

**AVALANCHE RISK REDUCTION AND COMMUNITY  
RESILIENCE BUILDING IN (BADAKHSHAN, AFGHANISTAN)**

By

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A thesis submitted to the Department of Architecture in  
partial fulfillment of the requirements for the degree of Master in Disaster Management

Postgraduate Programs in Disaster Management (PPDM)

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## **Declaration**

Declaration I hereby declare that the present study, entitled "Avalanche Risk Reduction and Community Resilience Building in Badakhshan Province", submitted to the BRAC University is a record of original work done by me under the guidance of Professor Dr. Md. Humayun Kabir, Department of Geography and Environment, University of Dhaka, and this thesis is submitted for partial fulfillment of the requirements of a master's program in Disaster Management. The discovered results or responses have not been submitted to any university or institution for award or diploma fulfillment.

A handwritten signature in black ink, appearing to read 'Sayed Hafiz Lashkari', with a horizontal line drawn across the middle of the signature.

**Sayed Hafiz Lashkari**

## Approval

The thesis with the title "AVALANCHE RISK REDUCTION AND COMMUNITY BUILDING RESISTANCE IN BADAKHSHAN PROVINCE" was submitted by Sayed Hafiz Lashkari (21168008) in the spring semester of 2022 and has been accepted as satisfactory in partial fulfillment of the requirement for the degree of Master in Disaster Management on (Date).

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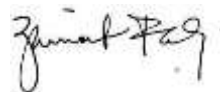
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## **Ethical Statement**

The entire investigation was carried out with ethical competence and integrity in terms of deliberate choice and responsible behavior taking into account ethical standards as well as social, economic, and ecological ramifications.

First, permission was obtained from each authority to survey their facilities while completing the field study. Everything that was done, including taking pictures and conversing with staff and volunteers, was authorized. The field survey was carried out according to the beneficence-do no principle. While inspecting the child protection facilities, the children's privacy and dignity were totally protected without interfering with their normal play and academic pursuits.

All participants were kept anonymous, and various identification codes were used to provide the data analysis and research findings for samples used in the study. Every time any intellectual property is used in this study, it is properly cited and given due credit.

## **Abstract**

Badakhshan province is one of Afghanistan's mountainous provinces, located in the northeast. During the winter, most of the country's villages are blanketed in heavy snow, which has an impact on people's lives, property, livestock, and agriculture. Based on the review of the literature, an avalanche in the eastern section of Badakhshan province killed 42 people and injured many more, according to the provincial governor's office. According to the Red Crescent's director, avalanches killed more than 60 people in 2012. This research aims to assess the vulnerability of avalanches, to develop an avalanche risk reduction plan and a reliable early warning system. Furthermore, to evaluate the community's capacity to tackle Avalanche Hazard in the study area.

The online survey was conducted with the government and non-government organizations. Respondents were divided into two groups: government officials such as the NDMA and NGOs working at the provincial and local levels; all processes were conducted by phone and email and Community members who live in avalanche-prone areas, academia, and society. After analyzing all the provided data, the result showed that the level of vulnerability has gradually decreased by getting knowledge and better awareness about the risk of avalanche in the study area.

In conclusion, these findings imply that communities are mostly unaware of the disaster's implications. Furthermore, most houses will not have enough food, water, or fuel during the avalanche disaster if no immediate response is provided. The main issue confronting avalanche risk reduction and Community resilience Building to failure is the region's security condition; nonetheless, non-governmental organizations are working to lower avalanche risk in Badakhshan province.

## **Acknowledgment**

I would like to express my thanks to several people who helped me with the fulfillment of this work.

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## **Operational Definition Terms**

**Adaptation:** Change the people's behavior and function to reduce vulnerability.

**Participation:** Contribute to cohesion to do an activity.

**Early warning:** The decimation of the information before any kind of disaster to reduce allowed the individual to take action to avoid or reduce the risk or be well prepared for an effective response.

**Vulnerability:** Refers to an individual's or a group's capacity to recover, resist, and cope with the impact of natural hazards.

**Coping Capacity:** Ability, opportunity with accessible equipment which humans use to tackle adverse.

**Avalanche:** A large mass of snow, ice, and rocks that falls down the side of a mountain.

**Avalanche damage:** Avalanche damage to tangible (buildings, infrastructure, and goods) and intangible (life, culture, and ecological assets) receptors.

**Avalanche disaster:** An avalanche event that has the potential to cause harm with resulting damage or risk to health, life, and livestock.

**Risk:** The probability of harm to harmful consequences to the human population resulting from the avalanche.

**Susceptibility:** How easily the individual/household community experiences harm.

**Exposure:** when someone or something is in a situation where they are not protecting from something dangerous or unpleasant.

**Resilience:** The ability to become strong, happy or successful again after the avalanche event.

**Mitigation:** To reduce the hazard risk.

**Prevention:** When something bad stops from happening.

**Hazard:** Something has the potential to cause harm.

**Risk Perception:** The idea or information about the likelihood of happening something bad.

**Emergency:** An unexpected and dangerous Avalanche situation that must be dealt with immediately.

**Education:** The highest level of education attained by the respondent. For example: primary, secondary, and university.

**Avalanche Forecasting:** A system designed to forecast Avalanche levels before they occur.

## **Abbreviation and Acronyms**

ANDMA	Afghanistan Disaster Management Authority.
UNEP	United Nation environment program.
AKAH	Aga Khan Agency for Habitat
VDMP	Village Disaster Management Program
WMPs	Weather Monitoring Post
SART	Search and Rescue Team
CERT	Community Emergency Response Team
PPE	Personal Protect Equipment
SERT	School Emergency Response Team
AVPT	Avalanche Preparedness Team
NGOs	Non-governmental organizations
SPSS	Statistical Package of Social Science
DRR	Disaster Risk Reduction
OCHA	United Nation Office for Coordination of Humanitarian Affairs.
HVRA	Hazard Vulnerability Risk Assessment
UNDP	United Nation Development Program
GIS	Geographical Information System

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# CHAPTER 1

## INTRODUCTION

### 1.1 Background

The present study investigates disaster risk reduction and community-building resilience in Badakhshan Afghanistan exploring particularly the implication of disaster risk reduction policies and community people and institutions' capacity for implementing Avalanche risk reduction strategies in the province.

Afghanistan is also one of the most vulnerable countries in the case of Avalanche which destroy people's life, properties, land, livestock, infrastructure, and so on. This research mostly focused on Badakhshan province's challenges during the snowfall. Most of the villages in the province are covered by heavy snow during the winter season, and it affects people's lives, properties, livestock, and agriculture. The road will be blocked by snow, there is no open road from the remote communities to the center of the province. In addition, the community people don't have access to advanced equipment for releasing the road from snow. Besides blocking the road, people face poor medical, and food assistance.

According to the existing literature review, some logical answers will be found as more details will be discussed about the reason behind the vulnerability of the community people, especially the specific study area. In addition, the withstand and capacity of the people and the coping strategy methods will be identified accordingly. Even though the avalanche-prone area community people and properties are affected by an avalanche, they are always trying to figure out a new risk reduction measure to tackle this problem. This is one of the essential points to find out some more measures to strengthen the community risk reduction in terms of avalanche risk.

When a disaster occurs, such as an avalanche, individuals in the community sell their lands and assets to reduce the danger of the disaster, particularly those who live in the most distant areas of Badakhshan province, and this has a significant impact on their economic and livelihood income. The residents of the community do not have the resources to recompense them for their losses. Communities in which there is a general poor knowledge of the disaster's consequences.

My interest in this topic has increased as our community also suffers from snowfall and avalanche risk, as defined according to several studies, Badakhshan province is one of Afghanistan's most vulnerable areas. People have been the main victims of avalanches in recent decades due to a poor knowledge and an ineffective early warning system. In this research, I'd like to concentrate more on Avalanche risk reduction and community building resilience, as well as compare recent and historical vulnerabilities in Badakhshan's most vulnerable places.

## **1.2 Problem Statement**

Avalanche is the current hazard in Badakhshan province. Badakhshan province is one of the mountainous provinces located in the northeastern part of Afghanistan. Most of the villages in the country are covered by heavy snow during the winter, and it affects people's lives, properties, livestock, and agriculture. The road will be blocked by snow, there is no open road from the remote communities to the center of the province. In addition, the community people don't have access to advanced equipment for releasing the road from snow. Besides blocking the road, people face poor medical, and food assistance.

On March 6, 2012, the Badakhshan provincial governor's office said that 42 people had been killed and many more injured by an avalanche in the eastern part of Badakhshan province. The director of the Red Crescent said that more than 60 people were killed by avalanche in 2012. Available literature reviews like the United Nations Office for Coordination of humanitarian affairs address the issue of Shaki District in winter (Cohobate, et al, 2016).

The purpose of this research is to assess the vulnerability of avalanches in Badakhshan province. The existing literature illustrates that the northeast part of the country (Badakhshan) is one of the most vulnerable parts from December through March. (Mohanty et al., 2019). A large number of the district and villages are at risk of avalanches in Afghanistan. Overall, the article shows 16 districts, and 180 villages, with a total of 501 and with a total population of 22, 477 (Chobat, et al, 2016).

The Afghanistan Disaster Management Authority (ANDMA) emphasizes that there are different challenges that affect the capacity or the resilience of the people and disaster Management, like security, poor statistics, poor financial resources, etc. (GIZ, 2013). Coping capacity and adaptive



capacity is depending on the capabilities of the community to use their own available resources and their long-term policies in mitigating the natural disaster event. Less quality of the governance and poor institutions. The literature suggests that poor governance and institutional quality have major distributional repercussions - particularly through the channel of resource allocation efficiency mainly affect the capacity building of the community people, especially in Avalanche-prone areas in Afghanistan. The report which was released on 11 November 2007 illustrated that more than 1,000 poor people live on the steep slope of the mountain in Badakhshan province and are at risk of being killed by Avalanche and landslide.

Poor capacity and coordination between the local, national and international agencies facing, Attracting and retaining qualified workers in remote and/or insecure locations is challenging regarding disaster risk reduction at the local and national level which has a negative impact for disaster risk reduction specifically Avalanche risk reduction and community building resilience.

According to the recent news report by Mohiuddin Ahmadi, director of the provincial information and culture decoration, three people were killed and five people wounded in Khambayal village late Tuesday, March 2, 2022 in Badakhshan. It seems that the community people are still the victims of Avalanche risk. The risk reduction measure and Community resilience Building will be considered.

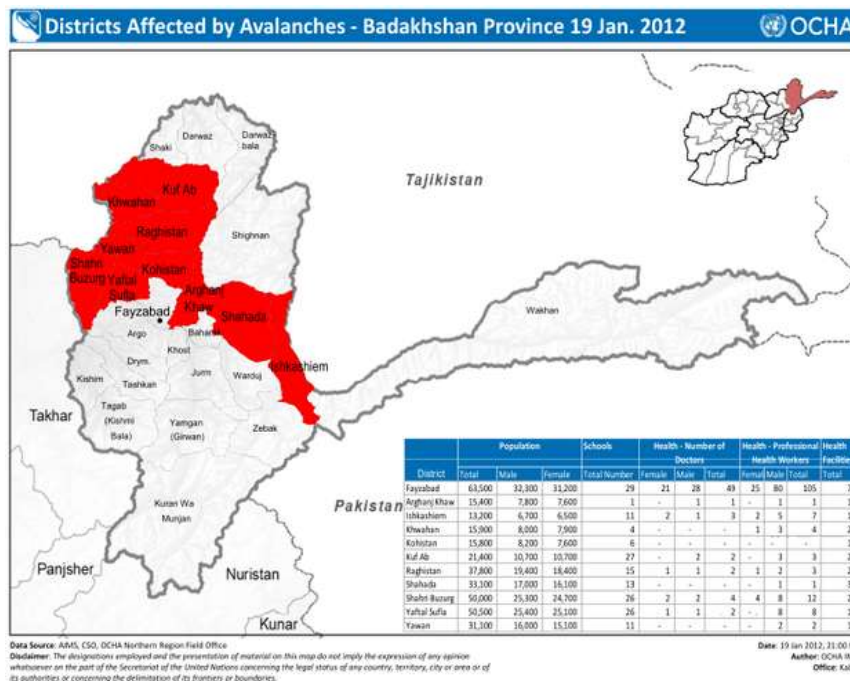


Figure 1.1 avalanche disaster map in 2019 source: (OCHA, 2019)

### **1.3 Research Questions**

- How are the community people vulnerable to the avalanche in the study area?
- To what extent are people capable of withstanding an avalanche?
- How can avalanche risk reduction measures be strengthened in the study area?

### **1.4 Research Objectives**

The specific objectives of the study are

- a) to assess the vulnerability of the avalanche in Badakhshan province.
- b) to develop an avalanche risk reduction action plan and effective early warning system.
- c) to evaluate the community's capacity to tackle avalanche hazard in the study area.

#### **1.4.1 Significance of the Study**

One of the significant points that I figured out the importance of this research is that the people who are living in the mountainous region of Badakhshan, lose their lives and properties during avalanches in the winter. All these issues increase people's vulnerability to avalanches. Security, poor statistics, poor financial resources, and other issues all limit people's capacity or resilience in disaster management, according to the Afghanistan Disaster Management Authority (ANDMA). In Afghanistan, there is no such thing as an early warning system. According to several resources, the main reasons for increasing the impact of natural disasters, particularly the avalanche in Afghanistan, are a poor awareness of avalanche risk, as well as an insufficient and ineffective early warning system, as well as awareness and risk reduction during the disaster's high probability. The community's avalanche resilience is low due to the scale of the disaster, which resulted in deaths and property destruction due to poor planning and early warning.

The purpose of this study is to investigate new challenges in avalanche risk reduction and to identify the factors that increase the susceptibility of community members, particularly those who live in the most distant avalanche-prone areas. Furthermore, there appears to be a dearth of precise information about the sources of increased avalanche risk and vulnerability.

Another crucial point about the importance of this research is that because of the remote geographical location of the research study area, there was not enough research conducted about the knowledge and coping capacity of the people. In this research, the essential points about the measures which will be needed for enabling the community people will be covered by conducting the research.

This study would explore people from the community who are affected by avalanches or live in areas at high risk of avalanches, as well as organizations planning to conduct avalanche risk reduction and community resilience building projects, in determining how to use the newly discovered information to determine which aspects of the community are more vulnerable to avalanches. Conducting catastrophe risk reduction and building resilience projects in avalanche-prone areas would be beneficial if the community's strengths and vulnerabilities were well understood.

### LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

#### 2.1 Introduction

This chapter overviews the literature about a natural disaster in Badakhshan province, identifies the main challenges of avalanche risk and risk reduction, community building resilience, explores how much the residents of the community can withstand an avalanche, to illustrate Avalanche risk reduction action plan and the existence of an effective early warning system.

This chapter also describes avalanche disaster risk management and discusses the role of stakeholders, including politicians ‘government, academia, and local approach in the Avalanche risk reduction process.

#### 2.2 Natural Disasters Terminologies

To describe the natural disaster in Afghanistan and the measures for disaster risk reduction and community building resilience, it is important to understand the hazard, vulnerability, coping capacity, resilience, mitigation, and early warning system.

There are some definitions about the terminologies connected with disaster risk reductions to promote the knowledge about the DRR and related activities discussed below.

**Disaster:** Professor Habibullah Khan, the lecturer of information and technology, Pakistan in his recently published paper mentioned that natural disaster is the combination of hazard, vulnerability, and poor capacity or measure to reduce the potential risk (khan et al 2008).

When people and assets are in harm, a natural hazard can turn into a disaster. The degree of community exposure and vulnerability determines the impact of a natural hazard, which can be mitigated by human action to mitigate the underlying casual element of exposure and vulnerability.

**Risk:** The measure of the expected losses due to hazard crises occurring in a specific area over a specific period. Risk is the probability of the hazardous event and the loss it would be caused (Khalid, 2018).

**Vulnerability:** According to a previous study, vulnerability is insecurity rather than security, and it refers to an individual's or a group's capacity to recover, resist, and cope with the impact of natural hazards. The description suggests that vulnerability cannot be defined without referring to the specific hazard or shock. According to the 2016 world risk report, Afghanistan ranked 4<sup>th</sup> in the most countries among the 15 most vulnerable countries all around the world (UNU-EHS, 2016).

**Resilience:** The ability to cope successfully in the face of stress and a situation full of challenges. Stressful life experiences, trauma, and chronic adversity can all have a considerable impact on brain function and structure, leading to the development of PTSD, depression, and other psychiatric disorders (Wu et al. 2013).

The Torren resilience institute published a report that stated that, in addition to individual and organizational resilience, community resilience is important because when members of the community are connected and working together while a disaster occurs, they can sustain the event under stress, and while being self-resilient is important in any disaster, it is especially important if the community is cut off from external resources (Torrens Resilience Institute, 2015).

**Coping Capacity:** Coping capacity is defined by which individual person, group of people and organization the accessible equipment, ability, and opportunity to face any kind of disaster or consequences and this is the skill of the people in which they use to tackle adverse situations. Coping capacity, the ability to decrease and adjust to risk is known as "capacity." In other words, it comprises capability that can be employed in the future to decrease and adapt to risk, in addition to institutionally based measures and people's local coping methods that are already in place (Skłodowska, 2020).

**Mitigation:** Mitigation is the attempt to reduce loss of life and property by decreasing the impact of the disaster. In order to be sure that our mitigation would be successful we should start now before the next disaster to reduce the people's life and loss of property. It is important to know that disasters happen usually anytime and anywhere if we are not ready for disaster then the consequences will be fatal. Effective mitigation necessitates that we all understand local hazards, make tough decisions, and invest in the long-term well-being of our community. We put our safety, financial security, and self-reliance in jeopardy if we don't take mitigation strategies (Mohamed, 2019).

## **2.3 Disaster Risk Profile in Afghanistan**

Afghanistan is a landlocked country that experiences frequent natural disasters, including earthquakes, floods, droughts, and landslides, which often result in significant losses of life, livelihoods, and property. Based on the EM-DAT International Disaster Database, the nation has had approximately 170 disasters since 1970, with a total loss of life exceeding 21,000 and an estimated 280,000 people impacted, excluding those affected by droughts. In Afghanistan, where the actual numbers are thought to be much greater than the predicted numbers, these statistics are incredibly inaccurate in depicting the true picture. The impacts are greater not because the country is subjected to more catastrophic disasters, but rather because it is more vulnerable to them.

On the other hand, Afghanistan is a mountainous country where various natural disasters occur due to its location and climate change. On the one hand, poor governance, ongoing conflict and political instability, weak institutions, and rapid urbanization have increased the frequency of natural disasters in Afghanistan (ANDMA, 2017).

Between 1980 and 2010, the country experienced 130 disaster incidents, according to ANDMA officials (Interview with Wais A. B. July 2, 2017).

According to a World Bank report, more than half of the population of Afghanistan is vulnerable to at least two natural disasters, such as earthquakes, floods, and droughts (World Bank, 2012).

## **2.4 Avalanche Hazard and Damage**

Instabilities in the snow and external triggers can cause avalanches at the slope of 25- 35 degrees. Extreme weather with the situation with the mass and heavy snowfall for a long time would be the catastrophic avalanche for the prone communities and access roads and railways. Various types of avalanches accrue according to their characteristics of snowpack and the amount of the snow.

## **2.5 Avalanche Risks in Afghanistan**

An avalanche is the massive snowfall, ice, and rocks that fall rapidly from the mountainous area. An avalanche is the rapid falling down of the snow from the hill slope area at a certain time, and the specific location of the avalanche is more divested than the other parts.

The literature review of the report, which was written by Mohammad Monib Noori and Haris Shirzad, shows that avalanches in Afghanistan likely happened during the winter months of January to March, when there is a large amount of snowfall in the mountainous area. An avalanche has the potential to destroy power systems, communication lines, road networks, homes, and livestock. As a result, it has an impact on the economy of the specific region (UNEP, 2020).

The origin of avalanches in Afghanistan is the mountainous topography of the Hindu Kush Mountains. A wide range of snow avalanches affect people's lives. On one hand, due to the increase in temperature, the risk of avalanches will be reduced in the lower elevation areas. On the other hand, the occurrence of avalanches will be increased in the high elevation regions of the country such as the Salang pass.

Avalanches are one of the climate change-related hazards in Afghanistan, affecting the rural population in 11 of the 34 provinces, with a total of 16,235 people affected and 389 killed between 2012 and 2016.

This section elaborates on the existence of avalanche risk in Badakhshan and how the community people are vulnerable to avalanches; the geographical distribution of avalanche risk in Badakhshan.

## **2.6 Avalanche Risks Profile in Afghanistan.**

Snow avalanches in Afghanistan's Hindu Kush Mountain range harm people's settlements and infrastructure over a broad area of terrain and elevation. Therefore, the country's mountainous region, which stretches from northeast to west, is affected. Delivering and providing aid to the most remote regions of the country is very difficult during an avalanche event. The report, which was published by the international bank for reconstruction and development in 2017, illustrates that 2 million people are exposed to avalanches and over 10,000 roads and \$4 billion of assets are at risk of avalanche. Moreover, \$990 million is exposed to avalanche risk in Badakhshan. According to the estimation, which was conducted by the World Bank in 2017, over 154,000 people were affected by avalanches (World Bank 2017).

## **2.7 Geographical Characteristics of Badakhshan**

Badakhshan is located at (N 37.91, E 71.58, and N 37.93, E 70.17) in the north, and (N 35.52, E 70.88, and N 36.66, E 70.25) in the south. The province has a total area of 44059 sq.km. Such external borders are Tajikistan in the north, Pakistan and Kashmir in the south, and China in the east. At the very end of Wakhan, the border with Tajikistan is marked by the Pyanzh tributary of the Amu River. On the inside, the Takhar, Nuristan, and Panjshir were within the province's limits.

Its high mountains and rivers in the valley are the principal geographical features of the province. Additionally, this province is one of the most disaster-prone and least developed in Afghanistan. The highest area of the province is located 3000-7000 meters above sea level and is covered with snow and glaciers throughout the year. The Hindukush range, which is located on the border of Kashmir and Pakistan, has 38 summits higher than 7000m, including Noshaq (7492 m). In the south of Hindukush, the mountains cut off Badakhshan from the rest of Afghanistan. The only road which leads to Panjshir valley is called Anjuman. According to the monstrous geographical location, communication, and road connections inside the province around the districts are difficult. In some areas, the roads remain closed for up to six months of the year.



Based on UNOCHA, Afghanistan has a very cold winter. The temperature range is from -0 to 40 °C. The eastern Pamir Mountains are covered with snow during the winter. The location and the amount of snow on the ground caused an avalanche and a flood risk. As the road is blocked because of snowfall, there is no way for medical and food delivery to the remote villages of the district (GIZ, 2013).

## **2.8 Avalanche Vulnerability Activities in Badakhshan**

Doug Chabot<sup>1</sup> and Aysha Kaba published a paper in 2016 that showed that vulnerable communities in avalanche risk zones with a large population are more vulnerable, as are infrastructures such as water channels and agriculture land, all of which can affect people's lives in disaster-prone areas, as well as their livelihood and lifeline. Blocking the road and having limited access to transit are both potential causes (Chabot, 2016).

The activity programs measured by Focus Humanitarian assistance organization in Badakhshan province are as follows.

- 1- All avalanche zones have been identified based on Hazard, vulnerability, and risk assessment (HVRA) maps in high frequency and high density.
- 2- Through awareness campaigns, population education on avalanche-prone locations, hazards, early warning indicators, safe havens, and safe routes to those safe havens.
- 3- CERTs would be trained on issues such as early warning signs, basic snow rescue, and the use of rudimentary measurement tools to evaluate avalanche risk using a standardized avalanche curriculum.
- 4- Verification and, if needed, strengthening of stockpiles near avalanche-prone locations, aided with avalanche safety equipment like probes, transceivers, shovels, and winterized tents, among others.
- 5- The establishment of an archive to analyze avalanche incident data. (Chabot, Kaba, 2016).

The recent update information about the avalanche vulnerable community is below.

Table 2.1: Avalanche vulnerable community NDMA Badakhshan (2021)

<b>Avalanche Hazard in Badakhshan</b>				
N O	District	Village	Types of hazards	Number of Households
1	Wakhan	Esk	Avalanche	6
2	shughnan	Sar Chesham	Avalanche	12
3	shughnan	Sar Chishmapidrod second	Avalanche	17
4	shughnan	Sar chashma, Tizhmay	Avalanche	17
5	shughnan	Shiakha, Roshan	Avalanche and flood	62
6	shughnan	Pastiw	Avalanche	380
7	Arghanj kha	kolan	Avalanche and Landslide	153
8	Ishkashim	MobarakQadam	Avalanche and Rockfall	10
9	shughnan	Shodooj	Avalanche and Rockfall	16

## 2.9 Natural Hazards in Shughnan

Shughnan is one of the 28 districts located in the north-eastern part of Badakhshan province. Faizabad is located 150 km to the east of its center, Faizabad. The land area of Shughnan district is 3,542.2 km<sup>2</sup> with a total population of 31,847 people. Shughnan district consists of 59 villages, and the center of the district has almost 3200 households. 2080 are vulnerable to avalanches. The district is located along the Amu River in the east, the Arghanjakhaw and Darwaz-e-Balah districts in the west, and Ishkashim and Shahada districts in the south. The district's local language is Shughni. According to the high mountains and impassable geography, When the snowfall happens, almost all the transportation in the district will be closed. The people of the district face lots of problems. It has a relatively hot and dry summer. The average amount of perception is 480 mm. The cold waves of the Cebrian have an impact on the temperature of the district. According to the report, avalanches and landslides were found to be the two most common natural disasters, followed by floods and flash floods. Avalanches occur more than four times per year on average in each village, causing the loss of life and property. At the same time, floods occur on average every two years. At the district level, however, the ratio of flood and avalanche frequency is 1-3/5-10 each year.

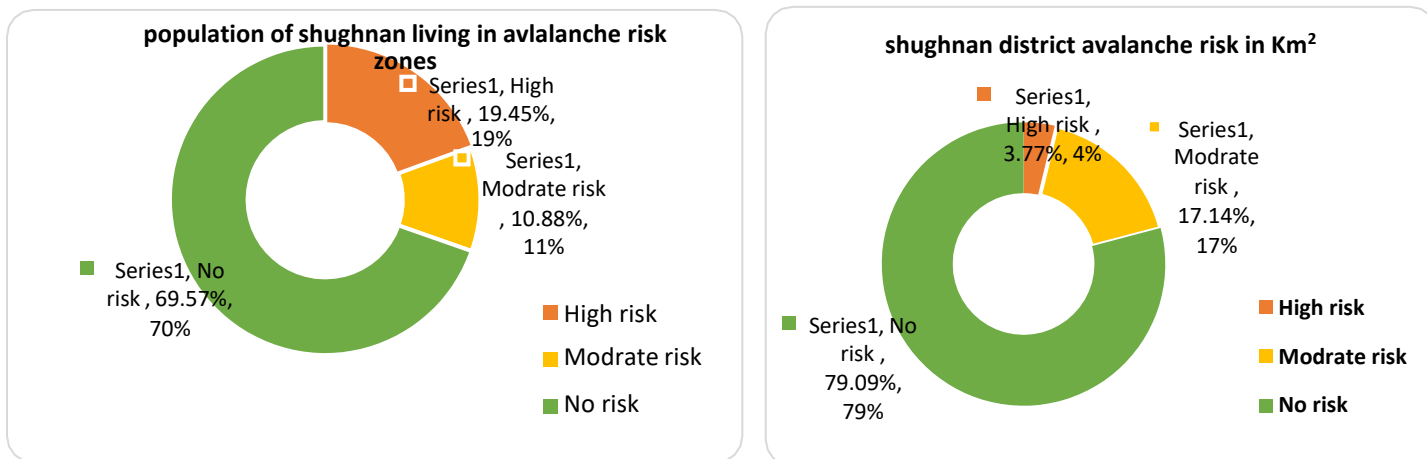


Figure 2.1: Shughnan district avalanche-prone population and area (NEPA, 2020)

## 2.10 Early warning System in Shughnan

Aga Khan Agency for habitat established standard early warning system as it already mentioned that shughnan district is mountainous area most of the thus, most of the population are living in climate change-induced disaster especially in avalanche prone areas.

### 2.10.1 Risk Knowledge

The collected data by AKAH in 2007 has been reported based on the historical collected data and discussion. The risk map process was done. After close coordination with the local people and reviewing the data, A team of AKAH experts deployed to the area for a transaction walk exercise to discover the vulnerability profile and risk exposure of the community National and international specialists prepare a risk and vulnerability profile of the community based on the conclusions of this team, which is called the Village Disaster Management Plan (VDMP). This VDMP, on the other hand, offers comprehensive socioeconomic and demographic statistics for each hamlet, such as hazardous elements and a safe sanctuary in the event of a natural disaster.

At the same time, after preparing VDMP, the Community Emergency Response Team was established, which included 25 people, both male and female, who are equipped with basic emergency response equipment as well as trained in first aid response, search and rescue.

## 2.10.2 - Monitoring and Early Warning Services

According to AKAH organization report, after identifying the vulnerable areas, two areas of Shughnan district have been chosen for the establishment of WMPs. Arakhtthe higher stream area and Warizn is down area of shughnan district.

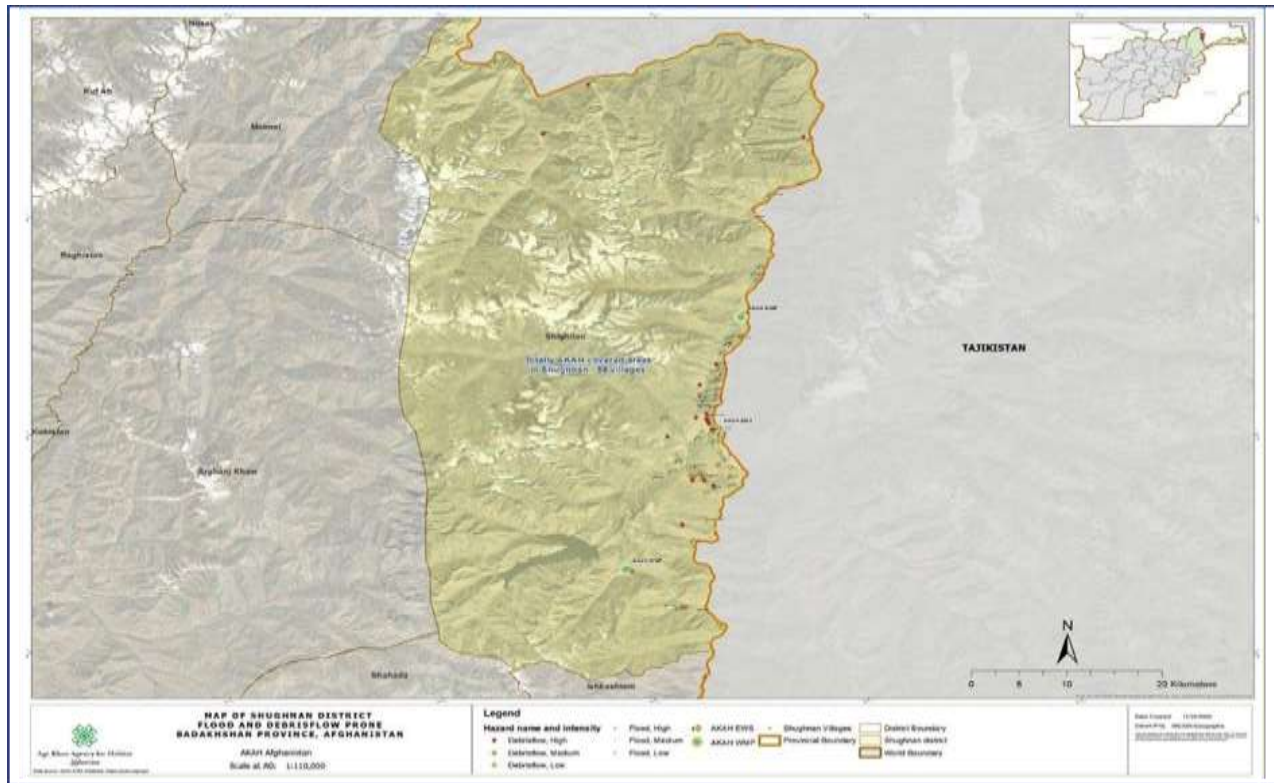


Figure 3.1: Map of Shughni district Avalanche area and the location of AKAH WMPs (NEPA,2020)

WMPS provide the fresh information of some meteorological parameters on the daily basis such as:

- The amount of the rainfall within 24 hours
- Clarify the amount of snowfall.
- Defined the Snow depth on the ground.
- Wind speed.
- Show the wind's main direction.
- Daily high degree temperature and low degree temperature.

The report also illustrates the data will be collected daily and reported by the selected person based on the community or village via phone call to Kabul. In the field, there are five people responsible for monitoring and observing the station. These people have already received training on a collection of the data, and in addition, they are equipped with personal protection equipment and technical tools.



Figure 3.2: Warizn village WMPs, Sent by Rakshana Ghalib

### **2.10.3 Community Emergency Response Team**

The report, which was published by the 2020 National Environmental Protection Agency of the Islamic Republic of Afghanistan and the United Nations Environment Program, illustrates that the team were trained for two days on how to coordinate the disaster plan and to implement an evacuation plan according to the type of the disaster scenario. They also learned how to organize the search and rescue process, such as carrying the victim to a safe place and finding the people who are trapped in a disaster. Even though all team members are equipped with search and rescue tools, basic first aid, and personal protective equipment (PPE) to respond to any incident.

### **2.10.4 Avalanche Preparedness Team**

In each community there were selected 10 members who have already membership of the Community Emergency Response team are selected as the member of the Avalanche preparedness team in addition this team receives one day training every year and they make the plan of evacuation before, during and after avalanche incident.

### **2.10.5 Schools Emergency Response Team**

Another volunteer group in the Shughnan district is the SERT team, which helps schools respond to weather patterns and natural disasters. This group will be given two days of First Aid and Search and Rescue training. The SERTs are also outfitted with basic first aid and search-and-rescue equipment, as well as personal protective equipment (PPE). To date (November 2020), 120 people have been trained as SERT members, 56 of whom are male and 64 of whom are female.

Basic avalanche tools are provided to the teams to aid in their knowledge of the avalanche level and the likelihood of an avalanche occurrence.

Badakhshan is located in the northeast part of Afghanistan, where the Hindu Kush and Pamir Mountain ranges dominate the landscape. The people of the community mostly provide their livelihood from farming agriculture, keeping domestic animals, and dryland farming, which adds to the effect of climate change. Furthermore, Badakhshan has been hit by a variety of natural disasters in recent years, including avalanches, floods, landslides, and droughts.

## CHAPTER 3

### RESEARCH METHODOLOGY

#### 3.1 Introduction

to understand how the community people tackle avalanche disaster risk in the community, and to explore how the community people are more vulnerable to avalanches. Additionally, to discover how avalanche risk reduction measures can empower or strengthen, the community's capability to avalanche risk in Badakhshan. The researcher has used different methods for gathering data, which include assessing and evaluating organizations involved in disaster management and disaster risk reduction. Publication of a climate change research paper; field visit; interviews with affected populations, particularly those from the study area; government officials; and civil society representatives the field study took place from April 2022 to June 2022, and it included field visits and interviews with community members as well as government and non-government professionals working on disaster management programs around the province.

The researcher used inductive methods, which consist of interview, focus group discussions, and field visits to the area that has experienced avalanches. The main approach that has been conducted is a qualitative assessment of avalanche risk reduction and community-building resilience.

#### 3.2 Research Methods

Using the research involves gathering information through the participatory methods of data gathering. In this method, the researcher tries to get more information from the people who are particularly involved in the scenario of the selected research study area.

The objective of this research is to assess the vulnerability of the people in avalanche risk-prone areas, develop an avalanche disaster action plan, and evaluate the community's capacity to tackle avalanche hazards in the study area.

Although Badakhshan is a mountainous province, the people who live in the mountainous area have experienced many natural disasters induced by climate change, such as avalanches, floods, and so on. Due to the poor quality of academic papers, a different method has been used for gathering and analyzing the data, including a semi-structured interview with different groups and reviewing the available secondary data, which is published by government and non-government organizations in the community.

### **3.2.1 Study Area**

The study has conducted in Shendar village, Shughnan District, Badakhshan, Afghanistan, this area is one of the most prone areas to Avalanche with the people of the community suffering from the snowfall during the winter season. Shendar village is located on the right side of the district however this village is almost 15 km distance from the center of Shughnan district and 285 km far from the provincial center Faizabad.

The east of the village is connected to Amo river, west side is connected to Mohammad Dara, north side is Newadak village, and the south is located to the warizn village. the village is more. Exposure to various types of natural Hazard mainly avalanches, is one of the most devastating disasters in these villages. Most of the houses are vulnerable and located in the path of the avalanche.

The village is highly vulnerable to avalanches. According to some surveys conducted by AKAH, the residents of the village acquired from government and non-governmental organizations to evacuate them to a safe and secure place or to mitigate the risk of avalanche avalanches in the village. ‘

There are 25 households living in the village, and the total number of people reaches 231. Of this number, 121 are male, 110 are female, and 77 are children under 12 years old.

An avalanche disaster occurred several times in Sender in the years 2000. 2004. In the 2012 and 2016 years, 40m of road, 20 m of the channel, one pasture, and several trees (Mohamad son of Bik Mohammad, 56 years old, and one disabled person) were felled.



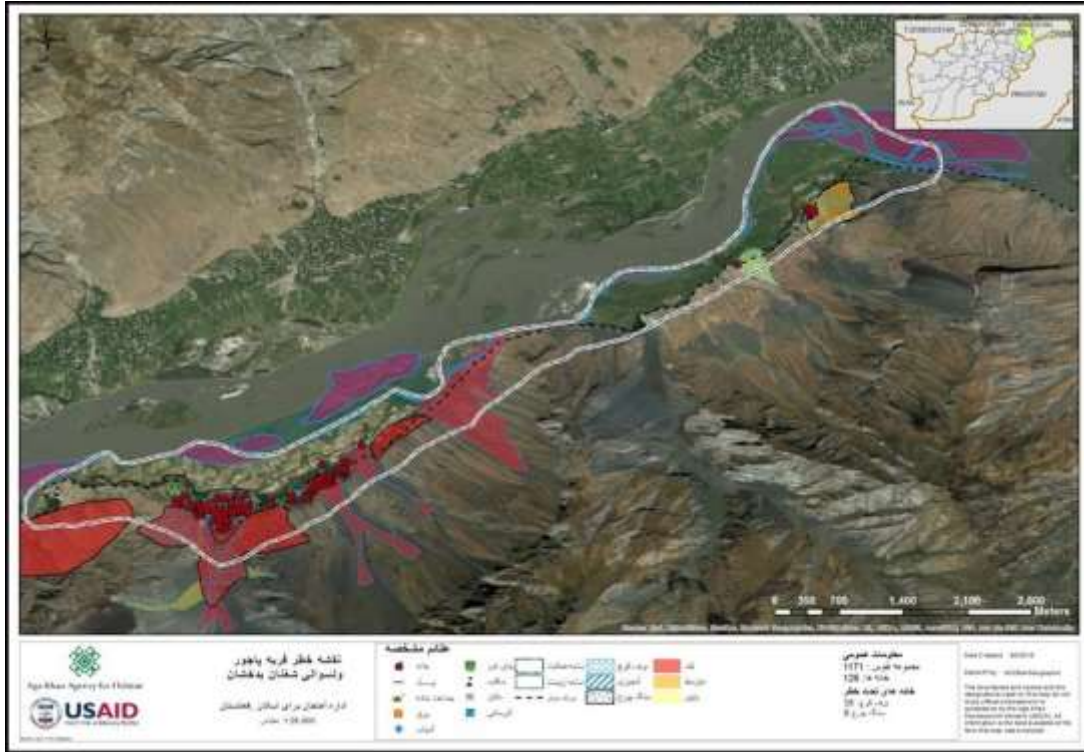


Figure 3.3: shindar village risk map, source: Aga Khan Agency for Habitat, Afghanistan

### 3.2.2 Sampling Techniques and Sampling Size

Given the very large size of the province, areas of the study subjected to a sampling process were selected for the study based on the experience of the avalanche in the specific areas. The most prone areas were chosen based on the metrological extent of the frequency of avalanches in the. Ishkashim, shughnan, Maimi, and shukai, which were chosen among the most avalanche-prone areas. It has been tied to selecting the high-level prone areas and the medium-level prone areas. Moreover, among the districts' more avalanche-prone areas are villages.

The identification and selection of the respondents were divided into two groups: the community people who are living in the community and the response from the perspective of the decision-makers. Simple random sampling was used to identify the people to respond to the questions.

### 3.2.3 Study Population

The study focuses on residents who live in avalanche-prone locations. Three villages were studied: Shendar, Khawar, and Dahshar in Shughni district; Obagh in Nusai; Khond in Shukai; and

Dakhawin Dakhaw district. From each village, two people of the community were chosen at random for questionnaire responses. One is the town's leader, while the other two were chosen from among those involved in disaster risk preparation and response for any type of disaster, particularly an avalanche in the community. Four selected government and non-government organizations working on disaster relief at the province and local levels were issued surveys via a google form and email.

### **3.2.4 Semi-structured Interview**

The semi-structured interview is widely used in this thesis because it is open and widely used in social science research to allow investigation of new ideas. However, it has the policy of concept to figure out (Crow, 2013). For instance, the interview with some of the local NGOs which are working in disaster management at local and national level, with the community affected people, search and rescue members of the community, school emergency team members in the affected areas It is worth mentioning that most of the interviews conducted with different groups were semi-structured interviews.

Semi-structured interviews aided this study in utilizing indigenous people who were free to share their knowledge and experience about avalanche risk reduction and building resilience.

1. Respondents were divided into two categories: government officials like NDMA and NGOs working at the provincial and local levels; all processes were done by phone call and through email.
2. People of the community who are living in Avalanche-prone areas, academia, and civil society.

To ensure the important data is missed the interview is recorded and the important document has printed by the interviewee during the interview. The time of taking the interview was not fixed, the minimum limit time was 30 minutes, and the maximum was 90 minutes.

### **3.2.5 : Research Participants**

The researcher has chosen a specific target group for the study, particularly for gathering primary data from community members living in avalanche hazard areas, particularly those who have already received disaster risk reduction and non-structural mitigation training from government

and non-government organizations. They are directly involved in avalanche and other disasters in the community, and they oversee deciding on disaster management in the village. Civil society individuals, as well as municipal and provincial governments and non-government groups participating in the disaster management field.

However, all the volunteers who were chosen to be divided into groups were male and female. All the participants have a lot of experience and have a lot of indigenous knowledge about avalanche risk reduction. They also play an important role in spreading early warning, disaster readiness, and response plans throughout the community.



*Figure A*



*Figure B*

Figure 3.4: picture (A) and picture (B) focus group discussion in Shindar village, sent by Jamaluddin

### **3.2.6 Review of secondary data**

Secondary data was gathered from a variety of sources, including reports published by the Afghan government (ANDMA) and NEPA (a key organization working in environmental and disaster-related activities), data available on various websites, books, publications, international, national, and local media, reports by NGOs and UN Agencies, the World Bank, and the World Bank Asian Development.

All the aforementioned resources helped the researcher in learning more about the literature, verifying the veracity of the original data acquired, and enhancing the total contribution.

### **3.3 Limitations of the study**

While conducting the research, the researcher faced several limitations as follows:

- Lack of the academic research paper in the disaster management field and specifically in Avalanche risk reduction and community building resilience. The research relies on the reports and articles published by Afghanistan Natural Disaster Authorizes and the NGOs which are working in the disaster management field.
- The research conducted during the avalanche months of year however, the researcher faced different problems like going to the affected areas prone to avalanche while conducting the interview and survey.
- Another issue is the security situation, as the government is controlled by the Taliban, and nobody can be guaranteed of their safety.
- NDMA does not mention all the basic information the researcher will need. NGOs which are working in disaster management work in specific locations. They have their own database for specific locations, but coordination between NDMA and NGOs and other governmental organizations is very limited.
- In some parts of Badakhshan province, there is illiteracy and a poor awareness of the disasters brought on by climate change. Because the community is overseen by a religious leader, most people do not believe in the measures being used to reduce catastrophe risk, and instead rely on chance if Allah wishes for a disaster to occur. If not, the tragedy will not last indefinitely.

### **3.4 Data Analysis Methods**

The survey contains three types of data: data that categorizes and identifies people's behaviors; data that categorizes and identifies people's behaviors; and data that categorizes and identifies Data that describes people's behavior as well as data that indicate people's perceptions, opinions, and beliefs. In this study, three types of questions were prepared: one to identify community members' resilience in avalanche-prone areas, another to illustrate the measurement of people who will be taken for avalanche risk reduction in the community and their perception, and the third to examine the measurement taken for avalanche risk reduction and Community resilience Building by local and national organizations in the avalanche-prone areas.

These data were analyzed with the help of a computer program called SPSS (Statistical Package for Social Science) and an excel spreadsheet. For both continuous and categorical data, descriptive data is employed. This was reported as a percentage and frequency.

### **3.4 Tools and Techniques of Data Collection**

#### **3.4.1 Interviews**

I wanted to figure out a community to know about the household knowledge about awareness and preparedness for the Avalanche. The question is, when the avalanche happens, what will be the individual's reaction (go inside your house, get to a safe place, or alert other families for help). Each correct answer will receive a score of 1, and each incorrect answer will receive 0. The sum of the scores shows the preparedness of an individual against an avalanche.

## CHAPTER 4

### Avalanche DRR in Badakhshan

#### 4.1 introduction

This chapter comprises the interpretation and analysis of the research findings. This research part is carried out in phases, as we already discussed the Badakhshan avalanche-prone areas. On August 1, 2010, this entry was published.

Badakhshan province is one of Afghanistan's mountainous provinces, located in the northeast. During the winter, most of the country's villages are covered in heavy snow, which has an impact on people's lives, property, cattle, and crops. The road will be buried by snow, and there will be no open road between the rural communities and the province's capital. Furthermore, the residents of the village do not have access to the latest equipment for de-icing the road. People face poor medical and food aid in addition to obstructing the route (world bank.2017).

The purpose of this study is to illustrate the vulnerability of the people in an avalanche-prone area, to what extent the people have the coping capacity to overcome the disaster, and additionally, how avalanche risk reduction should be a strength. The study's target population has been narrowed down to community members living in avalanche-prone locations, particularly those who have already undergone disaster risk reduction and non-structural mitigation training from government and non-government groups. Semi-structured interviews were used in this study to allow indigenous peoples to freely share their knowledge and experience about avalanche risk reduction and resilience development.

Respondents were divided into two groups: government authorities such as the NMDA and non-governmental organizations (NGOs) working at the provincial and municipal levels. All processes were conducted via phone and email. People from the community who live in avalanche-prone areas, academics, and civil society.

This study's collected, processed, and interconnected data is extremely valuable for community members, particularly students living in avalanche-prone locations, to improve their knowledge

and awareness of avalanche risk reduction and community building resilience. The organizations that cover the area for implementing the disaster risk reduction project or program could, meanwhile, get essential information from the conducted research for better implementation of their program in the community.

## **4.2 Avalanche Action Plan**

The qualitative data in this study included interviews and online surveys with the government and non-government organizations which are working in the field of disaster in Badakhshan province.

The interview, which was conducted with Dawlat Bek kawish who is working as a program officer for hazard and vulnerability risk assessment with Aga Khan Agency for Habitat, asked about the programs or projects carried out in the community for avalanche risk reduction and community building resilience, pointed out, they have already selected the avalanche risk prone. Furthermore, the community people were helped to prepare better action plans for any sort for disaster. He mentioned that disaster mitigation has a paramount role for disaster risk reduction, he mentioned that they have been conducting structural mitigation programs such as plantations, tracing the hazard's geographical location of the avalanche-prone area. Additionally, non-structural programs such as first aid, search, and rescue techniques during avalanches are offered.

The risk maps were provided by the Aga Khan Agency for Habitat so that community members may better understand the location of the danger and how to get to a safe spot in the event of a disaster. He also noted that we have initiated an early warning system in some villages of Badakhshan and specific people had been trained for observing the system and disseminating the result to the community people as well as the responsible organization for implementing the programs.

## **4.3 Programs for Community Resilience Building**

Some government and non-government organizations working in the disaster management field in Badakhshan have already mentioned that they have conducted various programs for building community resilience in various disaster-prone areas and that each individual office has

implemented programs specific to their covered areas. Most of them were providing training to community members in order to increase their ability and resilience. According to the information provided by the authorities, they have developed a danger map of certain areas where avalanche risk exists. Furthermore, structural mitigation has been considered in the measurement. The organizations created volunteer teams that were taught on how to provide information to the community, how to monitor the weather monitoring station, and were also provided with personal protective equipment and search and rescue equipment in case of an avalanche or other disaster.

#### **4.4 Avalanche Preparedness and Response**

According to the research study's questions, some government and non-government organizations have presented their implemented programs and project outcomes related to avalanche catastrophe risk reduction and community building resilience. According to the AKAH organization, after conducting the training in the community, people's knowledge and understanding of avalanche risk reduction increased, and people realized their homes were at risk of avalanches. For example, Verizon village in Shughni is prone to avalanches, and people who realized their homes were at risk of avalanches relocated them to a safer location. A terracing project was implemented in Shindar in Shadow in 2020, reducing the likelihood of an avalanche during any catastrophe response phase. AKAH offered search and rescue equipment in the case of an avalanche or other disaster.

#### **4.5 The Recent Avalanche Impact**

The conducted interviews with the local and national organizations' authorities provided information about the last very recent avalanche event. The details of an avalanche risk assessment of the organizations were revealed. As already mentioned, Badakhshan is a mountainous province in which the district transportation will be blocked during the winter. However, in mid-February 2022, an avalanche occurred. The students were traveling to the center of the province to continue their education when suddenly an avalanche occurred. As a result, one male student and three female students were injured. The rest of the people were evacuated by the local avalanche preparedness team, which has already trained the organizations. Furthermore, in March 2020, an



avalanche in the Shughnan district destroyed one house, more than 400 trees, 200 m of canal, and four secure farmlands were also damaged.

Overall, the data of the NDMA of Badakhshan province shows that 8 people, 50 houses, and more than 200 livestock have been affected by the avalanche during the past three months.

#### **4.6 Avalanche Response Capability Programs**

The outcome of the conducted program or project in the community by the institutions in the community for avalanche risk reduction and Community resilience Building in the community of Badakhshan province. Since the conducting of such a useful program, people's knowledge and understanding have improved, and the people whose houses were in the exposure of avalanche risk have shifted to safer places. For instance, the people of the Warizn village, where the people's houses have already been at risk, have shifted to a safe area. In addition, in 2022, the avalanche mitigation has been taken into account and the tracing project implemented, so there is no more threat to the community people. The survey, which was carried out with the assistance of ANDMA Badakhshan, provided information about the implemented program in avalanche risk reduction and Community resilience Building and explained that the rate of damage in Badakhshan province has declined since the beginning of the disaster risk reduction and Community resilience Building if we compare it with the past.

In the winter season, it is extremely difficult to provide an immediate response for a community in an avalanche disaster from the center of the province or district. Due to road blockage by snow, so one of the most important measures was to establish a community emergency team with high capacity and knowledge to respond to avalanches. The communication system that has been established will help to alert other community team members for assistance.

#### **4.7 Strengthening the Community Resilience**

The National Disaster Management Authority in Badakhshan pointed out that there are still villages in avalanche disaster prone areas suffering from the disaster risk of avalanches. There were not implemented any programs regarding avalanche risk reduction and Community resilience

Building because of the remote location for access and poor budget. In addition, he mentioned having the professional response team in these villages equipped with an avalanche risk stockpile with all the needed emergency response gear.

#### **4.8 Community Resilience Building of Badakhshan**

The questionnaire survey, which was conducted with community people in the different exposure communities to avalanches in Badakhshan province, has been usefully done with the people who are responsible for the local community disaster and the authority people in the village. The following information indicates the community's resilience rates. We ranked the responses to individual questions from least resilient to most resilient. They have provided five options for each question. Option one, which demonstrates the least resilience, receives a score of 1, option two, which demonstrates more resilience, receives a score of 2, and the last option, which demonstrates the most resilience, receives a score of 5. Furthermore, for the score of one, we chose option one, given 20% from the pie chart.

#### **4.9 Community Resilience Building in Shindar**

The village is highly vulnerable to avalanches. According to some surveys conducted the residents of the village acquired form government and non-governmental organizations to evacuate them to the safe and secure place or to mitigate the risk of avalanche in the village.

There are 25 households living in the village, and the total number of people reaches 231 from this number. 121 members are male, 110 are females, and 77 are children (below 12 years old).

Avalanche disasters occurred several times in the year 2000. 2004. 2012 and 2016 years damaged 40m road, 20 m channel, one pasture and about several trees (Mohamad son of Bik Mohammad 56 years old one disabled person disabled person.

The community people, notably those who work for the community Avalanche preparedness team in Shindar, Shedooj village, were given information through focus group discussions and survey questionnaires. All of the information below is collected in order to keep track of the community's resilience building efforts in this specific village.



*Figure 1Figure 4 .1: shindar village Avalanche taken by (Jamaluddin Hamzai ,2022).*

#### **4.9.1 Available Emergency Planning**

Figure A depicted the amount of food, water, and gasoline available throughout the emergency. According to the survey questionnaire, 58.33% of the respondents stated that their household can provide food, water, and fuel for more than two days, demonstrating the village's resilience in terms of food, water, and fuel availability. The three options have the same percentage of 8.33 percent; the information can be found in the pie chart below by referring to the below chart.

Figure B depicts the emergency response and recovery resources available to residents of the community in the event of a disaster, particularly an avalanche. Overall, 36.46 percent of respondents and 15.36 percent of respondents, respectively, are the greatest and lowest percent of respondents. However, according to the information supplied in the pie chart, most the community's specific infrastructure components have emergency plans in place. Furthermore, 23.06 percent of respondents mentioned that the infrastructure system is considered throughout the emergency preparedness process.

Finally, the two graphic charts illustrate that in an avalanche emergency, the community members appear to be resilient in terms of available emergency and response and recovery resources and also available food, water, and fuel.

Figure (A)

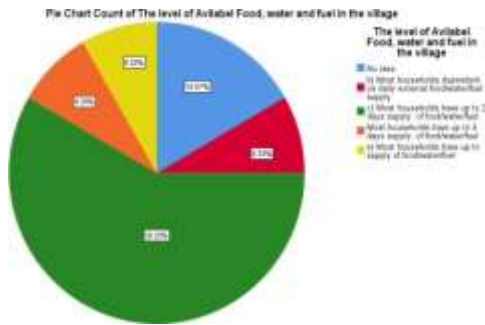


Figure 4.1: the available food, water, and fuel in

figure (B)

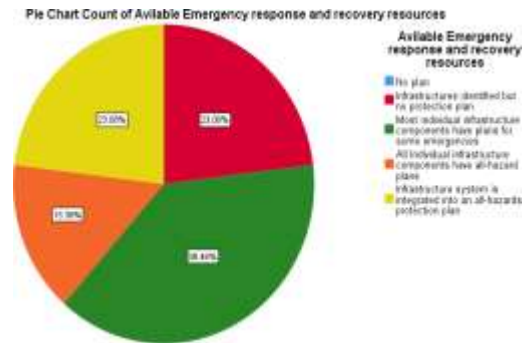


Figure 4.2: available emergency response and recovery resources

The figure below provided information about the education institutions engaged in the avalanche and proportion of the people who have skills to provide first aid assistance, safe food handling during the avalanche other some other disasters exist in the village.

The pie chart (C) shows all of the educational institutions that are involved in an avalanche emergency. According to the data, 46.15 percent of respondents believe that most schools provide emergency preparedness training to teachers, students, and parents. Furthermore, 15, 38% of those polled said that most schools provide disaster preparedness material to teachers and students. In addition, the same percentage of respondents responded that most schools provide instructors and students with emergency preparedness material. If we look at the pie chart, we can see that most schools provide emergency preparation instruction to teachers, students, and parents in 23.08 percent of cases.

The pie chart (D) provided information shows 41-60 % of the village people have the skill to provide first aid and safe food handling during the Avalanche emergency; many the population of the village agree with this option.

Figure (C)

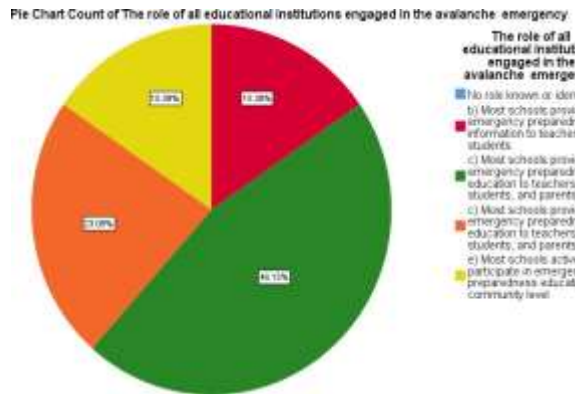


Figure 4.3: the role of education institutions by multiple-choice question

Figure (D)

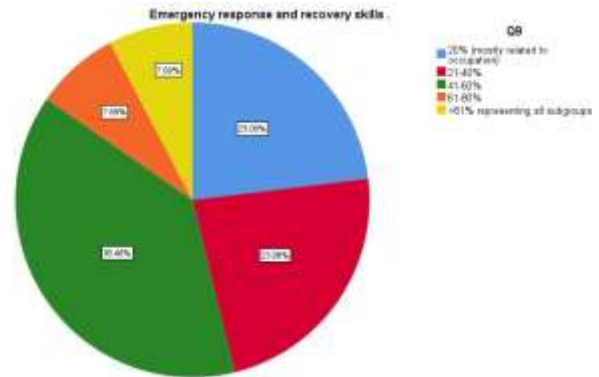


Figure 4.4: Emergency recovery and response skills

Finally, all of the aforementioned Avalanche emergency preparation and response information is available in Shindar village. In this scenario, the community has sufficient resilience. For additional information, please see the descriptive analysis of the data below for all the specifics.

#### 4.9.2 The Recent Population Changes

The table below shows the proportion of the population in the Shaundar village over the last five years among all respondents in the village. 38.5% of respondents stated that the village's population has gradually increased over the last five years, implying that as the village's population grows, so does the rate of vulnerability in the specific location, without taking avalanche risk reduction and Community resilience Building into account.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	>30%	1	7.7	7.7	7.7
	20-29%	3	23.1	23.1	30.8
	13-19%	5	38.5	38.5	69.2
	12%	3	23.1	23.1	92.3
	5%	1	7.7	7.7	100.0
	Total	13	100.0	100.0	

The table below shows the percentage and frequency of data about the percentage of the population that is able to evacuate to a safe location during an avalanche without requesting assistance from other people. Overall, among the respondents, most of them agreed that 40–41% of the village population were able to reach them in the safe area after the avalanche.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20%	3	23.1	23.1	23.1
	21-40%	1	7.7	7.7	30.8
	41-60%	5	38.5	38.5	69.2
	61-80%	3	23.1	23.1	92.3
	81-10%	1	7.7	7.7	100.0
	Total	13	100.0	100.0	

The table below depicts the importance of involving the village's transit population in disaster preparedness. The transit population is a group of people who are staying in the hamlet for a short time, usually during the snowfall. As a result, all of the submitted information is listed in the table below. In general, 30.8 percent of respondents said that 50 percent of the plans incorporate the village's temporary population. Moreover, 30.8 percent of those polled felt the transient population was identified.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No transient populations included	2	15.4	15.4	15.4
	Transient populations identified	4	30.8	30.8	46.2
	50% of plans include transient populations	4	30.8	30.8	76.9
	51-75% of organization plans include transient population	1	7.7	7.7	84.6
	All plans include transient populations	2	15.4	15.4	100.0
	Total	13	100.0	100.0	

## **4.10 Risk reduction in Avalanche prone Areas**

The survey of research questions was conducted in various avalanche-prone areas in Badakhshan province. The questions were structural and non-structural and were answered through phone calls with people from the villages who are responsible for disaster risk planning and response in the community.

The interview took place at ObaghNusai, Khund village of Shukai district, Dakhwar,shindar, khawar Bashar, Dashar of shughnan district, and Dakhw, shindar, khawar Bashar, Dashar of Shughni district.

### **4.10 .1 Risk Reduction Measurements**

In an interview with Mohammad Hamed, the village's AVPT team leader, it was revealed that the village has previously faced several issues related to avalanche risk reduction and community building resilience, such as a poor capacity building programs, a poor equipment for disaster response, and a poor support for the organization. He also noted that the chairman council, CERT, and AVPT oversee avalanche catastrophe preparation and response. He also shared some historical avalanche preparedness and response experiences. If the current measures are compared to the past, people used to live in avalanche-prone locations, but now they understand and have relocated their homes to a safer location. Finally, he has underlined the importance of developing community people's capacity and providing additional tools for preparedness and reaction planning in the village.

### **4.10.2 Risk Reduction Reassures in Khawar, Bashar.**

According to a phone chat with the avalanche preparedness and response team head and the council chairman, the problem they had during the avalanche was that there was too much snow, and the road to the neighboring village was closed owing to the significant amount of snowfall. k. NGOs and government organizations have played a critical role in assisting in the reduction of avalanche risk and community building resilience.

### **4 .10.3 Avalanche Risk Reduction Measures in Shindar**

According to the questions asked during the interview with the team leader of the community emergency response team. He has described his previous avalanche risk experience, in which many

residences were exposed to avalanche risk, but as time passed, the community got together and established a disaster plan by assisting NGOs and governmental organizations in the area. The Aga Khan Agency for Habitat was key in shaping the village's preparedness and response plan. Furthermore, the Aga Khan Agency for Habitat-created team has a responsibility within the community to disseminate early warning to the community's residents. He also mentioned that the population had little understanding of avalanche risk, and that a huge number of houses were vulnerable to avalanches, but as people's knowledge of avalanche risk improved, they began to relocate their homes to safer zones. Finally, he emphasized that future steps should include tree planting and the construction of an avalanche protection wall in avalanche-prone locations.

As a result of an interview with local community village people active in village disaster planning and response, the table below indicates avalanche risk reduction in sensitive areas of Badakhshan province. Refer to the following for further information on avalanche risk reduction and avalanche mitigation strategies in Badakhshan province.

The following tables show the frequencies of the responses to questions by the participants. If we consider the tables in spite of the frequency, we can find out the percent, valid percent, and cumulative percent.

**Table 4.4: Avalanche risk reduction in Badakhshan avalanche vulnerable areas by multiple choice questions.**

		People responsible for Avalanche.	If yes, what does this person has a connection with?	access to internet	Disaster plan	who help for avalanche preparedness and response	knowledge of the community people using avalanche materials	the resources of receiving information in community	the responsibility of avalanche risk reduction
N	Valid	15	15	15	15	15	15	15	15
	Missing	0	0	0	0	0	0	0	0
Mean		1.7333	2.5333	2.0000	1.3333	2.2667	1.6000	2.2667	3.53333
Median		1.0000	3.0000	2.0000	1.0000	2.0000	1.0000	2.0000	4.00000
Mode		1.00	3.00	2.00	1.00	2.00	1.00	2.00	4.000
Minimum		1.00	1.00	1.00	1.00	2.00	1.00	1.00	1.000
Maximum		4.00	3.00	3.00	3.00	4.00	3.00	5.00	6.000
Sum		26.00	38.00	30.00	20.00	34.00	24.00	34.00	53.000



In the interview with the AVPT team leader, it was revealed that NGOs played a core aspect in setting up the AVPT team and the disaster plan with the help of the locals. This information is shown in the table below. The chart reveals that most respondents participate in community disaster plans.

Table 4.5: Disaster plan in the community

Disaster plan					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	11	73.3	73.3	73.3
	NO	3	20.0	20.0	93.3
	3.00	1	6.7	6.7	100.0
	Total	15	100.0	100.0	

The information about the people who assisted the community during the avalanche tragedy was supplied in the table below. According to the respondents, NGOs generally play a crucial role during disasters.

Table 4.6 main actors of the disaster

Who help for avalanche preparedness and response					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Non-government organizations	12	80.0	80.0	80.0
	United Nation agencies	2	13.3	13.3	93.3
	Volunteer groups	1	6.7	6.7	100.0
	Total	15	100.0	100.0	

There are two types of knowledge that the people of the community are using. Some people have the experience from the past and some of them have gained new knowledge from the conducted training by the organization in the community. By referring to the below table we get more information about the knowledge of the community for using avalanche materials.

Table 4.7: knowledge of the community

Knowledge of the community people focusing avalanche materials					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	8	53.3	53.3	53.3
	NO	5	33.3	33.3	86.7
	don't know	2	13.3	13.3	100.0
	Total	15	100.0	100.0	

The below table shows the way the community receives information about the occurrence of a disaster in their village. Overall, the table below shows the highest percentage, which is 60%, and the lowest percentage is 6.7 %, which is 6.7%. Between these two proportions, the people of the community receive information about the occurrence of avalanches in the village. Finally, the table shows the majority of the people getting information from friends and family.

**Table 4.8:** The resources of receiving information in community

Table 4.8: The resources of receiving information in community					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	News paper	2	13.3	13.3	13.3
	Family and friends	9	60.0	60.0	73.3
	TV and radio	3	20.0	20.0	93.3
	Internet	1	6.7	6.7	100.0
	Total	15	100.0	100.0	

Having the accountable individuals for risk reduction inside the community from the preparation phase till the response phase is one of the most valuable aspects for the community that suffers from a natural disaster. Additionally, this would aid in the community's resilience building and strengthen their resistance to many types of natural hazards, including avalanches. The table below shows how NGOs take on a greater role in the village's efforts to improve community resilience and reduce avalanche risks.

Table 4.9: the responsible of avalanche risk reduction

Table 4.9: the responsible of avalanche risk reduction					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Community people	1	6.7	6.7	6.7
	community leaders	3	20.0	20.0	26.7
	NGOs in disaster management	10	66.7	66.7	93.3
	NDMA	1	6.7	6.7	100.0
	Total	15	100.0	100.0	

**CONCLUSION AND RECOMMENDATION**

**5.1 Summary of Avalanche DRR and Community resilience Building**

**5.1.1 Avalanche Risk Reduction Measures**

According to a questionnaire survey of community members, particularly those responsible for making decisions regarding avalanche preparedness and response planning in the community, various thoughts and ideas have been elicited from those who are using community resources to reduce the risk of avalanche in hazardous areas. Despite the poor economy, people are attempting to spend their livelihood resources to mitigate the effects of the avalanche within the community. People in the community pointed out that groups, particularly non-governmental organizations (NGOs) responsible outside of the community, have implemented several projects in the village targeting avalanche risk reduction. People in the community previously did not have access to the internet or mobile networks, and as a result, they were unable to disseminate information to other villages. National or local organizations in the disaster of a calamity.

Furthermore, even though their homes were exposed to avalanche, the village's population historically lacked information or understanding of the potential of avalanche disaster, making them more vulnerable to avalanche. After understanding more about the avalanche, people realized what it was and relocated their homes to a safer part of town. In this approach, organizations played a crucial role.

**5.1.2 Community Resilience Building**

Most students in the schools, according to the findings of this study, in the research region, teachers, students, and parents were able to get disaster preparedness training, and this strategy helped the community become more robust to avalanches. As the study's population grows, the vulnerability grows as well. On the other hand, the knowledge that the community gains from diverse resources should keep the vulnerability stable or prevent it from growing. Disaster planning is an important consideration for the community.

According to the respondents, villagers can construct seasonal disaster plans for the village, particularly for avalanches, and community education workshops are held to aid in home emergency preparation. By doing the research, traditional knowledge has been provided by the

[respondent, which is the people, who pointed out that if snow is falling and the wind speed is increasing, this is a warning of a high risk of avalanche.

### **5.1.3 : Community Measurement for controlling avalanche risk**

The town has previously encountered several difficulties linked to avalanche risk reduction and community building resilience, including poor capacity-building programs, disaster response equipment shortages, and organizational assistance. The chairman council, CERT, and AVPT oversee avalanche disaster preparedness and response, he added. He also talked on avalanche preparedness and response in the past. When comparing current measures to previous ones, individuals used to live in avalanche-prone areas, but now they know better and have moved their homes to a safer position. Finally, he emphasized the necessity of building community capacity and offering new tools for preparedness and response planning in the future.

### **5.1.4 Preparedness and Response Initiatives Results**

Some government and non-government disaster management groups in Badakhshan have already stated that they have carried out numerous programs for community resilience building in disaster-prone areas, and that each individual office has executed programs tailored to their covered areas.

Many of them were providing training to community members in order to increase their ability and resilience. According to the information provided by the authorities, they have developed a danger map of certain areas where avalanche risk exists. Furthermore, structural mitigation has been considered in the measurement. The organizations created volunteer teams that were taught on how to provide information to the community, how to monitor the weather monitoring station, and were also provided with personal protective equipment and search and rescue equipment in case of an avalanche or other disaster. The outcome of the community's executed program or initiative for avalanche risk reduction and community resilience building in Badakhshan province. People's knowledge and comprehension have improved because of the program's implementation, and those whose homes were at risk of avalanche have relocated to safer locations. People in Warizn village, for example, have relocated to a safer region after their homes were previously threatened. Avalanche mitigation has also been considered, and a tracing project has been implemented, so the community's residents are no longer at risk.

## 5.2 Conclusion

From the above summary, the following can be concluded for the study.

- The level of the casualties and damages to the community by avalanche has decreased from the according to the past through finding the research. the knowledge and understanding of the people have boosted.
- The study looked into whether the number of people living in avalanche-prone areas is growing. If the avalanche risk reduction measure is not implemented, the number of vulnerable people in the area will increase.
- Community Individuals in the community, particularly those who live in the most remote areas of Badakhshan province, sell their lands and assets to lessen the chance of a calamity, such as an avalanche, and this has a substantial influence on their economic and livelihood income.
- The community's citizens lack the financial means to compensate them for their losses. Communities have a general poor comprehension of the disaster's consequences. Furthermore, if there is no immediate response, most households will not have adequate food, water, or fuel during the avalanche disaster.
- The study has figured out that Some government and non-government organizations working in the disaster management field in Badakhshan have already stated that they have conducted various programs for community resilience building in various disaster-prone areas, with each office implementing programs specific to their covered areas. The vast majority of them were giving community members training in order to improve their skill and resilience. Authorities have produced a hazard map of some regions where avalanche risk exists, according to information provided by the authorities.
- The study has some limitations, one of which is the security situation in Afghanistan, which has altered since the Taliban took control of the country, which has a negative impact on reducing all-hazards hazards risks, particularly avalanche risk reduction and community building resilience. Furthermore, the NDMA does not have all of the basic data that a researcher will require. Disaster relief NGOs work in specific localities and have their own databases, but cooperation between the NDMA, NGOs, and other government agencies is minimal.
- Avalanches have become more frequent in Badakhshan due to climate change; if proper preparatory measures are not done in the future, the community's vulnerability will increase

### 5.3: Recommendations

- The community people are the responsible organization and should provide emergency shelter for the avalanche disaster. The current shelter is not enough for the entire population of the community.
- People in the community are not economically equipped to deal with disasters with food and fuel materials for more than two days. Therefore, food and other daily life resources should be stored in a stockpile for an emergency.
- In some areas of Badakhshan province, people don't have emergency recovery and response skills to be well prepared in an emergency. There should be some people from both genders, male and female, to provide recovery and response skills during the disaster.
- As a result of climate change, disasters that are induced by it are happening more frequently. New research should examine the causes and suggest new measures so that people can deal with avalanche risk in the future.
- In the last five years, the community's population has grown. Therefore, if people are not included in future disaster plans, the number of vulnerable people will increase.
- The community should provide facilities for the disabled to move to the safe place on their own since the disabled and children are not able to evacuate on their own during a disaster.
- Due to the poor economy, the community people are not able to take measures to reduce avalanche risk in their community, and this will impact the community's resilience. New measures should be taken by the community to tackle avalanche risk.

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