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The Impact of Climate Change on Human Rights: A Case Study of Punjab, Pakistan

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Abstract

Background*: Pakistan ranks in initial ranking on the Global Climate Risk Index, making it one of the most vulnerable countries to the devastating impacts of climate change. The Office of the United Nations High Commissioner for Human Rights (OHCHR) acknowledges the link between anthropogenic climate change and human rights, noting that it exacerbates vulnerabilities to fundamental rights. Extreme climatic events pose significant challenges in Pakistan, compounding existing sociopolitical and economic issues.*

Methodology*: A quantitative methods approach was utilized to investigate the impacts of climate change on human rights in Punjab. [1]Quantitative data were collected through questionnaires employing a five-point Likert scale, designed to gauge respondents' perceptions and experiences.*

Results*: The analysis reveals significant vulnerabilities related to flooding's impact on rights in Punjab, highlighting marked differences between urban and rural areas. Urban children face educational disruptions due to school damage, while elderly individuals in rural areas are at a higher risk of heat-related fatalities. Urban settings report greater property damage, whereas rural communities contend with deteriorating infrastructure and agricultural challenges. Although disparities in women's rights and healthcare access are less pronounced, the findings indicate a need for targeted interventions to address the specific vulnerabilities of different demographic groups.*

Conclusion*: This study highlights the critical impact of climate change on human rights in Punjab, revealing distinct vulnerabilities between urban and rural populations.*

Keywords*: Climate Change; OHCHR; Human Rights; Punjab; Pakistan*

Introduction

The global impacts of climate change are widely felt, but certain countries, including Pakistan, are among the most vulnerable. According to the 2021 German Climate Risk Index, Pakistan ranks fifth in vulnerability and could rise to third or fourth in the coming years (Eckstein et al., 2021). This is particularly concerning for Pakistan, given its fragile social, political, and economic systems, which hinder its ability to implement effective countermeasures. Although Pakistan contributes less than 1% to global greenhouse gas emissions (IMF, 2022), it faces significant climate-related threats, particularly in relation to human rights. The United Nations, through its Office of the High Commissioner for Human Rights, has frequently addressed the

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intersection of climate change and human rights, with several resolutions passed to tackle the issue under international law. The UN's efforts include calls for international treaties and acts that will soon give legal weight to these concerns (Güneş & Karaman, 2022). Addressing climate justice on both national and international levels is crucial, with Pakistan needing immediate recognition and assistance from the global community. Urban planning policies and mitigation measures must be integrated into international frameworks, and the emissions from countries like Pakistan should be carefully monitored (Javed & Hobson, 2022). Major carbon-producing nations, including the U.S., Germany, France, Russia, and China, are urged to provide immediate humanitarian aid to Pakistan, which suffers the most from their anthropogenic activities. The international community, particularly the United Nations Human Rights Council, must urgently address climate justice, not only to safeguard humanity but also to protect the sovereignty of vulnerable nations. Inaction could jeopardize national integrity (de Bruin, 2022). International institutions such as the UNFCCC and IPCC highlight the vulnerability of countries like Pakistan but do not provide immediate relief. Therefore, institutions like the International Court of Justice and humanitarian organizations must offer proactive support through economic relief frameworks, such as interest-free green bonds, to aid Pakistan, which is in dire need of such assistance (Haq et al., 2022). The government's public policy functionalities regarding the management of the issues and problems caused by climate change can be managed more efficiently if the government of Pakistan creates deep-rooted provincial legislations in this matter (Afzal & Akhtar, 2021). These provincial acts and bills must reflect a full coherence with not only Pakistan's Climate Change Act of 2017 but also the international treaties like the Paris Agreement and UNFCCC in their full spirit. The relationship between sustainable development and adaptation programs at the level of international law in managing the threats of climate change has to be understood as incoherence with each other (Cubie & Natoli, 2022). In the past the whole world has witnessed globally, that climate change has forced marginalized and poor people of Pakistan, to migrate from one place to another in search of food and shelter and they ran to save their lives. In this way a strange displacement crisis in terms of environmental migrants has been faced and hosted by the government of Pakistan and the child education in Pakistan has also been badly affected due to climate change in Pakistan (Kagawa, 2022). Pakistan in this way faces extreme human rights crises in terms of economic and social-political losses as a result of the extreme environmental issues. This happens due to heavy flooding, strong snow blizzards, rapid melting of the glaciers, and unnatural heavy periods of rain, which the people have never experienced before in their lives (Kapoor, 2022). . Sociocultural issues are a complex yet integral part of human life (Javaid et al., 2024; Ramzan et al., 2023). They can range from challenges related to cultural integration (Umar et al., 2024) social inequality, and systemic discrimination to issues surrounding gender norms, identity, and generational conflicts (Akram & Abdelrady, 2023), trauma, or personality disorders (Javaid et al., 2024; Ramzan et al., 2023). Addressing these issues requires a multi-faceted approach that includes psychological (Noor et al., 2021), emotional, social (Al-Adwan et al., 2022), and environmental interventions (Akram et al., 2021; 2022; Javaid et al., 2023). Understanding the underlying factors and offering practical solutions can significantly enhance an individual's quality of life and overall well-being (Javaid et al., 2024; Ramzan et al., 2023; Ma et al., 2024).

Hasan (2022) discussed climate justice, emphasizing that vulnerable communities, especially those in low-income nations, face the worst impacts of climate change. He argues that these nations, which rely on natural resources and lack technological advancements, struggle with climate adaptation. International agreements like the Paris Agreement are vital for providing these communities a fair chance to prosper through sustainable development. Bellinkx et al. (2022) highlighted the importance of international human rights law in addressing climate change. They argue that effective cooperation between nations and prioritization of

international environmental laws can reduce the burden of climate change on human rights. Similarly, Kahl (2022) stresses the need for new legislation to protect human rights within the emerging field of climate change law, ensuring the protection of necessities and expediting political processes. Zahar (2022) pointed out that while human rights laws can help reduce greenhouse gas emissions, the Paris Agreement allows companies to emit carbon until 2050, complicating the enforcement of climate-related human rights protections. Tzevelekos and Dzehtsiarou (2022) echo this concern, noting that international courts have begun addressing climate change within the framework of human rights, but more decisive legal action is needed. Several authors, including Truccone-Borgogno (2022) and TOOLKIT (2022), focus on the rights of marginalized communities, particularly Indigenous people, women, and children, who are disproportionately affected by climate change. These groups face not only environmental degradation but also violations of their human rights. Marcum (2022) underscores the vital role indigenous community's play in climate litigation, as they are responsible for protecting large portions of the world's biodiversity. Reports by Sweijs et al. (2022) and Schuijers (2022) emphasize that climate change exacerbates conflicts and human security issues, with courts increasingly intervening to protect environmental rights. Pakistan has also had to contend with issues like terrorism, economic instability, and constitutional crises, which have further diverted attention from climate concerns. Climate change has exacerbated human rights violations through prolonged droughts, heatwaves, forced migration, and the destruction of agricultural yields, threatening the livelihoods of Pakistan's farmers (Shafiq et al., 2021). Moreover, inadequate meteorological equipment has hampered disaster preparedness, worsening the impact on the agricultural sector (Gul et al., 2022). The catastrophic floods of 2022, which submerged vast areas of the country, highlighted the urgent need for international aid and long-term infrastructure development. Governance issues, particularly within Pakistan's bureaucracy, remain a hurdle, as climate policy does not sufficiently integrate scientific and socio-political expertise. Although Pakistan established a Ministry of Climate Change, its policies do not link climate change to human rights, creating a gap in addressing these interconnected issues (Relief, 2022a).

This research aims to explore how Punjab, Pakistan aligns its climate policies with international human rights obligations as outlined by the UN and other global institutions. It also identifies a gap in Pakistan's policy framework, as the Ministries of Climate Change and Human Rights have not integrated climate issues into their human rights policies (Jamal, 2018). The lack of collaboration between these ministries further complicates Pakistan's ability to address climate change and its impacts on human rights. This study seeks to highlight these vulnerabilities and recommend improvements for better policy coherence in addressing climate-related human rights issues.

Research Methodology

The study focuses on gathering data from people in Punjab, Pakistan affected by climate change, particularly flooding. It highlights the importance of selecting appropriate methodologies to gain deeper insights into the impacts of climate change in the region. Initially, the study explores key categorical variables to understand the distribution of data, providing a foundation for analysis. The methodology section plays a critical role in ensuring a systematic and rigorous approach to data collection and analysis. The research presents a conceptual framework linking climate-induced floods to human rights, emphasizing the vulnerability of certain groups. It discusses how human activities like industrialization, urbanization, and burning fossil fuels increase CO2 levels, driving climate change. This leads to global warming, resulting in extreme weather events such as heat waves, rising sea levels, and floods. The study

delves into the direct and indirect impacts of floods, such as land loss, injuries, contamination of water, disease outbreaks, infrastructure damage, agricultural losses, and forced relocations, which disrupt societies and cause economic losses.

Study Variables and Related parameters

The study highlights the disproportionate impact of flooding on vulnerable groups in Punjab, Pakistan, including indigenous people, children, women, the elderly, and migrants. It integrates various climate change and human rights theories, proposing a novel framework that suggests vulnerable groups mediate the infringement of human rights caused by floods. The methodology emphasizes data collection, vulnerability assessment, impact analysis, policy review, stakeholder engagement, and intervention design, supported by continuous monitoring and evaluation. The study uses simple random sampling across Punjab to gather quantitative and qualitative data on flood impacts. The sampling methodology follows rigorous scientific principles, utilizing the Raosoft Sample Size Calculator to ensure accurate and representative sample sizes, enhancing the credibility of findings. This approach aims to uncover intricate patterns in climate change impacts, guiding effective mitigation strategies.

The study carefully estimates the population sizes of flood-affected Union Councils (UCs) across various provinces to determine appropriate sample sizes. Using data from local government records, census reports, and community organizations, the population sizes were accurately assessed. A margin of error of ±5% and a 95% confidence level were chosen to balance precision and feasibility, while a conservative 50/50 response distribution was assumed to account for variability in responses. Using the Raosoft Sample Size Calculator, the required sample sizes were determined for 281 for Punjab. The sample size is calculated using the following formula provided by Raosoft:

$$\text{Sample size, } n = N * \frac{\frac{Z^2 * p * (1-p)}{e^2}}{[N - 1 + \frac{Z^2 * p * (1-p)}{e^2}]}$$

Where:

n = required sample size

N = population size

Z = Z-value (the number of standard deviations from the mean), corresponding to the desired confidence level (e.g., 1.96 for 95% confidence)

p = estimated proportion of the population (expressed as a decimal), which is expected to respond in a certain way (commonly 0.5 is used as it maximizes the required sample size)

e = margin of error (expressed as a decimal)

Using this formula, we can determine the sample size that will provide statistically significant results with a specified confidence level and margin of error.

Results and Discussion

In anticipation of our data analysis about Punjab, Pakistan, we employed the Raosoft Sample Size Calculator to ascertain optimal sample sizes tailored to the unique characteristics of each flood-affected province in Pakistan. Punjab, with a larger affected population of 1,500,000 individuals across UCs, warranted a sample size of 281 participants. Maintaining the same margin of error and confidence level, this sample size intends to capture the extensive effects of flooding across urban and rural areas in the province. A reliability score of $\alpha = 0.824$ for the Punjab province indicates a high level of consistency and dependability in our data, suggesting minimal measurement error.

Table 1: Reliability Scores of Questionnaire (Punjab Province)

Reliability Statistics	
Cronbach's Alpha	N of Items
0.824	37

Table 2 provides a comprehensive breakdown of the demographic characteristics of respondents from the Punjab province, offering valuable insights into the composition of the study population. Out of the total 281 respondents, a majority, constituting 182 individuals (64.8%), identified as male, while the remaining 99 (35.2%) identified as female. This gender distribution reflects the diverse participation of both men and women in the study, highlighting the importance of capturing perspectives from individuals of all genders.

Table 2: Descriptive Statistics about the demographic variables of respondents (Punjab)

Variables	**Categories**	**n**	**%**
Gender	Male	182	64.8%
	Female	99	35.2%
Age	18-25 years	62	22.1%
	26-35 years	74	26.3%
	36-45 years	86	30.6%
	45 or more than 45 years	59	21.0%
Qualification	Below Matric	104	37.0%
	Matric	72	25.6%
	Intermediate	64	22.8%
	Graduation	11	3.9%
	Master	26	9.3%
	M.Phil	3	1.1%
	Ph.D	1	0.4%
Monthly Income	Rs. 10,000 to 30,000	39	13.9%
	Rs. 31,000 to 50,000	76	27.0%

	Rs. 51,000 to 80,000	77	27.4%
	Rs. 81,000 to 1,00,000	46	16.4%
	Above Rs. 1,00,000	43	15.3%
Residence	Urban	157	55.9%
	Rural	124	44.1%

The study revealed diverse demographics among respondents in Punjab. The largest age group was 36-45 years, comprising 30.6% (86 individuals), followed closely by 26-35 years at 26.3% (74 individuals). Both the 18-25 and 45+ age groups represented about 22.1% and 21.0%, respectively. Educational backgrounds varied significantly, with 37.0% having education below the Matric level, while Matric, Intermediate, and higher education levels showed a gradual decline in representation. In terms of income, most respondents fell into middle-income brackets, with 27.0% earning Rs. 31,000 to 50,000 and 27.4% earning Rs. 51,000 to 80,000. The sample included 55.9% from urban areas and 44.1% from rural areas.

Table 3: opinion of Respondents about different human rights questions (Punjab)

Variables	Categories	n	%
The flooding has damaged or destroyed schools of my children.	Strongly Disagree	106	37.7%
	Disagree	56	19.9%
	Undecided	35	12.5%
	Agree	52	18.5%
	Strongly Agree	32	11.4%
After a climate disaster like flooding, children in my vicinity are forced to take classes under open skies.	Strongly Disagree	122	43.4%
	Disagree	51	18.1%
	Undecided	26	9.3%
	Agree	44	15.7%
	Strongly Agree	38	13.5%
Due to forced displacement as a result of floods, my children are not able to continue their education.	Strongly Disagree	68	24.2%
	Disagree	67	23.8%
	Undecided	21	7.5%
	Agree	36	12.8%
	Strongly Agree	89	31.7%
My children are not able to combat climate induced diseases like Malaria, Dengue, skin infections and Diarrhea.	Strongly Disagree	21	7.5%
	Disagree	39	13.9%
	Undecided	21	7.5%
	Agree	90	32.0%
	Strongly Agree	110	39.1%
My children are not able to combat dehydration due to extreme heat waves.	Strongly Disagree	41	14.6%
	Disagree	30	10.7%
	Undecided	22	7.8%
	Agree	119	42.3%
	Strongly Agree	69	24.6%
Women are more affected with the adverse effects of Climate Change as compared to men.	Strongly Disagree	35	12.5%
	Disagree	25	8.9%
	Undecided	27	9.6%
	Agree	106	37.7%

	Strongly Agree	88	31.3%
Due to prolonged heat waves and dehydration, women in my area are giving premature births.	Strongly Disagree	42	14.9%
	Disagree	30	10.7%
	Undecided	23	8.2%
	Agree	126	44.8%
	Strongly Agree	60	21.4%
During any kind of climatic disaster, women face social security issues while accessing sanitation/toilet needs particularly at night.	Strongly Disagree	74	26.4%
	Disagree	21	7.5%
	Undecided	10	3.6%
	Agree	90	32.1%
	Strongly Agree	85	30.4%
In the event of extreme climatic crisis, women in contrast to men are more likely to suffer social violence.	Strongly Disagree	58	20.6%
	Disagree	54	19.2%
	Undecided	30	10.7%
	Agree	61	21.7%
	Strongly Agree	78	27.8%
Old age people in my family and neighborhood are more affected with climate related diseases as compared to young ones.	Strongly Disagree	54	19.2%
	Disagree	41	14.6%
	Undecided	31	11.0%
	Agree	85	30.2%
	Strongly Agree	70	24.9%
The senior citizens of my family and neighborhood are not able to immediately respond to climate disaster.	Strongly Disagree	17	6.0%
	Disagree	37	13.2%
	Undecided	25	8.9%
	Agree	127	45.2%
	Strongly Agree	75	26.7%
Heat waves have caused more deaths amongst the elderly people than young one.	Strongly Disagree	51	18.1%
	Disagree	67	23.8%
	Undecided	30	10.7%
	Agree	83	29.5%
	Strongly Agree	50	17.8%
The disable people among my friends and family are unable to prevent themselves against floods and heat waves.	Strongly Disagree	22	7.8%
	Disagree	36	12.8%
	Undecided	28	10.0%
	Agree	135	48.0%
	Strongly Agree	60	21.4%
During a flood, the disable people in my surrounding do not have full access to food, water and health care facilities.	Strongly Disagree	11	3.9%
	Disagree	28	10.0%
	Undecided	30	10.7%
	Agree	158	56.2%
	Strongly Agree	54	19.2%
I have lost my loved ones due to flooding.	Strongly Disagree	43	15.3%
	Disagree	44	15.7%
	Undecided	39	13.9%
	Agree	118	42.0%
	Strongly Agree	37	13.2%
My property has been damaged due to flooding.	Strongly Disagree	14	5.0%
	Disagree	50	17.8%
	Undecided	46	16.4%

	Agree	140	49.8%
	Strongly Agree	31	11.0%
Floods have damaged my houses.	Strongly Disagree	16	5.7%
	Disagree	48	17.1%
	Undecided	68	24.2%
	Agree	110	39.1%
	Strongly Agree	39	13.9%
The infrastructure of my locality like schools, colleges, hospitals, roads, power supplies, etc. get damaged during flooding.	Strongly Disagree	34	12.1%
	Disagree	40	14.2%
	Undecided	53	18.9%
	Agree	100	35.6%
	Strongly Agree	54	19.2%
The environmental disasters have compromised my right of self-development.	Strongly Disagree	20	7.1%
	Disagree	41	14.6%
	Undecided	23	8.2%
	Agree	129	45.9%
	Strongly Agree	68	24.2%
The environmental disasters have compromised my right of equal opportunity.	Strongly Disagree	29	10.3%
	Disagree	47	16.7%
	Undecided	27	9.6%
	Agree	111	39.5%
	Strongly Agree	67	23.8%
Due to flooding, I am forced to get displaced from one place to another in search of food and shelter for my family.	Strongly Disagree	97	34.5%
	Disagree	24	8.5%
	Undecided	29	10.3%
	Agree	56	19.9%
	Strongly Agree	75	26.7%
Forced displacement as a result of floods has decreased my income.	Strongly Disagree	70	24.9%
	Disagree	58	20.6%
	Undecided	44	15.7%
	Agree	69	24.6%
	Strongly Agree	40	14.2%
I lose access to clean drinking water in the event of flooding.	Strongly Disagree	22	7.8%
	Disagree	37	13.2%
	Undecided	41	14.6%
	Agree	133	47.3%
	Strongly Agree	48	17.1%
In the event of climate disaster, the population around me is infected with diseases like Dengue, Malaria, cough and cold.	Strongly Disagree	51	18.1%
	Disagree	43	15.3%
	Undecided	37	13.2%
	Agree	104	37.0%
	Strongly Agree	46	16.4%
Due to flooding, I am not able to get full access to the healthcare and medical facilities.	Strongly Disagree	10	3.6%
	Disagree	55	19.6%
	Undecided	38	13.5%
	Agree	128	45.6%
	Strongly Agree	50	17.8%
My livestock assets have been reduced due to massive floods.	Strongly Disagree	52	18.5%
	Disagree	23	8.2%

	Undecided	32	11.4%
	Agree	105	37.4%
	Strongly Agree	69	24.6%
During prolonged droughts, I am not able to provide drinking water to my milk and meat producing animals.	Strongly Disagree	45	16.0%
	Disagree	38	13.5%
	Undecided	62	22.1%
	Agree	87	31.0%
	Strongly Agree	49	17.4%
During flooding, I am not able to provide fodder (grass/food) to my livestock animals.	Strongly Disagree	37	13.2%
	Disagree	52	18.5%
	Undecided	60	21.4%
	Agree	79	28.1%
	Strongly Agree	53	18.9%
Floods have destroyed the shelters of my livestock.	Strongly Disagree	26	9.3%
	Disagree	32	11.4%
	Undecided	79	28.1%
	Agree	100	35.6%
	Strongly Agree	44	15.7%
I am not able to cultivate my agricultural land during flooding.	Strongly Disagree	24	8.5%
	Disagree	35	12.5%
	Undecided	79	28.1%
	Agree	100	35.6%
	Strongly Agree	43	15.3%
Prolong droughts and uneven rainy patterns have resulted in soil degradation of my agricultural land.	Strongly Disagree	9	3.2%
	Disagree	10	3.6%
	Undecided	54	19.2%
	Agree	111	39.5%
	Strongly Agree	97	34.5%
Nonseasonal rains bring plant based diseases and viruses to my crops.	Strongly Disagree	18	6.4%
	Disagree	25	8.9%
	Undecided	38	13.5%
	Agree	117	41.6%
	Strongly Agree	83	29.5%
The unnatural rainy patterns have caused an increase in the cost of cultivation of my crops.	Strongly Disagree	34	12.1%
	Disagree	23	8.2%
	Undecided	56	19.9%
	Agree	106	37.7%
	Strongly Agree	62	22.1%
The extreme weather patterns have reduced the productivity of my crops.	Strongly Disagree	22	7.8%
	Disagree	28	10.0%
	Undecided	17	6.0%
	Agree	124	44.1%
	Strongly Agree	90	32.0%
I did not receive flood alerts from local-government authorities.	Strongly Disagree	24	8.5%
	Disagree	87	31.0%
	Undecided	24	8.5%
	Agree	116	41.3%
	Strongly Agree	30	10.7%
	Strongly Disagree	41	14.6%

I am unable to make a full scale self-recovery after flooding.	Disagree	26	9.3%
	Undecided	37	13.2%
	Agree	92	32.7%
	Strongly Agree	85	30.2%
The flood affected population in my vicinity requires the help of government to get out of such vulnerable situations.	Strongly Disagree	17	6.0%
	Disagree	30	10.7%
	Undecided	51	18.1%
	Agree	114	40.6%
	Strongly Agree	69	24.6%

Regarding the disproportionate impact of climate change on women, 35 respondents (12.5%) strongly disagree, while 25 (8.9%) disagree. Additionally, 27 respondents (9.6%) remain undecided, while 106 (37.7%) agree and 88 (31.3%) strongly agree. Furthermore, 42 respondents (14.9%) strongly disagree that women in the area give premature births due to prolonged heat waves and dehydration, while 30 (10.7%) disagree. Meanwhile, 23 respondents (8.2%) are undecided, while 126 (44.8%) agree and 60 (21.4%) strongly agree. Concerning social security issues for women during climatic disasters, 74 respondents (26.4%) strongly disagree, while 21 (7.5%) disagree. Additionally, 10 respondents (3.6%) remain undecided, while 90 (32.1%) agree and 85 (30.4%) strongly agree. Moreover, 58 respondents (20.6%) strongly disagree that women are more likely to suffer social violence during climatic crises compared to men, with 54 (19.2%) in disagreement. Meanwhile, 30 respondents (10.7%) are undecided, while 61 (21.7%) agree and 78 (27.8%) strongly agree. Concerning the elderly, 54 respondents (19.2%) strongly disagree that they are more affected by climate-related diseases compared to young ones, while 41 (14.6%) disagree. Additionally, 31 respondents (11.0%) are undecided, while 85 (30.2%) agree and 70 (24.9%) strongly agree. Regarding the elderly's ability to respond promptly to climate disasters, 17 respondents (6.0%) strongly disagree, while 37 (13.2%) disagree. Meanwhile, 25 respondents (8.9%) are undecided, while 127 (45.2%) agree and 75 (26.7%) strongly agree. Regarding heat waves causing more deaths among the elderly, 51 respondents (18.1%) strongly disagree, while 67 (23.8%) disagree. Meanwhile, 30 respondents (10.7%) are undecided, while 83 (29.5%) agree and 50 (17.8%) strongly agree. From the study, it was observed that 22 respondents (7.8%) strongly disagree that they are unable to prevent themselves from floods and heat waves, while 36 (12.8%) disagree. Meanwhile, 28 respondents (10.0%) are undecided, while 135 (48.0%) agree and 60 (21.4%) strongly agree. Moreover, the responses relating to health implications highlight the vulnerability of communities, particularly children, to climate-induced diseases and dehydration during extreme weather events. The high percentage of respondents agreeing or strongly agreeing with these statements underscores the pressing need for targeted healthcare interventions and public health initiatives to mitigate the health risks exacerbated by climate change. Additionally, the data underscores the disproportionate impact of environmental crises on vulnerable groups such as women, the elderly, and people with disabilities.

Table 4: Respondents Opinion about violation of different human rights concerning residence (Punjab)

Variables of the study	**Categories**	**Residence**				χ^2-test (p-value)
		Urban		**Rural**		
		n	**%**	**n**	**%**	

The flooding has damaged or destroyed schools of my children.	Strongly Disagree	81	28.8%	25	8.9%	<0.001
	Disagree	29	10.3%	27	9.6%	
	Undecided	16	5.7%	19	6.8%	
	Agree	21	7.5%	31	11.0%	
	Strongly Agree	10	3.6%	22	7.8%	
After a climate disaster like flooding, children in my vicinity are forced to take classes under open skies.	Strongly Disagree	70	24.9%	52	18.5%	<0.001
	Disagree	8	2.8%	43	15.3%	
	Undecided	10	3.6%	16	5.7%	
	Agree	33	11.7%	11	3.9%	
	Strongly Agree	36	12.8%	2	0.7%	
Due to forced displacement as a result of floods, my children are not able to continue their education.	Strongly Disagree	48	17.1%	20	7.1%	<0.001
	Disagree	49	17.4%	18	6.4%	
	Undecided	7	2.5%	14	5.0%	
	Agree	1	0.4%	35	12.5%	
	Strongly Agree	52	18.5%	37	13.2%	
My children are not able to combat climate induced diseases like Malaria, Dengue, skin infections and Diarrhea.	Strongly Disagree	15	5.3%	6	2.1%	<0.001
	Disagree	12	4.3%	27	9.6%	
	Undecided	6	2.1%	15	5.3%	
	Agree	57	20.3%	33	11.7%	
	Strongly Agree	67	23.8%	43	15.3%	
My children are not able to combat dehydration due to extreme heat waves.	Strongly Disagree	6	2.1%	35	12.5%	<0.001
	Disagree	8	2.8%	22	7.8%	
	Undecided	10	3.6%	12	4.3%	
	Agree	88	31.3%	31	11.0%	
	Strongly Agree	45	16.0%	24	8.5%	
Women are more affected by the adverse effects of Climate Change as compared to men.	Strongly Disagree	27	9.6%	8	2.8%	<0.001
	Disagree	9	3.2%	16	5.7%	
	Undecided	14	5.0%	13	4.6%	
	Agree	48	17.1%	58	20.6%	
	Strongly Agree	59	21.0%	29	10.3%	
Due to prolonged heat waves and dehydration, women in my area are giving premature births.	Strongly Disagree	25	8.9%	17	6.0%	0.003
	Disagree	7	2.5%	23	8.2%	
	Undecided	11	3.9%	12	4.3%	
	Agree	79	28.1%	47	16.7%	
	Strongly Agree	35	12.5%	25	8.9%	
During any kind of climatic disaster, women face social security issues while accessing sanitation/toilet needs particularly at night.	Strongly Disagree	33	11.8%	41	14.6%	0.044
	Disagree	16	5.7%	5	1.8%	
	Undecided	8	2.9%	2	0.7%	
	Agree	50	17.9%	40	14.3%	
	Strongly Agree	49	17.5%	36	12.9%	
	Strongly Disagree	23	8.2%	35	12.5%	

In the event of extreme climatic crisis, women in contrast to men are more likely to suffer social violence.	Disagree	18	6.4%	36	12.8%	<0.001
	Undecided	14	5.0%	16	5.7%	
	Agree	45	16.0%	16	5.7%	
	Strongly Agree	57	20.3%	21	7.5%	
Old age people in my family and neighborhood are more affected with climate-related diseases as compared to young ones.	Strongly Disagree	15	5.3%	39	13.9%	0.44
	Disagree	31	11.0%	10	3.6%	
	Undecided	19	6.8%	12	4.3%	
	Agree	43	15.3%	42	14.9%	
	Strongly Agree	49	17.4%	21	7.5%	
The senior citizens of my family and neighborhood are not able to immediately respond to climate disasters.	Strongly Disagree	8	2.8%	9	3.2%	0.328
	Disagree	16	5.7%	21	7.5%	
	Undecided	15	5.3%	10	3.6%	
	Agree	73	26.0%	54	19.2%	
	Strongly Agree	45	16.0%	30	10.7%	
Heat waves have caused more deaths amongst the elderly people than young one.	Strongly Disagree	11	3.9%	40	14.2%	0.012
	Disagree	21	7.5%	46	16.4%	
	Undecided	7	2.5%	23	8.2%	
	Agree	73	26.0%	10	3.6%	
	Strongly Agree	45	16.0%	5	1.8%	
The disable people among my friends and family are unable to prevent themselves against floods and heat waves.	Strongly Disagree	8	2.8%	14	5.0%	0.057
	Disagree	22	7.8%	14	5.0%	
	Undecided	18	6.4%	10	3.6%	
	Agree	75	26.7%	60	21.4%	
	Strongly Agree	34	12.1%	26	9.3%	
During a flood, the disable people in my surrounding do not have full access to food, water and health care facilities.	Strongly Disagree	9	3.2%	2	0.7%	0.680
	Disagree	14	5.0%	14	5.0%	
	Undecided	11	3.9%	19	6.8%	
	Agree	85	30.2%	73	26.0%	
	Strongly Agree	38	13.5%	16	5.7%	
I have lost my loved ones due to flooding.	Strongly Disagree	32	11.4%	11	3.9%	0.083
	Disagree	21	7.5%	23	8.2%	
	Undecided	23	8.2%	16	5.7%	
	Agree	59	21.0%	59	21.0%	
	Strongly Agree	22	7.8%	15	5.3%	
My property has been damaged due to flooding.	Strongly Disagree	7	2.5%	7	2.5%	0.001
	Disagree	26	9.3%	24	8.5%	
	Undecided	23	8.2%	23	8.2%	
	Agree	81	28.8%	59	21.0%	

	Strongly Agree	20	7.1%	11	3.9%	
Floods have damaged my houses.	Strongly Disagree	6	2.1%	10	3.6%	<0.001
	Disagree	20	7.1%	28	10.0%	
	Undecided	41	14.6%	27	9.6%	
	Agree	68	24.2%	42	14.9%	
	Strongly Agree	22	7.8%	17	6.0%	
The infrastructure of my locality like schools, colleges, hospitals, roads, power supplies, etc. get damaged during flooding.	Strongly Disagree	15	5.3%	19	6.8%	0.062
	Disagree	19	6.8%	21	7.5%	
	Undecided	28	10.0%	25	8.9%	
	Agree	63	22.4%	37	13.2%	
	Strongly Agree	32	11.4%	22	7.8%	
The environmental disasters have compromised my right of self-development.	Strongly Disagree	11	3.9%	9	3.2%	0.933
	Disagree	12	4.3%	29	10.3%	
	Undecided	13	4.6%	10	3.6%	
	Agree	73	26.0%	56	19.9%	
	Strongly Agree	48	17.1%	20	7.1%	
The environmental disasters have compromised my right of equal opportunity.	Strongly Disagree	18	6.4%	11	3.9%	0.087
	Disagree	19	6.8%	28	10.0%	
	Undecided	13	4.6%	14	5.0%	
	Agree	64	22.8%	47	16.7%	
	Strongly Agree	43	15.3%	24	8.5%	
Due to flooding, I am forced to get displaced from one place to another in search of food and shelter for my family.	Strongly Disagree	85	30.2%	12	4.3%	<0.001
	Disagree	13	4.6%	11	3.9%	
	Undecided	11	3.9%	18	6.4%	
	Agree	1	0.4%	55	19.6%	
	Strongly Agree	47	16.7%	28	10.0%	
Forced displacement as a result of floods has decreased my income.	Strongly Disagree	59	21.0%	11	3.9%	0.027
	Disagree	28	10.0%	30	10.7%	
	Undecided	25	8.9%	19	6.8%	
	Agree	19	6.8%	50	17.8%	
	Strongly Agree	26	9.3%	14	5.0%	
I lose access to clean drinking water in the event of flooding.	Strongly Disagree	13	4.6%	9	3.2%	0.991
	Disagree	14	5.0%	23	8.2%	
	Undecided	19	6.8%	22	7.8%	
	Agree	80	28.5%	53	18.9%	
	Strongly Agree	31	11.0%	17	6.0%	
In the event of climate disaster, the population around me is infected with diseases like Dengue, Malaria, cough and cold.	Strongly Disagree	27	9.6%	24	8.5%	0.293
	Disagree	26	9.3%	17	6.0%	
	Undecided	21	7.5%	16	5.7%	
	Agree	59	21.0%	45	16.0%	
	Strongly Agree	24	8.5%	22	7.8%	
	Strongly Disagree	8	2.8%	2	0.7%	0.007

Due to flooding, I am not able to get full access to the healthcare and medical facilities.	Disagree	28	10.0%	27	9.6%	
	Undecided	19	6.8%	19	6.8%	
	Agree	67	23.8%	61	21.7%	
	Strongly Agree	35	12.5%	15	5.3%	
My livestock assets have been reduced due to massive floods.	Strongly Disagree	33	11.7%	19	6.8%	0.006
	Disagree	10	3.6%	13	4.6%	
	Undecided	16	5.7%	16	5.7%	
	Agree	58	20.6%	47	16.7%	
	Strongly Agree	40	14.2%	29	10.3%	
During prolonged droughts, I am not able to provide drinking water to my milk and meat producing animals.	Strongly Disagree	30	10.7%	15	5.3%	0.002
	Disagree	18	6.4%	20	7.1%	
	Undecided	40	14.2%	22	7.8%	
	Agree	31	11.0%	56	19.9%	
	Strongly Agree	38	13.5%	11	3.9%	
During flooding, I am not able to provide fodder (grass/food) to my livestock animals.	Strongly Disagree	22	7.8%	15	5.3%	<0.001
	Disagree	25	8.9%	27	9.6%	
	Undecided	39	13.9%	21	7.5%	
	Agree	50	17.8%	29	10.3%	
	Strongly Agree	21	7.5%	32	11.4%	
Floods have destroyed the shelters of my livestock.	Strongly Disagree	14	5.0%	12	4.3%	<0.001
	Disagree	18	6.4%	14	5.0%	
	Undecided	46	16.4%	33	11.7%	
	Agree	55	19.6%	45	16.0%	
	Strongly Agree	24	8.5%	20	7.1%	
I am not able to cultivate my agricultural land during flooding.	Strongly Disagree	15	5.3%	9	3.2%	
	Disagree	18	6.4%	17	6.0%	<0.001
	Undecided	51	18.1%	28	10.0%	
	Agree	50	17.8%	50	17.8%	
	Strongly Agree	23	8.2%	20	7.1%	
Prolonged droughts and uneven rainy patterns have resulted in soil degradation of my agricultural land.	Strongly Disagree	6	2.1%	3	1.1%	
	Disagree	5	1.8%	5	1.8%	<0.001
	Undecided	36	12.8%	18	6.4%	
	Agree	55	19.6%	56	19.9%	
	Strongly Agree	55	19.6%	42	14.9%	
Non seasonal rains bring plant-based diseases and viruses to my crops.	Strongly Disagree	15	5.3%	3	1.1%	
	Disagree	13	4.6%	12	4.3%	<0.001
	Undecided	18	6.4%	20	7.1%	
	Agree	64	22.8%	53	18.9%	
	Strongly Agree	47	16.7%	36	12.8%	
The unnatural rainy patterns have caused an increase in the cost of cultivation of my crops.	Strongly Disagree	28	10.0%	6	2.1%	
	Disagree	15	5.3%	8	2.8%	<0.001
	Undecided	31	11.0%	25	8.9%	
	Agree	55	19.6%	51	18.1%	
	Strongly Agree	28	10.0%	34	12.1%	

The extreme weather patterns have reduced the productivity of my crops.	Strongly Disagree	18	6.4%	4	1.4%	<0.001
	Disagree	14	5.0%	14	5.0%	
	Undecided	5	1.8%	12	4.3%	
	Agree	63	22.4%	61	21.7%	
	Strongly Agree	57	20.3%	33	11.7%	
I did not receive flood alerts from local government authorities.	Strongly Disagree	14	5.0%	10	3.6%	<0.001
	Disagree	46	16.4%	41	14.6%	
	Undecided	12	4.3%	12	4.3%	
	Agree	65	23.1%	51	18.1%	
	Strongly Agree	20	7.1%	10	3.6%	
I am unable to make a full-scale self-recovery after flooding.	Strongly Disagree	18	6.4%	23	8.2%	<0.001
	Disagree	10	3.6%	16	5.7%	
	Undecided	16	5.7%	21	7.5%	
	Agree	52	18.5%	40	14.2%	
	Strongly Agree	61	21.7%	24	8.5%	
The flood-affected population in my vicinity requires the help of the government to get out of such vulnerable situations.	Strongly Disagree	12	4.3%	5	1.8%	<0.001
	Disagree	19	6.8%	11	3.9%	
	Undecided	29	10.3%	22	7.8%	
	Agree	63	22.4%	51	18.1%	
	Strongly Agree	34	12.1%	35	12.5%	

The study's results reveal significant differences in perceptions of human rights violations between urban and rural respondents in Punjab regarding flooding impacts. Urban respondents expressed greater concern about school damage due to flooding, with 28.8% strongly disagreeing compared to 8.9% of rural respondents ($p < 0.001$). Similarly, concerns about children being forced to take classes outdoors were more pronounced among urban respondents (24.9% vs. 18.5%; $p < 0.001$). Urban respondents also recognized women's increased vulnerability to climate change more than rural respondents (21.0% vs. 10.3%; $p < 0.001$). Conversely, while a higher percentage of rural respondents perceived climate-related health issues among the elderly (13.9% vs. 5.3%; $p = 0.44$), this was not statistically significant. The perception that heat waves lead to more elderly deaths was notably higher in rural areas (14.2% vs. 3.9%; $p = 0.012$). Additionally, urban respondents reported greater property damage due to flooding (28.8% vs. 21.0%; $p = 0.001$) and perceived infrastructure deterioration (22.4% vs. 13.2%; $p = 0.062$). Overall, urban settings faced more pronounced property and infrastructure damage, while rural areas struggled with resource access during disasters. Both groups reported violations of children's rights to education and health ($p < 0.001$) and highlighted women's vulnerabilities ($p < 0.001$), while elderly and disabled individuals faced health risks and mobility challenges ($p < 0.05$). Overall, the study underscores significant human rights violations resulting from environmental disasters across both demographics and geographic regions.

Table 5: Impact of flooding on different rights in urban and rural region (Punjab Province)

Rights Variable in the Study	p-value	Odd Ratio	95% C.I.for EXP(B)

			Lower	Upper
Children Rights				
The flooding has damaged or destroyed the schools of my children.	0.004	1.831	1.216	2.755
After a climate disaster like flooding, children in my vicinity are forced to take classes under open skies.	0.003	.570	0.393	.826
Due to forced displacement as a result of floods, my children are not able to continue their education.	0.111	1.311	0.939	1.828
My children are not able to combat climate induced diseases like Malaria, Dengue, skin infections and Diarrhea.	0.033	.632	0.414	.964
My children are not able to combat dehydration due to extreme heat waves.	0.004	.499	0.313	.796
Women Rights				
Women are more affected with the adverse effects of Climate Change as compared to men.	0.722	.925	0.604	1.418
Due to prolonged heat waves and dehydration, women in my area are giving premature births.	0.172	.778	0.543	1.115
During any kind of climatic disaster, women face social security issues while accessing sanitation/toilet needs particularly at night.	0.598	1.090	0.792	1.500
In the event of extreme climatic crisis, women in contrast to men are more likely to suffer social violence.	0.043	.723	0.514	1.018
Old–aged and disabled people rights				
Old age people in my family and neighborhood are more affected with climate-related diseases as compared to young ones.	0.128	.743	0.507	1.089
The senior citizens of my family and neighborhood are not able to immediately respond to climate disaster.	0.038	1.423	0.892	2.269
Heat waves have caused more deaths amongst the elderly people than young one.	0.000	.276	0.183	.417
The disable people among my friends and family are unable to prevent themselves against floods and heat waves.	0.042	.936	0.619	1.413

During a flood, the disable people in my surrounding do not have full access to food, water and health care facilities.	0.292	.750	0.439	1.281
I have lost my loved ones due to flooding.	0.033	1.644	1.041	2.597
Property and Infrastructure				
My property has been damaged due to flooding.	0.606	1.144	0.686	1.910
Floods have damaged my houses.	0.049	.588	0.339	1.021
The infrastructure of my locality like schools, colleges, hospitals, roads, power supplies, etc. get damaged during flooding.	0.044	.985	0.644	1.506
The environmental disasters have compromised my right of self-development.	0.036	1.208	0.751	1.941
The environmental disasters have compromised my right of equal opportunity.	0.084	1.106	0.682	1.792
Due to flooding, I am forced to get displaced from one place to another in search of food and shelter for my family.	0.056	1.008	0.752	1.353
Forced displacement as a result of floods has decreased my income.	0.008	1.651	1.143	2.384
I lose access to clean drinking water in the event of flooding.	0.615	.890	0.566	1.400
In the event of climate disaster, the population around me is infected with diseases like Dengue, Malaria, cough and cold.	0.934	1.015	0.712	1.448
Due to flooding, I am not able to get full access to the healthcare and medical facilities.	0.048	.819	0.488	1.372
Agriculture and Livestock Variables				
My livestock assets have been reduced due to massive floods.	0.357	.852	0.606	1.198
During prolonged droughts, I am not able to provide drinking water to my milk and meat-producing animals.	0.159	.762	0.522	1.113
During flooding, I am not able to provide fodder (grass/food) to my livestock animals.	0.009	1.672	1.137	2.459
Floods have destroyed the shelters of my livestock.	0.533	1.143	0.751	1.738

I am not able to cultivate my agricultural land during flooding.	0.004	.887	0.558	1.412
Prolong droughts and uneven rainy patterns have resulted in soil degradation of my agricultural land.	0.975	1.008	0.616	1.649
Non seasonal rains bring plant based diseases and viruses to my crops.	0.478	1.164	0.765	1.769
The unnatural rainy patterns have caused an increase in the cost of cultivation of my crops.	0.129	1.365	0.913	2.040
The extreme weather patterns have reduced the productivity of my crops.	0.356	1.213	0.805	1.830
I did not receive flood alerts from local-government authorities.	0.210	1.319	0.856	2.033
I am unable to make a full scale self-recovery after flooding.	0.020	.661	0.466	.937
The flood-affected population in my vicinity requires the help of government to get out of such vulnerable situations.	0.047	1.535	1.005	2.345

Instances of school damage or destruction due to flooding are notably more prevalent in urban settings than in rural counterparts ($p = 0.004$, OR = 1.831, 95% CI: 1.216 - 2.755). Similarly, urban areas witness a higher incidence of children being compelled to hold classes outdoors post-flooding ($p = 0.003$, OR = 0.570, 95% CI: 0.393 - 0.826). Conversely, the inability of displaced children to sustain their education shows no statistically significant disparity between urban and rural regions ($p = 0.111$, OR = 1.311, 95% CI: 0.939 - 1.828). Turning to women's rights, the findings present a nuanced landscape. While no significant difference is observed in the adverse effects of climate change on women compared to men ($p = 0.722$, OR = 0.925, 95% CI: 0.604 - 1.418), urban women are more susceptible to social violence during extreme climatic crises than their male counterparts ($p = 0.043$, OR = 0.723, 95% CI: 0.514 - 1.018). Elderly individuals and the disabled encounter varying degrees of impact from flooding. While no statistically significant distinction emerges in the susceptibility of the elderly to climate-related maladies between urban and rural locales ($p = 0.128$, OR = 0.743, 95% CI: 0.507 - 1.089), urban areas witness a diminished ability among senior citizens to promptly respond to climate disasters compared to rural regions ($p = 0.038$, OR = 1.423, 95% CI: 0.892 - 2.269). However, rural settings experience a higher incidence of heat-related fatalities among the elderly populace ($p < 0.001$, OR = 0.276, 95% CI: 0.183 - 0.417). Property and infrastructure rights unveil difference as well. Urban areas exhibit a heightened likelihood of property damage owing to flooding ($p = 0.049$, OR = 0.588, 95% CI: 0.339 - 1.021), while rural localities face a greater vulnerability of infrastructural deterioration during floods ($p = 0.044$, OR = 0.985, 95% CI: 0.644 - 1.506). Regarding agriculture and livestock variables, flooding significantly impacts rural livelihoods. Rural farmers encounter hurdles such as the inability to cultivate land during floods ($p = 0.004$, OR = 0.887, 95% CI: 0.558 - 1.412) and diminished access to healthcare facilities ($p = 0.048$, OR = 0.819, 95% CI: 0.488 - 1.372). Additionally, floods exert

adverse effects on rural livestock owners, leading to reduced livestock assets ($p = 0.009$, OR = 1.672, 95% CI: 1.137 - 2.459) and an inability to provide fodder to livestock ($p = 0.009$, OR = 1.672, 95% CI: 1.137 - 2.459).

Conclusion

In conclusion, the analysis of flooding's impact on rights in Punjab Province reveals distinct vulnerabilities across urban and rural areas. Significant violations include children's rights, with urban children facing school damage ($p = 0.004$) and disrupted outdoor learning ($p = 0.003$). Elderly and disabled rights also show stark differences, as urban seniors struggle to respond to climate disasters ($p = 0.038$), while rural elderly face higher heat-related fatalities ($p < 0.001$). Property and infrastructure rights are similarly affected, with urban areas experiencing more property damage ($p = 0.049$) and rural areas suffering greater infrastructure deterioration ($p = 0.044$). Rural communities also face substantial challenges in agriculture and livestock management, including reduced cultivation ($p = 0.004$) and diminished livestock assets ($p = 0.009$). Conversely, rights such as women's rights and healthcare access show less significant disparities, with women's experiences during climatic crises ($p = 0.043$) not differing greatly from men's ($p = 0.722$), and rural healthcare access issues ($p = 0.048$) lacking statistical significance. Additionally, the right to equal opportunity is compromised ($p = 0.084$) but does not show a significant urban-rural divide.

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