, partial, and no rain)	Strongly disagree	1.4%		0.9%		0.7%
	Disagree	2.8%	4.5%	1.7%	1.7%	2.8%
	Neutral	4.9%	16.1%	8.7%	8.6%	9.3%
	Agree	26.6%	59.8%	53.0%	56.9%	46.5%
	Strongly Agree	64.3%	19.6%	35.7%	32.8%	40.7%
Total		100.0%	100.0%	100.0%	100.0%	100.0%
Chi-Square Tests						
		Value	df	Asymp. Sig. (2-sided)		
Pearson Chi-Square		64.955 ^a	12	.000		

Data Source: Field Survey 2024

Table 4 shows that a high proportion (64.3%) of illiterate respondents have expressed their strong agreement on variation in rainfall whereas only 19.6% literate support this viewpoint. 35.7% and 32.8% of respondents strongly agree from primary and high school and above category respectively about variation in rainfall pattern (heavy, partial and no rain). On the contrary, illiterate (1.4%) and primary level education (0.9%) show their strong disagreement on this statement, however literate and high school and above didn't show their disagreement on variation in rainfall pattern.

Illiterate (4.9%) and literate (16.1%) respondents have shown their neutral stance on this statement whereas almost same proportion of respondents from primary and high school and above have expressed their neutral stances. The respondents (1.7%) of primary and high school and above education level have opined their similar position on being neutral about variation on rainfall due to climate variability and change. The Pearson Chi Square test value ($\chi^2 = 64.955$) with 12 degree of freedom, the p value is $< .05$ thus the result is statistically significant. Therefore, there is an association between level of education and understanding on variability of rainfall.

Increased health vulnerability (morbidity and mortality) * Education qualification of respondent

Table 4: Increased Health Vulnerability (Morbidity and Mortality)

		Education qualification of respondent				Total
		Illiterate	Literate (Informal education)	Primary (1-8)	High school (9-12) and above	
Increased food vulnerability (morbidity and mortality)	Disagree	4.9%	8.0%	5.2%	1.7%	5.4%
	Neutral	16.1%	24.1%	31.3%	20.7%	22.9%
	Agree	55.9%	65.2%	49.6%	58.6%	57.0%
	Strongly Agree	23.1%	2.7%	13.9%	19.0%	14.7%
Total		100.0%	100.0%	100.0%	100.0%	100.0%
Chi-Square Tests						
		Value	df	Asymp. Sig. (2-sided)		
Pearson Chi-Square		30.687 ^a	9	.000		

Data Source: Field Survey 2024

The data in table 5 presents respondents' perceptions of increased health vulnerability, focusing on morbidity (illness rates) and mortality (death rates) across different educational levels. The Pearson Chi-square test is ($\chi^2 = 30.687$) and $p = 0.000$ that confirms a statistically significant relationship between education and health vulnerability, indicating that education stands influential in determining health awareness.

Proportion of 4.9%, 8.0%, 5.2% and 1.7% respondents following under the educational category of illiterate, primary and high school and above have respectively expressed their strong disagreement on increased health vulnerability due to climate change and climate induced disasters. On the contrary, 23.1%, 2.7%, 13.9% and 19.0% of respondents with educational category of illiterate, literate, primary and high school and above have respectively expressed their confidence by strongly supporting the idea of climate change and climate induced disaster causes health vulnerability. Similarly, a significant proportion of respondents 16.1%, 24.1%, 31.3% and 20.7% following to educational category of illiterate, literate, primary, high school and above respectively are unsure about climate change and disasters causing the health vulnerability by maintaining their neutral instance. Majority of respondents,

55.9%, 65.2%, 49.6% and 58.6% respectively agree on the statement that climate change and disaster are causing health vulnerability. From the data, we can conclude that most of respondents believe that climate change and disaster causing morbidity and mortality of people.

Changes in crop yield or livestock productivity * Education qualification of respondent

Table 5: Changes in Crop Yield or Livestock Productivity

		Education qualification of respondent				Total
		Illiterat	Literate (informational education)	Primary (1-8)	High school (9- 12) and above	
Changes in crop yield or livestock productivity	Strongly disagree	0.7%	0.9%	0.9%		0.7%
	Disagree	6.3%	4.5%	7.8%	8.6%	6.5%
	Neutral	21.0%	29.5%	22.6%	22.4%	23.8%
	Agree	46.2%	57.1%	57.4%	55.2%	53.3%
	Strongly agree	25.9%	8.0%	11.3%	13.8%	15.7%
Total		100.0%	100.0%	100.0%	100.0%	100.0%
Chi-Square Tests						
		Value	df	Asymp. Sig. (2-sided)		
Pearson Chi-Square		21.331	12	.046		

Data Source: Field Survey 2024

The data presents respondents' opinions on the effect of CC and disasters on changes in crop and livestock productivity, categorized by their education levels. The key points from the analysis are:

The highest percentage of respondents across all education levels either *agree* or *strongly agree* that climate change and disasters impact crop yield and livestock productivity. Agrees range from 46.2% (illiterate) to 57.4% (primary education). When it comes to strongly agree, it is highest among illiterate respondents (25.9%), but significantly lower among literate (8.0%), primary (11.3%), and high school (13.8%) respondents. A significant proportion of respondents are *neutral* (21.0% to 29.5%), with literate individuals (29.5%) showing the highest neutrality. *Disagree* and *strongly disagree* responses are minimal across all education groups.

The Pearson Chi-Square value ($\chi^2 = 21.331$, $df=12$, $p=0.046$) suggests a statistically significant relation between education level and perception of CC impact on agriculture ($p < 0.05$). This indicates that education level influences how people perceive these impacts.

The lower education groups (illiterate & primary) show stronger agreement, possibly because they directly experience climate impacts on agriculture. Literate and high school respondents show higher neutrality, which could indicate either a lack of strong opinion or greater exposure to diverse viewpoints. The strongest agreement among illiterate respondents (25.9%) suggests that firsthand experience may shape perceptions more than formal education.

Disruptions of livelihood and economic activities * Education qualification of respondent

Table 6: Disruptions of Livelihood and Economic Activities

		Education qualification of respondent				Total
		Illiterate	Literate (informational education)	Primary (1-8)	High school (9-12) and above	
Disruptions of livelihood and economic activities	Strongly disagree	2.8%		1.7%		1.4%
	Disagree	2.1%	6.2%	6.1%	5.2%	4.7%
	Neutral	15.4%	18.8%	21.7%	25.9%	19.4%
	Agree	46.2%	61.6%	50.4%	58.6%	53.0%
	Strongly agree	33.6%	13.4%	20.0%	10.3%	21.5%
Total		100.0%	100.0%	100.0%	100.0%	100.0%
Chi-Square Tests						
		Value		df	Asymp. Sig. (2-sided)	
Pearson Chi-Square		30.302		12	.003	

Data Source: Field Survey 2024

Table 7 presents how respondents from different educational backgrounds perceive the impact of CC and climate-induced disasters on livelihoods and economic activities. A large proportion of respondents either *agree* or *strongly agree* that climate change and disasters disrupt livelihoods and economic activities. Respondents' agreement on this statement ranges from 46.2% (illiterate) to 61.6% (literate). When it comes to strongly agree, highest among illiterate respondents (33.6%), but significantly lower for literate (13.4%) and high school (10.3%) respondents. Similarly, a notable portion of respondents remain *neutral* (15.4% to 25.9%), with neutrality increasing among more educated respondents. High school respondents have the highest neutral percentage (25.9%), suggesting they may have a more nuanced view or require stronger evidence to form an opinion. On the contrary, very few respondents *disagree* or *strongly disagree* that climate change disrupts livelihoods.

Illiterate respondents have the strongest agreement (33.6% strongly agree), likely due to direct experiences of climate change impacts on their daily lives. Literate respondents (informal education) and high school graduates show lower strong agreement (13.4% and 10.3%, respectively), suggesting a more cautious stance. Neutrality increases with education level, with high school respondents being the most neutral (25.9%). Disagreement is slightly higher among literate and primary-level respondents than illiterate respondents, though overall disagreement remains low.

The Pearson Chi Square Test $\chi^2=30.302$ with p value .003 lower than $<.05$ this indicates it is statistically significant thus null hypothesis is rejected. Perception on climate change and disaster impact is directly associated with their level of education. Lower education groups (illiterate & primary) are more likely to strongly agree that climate change disrupts livelihoods, likely due to firsthand experience. Higher education groups show more neutrality, possibly because they assess the issue with more information or consider multiple factors affecting livelihoods.

Changes in social dynamics and relationships * Education qualification of respondent

Table 7: Changes in Social Dynamics and Relationships

		Education qualification of respondent				Total
		Illiterate	Literate (informational education)	Primary (1-8)	High school (9- 12) and above	
Changes in social dynamics and relationships	Strongly disagree	2.1%	0.9%	1.7%		1.4%
	Disagree	9.8%	10.7%	9.6%	10.3%	10.0%
	Neutral	11.9%	52.7%	32.2%	31.0%	30.6%
	Agree	36.4%	25.9%	39.1%	46.6%	35.7%
	Strongly agree	39.9%	9.8%	17.4%	12.1%	22.2%
Total		100.0%	100.0%	100.0%	100.0%	100.0%
Chi-Square Tests						
		Value	df	Asymp. Sig. (2-sided)		
Pearson Chi-Square		73.016 ^a	12	.000		

Data Source: Field Survey 2024

This dataset examines how respondents from different educational backgrounds perceive the impact of climate change and disasters on social dynamics and relationships. The key insights are as follows:

A majority of respondents (57.9% in total) agree or strongly agree that climate change and disasters affect social dynamics. *Strongly agree* responses are highest among illiterate respondents (39.9%), suggesting that those with lower education levels perceive greater social impacts from climate change. *Agreement* is highest among high school graduates (46.6%), indicating that more educated individuals also recognize the issue but with slightly less intensity.

A very high neutrality rate among literate respondents (52.7%) stands out. Primary (32.2%) and high school (31.0%) respondents also show significant neutrality, suggesting they may have mixed views or require more evidence to form strong opinions. *Disagree & Strongly Disagree* responses are relatively low across all education levels, with total disagreement at 11.4%. This indicates that most respondents acknowledge at least some degree of climate-induced social disruption.

Illiterate respondents have the strongest agreement (39.9%), likely due to direct experience with social disruptions caused by disasters. Literate respondents (informal education) show the highest neutrality (52.7%), possibly indicating a lack of strong opinions or awareness. Primary and high school respondents lean more towards agreement, with high school respondents having the highest percentage of agreement (46.6%). More educated individuals (literate & high school) tend to be more neutral or cautious, possibly due to exposure to multiple perspectives on the issue.

The Chi-Square value (73.016, $df=12$, $p=0.000$) indicates a highly significant relationship between education level and perception of climate change's impact on social dynamics ($p < 0.05$). This means that education plays a crucial role in shaping perceptions of how climate change affects social relationships.

The above findings give a clear understanding that firsthand experience leave lasting impact on human being than formal education resultantly illiterate have made strong opinion about climate change impact. On the contrary, education influences climate perception, higher-educated individuals may require more data-driven evidence before forming strong opinions, whereas less-educated individuals rely on lived experiences. Lower-educated individuals are more likely to strongly perceive climate change as a social disruptor, possibly due to direct experiences. Higher-educated individuals are more neutral, suggesting they might weigh multiple factors before forming conclusions. Higher neutrality among educated groups suggests a need for targeted awareness campaigns linking climate science to agricultural impacts. Practical experience matters, farmers or those engaged in agriculture may have stronger opinions based on lived experiences rather than formal education. Education helps getting access to knowledge and information that facilitates in reducing vulnerabilities and reducing risk of hazards events and developing preparedness and coping capacities therefore awareness campaign among illiterate is equally important to make them understand facet of climate change and climate induced disaster dynamics.

Conclusions and recommendations:

The research findings strongly affirm that education is crucial in shaping perceptions of disaster impacts. A majority of the respondents, across all levels of education, acknowledge the link between climate change and disasters. Notably, respondents with no formal education, primarily engaged in agriculture, have a heightened awareness of climate change and its related threats. In contrast, individuals with higher levels of education tend to express either a moderate perception of CC and calamities or remain neutral on the issue. This trend suggests that both illiterate and literate farmers, due to their direct dependence on and exposure to the environment, are more acutely aware of climate-related changes than those with primary or secondary education.

In this milieu, the following key recommendations have been made:

Diverse Educational Approaches: A range of methods should be employed to impart disaster-related knowledge and skills. Emphasis should be placed on education through training

programs, exposure visits, simulation drills, and storytelling, incorporating real-time experiences to enhance learning and practical application.

Conductive policy environment: Effective policies must be developed to mitigate physical vulnerabilities to disasters. This includes implementing risk-sensitive land use planning and expanding infrastructure while ensuring comprehensive environmental impact assessments. Support systems should prioritize communities with lower education levels, as they may be more vulnerable to livelihood disruptions due to climate change.

Legal Framework: The legal framework should be further reinforced by establishing robust preparedness, risk reduction, and response mechanisms at various levels. Clear legal provisions will enhance coordination and effectiveness in disaster management.

Cross-Border Collaboration: Addressing transboundary disaster risks, such as water inundation, requires strong cross-border cooperation. As activities in one country can significantly impact another, recognizing and addressing shared vulnerabilities is essential for developing joint solutions and coordinated response strategies.

Comprehensive Disaster Risk Management: Community-based programs should prioritize strengthening social resilience, particularly among vulnerable groups. Climate-induced disasters can severely disrupt social structures, trigger migration, and exacerbate economic hardships, with the greatest impact often felt by less-educated and economically disadvantaged communities. As a result, these groups tend to have a stronger recognition of disaster risks. Thus, focus should be given on building their social, economic, physical as well as educational abilities to prepare, mitigate and adapt to disaster vulnerabilities.

Conflict of Interest: There are no conflicts of interest to declare.

Acknowledgements: We sincerely extend our heartfelt appreciation to all those who contributed their invaluable support and cooperation in conducting this research and preparing this article.

We are deeply grateful to Mr. Rajendra Agrahari, President of the Nepal Red Cross Society District Chapter, Nawalparasi West, and his dedicated team, as well as Mr. Sukhadi Prasad Chaudhari, Chairman of Sarawal Rural Municipality, along with the Chairpersons of Wards No. 5, 6, and 7, for their assistance and collaboration. My sincere appreciation goes to the Integrated Community Development Movement Nepal (ICODEMON) for providing transportation and some logistics support for undertaking the field work.

Our special thanks go to the respondents of the household survey for their time and insights. We also express our sincere gratitude to the enumerators—Mr. Shiva Raj Harijan, Mr. Pradip Yadav, and Mr. Kanhaiya Jaiswal—for their efforts in collecting survey data.

Additionally, we extend our appreciation to the Disaster Focal Person of the District Administration Office and the Personal Secretary of the Chief District Officer for providing valuable information regarding disasters in Nawalparasi.

References

- Adil, L., Eckstein, D., Kunzel, V., & Schafer, L. (2025). *Climate Risk Index 2025, Who suffers most from weather related events*. GERMANWATCH.
- ADPC. (2008). *Impact of Disaster on the Education Sector in Cambodia*. Bangkok, Thailand: Asian Disaster Preparedness Center. Retrieved from <http://www.adpc.net/>
- Aryal, P. (2023). Occurance of Disaster Events and their Impact in Nepal: Role of Government and Civil Society Organizations to Reduce the Disaster Risks. *Nepal Journal of Multidisciplinary Research*, 88-101. doi:<https://doi.org/10.3126/njmr.v6i1.54355>
- Aryal, P., Gangal, M., & Karki, T. B. (2025, February 25). Gender Perspective on Impact of Disasters: A Study of Sarawal Rural Municipality, Nawalparasi West, Nepal. *Nepal Journal of Multidisciplinary Research (NJMR)*, 8(1), 116-129. doi:<https://doi.org/10.3126/njmr.v8i1.75462>
- Bangay, C., & Blum, N. (2009). Education responses to climate change and quality: Two parts of same agenda. *International Journal of Educational Development*, 359-368. Retrieved from www.elsevier.com/locate/ijedudev
- Baul, T. K., & McDonald, M. (2015). Integration of Indigenous Knowledge in Addressing Climate Change. *Indian Journal of Traditional Knowledge*, 20-27.
- Cardona, O. D., Aalst, M. K., Birkmann, J., Fordham, M., McGregor, G., Perez, R., . . . Virgin. (2018). *Determinants of Risks: Exposure and Vulnerability; Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation: Special Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press. doi:<https://doi.org/10.1017/CBO9781139177245>
- Coppock, D. L., Pandey, N., Tulachan, S., Duwal, D., Dhungana, M., Dulal, B. P., & Davis, D. (2021). Nonformal Education Promotes innovation and climate change preparedness among isolated Nepalese farmes. *Climate and Development*. doi:<https://doi.org/10.1080/17565529.2021.1921685>
- Devkota, S., & Lal, A. C. (2017). *Local Knowledge for Addressing Climate Change Risks at Local Level: A Case Study from Nepal*. Springer, Cham. doi:https://doi.org/10.1007/978-3-319-33880-4_13
- Government of Nepal. (2021). *National Population and Housing Census*. Kathmandu: Office of the Prime Minister and Council of Ministers, Nepal Statistical Office. Retrieved from <https://censusnepal.cbs.gov.np/results/population#other>
- Hoffmann, R., & Blecha, D. (2019). Education and Disaster Vulnerability in Southeast Asia: Evidence and Policy Implications. *Sustainability*, 1-17. doi:[doi:10.3390/su12041401](https://doi.org/10.3390/su12041401)
- Hoffmann, R., & Blecha, D. (2020). Education and Disaster Vulnerability in Southeast Asia: Evidence and Policy Implications. *Sustainability*, 1-17. doi:<https://doi.org/10.3390/su12041401>
- IPCC. (2023). *Climate Change 2023 Synthesis Report, Summary for Policy Makers*. Geneva, Switzerland: Intergovernmental Panel on Climate Change. doi: [doi: 10.59327/IPCC/AR6-9789291691647.001](https://doi.org/10.59327/IPCC/AR6-9789291691647.001)

- Malla, G. (2008). Climate Change and its Impact on Nepalese Agriculture. *The Journal of Agriculture and Environment*, 9, 62-71. doi:<https://doi.org/10.3126/aej.v9i0.2119>
- McMichel, A. J., & Boulter, C. D. (2007). Health Promotion Challenges, Emerging Health Issues: the widening challenge for population health promotion. *Health Promotion International*, 21, 1-11. doi:[doi:10.1093/heapro/dal047](https://doi.org/10.1093/heapro/dal047)
- MoE. (2010). *National Adaptation Program of Action (NAPA)*. Kathmandu: Government of Nepal, Ministry of Environment. Retrieved from www.moenv.gov.np
- MoFE. (2021). *National Adaptation Plan (NAP) of Nepal, 2021 -2050*. Kathmandu, Bagmati, Nepal: Government of Nepal, Ministry of Forests and Environment. Retrieved from www.mofe.gov.np
- MoFE. (2021). *Vulnerability and Risk Assessment and Identifying the Adaptation Options, Summary for Policy Makers*. Kathmandu: Ministry of Forests and Environment, Government of Nepal. Retrieved from <https://www.mofe.gov.np/uploads/documents/vulnerability-repnew1630571413pdf-2940-766-1658827788.pdf>
- MoHA. (2019). *Nepal Disaster Report*. Kathmandu: Government of Nepal, Ministry of Home Affairs.
- Muttarak, R., & Lutz, W. (2014). Is Education a Key to Reducing Vulnerability to Natural Disasters and hence Unavoidable Climate Change? *Ecology and Society*, 19(1). doi:<http://dx.doi.org/10.5751/ES-06476-190142>
- NDRRMA. (2024). *Nepal Flood and Landslide Situation Report 2*. Kathmandu, Nepal: Ministry of Home Affairs, National Disaster Risk Reduction and Management Authority . Retrieved from www.bipad.gov.np
- Shrestha, M. (2000). Interannual variation of summer monsoon rainfall over Nepal and its relation to Southern Oscillation Index. *Meteorology and Atmospheric Physics*, 75, 21-28. doi:<https://doi.org/10.1007/s007030070012>
- Tuladhar, G., Yatabe, R., Dahal, R. K., & Bhandary, N. P. (2015). Disaster Risk Reduction Knowledge of Local People in Nepal. *Geoenvironmental Disaster*, 1-12. doi:DOI 10.1186/s40677-014-0011-4
- Yamane, T. (1967). Statistics; An Introductory Analysis. *A Harper International Edition*.