ETHNICITY AND DISASTER RISK REDUCTION: A CASE STUDY OF RURAL COMMUNITIES OF PAKISTAN

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I certify that this research work titled *"Ethnicity and Disaster Risk Reduction: A case study of rural communities of Pakistan"* is my work. The work has not been presented elsewhere for assessment. The material, method and procedure that has been used from other sources have been properly referred/acknowledged.

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Abstract

The numbers of natural hazards occurrence have increased worldwide, thus constructing the risk of disaster a universal concern. These disasters caused substantial losses and harm to human society and the economy. Climate change is a global phenomenon and affects people worldwide. Therefore, it cannot be limited to particular proximity and thus needed global attention. Despite the losses and damages from natural hazards and climate change, some individuals or groups do not attach much significance to these threats. To reduce the risk of climate change and natural hazards, vulnerability and its linked components need to understand.

Vulnerability assessment methods are complex and diverse in nature and ultimately mirrored in the quantifying of results. The main purpose of this study is to assess the vulnerabilities, i.e., social, economic, and attitudinal, examine risk perception, and identify coping and adaptive strategies of three different ethnic groups against climate change and natural hazards. The study identifies three different ethnicities based on linguistic differences, i.e., Punjabi, Pashtun, and Hindko groups, as per their population statistics. The identified ethnic groups are well reflected by Attock, Swabi, and Haripur for Punjabi ethnicity, Pashtun ethnicity, and Hindko ethnicity, respectively. Based on well-defined indicators for each dimension, indices were developed, and a detailed household survey was conducted for three ethnicities. The study analyses the obtained data using descriptive statistics, and to correlate the three different ethnic groups variable, a correlation coefficient chi-square value and P-value is checked.

It is apparent from the study that in some situations, cultural beliefs and perceptions become a factor of survival for different ethnic groups. In contrast, in some cases, they act as a barrier to effective DRR activities. The study emphasizes those ethnic-based DRR activities as a procedure to integrate with beliefs to effectively manage disaster risk.

Key word: *Ethnicities, Vulnerability assessment, risk perception, disaster risk reduction, natural hazards, climate change, Pakistan*

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Chapter 1 . Introduction

1.1 Background

The word ‘ethnicity’ explains the individual race, origin, and general identity, determining how member of ethnic group tackle issues or threats in their daily lives. Ethnic communities play an important role in how societies react to threats and catastrophes. Variation in exposure and vulnerability are the factors that affect how ethnic groups are affected by hazards and disasters. Variation in exposure is influenced by location, level of education, poverty, income, and hazardous settlement. Cultural perceptions play a vital role in persuading the manner ethnic groups react to threat in their communities and play an important part in disaster risk reduction. Disappointment to recognize the effects of public’s ethos leads to amplified susceptibility to threats. The Culture of people forms a center for knowledge and passes from one group to another group. This knowledge is ‘local’ to people, tribes, ethnic groups, or communities.

Disaster is defined as abrupt actions that bring sudden disturbance to a culture with anthropological, physical, financial, and environmental sufferers or effects that surpass the skill of exaggerated community to handle up with utilizing their particular possessions. Disaster is a condition or an incident that overwhelms the ability of the exaggerated community, which pursue state and global assistance. In disaster management, the application of suitable disaster risk reduction action is inevitable. The Absence of significant DRR procedures could lead to huge destruction and harm to humans, material and could hinder the monetary property of the society.

1.2. Problem statement

Cultural perceptions shape individual actions in case of emergency. The research aims to understand the perception of households in rural areas of Pakistan towards matters of climate change and hazards in their respective groups. Climate change and natural hazards are phenomena that cause substantial damage to human socio-economic conditions. Its occurrence, consequences, and its impacts need to understand to lessen its negative effects in communities. Therefore, individuals' response to danger or any emergency is mainly influenced by their ability to resist using available resources and knowledge. These insights are inspired by a variety of aspects from within and outside the community. Household's perception of dangers and calamities typically show a vital part in shaping the impacts within the community. These observations are shaped within the community and regarded as native awareness. To assess the perception of the household of community, the investigation targets accepting the parts played by beliefs and culture in disaster risk reduction in the societies. Indigenous knowledge of respective societies sometimes responsible for their survival, while in some cases, it enlarges consequences of danger due to the absence of proper integration in disaster risk reduction. The study goal is to explain how native people respond to the adverse impact of hazards and climate change. In order to lessen the adverse impact of climate change and natural hazards, local understanding knowledge of communities, perceptions, and adaptive strategies of ethnic groups need to examine in rural communities of Pakistan.

1.3. Rationale of the study

To provide valuable knowledge at a local level, cultural beliefs and values form a key fragment of people's ethnicity. The importance of this indigenous knowledge is mirrored from the Sendai framework of disaster risk reduction (SFDRR) and the Hyogo Framework of Action HFA. The HFA priority 1 (use of education, innovation, and knowledge to construct a culture of welfare and resilience at all levels) asks for the utilization of local information collected from all participants at all levels to ensure safety and resilience. This information includes local knowledge from the communities and scientific data from the experts. The SFDRR priority 1 (understanding disaster risk) stressed the need to '' certify the use of local, traditions, and native knowledge and practices as appropriate, to complement scientific knowledge in disaster risk assessment and the improvement and implementation of plans, strategies, program, and policies''. All the priorities for action in both HFA and SFDRR present the importance of sustainable development. Based on this evidence, the research aims to understand the local approaches to disaster risk reduction activities within rural areas of Pakistan.

1.4. Conceptual Framework

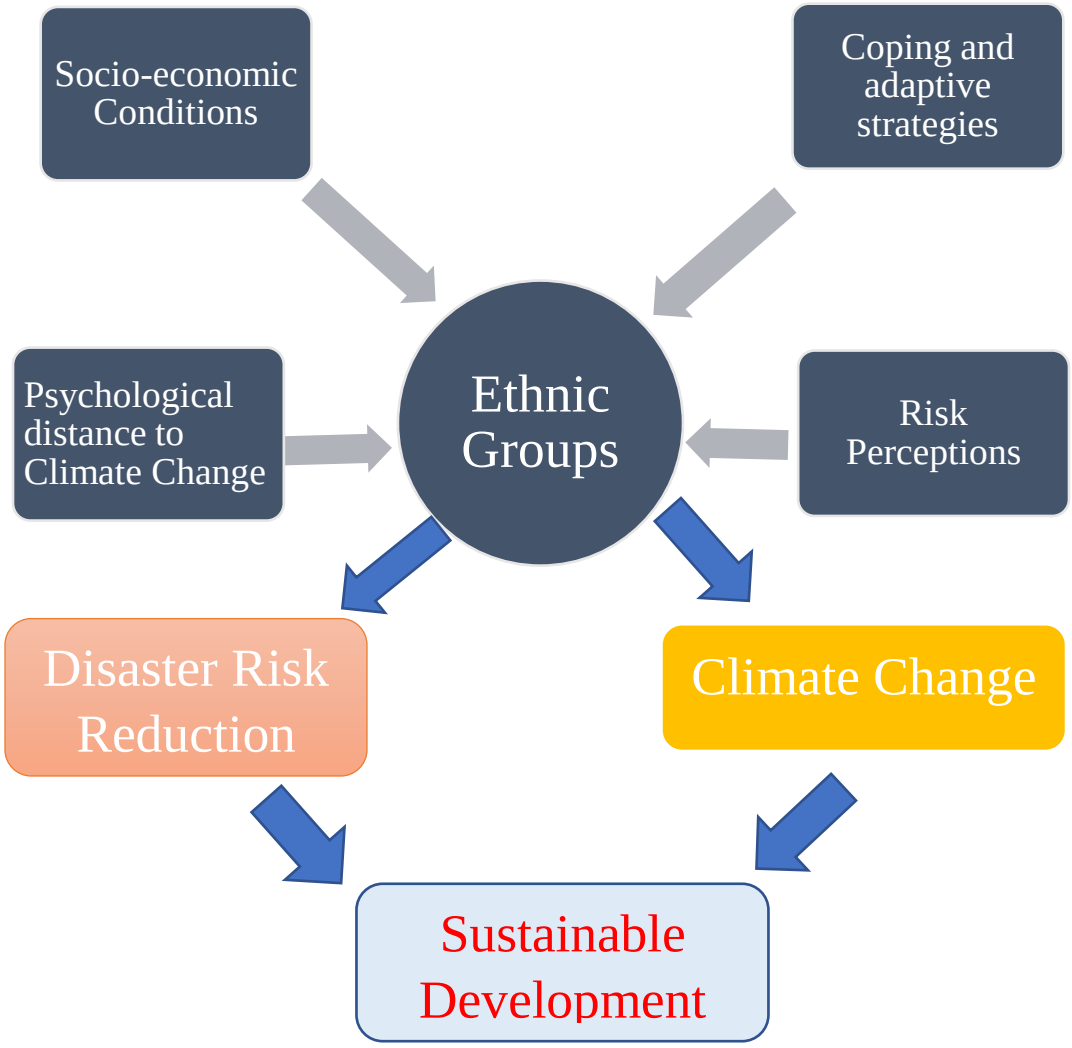


Figure 1.1. Study Framework

1.5. Research questions

The questions of the research study are;

Q.1. How to examine vulnerability assessment of three different ethnic groups regarding climate change and natural hazards?

Q.2. How to analyze risk perception assessment against climate change and natural hazards among three different ethnic groups?

Q.3. How to examine coping and adaptive strategies for three different ethnic groups?

Q.4. How to examine the psychological distance to climate change of three different ethnicities?

1.6. Research objectives

The objectives of the research study are;

1. To examine vulnerability assessment of three different ethnic groups regarding climate change and natural hazards.
2. To analyze risk perception assessment of three different ethnic groups regarding climate change and natural hazards.
3. To examine coping and adaptive strategies of three different ethnic groups.
4. To examine psychological distance to climate change of three different ethnicities.

1.7. Scope of research

This research takes an interdisciplinary approach to assess the perception of three different ethnic groups of Pakistan. It also determines their coping and adaptive strategies to cope with the adverse impact of climate change and disaster. The research is carried out at the household level in rural areas of Pakistan. From the pro-Arian group, Punjabi, from Iranian group, Pushto, and another ethnic group Hindko is select. The

research can be extended from household level to regional, national and international level dependent on resources and time constraints.

1.8. Summary

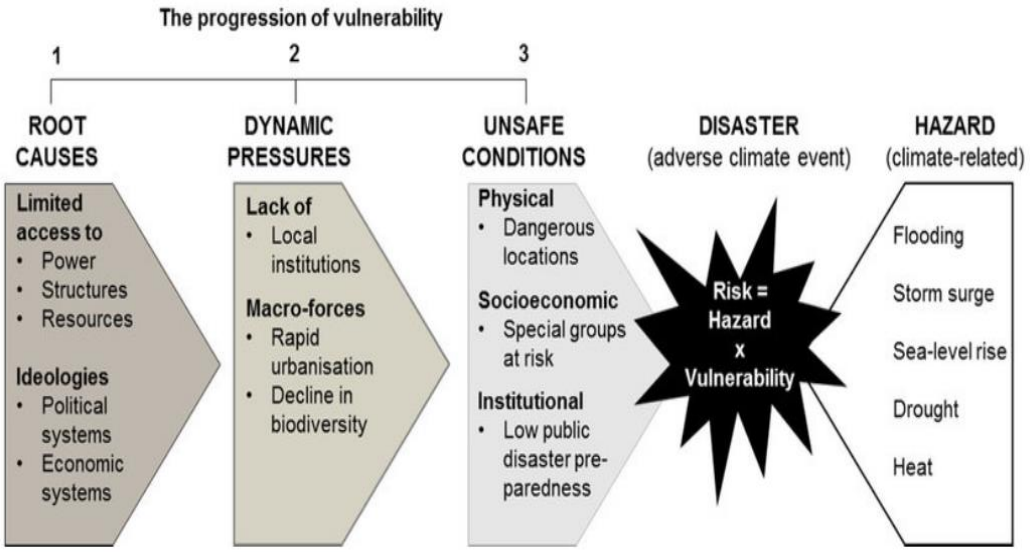
Ethnicities can use to indicate social differences among people. Their cultural indicators involve values, beliefs, knowledge, and habits which determine how the member of ethnic groups tackles the issue in their daily life. Disaster is a situation, which exceeds the capacity of the affected community to utilize available resources and persuade local and global assistance. In disaster risk management, the application of suitable DRR is inevitable. The study is conducted to explore the perceptions, socio-economic characteristics of the household, and local knowledge of ethnic groups of Pakistan; and to assess their coping and adaptive strategies. The importance of the study is reflected from the priorities of the Hyogo Framework for Action (HFA) and Sendai Framework for Disaster Risk Reduction (SFDRR). The research framework is the convergence of socio-economic conditions, local knowledge, risk perceptions, awareness, and capacities of the three ethnic groups (Punjabi, Pashtun, and Hindko), towards disaster and climate change which ultimately led to sustainable development. The objectives of the research are to assess the perceptions, local knowledge, and capacities of three ethnic groups of Pakistan. The limitation of the study is that it is household level of ethnic groups rather than communal level.

Chapter 2 . Literature Review

Since the 1970's a mounting figure of literature has highlighted the reputation of DRR, including local information and observes in the expansion and preservation projects. For example, in December 2002, inhabitants of Tikopia island in the Solomon island hit by cyclone Zoe lived using old indigenous performs of traditions and housing and taking lodging under a pendulous rock on higher ground as the whirlwind hit. The NDMO and related intercontinental agencies assisted their post-disaster rebuilding. The Indigenous population has accustomed their living to adjust steady revolution for periods, but the global pressure has knowingly changed people's political, social, economic, and environmental context.

The research aims to understand the awareness and perception of the household in different ethnic groups of Pakistan. It also tries to assess the coping and adaptive strategies of different ethnic groups to cope with the adverse impacts of disaster and climate change. It aims to understand what makes a household vulnerable to hazards, disasters, and the impacts of these disasters. To conceptualize these issues, the literature adopted two key frameworks and one guideline toward the goal of research. The pressure and release (PAR) model presents the progress of vulnerability from a root cause to an unsafe condition. The ASP (adaptive social protection) model supports the requirement of policy interference for local people who counter new and recurring hazards. It brings together the element of disaster risk reduction (DRR), climate change adaptation (CCA), and social protection for effective vulnerability reduction. The sustainable livelihood approach (SLA) is an approach that analyses the utilization of

vital assets/resources available to the household that could help in reducing vulnerability, manage the impacts of disaster and promote sustainable livelihood. The research uses methodological approaches from social sciences and other disciplines. However, it is necessary to consider that the research outcome depends on the perceptions of the household from specific local communities and key stakeholders.



The Pressure and Release (PAR) model The PAR model explains how disasters (here, adverse climate events) are shaped by structures and processes distant in space and time. Adapted from Wisner et al. (2004).

Figure 2.1. Pressure and Release Model

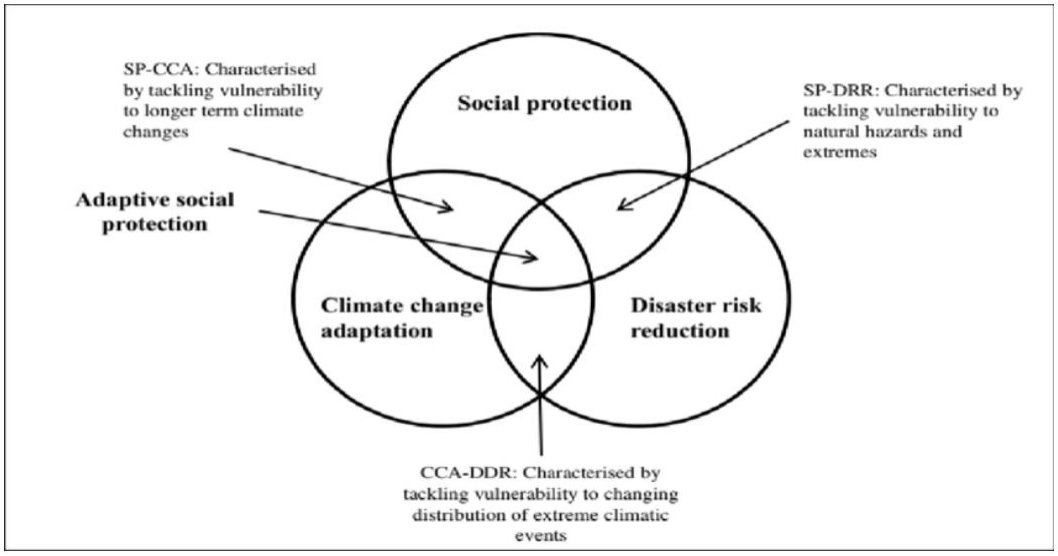


Figure 2.2. Adaptive Social Protection

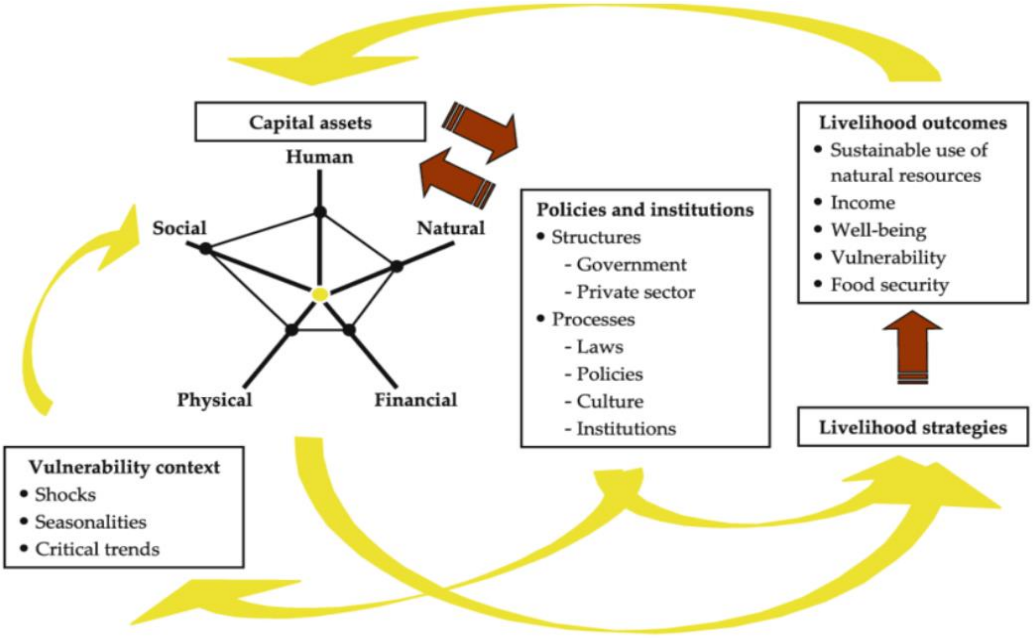


Figure 2.3. Sustainable Livelihood Approach

2.1. Understanding hazards, disaster and disaster risk reduction

Hazard is a condition or situation that leads to harm, loss of livelihood, fluctuation in the economy, and destruction of the environment. A combination of elements of vulnerability and hazards leads to the risk of disaster occurrence. UNISDR describes vulnerability as “the circumstances and characteristics of community, assets or system that makes it susceptible to the damaging effects of hazards”. A society is more susceptible when the capacity or strength to prepare, cope, resist and recover is absent when a disaster takes place. Several factors contribute to the vulnerability of the community that presents the level of exposure, age, gender, income, occupation, social affiliation, and location of an ethnic group. Moreover, it is the product of poverty. Susceptibility measurement not just determines the immediate impact of disasters but also determines the effect on future communities.

Disasters are the disruption, which cripples the normal running/processes of society and causes material, economic, environmental, and human loss, which exceeds the capacity of the affected community to cope or resist using available resources. However, disasters are classified as natural disasters, human-made disasters, and hybrid disasters. It is claimed that there is no ‘’ natural disaster’’ but a natural hazard. The evidence is that the poor relationship between environment and individual in the society leads to enhance vulnerability, thereby causing natural hazards to convert into natural disasters. Natural hazard-causing disasters are frequently occurring in developing countries as compared to developed states. Many countries experience one form or other

form of disaster. Overall, people in less developed countries are susceptible to hazards and climate change than develop states societies.

Disaster Risk Reduction Strategy for Small Island Developing States (SIDS) is clear that together with the corporal threat, the interconnected anthropological, general, and enlightening aspects adjacent to this risk also essential to be reserved under explanation. Disaster Risk Reduction views disaster as a socio-economic and political basis rather than expected. It can be seen as; '*the methodical expansion and submission of strategies, policies, and performs to curtail susceptibilities, threats, and the relating disaster impact all over society in the wide framework of sustainable progress.*

Over the previous decade's normal threats (natural hazards) have produced wide victims and compensations to human livelihood tangible services and socio-economics situations of affective community. E.g., flood in Pakistan (2010), earthquake in Italy (2009), hurricanes in New Orleans (2005), and Indian Ocean Tsunami (2004). These natural hazards have augmented vulnerabilities, stresses of people, and disapprove individuals and culture. It also disturbs individual, society's progress even in the large run. However, the grade to these ordinary hazards to be measured as '' NATURAL'' is being interrogated. In support of Barth (2010), state that, ' natural hazards only cannot cause potential sufferers and compensations to the human and material but unwell achieved communication amid society and environment pay to natural risks into ruin. Stress and susceptibility of the public towards a disaster can be rest upon the factor related to both tangible and fundamentals of community. Hence, it is agreed that 'natural disasters' are also shaped by humans by the growing susceptibility of the community,

public towards dangerous material procedures by erecting a hazardous building, congestion, poverty, dense population, poor urban planning. Thus, seeing natural hazards as an event outside human regulation is being confront but the source cause of disorder is estimated to discover operative answers of curtailing the wounded and reimbursements socio-economic activities. Despite the threat and fatalities from natural threats, sometimes, people don't ascribe ample implications for them. For example, why do some people reside on the slope of the dynamic volcano. Bestowing to Anthropologists, cultural factors influence behaviors of communities when fronting to a risk -when they are during the condition of a hazard. Public not only deliberate the risk that they could come across but give prioritize to aspects like social norms and standards, spiritual beliefs, civilizations, and attachment to a location.

2.2. Concept of culture

During Indian Ocean Tsunami, the reputation of culture towards disaster was chiefly emphasized. In the year 2004, when the tsunami hits south Asian Coastal lines, some communities with native information effectively endured, while the migrants and tourist who had little local information were highly affected. People assume culture in changed views/ways, and some claim that it is problematic and multifaceted to defend. Understands culture as the definitive method of undertaking things or finding ways. Anthropologists sight the globe as social diversity, of old-style culture and hereditary standards. Edward Taylor, a well-known anthropologist, claims culture as a complex whole being including beliefs, morals, values, knowledge, arts, regulation, tradition, or any abilities and behaviors attained by a man as an associate of society. Likewise, it sees

culture as a tool kit containing stories, rituals, signs, and worldviews which the public may practice in unlike circumstances. These fundamentals of culture provide guidance and pass down from one generation to another to continue in civilization. Defines culture, 'as the shared denominator that shape the activities of people involved to a group or not. Due to this durable connection between "culture' and 'group' they cannot happen without others.

2.3. Components of culture

There are two types of Culture;

2.1. Tangible culture

2.2. Non-tangible culture

Material/tangible culture comprises physical creations those members of society make. Where non-material/intangible culture is based on abstract and impalpable human makings of civilization that impact popular conduct. Physical principles can designate your character, for example, the clothes we wear. Around extra cases of substantial culture; include crafts, historical buildings, and sites. Non-material ethos consists of values, beliefs, language, family patterns, and role of behavior, political system, and network.

The main component of non-material culture is symbols, language, values, and Norms, etc. Many Researcher asserts one of the essential features of ethos as its generational alteration of component of culture, values, information, principles, and standards.

2.4. Culture and Livelihood

Culture is strictly related to livelihood adoptions and prospects. Livelihood encompasses skills that assert both palpable and incorporeal properties and actions required for a means of alive. Numerous emphasizes the cultural influences near maintainable livelihood. They asked that the constituent of living need to comprise in culture in totaling to gears as social capital, human capital, financial capital, natural capital, and corporal capital. Considering the livelihood outlines of various civilizations, they depend on abstract possessions such as civilizations and customs, facts, principles, services, communal, institution, language, and identity. Research grounded in Pacific island designated robust connections between culture and livelihood and highlighted that livelihood must effort within traditions and culture. The study recognized numerous issues that could affect culture such as, Hazard and susceptibility, Incentives people respond to, Access to govern of possessions, Choice and success of livelihood policies, Societal norms, Traditional politics, Gender roles and relations.

2.5. Culture concerns in DRR

It is estimated that around 200 million people are affected by natural hazards every year because of climate change. It is also extrapolated that around $314 billion will be lost in annual damages and losses by 2030. A 7.1 magnitude earthquake in Mexico (2017) represents 20% of the overall monetary losses. Also, in the 2015 Nepal earthquake, the total economic loss to tangible heritage accounts for $169 million.

The DRM previous framework for post-crisis recovery are;

1. The Sendai framework.

The framework demands,

a) The incorporation of culture outlook in rules and applies.

b) A sympathetic of the impact on social legacy when a specific hazard event occur.

c) The fortification of social societies and other ancient and religious legacy.

d) The complementing of scientific knowledge with the traditional, indigenous, and local knowledge practices in DRM.

ii. The joint Declaration on post-crisis assessment and recovery planning.

EU commission, the UN, and the World Bank to foster more collaboration and to progress a mutual approach for post-crisis valuation and regaining planning, signs it.

The two main instruments include;

a) The use and development of post-disaster needs assessment (PDNA's) and regaining outlines that raised out of the damage and loss assessment (DALA) procedure in post-disaster settings.

b) Recovery and peace-building assessment (RPBA) for conflicts situation.

iii. DaLa and PDNA's Methodologies.

Damage and loss assessment and post-disaster need assessments were developed to consolidate information in a range of vital areas, the economics of physical impacts of a disaster, the poverty and vulnerability impacts, high import needs for rebuilding

after a catastrophe or peace building later a skirmish and related regaining significances and needs.

iv. PDNA guideline for the culture sector.

The guidelines develop in 2013 and include detailed implementation procedures that involve men and women of all ages and social groups in decision making while promoting human-right practices and increased social equity.

PDNA's lays the foundation for the refurbishing of the pre-disaster state, alliance of the principles sector, and sustainable rebuilding by talking about the holes in the segment identified during assessments.

v. Disaster Recovery Framework.

The (GFDRR) in partnership with the EU, UNDP, and the World Bank, launched a disaster recovery framework (DRF) in 2014. DRF offers a flexible methodology adoptable to the country's own control for developing a national framework to rebuild and recovers after a disaster.

2.6. Concept of Ethnicity

The division of people in a society based on ranks, color, income, language, and religion, etc., is called ethnicity.

An **ethnic group** or **ethnicity** is a named social category of people who identify with each other based on shared attributes that distinguish them from other groups, such as a common set of

traditions, ancestry, language, history, society, culture, nation, religion, or social treatment within their residing area

Ethnicity can be an inherited status or based on the society within which one lives. Membership of an ethnic group tends to be defined by a shared cultural heritage, ancestry, origin myth, history, homeland, language or dialect, symbolic systems, such as religion, mythology- ritual, cuisine, dressing style, art, or physical appearance. The elements of ethnicity are presented in the below figure 5.

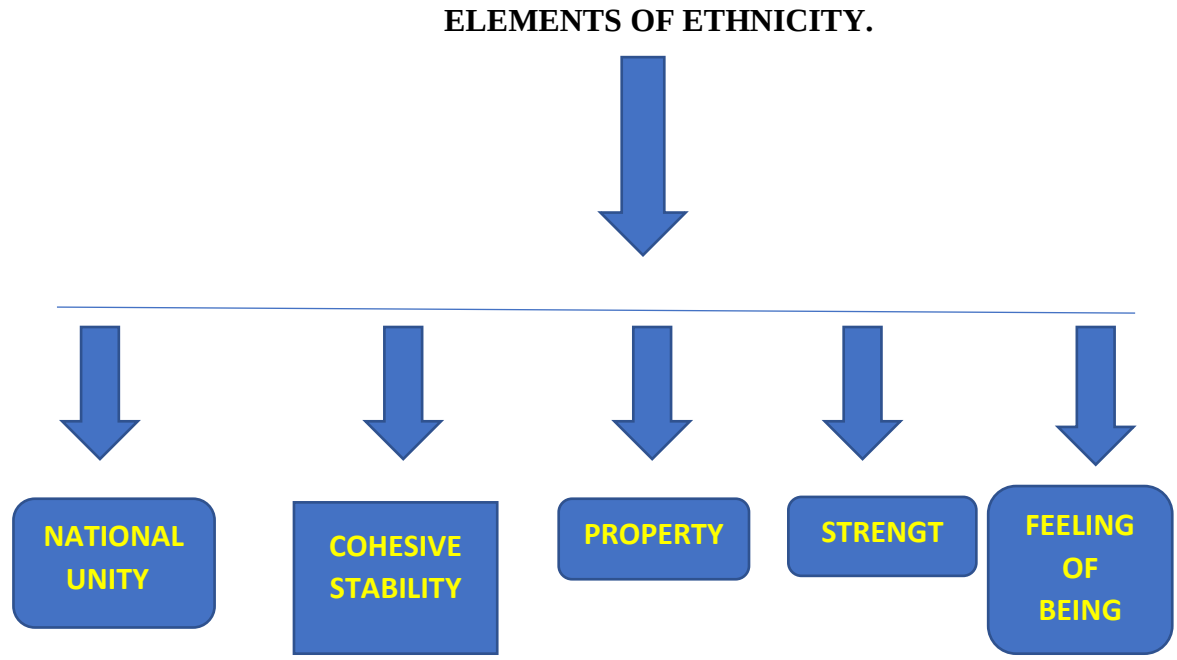


Figure 2.4. Elements of Ethnicity

2.7. Case Studies

Hydrological and meteorological disasters are responsible for 59 percent of all disasters in sub-Saharan Africa in the early 2000's. Flood contribute to 90 percent of people affected by the disaster. Flood not only cause loss to livelihood and lives but also caused chloric diseases such as malaria and cholera. Drought is another big issue of sub-

Saharan Africa, accountable for about a million deaths in Africa since the 1970s. The Sahel region of Africa was affected by the frequent flood, which continued for 30 years and caused devastation in the region. In Ethiopia, the drought claimed 250,000 lives and 50 percent of livestock loss from 1970 to 1974. Droughts in the Horn of Africa led to the death of a million people, and deaths are usually the result of famine.

Due to global warming, the heatwaves in Africa led to destruction of infrastructure, led to the danger of infection in elderly people and young children. and caused death from hyperthermia (High temperature) . Wildfire destroys farmland, livestock, homes and causes death in Africa. Wildfires account for the damage of 60 million hectares of land on a yearly basis. From earthquake and volcano eruption in the Democratic Republic of Congo to the flood in Ghana and Nigeria and the severe droughts in Somalia, the African continent is one, which is in battle with nature. 20 percent of world disasters and 60 percent of disasters related death occurred in Africa.

Climate change has had an adverse effect on the population of Nigeria. Disasters such as flooding, desertification, wildfire, landslide, rainstorm, and erosions led to considerable loss of lives and livelihood across the state. The vulnerability of households to the impacts of disaster continuously grew and affected. Climate change adversely affects the livelihood of the rural communities, thus depleting food sources and reducing resources. Recently, the biggest disaster Nigeria faced is flooding which has a catastrophic effect in northern states such as Bauchi. The flooding caused destruction to farmland, roads, and houses and caused loss of lives. Disasters in Nigeria have threatened sustainable development, and much essential to finance more in moderating

the effect of disasters in the country to ensure exposure is reduce. This will expand the economy and support livelihood. It is imperative to note that the main reason for disaster in Africa is poverty and the inability to use resources to sustain livelihood. Between the ’90s and 2010, the figure of individuals living below the poverty line drops from 56 percent to 48 percent

2.8. Identifying indigenous and scientific knowledge in DRR.

The first step of identifying scientific knowledge and indigenous information in Disaster Risk Reduction can effectively be amalgamated. Has established a framework for scrutiny of local knowledge and for data collection related to disaster preparedness;

Table 2-1: Indigenous Data structure

Indigenous Data Structure					
Composed of	**Influenced by**	**In context of**	**Resulting in**	**Based on**	**With effect in**
Knowledge • Technical • Historical • Ecological	**Structure** • Level of government • Private sector.	**Natural hazards** • Cyclone • Earthquake • Flood • Landslide	**Disaster preparedness** At the local level.	**Observation** • Nature and history of natural hazards. • Growth of people social and physical vulnerabilities	**Livelihood security** • Income level • Food security • Environment

Practice	**Process**	**Global Factors**	**Community Resilience building**	**Version**	
• Individual and community level. • Technical and non-technical. • Short term and long term	• Cultural • Institutions • Law • Policy	• War • Climate change • Migration • Population		• Socio-economic assets. • Financial resources • Physical assets.	
Belief and Values • Socio-economic beliefs. • Religious beliefs • Respect and humanity				**Statements** • Stories and songs • Taboos ceremonies • Local arts	

The Framework help in recognizing the connection between indigenous knowledge and disaster risk reduction. This framework allows an investigation of indigenous knowledge and it use in disaster alertness. At the same time, practices the term ‘’ Disaster preparedness’’ and the author of this paper, Jessica Mercer et al. (2009) use the term disaster risk reduction as defined above to involve all appropriate methods to lessen vulnerabilities to disaster, including disaster preparedness. However, it does not explain how this information should be applied together with technical knowledge to decrease public vulnerability to ecological dangers.

This paper recognizes how this may be achieved through progress of outline recognizing how native and systematic facts may be combined to lessen public

susceptibility to ecological risks, especially in Small Island Developing States SIDS. The expansion of the background seems from contributing work within three countryside societies in Papua New Guinea (PNG) namely, Kumalo (population 565), Singes (population 296), and Baliau (population 297) located in Marobe and Madang provinces. Landslides, flooding, and volcano eruption have exaggerated these groups correspondingly.

2.9. Summary of chapter

The research aims to understand the awareness and perception of the household in different ethnic groups of Pakistan. It also tries to assess the coping and adaptive strategies of the different ethnic groups to handle with the adverse effects of disaster and climate change. It aims to recognize what makes a household susceptible to hazards and disasters and the impacts of these disasters. The literature adopted two key frameworks and one guideline toward the goal of research. The pressure and release (PAR) model presents the progress of vulnerability from root cause to an unsafe condition. The ASP (adaptive social protection) model supports the requirement of policy interference for local people who counter new and periodic threats. It brings together the element of disaster risk reduction (DRR), climate change adaptation (CCA), and social protection for actual vulnerability reduction. The sustainable livelihood approach (SLA) is an approach that examines the utilization of vital resources accessible to the household that could help in decreasing exposure, manage the impacts of disaster and promote sustainable livelihood. The research uses methodological approaches from social sciences and other disciplines. However, it is necessary to consider that the consequence

of the research is reliant on the perceptions of the household from particular local communities and vital stakeholders.

Chapter 3 . Research Methodology

3.1. Introduction

The chapter outline all the method, tactics, and approaches that have been used in the study. It also outlines the aims and objectives of the research and explains different approaches to be used for data collection. The chapter also explains the study area of research, data sampling, and data collection using questionnaires and the analyses of the collected data. The literature tries to understand disasters from an African perspective, represents conditions and factor that shape how a member of the community perceives disaster, the importance of local knowledge, and understanding all stakeholders notions. It is understood that the effects of disasters due to climate change are on the rise, especially in developing countries. Thus, communities within developing countries must cope or adapt using native information and plans for survival (Wisner et al., 2012). Societies are shaped by shared beliefs, ethnic affiliations, geographic location as well as political notion (Fair et al., 2013)

3.2 Research Design.

In order to fulfill the aims and objectives of the study, a mixed-method approach is used for this research, which ensures all the concepts and aspects of the research. This research is conduct to assess the perception and local knowledge of ethnic groups of Pakistan. It also identifies their capacities to cope or resist and their psychology to the adverse impact of disasters and climate change. The ethnic groups for this study are Punjabi, Pashtun, and Hindko groups, i.e., Attock, Swabi, and Haripur region,

respectively. After detailed literature, the research used qualitative and quantitative approaches to gathered data from these ethnic groups.

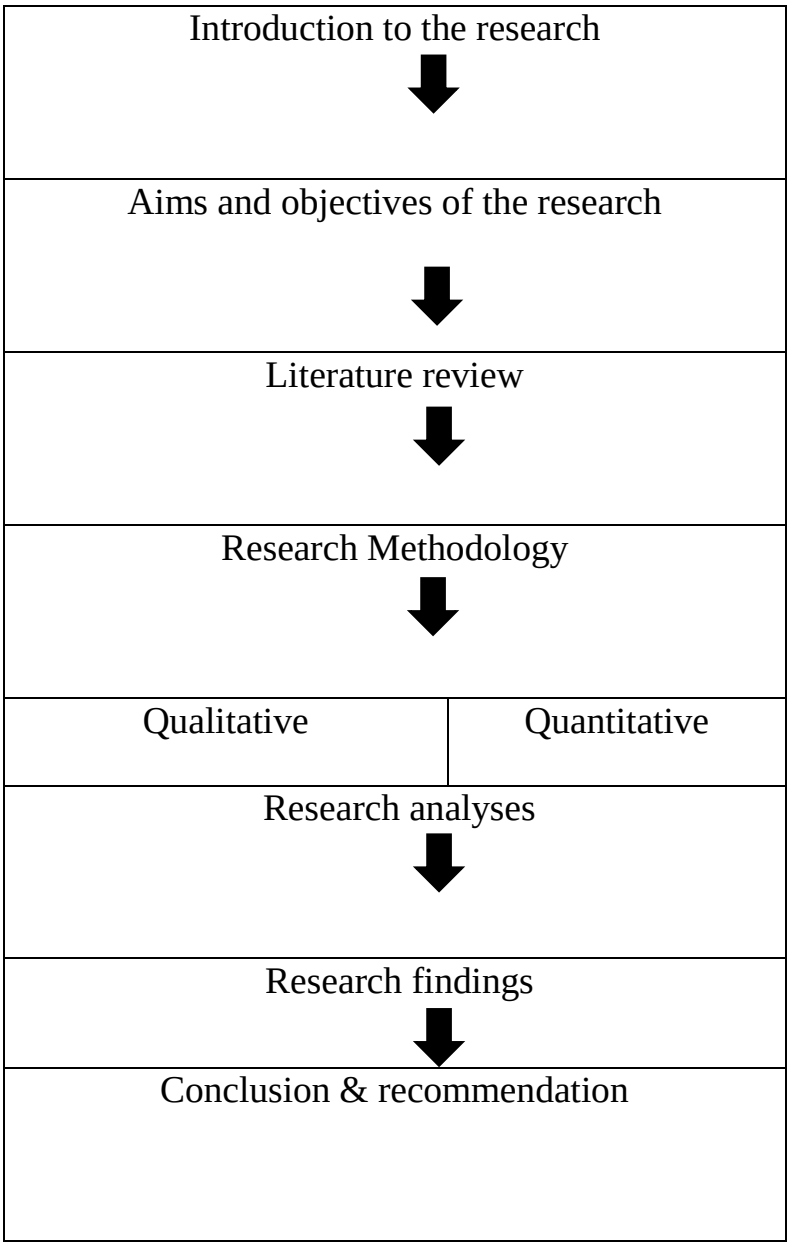


Figure 3.1. Research Design

Hazard is a condition or situation that leads to harm, loss of livelihood, fluctuation in the economy, and destruction of the environment. A combination of elements of vulnerability and hazards leads to the risk of disaster occurrence.

3.3 Study Area Selection

In order to study the perception and knowledge of ethnic groups of Pakistan, the researchers selected three rural areas of Pakistan based on their language difference. From Indo-Arian group, Punjabi, from Iranian group, Pashto, and another ethnic group including Hindko are selected.

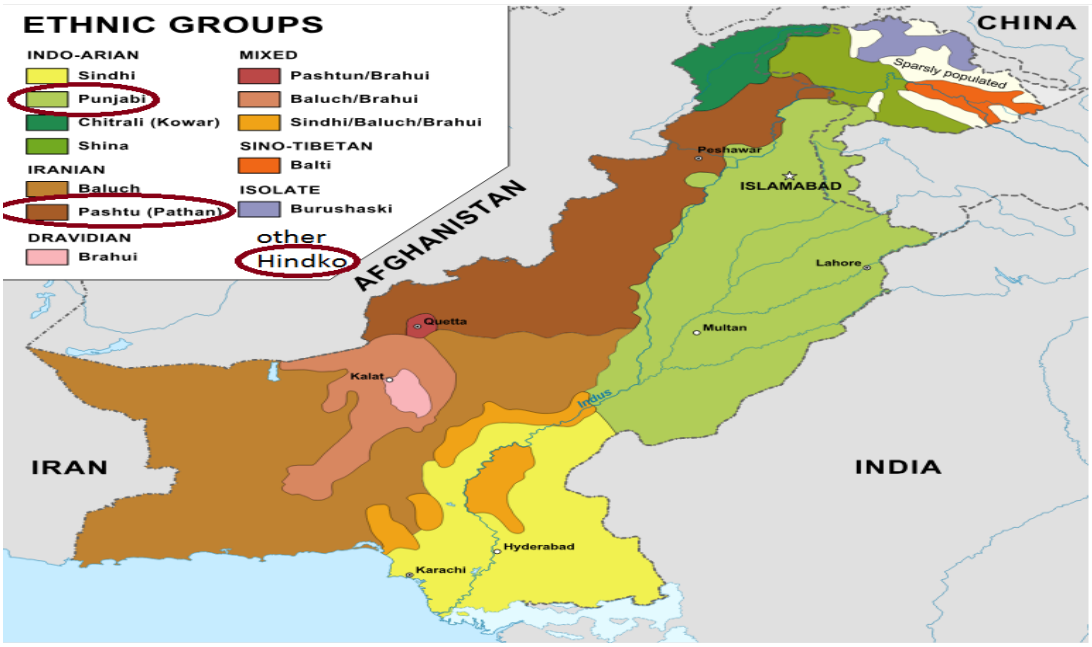


Figure 3.2. Pakistan ethnic groups, PBS-2017

For Punjabi, Pashto, and Hindko ethnic groups, three rural areas are chosen based on linguistics differences, i.e., Attock, Swabi, and Haripur, respectively. The census history of the major languages of Pakistan is below figure 3.3.

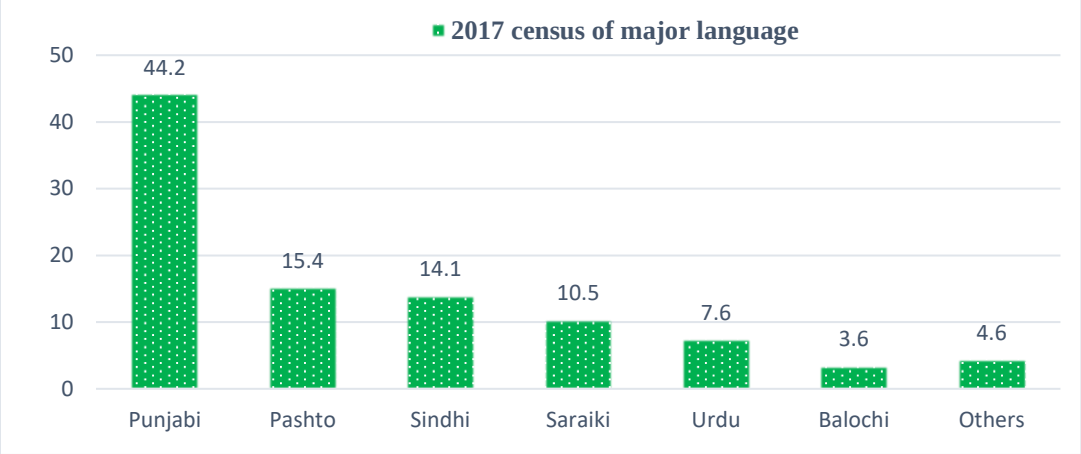


Figure 3.3. PBS- 2017 Census of major language

3.3.1. Punjabi Ethnic Group.

In order to study the Punjabi ethnic group, the Attock region is select for this study. Attock is a district in the Potohar plateau of the Punjab province of Pakistan. The district was created in 1904, and today it consists of six tehsils. The total area of the region is 6857 Km^2. The population of Attock is 1,883,556, and the density of the population is 270/ Km^2.

It is located in the north of Punjab province. Swabi and Haripur are in the north, Kohat to its west, Rawalpindi to its east, and in the south, it is bordered with Mianwali.

As per the 1998 census, 87 percent of the population identified their first language as Punjabi, 8.3 percent speak Pashto, and only 1.1 percent speak Urdu.

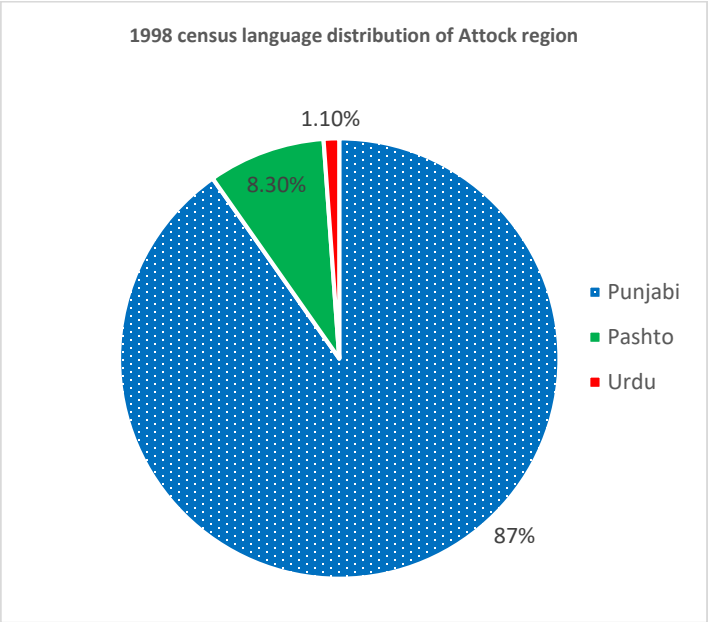


Figure 3.4. Language proportion of Attock

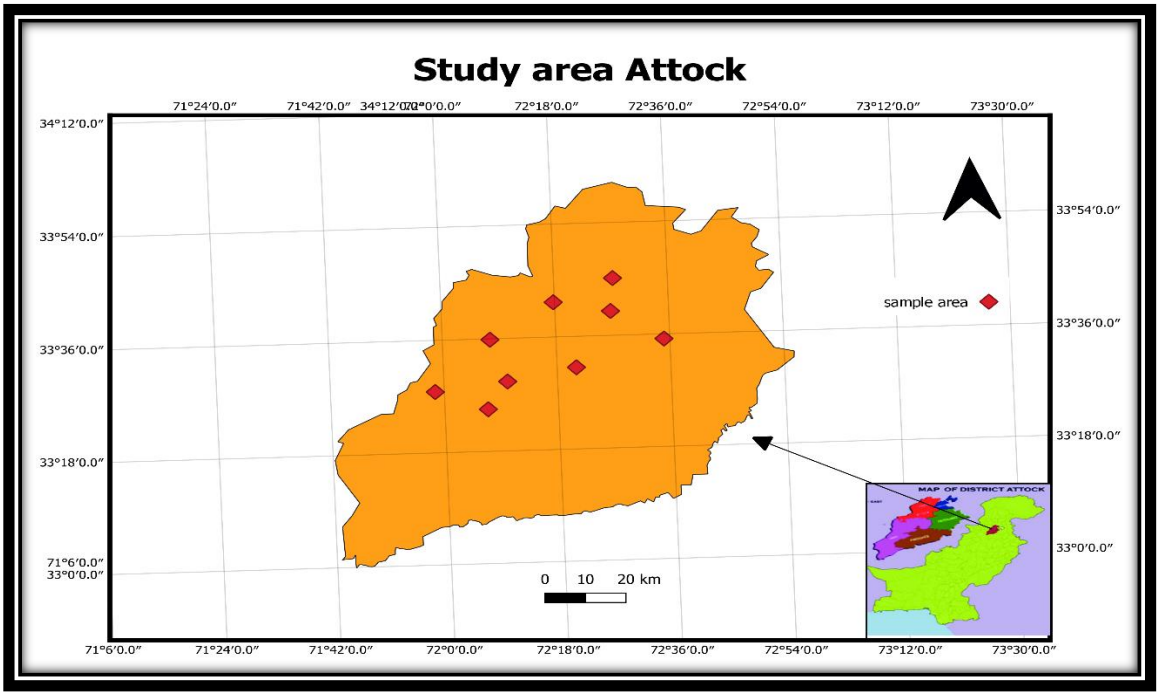


Figure 3.5. Punjabi Ethnic Group

3.3.2. Pashto Ethnic Group.

In order to study Pashto ethnic group, the Swabi region is selected for this study. The Swabi region lies between Indus and Kabul rivers. It became a district in 1988- before it was a tehsil of Mardan district. Currently, it consists of four tehsils. The total area of the Swabi region is 1,543 Km^2. The population of the region is 16,24,616, and the density of the population is 1100/ Km^2.

It is located in the province of Khyber Pakhtunkhwa. In the north Buner, north east Mardan and south east Nowshera and in the west Haripur are located.

As per the 2017 census, 96 percent of the total population speaks Pashto as their first language, while 4 percent speak other languages.

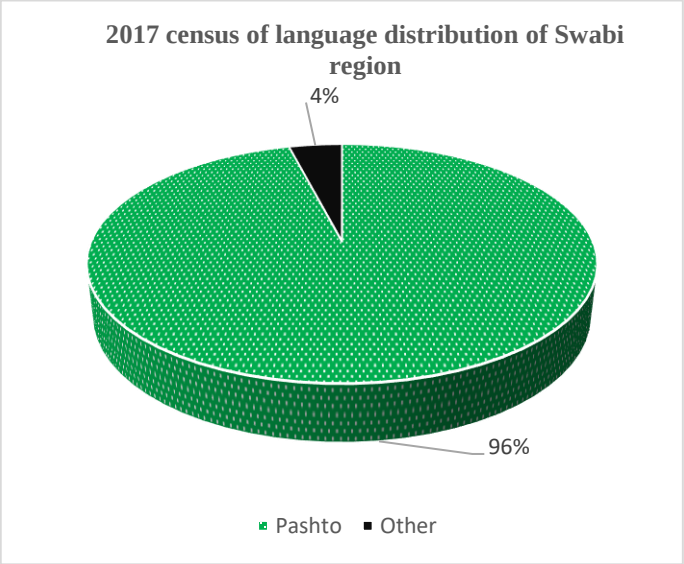


Figure 3.6. Language proportion of Swabi region

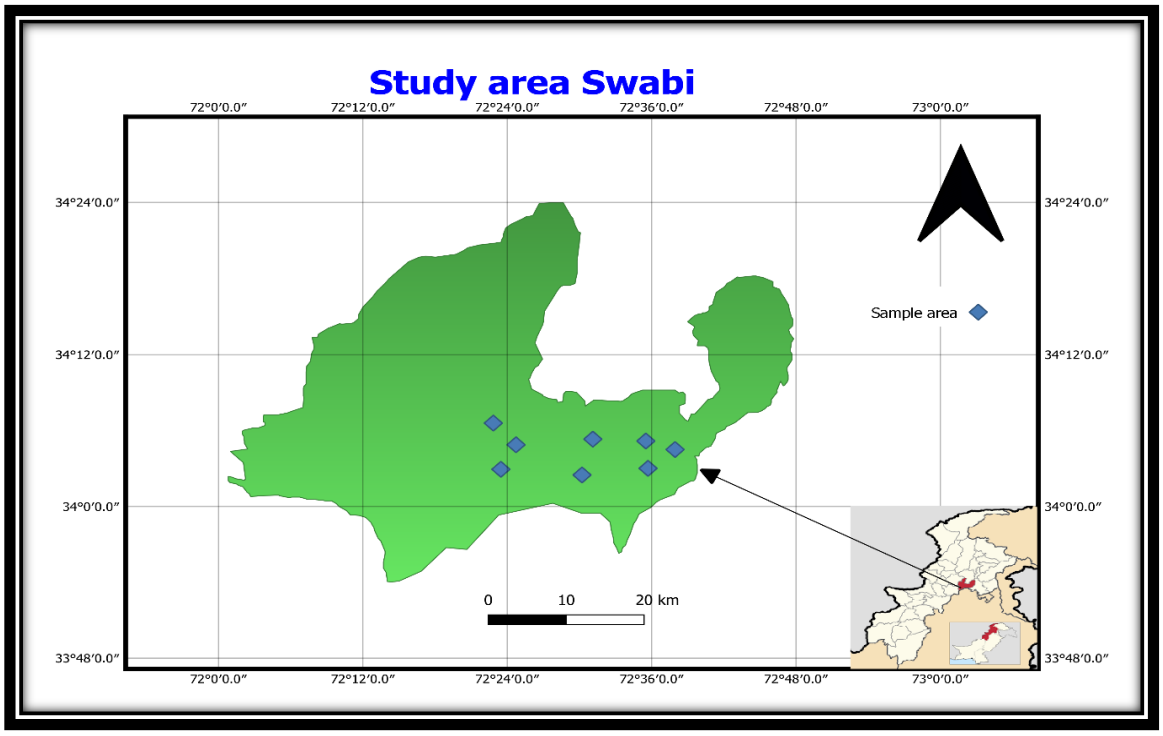


Figure 3.7. Pashtun Ethnic Group

3.3.3. Hindko Ethnic Group.

In order to study Hindko ethnic group, the Haripur region is chosen for this study. Haripur region is the main district of Hazara division, Khyber Pakhtunkhwa, Pakistan. Swabi and Buner are located in the west, in the north Abbottabad and in south Islamabad. The total area of the region is 1725 Km^2. The population of the region of the regions is 1,003,031, while the density of the population is 580/ Km^2.

According to the 2017 census of Haripur Tehsil, the predominant language is Hindko-89 percent of the population speak Hindko, 7.6 percent speak Pashto, and only 1.3 percent speak Punjabi.

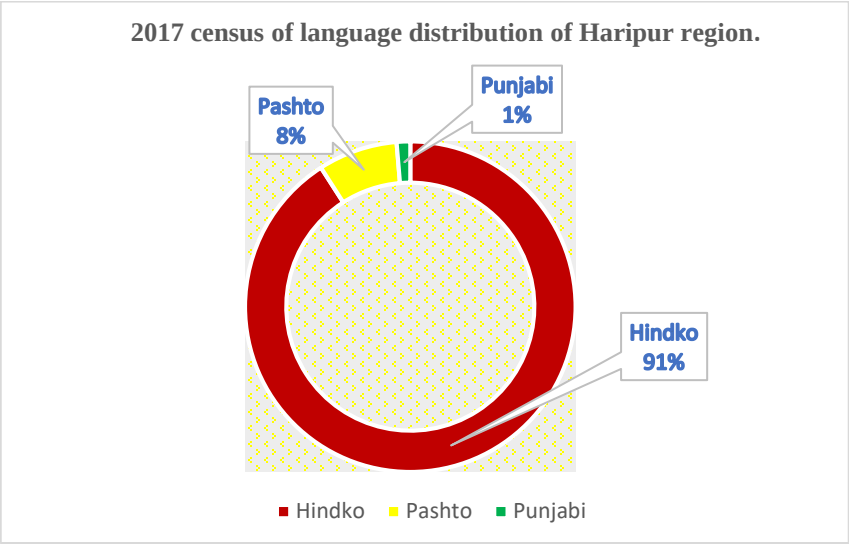


Figure 3.8. Language proportion of Haripur

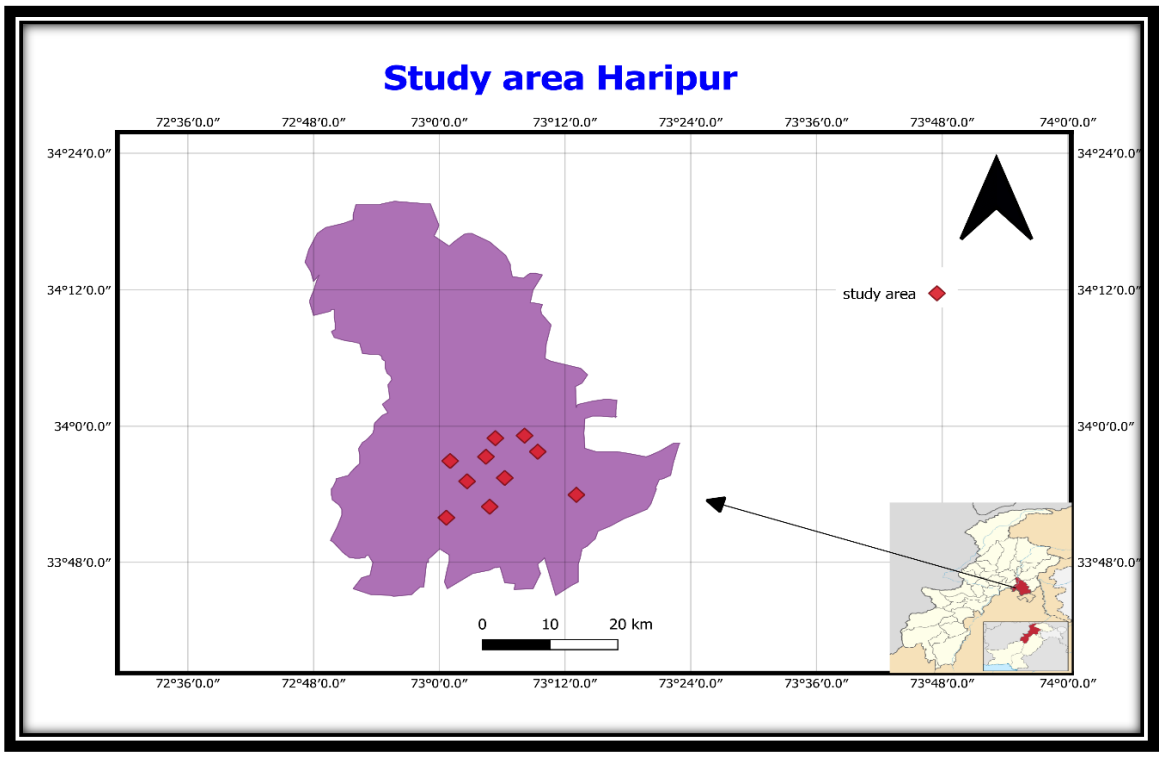


Figure 3.9. Hindko Ethnic Group

3.4. Selection of Indicators

The most vital dimension of vulnerability focusing on this study is social, economic, and attitudinal vulnerability. Twenty indicators were used to assess the social vulnerability of ethnic groups. For assessing economic vulnerability, seven indicators were used in this study. Furthermore, this study focused on attitudinal vulnerability, for which 3 indicators were taken by this study how attitude and behavior of three ethnic groups affect their vulnerability.

Regarding risk perception, four indicators were used to assess the risk perception of three different ethnicities. Three indicators used for attitude and behavior, two indicators used for fear & worry, and trust and confidence, and three indicators for disaster awareness were used by this study.

Ten indicators are used to assess the disaster awareness of respective ethnicities. However, ten indicators are used for assessing coping and adaptive strategies. Regarding psychological distancing to climate change, three indicators are used for spatial distancing, two indicators for temporal and social distancing and three indicators for uncertainty.

The detail of indicators along with transform values, explanation and references are represented in the below table 3-A.

Table 3-1: Research indicators

S.No	Indicator	Unit of measurement	Transform Value	Explanation	References
Social Vulnerability					
1	Family size	<4 4-8 >8	<4= 0.33 4-8= 0.67 >8= 1	Vulnerability will be high when the family size is large.	(Cutter, Boruff, & Shirley, 2003)
2	Female-male/ Gender ratio	<1 1-2 2-3 3-4 >4	<1=0.2 1-2=0.4 2-3=0.6 3-4= 0.8 >4 =1	Male has more access to information and is decision-maker while culture restricts female to seek information	(Phung, Rutherford, & Dwirahmadi, 2016)
3	Household 's head education level	No schooling Primary Matric Graduation	No Schooling= 1 Primary= 0.75 Matric= 0.50 Graduation= 0.25	A household with high education level decreases vulnerability and vice versa.	(Hahn, Riederer, & Foster, 2009)
4	Household living in community (in years)	>40 30-40 20-30 10-20 <10	>40= 0.2 30-40= 0.4 20-30 = 0.6 10-20= 0.8 <10= 1	Vulnerability will be increase for the household having less time spent in the community and	(Rana & Routray, 2018)

				are not aware of the evacuation route.	
5	Household past experience of disaster	No Yes	No =1 Yes= 0	People with past experience foresees problems	(Birkmann, Cardona, Carreño, Barbat, & Keiler, 2013)
6	Household local language drill	No Yes	No =1 Yes= 0	Local language drill reduces the vulnerability of community	(Bollin, Hidajat, & Birkmann, 2006)
7	Household knowledge regarding the presence of disaster Jargon.	No Yes	No =1 Yes= 0	It will help in the evacuation of the local community.	-
8	Household knowledge regarding the transfer of information from ancestors.	No Yes	No =1 Yes= 0	More information from ancestor decreases vulnerability.	-
9	Household understanding of the issue of climate change	No knowledge Little knowledge	1 0.80 0.60	Understanding climate change indicate more	(UNDP, 2007)

		Clear Understood Well understood	0.40 0.20	awareness and lessen vulnerability	
10	Household understanding of causes of climate change	No knowledge Little knowledge Clear Understood Well understood	1 0.80 0.60 0.40 0.20	Understanding causes of climate change indicate more awareness and lessen vulnerability	(UNDP, 2007)
11	Household knowledge of impacts and consequences of climate change	No knowledge Little knowledge Clear Understood Well understood	1 0.80 0.60 0.40 0.20	Understanding the impacts of climate change indicate more awareness and lessen vulnerability	(UNDP, 2007)
12	Household Migration	Yes No	No =1 Yes= 0	Higher satisfaction of household migration indicates a decrease in vulnerability to disaster.	(Hahn, Riederer, & Foster, 2009)

13	Household access to drinking water	Yes No	No =1 Yes= 0	Household access to safe drinking water will decrease their vulnerability.	(Phung, Rutherford, & Dwirahmadi, 2016)
14	Household access to improved sanitation	Yes No	No =1 Yes= 0	Households with access to improved sanitation are less vulnerable.	(Balica, Douben, & Wright, 2009)
15	Household access to electricity	Yes No	No =1 Yes= 0	Household access to electricity decrease their vulnerability	(Mazumdar & Paul, 2016) (Phung, Rutherford, & Dwirahmadi, 2016)
16	Household access to TV	Yes No	No =1 Yes= 0	Household access to TV decrease their vulnerability	(Phung, Rutherford, & Dwirahmadi, 2016) (Mazumdar & Paul, 2016)
17	Household access to mobile phone	Yes No	No =1 Yes= 0	Household access to mobile phone decease vulnerability	(Mazumdar & Paul, 2016)

18	Household access to the internet	Yes No	No =1 Yes= 0	Household access to the internet deceases vulnerability	(Yoon, 2012)
19	Household Frequency of awareness program	0 1 2	1 0.67 0.33	A low number of participation in drills and training shows the high vulnerability of households.	(Bollin, Hidajat, & Birkmann, 2006)
20	Household distance to nearest medical facility	<1 1-5 5-10 >10	<1= 0.25 1-5= 0.50 5-10 =0.75 >10 = 1	Vulnerability will be high when the distance between nearest medical facility and residence is more.	(Rana & Routray, 2016)
Economic Vulnerability					
1	Household Average monthly income	<10,000 10,000-19,999 20,000-39,999 40,000-60,000 >60,000	<10,000= 1 10k-19k=0.80 20k-39k=0.60 40k-60k= 0.40 >60k=0.20	Vulnerability will be high when the income of the household is less	(Cutter, Boruff, & Shirley, 2003), (Balica, Douben, & Wright, 2009), (Phung, Rutherford, & Dwirahmadi, 2016)

2	Household occupation Type	Service Self-employed Daily wages Unemployed	service= 0.25 self-Employed= 0.50 daily wages= 0.75 Unemployed = 1	Insecure sources of income will increase vulnerability	(Yoon, 2012) (Pandey & Jha, 2012)
3	House ownership	Yes No	yes = 0 No =1	Household with house ownership decreases vulnerability	(Cutter, Boruff, & Shirley, 2003), (Yoon, 2012)
4	Household with means of transportation	Yes No	yes = 0 No =1	Household with no means transportation increases vulnerability.	(Mazumdar & Paul, 2016), (Yoon, 2012)
5	Dependency ratio	<0.25 0.25-0.50 0.50-0.75 0.75-1 >1	<0.25= 0.2 0.25-0.50= 0.4 0.50-0.75= 0.6 0.75-1= 0.8 >1= 1	The higher the dependence in a household the higher the vulnerability; thus infants, women, and elders are more vulnerable.	(Phung, Rutherford, & Dwirahmadi, 2016), (Pandey & Jha, 2012)
6		0 1	0=1 1= 0.75	A higher number of earners in a	(Armaş, 2012)

	Number of earning members in the household	2 >2	2=0.50 >2= 0.25	household decreases vulnerability.	
7	Household able to get support from outside during crisis	Yes No	Yes= 0 No =1	Household with support during crisis reduce vulnerability	(Mazumdar & Paul, 2016)
Attitudinal Vulnerability					
1	Household dealing with natural hazards	Not able Less able Neutral Highly able Very highly able	1 0.80 0.60 0.40 0.20	Behavior and action were taken against disaster to increase adaptability and capacity and reduces vulnerability	(Ho, Shaw, Lin, & Chiu, 2008), (Miceli, Sotgiu, & Settanni, 2008)
2	Household Perceived adaptability of lifestyle	Not able Less able Neutral Highly able Very highly able	1 0.80 0.60 0.40 0.20	The adaptability of lifestyle affect perception and reduces vulnerability	(Armaş, 2012), (Miceli, Sotgiu, & Settanni, 2008)
3	Household ability that harmful effect of disaster can reduced.	Not able Less able Neutral	1 0.80 0.60	Household perceived harmful effects could be reduced influence	(Rana & Routray, 2016), (Ho, Shaw, Lin, & Chiu, 2008).

		Highly able Very highly able	0.40 0.20	perception and decrease vulnerability.	
Risk Perception indicator					
Attitude and behavior					
1	Household dealing with natural hazards.	Not able Less able Neutral Highly able Very highly able	1 0.80 0.60 0.40 0.20	Behavior and action were taken against disaster to increase adaptability and capacity.	(Ho, Shaw, Lin, & Chiu, 2008) (Rana & Routray, 2016)
2	Household Perceived adaptability of lifestyle	Not able Less able Neutral Highly able Very highly able	1 0.80 0.60 0.40 0.20	The adaptability of lifestyle affect perception	(Armaş, 2012) (Ho, Shaw, Lin, & Chiu, 2008)
3	Household Perceived harmful effects can that can be reduced	Not able Less able Neutral Highly able Very highly able	1 0.80 0.60 0.40 0.20	Perceived harmful effects can be reduced influence perception	(Rana & Routray, 2016) (Ho, Shaw, Lin, & Chiu, 2008)
Trust and Confidence					

4	Household Trust and confidence on information received	No trust Less trust Neutral highly trust very highly trust	1 0.80 0.60 0.40 0.20	Trust in different sources from disaster management agencies decrease vulnerability	(Sullivan-Wiley & Gianotti, 2017)
5	Household trust & confidence on Ministry of Climate Change	No trust Less trust Neutral highly trust very highly trust	1 0.80 0.60 0.40 0.20	Trust in disaster management policies influence perception	(Sullivan-Wiley & Gianotti, 2017)
Fear and Worry					
6	Household worry about the Probability of occurrence	No worry Less worry Neutral Highly worry Very highly worry	1 0.80 0.60 0.40 0.20	Highly worried about occurrence of hazard indicate high perceptions	(Miceli, Sotgiu, & Settanni, 2008) (Ho, Shaw, Lin, & Chiu, 2008)
7	Household level of afraid about Climate change	No afraid Less afraid Neutral Highly afraid	1 0.80 0.60 0.40 0.20	High level of afraid increase perception	(Rana & Routray, 2016) (Miceli, Sotgiu, & Settanni, 2008)

		Very highly afraid			
Awareness and Knowledge					
8	Household Perceived extent of familiarity	Not familiar Less familiar Neutral highly familiar Very highly familiar	1 0.80 0.60 0.40 0.20	High familiarity increase risk perception	(Rana & Routray, 2016) (Ho, Shaw, Lin, & Chiu, 2008)
9	Household Perceived extent of knowledge about rescue and evacuation procedures	No afraid Less afraid Neutral Highly afraid Very highly afraid	1 0.80 0.60 0.40 0.20	Well understood perception of information about rescue and evacuation procedures increase risk perception	(Johnson, Johnston, Ronan, & Peace, 2014)
10	Household Perceived understanding of disaster cause	No afraid Less afraid Neutral Highly afraid	1 0.80 0.60 0.40 0.20	Well understanding about causes of disaster increases perception	(L. Sj€oberg, 2000) (Sullivan-Wiley & Gianotti, 2017)

		Very highly afraid			
Disaster Awareness indicator					
1	Household disaster experience	Yes No	Yes = 0 No = 1	Household having experience disaster are much aware of the consequences	(Gain, 2015)
2	Household's awareness regarding evacuation route	Yes No	Yes = 0 No = 1	Lack of awareness of household shows incapacity of institutions	(Balica, Douben, & Wright, 2009)
3	Household's level of awareness regarding early warning system	Very high High Moderate Low Very low	0.20 0.40 0.60 0.80 1	Lack of awareness of household shows incapacity of institutions	(Bollin, Hidajat, & Birkmann, 2006)
4	Household's awareness regarding use of first aid kit	Yes No	Yes = 0 No = 1	Lack of awareness of household shows incapacity of institutions	(Ho, Shaw, Lin, & Chiu, 2008)
5	Community having land use/zoning laws	Yes No	Yes = 0 No = 1	Household not following urban planning	---

	and household following them			regulations will be more vulnerable	
6	Household awareness regarding rescue communications (emergency contacts, rescue 1122, 15 et.,)	Yes No	Yes = 0 No = 1	Lack of awareness of household shows capacity of institutions	----
5	Frequency of public awareness programs/drills attended by any household member (in number)	0 1 2	0= 1 1= 0.67 2= 0.33	Low number of participation in drills and training shows the inability of the institution regarding awareness campaigns and drills	(Bollin, Hidajat, & Birkmann, 2006)
6	Access to Radio	Yes No	Yes = 0 No = 1	Lack of information increase vulnerability	-
7	Access to Newspaper	Yes No	Yes = 0 No = 1	Household with no access to means of communication will be more vulnerable	-

8	Access to TV	Yes No	Yes = 0 No = 1	Household with no access to means of communication will be more vulnerable	
9	Access to Social Media	Yes No	Yes = 0 No = 1	Household with no access to means of communication will be more vulnerable	-
Coping and Adaptive Strategies Indicators					
1	Household migration	Yes No	Yes = 0 No = 1	Higher satisfaction of household to migration indicate a decrease in vulnerability to disaster	(Hahn, Riederer, & Foster, 2009)
2	Household language proficiency	Yes No	Yes = 0 No = 1	Multiple languages increase the capacity of community	(Zhou, Liu, Wu, & Li., 2015)
3	Distance to nearest medical facility (in km)	<1 1-5 5-10 >10	<1= 0.25 1-5= 0.50 5-10 =0.75 >10 = 1	The longer the distance between nearest health facility and residence, the lower will be the capacities	(Rana & Routray, 2016) (Armaş, 2012)

4	Household access to drinking water	Yes No	Yes = 0 No = 1	Household with no access to safe drinking water will be more vulnerable	(Hahn, Riederer, & Foster, 2009) (Mazumdar & Paul, 2016) (Phung, Rutherford, & Dwirahmadi, 2016)
5	Household access to improved sanitation	Yes No	Yes = 0 No = 1	Household with no access to improved sanitation will be more vulnerable	(Balica, Douben, & Wright, 2009) (Phung, Rutherford, & Dwirahmadi, 2016) (Mazumdar & Paul, 2016)
6	Adults able to get support from outside during crisis	Yes No	Yes = 0 No = 1	Household with support during crisis reduce vulnerability	(Mazumdar & Paul, 2016)
7	Household participation in voluntary works for an organization	Yes No	Yes = 0 No = 1	Household participation reduces vulnerability	(Balica, Douben, & Wright, 2009)

8	Household access to mobile phone	Yes No	Yes = 0 No = 1	Lack of information increase vulnerability	-
9	Household access to internet	Yes No	Yes = 0 No = 1	Lack of information increase vulnerability	-
10	Household participation continuing hazard education	Yes No	Yes = 0 No = 1	Household participation in hazards education reduces vulnerability	(Pandey & Jha, 2012)
Psychological Distancing to Climate Change					
Spatial or Geographical Distancing					
1	Climate change harms you and your family.	Very high High Moderate Low Very low	0.2 0.4 0.60 0.8 1	Highly understanding climate change harm decrease vulnerability and increases the perception	(Spence & Pidgeon, 2009)
2	Climate change can harm people in your community.	Very high High Moderate Low Very low	0.2 0.4 0.60 0.8 1	Highly understanding climate change harm decrease vulnerability and	(Spence, Poortinga, & Pidgeon, 2012)

				increases the perception	
3	Climate change can harm people in Pakistan.	Very high High Moderate Low Very low	0.2 0.4 0.60 0.8 1	Highly understanding climate change harm decrease vulnerability and increases the perception	(Spence & Pidgeon, 2009)
4	Climate change can harm people in the world.	Very high High Moderate Low Very low	0.2 0.4 0.60 0.8 1	Highly understanding climate change harm decrease vulnerability and increases the perception	(Milfont, 2010)
Temporal Distancing					
5	Household understanding that the severity of climate change increases in the future.	Very high High Moderate Low Very low	0.2 0.4 0.60 0.8 1	Household understanding about climate change decreases vulnerability.	(Liberman, Trope, McCrea, & Sherman, 2007)
6	Household understanding that climate change can harm future generation	Very high High Moderate Low Very low	0.2 0.4 0.60 0.8 1	Household understanding harm to future generation increases vulnerability.	(Lieberman, Gilbert, Gaunt, & Trope, 2002)

Social Distancing					
7	Household understanding climate change as human activities	Very high High Moderate Low Very low	0.2 0.4 0.60 0.8 1	Household level of understanding climate change cause decreases vulnerability.	(Pidgeon, Lorenzoni, & Poortinga, 2018)
8	Household understanding consequences of climate change	Very high High Moderate Low Very low	0.2 0.4 0.60 0.8 1	Household level of understanding climate change impacts increases vulnerability.	(Mason & Morris, 2010)
Uncertainty					
9	Household certainty about happening climate change.	Very high High Moderate Low Very low	0.2 0.4 0.60 0.8 1	High certainty increases vulnerability of household to climate change.	(Kortenkamp & Moore, 2006)
10	Household certainty about seriousness of climate change.	Very high High Moderate Low Very low	1 0.8 0.6 0.4 0.2	High certainty increases vulnerability of household to climate change.	(Spence & Pidgeon, 2009)
11	Household certainty about human causing climate change.	Very high High Moderate	0.2 0.4 0.60	High certainty increases vulnerability of	(Stoll-Kleemann, Jaeger, &

		Low Very low	0.8 1	household to climate change.	O'Riordan, 2001)

3.5. Research Sampling

Several forms of samples are used for every research. It involved the gathering of data from various sources. The research question, research objective, and methodologies indicated the selection of the sample involved. Yamane (1967: 886) provides a simplified formula to calculate the sample size. The formula calculates the sample size, using a confidence level of 95% and p= 0.5 for the given equation. The Yamane formula for calculating sample size is below;

$$n = \frac{N}{1 + N(e)2}$$

Where, n is the sample size.

N= total population of the study area

e = level of precision

To calculate the sample size for this study, the population of Attock is 1,883,556, the Swabi population is 1,624,616, and the Haripur region population is 1,003,031. The combined population of the three ethnic groups is 4,511,203. Thus, by using the Yamane formula, a sample size of 400 is obtained. Therefore, around 135 samples are required from each ethnic group to study the perception, knowledge, and capacities of these communities.

$$n = \frac{45,11,203}{1+45,11,203(0.05)\text{^}2} = 399.9=400$$

The total sample size of 400 is divided among three ethnic groups, i.e., Punjabi, Pashtun, and Hindko group, as per their demographic pattern. The sample size for the Attock region is;

$$Attock\ sample\ size = n = \frac{183556}{4511203} * 100 = 41\% = .41 * 400 = 164 = 170$$

The sample size of the Pashtun ethnic group is;

$$Swabi\ sample\ size = n = \frac{1624616}{4511202} * 100 = 36\% = 0.36 * 400 = 144 = 150$$

The sample size of the Hindko ethnic group is;

$$Haripur\ Ethnic\ Group = n = \frac{1003031}{4511203} * 100 = 22\% = 0.22 * 400 = 88 = 100$$

Therefore, the total sample size for three ethnic groups are;

Table 3-2: Study sample size

Sr.No	**Ethnicity**	**Region**	**Population**	**Sample**
1	Punjabi	Attock	18,83,556	170
2	Pashtun	Swabi	16,24,616	130
3	Hindko	Haripur	10,03,031	100
Total			4511203	400

3.6. Data Collection and Questionnaire

The data need to be collected from the rural area of these ethnic groups. The questionnaire is distributed among populated villages of ethnic groups.

The rural-urban distribution of Ethnic groups;

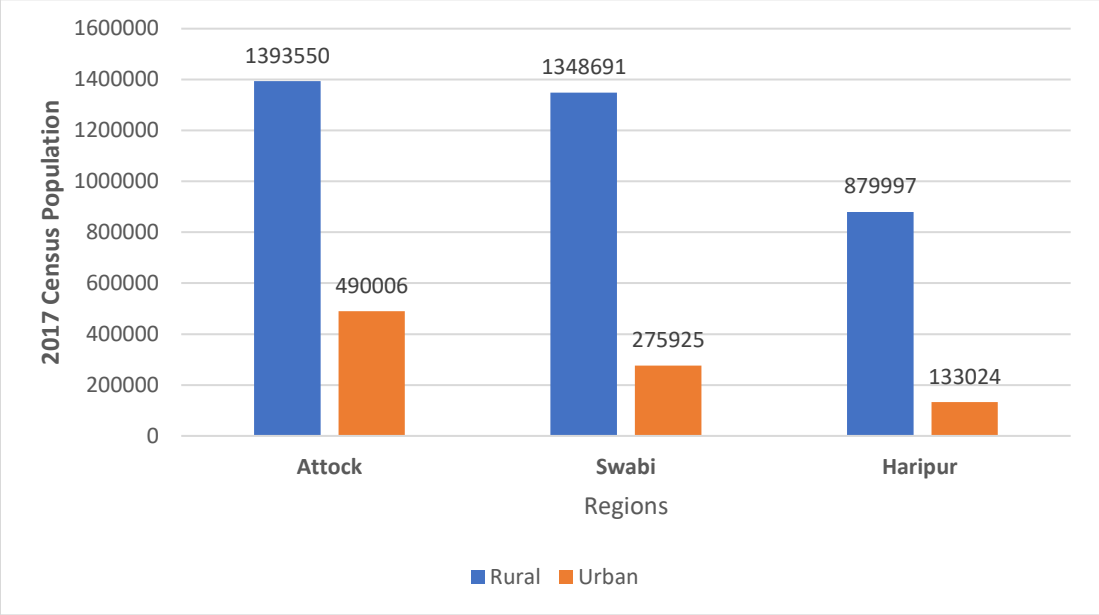


Figure 3.10. Rural-urban distribution of three different ethnic groups

The 170 samples of the Punjabi ethnic group are divided into the following.

Table 3-3. Punjabi ethnic group sample distribution

Punjabi Ethnic Group			
Sr. No.	**Regions**	**Population**	**Sample**
1	Attock	4,34,705	70
2	Hazro	3,39,238	55
3	Fateh Jang	3,25,970	45
Total		10,99,913	170

The 150 samples of the Pashtun ethnic group are divided into the following.

Table 3-4: Pashtun ethnic group sample distribution

Pashtun Ethnic Group			
Sr. No.	**Regions**	**Population**	**Sample**
1	Swabi	4,06,212	50
2	Razar	5,83,936	60
3	Topi	3,28,300	40
Total		13,18,448	150

The 100 samples of the Hindko ethnic group are divided into the following.

Table 3-5: Hindko ethnic group sample distribution

Hindko Ethnic Group			
Sr. No.	**Regions**	**Population**	**Sample**
1	Ghazi	1,45,367	20
2	Haripur	8,57,664	80
Total		1,003,031	100

3.7. Sources of Data.

Primary and secondary data are used to obtained data for this research. Figures and maps are from secondary sources, included journal articles- and scientific papers, and supported by adequate references to validate data. Primary data were obtained through survey questionnaire at household level to meet the study aims and objectives.

3.8. Data Analysis Method

Data analysis is the process of evaluating data using logical and analytical reasoning to examine each component of the data collected or provided carefully. Also, it is one of the many steps that are taken when a research experiment is conducted.

3.8.1. Data Analysis Method

There are several methods for these types of analysis, but all of them fall under two main methods: Qualitative Analysis and Quantitative Analysis.

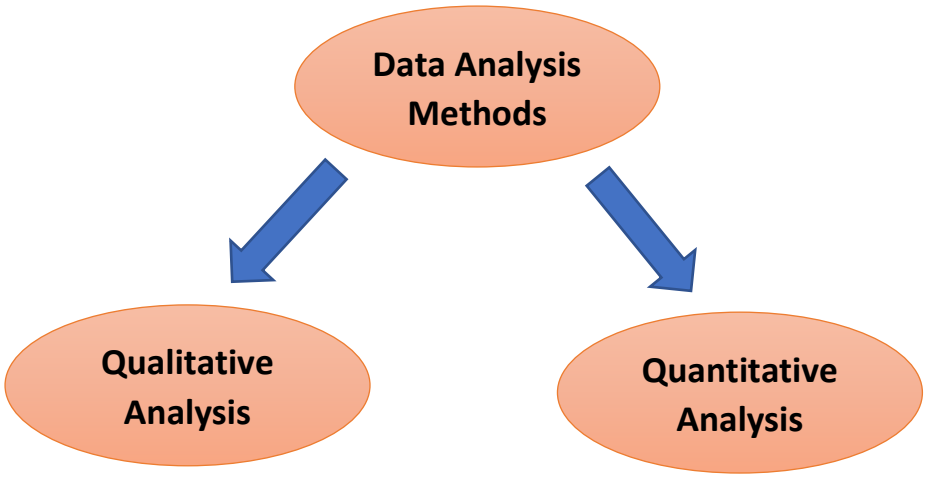


Figure 3.11. Data Analysis Method

1. **Qualitative Data Analysis*:***

The data obtained through this method consists of words, pictures, symbols and observations. This type of analysis refers to the procedures and processes utilized to analyze data to provide some level of understanding, explanation, or interpretation.

2. **Quantitative Data Analysis:**

Quantitative analysis is used to quantify data, which allows the generalization of the results obtained from a sample to a population of interest.

3.9. Summary of Chapter

To summarize, the mixed-method approach is used by this study to fulfill its aims and objectives. The research is carried out among three different ethnicities of Pakistan based on linguistics differences. The three ethnicities of Pakistan, i.e., Punjabi, Pashtun, and Hindko, are broadly imagined by Attock, Swabi, and Haripur. This study used a variety of indicators was used by this study to assess socio-economic characteristics, risk perception, disaster awareness, coping and adaptive strategies, and psychological distance to climate change at the household level of three ethnic groups.

A total of 400 sample sizes were calculated using the Yamane formula using a confidence level of 95% and p= 0.5. A detailed questionnaire was prepared, a household survey conducted at Attock, Swabi, and Haripur, and a clear 360 responses were obtained from the three ethnicities. The obtained data were then analyzed, and a correlation coefficient Chi-square and P-value were checked for the significance levels.

Chapter 4 . Profile of respondents

A household survey is conducted for three different regions Attock, Swabi, Haripur, to study socio-economic conditions, risk perception, capacities, and awareness of three ethnic groups, Punjabi, Pashtun, Hindko, respectively.

A one-month survey was conducted at Attock, Swabi, and Haripur region to study Punjabi, Pashtun, and Hindko ethnic group perception, capacities, and awareness about natural hazards and climate change. The respondent profile in these regions are as below;

Table 4-1: Socio-economic characteristics of respondents

Socio-economic characteristics	**Units**	**Punjabi ethnic group**		**Pashtun ethnic group**		**Hindko ethnic group**		**Chi-Square test**
		Frequency	**%age**	**Frequency**	**%age**	**Frequency**	**%age**	
Gender	**No. of male respondents**	110	69	81	74	68	76	**X^2= 1.546 P-value = 0.462**
	No. of female respondents	50	31	29	26	22	24	
Family Size	**<4**	12	7.5	10	9	10	11	**X^2= 3.917 P-Value = 0.417**
	4-8	124	74.5	75	68	65	72	
	>8	24	15	25	23	15	17	
House Ownership	**Yes**	121	76	88	80	70	79	**X^2= 0.721 P – Value = 0.697**
	No	39	24	22	20	20	21	

Education Level	**No schooling**	16	10	8	7.3	12	13.3	**X^2= 10.013 P – Value = .124**
	Primary	9	6	3	2.7	6	6.7	
	Matric	45	28	21	19	15	17	
	graduation	90	56	78	71	57	63	
Household living in community (years)	**<10**	8	5	5	6	5	5	**X^2= 24.702 P – Value = 0.002**
	10—20	56	35	17	16	12	13	
	20—30	52	32	49	44	35	39	
	30--40	22	14	13	12	15	17	
	>40	22	14	26	24	23	25	
Household past experience of disaster	**Yes**	119	74	80	73	71	79	**X^2= 1.062 P – Value = .588**
	No	41	26	30	27	19	21	
Household local language drill	**Yes**	33	21	30	27	23	26	**X^2= 1.768 P – Value = 0.413**
	No	127	79	80	73	67	74	
Household knowledge regarding disaster Jargon in local language	**Yes**	85	53	49	44.5	44	49	**X^2= 1.934 P – Value = .380**
	No	75	47	61	55.5	46	51	
Household information about transfer	**Yes**	85	53	64	58	49	54	**X^2= 0.688**
	No	75	47	46	42	41	46	

of disaster knowledge								**P-Value = .709**
Household Monthly Income	**<10000**	10	6	7	6	2	2	**X^2= 6.145 P – Value = .631**
	10000-19,999	18	11	18	17	16	18	
	20000-39,999	50	32	38	34	29	32	
	40000-599999	55	**35**	28	26	28	31	
	>60000	27	**17**	19	17	15	17	
Household Occupation Type	**Self employed**	51	39	27	24	25	28	**X^2= 6.675 P – Value = .352**
	Service	54	34	48	44	39	43	
	Daily wages	16	10	5	5	7	8	
	At home	39	24	30	27	19	21	
Dependency Ratio	**<0.25**	0	0	0	0	0	0	**X^2= 3.980 P-Value = 0.679**
	0.25-0.50	9	6	8	7	9	10	
	0.50-0.75	3	2	2	2	1	1	
	0.75-1	55	34	44	40	37	41	
	>1	93	58	56	51	43	48	
Household with mean of transportation	**Yes**	60	37	28	25.5	29	32	**X^2= 4.316 p-value = 0.116**
	No	100	63	82	74.5	61	68	
Household ability to get support from outside	**Yes**	41	26	25	23	23	26	**X^2= 0.339 P-value= 0.844**
	No	119	74	85	77	67	74	

The majority of survey respondents are male; 69, 74, and 76% from Punjabi, Pashtun, and Hindko ethnic groups, respectively. This makes ethnic groups less vulnerable to natural hazards and climate change as men are less vulnerable to females due to access to information and decision maker. A large number of survey respondent's family size lies 4 to 8 members; 74.5, 68, and 72% of Punjabi, Pashtun, and Hindko group respectively. This makes ethnic groups more vulnerable to natural threats and will face hurdles in case of evacuation. In case of any emergency, it will be difficult to evacuate 8-10 or more members than 3-6 members. More than 50% of survey respondents have owned their houses with a Chi-Square value of (X^2= 0.721). 46, 71, and 63% of a household marked their education level as graduation from Punjabi, Pashtun, and Hindko ethnic group. Therefore, most survey respondents are less vulnerable due to their own houses and higher education level which may help them understanding warning signs and evacuation procedures.

Regarding households living in a particular ethnic group, 32, 44, and 39% are living in their respective community for 20-30 years. This makes household's more vulnerable to natural hazards due to social affiliation with the house and respective community. The majority of respondents had experienced a disaster with a Chi-square value of (X^2= 1.062). Thus, most of the households are less vulnerable due to the experience of disaster and will be more prepared for future natural hazards then those who did not experience any disaster before.

However, many respondents did not attend any local language drill due to their claim of the native language. Similarly, the majority of respondents do not know disaster Jargon

in the local language. On the contrary, 53, 58, and 54% of Punjabi, Pashtun, and Hindko ethnic groups received disaster information from their ancestors. This makes them less vulnerable to natural hazards and climate change. Due to native language, they can understand any warning signs or evacuation procedure in case of emergency. Due to no information regarding disaster Jargon in the local language, it increases their vulnerability to natural hazards, as they cannot understand any useful information during a crisis. In addition to this, they will also lessen their vulnerability by utilizing the information received from their ancestors.

The majority of monthly household income lies in 20.000 to 39,999 in the proportion of 32, 34, and 32% for each ethnic group accordingly. Only 17% of the household from three ethnic group earn more than 60,000 and are less vulnerable than those who earn less than 60,000. Financial ability largely influence the household's capability to lessen vulnerability to natural hazards. 34, 44, and 43% of Punjabi, Pashtun, and Hindko respondents marked their occupation type as service with Chi-Square value (X^2= 6.675). Thus, most household respondents are less vulnerable due to their occupation type being service compared to other types of occupation. Likewise, most respondents with a dependency ratio greater than one are 58% from the Punjabi ethnic group, 51% from Pashtun ethnic group, and 48% from Hindko ethnic group. Many dependents in a household make them more vulnerable to natural hazards and climate change and thus lessen their capacity to cope with any emergency. Furthermore, many respondents do not have car ownership which hurdles evacuation procedures with a Chi-square value of (X^2= 4.316) and thus increases their vulnerability to natural hazards. Similarly, most

survey respondents cannot get support from outside during a crisis and thus raise their vulnerability to any emergency condition.

Chapter 5 . Vulnerability Assessment

5.1. Social Vulnerability

5.1.1 Gender

A total of 360 responses were collected from three different regions. Among 360, 259 are male respondents- 110 (69%) from Attock, 81 (74%) from Swabi and 68 (76%) from Haripur. The total number of female respondents from three regions is 101- 50 (31%) female respondents, from the Attock region, 29 (26%) from the Swabi region and 22 (24%) female respondents from the Haripur region.

The Chi-square value ($X^2 = 1.546$) and significance difference value (P-value = 0.462) was observed which is greater than 5 %. Therefore, the three regions and gender are independent of each other.

Table 5-1: Gender

Gender	**Region**			**Chi-square test**
	Punjabi Ethnic Group	**Pashtun Ethnic Group**	**Hindko Ethnic Group**	
Male	110 (69%)	81 (74%)	68 (76%)	$X^2 = 1.546$ P– Value = 0.462
Female	50 (31%)	29 (26%)	22 (24%)	
Total	160	110	90	

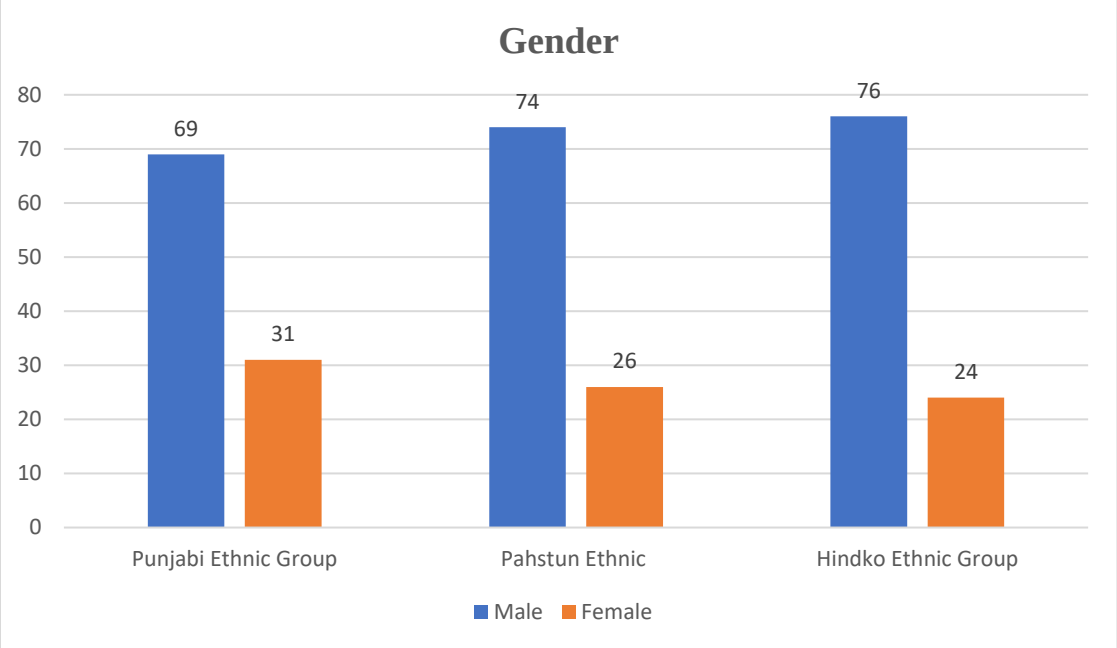


Figure 5.1. Gender

5.1.2. Family Size

The detail of the family size of the respondent of three different regions are as below;

Table 5-2: Family size

Family Size	**Region**			**Chi-square test**
	Punjabi Ethnic Group	**Pashtun Ethnic Group**	**Hindko Ethnic Group**	
<4	12 (7.5%)	10 (9%)	10 (11%)	$X^2 = 3.917$ P-Value = 0.417
4-8	124 (74.5%)	75 (68%)	65 (72%)	
>8	24 (15%)	25 (23%)	15 (17%)	
Total	160	110	90	

The majority of the respondent of the survey lies between 4-8 number of family size, which is 256 total, 124 (74.5%) from Attock, 75 (68%) from Swabi, and 65 (72%) from

the Haripur region, lies in this category. The family size of respondents less than 4 are 32 total respondents from three different areas- 12 (7.5%) from Attock, 10 (9%) from Swabi, as well as from (10%) Haripur regions. The respondents having a family size greater than 8 are 63 in total; 24 (15%) from Attock, 25 (23%) from Swabi, and 15 (17%) from the Haripur region. The Chi-square value (X^2 = 3.917) and significance difference value (P-value = 0.417) is observed which is greater than 5%. Therefore, the two variables are independent of each other.

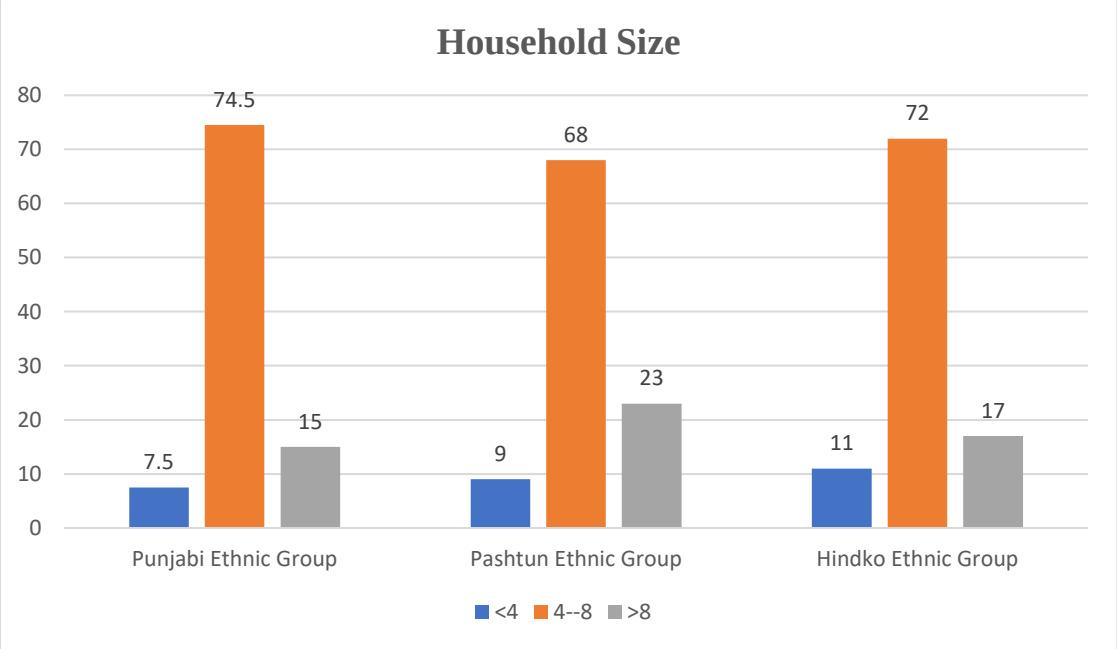


Figure 5.2. Household Size

5.1.3. Household Education Level

The total respondents having no education are 89, 9 (6%) respondents from Attock attend no school, 8 (7.3%) respondents from Swabi, and 12 (13.3%) respondents from Haripur have no schooling. The total respondent having primary educational level is 78- 9 (6%) from Attock, 3 (2.7%) from Swabi, and 6 (6.7%) from Haripur. The total

respondents having matric schooling are 57- 45 (28%) from Attock, 21 (19%) from Swabi, and 15 (17%) from Haripur regions. The total respondents having graduation educational level are 224- 90 (56%) from Attock, 78 (71%) from Swabi, and 57 (63%) from the Haripur region.

The Chi-square value (X^2 = 10.013) and significance difference value is (P-value = 0.124) observed which greater than 5 %. Therefore, there is no significant difference between regions and educational level, and hence both are independent of each other.

Table 5-3: Household Education Level

Education Level	**Region**			**Chi-square test**
	Punjabi Ethnic Group	**Pashtun Ethnic Group**	**Hindko Ethnic Group**	
No schooling	16 (10%)	8 (7.3%)	12 (13.3%)	X^2 =10.013 P–Value = .124
Primary	9 (6%)	3 (2.7%)	6 (6.7%)	
Matric	45 (28%)	21 (19%)	15 (17%)	
graduation	90 (56%)	78 (71%)	57 (63%)	
Total	160	110	90	

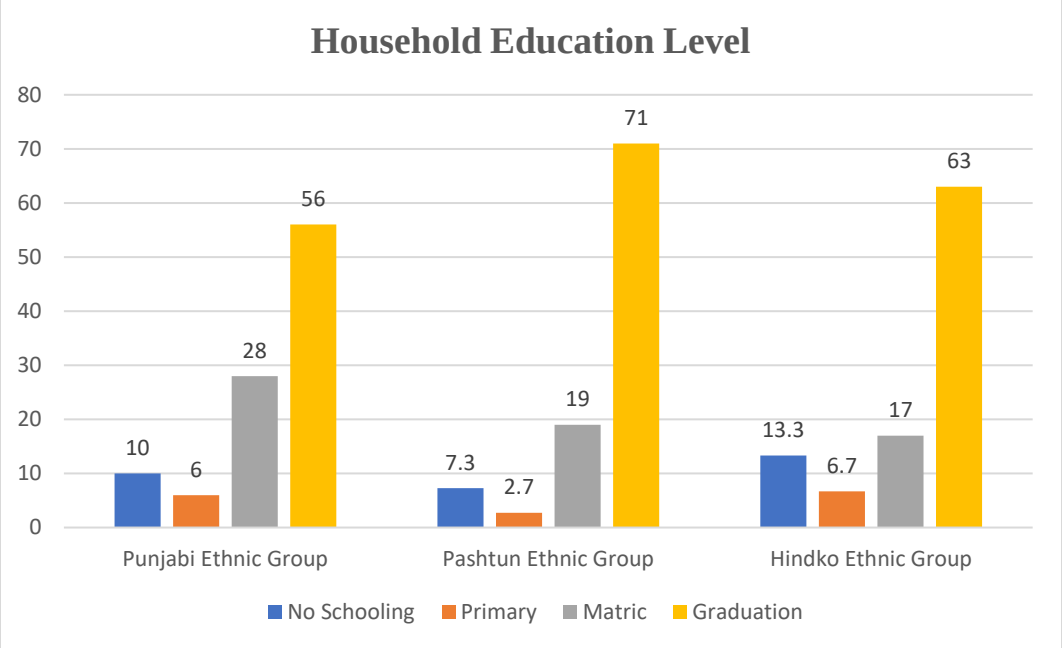


Figure 5.3. Household Education Level

5.1.4. Household Living in Community

The survey also asked the respondents for their period of living in their respective areas.

The detail of household living in community from three different regions are as below;

Table 5-4: Household living in community

Household Living in Community	**Region**			**Chi-square test**
	Punjabi Ethnic Group	**Pashtun Ethnic Group**	**Hindko Ethnic Group**	
<10	8 (5%)	5 (6%)	5 (5%)	X^2 = 24.702 P–Value= 0.002
10—20	56 (35%)	17 (16%)	12 (13%)	
20—30	52 (32%)	49 (44%)	35 (39%)	
30--40	22 (14%)	13 (12%)	15 (17%)	
>40	22 (14%)	26 (24%)	23 (25%)	

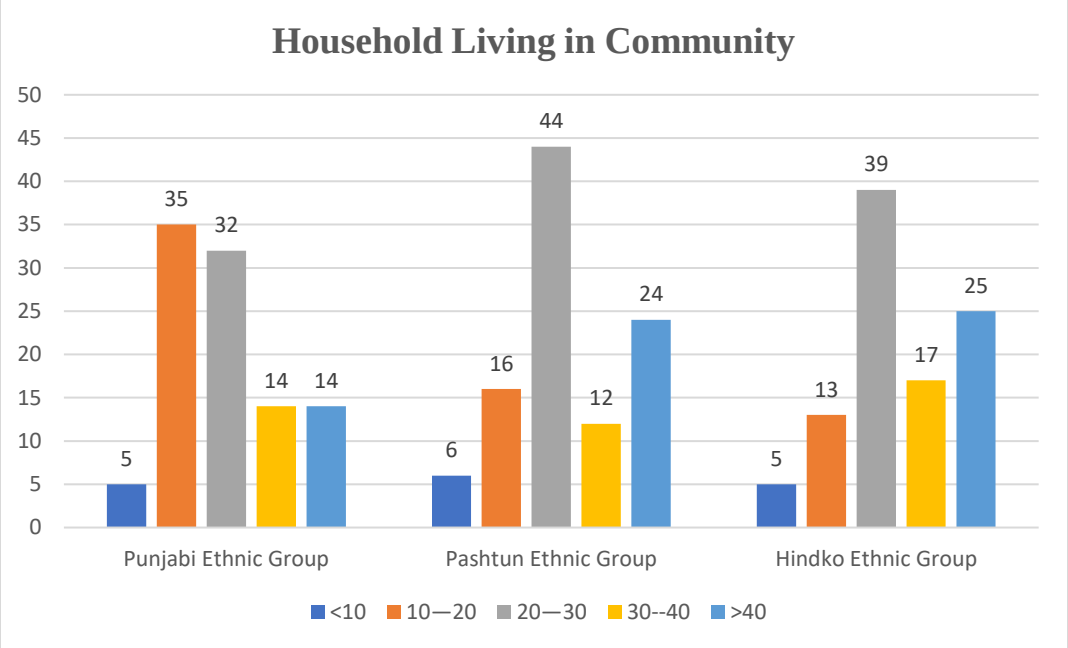


Figure 5.4. Household living in community

5.1.5. Household Past Experience of Disaster (Earthquake, Flood, Heatwaves)

The survey asked the respondents about past experience of disaster (earthquake, flood, heatwaves); the detail of respondents past experience of disaster are as below;

Table 5-5: Household past experience of Disaster

Household Past Experience of Disaster	**Region**			**Chi-square test**
	Punjabi Ethnic Group	**Pashtun Ethnic Group**	**Hindko Ethnic Group**	
Yes	119 (74%)	80 (73%)	71 (79%)	$X^2 = 1.062$ P–Value = .588
No	41 (26%)	30 (27%)	19 (21%)	
Total	160	110	90	

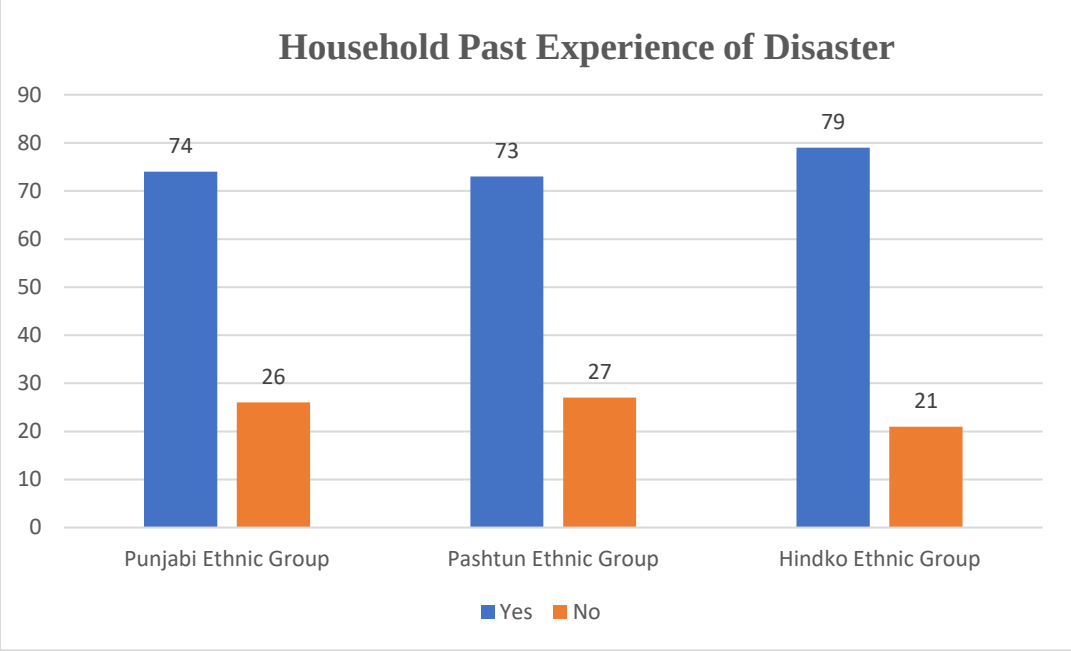


Figure 5.5. Household Past Experience of disaster

The total number of respondents who had experienced disaster in the past is 270, due to residing in the hazard-prone region or frequently affected by the disasters. 119 (74%) respondents from Attock, 80 (73%) respondents from Swabi, 71 (79%) respondents from Haripur have experienced disaster in the past. While the total number of respondents who had not experienced any disaster in the past is 90. 41 (26%) respondents are from Attock, 30 (27%) respondents from Swabi, and 19 (21%) respondents from Haripur who had not experienced any disaster before.

The Chi-square value ($X^2 = 1.062$) and significance difference value is (p-value= 0.588) is observed which is greater than 5%. Therefore, the two variables are independent of each other.

5.1.6. Household Local Language drill

The survey also asked the respondents about their local language training. The detail of responses are as below;

Table 5-6: Household local language drill

Household Local Language drill	**Region**			**Chi-square test**
	Punjabi Ethnic Group	**Pashtun Ethnic Group**	**Hindko Ethnic Group**	
Yes	33 (21%)	30 (27%)	23 (26%)	$X^2 = 1.768$ P–Value = 0.413
No	127 (79%)	80 (73%)	67 (74%)	
Total	160	110	90	

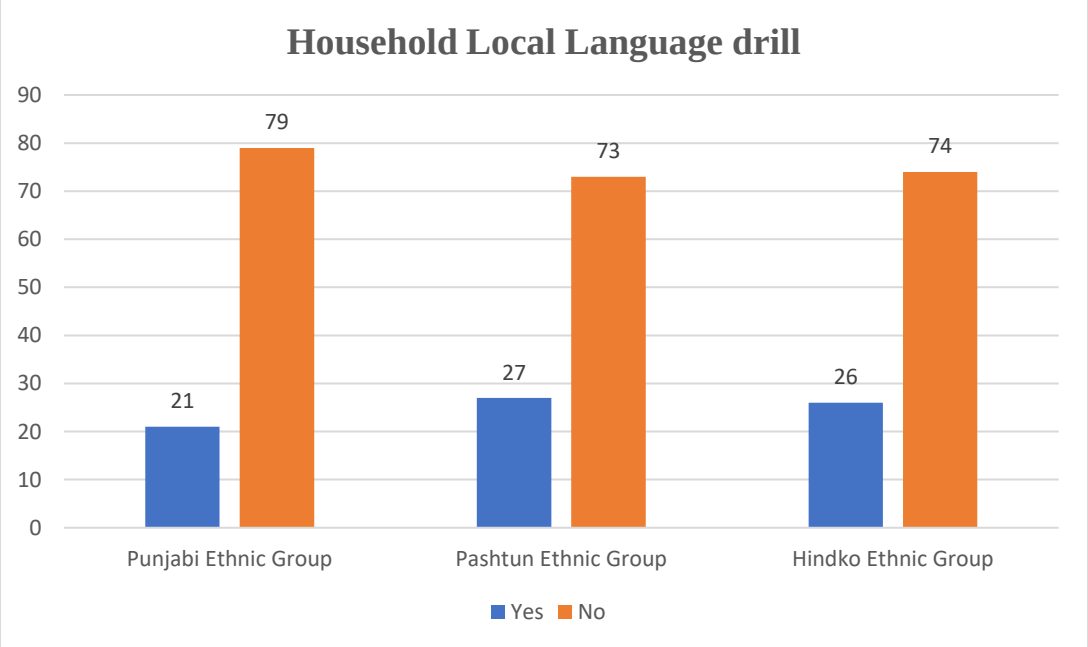


Figure 5.6. Household Local Language drill

The majority of respondents do not attend any local language drill because of their native or mother language. The number of respondents who attended local language training or studied is 88- 33 (21%) from Attock, 30 (27%) from Swabi, and 23 (26%) from the

Haripur region. The number of respondents who had not attended any local language training is 272- 127 (79%) from the Attock region, 80 (73%) from Swabi, and 67 (74%) from the Haripur region. The Chi-square value (X^2 = 1.768) and significance difference value (P-value = 0.413) is observed that are greater than 5% and hence are independent.

5.1.7. Household Understanding concept of Climate Change.

Table 5-7: Household Understanding Concept of climate change

Household Understanding concept of Climate Change.	**Region**			**Chi-square test**
	Punjabi Ethnic Group	**Pashtun Ethnic Group**	**Hindko Ethnic Group**	
No knowledge	13 (8.1%)	10 (9.1%)	6 (6.7%)	X^2 = 12.105 P–Value = 0.147
Little knowledge	16 (10%)	17 (15.5%)	14 (15.6%)	
Clear	44 (27.5%)	24 (21.8%)	19 (21.1%)	
Understood	74 (46.3%)	38 (34.5%)	39 (43.3%)	
Well understood	13 (8.1%)	21 (19.1%)	12 (13.3%)	

The majority of survey respondents understood climate change with the proportion of 46.3% Punjabi ethnic group, 34.3% Pashtun ethnic group, and Hindko ethnic group 43.3%. Similarly a significant number of respondents 8.1%, 19.1% and 13.3% of Punjabi, Pashtun, and Hindko ethnic groups, respectively, have well-understood climate change concepts with Chi-square value X^2= 12.105 and P-value = 0.147. This presents that majority of households are less or no vulnerable to climate change due to their understanding of climate change.

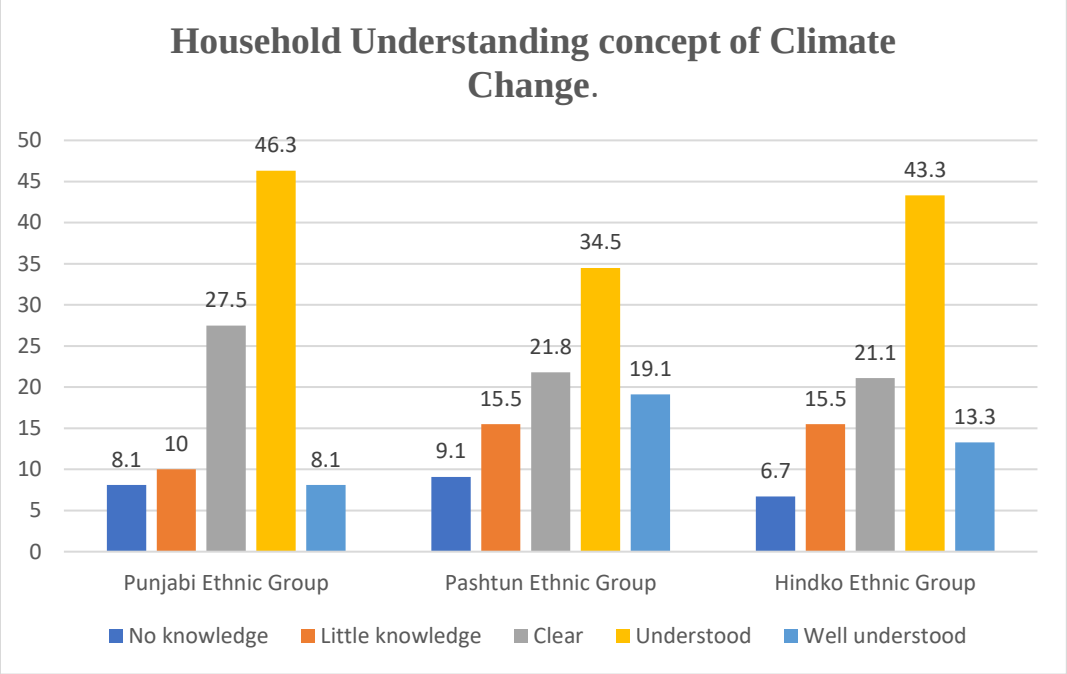


Figure 5.7. Household understanding the climate change concept

5.1.8. Household Understanding Causes of Climate change

The majority of the household of three ethnic groups respond positively to the understanding of climate change causes. 18.75% from Punjabi ethnic group, 30.9% from Pashtun and Hindko ethnic group understands climate change causes. Many respondents are well understood with climate change causes, and their percentages are 23.75%, 37.6%, and 36.7% from Punjabi, Pashtun, and Hindko ethnic groups, respectively. A Chi-square value of X^2= 94.121 and P-value = 0.000 were obtained. This results in lessen the vulnerability of respective ethnic groups to climate change because of their understanding of climate change causes.

Table 5-8: Household Understanding Causes of climate change

Household Understanding Causes of Climate change	**Region**			**Chi-square test**
	Punjabi Ethnic Group	**Pashtun Ethnic Group**	**Hindko Ethnic Group**	
No knowledge	12(7.5%)	9 (8.2%)	7 (7.8%)	$X^2 = 94.121$ P –Value = .000
Little knowledge	66 (41.3%)	14 (12.7%)	9 (10%)	
Clear	14 (8.8%)	12 (10.9%)	7 (7.8%)	
Understood	30 (18.75%)	34 (30.9%)	34 (30.9%)	
Well understood	38 (23.75%)	41 (37.3%)	33 (36.7%)	

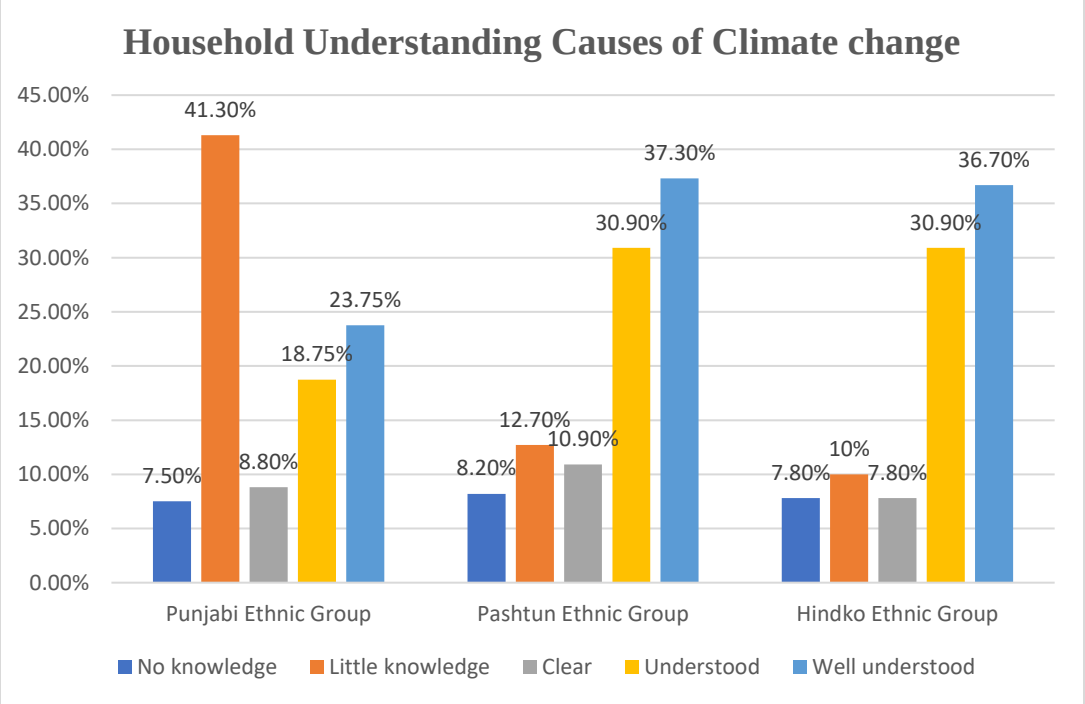


Figure 5.8. Household Understanding Causes of Climate change

5.1.9. Household Understanding Impacts and Consequences of Climate change

Table 5-9: Household Understanding Impacts and Consequences of Climate change

Household Understanding Causes of Climate change	**Region**			**Chi-square test**
	Punjabi Ethnic Group	**Pashtun Ethnic Group**	**Hindko Ethnic Group**	
No knowledge	12 (7.5%)	8 (7.3%)	3 (3.3%)	$X^2 = 4.080$ P–Value=.850
Little knowledge	33 (20.6%)	22 (20%)	22 (24.4%)	
Clear	41 (25.6%)	26 (23.6%)	21 (23.3%)	
Understood	58 (38.3%)	40 (36.4%)	37 (41.1%)	
Well understood	16 (10%)	14 (12.7%)	7 (7.8%)	

In response to understanding the consequences of climate change majority of the household has clear and understood response. 25.6% from Attock, 23.6% from Swabi, and 23.3% from Haripur region respondents have a clear understanding of the impacts of climate change which make them moderately vulnerable. The 38.3% of Attock respondents, 36.4% from Swabi, and 41.1% from the Haripur region have a high understanding of climate change impacts, making them less vulnerable with Chi-square value = 4.080 and P-value = 0.850.

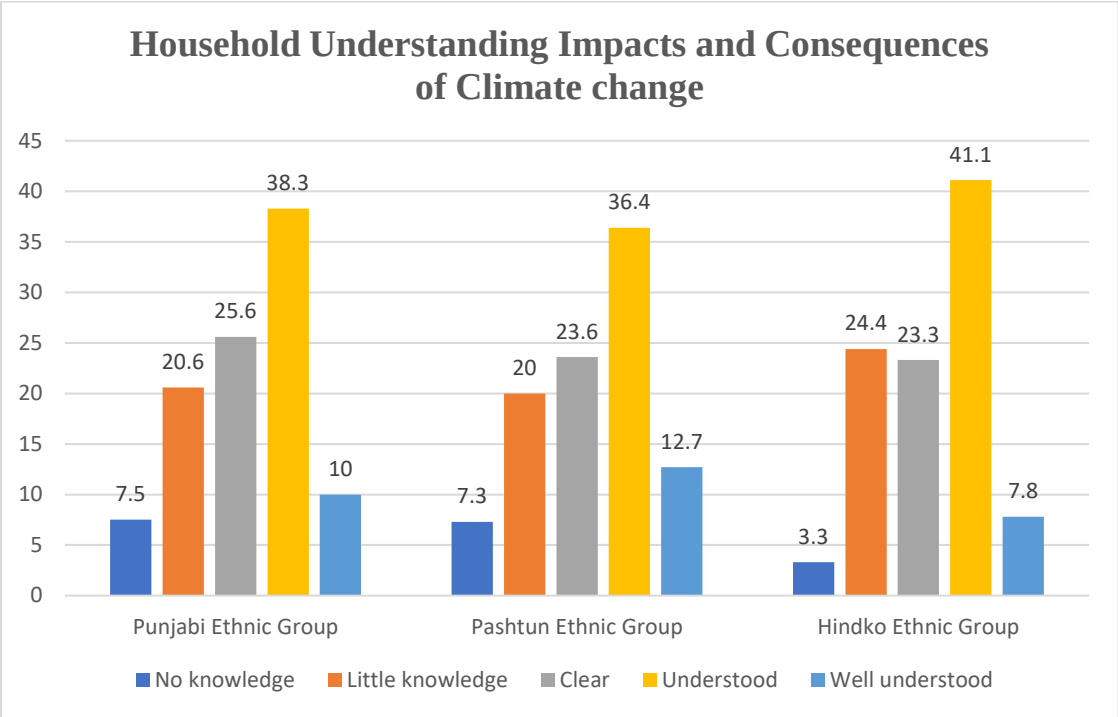


Figure 5.9. Household Understanding Impacts and Consequences of Climate change

5.1.10. Social Vulnerability Assessment

The surveyed responses were collected from all the three-region i-e., Attock, Swabi, and Haripur area are 360 in total. Among them, 259 responses from male, and 101 responses were recorded from female. The majority of survey respondents have a family size between 4-8 members i.e., 74.5%, 68%, and 65% are from the Attock, Swabi, and Haripur regions respectively. 278 respondents have owned their house; 76% from Attock, 88% from Swabi, and 79% from the Haripur region. The majority of survey respondents households have marked graduation as their education level and their total number is 224, 56% from Attock, 78% from Swabi, and 57% from the Haripur region, respectively.

Table 5-10: Social Vulnerability Index of three different ethnic group

Region	Classes	Very Low	Low	Moderate	High	Total	Descriptive statistics
Punjabi Ethnic Group	**Range**	**<.32**	**.32-.44**	**.44-.56**	**>.56**		Minimum = 0.20 Maximum = 0.68 Mean = 0.40 S.D = 0.09
	No. of Household	26	85	43	6	160	
	%age of household	16%	52%	27%	4%	100	
Pashtun Ethnic Group	**Range**	**<.31**	**.31-.45**	**.45-.59**	**>.59**		Minimum = 0.17 Maximum = 0.72 Mean = 0.40 S.D = 0.10
	No. Of Household	18	59	28	5	110	
	%age of household	16%	54%	25.5%	4.5%	100	
Hindko Ethnic Group	**Range**	**<.31**	**.31-.45**	**.45-.59**	**>.59**		Minimum = 0.17 Maximum = 0.72 Mean = 0.39 S.D = 0.10
	No. Of Household	21	43	21	5	90	
	%age of household	23.5%	48%	23.5%	5%	100	
Total	**No. Of Household**	65	187	92	16	360	
	%age of household	18%	52%	25%	5%	100%	

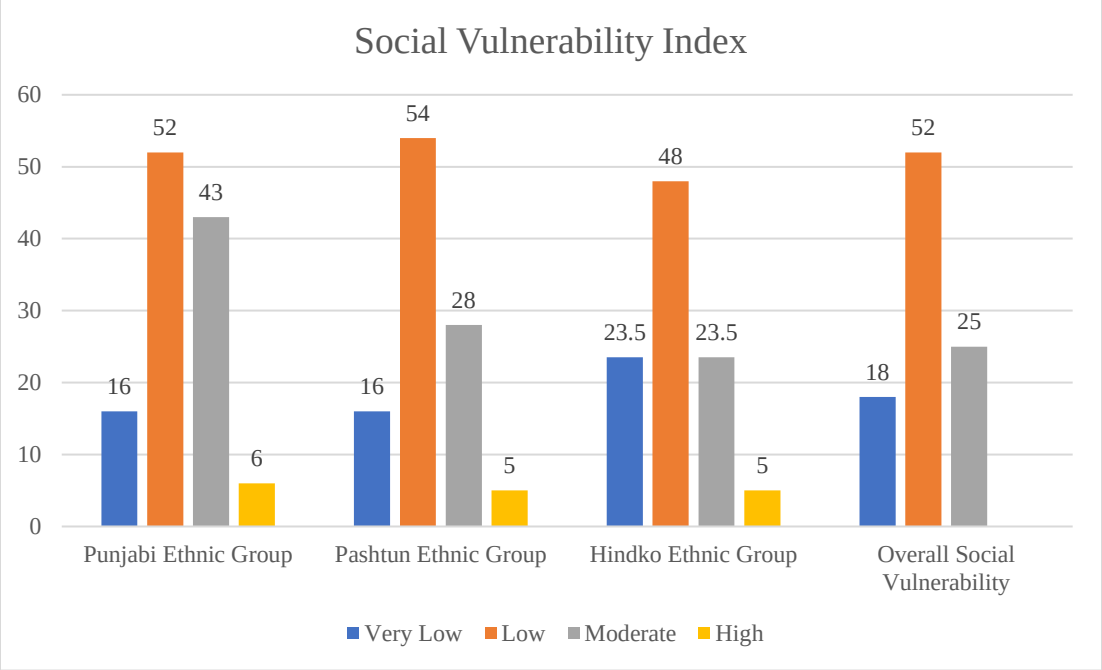


Figure 5.10. Social vulnerability index of three ethnicities

Many survey respondents live in their respective communities for 20-30 years and their total number is 144, 32% from Attock, 44% from Swabi, and 39% from the Haripur region. The Chi-square for all respondents living in their community is (X^2= 24.702), and the significant difference is (p-value = 0.002). 270 survey respondents experience a disaster in the past and thus have sufficient information to lessen future hazard impact. 74, 73, and 79% of respondents from the Attock, Swabi, and Haripur region, respectively, had experienced a disaster. 272 respondents didn't attend the local language drill due to their native language. 178 household respondents are known to disaster Jargon in their native language. 178 household respondents receive disaster information from their ancestors, of which 53% from Attock, 58% from Swabi, and 54% from the Haripur region, respectively.

The social vulnerability index of households varied from 0.20 to 0.68 in the Attock region, 0.17 to 0.72 in the Swabi community and Haripur region accordingly, with an average value of 0.40 for all the three ethnic groups Study. Around 4, 4.5, and 5% of the household surveyed are highly vulnerable, which is significantly less in a number because they had disaster experience.

Overall, 5%, of the surveyed households have high social vulnerability. Around 25%, 52%, of the respondents have moderate or low social vulnerability. This high social vulnerability of respondents is because of the absence of local language drills, a less knowledge of evacuation routes, a low understanding of climate change concepts, causes, and their impacts. The low vulnerability of households is due to the majority of respondents are male than female, high education level households, past experience of disasters, reside for a long time in a community, and received disaster information from their ancestors

5.2. Economic Vulnerability

5.2.1. Household Monthly Income

The survey also asked respondents about their monthly income to assess their vulnerability. The detail of the respondent's income is as below;

Table 5-11: Household Monthly Income

Household Monthly Income	**Region**			**Chi-square test**
	Punjabi Ethnic Group	**Pashtun Ethnic Group**	**Hindko Ethnic Group**	
<10000	10 (6%)	7 (6%)	2 (2%)	$X^2 = 6.145$ P – Value = .631
10000-19,999	18 (11%)	18 (17%)	16 (18%)	
20000-39,999	50 (32%)	38 (34%)	29 (32%)	
40000-59,9999	55 (35%)	28 (26%)	28 (31%)	
>60000	27 (17%)	19 (17%)	15(17%)	

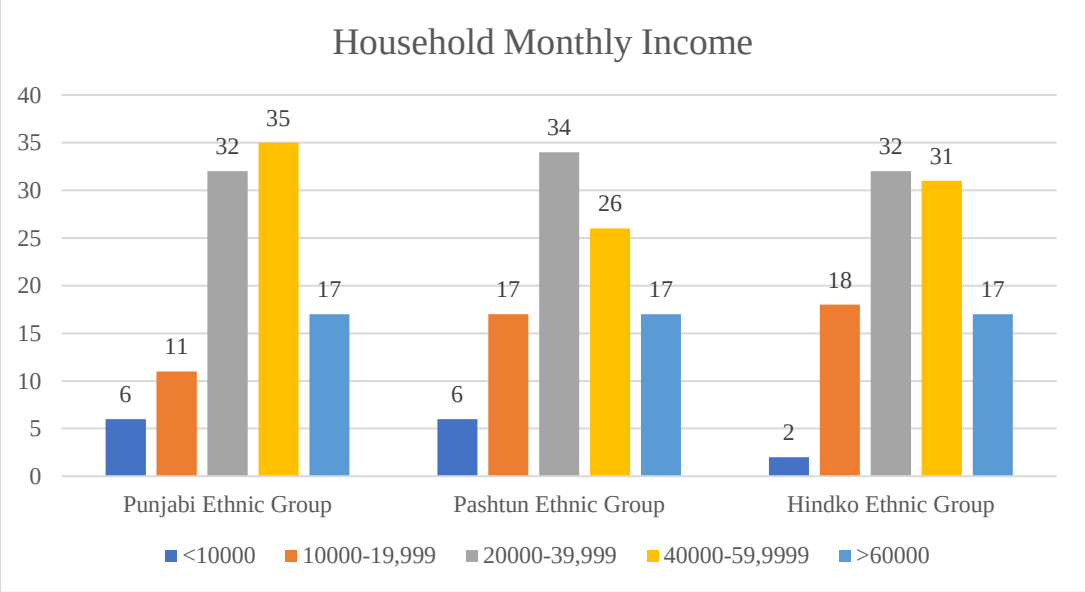


Figure 5.11. Household Monthly Income

The majority of respondent's monthly income is greater than 60000, which are in total 82 number: 27 (17%) from Attock, 19 (17%) from Swabi, and 15 (17%) from Haripur earn more than 60,000. The respondents who earn less than 10,000 are 19 in total, 10 (6%) from Attock, 7(6%) from Swabi, and 2 (2%) from the Haripur region. The respondents who earn between 10,000-19,999, 18 (11%) from Attock, 18 (17%) from

Swabi, and 16 (18%) from Haripur. The respondents who earn 20,000-39,999 are 64 in numbers; 50 (32%) from the Attock region, 38 (34%) from Swabi, and 29 (32%) from the Haripur regions. The respondents who earn between 40,000-59,999 are 111 in total; 55(35%) from the Attock region, 28 (26%) from Swabi, and 28(31%) from the Haripur region. The Chi-square value ($X^2 = 6.145$) and significance difference value (P-value = 0.631) represent no statistical difference between regions and monthly income and hence independent of each other.

5.2.2. Household Occupation

The survey also asked respondents about their occupation type. The detail of respondent's occupation is as below;

Table 5-12: Household Occupation

Household Occupation	**Region**			**Chi-square test**
	Punjabi Ethnic Group	**Pashtun Ethnic Group**	**Hindko Ethnic Group**	
Self employed	51 (39%)	27 (24%)	25 (28%)	$X^2 = 6.675$ P – Value = .352
Service	54 (34%)	48 (44%)	39 (43%)	
Daily wages	16 (10%)	5 (5%)	7 (8%)	
At home	39 (24%)	30 (27%)	19 (21%)	

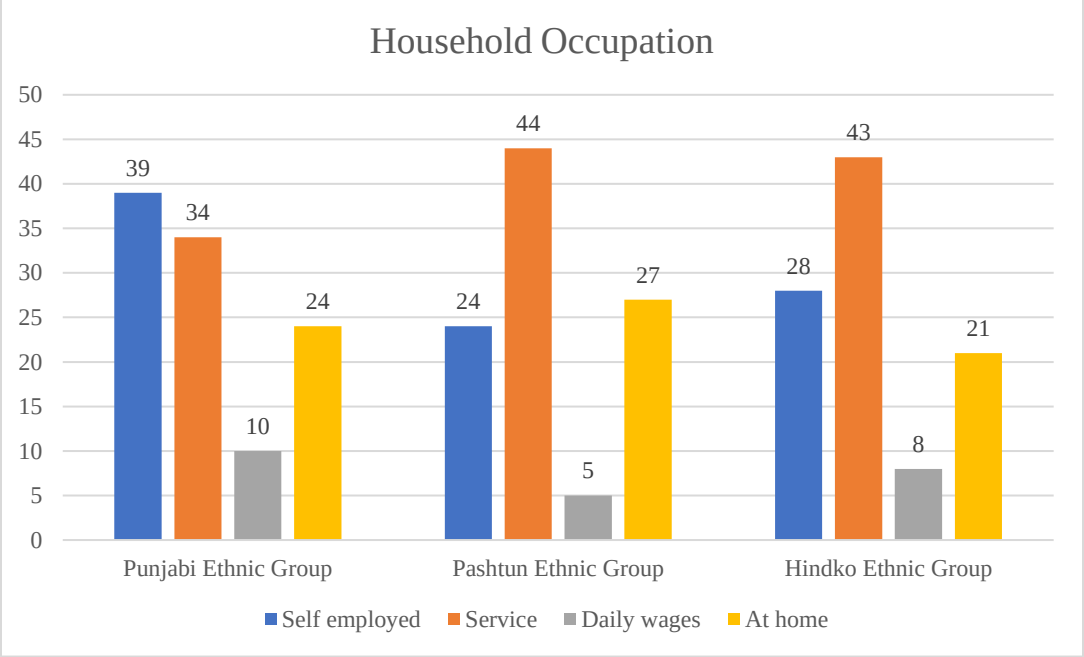


Figure 5.12. Household Occupation

The graph represents that majority of respondent's occupation types are service. The total number of respondents having service, as their occupation is 141; 54 (34%) from the Attock region, 48 (44%) from the Swabi region, and 39 (43%) from the Haripur region. The number of respondents having their occupation is self- employed are 102 in total number; 54 (39%) from Attock, 48 (24%) from Swabi, and 39 (28%) from Haripur regions. The total respondents had their occupation, as daily wagers are 28, 16 (10%) respondents from Attock, 5 (5%) respondents from Swabi and only 7 (8%) respondents are from the Haripur region. The total number of respondents who are at home is 89 in total number, 40 (24%) from the Attock region, 30 (27%) from the Swabi region, and 19 (21%) from the Haripur region. The Chi-square value ($X^2 = 6.675$) and significance difference value (P-value = 0.352) represent no statistical difference between region and type of occupation and are independent of each other.

5.2.3. House Ownership

The survey also asked about house ownership from respondents of three different regions. The majority of the respondent had owned their houses. The total number of respondents having a house are 278, 121 (76%) from Attock, 88 (80 %) from Swabi, and 70 (79%) from Haripur regions. The total number of respondents having no house ownership is 92, Attock respondents have no house ownership are 39 (24%), Swabi respondents having no house ownership are 22 (20%), and 20 (21%) respondents from Haripur having no house ownership.

The Chi-square value (X^2= 0.721) and significance difference value (P-Value = 0.697) is observed which is higher than 5%. Therefore, there is no significant difference between two variable and are independent of each other.

Table 5-13: Household Ownership

House Ownership	**Region**			**Chi-square test**
	Punjabi Ethnic Group	**Pashtun Ethnic Group**	**Hindko Ethnic Group**	
Yes	121 (76%)	88 (80%)	70 (79%)	X^2 = .721 P – Value = 0.697
No	39 (24%)	22 (20%)	20 (21%)	
Total	160	110	90	

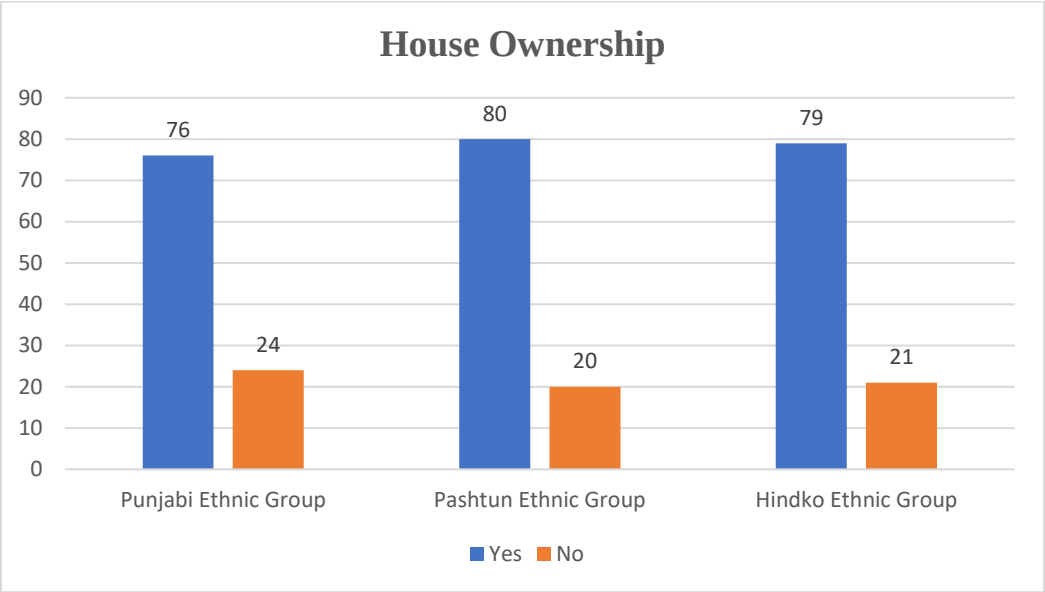


Figure 5.13. House Ownership

5.2.4. Household with mean of transportation

The survey also asked the respondents about their means of transportation, i.e., car ownership. The details of responses are as below;

Table 5-14: Household with mean of transportation

Household with mean of transportation	**Region**			**Chi-square test**
	Punjabi Ethnic Group	**Pashtun Ethnic Group**	**Hindko Ethnic Group**	
Yes	60 (37%)	28 (25.5%)	29 (32%)	X^2=4.316 P-Value=0.116
No	100 (63%	82 (74.5%)	61 (68%)	
Total	160	110	90	

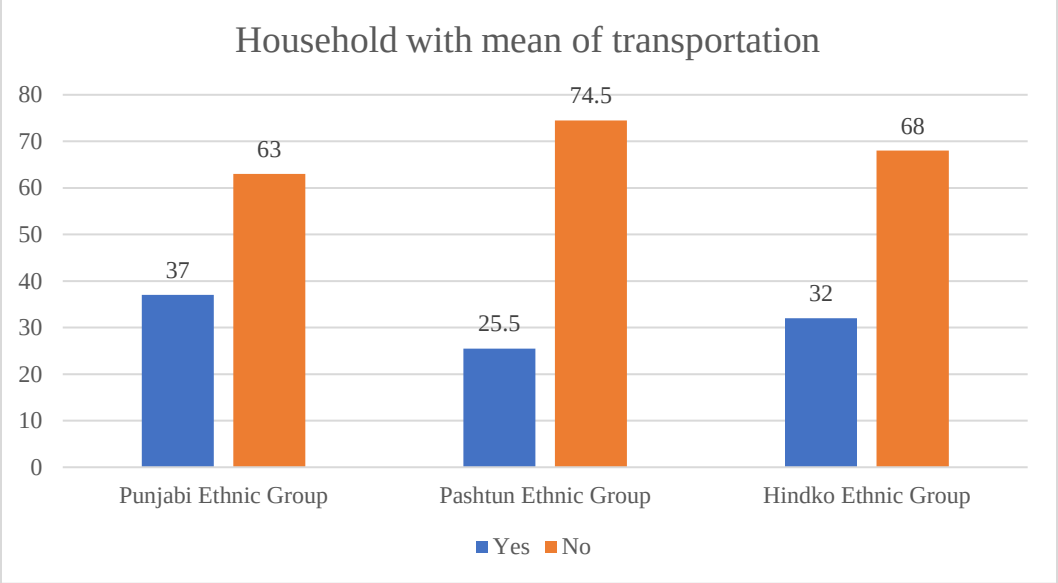


Figure 5.14. Household with mean of transportation

5.2.4. Household ability to get support from Outside

The survey asked the respondents to have financial, emotional support from outside in case of emergency. The majority of households are not able to get support from outside. 74% from Attock, 77% from Swabi, and 74% from Haripur region households are not able to get financial or emotional support with Chi-square value = 0.339 and P-value= 0.844. The inability to get support from outside households a huge number of respondents are vulnerable to climate change and natural hazards.

Table 5-15: Household ability to get support from Outside

Household ability to get support from Outside	**Region**			**Chi-square test**
	Punjabi Ethnic Group	**Pashtun Ethnic Group**	**Hindko Ethnic Group**	
Yes	41 (26%)	25 (23%)	23 (26%)	X^2= 0.339 P-Value= 0.844
No	119 (74%)	85 (77%)	67 (74%)	
Total	160	110	90	

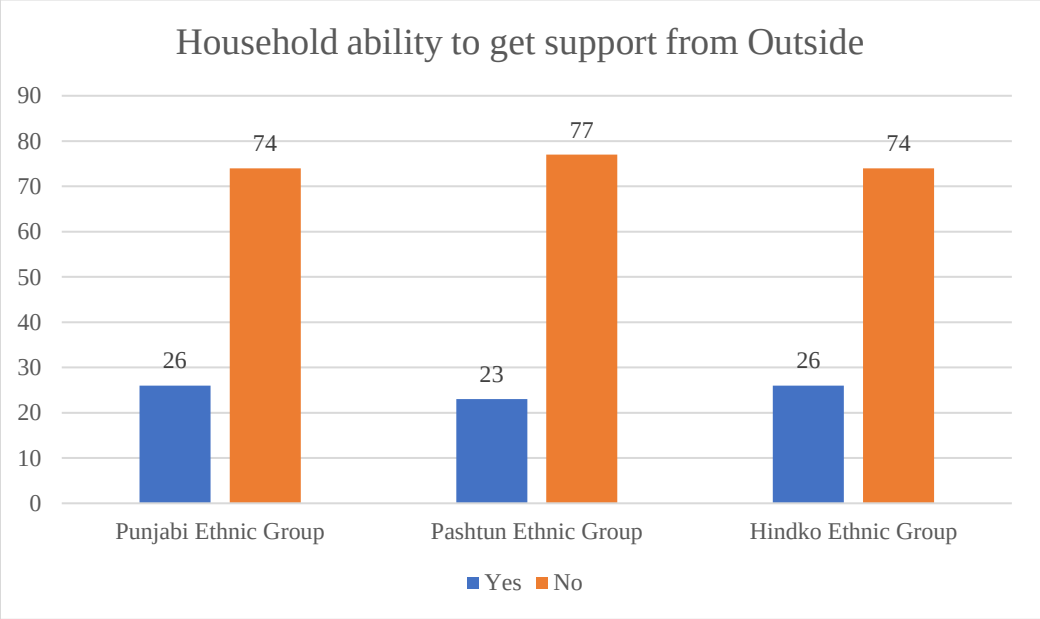


Figure 5.15. Household ability to get support from Outside

5.2.5. Economic Vulnerability Assessment

The majority of respondents have their monthly income lies 20,000-39,999, and their total number is 117, 32% from Attock region, 34% from Swabi region, and 32% from Haripur region, respectively. The majority of survey respondents have service, as their occupation type and their total number are 171, 34% from Attock region, 44% from Swabi region, and 43% from Haripur region. The majority of surveyed respondents have a dependency ratio greater than one, and their total number from three regions are 192, 58% from Attock, 51% from Swabi, and 48% from the Haripur region respectively. The majority of households surveyed have no car ownership, which negatively impacts their evacuation procedure and increases their vulnerability. 63.5, 74, and 68% of respondents from Attock, Swabi, and Haripur have no car ownership. Many respondents cannot get

support (financial, social, emotional, etc.) from outside their houses due to the cultural constraints or not known in society.

Table 5-16: Economic Vulnerability index of three different ethnic groups

Region	Classes	Very Low	Low	Moderate	High	Total	Descriptive statistics
Punjabi Ethnic Group	**Range**	**<.43**	**.43-.59**	**.59-.75**	**>.75**		Minimum = 0.27 Maximum = 0.90 Mean = 0.52 S.D = 0.15
	No. of Household	49	47	50	14	160	
	%age of household	30%	29%	31%	9%	100%	
Pashtun Ethnic Group	**Range**	**<.43**	**.43-.59**	**.59-.75**	**>.75**		Minimum = 0.27 Maximum = 0.90 Mean = 0.53 S.D = 0.14
	No. Of Household	22	44	37	7	110	
	%age of household	20%	40%	34%	6%	100%	
Hindko Ethnic Group	**Range**	**<.43**	**.43-.59**	**.59-.75**	**>.75**		Minimum = 0.27 Maximum = 0.90 Mean = 0.53 S.D = 0.15
	No. Of Household	25	30	28	7	90	
	%age of household	28%	33%	31%	8%	100%	
Total	**No. Of Household**	96	121	115	28	360	
	%age of household	27%	34%	32%	8%		

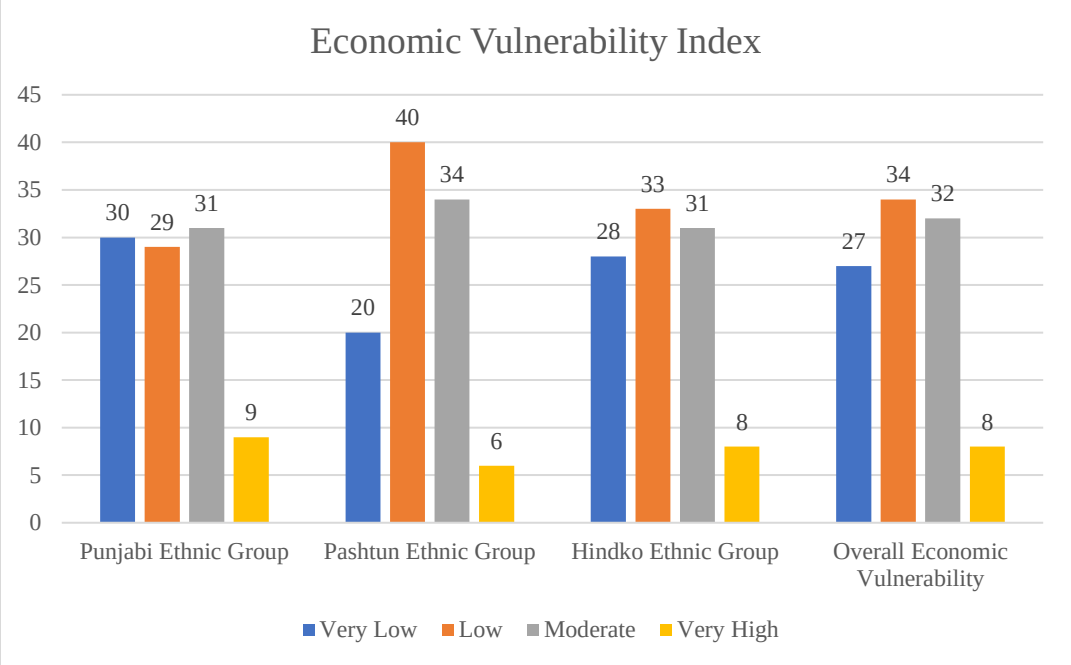


Figure 5.16. Economic Vulnerability Index

The Economic vulnerability index of households surveyed varied from 0.27 to 0.90 for all the three ethnic groups, i.e., Punjabi, Pashtun, and Hindko groups, with an average value of 0.52 for Attock and 0.53 for Swabi, and Haripur accordingly. Around 9, 6, and 8% of Attock, Swabi, and Haripur respondents are highly economically vulnerable. With respect to overall economic vulnerability, around 8% of household respondents are highly vulnerable.

This is because a mounting figure of respondents earns more than 60,000 and thus more economically stable. Secondly, being served as occupation type of most of the respondents makes them less financially vulnerable as compared to other types of occupation type.

Overall, 8% of the respondents are high economically vulnerable from the three ethnicities. Around 32%, and 34% have moderate or low economic vulnerability. The

low economic vulnerability of the respondents has high monthly income, service as their occupation, low dependency ratio, having access to a vehicle, and able to get support from outside in case of crisis.

5.3. Attitudinal vulnerability

5.3.1. Household dealing with natural Hazards

The survey asked households about dealing with natural hazards. The detail of their responses are as below;

Table 5-17: Household dealing with natural Hazards

Household dealing with natural hazards	**Region**			
	Punjabi Ethnic Group	**Pashtun Ethnic Group**	**Hindko Ethnic Group**	**Chi-Square Test**
Very Low	12 (7.5%)	8(7%)	2(4%)	$X^2 = 4.08$ P-value = 0.850
Low	33(20.5%)	22(20%)	22(24%)	
Moderate	41(25.5%)	26(24%)	21(23%)	
High	58(36.5%)	40(36%)	37(41%)	
Very High	16(10%)	14(13%)	7(8%)	
Total	160	110	90	

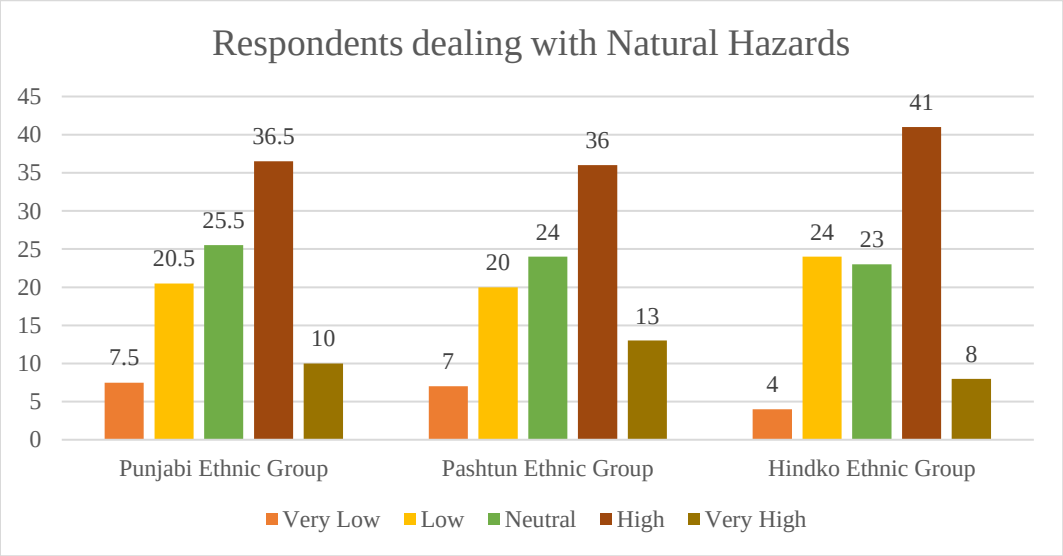


Figure 5.17. Household dealing with natural Hazards

The graphs represent that the majority of respondents are highly able to deal with natural hazards using their resources. The total number of very low respondents able to deal with natural hazards is 23 in total; 12 from Attock, 8 from Swabi, and 3 from the Haripur region. The respondents who are less able to deal with natural hazards are a total of 77; 33 from Attock, 22 from Swabi, and 22 from Haripur. The neutral respondents in dealing with natural hazards are in total 88; 41 from Attock, 26 from Swabi, and 21 from Haripur regions. The respondents who can deal with natural hazards are in total 135; 58 from the Attock region, 40 from the Swabi region, and 37 from the Haripur region. The respondents who are very highly able to deal with consequences of natural hazards are in total 37; 16 from Attock, 14 from Swabi, and 7 from the Haripur region.

5.2.2. Household adaptability of lifestyle

The survey also asked respondents about their perception of the adaptability of lifestyle to climate change. The detail of their responses are below;

Table 5-18: Household adaptability of lifestyle

Household Perceived adaptability of lifestyle	**Region**			
	Punjabi Ethnic Group	**Pashtun Ethnic Group**	**Hindko Ethnic Group**	**Chi-Square Test**
Very Low	8(5%)	5(4.5%)	4(4.5%)	$X^2 = 2.377$
Low	28(18%)	17(15.5%)	17(19%)	P-value = 0.967
Moderate	33(21%)	28(25.5%)	17(19%)	
High	73(45%)	50(45.5%)	45(50%)	
Very High	17(11%)	10(9%)	7(7.5%)	
Total	160	110	90	

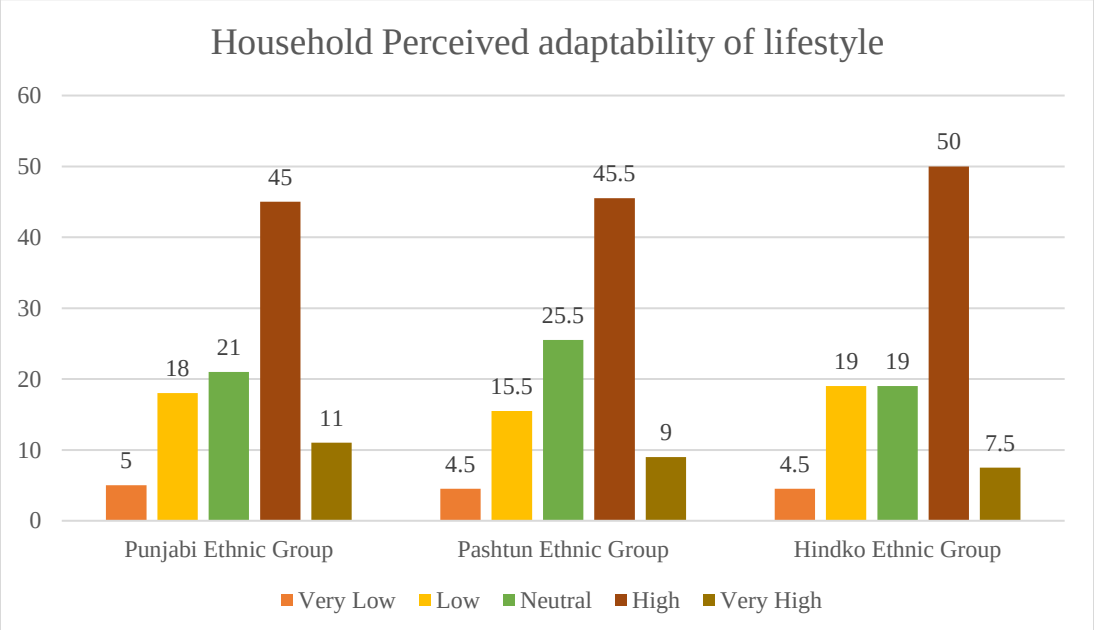


Figure 5.18. Household adaptability of lifestyle

The household response to perceived adaptability of lifestyle to climate change is high in the majority, and in number, it is 168; 73 from Attock, 50 from Swabi, and 45 from Haripur. The respondents who had a very low perception of adaptability of lifestyle to

climate change are 17 in total; 8 from Attock, 5 from Swabi, 4 from Haripur. The respondent who had a low response to the adaptability of lifestyle to climate change are 63; 29 from Attock, 17 from Swabi, and 17 from the Haripur regions. The respondent who is neutral and does not willing to adapt to new lifestyle are 78; 33 from Attock, 28 from Swabi, and 17 from the Haripur region. The respondents who are very highly able to adapt lifestyle are in total 34; 17 from Attock, 10 from Swabi, and 7 from the Haripur region.

5.3.3. Household ability that harmful effects of a disaster can reduced.

The survey asked the respondents the harmful effects of disaster related to climate change can be reduced, and received a variety of responses. The detail of their responses are as below;

Table 5-19: Household perception that harmful effects of disaster can reduced

Household Perceived disaster effects can be reduced	**Region**			
	Punjabi Ethnic Group	**Pashtun Ethnic Group**	**Hindko Ethnic Group**	**Chi-Square Test**
Very Low	16(10%)	9(8%)	9(10%)	$X^2 = 6.535$
Low	47(29%)	22(20%)	18(20%)	P-value = 0.587
Moderate	22(14%)	16(15%)	16(18%)	
High	56(35%)	51(46%)	38(42%)	
Very high	19(12%)	12(11%)	9(10%)	

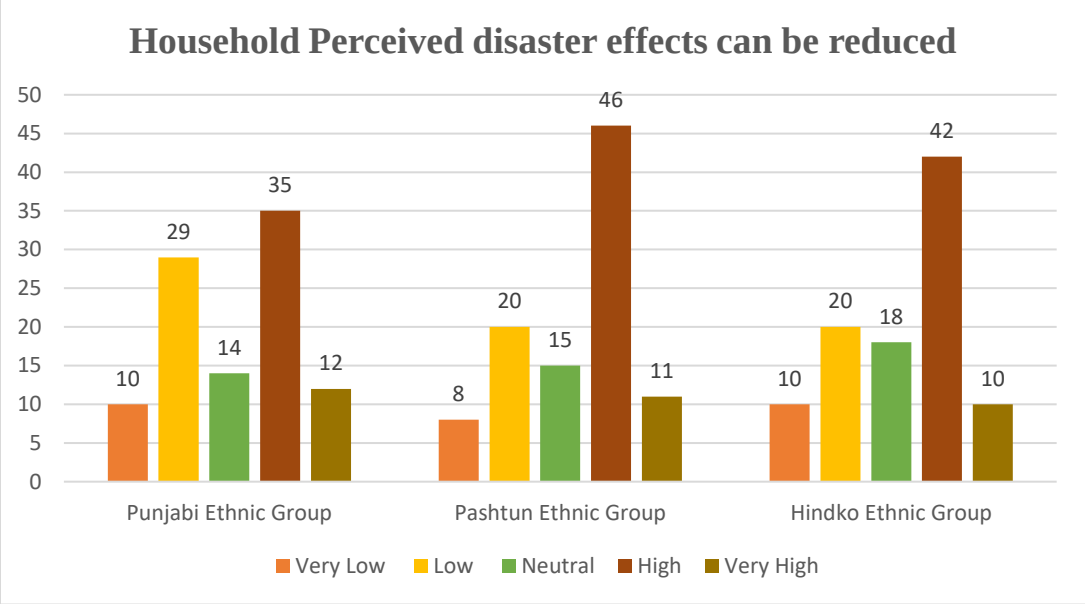


Figure 5.19. The Household perception that harmful effects of a disaster can reduced

The graphs represent that most of the households perceived high adaptability of lifestyle, and their total number is 145; 56 from Attock region, 51 from Swabi, and 38 from the Haripur region. The respondents who perceived very low adaptability of lifestyle are 34 in total; 16 from Attock, 9 from Swabi, and 34 from the Haripur region. The respondents who perceived low adaptability of lifestyle are 87 in total number; 47 from Attock, 22 from Swabi, and 18 from Haripur. The respondents who perceived no adaptability to lifestyle are 54 in total; 22 from Attock, 16 from Swabi, and 16 from the Haripur region. The respondents who perceived very high adaptability of lifestyle to climate change are in total 40 numbers; 19 from the Attock region, 12 from Swabi and 9 from the Haripur regions.

5.3.4. Attitudinal vulnerability Assessment

135 household respondents are highly able to deal with natural hazards. Around 36.5, 36, and 41% are highly capable of dealing with the consequences of natural hazards.

The majority of household respondents, about 168 in number, can adapt to a new lifestyle, which increases their capacities and ultimately decreases their vulnerabilities. Around 35, 46, and 42 % of Attock, Swabi, and Haripur respondents are highly able to understand that disaster effects or impacts can be reduced either by mitigation or by evacuation.

The attitudinal vulnerability index for all three ethnic groups i.e. Punjabi, Pashtun, and Hindko ethnic groups, is the same and varied from 0.20 to 1, with an average value of 0.55, 0.53, 0.54, for the Punjabi, Pashtun, and Hindko group, respectively.

Overall, 5% of the respondents from three ethnicities have high attitudinal vulnerability. Around, 39% and 45% of the household have a moderate or low attitude toward climate change and natural hazards, respectively. This low attitude of the respondents is because of low dealing or concern with natural hazards, low new-lifestyle adaptability, and lack of understanding of disaster harm can be reduced.

The smaller number of highly attitudinally vulnerable is because most survey respondents can deal with natural hazards and can adapt to a new lifestyle. Thus, it will decrease their exposure to hazards and increase their resilience to any emergency. Secondly, they are also willing to migrate from the affected region to another safe region, therefore showing less affiliation to their proximity in case of hazardous situations, and reducing their overall attitudinal vulnerability.

Table 5-20: Attitudinal vulnerability index of three different ethnic group

Region	Classes	Very Low	Low	Moderate	High	Total	Descriptive statistics
Punjabi Ethnic Group	**Range**	**<.40**	**.40-.60**	**.60-.80**	**>.80**		Minimum = 0.20 Maximum = 1 Mean = 0.55 S.D = 0.14
	No. of Household	14	72	65	9	160	
	%age of household	9%	45%	41%	5%	100%	
Pashtun Ethnic Group	**Range**	**<.40**	**.40-.60**	**.60-.80**	**>.80**		Minimum = 0.20 Maximum = 1 Mean = 0.53 S.D = 0.15
	No. Of Household	16	50	38	6	110	
	%age of household	14.5%	45%	35%	5%	100%	
Hindko Ethnic Group	**Range**	**<.40**	**.40-.60**	**.60-.80**	**>.80**		Minimum = 0.20 Maximum = 1 Mean = 0.54 S.D = 0.14
	No. Of Household	11	39	35	5	90	
	%age of household	12%	43%	39%	5%	100%	
Total	**No. Of Household**	41	161	138	20	360	
	%age of household	11%	45%	39%	5%		

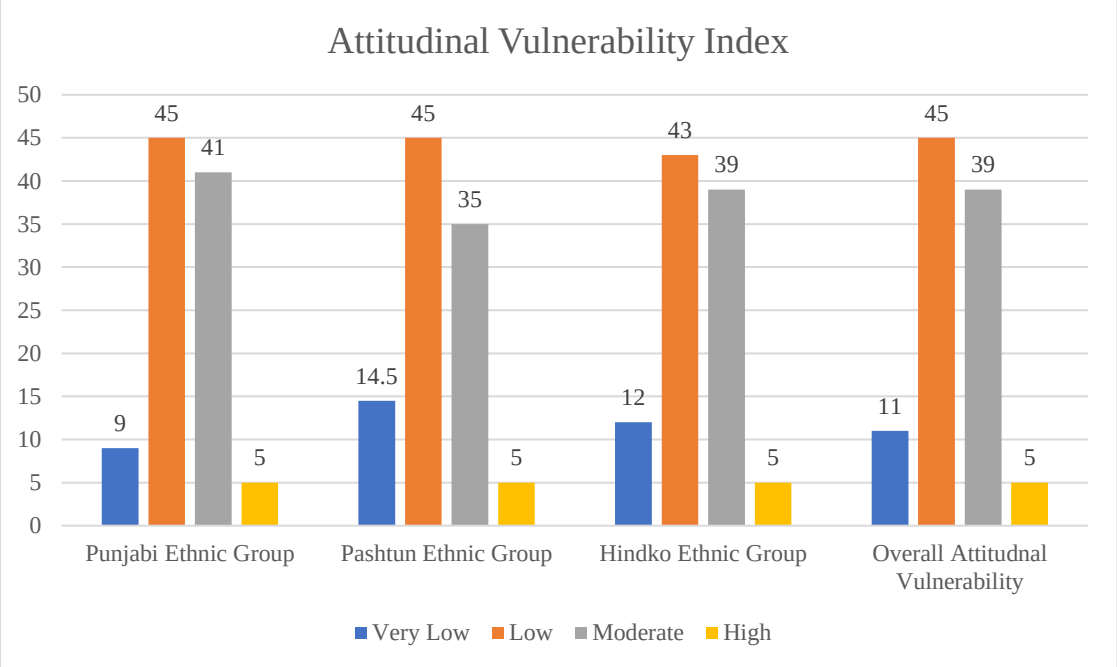


Figure 5.20. Attitudinal Vulnerability Index

5.4. Overall Vulnerability

The overall vulnerability index for all three ethnic groups is varying. For the Punjabi ethnic group, i.e., Attock, it varies from 0.27 to 0.67 with an average value of 0.47. Overall, 14% of Attock respondents are highly vulnerable due to their economic conditions. The overall vulnerability index for Pashtun Ethnic group varies from 0.25 to 0.69 with an average value of 0.47. Overall, 13% of Swabi respondents are highly vulnerable to climate change and natural hazards, which shows the equal contribution of social, economic, and attitudinal vulnerability. The overall vulnerability index for Hindko ethnic group varies from 0.39 to 0.69, with an average value of 0.53. 11% of Haripur respondents are highly vulnerable mainly due to economic conditions while attitude and behavior, a social condition also play its role.

Overall, 13% of total respondents are highly vulnerable to climate change and natural hazards, mainly due to social, economic, and attitudinal conditions. Around 41% and 37% of the respondents have moderate or low overall vulnerability. The reduction of socio-economic and attitudinal vulnerability lessening the overall vulnerability of three communities. The prioritizing of the attitudinal vulnerability improvement aids household responsible for their actions. The socio-economic conditions strengthen their actions and ultimately the societies or communities move toward clean energy, sustainable communities, and green infrastructure, achieving sustainability goals.

Table 5-21: Overall vulnerability index of three different ethnic groups

Region	**Classes**	**Very Low**	**Low**	**Moderate**	**High**	**Total**	**Descriptive statistics**
Punjabi Ethnic Group	**Range**	**<.37**	**.37-.47**	**.47-.58**	**>.58**		Minimum = 0.27 Maximum = 0.67 Mean = 0.47 S.D = 0.073
	No. of Household	9	62	67	22	160	
	%age of household	5%	39%	42%	14%	100%	
Pashtun Ethnic Group	**Range**	**<.36**	**.36-.47**	**.47-.58**	**>.58**		Minimum = 0.25 Maximum = 0.69 Mean = 0.47 S.D = 0.082
	No. Of Household	4	46	46	14	110	
	%age of household	3.5%	42%	42%	13%	100%	
Hindko Ethnic Group	**Range**	**<.48**	**.48-.57**	**.57-.66**	**>.66**		Minimum = 0.39 Maximum = 0.69 Mean = 0.53 S.D = 0.08
	No. Of Household	20	39	21	10	90	
	%age of household	22%	43%	23%	11%	100%	
Total	**No. Of Household**	33	147	134	46	360	

	%age of household	9%	41%	37%	13%		

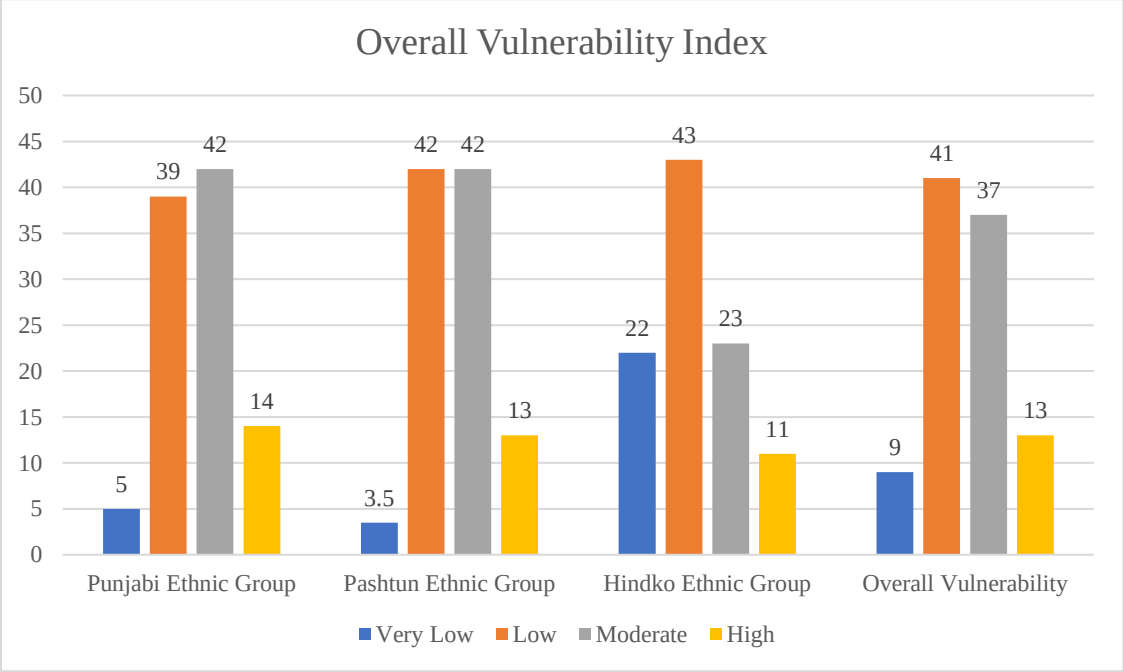


Figure 5.21. Overall Vulnerability Index

5.5. Impact of Ethnicities on Vulnerability.

Table 5-22: Model-Fitting Information

Model	**Model Fitting Criteria**	**Likelihood Ratio Tests**		
	-2 Log Likelihood	**Chi-Square**	**df**	**Sig.**
Intercept Only	767.095			
Final	714.738	52.357	4	.000

This table presents that the two independent variable are significantly fit .The final model reject the null model, which is that vulnerability have no impact on ethnicity.

Thus the vulnerability have significant impact on ethnicity with P= 0.000 and Chi-Square X^2= 52.357.

Table 5-23: Pseudo R-Square

Pseudo R-Square	
Cox and Snell	.135
Nagelkerke	.153
McFadden	.068

The pseudo R-Square is coefficient of determination and ranges from zero to one. Zero represents low variation and one presents perfect variation. All the three Pseudo R-Square value Cox and Snell, Nagelkerke and McFadden are 0.135, 0.153 and 0.68 respectively are closer to zero therefore show low variation.

Table 5-24: Likelihood Ratio Test

Effect	**Model Fitting Criteria**	**Likelihood Ratio Tests**		
	-2 Log Likelihood of Reduced Model	**Chi-Square**	**df**	**Sig.**
Intercept	743.025	28.286	2	.000
Vulnerability	767.001	52.263	2	.000

The vulnerability have significant impact on ethnicities with P= 0.000 and Chi-Square X^2= 52.263 against natural hazards and climate.

Table 5-25: Parameter Estimates

Parameter Estimates									
Ethnicity		**B**	**Std. Error**	**Wald**	**df**	**Sig.**	**Exp(B)**	**95% Confidence Interval for Exp(B)**	
								Lower Bound	**Upper Bound**
2	**Intercept**	-.097	.774	.016	1	.900			
	Vulnerability	-.468	2.030	.053	1	.818	.626	.012	33.504
3	**Intercept**	-4.388	.931	22.200	1	.000			
	Vulnerability	14.118	2.327	36.817	1	.000	1353761.489	14156.454	129458278.243
a. The reference category is: 1.									

The vulnerability have significant impact on three ethnicities regarding climate change and natural hazards. The high vulnerable individuals in Pashtun ethnic groups are less 0.468 times of Punjabi ethnic groups against natural hazards and are not significant as P= 0.818. The high vulnerability of household in Hindko ethnic groups are 14.118 times of Punjabi ethnic group and are significant with P= .000.

Chapter 6 . Respondents Risk perception

The survey was conducted to assess the risk perception of households towards climate change and natural hazards. A total of 360 were responses were collected from the household. The detail of their responses are below;

6.1. Respondents' Behavior and Attitude

The behavior and attitude of respondents are subdivided into three parts;

- Household dealing with natural hazards
- Household Perceived adaptability of lifestyle
- Household Perceived harmful effects can be reduced.

6.1.1. Household dealing with natural hazards

The survey asked households about dealing with natural hazards. The detail of their responses are as below;

Table 6-1: Household dealing with natural hazards

Household dealing with natural hazards	**Region**			
	Punjabi Ethnic Group	**Pashtun Ethnic Group**	**Hindko Ethnic Group**	**Chi-Square Test**
Very Low	12 (7.5%)	8(7%)	2(4%)	$X^2 = 4.08$ P-value = 0.850
Low	33(20.5%)	22(20%)	22(24%)	
Moderate	41(25.5%)	26(24%)	21(23%)	
High	58(36.5%)	40(36%)	37(41%)	
Very High	16(10%)	14(13%)	7(8%)	
Total	160	110	90	

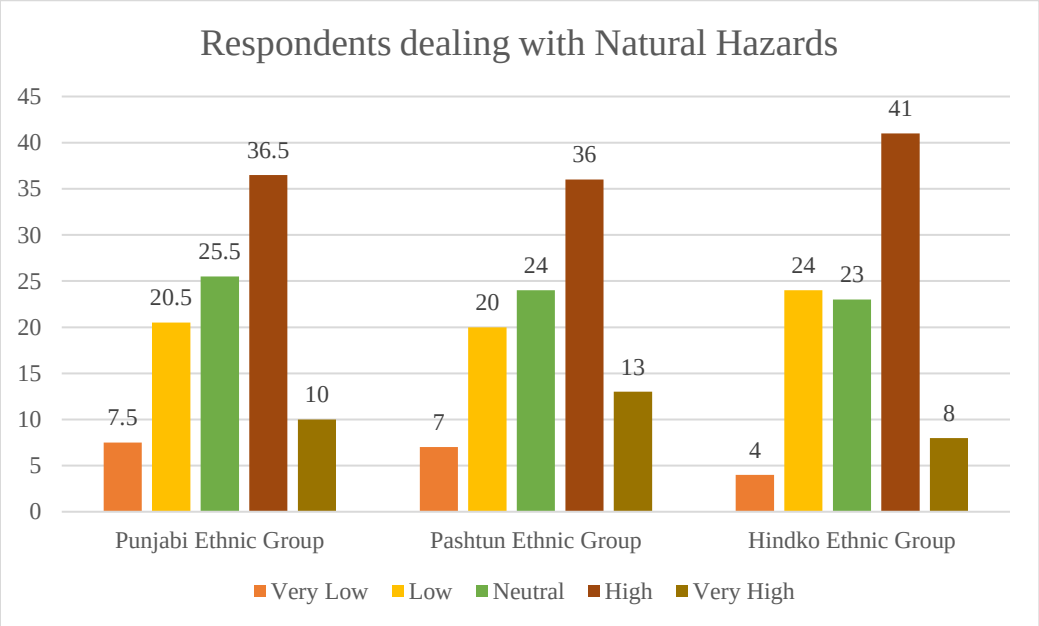


Figure 6.1. Respondents dealing with natural hazards

The graphs represent that most respondents are highly able to deal with natural hazards using their resources. The total number of very low respondents able to deal with natural hazards is 23 in total; 12 from Attock, 8 from Swabi, and 3 from the Haripur region. The respondents who are less able to deal with natural hazards are a total of 77; 33 from Attock, 22 from Swabi, and 22 from Haripur. The neutral respondent in dealing with natural hazards are 88; 41 from Attock, 26 from Swabi, and 21 from Haripur regions. The respondents who can deal with natural hazards are 135; 58 from the Attock region, 40 from the Swabi region, and 37 from the Haripur region. The respondents who can deal with the consequences of natural hazards are in total 37; 16 from Attock, 14 from Swabi, and 7 from the Haripur region.

6.1.2. Household Perceived adaptability of lifestyle

The survey also asked respondents about their perception of the adaptability of lifestyle to climate change. The detail of their responses are below;

Table 6-2: Household perceived adaptability of lifestyle

Household Perceived adaptability of lifestyle	**Region**			
	Punjabi Ethnic Group	**Pashtun Ethnic Group**	**Hindko Ethnic Group**	**Chi-Square Test**
Very Low	8(5%)	5(4.5%)	4(4.5%)	$X^2 = 2.377$
Low	28(18%)	17(15.5%)	17(19%)	P-value = 0.967
Moderate	33(21%)	28(25.5%)	17(19%)	
High	73(45%)	50(45.5%)	45(50%)	
Very High	17(11%)	10(9%)	7(7.5%)	
Total	160	110	90	

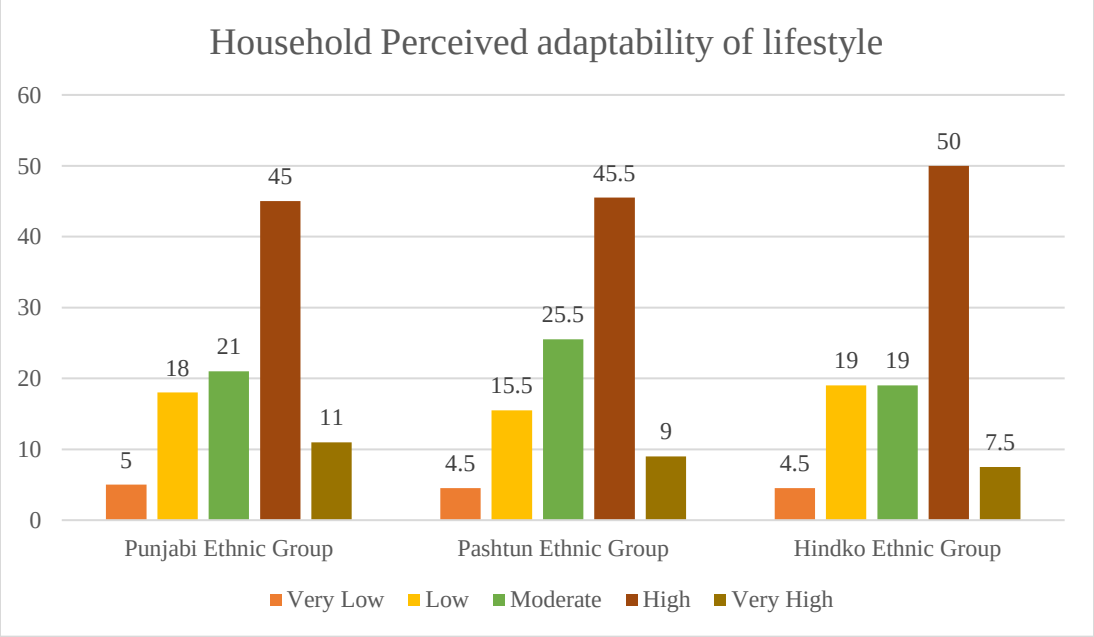


Figure 6.2. Household perceived adaptability of lifestyle

The household response to perceived adaptability of lifestyle to climate change is high in the majority, and in number, it is 168; 73 from Attock, 50 from Swabi, and 45 from Haripur. The respondents who had a very low perception of adaptability of lifestyle to climate change are 17 in total; 8 from Attock, 5 from Swabi, 4 from the Haripur region. The respondents who had a low response to the adaptability of lifestyle to climate change are 63; 29 from Attock, 17 from Swabi, and 17 from the Haripur regions. The respondents who are neutral and do not willing to adapt to new lifestyle are 78; 33 from Attock, 28 from Swabi, and 17 from the Haripur region. The respondents who are very highly able to adapt lifestyle are in total 34; 17 from Attock, 10 from Swabi, and 7 from the Haripur region.

6.1.3. Respondents' perception that harmful effects of disaster can reduced

The survey asked the respondents that the harmful effects of disasters related to climate change can be reduced and received a variety of responses. The detail of their responses are as below;

Table 6-3:Household Perception that harmful effect of disaster can reduced

Household Perceived disaster effects can be reduced	**Region**			
	Punjabi Ethnic Group	**Pashtun Ethnic Group**	**Hindko Ethnic Group**	**Chi-Square Test**
Very Low	16(10%)	9(8%)	9(10%)	$X^2 = 6.535$
Low	47(29%)	22(20%)	18(20%)	P-value = 0.587
Moderate	22(14%)	16(15%)	16(18%)	
High	56(35%)	51(46%)	38(42%)	
Very high	19(12%)	12(11%)	9(10%)	

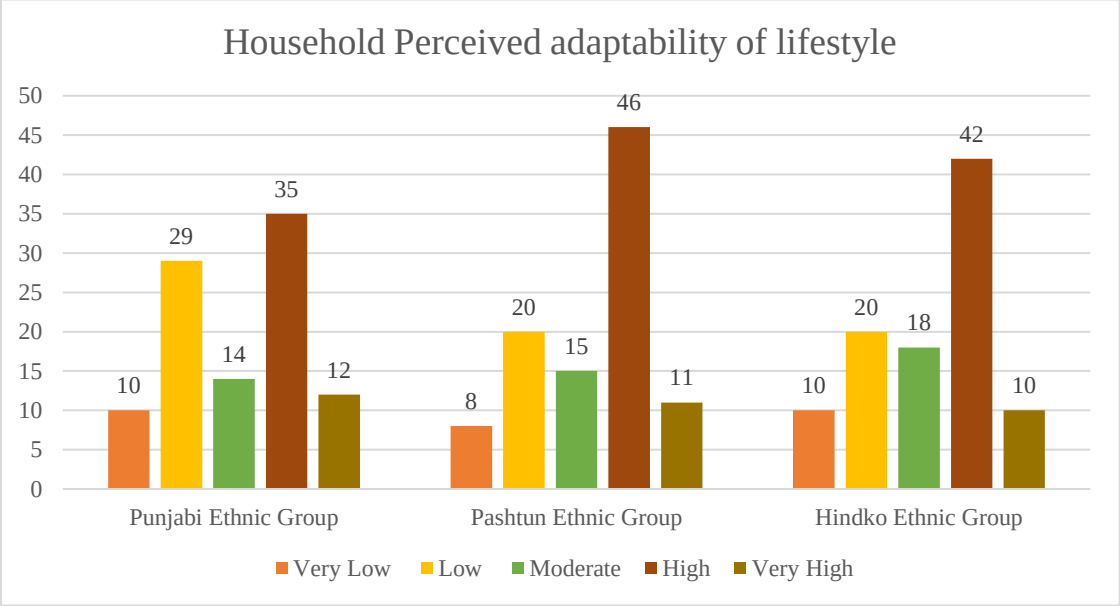


Figure 6.3. Household perception that harmful effects of disaster can reduced

The graphs represent that most of the households perceived high adaptability of lifestyle, and their total number is 145; 56 from Attock region, 51 from Swabi, and 38 from Haripur region. The respondents who perceived very low adaptability of lifestyle are 34; 16 from Attock, 9 from Swabi, and 34 from the Haripur region. The respondents who perceived low adaptability of lifestyle are 87 in total number; 47 from Attock, 22 from Swabi and 18 from Haripur. The respondents who perceived no adaptability to lifestyle are 54 in total; 22 from Attock, 16 from Swabi, and 16 from the Haripur region. The respondents who perceived very high adaptability of lifestyle to climate change are in total 40 numbers; 19 from Attock region, 12 from Swabi, and 9 from Haripur regions.

6.2. Respondents' Trust and Confidence

The survey also asked the household about their trust and confidence in the information received from different sources about climate change and asked them about their trust

in the Ministry of Climate Change to combat climate change. The detail of their responses is below.

6.2.1. Household Trust and confidence in the information received

The survey asked the respondent about their trust and confidence in the information received from different sources. The detail of their responses are represented below table;

Table 6-4: Household trust on the information received

Household Trust and confidence in the information received.	**Region**			
	Punjabi Ethnic Group	**Pashtun Ethnic Group**	**Hindko Ethnic Group**	**Chi-Square test**
Very Low	8 (5%)	11 (10%)	7 (8%)	X^2= 15.179 p-value = 0.056
Low	20 (12.5%)	15 (13.5%)	14 (15.5%)	
Moderate	54 (34%)	20 (18%)	15 (16.5%)	
High	55 (34%)	43(39%)	41 (46%)	
Very High	23 (15%)	21 (19%)	13 (14%)	
Total	**160**	**110**	**90**	

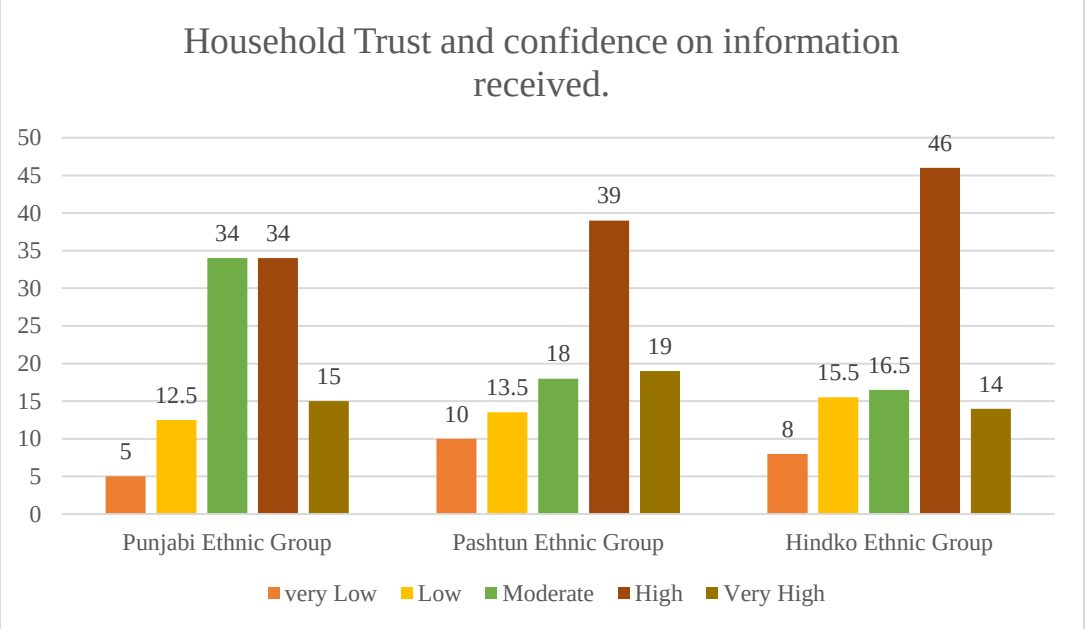


Figure 6.4. Household trust on information received.

The above figure represents that most respondents have high trust and confidence in the information received from different sources. Their total number is 127, 55 from Attock, 31 from Swabi, and 41 from the Haripur region. The respondents with very low trust in the information received from different sources are 34; 8 from Attock, 19 from Swabi, and 7 from the Haripur region. The respondents who have low trust in the information received are 51 in total number; 20 from Attock, 17 from Swabi, and 14 from the Haripur region. The respondents who have no trust in the information received are a total of 96; 54 from Attock, 27 from Swabi, and 15 from the Haripur region. The respondents who have very high trust in the information received from different sources are 52, 23 from the Attock region, 16 from Swabi, and 13 from the Haripur region.

6.2.2. Household trust & confidence in the Ministry of Climate Change

The survey also asked the respondents about their trust and confidence in the ministry of climate change to combat climate change. The detail of their responses are represented in the below table;

Table 6-5: Household trust on Ministry of Climate Change

Household trust & confidence on ministry of Climate Change.	**Region**			
	Punjabi Ethnic Group	**Pashtun Ethnic Group**	**Hindko Ethnic Group**	**Chi-Square Test**
Very Low	21 (13%)	19 (17%)	15 (17%)	$X^2 = 6.642$
Low	14 (9%)	17 (15.5%)	12 (13%)	p-value = 0.579
Moderate	55 (34%)	27 (24.5%)	23 (25.5%)	
High	45 (28%)	31 (28%)	28 (31%)	
Very High	25 (15.5%)	16 (14.5%)	12 (13%)	
Total	**160**	**110**	**90**	

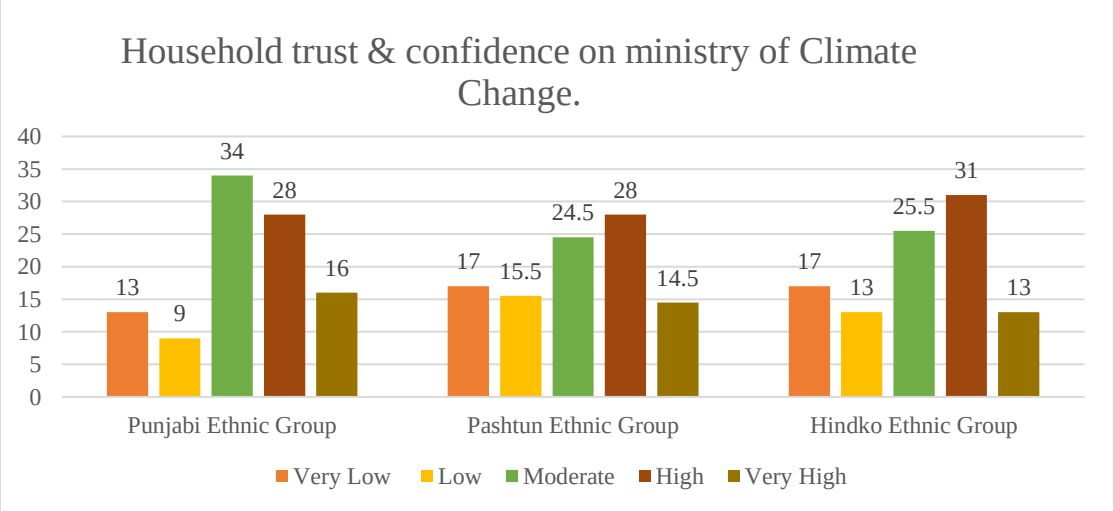


Figure 6.5. Household trust on Ministry of Climate Change

The above graph represents that most of the respondents have high trust and confidence in the ministry of climate change to combat climate change. Their total number is 118, 45 from Attock, 45 from Swabi, and 28 from Haripur regions. The number of respondents who have very low trust in climate change ministry is 44 in total; 21 from Attock, 8 from Swabi, and 15 from the Haripur region. The number of respondents who have low trust in climate change ministry is 38 in total number; 14 from Attock, 12 from Swabi, and 12 from the Haripur region. The respondents who have no trust in the work of the ministry of climate change are 92 in total number; 55 from Attock, 14 from Swabi, and 23 from the Haripur region. The respondents who have very high trust in the work of the ministry of climate change are 68 in total number; 25 from Attock, 31 from Swabi, and 12 from the Haripur regions.

6.3. Household Fear and worry

The survey asked the household about their perception of fear and worry about climate change and natural hazards. The survey asked about their level of afraid of climate change and their worries about the occurrence of natural hazards.

6.3.1. Household level of afraid about Climate change

The detail of household responses about their level of afraid from climate change as shown in below table;

Table 6-6: Household level of afraid

Household level of afraid about Climate change	**Region**			
	Punjabi Ethnic Group	**Pashtun Ethnic Group**	**Hindko Ethnic Group**	**Chi-Square Test**
Very Low	29 (18%)	11 (10%)	13 (14%)	X^2= 9.863
Low	20 (12.5%)	11 (10%)	13 (14%)	P-value = .275
Moderate	25 (15.5%)	27 (24.4%)	18 (20%)	
High	59 (37%)	34 (31%)	32 (35.5%)	
Very high	27 (17%)	27 (24.5%)	14 (15.5%)	
Total	160	110	90	

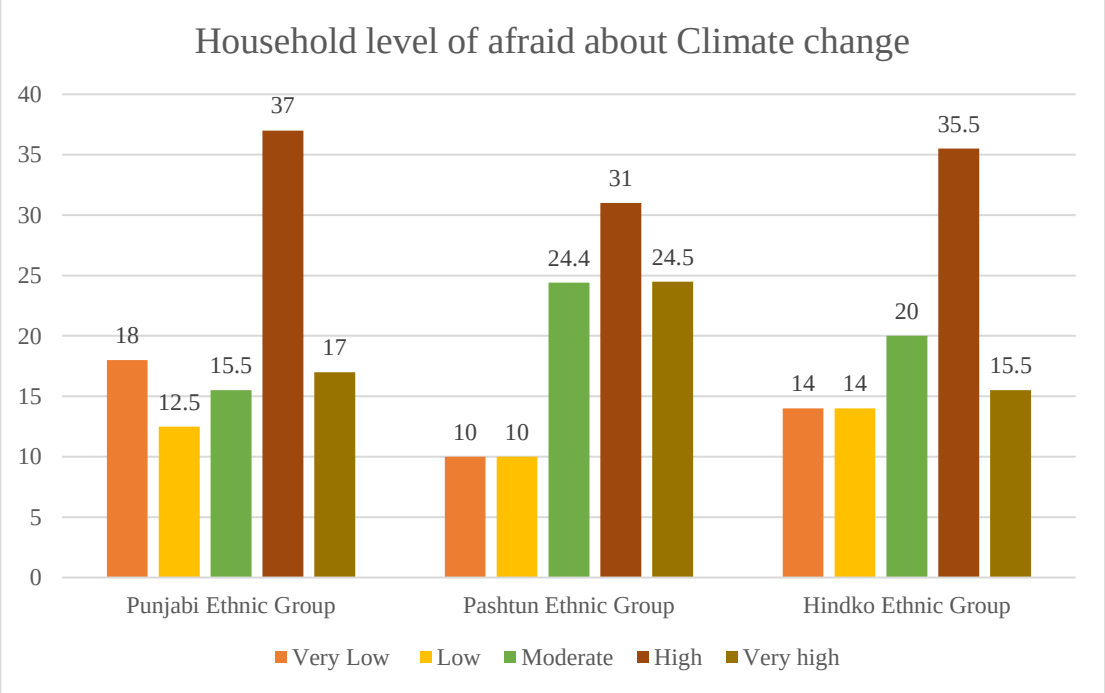


Figure 6.6. Household level of afraid

The above graph represents the household level of fear about climate change. The majority of respondents are highly afraid, and their total number is 125; 59 from the

Attock region, 34 from the Swabi, and 32 from the Haripur region are highly afraid of climate change. The respondents who have a very low level of fear about climate change are 52 in total number; 29 from Attock, 11 from Swabi, and 12 from the Haripur region perceive a very low level of fear. The respondents with a low level of fear are 44 number; 20 from the Attock, 11 from the Swabi, and 13 from the Haripur region. The respondents who perceive no level of afraid are in total 70 number; 25 from the Attock region, 27 from the Swabi, and 18 from the Haripur region. The respondents who perceive a very high level of afraid about climate change are in total 68 number; 27 from Attock, 27 from Swabi, and 14 from the Haripur region.

6.3.2. Household worry and fear about Occurrence of Natural Hazards

The survey asked the respondent about their perception of worries about the occurrence of natural hazards. The detail of their responses are as below;

Table 6-7: Household worry about the occurrence of natural hazards

Household worry about Occurrence of Natural Hazards.	**Region**			
	Punjabi Ethnic Group	**Pashtun Ethnic Group**	**Hindko Ethnic Group**	**Chi-Square Test**
Very Low	9 (5.5%)	6 (5.5%)	3 (3%)	X^2= 3.551 P-value = .895
Low	12 (7.5%)	12 (11%)	11 (12%)	
Moderate	23 (14%)	13 (12%)	11 (12%)	
High	38 (24%)	21 (19%)	21 (23%)	
Very High	78 (49%)	58 (53%)	44 (49%)	

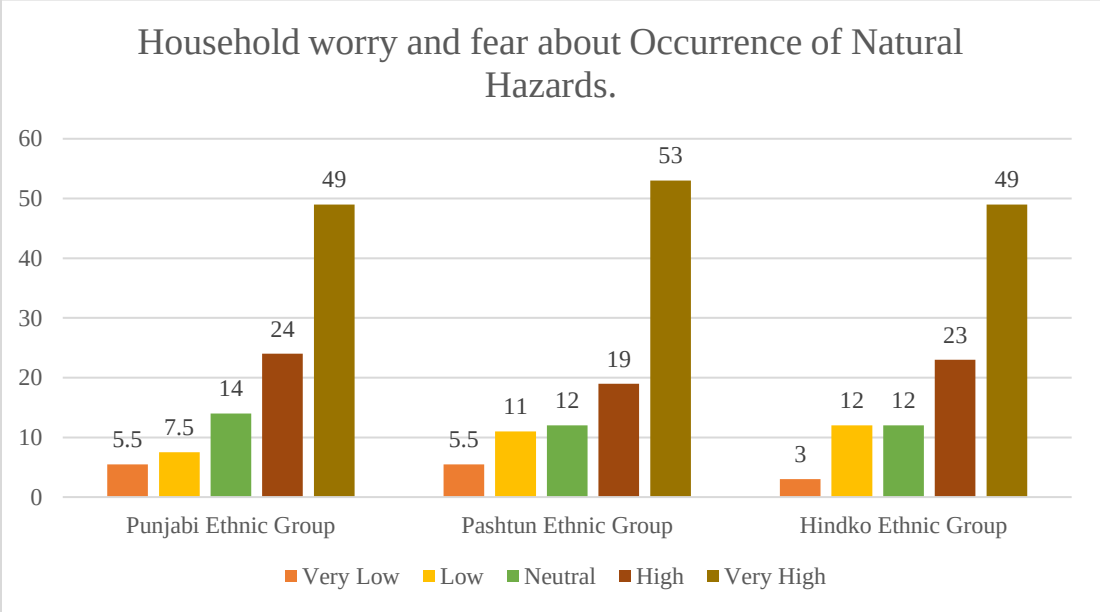


Figure 6.7. Household worry about the occurrence of natural hazards

The above figure represents that most of the respondents highly perceive fear and concern about the occurrence of natural hazards. Their total number is 179; 77 from the Attock region, 58 from the Swabi region, and 44 from the Haripur region. The respondents who have a very low level of fear of natural hazards are 16 in total; 7 from Attock, 6 from Swabi, and 3 from the Haripur region. The respondents who have a low level of worry about the occurrence of natural hazards are in total 35; 12 from Attock, 12 from Swabi, and 11 from the Haripur region. The respondents who have no fear about natural hazards are in total 47; 23 from Attock, 13 from Swabi, and 11 from the Haripur region. The respondents who have a high level of fear about the occurrence of natural hazards are in total 81 number; 39 from the Attock region, 21 from Swabi, and 21 from the Haripur region, respectively.

6.4. Household Knowledge and Information

The survey also asked respondents about the extent of familiarity, the extent of knowledge about rescue and evacuation procedures, and understanding of disaster causes. The detail of their responses is below.

6.4.1. Household Perceived extent of familiarity

The survey asked the respondent about their extent of familiarity with climate change. The detail of their responses as shown below table;

Table 6-8: Household extent of familiarity

Household Perceived extent of familiarity.	**Region**			
	Punjabi Ethnic Group	**Pashtun Ethnic Group**	**Hindko Ethnic Group**	**Chi-Square Test**
Very Low	13 (8%)	10 (9%)	6 (6.5%)	$X^2 = 12.105$ P-value = .147
Low	16 (10%)	17 (15.5%)	14 (16%)	
Moderate	44 (27.5%)	24 (22%)	19 (21%)	
High	74 (46%)	38 (34.5%)	39 (43%)	
Very High	13 (8%)	21 (19%)	12 (13.5%)	
Total	**160**	**110**	**90**	

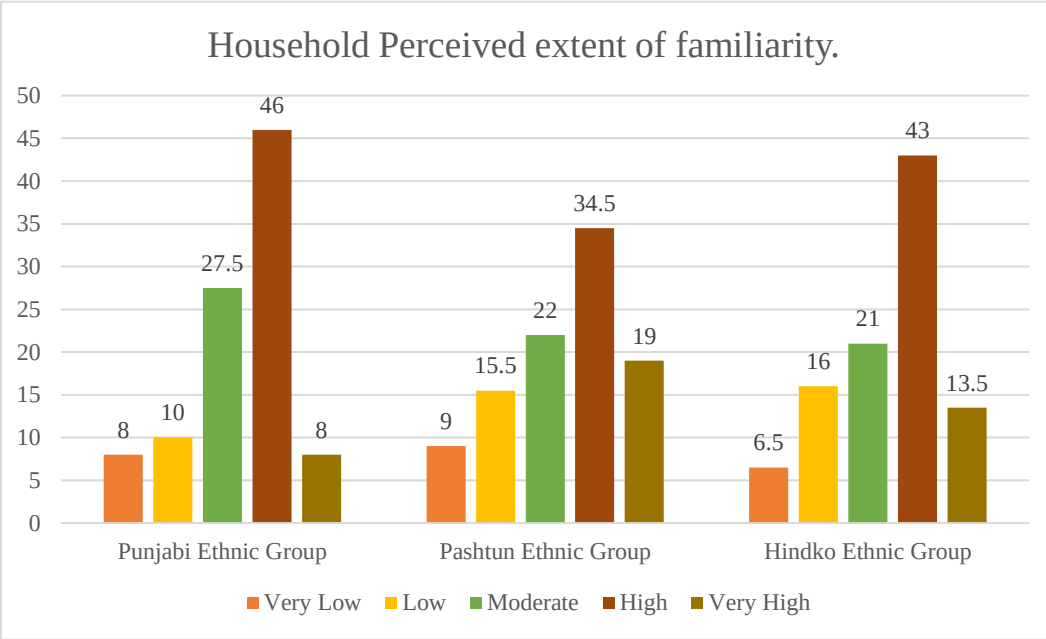


Figure 6.8. Household extent of familiarity

The above graph represents respondent's perception of familiarity with climate change. The majority of respondents are highly familiar with climate change, and their total number is 151, 74 from Attock, 38 from Swabi, and 39 from the Haripur region. The least respondents are very low familiar with climate change, and their total number is 29, 13 from Attock, 10 from Swabi, and 6 from the Haripur region. The respondents with low familiarity with climate change are 47 in total; 16 from Attock, 17 from Swabi, and 14 from the Haripur region. The respondents with no familiarity with climate change are in total 87 number; 44 from Attock, 24 from Swabi, and 19 from the Haripur region. The respondents who have a very high familiarity with climate change are in total 46 number, 13 from Attock, 21 from Swabi, and 12 from the Haripur region respectively.

6.4.2. Household Perceived extent of knowledge about rescue and evacuation procedures

The survey asked the respondent about the evacuation route in their respective areas. The detail of their responses about the presence of the evacuation route is present in the following table.

Table 6-9: Respondents knowledge about presence of evacuation route

Respondents knowledge about the presence of evacuation route	**Region**			
	Punjabi Ethnic Group	**Pashtun Ethnic Group**	**Hindko Ethnic Group**	**Chi-Square Test**
Yes	81 (50.5%)	65 (59%)	46 (51%)	X^2= 2.603
No	79 (49.5%)	45 (41%)	44 (49%)	P-Value = .272
Total	160	110	90	

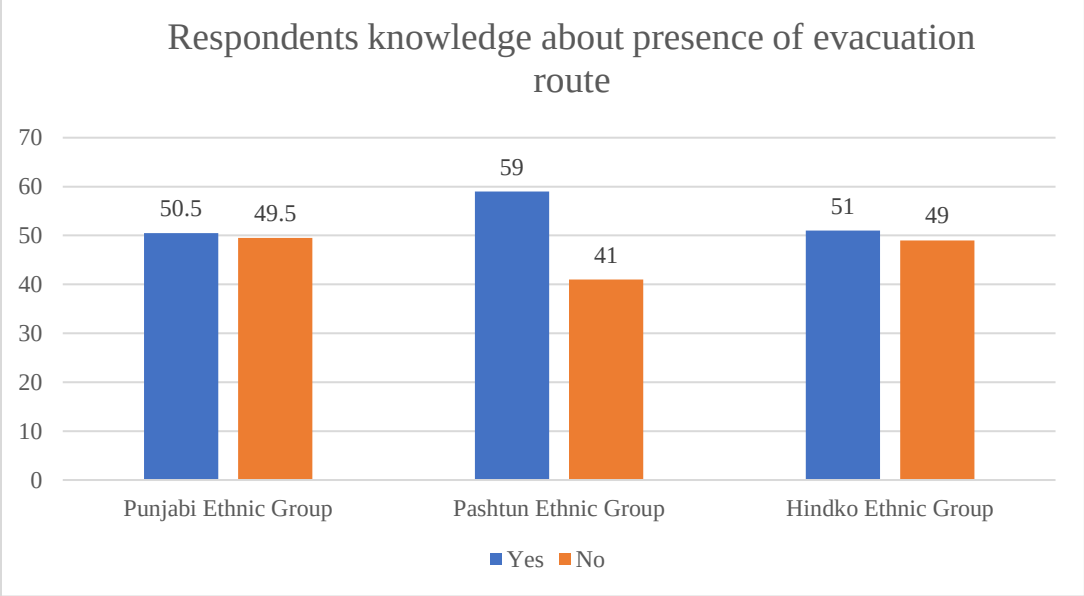


Figure 6.9. Respondent's knowledge about the presence of evacuation route

The above graph represents that most respondents do not know of evacuation route in their respective areas, and their total number is 190; 79 respondents from the Attock region, 65 respondents from the Swabi region, and 46 respondents from the Haripur region do not know evacuation route. The respondents who know evacuation route in case of emergency are 170 in total number; 81 from Attock, 45 from Swabi, and 44 from Haripur region respondents know evacuation route in their respective area.

6.4.3. Household Perceived understanding of disaster cause

The survey asked the respondents about their perception of understanding the cause of the disaster. The detail of their responses is present in below table.

Table 6-10: Household understanding of disaster cause

Respondents Perceived understanding of disaster cause.	**Region**			
	Punjabi Ethnic Group	**Pashtun Ethnic Group**	**Hindko Ethnic Group**	**Chi-Square test**
Very Low	16 (10%)	9 (8%)	9 (10%)	X^2= 6.635
Low	47 (29%)	22 (20%)	18 (20%)	P-Value = .587
Moderate	22 (14%)	16 (14.5%)	16 (18%)	
High	56 (35%)	51 (46%)	38 (42%)	
Very High	19 (12%)	12 (11%)	9 (10%)	
Total	**160**	**110**	**90**	

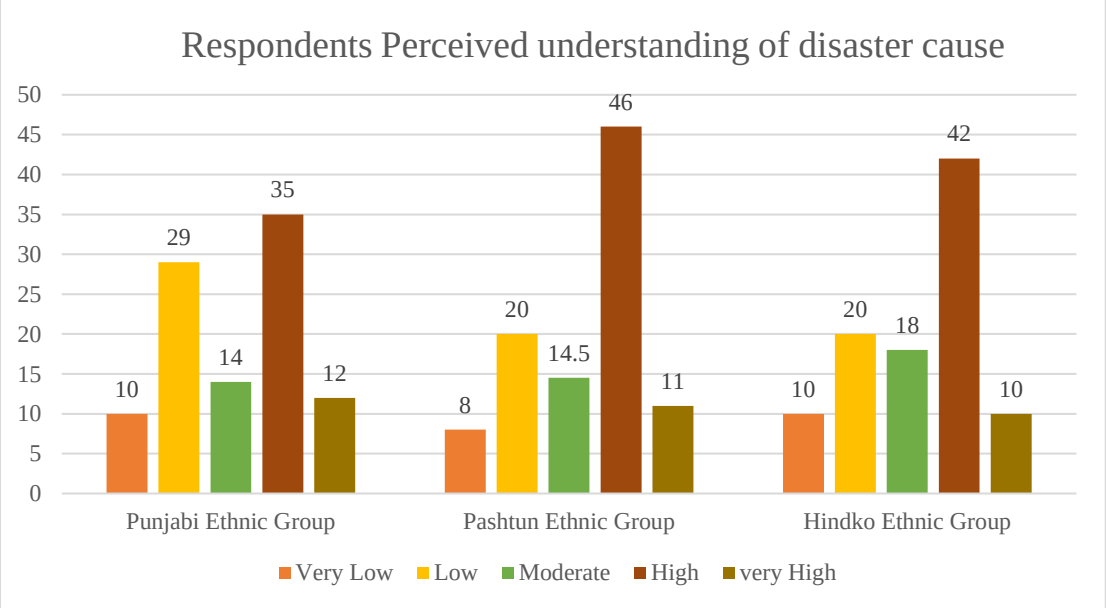


Figure 6.10. Respondents understanding of disaster cause

The above figure represents that most of the respondents perceive a higher understanding of disaster causes, which are 145 in total number. Among them, 56 from the Attock region, 51 from Swabi, and 38 from the Haripur region. The respondents who have a very high understanding of disaster causes are 41 in number, 19 from Attock, 12 from Swabi, and 9 from the Haripur. The respondents who have a very low level of understanding about disaster causes are 34 in total number, 16 from Attock, 9 from Swabi, and 9 from the Haripur region. The respondents with a low level of understanding about disaster causes are 87 in number, 47 from the Attock region, 22 from Swabi, and 18 from the Haripur region, respectively. The respondents who have no understanding about disaster causes are 54 in total number, 22 from Attock, 16 from Swabi, and 16 from the Haripur region, respectively.

6.5. Risk perception assessment.

6.5.1. Attitude and Behavior index

The study also aims to identify risk perceptions of different ethnic groups, i.e., Punjabi, Pashtun, and Hindko groups, against climate change and natural hazards. The risk perception index for attitude and behavior of Punjabi, Pashtun, and Hindko respondent's attitudes and behavior varies from 0.20 to 1, with an average value of 0.55, 0.53, and 0.54 for Attock, Swabi, and Haripur region, respectively. This is due to the household's ability to deal with natural hazards and able to adapt new lifestyles. The risk perception assessment for attitude and behavior is shown in the following table;

Table 6-11: Attitude and Behavior of Respondents

Region	Classes	Very Low	Low	Moderate	High	Total	Descriptive statistics
Punjabi Ethnic Group	**Range**	**<0.40**	**0.40-0.60**	**0.60-0.80**	**>0.80**		Min = 0.20 Max = 1 Mean = 0.55 S.D = 0.14
	No. of Household	14	72	65	9	160	
	%age of household	9%	45%	41%	5%	100%	
Pashtun Ethnic Group	**Range**	**<0.40**	**0.40-0.60**	**0.60-0.80**	**>0.80**		Min = 0.20 Max = 1 Mean = 0.53 S.D = 0.15
	No. of Household	16	50	38	6	110	
	%age of household	14.5%	45%	35%	5%	100%	
Hindko Ethnic Group	**Range**	**<0.40**	**0.40-0.60**	**0.60-0.80**	**>0.80**		Min = 0.20 Max = 1 Mean = 0.54 S.D = 0.14
	No. of Household	11	39	35	5	90	

	%age of household	12%	43%	39%	5%	100%	
Total	**No. of Household**	41	161	138	20	360	
	%age of household	11%	45%	39%	5%		

Around 5%, of the households from three ethnicities have highly perceived climate change and natural hazards. About 39% and 43% of the respondents have moderate or low perceptions of climate change and natural hazards. This low attitudinal perception of the households towards natural hazards is because of no or less dealing with natural hazards, less inclined to new-lifestyle adaptability, and a poor perception of non-reducing the harmful effects of the disaster. The seriousness and awareness of households to natural hazards through information, new-lifestyle adaptability through mindsets, training, or drill, and able those to deal with harmful effects of a disaster can make them safe and resilient.

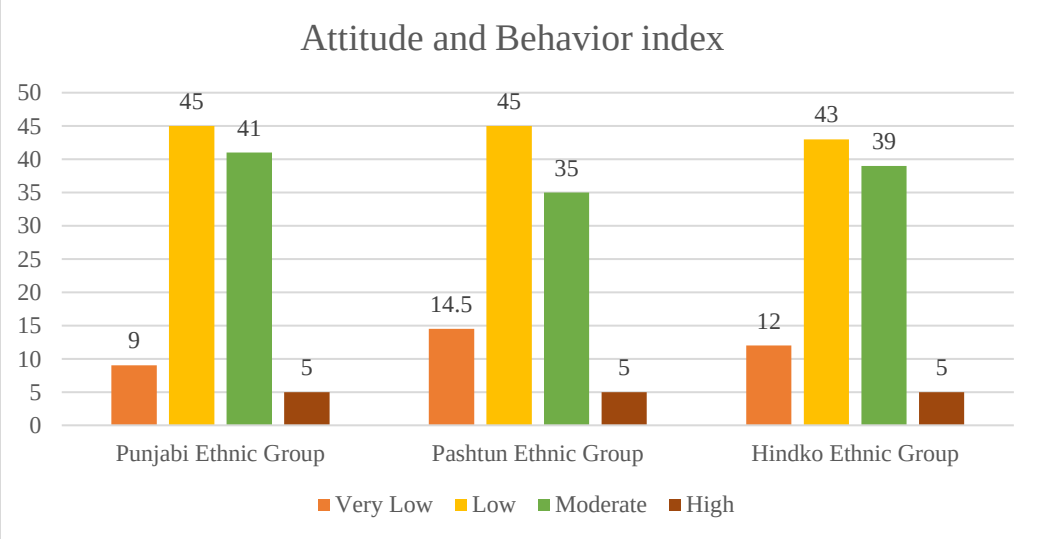


Figure 6.11. Attitude and behavior index

6.5.2. Trust and Confidence index

The risk perception index for trust and confidence of different ethnic groups varies from 0.20 to 0.1 with an average value of 0.54, 0.55, 0.54 for the Attock, Swabi, and Haripur region, respectively. 14, 14.5, and 13% of Punjabi, Pashtun, and Hindko ethnic group respondents had high trust and confidence in the information received from different sources and confidence in the ministry of climate change against natural hazards and climate change. The risk perception index for trust and confidence of different ethnic group are below;

Table 6-12: Trust and confidence assessment of respondents

Region	**Classes**	**Very Low**	**Low**	**Moderate**	**High**	**Total**	**Descriptive statistics**
Punjabi Ethnic Group	**Range**	**<0.40**	**0.40-0.60**	**0.60-0.80**	**>0.80**		Minimum = 0.20
	No. of Household	28	50	60	22	160	Maximum = 1
	%age of household	17.5%	31%	37.5%	14%	100%	Mean = 0.54 S.D = 0.19
Pashtun Ethnic Group	**Range**	**<0.40**	**0.40-0.60**	**0.60-0.80**	**>0.80**		Minimum = 0.20
	No. Of Household	16	40	38	16	110	Maximum = 1
	%age of household	14.5%	36%	35%	14.5%	100%	Mean = 0.55 S.D = 0.20
Hindko Ethnic Group	**Range**	**<0.40**	**0.40-0.60**	**0.60-0.80**	**>0.80**		Minimum = 0.20
	No. Of Household	12	36	30	12	90	Maximum = 1
	%age of household	13%	40%	33%	13%	100%	Mean = 0.54 S.D = 0.19

Total	**No. Of Household**	56	126	128	50	360	
	%age of household	15.5%	35%	35%	14.5%	100%	

Overall, 14.5%, of the household perceive high trust and confidence in the information received and in the performance of the Ministry of Climate Change. This low percentage of high perception of the household in the information received is because of fake information on social media or less inclination towards valid and solid information. The low perceptions of the respondent in the performance of the Ministry of Climate Change is because of their ineffective post-disaster relief, and no assistance in time is listed.

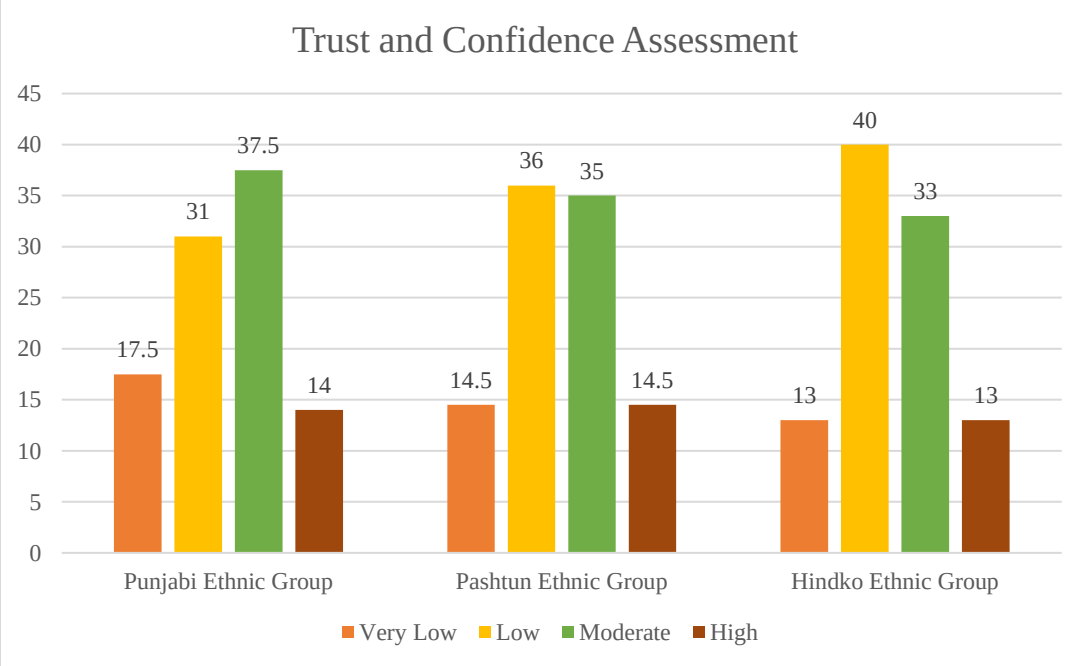


Figure 6.12. Trust and Confidence Assessment

6.5.3. Fear and worry index

The risk perception index for fear and worry of the different ethnic groups varies from 0.20 to 1 with an average value of 0.47,0. 44 and 0.47 for Attock, Swabi, and Haripur region, respectively. 9, 10, and 12% of Attock, Swabi, and Haripur respondents highly perceive the fear and worry against climate change and natural hazards. This is because the majority of respondents are highly afraid of natural hazards and their frequency of occurrence. The risk perception index for fear and worry are as follow;

Overall, 10% of the households have a high perception of fear and worry about natural hazards and climate change. About 22% and 31% of the respondents from three ethnicities have a moderate or very low perception of fear and worry against natural hazards and climate change. The low percentage of high perception of household fear is because of the low level of afraid from climate, and a moderate fear about the occurrence of natural hazards. The high the fear of climate change, and worry of the frequent occurrence of natural hazards, the high will be the perception and low vulnerability.

Table 6-13: Fear and worry assessment

Region	**Classes**	**Very Low**	**Low**	**Moderate**	**High**	**Total**	**Descriptive statistics**
Punjabi Ethnic Group	**Range**	**<0.40**	**0.40-0.60**	**0.60-0.80**	**>0.80**		Min = .20 Max = 1 Mean = 0.47 S.D = 0.20
	No. of Household	59	44	43	14	160	
	%age of household	37%	27.5%	27%	9%	100%	
		<0.40	**0.40-0.60**	**0.60-0.80**	**>0.80**		Min = 0.20

Pashtun Ethnic Group	**Range**						Max =1 Mean = 0.44 S.D = 0.20
	No. Of Household	41	40	16	13	110	
	%age of household	37%	36%	14.5%	12%	100%	
Hindko Ethnic Group	**Range**	**<0.40**	**0.40-0.60**	**0.60-0.80**	**>0.80**		Min = 0.20 Max = 1 Mean = 0.47 S.D = 0.20
	No. Of Household	31	29	20	10	90	
	%age of household	34%	32%	22%	10%	100%	
Total	**No. Of Household**	131	113	79	37	360	
	%age of household	36%	31%	22%	10%	100%	

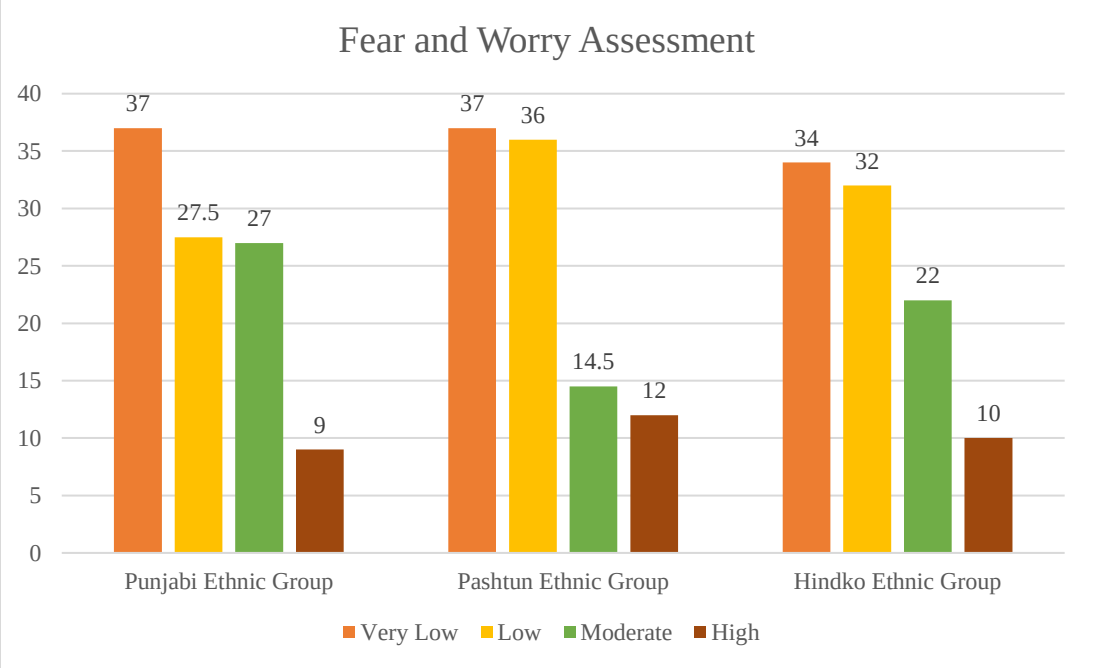


Figure 6.13. Fear and Worry Assessment

6.5.4. Knowledge and awareness index

The risk perception index for knowledge and awareness of different ethnic groups varies from 0.13 to 1, with an average value of 0.53, 0.55, and 0.53 for the Attock, Swabi, and Haripur regions, respectively. 17, 15, and 13% of Attock, Swabi, and Haripur respondents are highly aware of rescue and evacuation procedures and are familiar with climate change. The knowledge and awareness index are shown below;

Overall, 15% of the households have perceived high awareness about climate change and natural hazards therefore, reducing their vulnerability. Around 32.5% and 28% of the respondents have moderate and less knowledge about natural hazards and climate change. This low proportion of high knowledge of the households about natural hazards and climate change is because of the moderate or low extent of familiarity of respondents towards climate change, less aware of early warning system, little knowledge of evacuation routes in case of emergency, and low understanding of disaster causes. An increasing familiarity of climate change, becoming aware of evacuation routes, and understanding disaster causes makes the communal perception high and lessen the vulnerability.

Table 6-14: Knowledge and awareness assessment

Region	Classes	Very Low	Low	Moderate	High	Total	Descriptive statistics
Punjabi Ethnic Group	**Range**	**<0.34**	**0.34-0.56**	**0.56-0.77**	**>0.77**		Minimum = 0.13 Maximum = 1 Mean = 0.53 S.D = 0.20
	No. of Household	42	42	49	27	160	
	%age of household	26%	26%	30%	17%	100%	
Pashtun Ethnic Group	**Range**	**<0.34**	**0.34-0.56**	**0.56-0.77**	**>0.77**		Minimum = 0.13 Maximum =1 Mean = 0.55 S.D = 0.19
	No. of Household	25	29	40	16	110	
	%age of household	23%	18%	25%	15%	100%	
Hindko Ethnic Group	**Range**	**<0.34**	**0.34-0.56**	**0.56-0.77**	**>0.77**		Minimum = 0.13 Maximum = 1 Mean = 0.53 S.D = 0.20
	No. of Household	22	28	28	12	90	
	%age of household	24%	31%	31%	13%	100%	
Total	**No. of Household**	89	99	117	55	360	
	%age of household	25%	28%	32.5%	15%	100%	

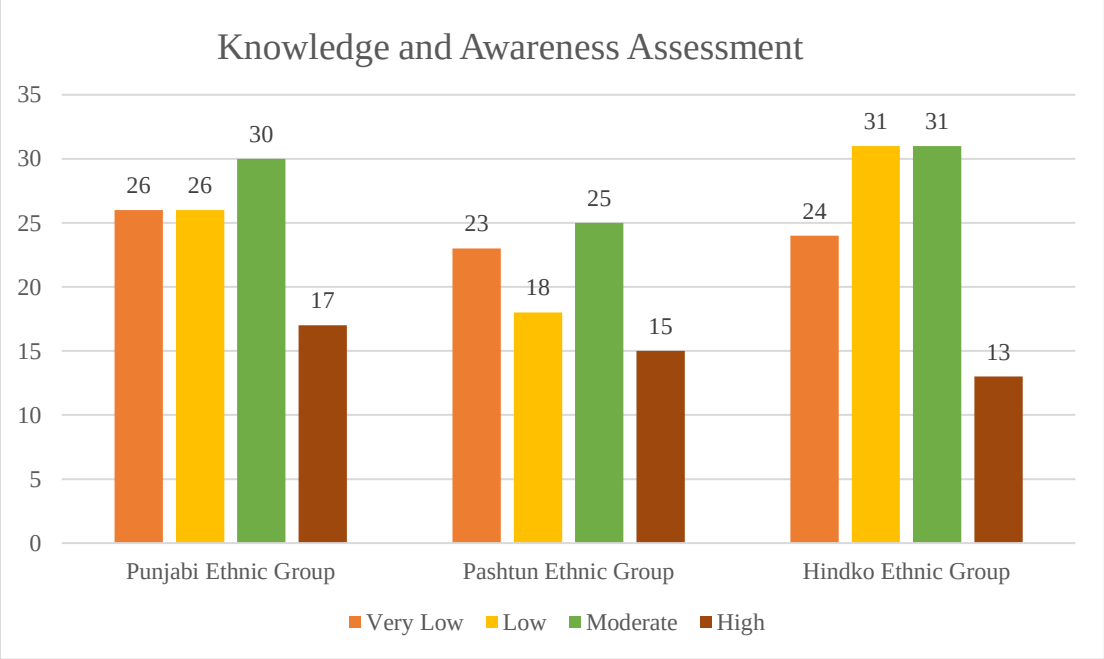


Figure 6.14. Knowledge and Awareness Assessment

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6.5.5 Overall risk perception index

Regarding overall risk perception, the Attock region varied from 0.18 to 0.84, 0.20 to 0.94 for the Swabi region, and 0.18 to 0.94 for the Haripur region, with an average value of 0.53, 0.52, and 0.52 for Attock, Swabi, and the Haripur region, respectively. 12.5, 4.5, and 1% of Attock, Swabi, and Haripur respondents highly perceive risk against climate change and natural hazards and thus lessen vulnerability. The overall risk perception index for three different ethnic groups are shown below,

Table 6-15: Overall Risk Perception of different Ethnic Group

Region	Classes	Very Low	Low	Moderate	High	Total	Descriptive statistics
Punjabi Ethnic Group	**Range**	**<0.34**	**0.34-0.50**	**0.50-0.66**	**>0.66**		Minimum = 0.18
	No. of Household	9	46	85	20	160	Maximum = 0.84
	%age of household	5.5%	29%	53%	12.5%	100%	Mean = 0.53 S.D = 0.12
Pashtun Ethnic Group	**Range**	**<0.38**	**0.38-0.56**	**0.56-0.74**	**>0.74**		Minimum = 0.20
	No. Of Household	9	60	36	5	110	Maximum = 0.94
	%age of household	8%	54.5%	33%	4.5%	100%	Mean = 0.52 S.D = 0.12
Hindko Ethnic Group	**Range**	**<0.37**	**0.37-0.56**	**0.56-0.75**	**>0.75**		Minimum = 0.18
	No. Of Household	6	50	33	11	90	Maximum = 0.94
	%age of household	6.5%	55.5%	36.5%	1%	100%	Mean = 0.52 S.D = 0.11
Total	**No. Of Household**	24	156	154	26	360	
	%age of household	6.5%	43.5%	43%	7%		

Overall, 7% of the households from three ethnicities have hi9gh risk perception to climate change and natural hazards. Around 43% and 43.5% of respondents have moderate and low risk perception of natural hazards. The high risk perception of household is due to high trust and confidence in the information received, high concern

with natural hazards , high fear of natural hazards occurrence and high knowledge of disaster causes and information of evacuation routes.

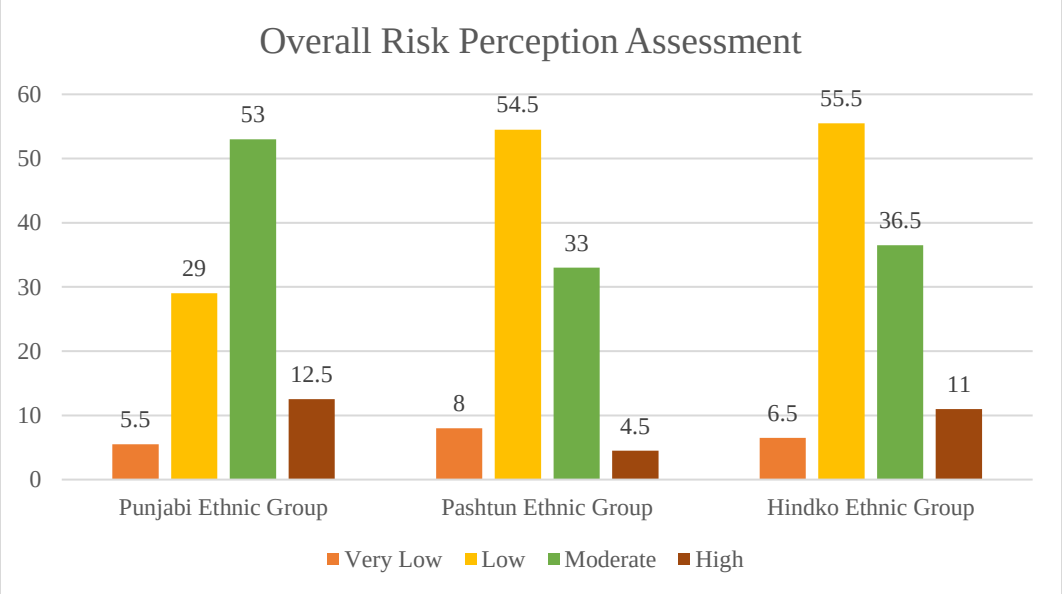

Figure 6.15. Overall Risk Perception Assessment

6.6.6. Impact of Ethnicities on Risk Perception

Table 6-16: Likelihood Ratio Tests

Effect	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood of Reduced Model	Chi-Square	df	Sig.
Intercept	743.025	28.286	2	.000
Risk Perception	733.994	19.256	2	.000

The risk perception have significant impact on three different ethnic group against natural hazards and climate change with P= 0.000 and Chi-Square X^2= 19.256.

Table 6-17: Parameter Estimates

Parameter Estimates									
Ethnicity		B	Std. Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
								Lower Bound	Upper Bound
2	Intercept	-.097	.774	.016	1	.900			
	Risk Perception	-.105	1.351	.006	1	.938	.900	.064	12.727
3	Intercept	-4.388	.931	22.200	1	.000			
	Risk Perception	-6.259	1.585	15.585	1	.000	.002	.000	.043
a. The reference category is: 1.									

The risk perception of Pashtun ethnic group is 0.105 times less of Punjabi ethnic group with P= 0.938 and are not significant. The high risk perception of Hindko ethnicity household is 6.259 times less than Punjabi ethnic groups and are significant with P=0.000.

Chapter 7 . Disaster Awareness Assessment

The study assesses the awareness of three ethnic groups regarding natural hazards and climate change. A majority of households, 119 (74.1%) in numbers from Punjabi ethnic group, 80 (72.1%) from Pashtun ethnic group, and 71 (78.9%) from Hindko ethnic group, an experienced disaster with Chi-square value X^2= 1.068 and P-value= 0.588 and thus decreases their vulnerability. Many household respondents are aware of evacuation routes in their respective areas with X^2= 2.603, and a P-value is 0.248. 81 (50.6%) from Attock, 45 (40.9%) from Swabi, and 44 (48.9%) from the Haripur region are aware of the evacuation route and thus decrease their vulnerability.

Regarding the early warning system, the majority of household respondents are highly aware with X^2= 14.035 and P-value= 0.074.50 (31.3%) from Attock region, 53 (48.2%) from Swabi, and 41 (45.6%) from the Haripur region are highly aware with an early warning system. A huge number of survey respondents can use the first aid kit with X^2= 1.239 and P-value= 0.538. 124 (77.5%) from Punjabi ethnic group, 80 (72.7%) from Pashtun ethnic group, and 71 (78.9%) from Hindko ethnic group can use first aid kit respectively.

Most respondents do not attend awareness drills that increase their vulnerability to natural hazards and climate change with X^2= 4.655 and P-value = 0.325. 111 (69.4%) from the Attock region, 86 (78.2%) from the Swabi region, and 66 (73.3%) from the Haripur region did not attend any training or drill, which makes them more vulnerable. Furthermore, many households do not follow land zoning laws with X^2= 5.684 and P-value = 0.058, which increases their vulnerability. Only 61 (38.1%) from the Punjabi

ethnic group, 28 (25.5%) from Pashtun ethnic group, and 35 (38.9%) from the Hindko ethnic group follow land zoning laws in their respective proximities and thus lessens their vulnerabilities.

Many respondents are aware of rescue communication, i.e., can contact or communicate with rescue 1122, 15, fire brigade, police, etc., with X^2= 0.362 and P-value = 0.834 making them less vulnerable. 135 (84.1%) from Attock, 90 (81.8%) from Swabi, and 74 (84.2%) from the Haripur region are aware of rescue communication. In the same manner, 149 (93.1%) from the Punjabi ethnic group, 75(68.2%) from the Pashtun ethnic group, and 69 (76.7%) from Hindko ethnic group have access to TV and radio as their source of information which makes them more aware with X^2= 28.541 and P-value .000 and thus lessens their vulnerability.

The detail of household responses are presented in the below table;

Table 7-1: Disaster Awareness Responses

Disaster Awareness Indicators	**Units**	**Punjabi Ethnic Group**		**Pashtun Ethnic Group**		**Hindko Ethnic Group**		**Chi-Square Test**
		Frequency	**%age**	**Frequency**	**%age**	**Frequency**	**%age**	
Household disaster experience	Yes	119	74.4	80	72.7	71	78.9	**X^2 = 1.068 p-value= .588**
	No	41	25.6	30	27.3	19	21.1	
Household's awareness regarding evacuation route	Yes	81	50.6	45	40.9	44	48.9	**X^2 = 2.603 P-value= .272**
	No	79	49.4	65	59.1	46	51.1	

Household's level awareness regarding early warning system	Very High	26	16.3	14	12.7	12	13.3	**X^2 = 14.305 P-value= .074**
	High	50	31.3	53	48.2	41	45.6	
	Neutral	39	24.4	14	12.7	15	16.7	
	Low	37	23.1	19	17.3	16	17.8	
	Very Low	8	5	10	9.1	6	6.7	
Household's awareness regarding use of first aid kit	Yes	124	77.5	80	72.7	71	78.9	**X^2 = 1.239 P-value = .538**
	No	36	22.5	30	27.3	19	21.1	
Frequency of public awareness programs/drills attended by any household member (in number)	0	111	69.4	86	78.2	66	73.3	**X^2 = 4.655 P-value= .325**
	1	14	8.8	11	10	9	10	
	2	35	29.1	13	11.8	15	16.7	
Community having land use/zoning laws and household following them	Yes	61	38.1	28	25.5	35	38.9	**X^2 = 5.684 P-value= .058**
	No	99	61.9	82	74.5	55	61.1	
Household awareness regarding rescue communications	Yes	135	84.1	90	81.8	74	82.2	**X^2 = .362 P-value = .834**
	No	25	15.6	20	18.2	16	17.8	

(emergency contacts, rescue 1122, 15 etc.,)								
Radio/TV	Yes	149	93.1	75	68.2	69	76.7	**X^2 = 28.541 P-value= .000**
	No	11	6.9	35	31.8	21	23.3	

The study identifies disaster awareness assessment for three different ethnic groups. The Punjabi & Pashtun ethnic group varies from 0.1 to 0.9 with mean values of 0.39 and 0.47, respectively. For Hindko ethnic group, it varies from 0.06 to 0.87 with a mean value of 0.41. 10% of Punjabi respondents have high awareness regarding disasters and climate change. 16.3% of Pashtun ethnic group respondents and 12.25% of Hindko ethnic group households are highly aware of disaster because of their disaster experience and knowledge of evacuation routes in their regions. Overall, 13% of survey respondents have an awareness of disaster, enhancing their capacities and reducing vulnerabilities to natural hazards and climate change.

Overall, 15% of respondents are very low awareness of disaster because of not experience of disaster and do not know evacuation route. This figure is also due to not following land-zoning laws in their societies and cannot use first aid kits, which makes them more vulnerable to climate change and natural hazards.

Overall, 44% of households are less aware of a disaster due to not or least attending training programs. This is also due to lack of experience of disaster and not access to

any source of information that makes them vulnerable. Only 28% of survey respondents are moderately aware of natural hazards and climate change, increasing their resilience to natural hazards.

Table 7-2: Disaster Awareness Assessment

Ethnicities	**Classes**	**Very Low**	**Low**	**Moderate**	**High**	**Descriptive statistics**
Punjabi Ethnic Group	**Range**	**<0.3**	**0.3-0.5**	**0.5-0.7**	**>0.7**	Mean= .39
	No. of Household	32	64	48	16	Maximum= 0.1
	%age of Household	20%	40%	30%	10%	Minimum= 0.9 S.D= 0.1708
Pashtun Ethnic Group	**Range**	**<0.3**	**0.3-0.5**	**0.5-0.7**	**>0.7**	Mean= .47
	No. of Household	8	50	34	18	Maximum= 0.1
	%age of Household	7.2%	45.4%	31%	16.3%	Minimum= 0.9 S.D= 0.169
Hindko Ethnic Group	**Range**	**<0.26**	**0.26-0.46**	**0.46-0.66**	**>0.66**	Mean= .41
	No. of Household	14	45	20	11	Maximum= 0.06
	%age of Household	15.5%	50%	22.2%	12.2%	Minimum= 0.87 S.D= 0.181
Total	**No. of Household**	54	159	102	45	
	%age of Household	15%	44%	28%	13%	

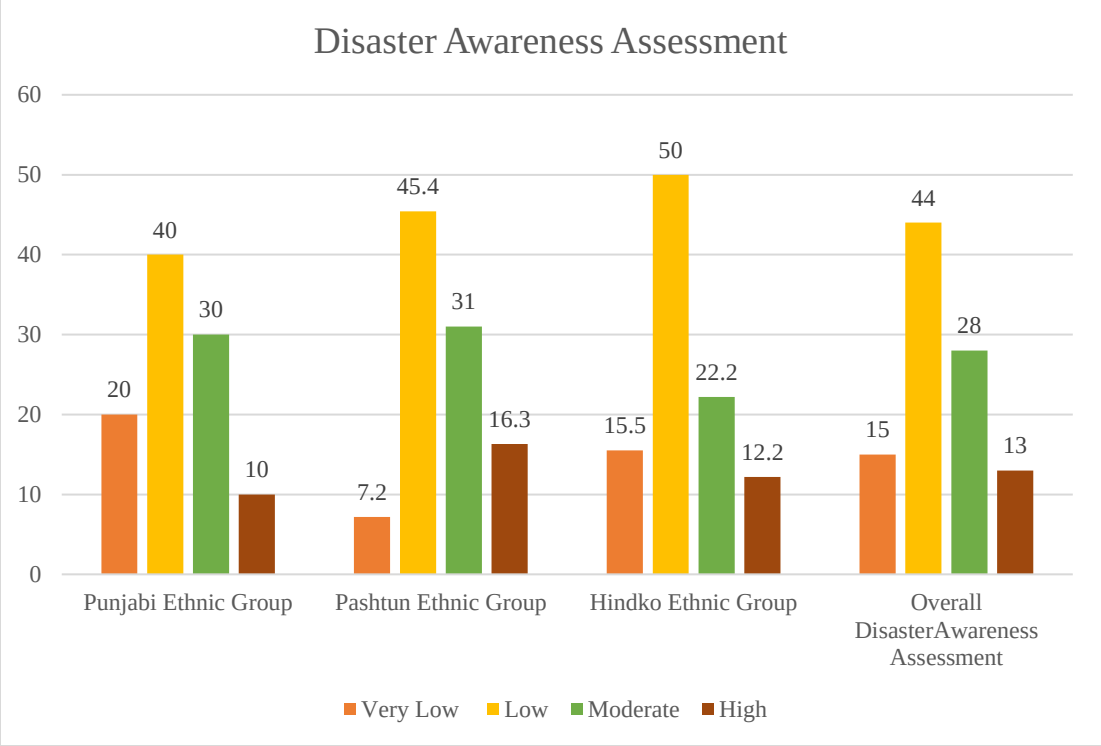

Figure 7.1. Disaster Awareness Assessment

Chapter 8 . Coping and Adaptive Strategies

The study collected three ethnic groups' responses regarding coping and adaptive strategies. The majority of survey respondents are willing to migrate from their respective native regions with X^2= 2.066 and P-value= 0.356. 123 (76%) from the Punjabi ethnic group, 46 (69%) from the Pashtun ethnic group, and 67(23%) from the Hindko ethnic group are willing to leave their places in case of an emergency which increases their capacities and lessen vulnerability. In addition, Most households can speak Urdu with X^2= 0.427 and P-value = 0.807. 151 (94%) from Attock, 105 (95%) from Swabi, and 84 (93%) from the Haripur region understand and speak Urdu, which helps them in their evacuation procedures.

Furthermore, the majority of households are located at a distance of 1-5 km with X^2= 10.508 and P-value = 0.033. 156 (97%) from the Punjabi ethnic group, 98 (89%) from the Pashtun ethnic group, and 8 (9%) from the Hindko ethnic group marked medical facility at a distance of 1-5 km far. Majority of household have access to safe drinking water and improved sanitation with X^2= 0.681, P-value= 0.711 and X^2= 2.471, P-value= 0.291, respectively. 149 (53%), 153 (95%) from Attock, 105 (95%), 101 (91%) from the Swabi region, and 84 (93%), 82 (91%) from the Haripur region have access to safe drinking water and improved sanitation respectively.

The majority of respondents 119 (74%) from the Attock, 85 (77%) from the Swabi, and 67 (74%) from the Haripur region can get support from outside with X^2= 0.339 and P-value= 0.916 which increase resilience and lessen their susceptibility to natural hazards and climate change. A large number of household 153 (95%), 111(69%) from Punjabi

ethnic group, 105 (95%), 75 (68%) from Pashtun ethnic group and 86 (95%) 49 (54%) from Hindko ethnic group have access to mobile phone and internet with X^2= 0.005, P-value= 0.844 and X^2= 6.254 and P-value = 0.044 respectively.

The majority of the household want to participate in hazard education with X^2= 2.890 and P-value = 0.236. 107 (67%) from the Punjabi ethnic group, 80 (73%) from the Pashtun ethnic group, and 69 (73%) from the Hindko ethnic group want to continue hazards education which increases their adaptive capacity.

The detail of responses regarding coping and adaptive strategies is presented below;

Table 8-1: Coping and adaptive strategies responses

Coping and adaptive strategies indicators	**Units**	**Punjabi Ethnic Groups**		**Pashtun Ethnic Groups**		**Hindko Ethnic Groups**		**Chi-square Test**
		Frequency	**%age**	**Frequency**	**%age**	**Frequency**	**%age**	
Household migration	Yes	123	76.1	76	69.1	67	74.4	X^2= 2.066 P-value= .356
	No	37	24	34	31	23	25	
Household language proficiency	Yes	151	94.4	105	95.5	84	93.3	X^2= .427 P-value= .807
	No	9	5.6	5	4.5	6	6.4	
Distance to nearest medical facility (in km)	<1	4	2.5	9	8.2	8	8.9	X^2=10.508 P-value= .033
	1-5	156	97.5	98	89.1	81	90	
	5-10	0	0	3	2.7	1	1	
	>10	0	0	0	0	0	0	
Household access to the drinking water	Yes	149	93.1	105	95.5	84	93.3	X^2= .681 P-Value= .711
	No	11	6.9	5	4.5	6	6.7	
Household access to the improved sanitation	Yes	153	95.6	101	91.8	82	91.1	X^2= 2.471 P-value= .291
	No	7	4.4	8	8.9	9	8.2	
Adults able to get support	Yes	119	74.4	85	77.3	67	74.4	X^2= .339 P-value= .844
	No	41	25.6	25	22.7	23	25.6	

from outside during crisis								
Household participation in voluntary works for an organization	Yes	100	62.5	66	60	55	61.1	X^2= .176 P-value= .916
	No	60	37.5	44	40	35	38.9	
Household access to mobile phone	Yes	153	95.6	105	95.5	86	95.6	X^2= 0.004 P-value= 0.998
	No	7	4.4	5	4.5	4	4.4	
Household access to the internet	Yes	111	69.4	75	68.2	49	54.4	X^2= 6.254 P-value= 0.044
	No	49	30.6	35	31.8	41	45.6	
household participation continuing hazard education	Yes	107	66.9	80	72.7	69	76.7	X^2= 2.890 P-value= .236
	No	53	33.1	30	27.3	21	23.3	

Table 8-2: Coping and adaptive strategies assessment

Ethnicities	**Classes**	**High**	**Moderate**	**Low**	**Very Low**	**Descriptive statistics**
Punjabi Ethnic Group	Range	<0.20	0.20-0.38	0.38-0.56	>0.56	Mean= 0.22
	No. of household	79	62	17	2	Maximum=0.75
	%age of household	49%	39%	11%	1%	Minimum=0.02 S.D= 0.15
Pashtun Ethnic Group	Range	<0.20	0.20-0.38	0.38-0.56	>0.56	Mean= 0.22
	No. of household	56	44	7	3	Maximum=0.75
	%age of household	51%	40%	6%	3%	Minimum= 0.02 S.D= 0.15
Hindko Ethnic Group	Range	<0.20	0.20-0.38	0.38-0.56	>0.56	Mean= .23
	No. of household	46	30	12	2	Maximum=0.75
	%age of household	51%	33%	13%	2%	Minimum= 0.02 S.D= 0.169
Total	No. of household	181	136	36	7	
	%age of household	50%	38%	10%	2%	

The study assesses coping and adaptive strategies of three different ethnic groups. For the Punjabi ethnic group, it is varying from 0.02 to 0.75; with a mean value is 0.22. 49% of the Punjabi ethnic group have very high coping and adaptive strategies. In comparison, 39% of households have moderate strategies, which make them very less vulnerable to natural hazards because of their ability to migrate from the native region and have access to outside support in case of crisis.

For Pashtun ethnic group, it is varying from 0.02 to 0.75, with a mean value is 0.22. 51% of a household has very high coping and adaptive capacities toward natural hazards and climate change. In comparison, 40% of respondents have moderate adaptive strategies due to getting support from outside or located to the nearest medical facility. For Hindko ethnic group, it is varying from 0.02 to 0.75, with a mean value of 0.23. 51% and 33% Hindko ethnic group respondents have very high or moderate coping strategies because of their willingness to migrate and access a mobile phone, the internet, safe drinking water, and improved sanitation.

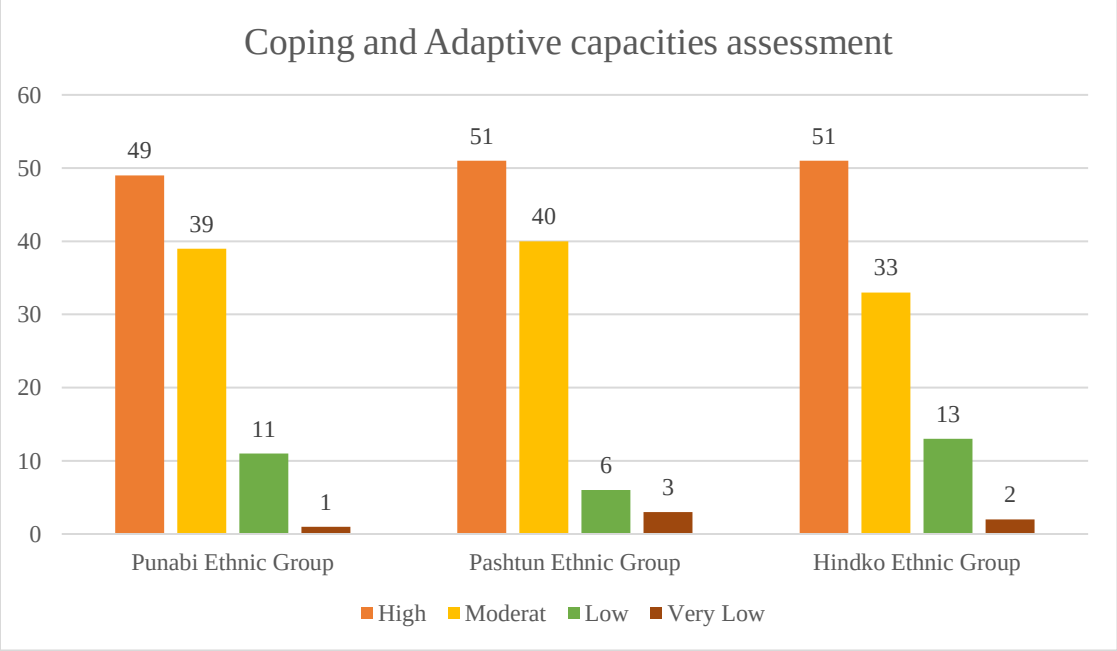

Figure 8.1. Coping and Adaptive capacities assessment

Chapter 9 . Psychological Distancing to Climate change

9.1. Spatial Distancing to Changing Climate

9.1.1. Personalized Harm

The survey asked the respondents about climate change harm to them and their families and received a variety of responses. The below table presented a detailed statistics about their responses;

Table 9-1: Household Understanding Causes of Climate change

Climate change harms you and your family.	**Region**			**Chi-square test**
	Punjabi Ethnic Group	**Pashtun Ethnic Group**	**Hindko Ethnic Group**	
Very high	73 (45.6%)	55 (50%)	39 (43%)	**X^2= 3.515** **P-Value = .898**
High	47 (29.4%)	35 (32%)	28 (31%)	
Moderate	19 (12%)	8 (7%)	8 (9%	
Low	13 (8%)	8 (7%)	10 (11%)	
Very Low	8 (5%)	4 (4%)	5 (6%)	

The majority of survey respondents understands that climate change can causes harm to them as an individual and their families collectively. A large percentage of respondents very high psychologically perceive harm to themselves and their families. 45% from Punjabi ethnicity, 50% from Pashtun ethnicity, and 43% from Hindko ethnicity understands climate change harm and thus possess high psychology to climate change with Chi-square X^2= 3.515 and P-value= 0.898.

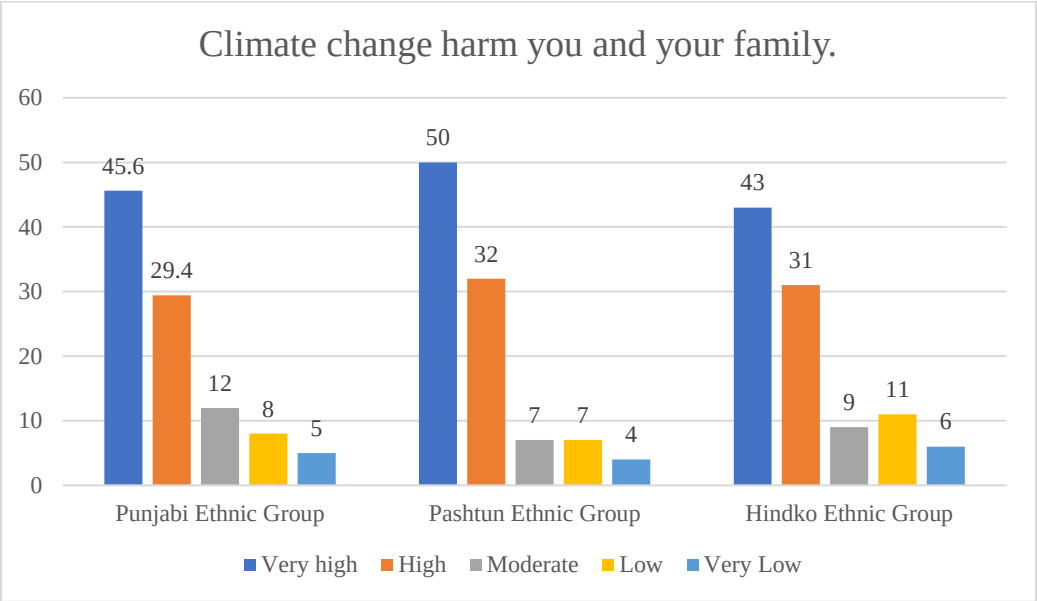

Figure 9.1. Climate change harm you and your family

9.1.2. Communal Harm

The survey asked the respondents about climate change harm to their respective communities and received a variety of responses. The below table presented a detailed statistics about their responses;

Table 9-2: Climate change can harm people in your community

Climate change can harm people in your community	**Region**			**Chi-square test**
	Punjabi Ethnic Group	**Pashtun Ethnic Group**	**Hindko Ethnic Group**	
Very high	73 (45.5%)	45 (41%)	40 (44%)	**X^2= 9.948** **P-Value = .269**
High	48 (30%)	49 (44.5%)	33 (37%)	
Moderate	18 (11%)	5 (4.5%)	7 (8%)	
Low	11 (7%)	8 (7%)	7 (8%)	
Very Low	10 (6.5%)	3 (3%)	3 (3%)	

The majority of respondents have high psychologically understood that climate change can harm their communities and disrupt the functionality of societies. 45.5% from the Punjabi ethnic group, 41% from the Pashtun ethnic group, and 44% from the Hindko ethnic groups have a very high psychological understanding that climate change will harm their communities with a Chi-square value $X^2 = 9.948$ and a P-value of 0.269.

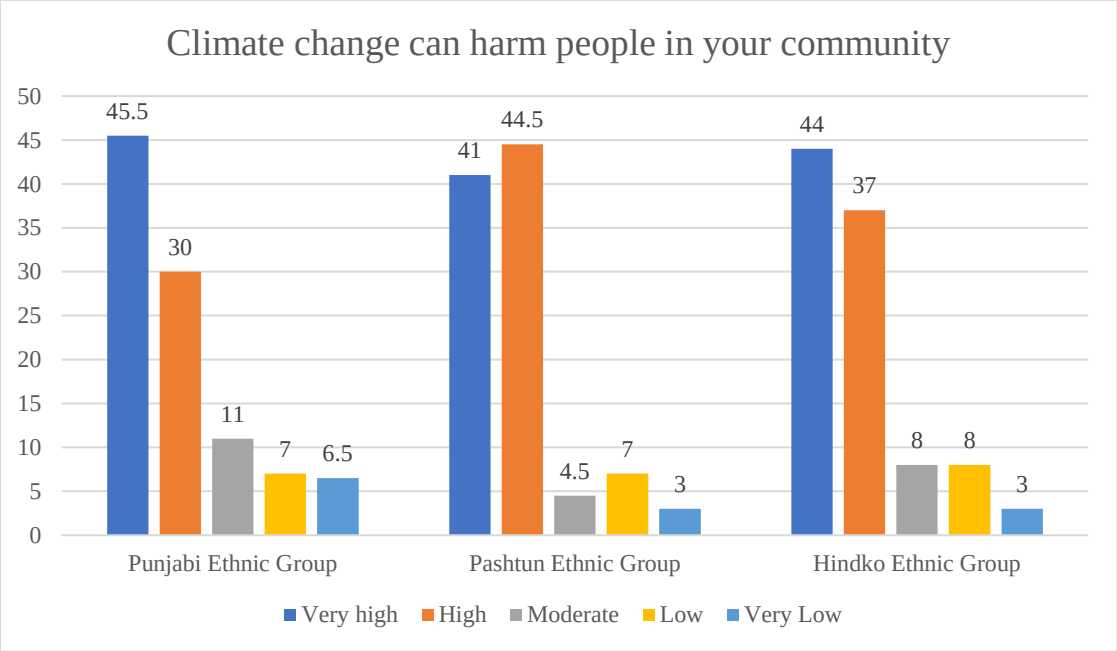

Figure 9.2. Climate change can harm people in your community

9.1.3. National Harm

The survey asked the respondents about climate change harm to their respective countries and received various responses. The below table presented detailed statistics about their answers;

The majority of survey respondents believe that climate change can cause harm to their countries, i.e., Pakistan, and developing countries, making them more prepared and less vulnerable. 48% from the Punjabi ethnic group, 49% from the Pashtun ethnic group, and

50% from the Hindko ethnic group have a high psychological understanding that climate change caused harm to their countries with Chi-square X^2= 1.250 and a P-value = 0.996.

Table 9-3: Climate change can harm people in Pakistan

Climate change can harm people in Pakistan.	**Region**			**Chi-square test**
	Punjabi Ethnic Group	**Pashtun Ethnic Group**	**Hindko Ethnic Group**	
Very high	77 (48%)	54 (49%)	45 (50%)	**X^2= 1.250** **P-Value = .996**
High	50 (31%)	35 (32%)	27 (30%)	
Moderate	17 (10.5%)	10 (9%)	7 (8%)	
Low	10 (6.5%)	8 (7%)	7 (8%)	
Very Low	6 (4%)	3 (3%)	4 (4%)	

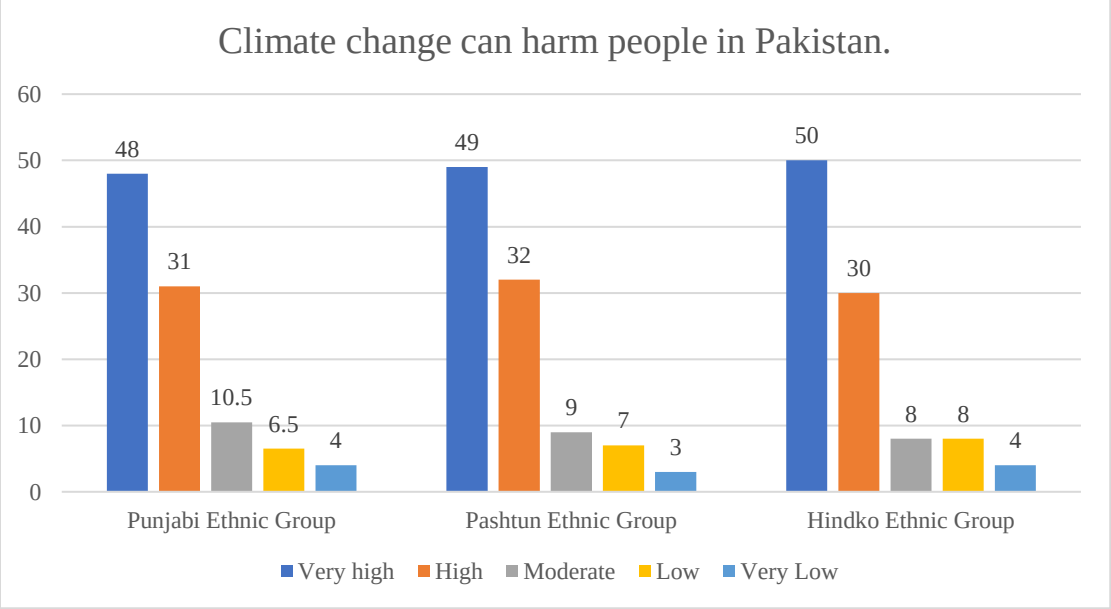

Figure 9.3. Climate change can harm people in your Pakistan

9.1.4. Global Harm

The survey asked the respondents about climate change's harm to the world and received various responses. The below table presented detailed statistics about their responses;

The majority of survey respondents believe that climate change can cause harm to the world and thus disrupt the smooth running of global affairs. 49% from the Punjabi ethnic group, 56.5% from the Pashtun ethnic group, and 53% from the Hindko ethnic group have a high psychological understanding that climate change causes harm to the world with Chi-square X^2= 3.950 and a P-value = 0.862. This high psychology of respondents has high resilience and low vulnerability to climate change harm.

Table 9-4: Climate change can harm people in the world

Climate change can harm people in world.	**Region**			**Chi-square test**
	Punjabi Ethnic Group	**Pashtun Ethnic Group**	**Hindko Ethnic Group**	
Very high	79 (49%)	62 (56.5%)	48 (53%)	**X^2= 3.950** **P-Value = .862**
High	48 (30%)	31 (28%)	28 (31%)	
Moderate	17 (11%)	9 (8%)	5 (6%)	
Low	9 (5.5%)	6 (5.5%)	6 (7%)	
Very Low	7 (4.5%)	2 (2%)	3 (3.5%)	

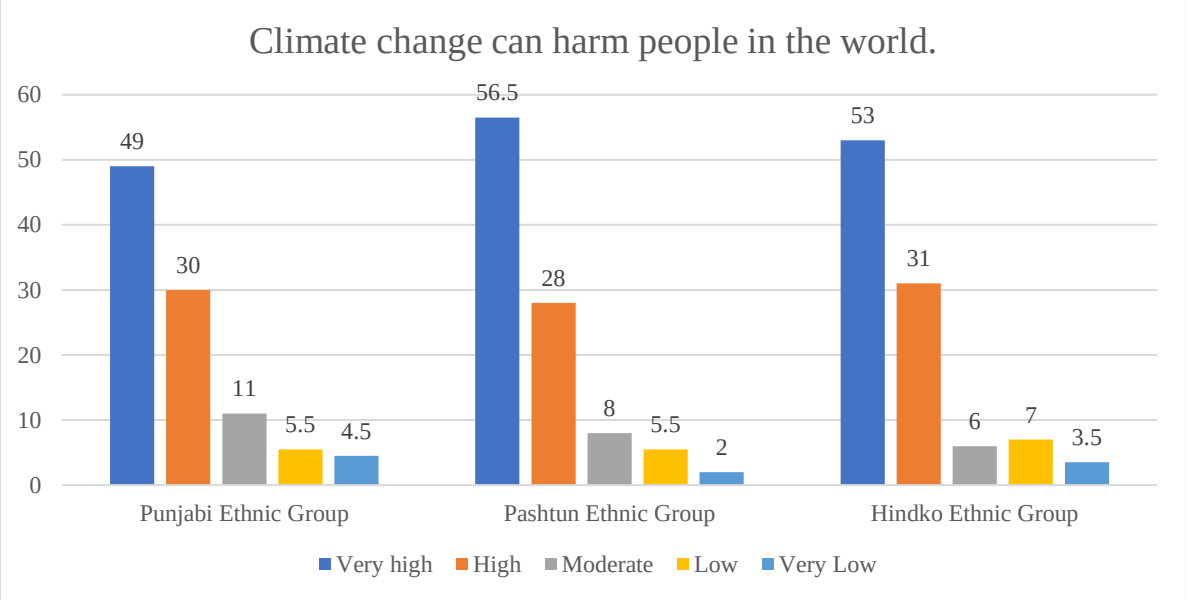

Figure 9.4. Climate change can harm people in the world.

9.2. Temporal Distancing to Climate change

9.2.1. Climate change exaggeration in future

The survey asked the respondents that climate change severity will be exaggerated in the future and obtained a variety of responses. The detail of their responses are as below;

49% of Punjabi ethnicity, 40% from Pashtun ethnicity, and 47% from Hindko ethnicity have a high understanding that climate change seriousness will be increasing in future with Chi-square value= 11.218 and p-value = 0.190. This high understanding of climate change seriousness that will be increased in the future makes their psychological distance to climate change less.

Table 9-5: Household understanding that the severity of climate change increases in the future

Household understanding that the severity of climate change increases in the future.	**Region**			**Chi-square test**
	Punjabi Ethnic Group	**Pashtun Ethnic Group**	**Hindko Ethnic Group**	
Very high	45 (28%)	45 (41%)	30 (33%)	**X^2= 11.218 P-Value = .190**
High	78 (49%)	44 (40%)	42 (47%)	
Moderate	17 (10.5%)	4 (3.5%)	4 (4.5%)	
Low	12 (7.5%)	8 (7.5%)	7 (8%)	
Very Low	8 (5%)	9 (8%)	7 (8%)	

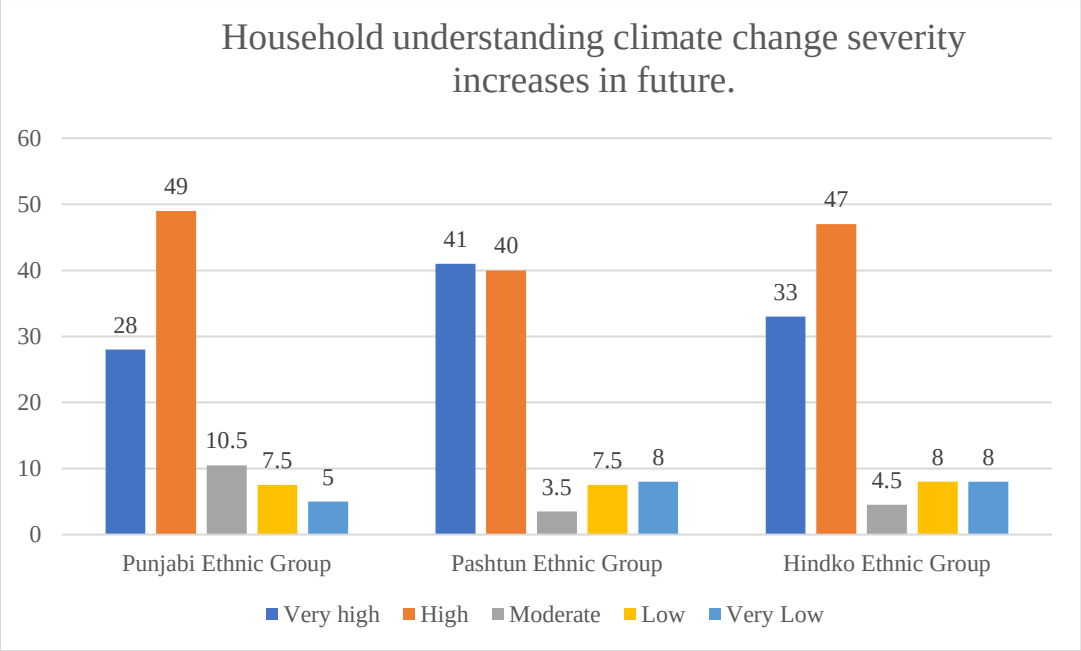

Figure 9.5. Household understanding that severity of climate change increases in future.

9.2.2. Climate change harm to future generation

The survey asked the respondents about climate change harm to the future generation and received a variety of responses, and their details are below;

Table 9-6: Household understanding that climate change can harm future generation

Household understanding that climate change can harm future generation	**Region**			**Chi-square test**
	Punjabi Ethnic Group	**Pashtun Ethnic Group**	**Hindko Ethnic Group**	
Very high	58 (36%)	51 (46.5%)	41 (45%)	**X^2= 4.995 P-Value = .758**
High	66 (41%)	41 (37%)	36 (40%)	
Moderate	19 (12%)	9 (8%)	7 (8%)	
Low	10 (6.5%)	6 (5.5%)	4 (4.5%)	
Very Low	7 (4.5%)	3 (3%)	2 (2%)	

36% from the Punjabi ethnic group, 46.5% from the Pashtun ethnic group, and 45% from the Hindko ethnic group have a very high understanding that climate change will cause harm to the future generation. 41% from Attock, 37% from Swabi, and 40% from the Haripur region have high psychology that climate change will harm future generations with Chi-square value= 4.995 and a P-value = 0.758. This high understanding makes them more resilient and less vulnerable.

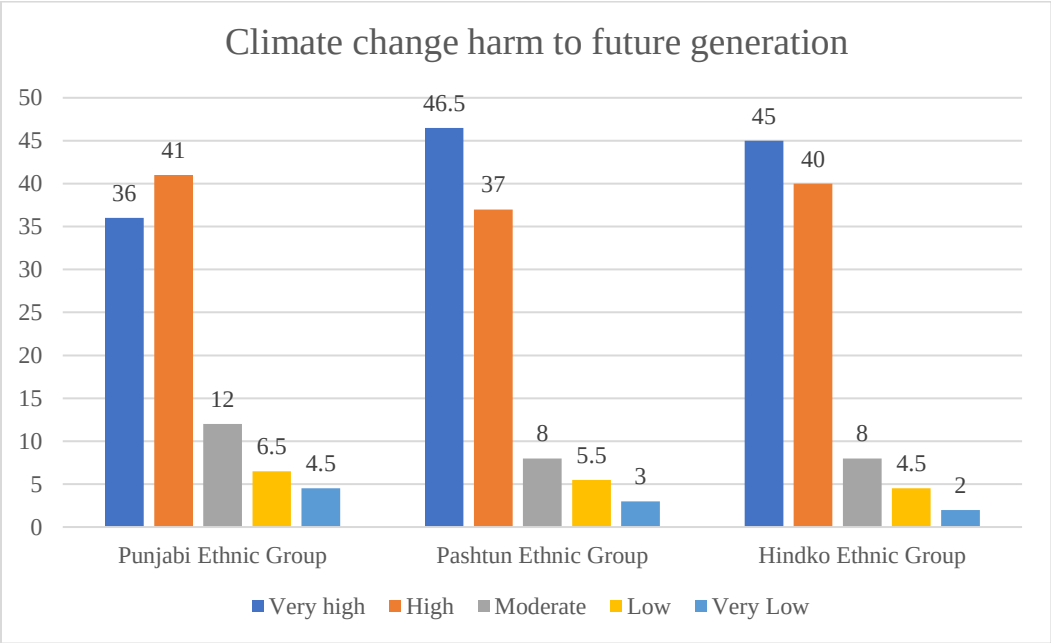

Figure 9.6. Climate change harm to future generation

9.3. Social Distancing to Climate Change

9.3.1. Human Activities result in climate change

The survey asked the respondents that climate change is the result of human activities and obtained various responses. The detail of their responses are as below;

Table 9-7: Household understanding climate change as human activities

Household understanding climate change as human activities	**Region**			**Chi-square test**
	Punjabi Ethnic Group	**Pashtun Ethnic Group**	**Hindko Ethnic Group**	
Very high	16 (10%)	14 (13%)	7 (8%)	**X^2= 4.080 P-Value = 0.850**
High	58 (36%)	40 (36%)	37 (41%)	
Moderate	41 (25.5%)	26 (24%)	21 (23%)	
Low	33 (21%)	22 (20%)	22 (24%)	
Very Low	12 (7.5%)	8 (7.5%)	3 (4%)	

Around 1/4th of responses from three ethnicities have a moderate level of understanding that climate change results from anthropogenic activities and make them moderately vulnerable. 36% from Punjabi ethnicity, 36% from Pashtun ethnicity, and 41% from Hindko ethnicity respondents have a high level of understanding that climate change is the result of human activities and thus make their psychological distance low to climate change with Chi-square value = 4.0808 and P-value = 0.850.

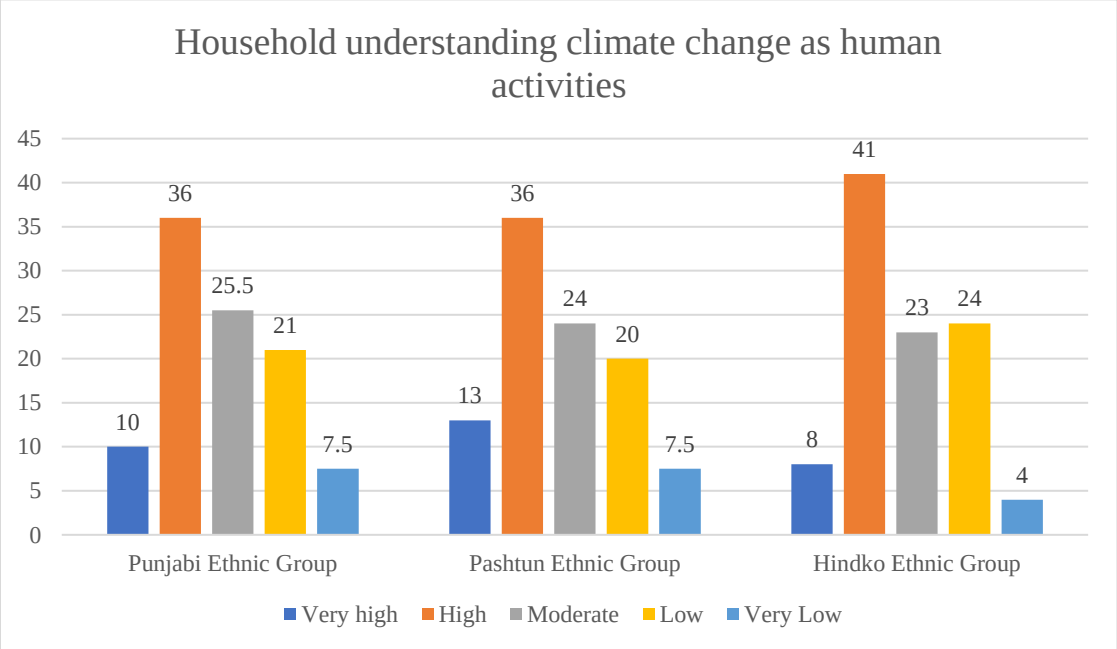

Figure 9.7. Household understanding climate change as human activities

9.3.2. Understanding Consequences of Climate change

The survey asked the respondents about the understanding of climate change consequences and received a variety of responses;

Table 9-8: Household understanding consequences of climate change

Household understanding consequences of climate change	**Region**			**Chi-square test**
	Punjabi Ethnic Group	**Pashtun Ethnic Group**	**Hindko Ethnic Group**	
Very high	30 (40%)	41 (37%)	33 (37%)	**X^2= 94.121 P-Value = .000**
High	38 (23%)	34 (31%)	34 (38%)	
Moderate	14 (9%)	12 (11%)	7 (9%)	
Low	68 (20%)	14 (13%)	9 (10%)	
Very Low	12 (7.5%)	9 (8%)	7 (8%)	

The majority of the household has a high and very high level of understanding the consequences of climate change. 23% from Attock, 31% from Swabi, and 38% from Haripur have a high climate change consequences understanding. 19% from the Punjabi ethnicity, 37% from the Pashtun ethnicity, and 37% from the Hindko ethnicity have a very high level of understanding about climate change consequences, making their psychological distancing low and more resilient to climate change.

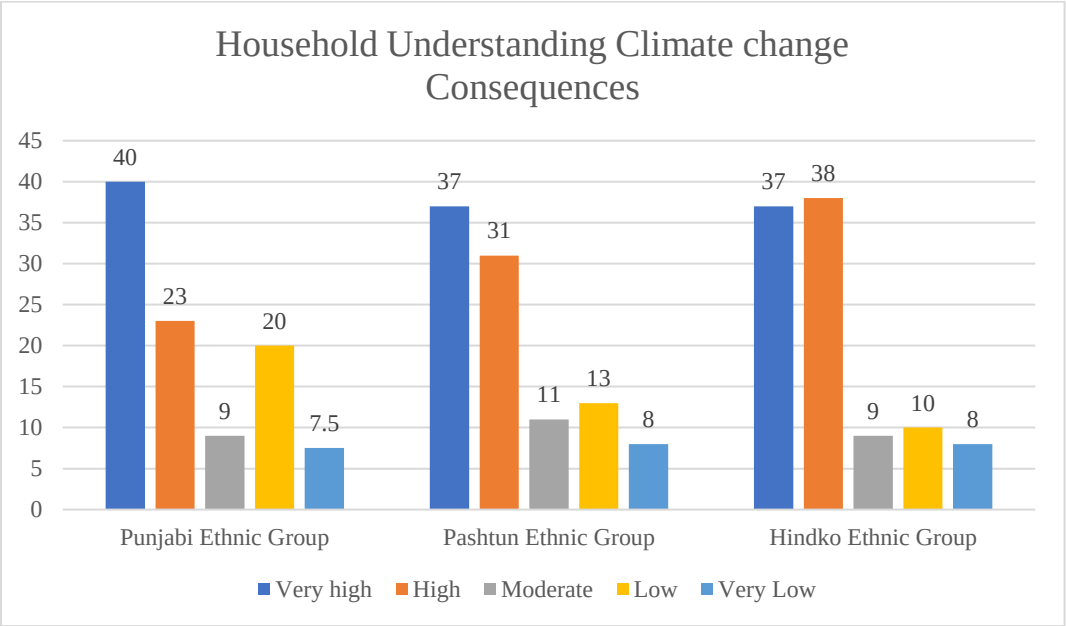

Figure 9.8. Household Understanding Consequences of Climate change

9.4. Uncertainty

9.4.1 Happening of Climate Change

The survey asked the household about their certainty of climate change and obtained a variety of responses. The detail of their responses are as below;

A huge number of respondents have high and very high certainty that climate change is happening. 30% from Attock, 28% from Swabi, and 24.5% from Haripur has very high certainty that climate change is happening, while 36% from Punjabi ethnicity, 41% from Pashtun ethnicity, and 24.5% from Hindko ethnicity has highly certain that climate change is happening with X^2= 6.582 and P-value= 0.582. This huge number of respondents certainty that climate change is happening makes their psychology high compared to those who do not believe that climate change is happening.

Table 9-9: Household certainty about happening climate change

Household certainty about happening climate change.	**Region**			**Chi-square test**
	Punjabi Ethnic Group	**Pashtun Ethnic Group**	**Hindko Ethnic Group**	
Very high	48 (30%)	31 (28%)	22 (24.5%)	**X^2= 6.582** **P-Value =.582**
High	58 (36%)	45 (41%)	39 (43%)	
Moderate	32 (20%)	14 (13%)	13 (14.5%)	
Low	12 (7.5%)	12 (11%)	12 (13.5%)	
Very Low	10 (6.5%)	8 (7%)	4 (4.5%)	

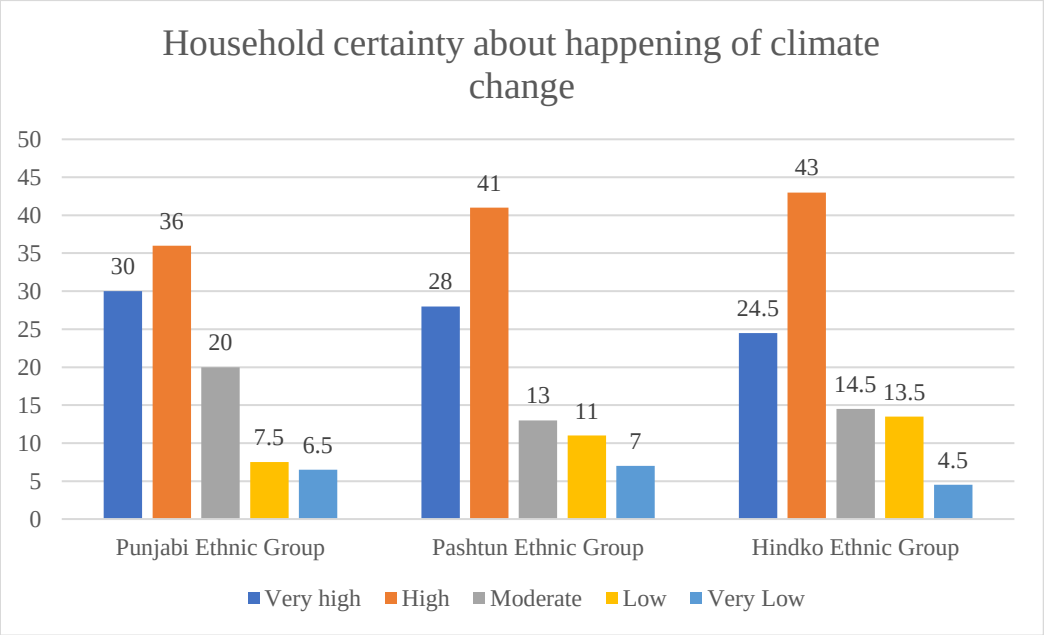

Figure 9.9. Household certainty about happening climate change.

9.4.2. Seriousness of Climate Change

The survey asked the household about the increased seriousness of climate change and received several responses from three ethnicities. The detail of their responses are as below;

Table 9-10: Household certainty about the seriousness of climate change

Household certainty about the seriousness of climate change.	**Region**			**Chi-square test**
	Punjabi Ethnic Group	**Pashtun Ethnic Group**	**Hindko Ethnic Group**	
Very high	59 (37%)	40 (36%)	28 (31%)	**X^2=2.203 P-Value =.974**
High	52 (32.5%)	34 (31%)	33 (37%)	
Moderate	27 (17%)	17 (15.5)	14 (16%)	
Low	13 (8%)	12 (11%)	8 (9%)	
Very Low	9 (7%)	7 (6.5%)	7 (8%)	

The majority of survey respondents are highly certain that the seriousness of climate change is increasing, making them psychology high. 37% from Attock, 36% from Swabi, and 31% from Haripur region households have very high certainty that climate change seriousness is increasing. In comparison, 32.5% from Punjabi ethnicity, 31% from Pashtun ethnicity, and 37% from Hindko ethnicity has high certainty that seriousness of climate change is increasing with X^2= 2.203 and P-value = 0.974. This high certainty of households made their psychological distancing to climate change low.

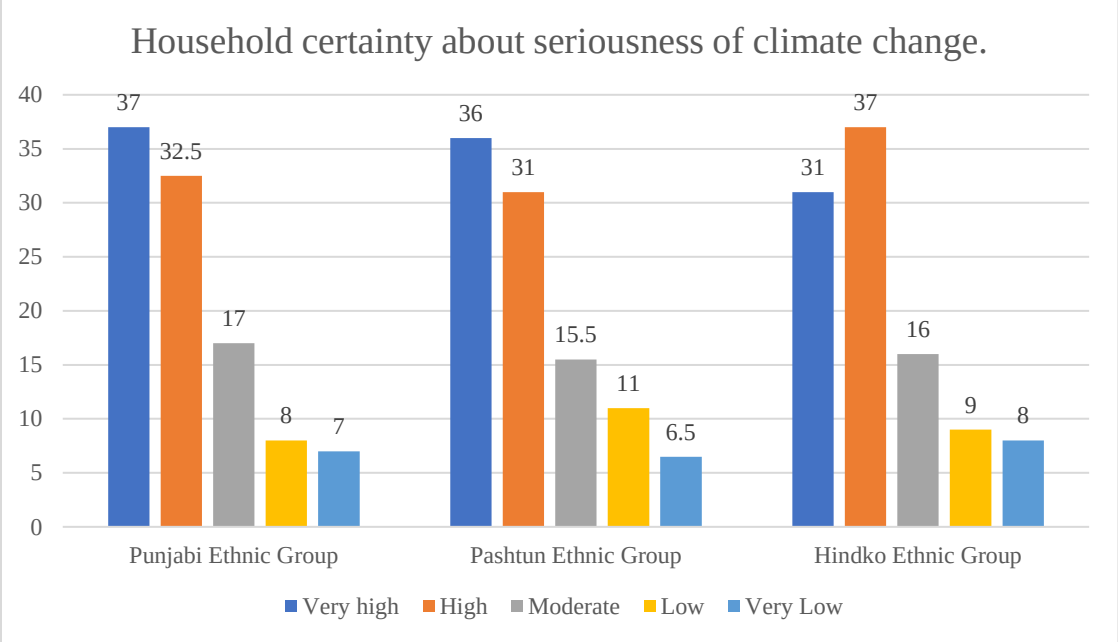

Figure 9.10. Household certainty about the seriousness of climate change.

9.4.3. Human being Cause Climate Change

The survey asked the household about their certainty that climate change is the result of anthropogenic activities, and received a variety of responses. The details of their responses are below;

Table 9-11: Household certainty about human causing climate change

Household certainty about human causing climate change.	**Region**			**Chi-square test**
	Punjabi Ethnic Group	**Pashtun Ethnic Group**	**Hindko Ethnic Group**	
Very high	76 (47%)	44 (40%)	37 (41%)	**X^2=9.129 P-Value =.332**
High	46 (19%)	37 (34%)	30 (33%)	
Moderate	22 (14%)	14 (13%)	13 (14.4%)	
Low	11 (7%)	5 (4.5%)	2 (2%)	
Very Low	5 (3%)	10 (9.5%)	8 (9%)	

The majority of the household has highly and very highly certain that climate change is the result of human activities. 47% from Attock, 40% from Swabi, and 41% from Haripur region respondents are very highly certain that human being activities result in climate change. Similarly, 19% from Punjabi ethnicity, 34% from Pashtun ethnicity, and 335 from Hindko ethnicity are highly certain that climate change is the result of anthropogenic activities with X^2=9.129 and P- value= 0.332. This high certainty makes the respective ethnicities psychological distancing less to climate change and made them more resilient.

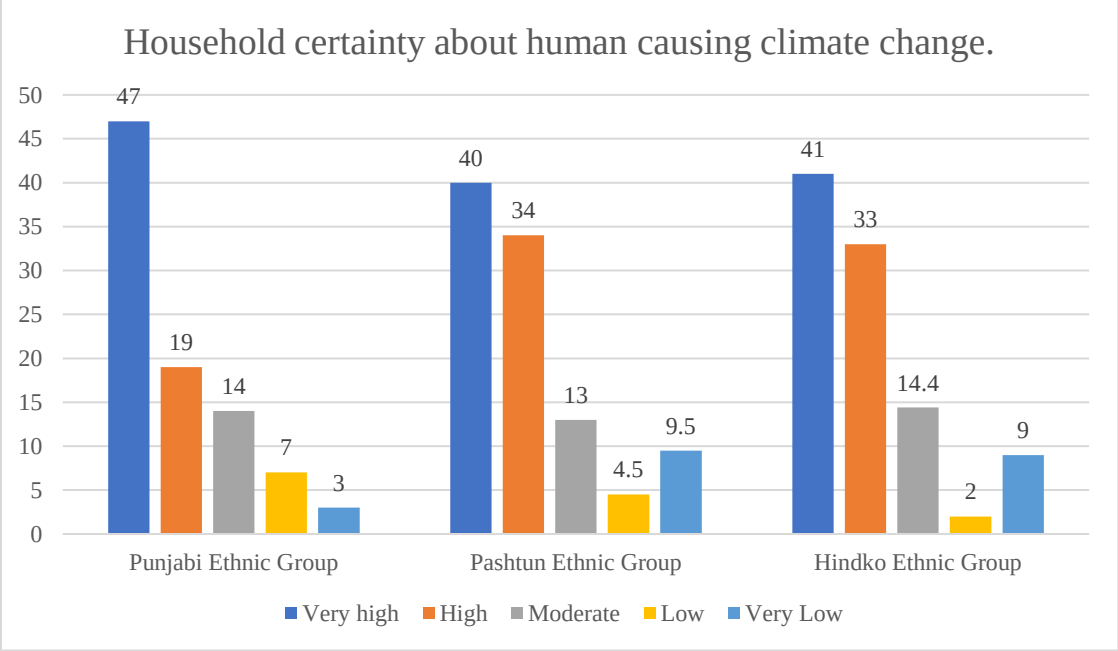

Figure 9.11. Household certainty about human causing climate change.

9.5. Psychological Distancing to Climate change Assessment

The study assesses psychological distance to climate change of three different ethnic groups. For the Punjabi ethnic group, it is varying from 0.22 to 0.90 with a mean value of 0.44. 5% of respondents have a high psychological distance to climate change and

less understood climate change, while 48% and 35.5% of respondents are very low and low psychology because their high understanding of climate change causes and consequences.

Table 9-12: Psychological distancing to climate change assessment

Ethnicities	**Classes**	**Very Low**	**Low**	**Moderate**	**High**	**Descriptive statistics**
Punjabi Ethnic Group	Range	**<0.39**	**0.39-0.56**	**0.56-0.73**	**>0.73**	**Mean= 0.44 Maximum=0.90 Minimum=0.22 S.D= 0.14**
	No. of household	70	57	24	9	
	%age of household	48%	35.5%	6.5%	5%	
Pashtun Ethnic Group	Range	**<0.38**	**0.38-0.54**	**0.54-0.70**	**>0.70**	**Mean= 0.41 Maximum=0.85 Minimum= .20 S.D= 0.14**
	No. of household	52	37	16	5	
	%age of household	47%	33.5%	14.5%	4.5%	
Hindko Ethnic Group	Range	**<0.36**	**0.36-0.52**	**0.52-0.68**	**>0.68**	**Mean= .42 Maximum=0.85 Minimum= 0.2 S.D= 0.14**
	No. of household	37	32	16	5	
	%age of household	41%	35.5%	17.5%	5%	
Total	No. of household	160	125	56	19	
	%age of household	44%	35%	16%	5%	

For the Pashtun ethnic group, it is varying from 0.20 to 0.85 with a mean value of 0.41. 47% and 33.5% of respondents had a low and low understanding of climate change socially, spatially, and temporally making them less vulnerable.

For Hindko ethnic group, it is varying from 0.2 to 0.85 with a mean value of 0.42. 5% of Haripur respondents have high psychology due to very low psychological distance to climate change. In comparison, 41% and 35.5% of respondents are well aware of climate change, making them low psychologically distance to climate change and more resilient.

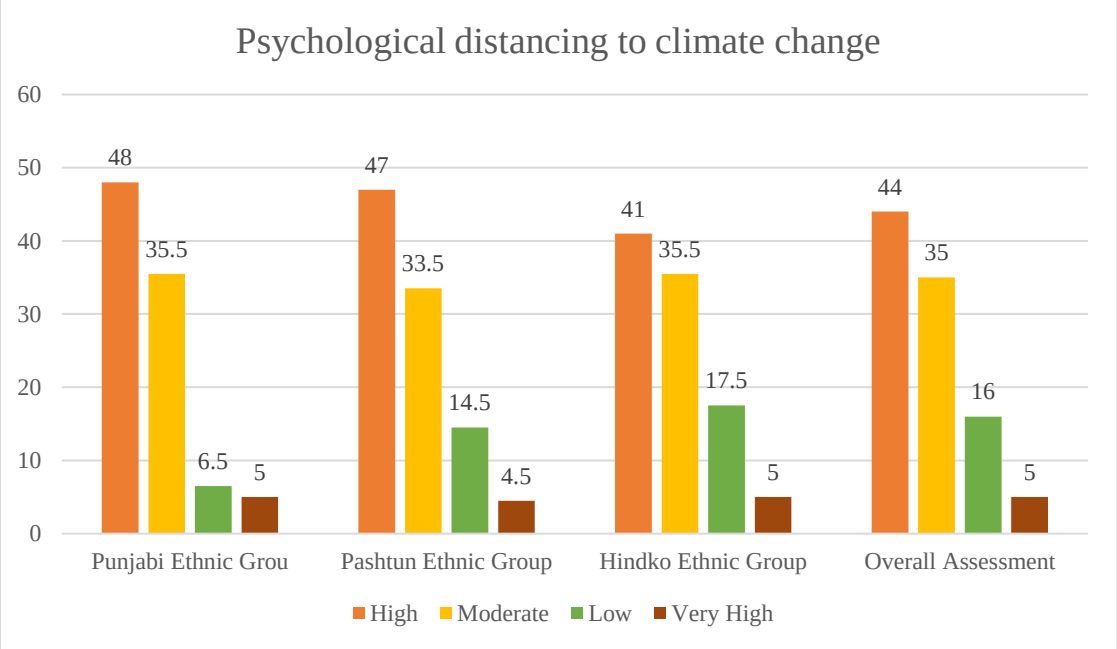

Figure 9.12. Psychological distancing to climate change

Overall, 5% of the households have high psychological distance from climate change. Around 44% and 35% of the respondents have very low and low psychology towards climate change. The less psychological distancing to climate change of the respondents is due to their understanding of climate change and natural hazards personalized haram, communal harm, national threat and global harm. This is also due to their understanding of future harm, damage to the future generation, understanding anthropogenic activities result, high awareness of climate change consequences, and their certainty that climate change is happening, and its seriousness is increasing.

Chapter 10 . Conclusion and Recommendation

The study is conducted to explore the perceptions, socio-economic characteristics of the household and local knowledge of ethnic groups of Pakistan and to assess their coping and adaptive strategies against natural hazards and climate change. Ethnicity is a named social category of people who identify with each other based on shared attributes that distinguish them from other groups such as a common set of traditions, ancestry, language, history, society, culture, nation, religion, or social treatment within their residing area. Ethnicity is sometimes used interchangeably with the term nation, particularly in cases of ethnic nationalism, and is separate from but related to the concept of races. Disaster is a condition that disrupts the normal running of societies and causes physical, financial, and psychological damage to humans and society. The importance of the study reflects from the priorities of the Hyogo Framework for Action (HFA) and Sendai Framework for Disaster Risk Reduction (SFDRR). The framework of research is the convergence of socio-economic conditions, local knowledge, risk perceptions, awareness, and capacities of the three different ethnic groups (Punjabi, Pashtun, and Hindko), towards disaster and climate change which ultimately led to sustainable development. The research objectives are to assess the perceptions, local knowledge, capacities, and psychological distance to climate change of three ethnic groups of Pakistan.

10.1. Main Findings

The study identifies three ethnicities based on linguistic differences, i.e. Punjabi, Pashtun, and the Hindko ethnic group. The study assesses their vulnerabilities (social,

economic, attitudinal), risk perception, capacities, and psychological distance to climate change. Based on the population statistics a valid 360 samples were obtained from the three ethnicities.

The study concluded that the ethnicity who has more number of males in a household than females are less vulnerable to natural hazards due to their physical strength, access to information, and decision-making power. Similarly, those households who have house ownership are less exposed to the threat of natural hazards as compared to those who do not have house ownership. The households who have high education levels are more aware, and understand natural hazard threats and are less vulnerable than those who have no or less education level. Likewise, the households from three ethnicities who reside for a long time in a community are less vulnerable to disaster harm than those who recently migrated. The study identifies that those households who have past experience of disasters are less vulnerable because of suffering from its consequences and will be more prepared for future hazards. In the same manner, those households who have access to safe drinking water, electricity, internet, TV, and mobile phone are less vulnerable to natural hazards than those who do not have access to these resources. Those households from three different ethnicities who can use first aid kits attended frequent training drills, and aware of evacuation routes are less sensitive to natural hazards harm.

In case of flood, the safety measure is to a used boat, try to get to a higher place, migrate from that place, and avoid electric areas. Similarly, one can remain safe by constructing

barriers to flood water, avoid the construction of building in flood-prone areas. Institutions need to inform people, and people should be aware of the evacuation route.

The study concluded that the households from three ethnicities having high monthly income and less dependency ratio are less vulnerable to natural hazards. Similarly, households from three ethnic groups who have access to cars or vehicles are less susceptible to natural hazards threat. In the same way, the household who have a stable occupation, able to get support from outside in an emergency are more prepared for natural hazards.

In case of natural hazards, one needs to maintain its quality of life by fully aware of a hazardous situation, take necessary precautions before its occurrence, nutrients-rich food should consume, and constructing a waterproof and heatproof building. Furthermore, one can also sustain its quality of life by migrating from flood-prone regions to avoid any future occurrence and avoid any epidemics.

The households from three ethnic groups who have high concerns about natural hazards are less vulnerable to its harm. Similarly, most of the households from three ethnicities are willing to adapt to new lifestyles due to climate change and are less susceptible to natural hazards consequences. In the same manner, the households who perceive high trust in the information received and in the performance of the Ministry of Climate Change are less inclined to climate change harm. Likewise, the respondents from three rural communities who have a high fear of natural hazard reoccurrence are less vulnerable than those who do not attach any worry. The households who have high

awareness of natural hazards and climate change consequences are less vulnerable because of their high preparedness.

The performance of institutions, i.e., National Disaster Management Agency (NDMA), Local Council Board (LCB), Ministry of Climate Change (MOCC), etc., is satisfactory and working up to their jurisdiction, but still, there is a lot to improve. The performance of institutions is strain due to their inefficient management of time and poor post-disaster actions. The blame game of institution is the biggest hurdle in the performance of the respective organization, and vague or overlap responsibilities make it ineffective during these natural hazards.

The study concluded that the household who has high psychology that climate change can cause personalized harm, communal harm, national, and global harm have low psychological distancing to climate change. Similarly, the households who have a psychology that climate change will harm future generation and its seriousness will be increasing in the future has a low psychological distance to climate change. In the same manner, the household from three ethnicities who has certainty that climate change is caused by anthropogenic activities has a low psychological distance to climate change and will be more careful about their actions.

To minimize the losses of natural hazards efficient and environmentally friendly infrastructure, must adapt. This includes waterproof and heatproof infrastructures and buildings, wide and open infrastructure, use of concrete dikes to prevent floodwater and seismic resistance buildings, and green infrastructure should follow. Shelters and safe zones may construct and add to the evacuation route.

In case of flood, dikes and barriers are important to stop floodwater in crop areas. Ditches and drain are required for quick drainage of floodwater, harvest field on higher grounds, and keep the livestock in open space so that they can move quickly. In case of heatwaves, crops need to harvest at sunset or night, an efficient irrigation facility needed for crops, and frequent crop watering is needed.

Along with basic needs, i.e., (food, shelter), electricity, gas, and security is the main requirement. Renewable energy, a balanced diet, access to a medical facility, safety to lives and properties are some essential requirements for a prosperous society.

10.2. Recommendations

The recommendation of the research are as below:

Practical Recommendations

- To combat climate change or lessen its adverse impacts, ethnicities need to shift from non-renewable energy sources to renewable energy sources.
- Governmental organizations must play a proactive role in disaster preparedness and mitigation and should be the front liner in post-disaster rehabilitation and reconstruction.
- Social and pilot projects regarding the awareness of climate change and natural hazards consequences are required in a furlong and hazard-prone areas to lessen the adverse impacts for all stakeholders.
- A welfare center needs to establish in each community. This will help the community in case of emergency and act as a safe home for natives.

Policy Recommendations

- Cultural perception plays an important role in minimizing the adverse impacts of natural hazards. Therefore, it shall be incorporated into disaster management policies.
- In order to strengthen the marginalized community's resilience, quarterly disaster trainings, drills, or campaigns must be incorporated into disaster management policy.
- Evacuation routes plan should be added to local communal map.
- Government organizations should clarify their roles and responsibilities. This will aid the organization to effectively perform and provide assistance in time.

11.3. Contribution of the study

This study review socio-economic characteristics of three different ethnic groups based on linguistic difference against climate change and natural hazards. This study also reviews the risk perception index of three ethnicities at the household level. This research identifies coping and adaptive strategies of three different ethnic groups along with the psychological distance to climate change. The survey stage brought an awareness opportunity to the respective ethnic community. The study brought an opportunity to explore the perceptions of households regarding natural hazards and climate change. The study provides a complete analysis of selected indicators using the analysis technique. The results indicate which factor should be enhanced to minimize the adverse impacts.

10.4. Limitations of Research

The limitation of the study includes assessing risk perceptions, socio-economic conditions, and capacities only in three ethnic groups of Pakistan. The study conducted only at the household level, not at the community or national level. Likewise, it is only limited to ethnic groups of rural areas rather than urban areas. The study further explores the socio-economic conditions, traditional knowledge, and access to the capacities of ethnic groups at the household level rather than the regional level. This study is particularly limited to the three ethnic groups of Pakistan Punjabi, Pashtun, and Hindko ethnic group and can be extended to other ethnicities.

10.5. Future Direction of Research

The future areas of research can be about studying vulnerabilities and capacities of ethnicities from urban perspectives. Further study can be conducted to focus on man-made hazards rather than natural hazards. The research can also be carried out to identifies, why some factors are responsible for low perceptions of individuals against climate change.

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Annexure
Survey Questionnaire

Sr. No._____ Region: _____

National University of Science and Technology (NUST) H-12 Islamabad is conducting a study on ethnicities and disaster risk reduction. The survey will take only 7-12 minutes. All the collected data during survey will be keep confidential and will only be use for the purpose of this study.

- Age: _____ Gender: _____ family size: _____ No. of male: ____
- No. of female; _____ Household ownership: Yes □ No □ Car ownership: Yes □ No □
- Education level; No schooling □ primary □ Matric □ Graduation □
- Monthly income: _____ No. of earner: _____
- For how long you are living in this community. _____
- Type of occupation? Self-employed □ service □ Daily wages □ At home □
- Do you have access to the following?
  Safe drinking water? Yes □ No □ Proper sanitation? Yes □ No □
  Electricity? Yes □ No □
  TV/radio? Yes □ No □ Mobile phone? Yes □ No □
  Internet? Yes □ No□
- What is your source of information?
  Radio □ TV: □ Newspaper: □
  Facebook, Twitter, and Instagram: □

Please answer the following question from scale 1-5

1. Very low 2. Low 3. Neutral 4. High 5. Very high

Sr.No.	Questions	1	2	3	4	5
1.	How much do you afraid of changing climate?					
2.	How much are you familiar with climate change?					

3.	How much do you adopt well from the known adaptation measures to deal with the changing climate?					
4.	How much you can deal with the consequences of climate change.					
5.	How much do you worry about the occurrence of natural hazard?					
6.	How much do you aware of early warning system?					
7.	How much you feel that changing climate is due to human activities?					
8.	How much do you understand that the harmful effects of disaster related to climate change can be reduced?					
9.	How much do you think that climate change can cause harm to you and your family?					
10.	How much do you think that climate change can cause harm people in your community?					
11.	How much do you think that climate change can cause harm people in Pakistan?					
12.	How much do you think that climate change can cause harm to people around the world?					
13.	How much do you think that the severity of climate change will increase in future?					
14.	How much do you think that climate change will harm future generations?					
15.	How much do you trust the information received related to climate change from different sources?					
16.	How much do you trust the ministry of climate change to combat with climate change?					
17.	How much are you certain that climate change is happening?					
18.	How much you think that the seriousness of climate change is exaggerated?					
19.	Most scientists agree that humans are causing climate change?					

Please answer the following question in YES/NO			
Sr. No.	**Statements**	**Yes**	**No**
1.	Have you experienced any disaster before?		
2.	Have you attended local language drill?		
3.	Do you know about the disaster Jargon in your local language?		
4.	Have your ancestors transfer any disaster knowledge to you?		
5.	Do you know about the evacuation route in your area?		
6.	Do you able to use first aid kit?		
7.	Do you follow land-zoning laws in your area?		
8.	Are you aware of rescue communication in case of disaster?		
9.	Are you willing to migrate from this region in case of emergency?		
10.	Do you speak Urdu?		
11.	Are you able to get support from outside during crisis?		
12.	Have you ever participated as volunteer in climate friendly activities?		
13.	Are you want to participate in hazard education?		
14.	How many times you attended disaster awareness programs.		
15.	How far are you from the nearest medical facility?		

A. What are the safety measures you want to adopt in case of flood/heatwaves?

_____
_____
_____
_____
_____
_____

B. What measures do you want to adopt in crop harvesting in case of flood/heatwaves?

_____
_____
_____
_____

_____

_____

C. How you sustain your quality of life in case of flood/heatwaves?

_____

_____

_____

_____

_____

_____

D. What measure do you want to adopt in physical infrastructure in case of flood/heatwaves?

_____

_____

_____

_____

_____

_____

E. Do you satisfied from the work of institutions against flood/heatwaves?

_____

_____

_____

_____

_____

_____

F. What are the biggest requirements of your household?

_____

_____

_____

_____

_____

If any comments;

_____

_____

Safety Measures

Punjabi Ethnic Group Responses;

Ans.1. *In case of flood; we need to use boat, try to get on higher place.*
In case of heat waves; we a must stay home and cover your head while going outside.

Ans. 2. *In case of flood, we will migrate from that place, and will avoid electric areas and turn down all supplies.*

In case of heat waves; we must keep body covered, use cool places and need more water consumptions.

Ans. 3. *In flood, we need to avoid building construction in flood prone area, buy food insurance, Construct barriers to stop floodwater from entering your home, and always carry first aid box and use water boats and tubes for evacuation.*

In heatwaves, we must stay inside home.

Ans. 4. *In case of flood, I will just try to save my home by locking the doors, and will try to reach top of my house to rescue myself, and if informed early, then we will migrate to other house or leave this place.*

In case of Heat waves, I will cover my head while going outside, stay inside house and use cold clothes.

Pashtun Ethnic Group Responses;

Ans.1 *In case of flood; use high attitude, migrate from flood region to build residential building at a safe distance from natural streamline.*
In case of heatwaves, forestation is required at higher level, use shadow over crops, use cap to avoid sunstroke.

Ans.2 *In case of flood, people should be inform about oncoming flood; people should be move to safe places, Govt should provide timely supported, People should aware about evacuation plan.*

In case of heat waves, wet cloth on head, remain under shadow and use of excessive drinks

Ans. 3 In *case of flood, I will try my best to transfer my family to a higher altitude spot and make sure that first aid kit and enough food supplies are available.*
In case of heatwave; I will cover my head with cap and take cover under shade or keep inside.

Hindko Ethnic Group Responses;

Ans.1 In case of flood, we need to increase the ratio of plantation in our region, construct building far away from flood prone area, Move to higher attitude places.

In case of heatwaves, in case of heatwaves, we can do our work at night rather daytime.

Ans.2 In flood, use of high altitude places, migrate from flood area, and spikes and dukes need to construct to avoid floodwater.

In heatwaves, we need to increase the ratio of plantation in our region.

Ans.3 In case of flood, construct building far away from flood prone area, we need to construct our home as per climate and we will evacuate the area in case of flood.

In case of heatwaves, we will remain inside our home, we will use cold places and shall consume more water.

Crop harvesting adaptation.

Punjabi Ethnic Group Responses;

Ans.1 In case of flood/heatwaves, we cannot save crops from natural hazards and we will use machine for fast harvesting.

Ans.2 In flood/heatwaves, we want to adapt physical barriers i.e. dikes, to stop the flow of floodwater in crops area, providing necessary irrigation facility required for safe watering of crops.

Ans.3. In case of flood/heatwaves allow farmer to drain or retain water as needed, drainage ditches can used to avoid floodwater and cover the crops in case of heatwaves.

Pashtun Ethnic Group Responses;

Ans.1 In case of flood/heatwaves, Harvest field on higher grounds, identify tools and machinery to easily moved, livestock must kept in open areas so that they can move quickly.

Ans.2 *In case of flood the crop are not cultivated in that area. We use modern machinery for harvesting.*
In case of heatwave, crops should harvest at sunset or at night.

Ans.3 I will try my best to surround the crop field with drainage at all sides along with wells so that the extra water coming to field should stopped for a longer period.

In case of heatwave, we need to harvest after sunset.
Hindko Ethnic Group Responses;

Ans.1 In case of flood, floodwater should channelized from the fields.
The farmer should be equipped with new farming machinery and should have enough facility.

Ans.2 In flood region we need to crop rice, sugar cane etc. and in case of heatwave we shall harvest the crop after sunset.

Ans.3 In case of flood/heatwaves, we need to harvest good quality crops.

Quality of life

Punjabi Ethnic Group Responses;

Ans.1 By being fully aware of any hazardous situation coming up before time and taking the required necessary precautions well before time to avoid any necessary consequences.

Ans.2. Through saving, we can sustain our quality of lives in flood/heatwaves.

Pashtun Ethnic Group Responses;

Ans.1. We need to transfer from non-renewable energy to renewable energy to ensure energy in every harsh conditions. Nutrient rich food should be available for whole family.

Ans.2 we can sustain our lives in flood/heatwaves, by elevating buildings, block flood water, use water proof material, and store food for emergencies.

Hindko Ethnic Group Responses;

Ans.1 In case of flood/heatwaves, we can sustain our lives by providing shelter and access to essential life requirements.

Ans.2 We can sustain our lives by Migrating from the flood/heatwave area to avoid any future occurrence and avoid diseases.

Physical infrastructure adaptation

Punjabi Ethnic Group Responses;

Ans.1 Waterproof and heatproof infrastructure must accelerated.

Ans2. Wide and open infrastructure is the measure I want to adapt.

Pashtun Ethnic Group Responses;

Ans.1 The riverbank should be made safe or construct with concrete. Sand are to use to prevent floodwater. The walls of houses are to be made of concrete so that they may not damage from floodwater.

Ans.2 Heatproof and waterproof infrastructure is necessary to avoid any possible harm. Seismic resistance buildings and green infrastructure covers must provide.

Ans.3 Heat resistance, green infrastructure, RCC use multistory building and green roofs need to adapt.

Hindko Ethnic Group Responses;

Ans.1 Shelters and safe zones must established and added in evacuation plan along with heatproof and waterproof infrastructure.

Work satisfaction of Institution

Punjabi Ethnic Group Responses;

Ans.1 No, I am not satisfied. There is lack of preparation as well in participation.

Ans.2 Yes, I am satisfied but room of improvement is there.

Ans.3 Yes, they are working up to their jurisdiction.

Pashtun Ethnic Group Responses;

Ans.1 The performance of government institutions in emergencies is not satisfied, as they are unable to inform their people about the imminent floods etc. Also after calamities, they are not able to provide full support to the people.

Ans.2 Yes, satisfied b/c these institutes aware the nearby people in case of flood coming and I think this on of the foremost duty they always being in success to inform masses.

Hindko Ethnic Group Responses;

Ans.1 No, because of non-structured cities. No proper drainage systems are available. The blame game of institutions is the main cause of non-productive work.

Ans.2 Yes, I am satisfied from their work contribution.

What are the biggest requirement of your household?

Punjabi Ethnic Group Responses;

Ans.1. Along with basic needs, electricity and gas are required.

Ans.2. Safety, security, reliability, infrastructure and basic necessities are our biggest requirements.

Ans.3 Food, internet, Money, Clothing, and heating and cooling system

Pashtun Ethnic Group Responses;

Ans. 1. Renewable energy, balance diet, medical facilities, quality education, job markets, investment opportunity, safety to life, property and legal rights are our biggest requirements.

Ans. 2 Safe and sound infrastructure.

Ans.3 Food, electricity, gas, clean water and sanitation are our biggest requirements.

Hindko Ethnic Group Responses;

Ans.1. Food, Shelter, Money and govt. supports are our requirements.