

**FARMERS' PERCEIVED KNOWLEDGE AND PRACTICES ON CLIMATE  
CHANGE ADAPTATION: A STUDY OF PANCHKHAL MUNICIPALITY-3,  
KAVREPALANCHOK, NEPAL**

**A Thesis**

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Submitted By

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## DECLARATION

I hereby declare that this MA thesis entitled **FARMERS' PERCEIVED KNOWLEDGE AND PRACTICES ON CLIMATE CHANGE ADAPTATION: A STUDY OF PANCHKHAL MUNICIPALITY-3, KAVREPALANCHOK, NEPAL** submitted to the Central Department of Rural Department of Tribhuvan University, is entirely my original work prepared under the guidance and supervisor of the thesis supervisor assigned by the department. I have made due acknowledgements to all ideas and information borrowed from different sources during the preparation of this thesis. The result of this research work has not been presented, published or submitted anywhere else for the award of any degree or for any purpose. I assure that not part of the content has been published in any form before, I shall be solely responsible if any evidences found against my thesis.

.....

Nanda Kumari Kathyat

Date: 2082/04/09

25-07-2025

## RECOMMENDATION LETTER

The thesis **FARMERS' PERCEIVED KNOWLEDGE AND PRACTICES ON CLIMATE CHANGE ADAPTATION: A STUDY OF PANCHKHAL MUNICIPALITY-3, KAVREPALANCHOK, NEPAL** has been prepared by Ms. Nanda Kumari Kathyat under my guidance and supervision. I hereby forward this thesis to the evaluation committee for the final evaluation and approval.

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## APPROVAL LETTER

We certify that this thesis entitled **FARMERS' PERCEIVED KNOWLEDGE AND PRACTICES ON CLIMATE CHANGE ADAPTATION: A STUDY OF PANCHKHAL MUNICIPALITY-3, KAVREPALANCHOK, NEPAL** submitted by Ms. Nanda Kumari Kathyat to the Central Department of Rural Development, Faculty of Humanities and Social Sciences, Tribhuvan University, in partial fulfillment of the requirements for the Degree of Master Arts in Rural Development. It has been found Satisfactory in scope and quality. Therefore we accept this thesis as a part of the Master's Degree.

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## ABSTRACT

Climate change poses significant threats to Nepal's agricultural sector, particularly in vulnerable regions like Panchkhal Municipality. Despite minimal contributions to global greenhouse gas emissions, Nepal faces severe climate impacts, necessitating robust adaptation strategies. This study assesses farmers' knowledge, practices, and challenges in adapting to climate change in Panchkhal Municipality-3, Kavrepalanchok, focusing on their vulnerability and the effectiveness of adaptation.

The research adopts a mixed-methods approach, combining household surveys and semi-structured interviews with 108 farmers selected through stratified random sampling. Primary data was collected via structured questionnaires, while secondary data was sourced from government reports, academic journals, and climate policy documents. The study is grounded in Agriculture Transformation Theory, Integrated Farming Systems, and the Cultural Theory of Risk theories which collectively analyze technological, ecological, and socio-institutional dimensions of adaptation.

Key findings reveal that farmers predominantly rely on digital platforms (42.6%) and traditional media (38%) for climate information. Major challenges include soil fertility loss (36.1%), erratic rainfall (21.3%), and high input costs (93.5%). While 75.9 percent of farmers reported experiencing extreme weather, adaptation practices remain limited, with only 29.6 percent adopting crop diversification and 21.3 percent dependent on chemical inputs. Institutional support is heavily state-centric, with 86.1 percent of farmers relying on govt. programs, yet coordination and resource allocation remain weak.

The study concludes that despite awareness of climate risks, farmers' adaptive capacity is constrained by financial barriers, insufficient technical training, and fragmented governance. Recommendations include implementing climate-smart agriculture policies, enhancing localized weather forecasting, and strengthening public-private partnerships to promote resilient farming practices. Local governments should prioritize irrigation infrastructure and community-based adaptation committees, while I/NGOs and cooperatives can facilitate knowledge-sharing and gender-inclusive programs. These measures are critical to reducing vulnerability and ensuring sustainable agricultural livelihoods.

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## ABBREVIATIONS/ACRONYMS

CDRD	: Central Department of Rural Development
CTR	: Cultural Risk Theory
FAO	: Food and Agriculture Organization
FGD	: Focus Group Discussion
GCM	: Global Climate Model
ICT	: Information Communication and Technology
INGO	: International Non-Government Organization
IPCC	: Intergovernmental Panel on Climate Change
KII	: Key Informant Interview
LAPA	: Local Adaptation Plans of Action
LDC	: Least Developed Countries
LT	: Linearity Test
MA	: Master's Degree
MoAC	: Ministry of Agriculture and Cooperative
MoFE	: Ministry of Forest and Environment
NAP	: National Adaptation Plan
NAPA	: National Adaptation Plan of Action
NCVST	: National Council of Vocational and Skill Training
NGO	: Non-Government Organization
PRC	: People's Republic of China
SDG	: Sustainable Development Goals
SPSS	: Statistical Package for Social Sciences
TU	: Tribhuvan University
UNFCC	: United Nations Framework Convention on Climate Change.
VIF	: Variance Inflation Factor
WB	: World Bank

# CHAPTER I

## INTRODUCTION

### 1.1 Background of the Study

Climate change" has been defined as a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere" (UNFCCC, 2022). Climate change is reshaping agricultural landscapes across the globe, compelling farmers to adapt to shifting weather patterns, prolonged droughts, and unpredictable rainfall (Below et al., 2015). Smallholder farmers, particularly in developing regions, are among the most vulnerable to these changes, relying heavily on traditional knowledge and localized practices to sustain their livelihoods (Mertz et al., 2009). Their perceptions of climate risks—whether rooted in personal experience or external information—play a pivotal role in determining the adoption of adaptive measures such as crop diversification, water conservation, and soil management (Reddy et al., 2022). However, disparities in awareness, resource access, and institutional support often hinder effective adaptation, leaving many farmers exposed to heightened climatic threats.

Farmers' responses to climate change are not uniform but instead reflect a complex interplay of socio-economic, cultural, and environmental factors (Arbuckle et al., 2015). In some regions, indigenous knowledge systems guide adaptive strategies, such as altering planting calendars or selecting resilient crop varieties (Belay et al., 2022). In contrast, others depend on scientific advancements, government policies, or agricultural extension services to navigate climatic uncertainties. Despite these efforts, gaps persist in translating climate awareness into actionable practices, with some farmers constrained by financial limitations, lack of infrastructure, or conflicting information (Guo et al., 2021). Understanding these dynamics is critical for designing targeted interventions that align with farmers' realities and enhance long-term resilience.

A global perspective on farmers' adaptation practices reveals both common challenges and region-specific innovations. While some communities prioritize short-term coping mechanisms, others invest in long-term strategies like agroforestry or irrigation systems (Limantol et al., 2016). Policymakers and researchers must bridge

the divide between scientific recommendations and on-ground implementation, ensuring that adaptation strategies are both accessible and sustainable. By integrating farmers' lived experiences with evidence-based solutions, stakeholders can foster more inclusive and effective climate resilience frameworks, ultimately safeguarding food security and rural livelihoods in an era of escalating environmental change. Climate change is considered as the most critical global challenge of the century. Climate scientists often view vulnerability in terms of the likelihood of occurrence and impacts of weather and climate related events (Nicholls, 1999). The effects of climate change can already be observed and projected to become more pronounced in terms of impacts on natural eco- system, bio –diversity and human health as well as on many economic sectors such as forestry, agriculture, tourism, and insurance industry and urbanization continue to increase so too will stress on the living things such change in climate and environmental quality could have huge implications for quality of life (Jack et al., 2010). Predictions of the yield changes in response to changes in climate variables, from regression models based on climatic data and yield data for specific crops are relatively accurate (Boubacar, 2010).

Earth climate has undergone radical changes in the distance as well as the recent past and is to undergo more radical changes in the not too distance future such industrialization, population in solar energy (Upreti, 1999). Climate change in (IPCC, 2015) usage refers to a change in the state of the climate that can be identified (e.g. using statistical tests) by changes in the mean and or the variability of its properties, and that persists for an extended period, typically decades or longer. It refers to any change in climate over time, whether due to natural variability or as a result of human activity which causes; increases in average global temperature; changes in cloud cover and rainfall, particularly over land; melting of ice caps and glaciers and reduced snow cover; and increase in ocean temperatures and ocean acidity –due to seawater absorbing heat and carbon dioxide from the atmosphere are the main characteristics of climate change (UNFCCC, 2017).

The latest Assessment Report of the intergovernmental Panel on climate change (IPCC, 2017), projects that global average temperature in 2100 will be between 1.8 and 4.0 c. higher than the 1980-2000 average sea levels are projected to rise 0.18/ 0.59 meters by 2100 based on observed rates of ice flow from Greenland and

Antarctica. More frequent and intense extreme Weather events, including drought and flooding are also expected (Calvo et al., 2007).The nature of agriculture and farming practices in any particular location are strongly influenced by the long term mean climate state –the experience and infrastructure of local communities are generally appropriate to particular types of farming and to a particular groups of crops which are known to be productive under the current climate (Gornall et al., 2010).

**Vulnerability and Coping Mechanism** Future vulnerability depends not only on climate change but also on the type of development path that is pursued (IPCC, 2007) and for any development we must focus on the sustainable approach minimizing not only environmental hazard but also long term impacts on lifestyle, human behavior and associated effects. Although higher level of development creates higher coping capacity, it might also imply increased social exposure to climate hazards. The developing countries are more susceptible to climate change impacts as they have limited capacity to adapt. The least developed countries are among the most vulnerable to extreme weather events and the adverse effects of climate change. They also have the least capacity to cope with and adapt to the adverse effects of climate change (UNFCCC, 2006). There are many reports and case studies focusing on different aspects of climate change in Nepal. Climate change poses significant challenges to Nepal's agricultural sector, where farming systems are highly vulnerable to shifting weather patterns and extreme climatic events (Manandhar et al., 2011). Farmers in Nepal's diverse agroecological zones—from the lowland Terai to the high Himalayas—have observed noticeable changes in temperature, precipitation, and seasonal cycles, influencing their agricultural practices (Paudel et al., 2020). Despite these challenges, many smallholder farmers rely on indigenous knowledge and localized adaptation strategies, such as altering planting dates, adopting drought-resistant crops, and modifying irrigation practices (Sherpa, 2023). However, the effectiveness of these measures varies across regions, highlighting the need for a deeper understanding of farmers' perceptions and adaptive capacities.

Farmers' awareness of climate change and their willingness to adopt adaptation strategies are shaped by socio-economic factors, access to information, and institutional support (Joshi et al., 2017). Studies indicate that while many Nepalese farmers recognize climate risks, barriers such as limited financial resources, lack of

technical knowledge, and inadequate infrastructure hinder widespread adoption of adaptive practices (Devkota et al., 2018). For instance, in the mid-hills of Nepal, farmers report declining crop yields due to erratic rainfall and rising temperatures, yet only a fraction have access to climate-resilient technologies or government-led adaptation programs (Dahal et al., 2022). These disparities underscore the importance of tailored interventions that align with local realities and leverage existing indigenous knowledge. In this background, this study analyzed farmers' perceived knowledge and practices on climate change adaptation in Panchkhal Municipality-3, Kavrepalanchok District.

## **1.2 Statement of the Problem**

The warming trend in Nepal after 1997 has ranged from 0.06° to 0.12° C per year in the most of the middle mountains and Himalayan regions, while the Siwalik and Terai regions warming trend has been less than 0.03° C per year (Shrestha, 1999). Geographically, over 75percent of Nepal is composed of rugged hills and mountains. Increased of intense rains concentrated during the monsoon season and compounded by frequent occurrences of glacial lake outburst floods has increased soil erosion, floods and landslides in the region (Shrestha, 1999). Nepal demonstrates diverse geophysical and climatic conditions within relatively small areas resulting vast biological diversity, therefore, it is an ideal place to study climate change impacts on natural and socioeconomic spheres.

The impacts of climate change increase, among other things, are associated with water and food shortages, coastal inundation, the distribution of vector-borne diseases such as malaria and dengue fever, and the rate of extinction for many species (up to 30 per cent to 30 per cent with a 2° C rise in temperature) (IPCC, 2017). Higher growing season temperatures can significantly impact agricultural productivity farms incomes and food security (Battis & Naylor, 2009). There is growing evidence that concentrations of carbon dioxide (CO<sub>2</sub>) in the atmosphere are on the rise and that is largely due to human activities.

A systematic review of adaptation practices in Nepal reveals that autonomous strategies, such as crop diversification and agroforestry, are more common than planned interventions (Rijal et al., 2022). However, the long-term sustainability of

these practices remains uncertain, particularly as climate impacts intensify. Bridging the gap between farmers' perceptions and scientifically validated adaptation measures requires enhanced communication, capacity-building initiatives, and policy support. By integrating local knowledge with modern climate-smart agriculture, Nepal can strengthen its resilience to climate change while safeguarding the livelihoods of its farming communities.

Although Nepal's contribution to the GHGs emissions is very less, it is the country where its impacts are very high (Chalise, 1994). In Nepal National Adaptation Plan (2021-2050) aims to improve adaptation strategies by implementing 64 priority programmes (MoFE, 2022). The total budget of Nepal NAP implementation is USD 47.4 billion to implement priority programmes until 2050. The government requires USD 2.1 billion per year for the delivery of adaptation services through the implementation of ten sector wise priority adaptation program. Therefore, climate change adaptation action can reduce vulnerability of farming (IPCC, 2016). Adaptive capacity is intimately connected to socio-economic development that is unevenly distributed within societies (IPCC, 2016).

To various climate change vulnerability assessments shows that Nepal is highly vulnerable to climate change and more than 1.9 million people are estimated to be highly vulnerable and another 10 million are exposed to increasing risk (MoE, 2011). Local level vulnerability assessment studies are rare in context of hilly region of Nepal. Available literature has been reviewed before carrying the study. The climate on the earth has undergone many changes in the past and this is entirely natural. The impact of global warming is already being felt by the most vulnerable-the world's poorest people and countries and its impact is severe on Nepal because of the geographical and climatic conditions, high dependence on natural resources and lack of resources to cope with the changing climate. Developed countries are mainly responsible for global warming and they need to take concrete steps and actions to reduce their greenhouse gas emissions.

Overall, climate change poses unprecedented threats to Nepal, particularly in vulnerable regions like Panchkhal Municipality, where geographic fragility, economic dependence on agriculture, and limited adaptive capacity exacerbate risks. With over 1.9 million Nepalis highly vulnerable and 10 million at increasing risk (MoE, 2011),

localized studies in hilly areas remain scarce, despite evidence that erratic weather, biodiversity loss, and yield fluctuations (Boubacar, 2010) disproportionately impact smallholder farmers. This study underscores the urgency of context-specific solutions to enhance resilience in agrarian communities. Therefore the study raised following research questions:

- i. What knowledge and skills do farmers in Panchkhal Municipality-3 possess regarding climate change adaptation actions?
- ii. How do climate change adaptation actions influence farmers' vulnerability in the study area?
- iii. iii. What are the key challenges hindering the implementation of climate change adaptation plans in Panchkhal Municipality-3?

### **1.3 Research Objectives**

The general objective of the study is to explain perceived knowledge and practices of the farmers on climate change adaptation action. The specific objectives are as follow:

- i. To assess knowledge and skills of the farmers related to climate change adaptation.
- ii. To analyze the climate change adaptation practices adopted by farmers.
- iii. To analyze challenges for implementing Local Adaptation Plan of Action (LAPA) in the study area.

### **1.4 Significance of the Study**

Findings of the study help to explain perceived knowledge and practices of the farmers regarding climate change adaptation. Therefore, findings of the study may fruitful to the farmers, policy makers and planners. Besides, local development stakeholders can also develop and implement settlement specific climate change adaptation strategies in the study area. Findings of the study can be milestone for local development planners, policy makers who are working for offering adaptation strategies to the local farmers.

### **1.5 Limitation of the Study**

Due to the limited resource and time, the study has been conducted in Panchkhal municipality located in Kavre District. Agriculture as a primary source of family earning of the majority of the households. The required data were collected from 108 sample households residing in ward number 3 of the municipality.

### **1.6 Organization of the Study**

The study has been organized into five chapters. The first chapter deals with the background, problem statement, objectives, significance, delimitation and organization of the study. The second chapter presents literature review. The third chapter includes the research methodology, selection of the study area, data collection techniques and methods of data analysis. The fourth chapter highlights analysis and interpretation of data. Finally, the fifth chapter presents findings, conclusion and implications of the study.

## **CHAPTER II**

### **LITERATURE REVIEW**

#### **2.1 Conceptual Review**

##### **2.1.1 Climate Change as Ecological and Social Concerns**

The climate has always changed in the earth during the period of present to past between 2500 BC and 2300 BC. For example, in the Sahara desert has been rapidly climate changed from a situation in which Wheat, Millet and Guinea Corn could be cultivated into a situation in which only Livestock could be kept (Curtin et al, 1978). The average atmospheric CO<sub>2</sub> concentration has increased from 280 ppm in 1850 to 365 ppm at present, and could exceed 700 ppm by the end of the present century if emissions continue to rise at current rates (IPCC, 2001).

Climate change in global context Climate Change refers to a statistically significant variation in either the mean state of the climate or in its variability which may be due to natural processes or external forcing, or to persistent anthropogenic changes in the composition of the atmosphere or in land use” (IPCC, 2001). The average temperature of the earth’s surface has risen by 0.74°C since the late 1800s (IPCC, 2007). Under a business as usual scenario, greenhouse gas emissions could rise by 25-90 percent by 2030 relative to 2000 and the Earth could warm by 30 c this century. Even with a temperature rise of 1-250 c the IPCC predict serious effects including reduced crop yields in tropical areas leading to increased risk of hunger, spread of climate sensitive diseases such as malaria and an increased risk of extinction of 20-30 percent of all plant and animal species. By 2020, up to 250 million people in Africa could be exposed to greater risk of water stress (UNFCCC, 2007).

Natural changes in climatic conditions have resulted in Ice Ages and relatively warm periods in temperate regions while wet periods have intermitted with dry periods in Africa (Kemp, 1994). Over a decade ago, most countries joined an international treaty –the United Nations Framework Convention on Climate Change–to begin to consider what can be done to reduce global warming and to cope with whatever temperature increases are inevitable. Recently a number of nations have approved an addition to

the treaty, called the Kyoto protocol, which the planet's average surface temperature has risen about 2.0 degree Fahrenheit (1.1 degree Celsius) since the late 19th centuries, a change driven largely by increased carbon dioxide and other human – made emission into the atmosphere.

Article 17 of The Marrakesh Accords UNFCCC (2001) said " the least developed countries are among the most vulnerable to extreme weather events and the adverse effects of climate change due to mountainous and landlockness". They also have the least capacity to cope with and adapt to the adverse effects of climate change. Considering this fact UNFCCC article 4.4 said “the developed country parties shall assist the developing country parties that are particularly vulnerable to the adverse effects of climate change in meeting cost of adaptation.

Climate change is emerging as one of the most profound ecological and social concerns over our time (Y2Y, 2007). The ecological axiom "adapt, migrate or die" takes a particular relevance and urgency as scientists continue to study potential scope of climate change. In the face of warming temperatures many species, not leaving human beings, will be forced down one of the three paths (Y2Y, 2007) of adaptation, migration or die. Associated effects of climate change were already observed such as increase in dry period, intense rainfall, flood, landslides, forest fires, glacial threats etc. (Shrestha & Wake, 2000). Climate has an important role in determining the altitudinal zone of vegetation and life zones, it is possible that high altitude communities in mountain areas will be sensitive to the effects of long term climatic change (Grabherr et al., 1994).

### **2.1.2 Impact of Climate Change on Agriculture**

Nearly a billion people who work in agriculture and more than 500 million family farms, which produce more than 80 percent of the world's food, have contributed to better health and nutrition of the global population (UNHDR, 2015). Agriculture sector can contribute to employment, food security and raw materials for agro-based industries. In Nepal, agriculture has been contributing to more than 70 percent households (CBS, 2013), 66 percent employment (MoAD, 2015) and 35.12 percent share to National Gross Domestic Product (GDP) (MoF, 2014). Horticulture is the science and art of growing plants (fruits, vegetables, flowers, and any other cultivar).

Horticulture is the growing of flowers, fruits and vegetables, and of plants for ornament and fancy Horticulture, literally garden culture, is a part of crop agriculture that also includes agronomy and forestry.

Agriculture is the most climate sensitive of all economic sectors. In Albania, the impacts of climate change on the agricultural sector represent an urgent problem, since the majority of the rural population depends either directly or indirectly on agriculture. The rural poor will be disproportionately affected because of their greater dependence on agriculture, their relatively lower ability to adapt, and the high proportion of their income that is spent on food. The impacts of climate change could therefore undermine the progress that has been made in poverty reduction and could adversely affect food security and economic growth in vulnerable areas.

Increased exposure to high temperatures, drought, and shifting seasonal patterns, increased incidence of diseases and pests and soil erosion are already beginning to damage agricultural productivity. At the same time, climate vulnerability has been exacerbated by sub-optimal policies, the deficient management of natural resources and associated infrastructure, and poor adaptive capacities. Soil erosion is a huge problem: 60 percent of the territory is affected, while 30 percent of agricultural land has annual soil loss rates of around 20 to 70 tons/ha. As the agricultural sector is the biggest consumer of fresh water, at 60 percent of the total, water resources are an important issue. Extreme events such as floods, droughts and fires have occurred in recent years, but no integrated assessment has been carried out to measure the costs from an economic, social and environmental perspective.

Climate change is a burning issue in the world. It is a long term shift in the climate of a specific location, region or planet. The shift is measured by changes in features associated with average weather, such as temperature, wind patterns and precipitation. Climate change is the biggest emerging environmental challenge to date (Alam, et al., 2004). Change in an average weather pattern of an area over long period of time is known as climate change. The climate system is a complex, interactive system consisting of the atmosphere, land surface, snow and ice, oceans and other bodies of water as well as living creatures. Climate in a narrow sense is usually defined as the average weather, or more rigorously, as the statistical description in terms of the mean and variability of relevant quantities over a period of time ranging from months to

thousands of years. The classical period for averaging these variables is 30 years, defined by World Meteorological Organization (Maharjan & Joshi, 2012).

United Nations Framework Convention on Climate Change, in its Article 1, defines climate change as "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods". Climate change refers to a change in the state of the climate that can be identified by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer (IPPC, 2007).

Dahal et.al (2011) have been observed the number of negative effects of Climate change in Agricultural, vegetation, grazing, harvesting and storing in Nepal. Before three years has examined the delay in monsoon season experienced in Nepal has changed the cropping pattern and crop maturity period. Due to the delay monsoon the planting and harvesting season by a month, which has in turn affected rotation practices in Agriculture.

Regmi and Adhikari, (2007) the delay in monsoon season has also made thousands of hectares land effects in Cropping Agriculture. Practical Action,(2008) has examines the effects of climate change in Eastern region of Nepal, decreased the rice production by 30 percent in 2006 and like this heavy flooding in the mid-Western and far-Western regions in 2006 and 2008 destroyed thousands of crops production and livestock in many places. Gautam and Pokhrel (2010) have predicted temperature gradually rise in the world of  $0.06^{\circ}\text{C}$  per annum but the Global Climate Models (GCM) project the increase in temperature by  $0.5\text{-}2.0^{\circ}\text{C}$  with a multimodal mean of  $1.4^{\circ}\text{C}$  by the 2030s, rising to  $3.0\text{-}6.3^{\circ}\text{C}$  with a multimodal mean of  $4.7^{\circ}\text{C}$ , by the 2090s (NCVST, 2009). The majority of the world's extremely poor people live in rural areas and have livelihoods which are bound closely to smallholder agriculture as farmers, labourers, transporters, marketers and processors of produce and as suppliers of non-agricultural services to households whose income is principally agriculture-derived. Furthermore, the poor in rural towns and the larger cities are often engaged in the processing and distribution of agricultural products from the hinterland. The food needs of poor urban households are purchased, except where supplemented by supplies from rural relatives, and a growing share of rural food consumption is also

purchased. This makes the welfare of the poor highly sensitive to food prices. Although food prices in the areas where the poor live are increasingly linked to world markets, the availability of local surpluses also has profound effects on prices and hence access.

### **2.1.3 Climate Change Vulnerability of Agriculture**

Chambers, (1989) and Liverman (1992) have used the term vulnerability in loosely in many different contexts, from medicine to poverty and development literature. In recent trend the burning issues global environmental change studies, the concept of vulnerability is often derived from the social sciences. Chambers, (1989) introduced the concept that vulnerability has an internal and external dimension and these relate to the capacity to anticipate, cope, or recover from the impacts of a hazard, and to the exposure to risks of the hazard.

Kasperson and Kasperson, (2001) have recognized the interactions between the internal capacity of humans to withstand or respond to a risk and the external dimension (risk). There is a similar interaction between the social and economic vulnerability of populations and the degree of resilience of ecological systems. He suggested that an integrated approach to both human and natural systems is needed if significant progress is to be made in understanding the different vulnerability of regions, places and people.

Watson et al. (1996), widely accepted methodological framework to analyze vulnerability arising from these two concepts of the internal and external dimensions (and their interplay) has yet to be fully developed. The Intergovernmental Panel on Climate Change (IPCC), in its Second Assessment Report, defines vulnerability as “the extent to which climate change may damage or harm a system” and it adds that vulnerability “depends not only on a system’s sensitivity, but also on its ability to adapt to new climatic conditions.

Bohlet et al.(1994), looking at vulnerability from the food security point of view, the FAO publication, *The State of Food Insecurity in the World* (1999), defines vulnerability as “the presence of factors that place people at risk of becoming food insecure or malnourished.” Clearly, this definition encompasses causes of food

insecurity other than climate change (e.g., armed conflict, landlessness, etc.). Nevertheless, the concept of vulnerability includes hunger vulnerability, which refers to the vulnerability of individuals or households rather than that of regions or economic sectors.

A common theme in the climate change impacts and vulnerability literature is the idea that countries, regions, economic sectors and social groups differ in their degree of vulnerability to climate change. This is due partly to the fact that changes in temperature and precipitation will occur unevenly and that climate change impacts is unevenly distributed around the globe. It is also due to the fact that resources and wealth are distributed unevenly. 10 Crop lands in Mountain region of Nepal is environmentally marginal and are likely to be at increased risk of land degradation and biodiversity loss as a result of climate trends. Olmos, (2001) Nepalese farmers are largely poor with limited access to external resources and are likely to be particularly vulnerable to climate change. Vulnerability to climate change is closely related to poverty, a poor are least able to respond to climatic stimuli. Reale et al. (2001) besides, biophysical features of the region further increases the vulnerability. 2.5. Climate Change Impacts and Vulnerability of Soil is an important natural resource which directly or indirectly supports all forms of life on the planet earth.

Nepal is a mountain region, experienced severely overcast skies during winter, affecting major winter crops like potato, oilseeds, pulses and onions. The winter cold wave in 1997/1998 reduced the yield of winter crops by 11-38 percent compared to the average opreceding 10 years (APN/ DHM, 2007). Crop production is entirely linked with the weather condition and their relationship has a direct effect on the growth and development of a crop, since the physiological function of the crop is governed by the climatic parameters. Rice, maize, wheat, millet and barley are the major food crops grown in Nepal (Regmi, 2007).

Livestock are domesticated animals and give us milk, meat, eggs, wool, labor, etc. Today, it has taken a sub sector of agriculture of Nepal and going to increased and product different things and used to national and international . Therefore, it is an important source of cash in Nepal. Livestock farming is used for encouraging and pulling people into cultivation, and the dung of animals is used to enrich the soil fertility. In the hills and the mountains used for the livestock like a yaks, donkey,

mules, sheep and goats are used to transport goods. In the Terai, bullocks and buffalo bulls pull carts. Livestock covers approximately about 32 percent of agricultural Gross Domestic Product (GDP) and about 11.5 percent of total country GDP. Numerous people are involved in the production, slaughtering, processing, and trading of livestock and livestock products. More than 2 million households own cattle, and over 1.4 million households raise chickens (CBS, 2011).

The growth rate of livestock is less than that of fishery and cash crop, but the contribution of livestock farming in the overall agricultural GDP is more than fishery and cash crops agriculture. The overall growth rate of livestock is around 5.3 percent per annum. The growth rate of buffalo, pigs, milking buffalo, and fowl was very good compared to cattle, sheep, duck, laying duck (MoAC, 2011/12)

#### **2.1.4 Agriculture and Sustainable Development Goals**

SDG 12 intends to ensure sustainable consumption and production patterns. In Nepal, only 10 percent of water resources have been used and fossil fuels comprise only 12.5 percent of energy consumption. The proposed targets for 2030 include limiting fossil fuel consumption to 15 percent of energy consumption and improving the soil organic matter from 1 percent in 2014 to 4 percent in 2030. The SDG 15 calls for protecting, restoring and promoting the sustainable use of terrestrial ecosystems, sustainably managing forests and halting biodiversity loss. Nepal's current forest cover including bushes and grassland is 39.6 percent. Protected areas cover 23.2 percent of the country's land area. The proposed specific targets for 2030 are to increase forest cover to 45 percent and protected areas to 25 percent. Nepal Sustainable Development Goals: Status and Roadmap Report (2018), envisioned for building a prosperous Nepal by 2030. All the 17 SDGs and 169 targets are legitimate development objectives seen through a global lens. Well before 2030, Nepal will have graduated from the list of Least Developed Countries (LDC) as defined by the United Nations. This road map will be played an important role in steering the environment friendly regional economy. Below table 4 presented gist of report.

*Table 2.1 Targeted Indicators for Nepal Sustainable Goals*

Targeted Indicators	2015	2019	2022	2025	2030
Population <US\$ 1.25 per day (ppp value %)	23.7	17	13.7	10.4	4.9
Poverty gap ratio at US\$ 1.25 per day (%)	5.6	4.9	4.3	3.7	2.8
Poverty \$1.9 Per day	36	28.5	22.9	17.3	8
Per capita Gross National Income (US\$)	766	821	1647	2029	2500
Population below national poverty line (%)	21.6	17.1	13.8	10.5	4.9
Multidimensional Poverty Index (MPI)	44.2	35.1	28.2	21.4	10.0
Ratio of girls enrollment in technical education	0.53	0.66	0.75	0.84	1
Ratio of girls enrollment in tertiary education	0.88	0.91	0.94	0.96	1
Youths with vocational training in '000, annual	50	165	300	350	480
Working youths with vocational training (%)	25	38	48	58	75
Literacy rate of 15-24 years old (%)	88.6	91.4	95	98	99
Literacy rate of 15-24 years old (women)	87.4	90.5	92.8	95.1	99

*Source:* NPC, 2018

## **2.2 Theoretical Review**

### **2.2.1 Agriculture Transformation**

In agriculture transformation theory, Nobel laureate economist (in1979) Theodore William Schultz emphasized that key to agricultural transformation lies in emphasizing technological change in agriculture (Author & Lekhi, 2008). According to the conception of this theory, Schultz has given more focus to following assumptions (Lekhi, 2012):

- Lack and availability of the capital is another reason and he thinks that peasants are more effective in producing output per additional unit of capital input.
- Given the enormous productive potential of agriculture, he stresses that poor countries with large agricultural sectors and large rural population should allocate more resources to agriculture.
- By saying that he does not belittle the importance of industrial sector but he wants the removal of those biases which stand in the way of transfer of resources from rural to urban areas.

- He further recommends that manufacturing and other urban sectors should not be subsidized with massive resource transfer of from rural to urban areas and this practice should be stopped forthwith.
- Agriculture as a tool of employment-based strategy requires three elements.
  - Accelerated output growth through technological, industrial and price incentive changes to raise the productivity of small farmers.
  - Raising domestic demand for agriculture output.
  - Diversified and non-agriculture labor-intensive rural development activities that directly/indirectly support and are supported by the farming community.

### **2.2.2 Integrated Farming System**

Full integration of agricultural systems at the producer or community scale may help in slowing or reversing some of the detrimental environmental and economic problems associated with specialized industrial agriculture. Modern agriculture requires intensive inputs (John et al., 2008). However, the use of forages and other diverse crops in the crop rotation can reduce intensive inputs while in some cases increasing crop yield enhancing nutrient cycling reducing plant disease and improving soil quality. Integration of livestock and cropping systems has the potential benefits of enhancing nutrient cycling efficiency, adding value to grain crops, and providing a use for forages and crop residue. Integrated crop/livestock producers traditionally have raised a greater diversity of crops, encouraging crop rotation and have allowed livestock to convert low- quality crop residues or failed crops into higher value protein. Integrated agricultural systems are not new (John et al., 2008).

The number of commodities produced per farm has decreased from five in 1900 to approximately one in 2002<sup>18</sup>. Integrating forage, crop and livestock systems can spread economic and production risks over several different enterprises, thereby taking advantage of a variety of agricultural markets. As an example, incorporating forages into a Canadian cropping system potentially reduced risk more than participation in government programs. There are also potential environmental benefits to integrated systems. Research in Norway indicated that runoff of N and P was linked to the amount of ley in the system. In New Zealand cropping systems, 2–4 years of grass-clover swards resulted in large net N input and increased soil aggregate

stability, soil porosity, and earthworm activity. Soil properties rapidly declined during the subsequent 2–4 years of crop production. Recently, some US producers have adopted more diversified management systems that include crops and livestock.

Integrated agricultural production systems are agricultural systems with multiple enterprises that interact in space and/ or time and the interactions result in a synergistic resource transfer among enterprises. These systems differ from dynamic agricultural production systems because there is interaction between different enterprises and the synergistic resource transfer between enterprises. An example of an integrated agricultural production system may be an integrated crop–livestock production unit where manure from livestock is added to crop land and at least a portion of the grain grown on the farm the stover (crop residue) is fed to livestock. Manure from livestock can replace some of the fertilizer inputs. Feeding grain to livestock or allowing them to use crop residues can potentially add value to the grain or crop residue<sup>17</sup>. A cotton farmer who uses gin trash from ginning operation as organic matter input for cotton production would have an integrated system because there is a synergistic resource transfer.

### **2.2.3 Cultural Theory of Risk for Climate Change Adaptation**

Cultural theory of risk (CTR) argues that certain forms of social organization are associated with each of the types of worldviews. Different forms of social organization therefore view and manage risks differently (Rayner, 1992). This can lead to conflict between groups with different institutional cultures about how they recognize risks and approach solutions (Thompson & Rayner 1998). CTR thus explains conflict as arising from mismatched world- views about how risk is identified and managed. As such, it is the social organization of institutions, rather than the threat itself that determines what risks are recognized, the process for obtaining social consent about each risk, and how liabilities and benefits arise (Wildavsky, 1982; Rayner, 1984; Gross & Rayner 1985).

This understanding contrasts with conventional views of risk analysis, communication, and management that frame risk as quantitative probabilities of certain extreme events— information that is then transmitted from information producers to receivers who will then manage the risk accordingly. Such risk framing

ignores that risk communication and management are predicated on shared meaning and trust among individuals who make up the communities and institutions where policies are made and implemented (ornot) (Rayner, 1992). Rayner (1984) presents three main kinds of institutional cultures for risk management and a set of principles and perceptions that go along with each of the three that result in certain types of institutional structure:

1) Market individualist: entrepreneurial, competitive, or market organization where individualism and competition are key to market success. Examples of this culture type are predominant in the business sector and corporate America.

2) Hierarchical bureaucracy: differentiated roles are seen to contribute to the functioning of the whole, characterized by rules and routine procedures to maintain the system. Federal regulatory agencies in the United States are examples of this, such as the Environmental Protection Agency and Department of Energy.

3) Egalitarian group: emphasis is on cooperation rather than competition, decisions are made by consensus, and social solidarity and equality are highly valued. Many Native American and environmental advocacy nonprofit organizations exemplify this culture.

### **2.3 Policy Practices**

The scenario of the global change impacts in the fragile mountains of Nepal and around is greater, the major impacts and threats of global warming are widespread. As a result of global warming, the type, frequency and intensity of extreme events, floods, droughts and heavy precipitation events, are expected to rise even with relatively small average temperature increases. Changes in some types of extreme events have already been observed, for example, increases in the frequency and intensity of heat waves and heavy precipitation events (Meehl, et al., 2005) and such events bring more risk to the people living near to riverside or the marginal community.

Darjee et al. (2021) appraised national climate change policy and strategies set out a framework for planning and undertaking climate change adaptation in national and

local level. The authors found that through the Community Adaptation Plan of Action, local communities have planned and implemented adaptation measures envisioned in the thematic areas identified in the climate change policy of Nepal. However, the CAPA is not institutionalized under government policies and the institutional framework as a local level implementing unit.

In the past ten years, donor agencies have committed approximately US\$ 3 billion adaptation grants to Nepal (Dhungana et al., 2020). However, efficiency of the climate finance depends on localization of climate budgeting, monitoring, and evaluation of the sector wise projects. ADB (2013) also suggested to integrate productivity and efficiency measures for water usage while implementing adaptation in the water resource sector.

## **2.4 Empirical Studies**

FAO,(2019) has ensure the challenge of enabling means embodied in a new climate change agreement will encourage the agriculture sector in the global context and farmers to generate these benefits under increasingly adverse conditions shaped by global financial, food and fuel insecurity. In this context for the adjustment Timely and appropriate adaptation clues will promote technology in local people to change the production of crops like a farming pattern, season of cropping, choice of crop, prevention from health hazards.

UNFCCC (2017) examine the Climate Change coverage the broad- area effects on the environment and socio-economic related sectors, such as water resources, agriculture and food security, human health, terrestrial ecosystems and biodiversity and coastal zones of the world. Due to the climate Changes in rainfall pattern are likely to lead to water shortages or flooding like this, melting of glaciers can cause flooding and soil erosion. If will rise the temperatures effects in crop growing seasons and shift their production. Temperature increases will potentially severely increase rates of extinction for many habitats and species (up to 30percent with a 20 c rise in temperature.

Adger et al (2018) the term adaptation means to the actions taken to adjustment in the consequences of climate change whatever impacts is experienced. Adaptation in

climate change takes place through how to adjustment in the global context and reduce vulnerability or enhance resilience in response to observed or expected in climate change and associated changing weather events of people who adjustment on Climate-dependent upon available resources for their livelihoods. There are two types of climate change such as natural and artificial. Due to the climate change it directly affects in human activities whatever direct or indirect.

Nepal is a land-locked country situated in the Asia Continent of the Himalayas Regions stretched between 26° 22' to 30° 27'N latitudes and 80° 4to 88° 12, E longitudes. The total area of the country is 147,181 km<sup>2</sup> that is made up of five physiographic regions (LRMP, 1986). According to the physiological division of Nepal, they are High Himal, High Mountain, Middle Mountain, Siwalik (the Curia Range), and the Terai. It is observed that the data indicates consistent warming and rise in maximum temperature an annual rate of 0.04 – 0.06° C (MoE, 2010). Although Nepal has a negligible share in global emissions, Acharya (2012) revealed that the higher side temperature rise seems terrible as it is nearly 2.0° C on an average in the western Nepal which is almost three times of the lower average temperature. Such temperature rise in Nepal, if compared to global trend, is significantly higher. Furthermore, Hills and high hills are more vulnerable to climate change.

Gautam et al., (2010), Mountain region of Nepal is most vulnerable to climate change in comparison to other parts. Past studies on climate change in Mountain region of Nepal has suggested significant warming in higher elevations leading to reduction in snow and ice coverage with increased frequency of extreme events like landslides and droughts (Gautam et al., 2010).

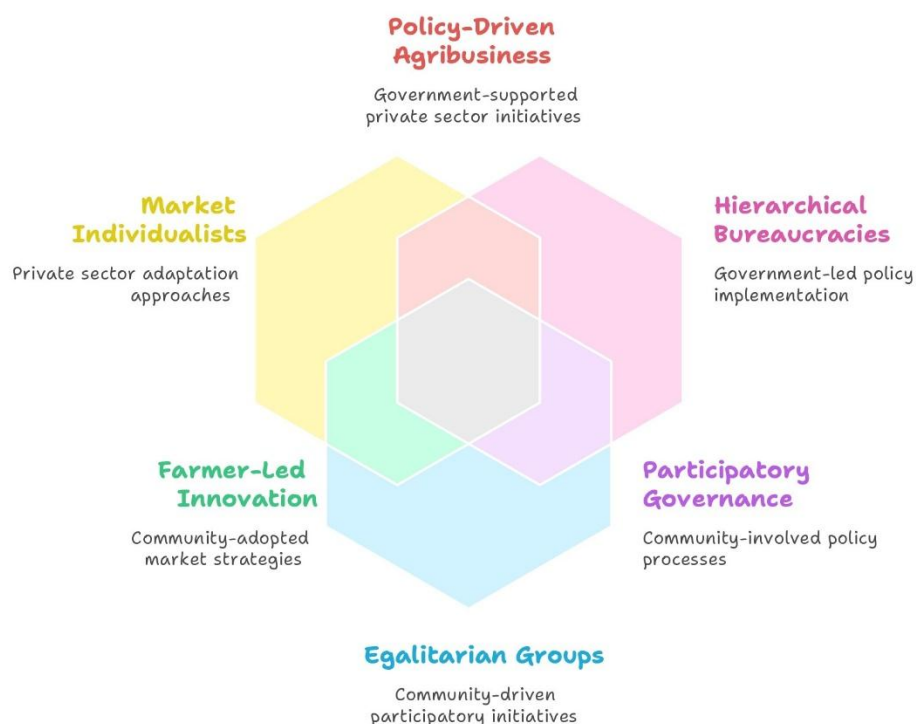
Regmi and Adhikari (2007) argue that delay in monsoon season has also made thousands of hectares of farm land fallow and reduced production due to lack of water. Practical Action (2008) in the Eastern region of Nepal decreased the rice production by 30percent in 2006 and heavy flooding in the mid-Western and far-Western regions in 2006 and 2008 destroyed crops in many places and there is also evidence that the vector borne diseases in livestock are increasing, forcing the livestock.

Dell, Jones and Olken (2011) revealed three primary results that (a) higher temperatures substantially reduce economic growth in poor countries (b) higher temperatures appear to reduce growth rates, not just the level of output, and (c) higher temperatures have wide-ranging effects, reducing agricultural output, industrial output, and political stability. Zhai, Lin., and Enerelt (2009) have studied the potential long term impacts of global climate change on agricultural production and trade in the People's Republic of China (PRC). Using an economy-wide, global computable general equilibrium model, the simulated scenarios of global agricultural productivity change induced by climate change up to 2080 has revealed results that with the anticipated decline in agriculture share of gross domestic product, the impact of climate change on the PRC's macro economy will be moderate. The food processing subsectors are predicted to bear the brunt of losses from the agricultural productivity changes caused by climate change. Production of some crop (such as wheat), in contrast, is likely to expand due to increased demand from other regions of the world.

The developed countries, countries towards the North Pole, including North America, former Soviet Union are seem to be benefited from the climate change due to the increased cereal production, ample resources for factor substitutability and some others. Nonetheless, the negative impact tends to be greater toward the equator, and hence mostly concentrated in developing countries. Developing countries are more vulnerable to climate change especially to the agriculture production lacking adequate resources for the adaptation and substituting the production factors, agriculture based economy, food insecurity and poverty. In this context, the country specific quantitative relationship of climate change (especially that of rainfall and temperature) to the agricultural GDP still deficit in Nepalese context that this paper wants to fill the gaps.

## 2.5 Conceptual Framework of the Study

### Overlapping Adaptation Strategies in Panchkhal



*Source:* AI generated

This conceptual framework illustrates the overlapping adaptation strategies in Panchkhal, Nepal, by categorizing stakeholders into three groups based on Cultural Theory of Risk: Market Individualists (private sector-driven initiatives), Hierarchical Bureaucracies (government-led policy implementation), and Egalitarian Groups (community-based participatory efforts). It highlights how these groups interact—such as policy-driven agribusiness blending government and private sector roles, or farmer-led innovations bridging market and community approaches. The framework emphasizes collaborative governance, where top-down policies, private sector adaptation, and grassroots participation intersect to address climate resilience in agriculture. The visual suggests that effective adaptation requires integration across these sectors, balancing market efficiency, institutional support, and local empowerment.

## **CHAPTER III**

### **RESEARCH METHODOLOGY**

#### **3.1 Research Design**

The study used rapid survey which is a method of collecting data in which a specifically defined group of individuals are asked to answer a number of questions (Baker, 1994). Survey is a key source of data on social phenomena in the last 60-70 years that provide a mechanism for meeting the additional and emerging needs on a continuous basis in any population based subject. It is a numerical description of relevant aspects of a study population household is a group of persons who make common or joint provision for food and other essential of living. Within various forms of the survey, this study applied specialized survey that may cover single subject climate change aid tits impact in agriculture my study (UN, 2005). By selecting representative sample population, this study has analyzed the collected data. Findings and conclusion may help to generalize to the whole population in the country who are applying their knowledge and skills for agriculture especially in the area throughout the country.

#### **3.2 Field of the Study**

The study has been conducted in Panchkhal Municipality. Panchkhal Municipality Kavrepalanchok District. This municipality is popularly known as

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PrimeMinister Agriculture Modernization Project. The project aims to produce potato in 10 hector areas which is targeted to run for the next 10 years until 2029 (April, Gorkhapatra, 2019).

However, climate change has increased the risk of disaster in the study area. The entire regions of Nepal are regarded as in high-risk zone in the world due to climate change and it is one of the most disaster-prone countries in the world (DFID, 2010). Climate change is becoming dangerous phenomenon in Nepalese context. Government organization, international non-government organizations and

nongovernment organizations are thus providing knowledge about

Therefore, ward number three of the municipality has been the municipality

### **3.3 Nature and Sources of Data**

This study used both primary and secondary sources of data. The primary data and information were collected from structured questionnaire, interview guideline. Likewise, required secondary data were collected from books, international journals, published and unpublished reports, theses and seminar papers as well.

### **3.4 Sampling Procedure**

The study area Panchkhal Municipality has divided into 13 wards. The Municipality has total 8,544 households (Municipal Profile, 2021). The ward number 12 had most households with total 1,147, while ward number 7 had least number of households with total 431 number of households. Purposively, the study selected ward number 3 as a field of the study because the administrative centre of the municipality is popularly known as “Kirshi nagari”. The study site ward number 3 has total 519 households with 1080 male and 1141 female population (Municipal Profile, 2021). Out of total, this study identified 312 households who are involving in commercial farming (Municipal Profile, 2024). Finally, out of total sample households, this study selected 108 sample households (34% of HHs) by using simple random sampling method (Burton, 2017).

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

#### **3.5.1 Household Survey**

This study used household survey research techniques to collect quantitative and qualitative data from 108 randomly selected households in Panchkhal Municipality-3, Kavrepalanchok, using a stratified random sampling method to ensure representativeness. A structured questionnaire was administered, covering key themes such as socio-demographics, climate change awareness, adaptation practices, and

challenges in farming. The survey included both closed-ended (Likert-scale) and open-ended questions to capture detailed insights on farmers' perceived knowledge and adaptive behaviors.

### **3.5.2 Key Informant Interview**

Interview is an effective method for capturing the views of interviewees that can ultimately produce some parcel of knowledge. But an effectiveness of interview entails creating a shared concern between interviewer and interviewees to understand the contextual nature of the interview (Kvale, 1996). Therefore, interviews were depending on how effectively the interview conducted and how easily interviewee meet either in their working area or in their village. For that purpose, the participants elected representatives, administrative staffs, agriculture technicians, role model farmers and local intellectual have been selected purposively.

### **3.5.3 Focus Group Discussions**

This study conducted focus group discussions (FGDs) with elected representatives, officials, role model farmers, and agriculture technicians in Panchkhal Municipality-3 to explore climate adaptation challenges. Two FGDs were conducted in which each session engaged 6-8 participants in discussions about climate impacts, adaptation practices, and institutional barriers. The interactive format revealed community knowledge and consensus on key issues, while moderator probes ensured comprehensive coverage. Recorded and transcribed discussions provided qualitative insights that complemented survey data, particularly regarding leadership roles and social dynamics in climate resilience. The FGDs effectively captured local perspectives to inform policy recommendations.

### **3.5.4 Case Study**

This study also used narrative case study technique for data collection. This technique allows researchers to gain a subjective understanding of research issues from the participants. Case study can provide valuable insights for similar settings, contributing to explore lived experiences of the participants. Therefore, the study conducted seven case studies related to research issues which are presented narratively in the box.

### **3.6 Data Analysis and Interpretation**

Data analysis is the process of systematically searching and arranging structured data information so that the researcher can accumulate to increase his or her understanding and enabling them to present generalized knowledge to others (Bogdan & Biklen, 1998). Thus, in this study, all the recorded questionnaires were systematically arranged in various headings and subheadings. Analysis and interpretation of collected data information are generated by triangulating the data collected from various sources.

Therefore, during triangulation, the study drew insights from description, analysis, and interpretation of the data. Description of data information helped to understand the meaning of the data, analysis of data information helped to identify underlying meanings of my data to make a systematic description and interpretation of data information helped to understand processes and meanings in the theoretical context (Yin, 2014). Similarly, SPSS software was used for managing and statistical interpretation of the data information. Before analyzing data, significant time has been spent to get familiarity with the data. Frequency tabulation, means, standard deviations and Likert scale analysis have been used.

**CHAPTER IV**  
**DATA ANALYSIS AND INTERPRETATION**

**4.1 Social-Demographic and Economic Characteristics of the Respondents**

**4.1.1 Social Demographics**

**Table 4.1 Key Demographic Characteristics of the Respondents**

Category	Response	Frequency	Percent
Age	23-40	58	53.9
	41-60	41	38.1
	61-77	9	8.2
Gender	Male	66	61.1
	Female	42	38.9
Religion	Hindu	102	94.4
	Buddism	5	4.6
	Christian	1	.9
Marital status	Unmarrie	9	8.3
	Married	94	87.0
	Widow	5	4.6
Mother Tongue	Nepali	94	87.0
	Tamang	11	10.2
	Dunuwar	3	2.8
Educational Status	Literate	9	8.3
	Primary and lower secondary	25	23.1
	Secondary	67	62.1
	Higher education	7	6.5
Total		108	100.0

**Source:** Field Survey, 2025

Age, gender, religion, marital status, mother language, and education are listed in the table. The majority (53.9%) are between 23 and 40, according to the data. Many (38.1%) are between 41 and 60, but few (8.2%) are between 61 and 77. This distribution reveals that most sample members are working-age and few are elderly. Males outnumber females (61.1% vs. 38.9%).

Social trends, occupational prejudices, or sample limits may explain this disparity. The most popular religion is Hinduism, with 94.4 percent of the population. Christian (0.9%) and Buddhist (4.6%) are far behind. The religious makeup is similar, with Hinduism being the biggest cultural and spiritual impact on the respondents.

The majority of participants 87 percent are married, whereas 8.3 percent are single or widowed (4.6%). Most people marry as adults. The mothers' main language is Nepali (87%), followed by Tamang (10.2%) and Dunuwar (2.8%). It displays the sample's racial and linguistic diversity.

While education varies, most (62.1%) have completed high school. Only 6.5 percent have higher education degrees, whereas 23.1 percent have completed primary or lower secondary school. Only 8.3 percent are "merely literate," meaning they can read and write without education. Most respondents had some schooling, but few did well in school. The data suggests that the surveyed group is largely young, married Nepali-Hindu men with moderate education. We can better comprehend the group's demographics and social dynamics.

#### 4.1.2 Family Size and Child Education

**Table 4.2 Family Size and Child Education**

Category	Response	Frequency	Percent
Family Size	0-2	11	10.2
	3-6	85	78.6
	7-11	12	11.2
School and college going students	0	22	20.4
	1	39	36.1
	2	35	32.4
	3	7	6.5
	4	4	3.7
	5	1	.9
Total		108	100.0

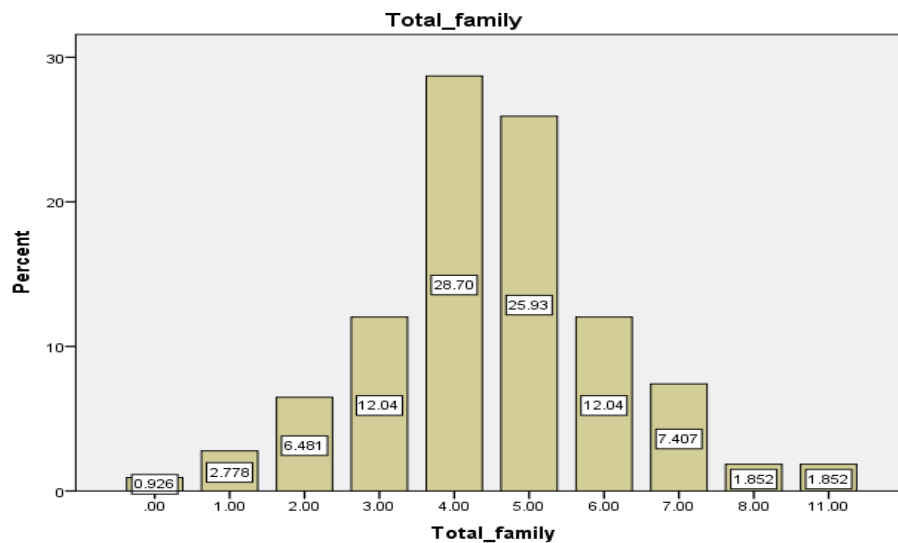
**Source: Field Survey, 2025**

We learn a lot about the 108 surveyed people's education and household makeup. The most frequent family structure is 3 to 6, with 78.6 percent of families having 3 to 6 members. This family size is middle-sized, so residents are not too close or far away. About 10.2 percent of respondents had 0–2 people in their families. More (11.2%) had 7–11-person families. Most families are moderately sized, however a small but significant percentage live in exceedingly small or very large households. The data provides an intriguing look at family schooling patterns. Most families support one or two children through school or college, as 68.5 percent of households have one (36.1%) or two (32.4%) student. However, 20.4 percent of homes had no students in school. This might mean a lot to older couples, young couples without kids, or households with graduated children. On the other hand, 11.1 percent of homes

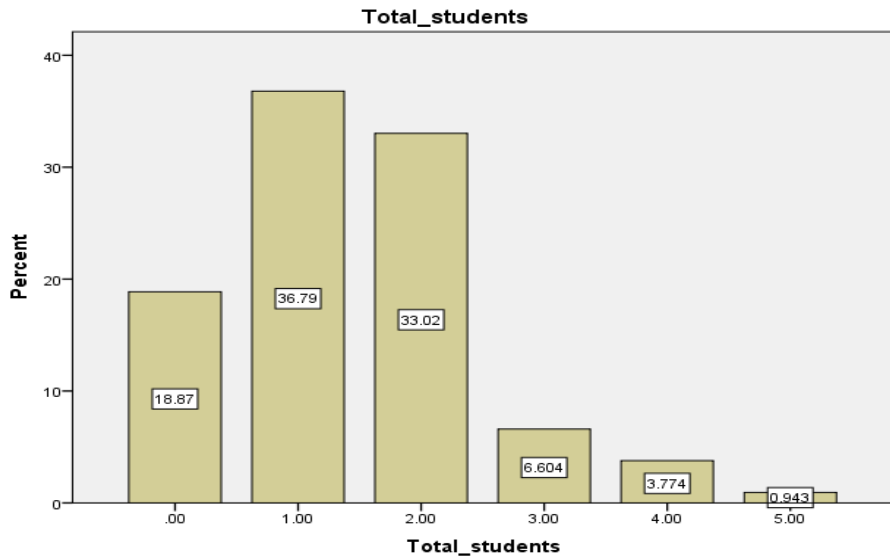
support three or more pupils at once, while 0.9 percent teach five. Different households' educational commitment may depend on their family structure, income, and education views.

Combining these two datasets reveals fascinating household demographic tendencies. Most families include three to six members and one or two students. It appears that many families balance their educational commitments with their household size. Larger families (7–11 individuals) with many pupils may live together and support each other's education. However, smaller homes without students may represent various life stages or families. These patterns may help determine how to provide resources and policies for families with diverse educational requirements.

**Figure 4.1 Total Family Size of the Respondents**



**Figure 4.2 Total School and College Going Children**



### 4.1.3 Annual Family Income and Expense

**Table 4.3 Annual Expense of the Family**

Family Income			Family Expense		
Range	Frequency	Percent	Range	Frequency	Percent
50000-299000	42	38.9	50000-199000	48	44.4
300000-699000	39	36.2	200000-399000	48	44.4
700000-1099000	12	10.9	400000-699000	6	5.5
1100000-2000000	15	13.6	700000-1200000	6	5.5
Total	108	100.00	Total	108	100.00

*Source:* Field Survey, 2025

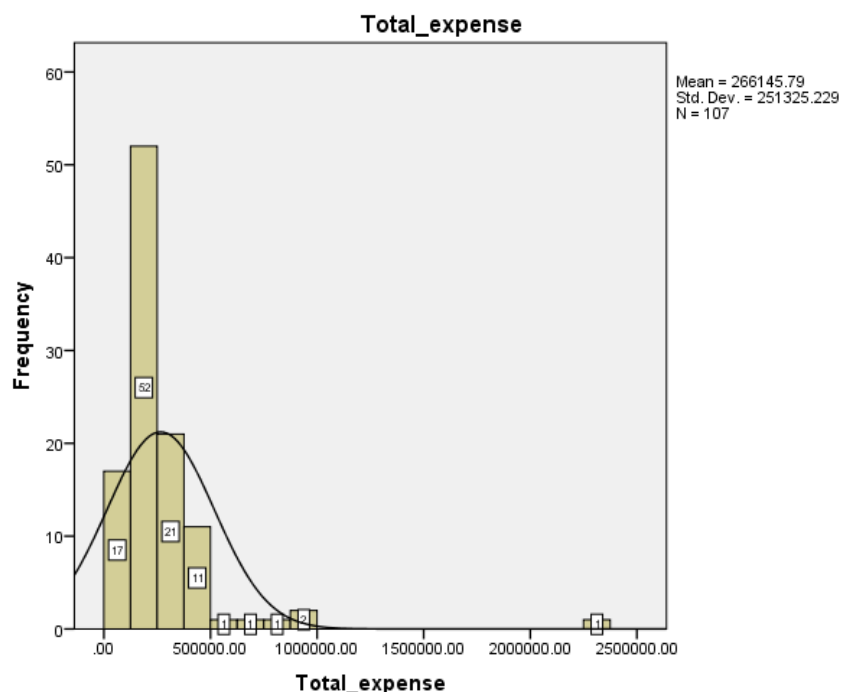
The table compares 108 households' income and spending. We learn a lot about their finances. Most households (75.1%) are low-to-middle-income. 38.9 percent of households earn \$50,000–\$299,000, and 36.2 percent earn \$300,000–\$699,000. Only 24.5 percent of households earn over 700,000, and 13.6 percent over 1,100,000–2,000,000.

This segmentation differs greatly from expenditure trends. Nearly 90 percent of households spend less than 400,000, with 50,000-199,000 (44.4%) and 200,000-399,000 (44.4%) split evenly. Most families spend little, even if their income changes. Upper spending dropped significantly. Only 11 percent of households spent over 400,000, and only 5.5 percent in each of the two highest expenditure levels.

This financial picture displays key points. First, it appears that most families questioned had low incomes and costs. It appears that most live on a budget. Second, the income-expense gap suggests that many households, especially higher-earners, are

frugal. The small but distinct group in the highest income bracket (13.6%) and few people in the same spending categories may indicate that wealthier households are saving a lot or not reporting all their expenses. These financial trends reveal the assessed population's economic reality and spending patterns.

**Figure 4.3 Total Amount of Annual Family Expense**



#### 4.1.4 Item wise Family Expense

**Table 4.4 Items wise Family Expenses**

	Max	Mean	SD	Skewness
Food consumption	500000	15157	61342	6.39
Lentils	50000	6236	5825	4.24
Vegetables	15000	1620	2843	1.96
Fruits	50000	5837	5902	4.42
Spices	20000	4148	3707	1.04
Milk, eggs and meat, oil	120000	6259	17359	5.64
Education	600000	53064	81004	4.63
Health	250000	49935	58460	1.21
Cultural celebration	600000	21579	87236	5.92
Travel and visit	51000	13037	15519	1.56
Donation/gifts	45000	1629	4672	7.66
Land rent	1500000	32963	148033	9.32

**Source:** Field Survey, 2025

The table shows detailed statistical data on household spending in different categories. This helps us understand people's spending habits and financial priorities. The large disparities between the top and lowest scores in all categories illustrate that expenditure varies substantially. Food intake has the largest absolute range (mean: 15,157 vs. max: 500,000), high standard deviation (61,342), and strong right-skewness (6.39). Most households spend fairly, but a few spend a lot. Milk/meat, lentils, and fruits have similar trends (mean 6,236, max 50,000). They all have positive skewness above 4, meaning most households spend less and a few spend more.

Education has the highest average spending (53,064) and the most variation (SD: 81,004), indicating that it is a household budget priority and that people can spend different amounts on it. Health costs are less skewed (1.21) than others, even at 250,000. This shows household medical spending is more evenly distributed. Cultural events (skewness 5.92) and land rent (skewness 9.32), where the maximum of 1,500,000 is much above the mean of 32,963, diverge most. The majority of households pay little for land rent, whereas a few pay a lot. The donation/gifts category has the greatest relative difference (mean 1,629 vs. max 45,000) and skewness (7.66). This implies most households give little, while others give a lot. These patterns suggest that most families spend less on food and more on non-essentials and celebrations, indicating income inequality and varied spending priorities.

#### 4.1.5 Sources of Family Income

**Table 4.5 Annual Family Income**

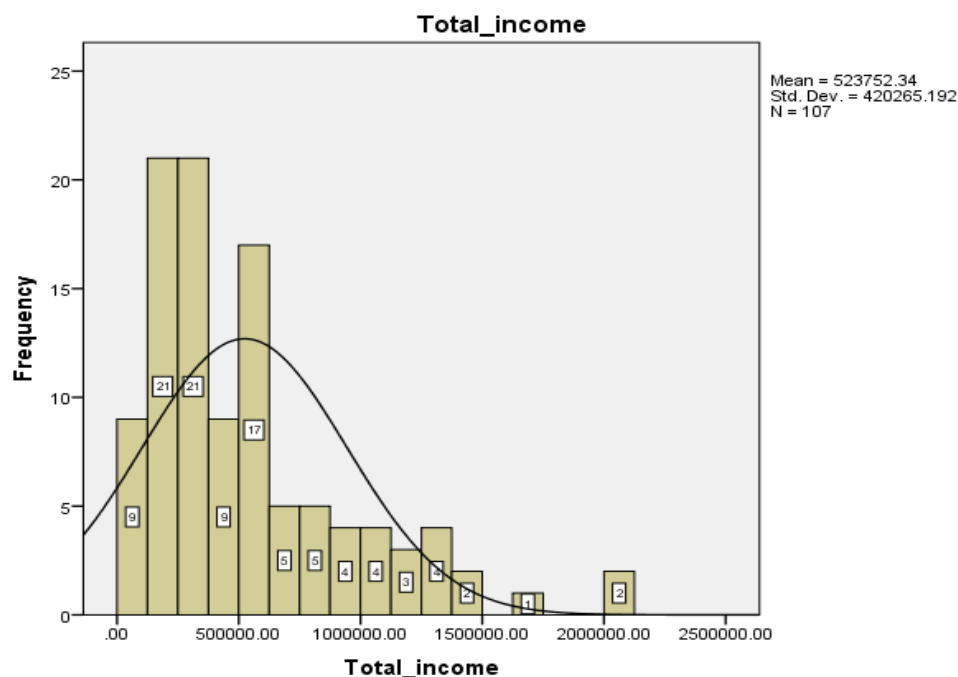
	Max	Mean	SD	Skewness
Agriculture	1500000	164550	215240	3.49
Animal husbandry	500000	30694	74164	5.09
Business	1500000	37685	205492	6.88
Poultry	200000	6861	29279	5.82
Mushroom	50000	1028	6859	7.01
Service	400000	53611	114658	1.95
Remittance	1200000	196759	256688	1.24
Wage labor	300000	15777	51982	4.75
Other	500000	15231	61535	5.673

*Source:* Field Survey, 2025

This table highlights the many ways questioned households make money, and it indicates that how people make money depends on their job. Agriculture is the largest source of income, with a high mean (\$164,550), maximum (\$1,500,000), standard deviation (\$215,240), and positive skewness (3.49). This means that most households earn less than average while a few make more from agriculture. Remittance income, the second largest source of income (mean: 196,759), has a lower skewness (1.24) than other sources despite its high maximum (1,200,000). This shows that remittance earnings are more evenly distributed than other wages.

The table reveals great income inequality in several locations. From 37,685 to 1,500,000, business income varies greatly. It is also significantly right-skewed (6.88), thus most families make little money from business, while a few make a lot. Animal husbandry (skewness: 5.09) and poultry (skewness: 5.82) similarly have low average incomes (30,694 and 6,861) but significant potential returns (500,000 and 200,000). The mushroom industry is the most unequal, with a minuscule mean income (1,028) but extreme skewness (7.01), showing that most earn little but a few very much. The service business has a more even income distribution (mean: 53,611, skewness: 1.95), suggesting a more constant earning potential. Compensation labor has an average compensation of 15,777, but skewness is 4.75, so most workers earn little and a few make a lot. These patterns indicate that most households have multiple minor income sources. Agriculture and remittances are the most common sources of income, however animal husbandry can yield substantial but unequal returns that few people can take advantage of. Most income-generating categories are right-skewed, demonstrating their inequality.

**Figure 4.4 Total Annual Family Income**



**4.1.6 Land Holding Status of the Respondents**

**Table 4.6 Land Holding Status**

	Max	Mean	SD	Skewness
Irrigated land	10	3.26	2.443	0.80
Rainfed land	7	1.57	1.708	1.34
Leasehold land to other	9	1.11	1.614	2.56
Leasehold land from other	7	1.10	1.913	1.68

*Source:* Field Survey, 2025

The table highlights important land ownership and use trends, helping us understand agricultural land distribution. Irrigated land holdings average 3.26 units and can reach 10 units. The variance is =1.34, indicating that most households have little rainfed land, but a few have larger plots. Leasehold land data are the most unequal (SD=2.443) and balanced (skewness=0.80) category. Some families have 10 acres of irrigated land, but most have 3–4 acres, with an even distribution. Rainfed land is more unequal (skewness patterns) and has smaller average holdings (1.57 units, max=7). The average land leased to others is 1.11 units (maximum 9) and the skewness is considerable (2.56). Most households rent little or no property, although a few rent a lot. Renting land from others has an average of 1.10 units (max=7) with a lot of skewness (1.68), making it rare but crucial for some

households.

These patterns reveal crucial land distribution facts: Irrigated land is more evenly distributed than rainfed property, which is rarer and held unevenly. Land leasing is popular among a few households. The fact that leasehold arrangements are more skewed than owned land demonstrates that land rental markets are active but not fairly, with most individuals renting land little and a few households performing a lot of land transactions. It appears that families have more fair access to irrigated land than rainfed land and leasing options.

#### 4.1.7 Involving in Commercial Farming

**Table 4.7 Involving in Commercial Farming**

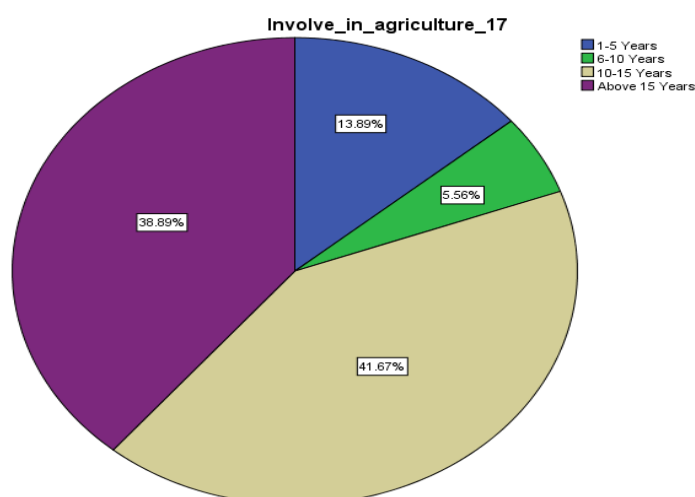
Response	Frequency	Percent
1-5 Years	15	13.9
6-10 Years	6	5.6
10-15 Years	45	41.7
Above 15 Years	42	38.9
Total	108	100.0

*Source:* Field Survey, 2025

The table indicates how long 108 people have been in a group or activity. Many people have been involved for a long period. The majority of respondents (80.6%) have been participating for over 10 years. Of them, 41.7 percent have been involved for 10–15 years and 38.9 percent for over 15 years. The membership is stable and dedicated, with long-term engagement prevalent.

Few respondents are shorter than average. Only 13.9 percent say they've been involved for 1–5 years and 5.6% for 6–10 years. The huge leap from 6-10 year (5.6%) to 10-15 year (41.7%) suggests that there may be important retention milestones around 10 years, when members either continue or stop participating. These patterns indicate a long-term, devoted membership. The fact that 19.5 percent of members have been around for less than 10 years compared to the majority of long-term members may indicate that the group has a hard time recruiting new members or that it keeps individuals interested over time. The data reveals that the group is stable and members stay long-term. This could be because they are happy, have strong social ties, or face major barriers to leaving.

**Figure 4.5 Involving in Farming Occupation**



*Source:* Field Survey, 2025

#### 4.1.8 Family Food Sufficiency

**Table 4.8 Family Food Sufficiency**

Time	Frequency	Percent
< 3months	3	2.8
upto 3month	2	1.9
6-9 month	15	13.9
9-12 month	49	45.4
>12 month	39	36.1
Total	108	100.0

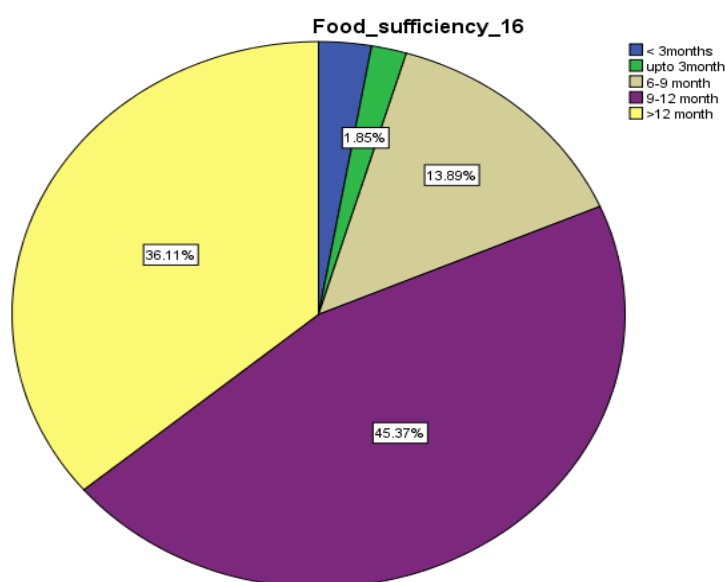
*Source:* Field Survey, 2025

The chart shows how long 108 families could eat. Food security is generally good, however there are some variances. It appears that 81.5 percent of homes have enough food for over 9 months. 45.4 percent have enough food for 9–12 months and 36.1% for more than 12 months. This suggests most of the study's households are food secure and can meet their needs year-round.

However, the data suggests that some worry about food shortages. Food supply times are shorter in 18.5 percent of houses. This includes 13.9 percent of homes with 6–9 months of food and 4.6 percent (5 dwellings) with fewer than 3 months. 2.8 percent of families have less than three months' food, 1.9 percent have more. Food security is normally excellent, although a small but vulnerable group is struggling with insufficient food.

The distribution shows that most households are food sufficient for 9+ months, whereas fewer are in the lower duration categories. Most poll respondents have good farming methods, food storage methods, or can afford food, which may explain this positive bias in food security. Nearly two-thirds (63.9%) of homes achieve food security for at least nine months, and all households acquire food. These results reveal that food security is generally high, but the tiny percentage of people who struggle to receive enough food needs particular attention.

**Figure 4.6 Family Food Sufficiency**



*Source:* Field Survey, 2025

#### 4.1.9 Agriculture Production Trend

**Table 4.9 Trend of Production**

Product	2076 (kg/L)	2077 (kg/L)	2078 (kg/L)	2079 (kg/L)	2080 (kg/L)
Cereal crops	300,000	160,000	150,000	200,000	100,000
Fruits	30,000	50,000	100,000	100,000	500,000
Vegetables	300,000	400,000	450,000	2,000,000	800,000
Meat	100,000	100,000	1,200,000	500,000	100,000
Milk	10,000	50,000	10,000	60,000	70,000
Poultry	10,000	700,000	30,000	40,000	400,000
Others	50,000	80,000	10,000	250,000	1,000,000
<b>Total</b>	<b>800,000</b>	<b>1,540,000</b>	<b>1,950,000</b>	<b>3,150,000</b>	<b>2,970,000</b>

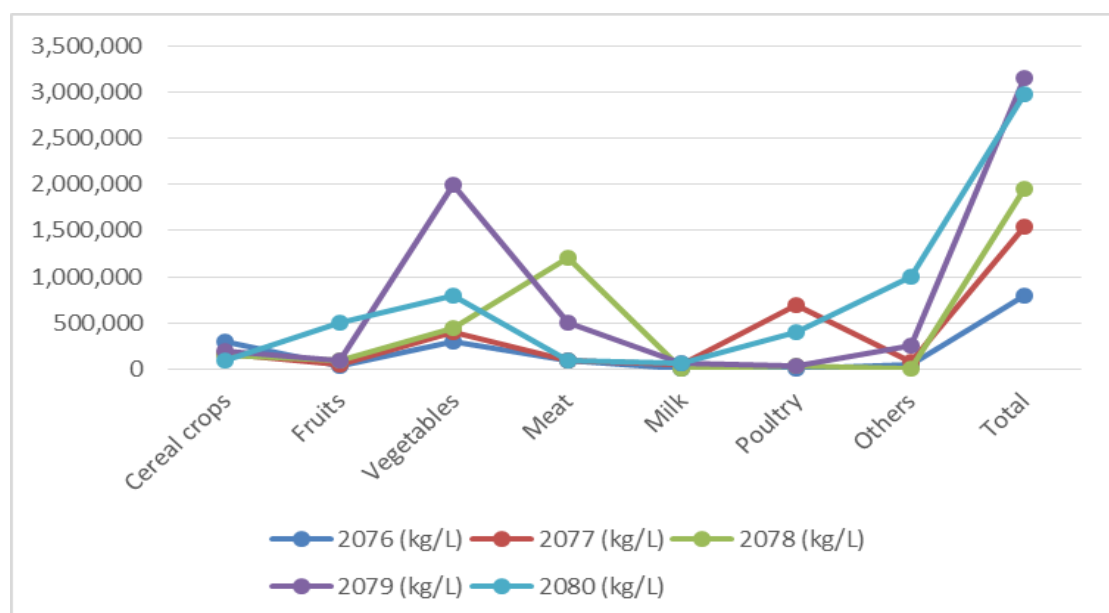
*Source:* Field Survey, 2025

The table presents five-year agricultural production data for seven product categories (2076–2080). This shows that production quantities and composition changed greatly. Overall production increased from 800,000 in 2076 to 2,970,000 in 2080. Between 2077 and 2079, output nearly tripled from 1,540,000 to 3,150,000 units.

Once the most frequent crop (300,000 units in 2076), cereal crops will only have 100,000 units by 2080. This differs from other change-prone groups: Vegetable output rose from 300,000 to 2,000,000 in 2079 and then fell to 800,000 in 2080. After two stable years at 100,000, meat production peaked at 1,200,000 in 2078. Poultry production fluctuated from 10,000 to 700,000 to 400,000. Fruits and "Others" have expanded the most, from 30,000 to 500,000 units (16 times) and 50,000 to 1,000,000 units (20 times).

The data displays some intriguing trends: (1) a shift from cereal production to a wider range of agricultural products; (2) big year-to-year changes in most product categories, possibly due to climate change, market changes, or farming methods; and (3) the rise of vegetables and "Others" as the most popular categories by volume in later years. Milk production is stable compared to other items. Beef and poultry alter the most per year. These changes indicate that farmers are changing their goals, the market is changing, or some places are becoming more productive in these years.

**Figure 4.7 Production Trend**



**Source:** Field Survey, 2025

#### 4.1.10 Cost of Production Trend

Table 4.10 Trend of Cost of Production

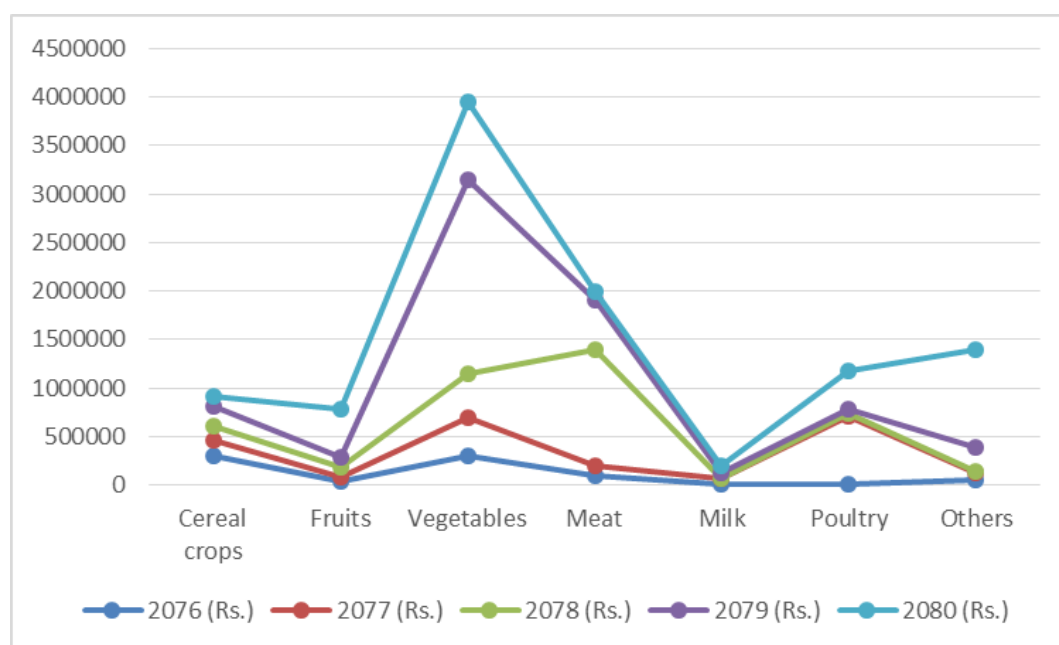
Amount	2076 (Rs.)	2077 (Rs.)	2078 (Rs.)	2079 (Rs.)	2080 (Rs.)
Cereal crops	300000	160000	150000	200000	100000
Fruits	30000	50000	100000	100000	500000
Vegetables	300000	400000	450000	2000000	800000
Meat	100000	100000	1200000	500000	100000
Milk	10000	50000	10000	60000	70000
Poultry	10000	700000	30000	40000	400000
Others	50000	80000	10000	250000	1000000

*Source:* Field Survey, 2025

The table illustrates the Rs. value of seven main agricultural production categories over five years (2076–2080). It reveals farming priorities and market dynamics have changed significantly. Many sectors are unstable, with production value rising from Rs. 800,000 to Rs. 2,970,000 inconsistently. The most valuable sector was cereals, at Rs. 300,000 in 2076. By 2080, its value had decreased to only Rs. 100,000, suggesting people were less interested in staple foods or that grain was difficult to farm. However, vegetable output skyrocketed from Rs. 300,000 to Rs. 2,000,000 in 2079 and Rs. 800,000 in 2080. This suggests it could be profitable and that the market is volatile.

The cattle industry offers fascinating patterns. Meat prices fluctuated, peaking at Rs. 1,200,000 in 2078, twelve times its base value, before falling to Rs. 100,000. This could have been due to short-term market opportunities or illness. Poultry prices fluctuated from Rs. 10,000 to Rs. 700,000 and back. This indicates market instability. Fruits (16-fold rise to Rs. 500,000) and "Others" (20-fold growth to Rs. 1,000,000) grew more steadily, suggesting diversification was successful. Milk production was stable but low. These changes may be caused by consumer demand, climate change, increased input costs, and agricultural laws. Overall, farming is shifting from grain cultivation to more diverse, high-value crops.

**Figure 4.8 Cost of Production Trend**



*Source:* Field Survey, 2025

## 4.2 Knowledge and Skills of the Farmers related to Climate Change Adaptation

### 4.2.1 Medium of Information Collection

**Table 4.11 Medium of Information Collection**

Source	Frequency	Percent
Internet	46	42.6
Radio/TV	41	38.0
Neighbour	15	13.9
Intellectual Person	2	1.9
Newspaper	4	3.6
Total	108	100.0

*Source:* Field Survey, 2025

This table illustrates respondents' main sources of agriculture and climate change information. Online sources are most popular, with 42.6 percent of respondents using them. Digital platforms are becoming more crucial for knowledge dissemination. Radio and TV rank second with 38.0 percent usage. This illustrates that broadcast media is still crucial for information, especially in locations with limited internet access. About 13.9 percent of people get information from neighbors, demonstrating the importance of sharing knowledge. However, intellectuals (1.9%) and newspapers (3.6%) aren't important, suggesting people are depending less on expert advice and print media.

These findings suggest that consumers use both internet and radio/TV media, with neighbors helping. Few read newspapers or consult experts. They may be hard to reach because communication styles are changing. For agricultural extension services or climate awareness campaigns, stakeholders should use internet and radio/TV outreach. Community networks can also help them reach more individuals, especially non-techies.

#### 4.2.2 Issues of Climate Change

**Table 4.12 Issues of Climate Change**

Issues	Frequency	Percent
Less Production	28	25.9
Excessive rainfall/drought rainfall	23	21.3
Low soil fertility	39	36.1
Pesticides	18	16.7
Total	108	100.0

*Source:* Field Survey, 2025

The table illustrates respondents' top farming issues. The most important issue was "low soil fertility," according to 36.1 percent of responders. People are concerned about soil deterioration and fertilizer depletion affecting food yields. Lower agricultural productivity (25.9%) is the second most common complaint, perhaps due to soil fertility or environmental issues. 21.3 percent of respondents indicated irregular rainfall patterns, too much or too little, affected farming. This indicates climate change impacts farming. Also, 16.7 percent of participants reported "pesticide-related challenges," maybe due to concerns about cost, efficacy, or environmental impact.

In the examined area, soil health and climate variability are the key factors preventing farming productivity. Sustainable soil fertility practices like organic matter and crop rotation and water management could help solve these issues. Integrated pest management (IPM) may affect pesticide answers. In general, the research advises focused activities to make people more resilient to these interrelated agricultural challenges.

### 4.2.3 Experiencing Climate Change

**Table 4.13 Experiencing Climate Change**

Experience	Frequency	Percent
Coldness	10	9.3
Hotter days	16	14.8
coldness and Hotter days	82	75.9
Total	108	100.0

*Source:* Field Survey, 2025

The table shows how people have dealt with changes in temperature, which shows that climate conditions have been changing over time. A large majority (75.9%) said they have experienced both cold and hot days, which shows that there was a clear change between very hot and very cold days. On the other hand, a smaller number of people talked about isolated experiences, with 14.8 percent saying they only had hotter days and 9.3 percent saying they only had chilly days.

These results show that the most common climate experience in the area questioned is not steady warming or cooling, but rather "unpredictable and contrasting temperature patterns." The fact that so many people saw both extremes (cold and hot) could mean that the temperature is becoming more variable, which could be linked to changes in the environment as a whole. The data shows that we need to come up with flexible plans to deal with these sudden changes in temperature, which could affect farming, health, and daily life.

### 4.2.4 Effect of Climate Change

**Table 4.14 Effect of Climate Change**

Effects	Frequency	Percent
Huge Rainfall	50	46.3
Increase in Ocean Waves	4	3.7
Increased erosion	2	1.9
Low Rainfall	18	16.7
Rise in Temperature	4	3.7
Dying of Trees	2	1.9
Rise of Sea Temp	4	3.7
Dying of animals and Plants	24	22.2
Total	108	100.0

*Source:* Field Survey, 2025

The table shows the poll results from 108 people who said they thought the environment was affected in some way. The biggest worry is "Huge Rainfall," which was mentioned by almost half of the people who took the survey (46.3%). This shows that too much rain is a big problem in the area that was studied. Next is "Dying of animals and plants" (22.2%), which suggests a big loss of biodiversity, either because of changing climate conditions or habitat loss. "Low Rainfall" is the third most common effect (16.7%), showing that some people are worried about conditions that are like droughts. A tiny number of people ( $\leq 3.7\%$ ) also said that things like "increased erosion," "dying of trees," "rise in temperature," "rise in sea temperature," and "increase in ocean waves" had happened. This means that these problems are either less obvious or less urgent than excessive rainfall and ecological deterioration. The data shows a clear pattern: respondents' biggest environmental worries are extreme weather events (both excessive and low rainfall) and damage to the environment (loss of animals and plants). The fact that other effects happen less often may mean that they are either limited or not seen as serious. In general, the results show that we need climate adaptation measures that deal with unpredictable rainfall and protect biodiversity.

#### 4.2.5 Perceived Attitude on Climate Change

**Table 4.15 Perceived Attitude on Climate Change**

Items	Min-Max	Mean	SD	Skewness
The world is concerned about climate change	1-5	2.50	1.13	0.70
Changes in average weather conditions constitute climate change	1-5	2.62	0.97	0.90
Due to climate change, global temperatures are rising	1-5	2.79	1.07	0.34
Climate change causes holes in the ozone layer	1-5	2.77	1.22	0.14
Deforestation is a cause of climate change	1-5	2.76	1.18	0.31
Excessive use of chemical fertilizers causes climate change	1-5	2.69	1.05	0.55
Industrial pollution contributes to climate change	1-5	3.02	0.99	0.37
Poor waste management leads to climate change	1-5	2.55	1.15	0.49
Climate change increases pest attacks on crops	1-5	2.54	1.04	0.56
The world is concerned about climate change	1-5	2.67	1.03	0.48

**Source:** Field Survey, 2025

Based on multiple claims assessed on a 1-5 Likert scale (presumably from Strongly Disagree to Strongly Agree), the table presents descriptive statistics on climate change

attitudes. People agree with climate change statements neutrally to moderately favorably, with average ratings between 2.50 and 3.02. Among responders, the highest mean agreement ( $3.02 \pm 0.99$ ) indicates that industrial pollution is primarily caused by humans. It's notable that all items have positive skewness (0.14–0.90), meaning replies tend to score lower (moderate disagreement). Responses varied somewhat, with the ozone layer perceptions (1.22 SD) being the most different. The item with the highest disagreement ("world's concern about climate change" appearing twice with different means: 2.50 vs. 2.67) may indicate inconsistent replies or question order. The clustered averages at the middle of the scale (2.5–2.8 for 7/10 items) indicate that climate change views are mixed or unclear, and no statement received strong agreement. A systematic positive skew shows that respondents rated agreement lower more often. This group may be skeptical or unfamiliar about climate change. These patterns suggest that we need specialized climate communication activities to fill knowledge gaps, particularly on how the ozone layer functions (which has the highest variation) and how waste management is connected (which has the least mean agreement at 2.55).

#### 4.2.6 Affecting Factors for Climate Change

Table 4.16 Affecting factors for Climate Change

N.	Statements	Yes	Percent
1	Lack of access to sufficient information on crop adjustment strategies	40	37.0
2	Limited government plans related to climate risk management	84	77.8
3	Agricultural land being far from residential areas	85	78.7
4	Inadequate technology for climate forecasting	74	68.5
5	Lack of supportive institutional facilities	97	89.8
6	Unavailability of agricultural labor on time	86	79.6
7	High cost of fertilizers, seeds, and agricultural inputs	101	93.5
8	High irrigation costs	88	81.5
9	High land purchase or rental prices	91	84.3
10	Lack of awareness about institutional sources for agricultural production	86	79.6
11	Lack of storage facilities for agricultural materials	87	80.6
12	Issues in price determination and market commercialization	70	64.8

**Source:** Field Survey, 2025

The table shows the answers to a survey on the main problems farmers face. Each problem is marked with a "Yes" or "No" and the percentage of people who said "Yes"

is shown next to it. The most important issue is the high cost of fertilizers, seeds, and agricultural inputs, which 93.5 percent of respondents said was a substantial financial obstacle to farming. Following closely are "lack of supportive institutional facilities" (89.8%), "high land purchase/rental prices" (84.3%), and "high irrigation costs" (81.5%), which show that there are problems with resources and infrastructure on a larger scale.

Labor shortages and logistical problems are also big problems. For example, agricultural land is remote from residential areas (78.7%) and agricultural labor is hard to get (79.6%). Also, limited government strategies for climate risk management (77.8%) and inadequate climate forecasting technology (68.5%) show that farmers don't have enough support to adapt. Storage and market-related problems, like lack of storage facilities (80.6%) and issues in pricing determination/market commercialization (64.8%), make it even harder for agriculture to be sustainable. Overall, the data shows that there are a mix of financial, institutional, and infrastructural bottlenecks, with high costs and limited institutional backing being the biggest problems. To properly support farmers, we need to subsidize inputs, develop infrastructure, boost climate adaptation measures, and strengthen market mechanisms to deal with these problems.

#### **4.2.7 Case Study**

Altogether three case study are presented in this section. These case studies reveal common themes: the value of blending traditional and modern knowledge, the gap between policy and practice, and the power of collective action in building resilience. However, they also expose persistent barriers—limited market access, funding shortages, and weak governance—that hinder effective adaptation. To address these, recommendations include strengthening local institutions, improving funding transparency, and integrating climate adaptation with broader rural development strategies, ensuring farmers like Sani, Sundar, and Sanu can thrive in an uncertain climate future.

#### **4.2.7.1: Adaptation through Resilient Farming**

*The resiliency of local communities in the face of climate change is exemplified by Sani Kanchhi Danuwar, a farmer from the Panchkhal Municipality. Traditional farming is in danger as a result of the severe changes in weather patterns that she has witnessed, along with many other people in her area. These changes include unexpected rains, protracted droughts, and rising temperatures. However, rather than giving in to these problems, Sani and her farmer's group have adapted by combining traditional knowledge with contemporary methods in order to adapt. They continue to grow drought-resistant crop varieties that have been passed down from generation to generation, while also adopting modern farming techniques such as tunnel farming and percolation ponds, which they learnt from learning programs offered by the government. Even though these attempts have been made, Sani draws attention to a significant gap: when adaptation techniques boost yields, farmers struggle to gain access to markets due to inadequate transportation and increasing price rivalry. Her experience highlights the significance of not just offering training on climate adaptation but also tackling systemic impediments such as infrastructure and market linkages in order to guarantee the long-term viability of the endeavor.*

#### **4.2.7.2: Struggle to Implement Climate Adaptation**

*The elected representative, S. Adhikari is well-versed in climate policies, and he makes reference to frameworks such as the United Nations Framework Convention on Climate Change and Nepal's National Adaptation Plan. However, he is confronted with enormous challenges when it comes to putting these principles into operation. Despite the fact that his agency is responsible for organizing farmer trainings, soil testing, and adaptation workshops, progress is hampered by inconsistencies in funding, political instability, and a lack of cooperation between different levels of government. There is still a lack of structural assistance, despite the fact that farmers in his area have individually adopted practices such as multi-cropping and improvements to irrigation. There is a tangible sense of irritation emanating from Adhiakri: "We have the plans, but without budget and trust, implementation fails." His experiences shed light on a significant gap that exists between national climate strategies and the implementation of such strategies at the grassroots level. This underscores the necessity of decentralized decision-making, transparent finance distribution, and strengthened local government in order to bridge this gap.*

### 4.2.7.3: Collective Action Builds Climate Resilience

*The path of S. M. Danuwar exemplifies how knowledge and the ability to work together as a community can transform climate-related concerns into opportunities. After suffering agricultural losses for a number of years as a result of unpredictable weather, she participated in a training program that was run by the ward. This program educated her on climate-resilient methods such as trellised crops and seasonal water management. Using these techniques, she was able to not only bring her farm back to life but also improve her income by expanding the kind of products she produced. Having said that, Sanu acknowledges that the outcomes of individual efforts are limited. Currently, she is an advocate for collective action, and she encourages farmers to establish cooperatives in order to enhance their bargaining power in the market. "Trainings gave us tools, but real change comes when we work together," she explains further. Her tale demonstrates that adapting to climate change involves more than just technical expertise; it also requires community organization, access to resources, and policies that empower small-scale farmers rather than leaving them to negotiate systemic problems on their own.*

## 4.3 Climate Change Adaptation Practices Practicing by the Farmers

### 4.3.1 Perceived Impact of Climate Change

Table 4.17 Perceived Impact of Climate Change

Response Category	Frequency	Percent
Loss in Capital	20	18.5
Loss of Animals	8	7.4
Loss in Agriculture Production	42	38.9
Low in Remittance	7	6.5
Health Issues	12	11.1
Low availability of Drinking Water	4	3.7
Neutral	7	6.5
Others	8	7.4
Total	108	100.0

**Source:** Field Survey, 2025

This table displays how the 108 respondents handled various issues, revealing their socioeconomic vulnerabilities. Agricultural output losses account for 38.9 percent of reported issues. This is the largest issue for polled people. This high percentage suggests that weather, pests, and market shifts may be affecting farming communities.

After agriculture, capital loss is the second most common concern (18.5%), which may indicate economic instability or business bankruptcies.

Additionally, 11.1 percent of people have health issues. This may reduce productivity and life quality. Even though animal loss is rare (7.4%), it affects farming economies' livelihoods. It's noteworthy that remittance reduction (6.5%) and water shortages (3.7%) seem less critical, but they typically worsen other issues. "Neutral" (6.5%) and "Others" (7.4%) indicate that a small number of persons have no main issues or issues not covered in the preset categories.

The majority of people are struggling with unreliable agriculture and losing money, while health and resource availability are less essential. Although the high rate of production losses recommends agricultural interventions, the vast range of other challenges illustrates that community development must be handled from multiple sides. Many specific, measurable difficulties (as opposed to indifferent responses) illustrate how real the problems are for this group.

#### 4.3.2 Perceived Family Migration Due to Climate Change

Table 4.18 Perceived Family Migration due to Climate Change

Response	Frequency	Percent
Yes	14	13.0
No	94	87.0
Total	108	100.0

*Source:* Field Survey, 2025

A fairly one-sided binary response pattern from 108 respondents is shown in the table. About 87 percent of respondents (n=94) chose "No," while 13% (n=14) chose "Yes." This big discrepancy suggests that the habit, condition, or characteristic surveyed is unusual or unpopular in this group.

The nearly universal "No" answers could signify many things. Good features like "Do you have access to healthcare?" would indicate a deficit. The data may reflect favorable conditions if it looked at undesirable outcomes (such "Have you been food insecure?"). The few "Yes" replies may be outliers or reporting errors, therefore they need extra attention. The affirmative group's small size (n=14) makes a thorough research difficult without demographic breakdown.

This reaction pattern greatly impacts data interpretation. They had 9 negative responses for every excellent response, thus they should verify if the question was interpreted correctly or if social desirability bias affected the results. These results would either indicate that a problem was avoided (if "No" is intended) or that adoption/access is severely lacking (if "Yes" is desired). Standard statistical tests may not work with skewed data, so be careful. More research is needed to determine why this feature is so rare and whether its measurement adequately reflects the complicated facts behind the yes/no dichotomy.

### 4.3.3 Involving in Awareness Raising Program

Table 4.19 Involving in Awareness Raising Programs

Response	Frequency	Percent
Government	55	50.9
Non-Government	17	15.7
United Nations	1	.9
No	35	32.4
Total	108	100.0

*Source:* Field Survey, 2025

The table shows how 108 participants answered institutional preferences or links. Institutional confidence or engagement is highest in government agencies. A surprising 50.9 percent of respondents (n=55) chose government institutions, indicating that they greatly like, rely on, or trust them. This preference implies that government entities are crucial in every scenario, whether it was providing services, implementing policies, or developing public trust.

With 15.7 percent (n=17), NGOs are the second most frequent response. This is far fewer than government options, but some exist. It's intriguing that 0.9 percent of persons are UN members (n=1). This could indicate that the UN doesn't accomplish much in the survey area or that individuals rarely interact with UN initiatives. 32.4 percent (n=35) picked "No," which could suggest they don't belong to any institution or had terrible experiences with all the possibilities.

Government agencies lead, NGOs play a reduced role, and international organizations like the UN have little direct public involvement. A large "No" category suggests that some may not be interested in or satisfied with institutional solutions. Government preference (50.9%) is much higher than all other groups (49.1%), demonstrating its

importance in this institutional environment. These tendencies may indicate that individuals have historically trusted government processes, that some institutions are easier to access, or that some companies are superior at providing services.

#### 4.3.4 Perceived Adaptation in Seasonal Basis

Table 4.20 Perceived Adaptation in Seasonal Basis

Response Category	Frequency	Percent
Can adapt according to weather	11	10.2
Climate Related only	6	4.6
Nothing can be done against climatic season	51	47.2
Unable to adapt to Weather	7	6.5
Yes Adopt to Climate	25	23.1
Yes, Change According to weather	6	4.6
Yes, village situation is good.	2	1.9
Total	108	100.0

*Source:* Field Survey, 2025

Poll results on community adaptability to climate change are shown in the table. How people see and adapt varies greatly. Fatalists 47.2 percent (n=51) believed "Nothing can be done against climatic season." This shows that many believe climate is susceptible or that adaptation is difficult. This answer suggests that many community members believe they can't fix climate change. This may be due to major weather disasters or a lack of resources to adapt.

Only 23.1 percent (n=25) indicated they could adapt ("Yes Adopt to Climate"), while 10.2 percent (n=11) said they could adapt to shifting weather patterns. The combination of negative answers is telling: more than 58 percent of respondents think they are vulnerable to climate change, including "Unable to adapt" (6.5%), "Climate Related only" (4.6%), and the biggest fatalistic group. The low "village situation is good" rate (1.9%) adds to concerns.

Three primary stories emerge from the answer distribution: Nearly half of respondents felt climatic determinism, one-third had a moderate but considerable ability to adapt, and small groups were either very sensitive to climate change (4.6%) or utterly unable to adapt (6.5%). These trends may indicate disparities in how successfully communities adapt, access technologies and information, and are affected by climate change. The results suggest we need concentrated adaptation strategies that address material and psychological climate resilience hurdles.

### 4.3.5 Participated in Skill Development Training

Table 4.21 Participated in Skill Development Training

Response Category	Frequency	Percent
Seed preparation training	23	21.3
Agriculture Training 15 days	4	3.7
Agriculture training 6 days municipality	1	.9
Agriculture Training 7 Days	1	.9
Agriculture Training by Govern	3	2.8
Agriculture Training for 3 Day	1	.9
Agriculture, 3 Day by Municipality	1	.9
IPS, 1 week Krishni knowledge	2	1.9
No	67	62.0
Onion Trraining for 3 Month	5	4.6
Total	108	100.0

*Source:* Field Survey, 2025

The table illustrates how many of the 108 respondents received agricultural training, indicating low interest in capacity-building. An alarming 62 percent (n=67) had never received agricultural extension training, indicating a dearth of information and services. Participants preferred seed preparation training (21.3%, n=23). This may indicate that it is the most accessible or crucial intervention.

Most other training programs enroll 1–5 participants. Only 6.5 percent reported 3- to 7-day training sessions. A mere 4.6 percent had the 3-month onion training. Because replies are spread out among several categories with identical wording (for example, different 3-day trainings), training services may be fragmented, either because they come from different suppliers (municipal vs. government) or because programs are not standardized.

In this agricultural community, (1) most farmers don't get formal training, (2) the few programs that do exist only target a limited number of people, and (3) the length and type of training vary widely without any clear dominating patterns. Farmers may prefer seed training over other programs due to a lack of supply or a desire to learn more about seeds. The high rate of non-participation raises important questions about why people can't access programs, how relevant they are, and how informed they are.

These trends suggest that agricultural extension programs should be more organized, extensive, and possibly longer to increase farmers' skills.

### 4.3.6 Changing Cultivation Pattern

Table 4.22 Changing Cultivation Pattern

Response	Frequency	Percent
Yes	45	41.7
No	63	58.3
Total	108	100.0

*Source:* Field Survey, 2025

The table shows the binary response distribution from 108 people. It shows that there is a moderate split in opinion on what seems to be an important survey topic. The statistics show that 58.3 percent (n=63) of the people who answered said "No," while 41.7 percent (n=45) said "Yes." This means that there was a small but significant majority. This almost even split shows that the subject at hand is either a real point of contention or a situation that naturally splits the public into two large parties.

The distribution has a number of major effects. The first thing to note is that the large number of "Yes" replies (41.7%) shows that the thing being measured is neither uncommon or ubiquitous, but rather impacts a large number of people. Second, the 16.6 percentage-point disparity between the two groups shows that there may be underlying characteristics, such as demographic, geographic, or socioeconomic ones, that consistently set apart those who would say yes from those who would respond no. Depending on the context of the question, the balance of responses could mean different things. If "Yes" meant a good outcome (such getting access to resources), the data would show that the goal was only partially met. On the other hand, if "Yes" meant an issue (like not having enough food), it would show that there are many problems, but not all of them. Because the two groups are almost evenly split, they are both useful for analysis because neither is a tiny outlier population. This pattern makes it especially important to look into what sets the two answer groups apart and if the observed split is due to intentional choices, unequal access, or different experiences within the community.

### 4.3.7 Changing Crop Verities

Table 4.23 Change Crop Verities

Response	Frequency	Percent
Yes	22	20.4
No	86	79.6
Total	108	100.0

*Source:* Field Survey, 2025

The table shows that 108 people answered a yes or no question in a way that was very uneven. The data shows that the vast majority (79.6%, n=86) said "No," while only a small number (20.4%, n=22) said "Yes." This 4:1 ratio shows that the thing being assessed is either rare, hard to get to, or not wanted by this group of people. There are a number of ways to look at this distribution. First, if "Yes" means a good outcome (such getting resources or using good practices), the data show that there are big disparities in availability or uptake, with only one-fifth of respondents getting any benefit. On the other hand, if "Yes" means a bad situation (like going through a hard time), the data demonstrates that the problem impacts a significant minority but is still rare overall. The small but important "Yes" group (22 responders) needs special attention. The substantial skew in the distribution suggests that more research should look into what makes the affirmative responses different from the majority. The findings may be due to structural problems, a lack of information, or cultural factors that make whatever "Yes" means less common. This trend could mean either successful prevention (if "No" is desired) or worrying exclusion (if "Yes" is desired) for policymakers. This shows how important it is to look at the underlying question in its own context.

### 4.3.7 Agriculture Labor Market

Table 4.24 Agriculture Labor Management

Response	Frequency	Percent
Inside the Family	18	16.7
Outside the Family	9	8.3
Both	81	75.0
Total	108	100.00

*Source:* Field Survey, 2025

Social or economic relationship replies are in table. Individuals want to stay in touch with family and non-family. The majority (75%, n=81) answered "Both," suggesting

family and non-family activities. This suggests most individuals of this group have balanced social and economic relationships.

Other responses indicate a second familial ties choice. 8.3 percent (n=9) chose "Outside the Family" entirely, while 16.7 percent (n=18) chose "Inside the Family". People who limit their connections value family over other relationships. These findings may suggest society favors family and community/work interactions. Some "Outside only" responses suggest that external networks may not work well or be popular locally. These societies have many links and prioritize family when making decisions, according to study.

#### 4.3.8 Practicing Tunnel Farming

**Table 4.25 Practicing Tunnel Farming**

Response	Frequency	Percent
Yes	22	20.4
No	86	79.6
Total	108	100.0

*Source:* Field Survey, 2025

The table shows 108 people's binary responses. Most (79.6%, n=86) answered "No," while a small minority (20.4%, n=22) said "Yes." This large disparity indicates that the thing being measured is scarce, hard to reach, or socially unacceptable in this group. Findings can indicate different things depending on the query. If "Yes" signifies a good result, the low percentage may indicate that few people use the service. If "Yes" signifies a bad condition, the data suggests few are impacted. The 22 good remarks are crucial since they may be from early adopters or special needs people. This distribution suggests that survey respondents may have different access, awareness, or acceptance. Most replied "No" suggesting the feature is rare. The pattern suggests deeper research into what distinguishes the two groups and if systemic barriers, cultural norms, or measuring errors cause the discrepancy. The results can be used to design efforts to boost "Yes" outcomes or address minority responses.

### 4.3.9 Off Season Farming and Sale

**Table 4.26 Off Season Sale**

Sale	Frequency	Percent
0	57	52.77
25000-99000	11	10.18
100000-250000	13	12.03
500000-699000	14	12.96
700000-1000000	13	12.03
Total	108	100.00

**Source:** Field Survey, 2025

The table shows how the 108 respondents' sales quantities were spread out, which shows that economic activity is split. A stunning majority (52.77%, n=57) said they didn't make any sales (0 value), which could mean that there was no commercial activity at all or that this group didn't report accurately. There is a fairly even spread of the remaining respondents across four sales tiers. The lowest tier (25,000–99,000) has 10.18 percent (n=11), the mid-range (100,000–250,000) and high-range (700,000–1,000,000) categories each have 12.03 percent (n=13), and the upper-mid range (500,000–699,000) has slightly more (12.96%, n=14). This distribution implies that the economy is split in two, with slightly less than half of respondents (47.23%) doing meaningful sales work. No one sales tier stands out among active sellers. The lack of respondents in the 250,001 to 499,999 range makes for an interesting gap in the data. This could mean that there is a natural limit or a psychological pricing barrier. The fairly even distribution of active sellers across the four tiers suggests that businesses come in a variety of sizes and that there isn't a distinct focus on any one level. The data could show that entrepreneurs have different sizes of businesses or that sales success changes with the seasons. The large group of people who didn't sell anything needs special attention to figure out if they are not participating in markets or just taking a break.

### 4.3.10 Adaptation Strategies for reducing impact of Climate Change

Table 4.27 Adaptation Strategies for reducing Impact of Climate Change

Response	Frequency	Percent
Change the Pattern of Crops	28	25.9
Change the Breed of Animals	32	29.6
Greenhouse	19	17.6
Crop Rotation	7	6.5
Water Collection	6	5.6
Other	16	14.8
Total	108	100.0

*Source:* Field Survey, 2025

The table shows the agricultural adaptation tactics used by 108 farmers. It shows that they all have different ways of adjusting how they farm. Changing the breeds of animals (29.6%) is the most popular technique, followed closely by changing the patterns of crops (25.9%). This shows that farmers put genetic and structural changes to their production systems first. A sizable minority (17.6%) of people choose to adopt greenhouses, which suggests that they are interested in controlled environment agriculture. Crop rotation (6.5%) and water collection (5.6%) are less popular than more traditional approaches, although a significant number of people (14.8%) use "Other" adaptations that aren't named. This distribution shows that farmers prefer new biological and technical methods to traditional farming methods. This could be because of climate change or market pressures. The fact that breed and crop patterns are changing shows that people are focusing on genetic answers. On the other hand, the fact that greenhouses are being used shows that people are prepared to use expensive technology when they are useful. The large "Other" category shows that there are other adaptive measures that the survey didn't include, thus more research is needed to find these other techniques.

### 4.3.11 Making Tree Shadow

Table 4.28 Making Tree Shadow

Response	Frequency	Percent
Yes	28	26.00
No	80	74.10
Total	108	100.0

*Source:* Field Survey, 2025

The table shows the responses of 108 people, with a large majority (74.1%, n=80) saying "No" and a lesser number (26%, n=28) saying "Yes." This ratio of almost 3:1 means that the behavior or condition being looked at is not very common in this group of people. The results could mean that the "Yes" phenomenon doesn't happen very often, or that there are obstacles that make it harder for more people to use it. The 26 percent of people who said "Yes" is still a significant enough group to pay attention to, whether they are a susceptible group (if "Yes" means a problem) or early adopters (if "Yes" means a good outcome). The distribution shows a clear split in the population, which could be due to socioeconomic circumstances, gaps in knowledge, or structural barriers that make it hard to get involved or participate. Note: Because of rounding, the overall percentage adds up to 100.1 percent.

#### 4.3.12 Agricultural Practices of the Communities

Table 4.29 Agricultural Practices of the Communities

	Min-Max	Mean	SD	Skewness
Fragmenting land into small plots	1-5	2.40	1.05	0.49
Practicing diversified land use	1-5	2.75	1.12	0.27
Increasing irrigation	1-5	3.09	1.21	-.37
Engaging in non-farming employment	1-5	3.30	1.13	-.68
Working to increase agricultural production	1-5	3.05	1.19	-.05
Using chemical fertilizers	1-5	3.33	1.13	-.76
Using organic manure	1-5	3.62	1.10	-.83
Practicing organic farming	1-5	3.76	0.80	-1.92
Planting trees/saplings	1-5	3.69	1.15	-1.11
Providing shade to plants	1-5	3.59	.97	-1.30
Practicing mulching	1-5	3.19	1.21	0.18
Modifying land shape/size	1-5	2.97	1.22	-.10
Fragmenting land into small plots	1-5	3.23	1.04	-.18

**Source:** Field Survey, 2025

The table presents Min-Max values, mean scores, SD, and skewness for different agricultural systems. Each practice's mean score ranges from 1 (Strongly Disagree) to 5 (Strongly Agree).

They have low mean scores because few individuals practice "Fragmenting land into small plots" (Mean = 2.40, SD = 1.05) and "Practicing diversified land use" (Mean = 2.75, SD = 1.12). The minor positive skewness increases their support. "Using organic manure" (Mean = 3.62, SD = 1.10), "Practicing organic farming" (Mean = 3.76, SD =

0.80), and "Planting trees/saplings" (Mean = 3.69, SD = 1.15) have higher mean scores, indicating greater use. The negative skewness indicates most replies favor higher agreement.

Activities like "Increasing irrigation" (Mean = 3.09, SD = 1.21) and "Engaging in non-farming employment" (Mean = 3.30, SD = 1.13), which exhibited a small negative skewness, indicated that respondents agreed more. Chemical fertilizers (Mean = 3.33, SD = 1.13) are widespread, but their negative skewness suggests more people agree with them. The standard deviations show that "Practicing mulching" (SD = 1.21) and "Modifying land shape/size" (SD = 1.22) are more widespread. Skewness levels indicate asymmetric response distributions. Most practices favor adoption (negative skewness), but land fragmentation and diverse land use are slightly favorable.

Sustainable approaches like organic farming and tree planting are gaining popular. Fragmentation and land use diversity are rare. The data also demonstrates a trend toward non-farming jobs and effective farming methods.

#### 4.3.13 Adaptation Strategies of the Communities

Table 4.30 Adaptation Strategies of the Communities

Categories	Frequency	Percent
Change Cultivation Date	13	12.0
Change types of Crops	15	13.9
Change the breed of Crops	22	20.4
Crops to Animals	9	8.3
Animal to Crops	2	1.9
Less Animals	2	1.8
Irrigation use	14	13.0
Using trees leaves for Shadow	8	7.4
Chemial Manuare and insecticides	23	21.3
Total	108	100.0

*Source:* Field Survey, 2025

The table shows different ways that 108 farmers have adapted their farming operations, showing clear patterns in how they are changing. Chemical fertilizers and insecticides are the most common adaptations, identified by 21.3 percent of respondents. This suggests that they rely heavily on agricultural inputs to boost productivity or fight pests. Changing crop breeds (20.4%) comes in second, showing that farmers are willing to try out or accept better types.

Changing the types of crops grown (13.9%) and the dates for planting them (12.0%) are two important tactics that show how farmers are changing to meet changing weather or market needs. Another important change is the usage of irrigation (13.0%), which is probably a way to deal with problems with getting enough water. Switching between crops and animals (8.3% crops to animals, 1.9% animals to crops) and lowering the amount of livestock (1.8%) are examples of more revolutionary adjustments that have not been widely adopted. Using tree leaves for shade (7.4%) seems like a conventional, low-tech way to adapt. This pattern shows that farmers would rather make little, controllable changes than big, radical ones. They are especially interested in solutions that promise to have an immediate effect on yields. The widespread use of chemicals may raise worries about sustainability, but the few changes made to livestock may suggest that animal husbandry conditions are stable or that people don't want to change this sector.

#### 4.3.14 Change Land Use Pattern for Adaptation

Table 4.31 Changing Land Use Pattern for Adaptation

Response	Frequency	Percent
Yes	11	9.3
No	97	82.2
Total	108	100.0

*Source:* Field Survey, 2025

The table shows that the 108 participants' binary replies were quite unevenly distributed. A large majority (82.2%, n=97) said "No," while a small minority (9.3%, n=11) said "Yes." This ratio of almost 9:1 suggests that the thing being measured is either very rare, hard to get to, or something that the people being questioned purposefully avoid. The few "yes" answers (less than 1 in 10 participants) could mean a lot of things. If "yes" means a good outcome (like getting access to resources), it means that there are big problems with availability or adoption. If "yes" means a bad condition (like going through hard times), it means that the problem is rare but still there. The big difference of 72.9 percentage points between the two responses shows that most people agree, and the minority "Yes" responses could be due to unusual situations, small groups of people who are not well-represented, or mistakes in reporting. This abnormal distribution calls for an examination into whether institutional barriers, lack of information, or cultural issues explain the almost universal negative responses. The tiny number of people who said yes may need

special attention since they are outliers or susceptible cases. Please check the data for accuracy because there seems to be an 8.5 percent difference (100% - 82.2% - 9.3%) in the total percentages given.

#### 4.3.15 Perceived Organization for Adaptation Assistance

Table 4.32 Perceived Organization for Providing Adaptation related Assistance

	Frequency	Percent
Nepal Government	93	86.12
INGOs	11	10.18
NGOs	4	3.70
Total	108	100.00

*Source:* Field Survey, 2025

The table shows how 108 people chose or were affiliated with different institutions. It shows that Nepal Government entities were by far the most popular. A huge majority of respondents (86.12%, n=93) said they agreed with or relied on government institutions. This suggests that people strongly trust, depend on, or favor state-led efforts. This overwhelming government affiliation is much bigger than any other type of institution. For example, international non-governmental organizations (INGOs) only made up 10.18 percent (n=11) of the replies, and local NGOs only made up 3.70 percent (n=4). The almost 9:1 ratio of government to non-government connections shows how important state institutions are in this case, whether it's for delivering services, making policies, or building public trust. It's especially interesting that there aren't many NGOs represented. This could mean that they don't reach out to enough people, don't have enough resources, or that people don't know about non-governmental options. This distribution is likely a result of how governments have historically governed, how far their institutions stretch, and maybe even how much resources are available to government and non-state actors. The results reveal that government bodies are the most important institutions, while foreign organizations play a less important role and local NGOs are not very important in the experiences or preferences of the people who answered. In this case, these kinds of patterns could help make strategic choices about how to allocate resources, develop partnerships, and offer services.

#### 4.3.16 Case Study

Two case studies are presented in this section. Both cases illustrate the importance of blending traditional knowledge with modern techniques, while also emphasizing the need for policy interventions to address financial and infrastructural constraints.

##### 4.3.16.1: Local Solutions for Water-Scarce Farming

*In Panchkhal Municipality, farmers like R. Aryal and S. Aryal have faced increasing challenges due to unpredictable rainfall patterns. Years of farming experience taught them that traditional rain-fed agriculture was no longer reliable. To combat water scarcity, the Panchakanya farmer's group adopted several adaptation strategies, including constructing percolation ponds to recharge groundwater and implementing drip irrigation systems for efficient water use. Additionally, they shifted to drought-resistant crop varieties such as millet and sorghum, which require less water than traditional maize crops. The group learned these techniques through agricultural training programs organized by the local government and NGOs. While these measures have improved crop resilience, challenges remain, particularly in accessing advanced irrigation technology and securing consistent market prices for their produce. Despite these hurdles, the farmers' proactive approach demonstrates how localized water management strategies can mitigate climate risks, even in resource-constrained settings.*

##### 4.3.16.2: Tunnel Farming Builds Climate Resilience

*K. Danuwar and H. K. Tamang, smallholder farmers in Kavrepalanchowk, have turned to tunnel farming as a solution to extreme temperature fluctuations and unseasonal frost. After witnessing repeated crop failures, they adopted this method, which involves growing vegetables under protective plastic covers to regulate temperature and moisture. This technique not only extends the growing season but also reduces pest infestations and water loss.*

*The farmers initially learned about tunnel farming through a government-led pilot project and later received hands-on training from agricultural experts. Today, they grow high-value crops like tomatoes and cucumbers year-round, significantly boosting their income. However, the high initial cost of materials and lack of subsidies for small-scale farmers remain barriers to wider adoption. Their success highlights how innovative farming techniques can enhance climate resilience, provided there is institutional support for scaling up such practices among marginalized farming communities.*

## 4.4 Challenges for Implementing LAPA in Nepal

### 4.4.1 Challenges for Implementing LAPA

**Table 4.33** Items wise Challenges I

Items	Min-Max	Mean	SD	Skewness
Insufficient municipal budget	1-5	3.68	1.17	-1.06
Unequal budget distribution among municipalities	1-5	3.63	1.29	-.54
Low capacity	1-5	3.48	1.35	-.66
Lack of technical expertise and knowledge	1-5	3.44	1.17	-.30
Weak inter-governmental coordination	1-5	3.66	1.26	-.92
Not aligned with national adaptation policies	1-5	3.58	1.23	-.68
Lack of community involvement	1-5	3.51	1.08	-.51
Limited awareness or understanding	1-5	3.60	1.22	-.88
Marginalized groups are not included	1-5	3.55	1.21	-.39
Gender-sensitive approaches are not integrated	1-5	3.57	.90	-.56
Effective monitoring/evaluation not conducted	1-5	3.55	1.27	-.73
Lack of transparency and accountability	1-5	3.47	1.41	-.58
Lack of localized climate data availability	1-5	3.70	1.14	-.60
No local-level climate forecasts and risk assessments	1-5	3.71	1.20	-.78

**Source:** Field Survey, 2025

The table shows statistical information about perceived problems with climate adaptation and governance, measured on a 1–5 Likert scale (where higher scores mean more agreement). The results show that there is a lot of agreement (mean scores of 3.44 to 3.71 across all items) about systemic hurdles. There is especially substantial agreement on data shortages ("No local-level climate forecasts" =  $3.71 \pm 1.20$ ) and resource limits ("Insufficient municipal budget" =  $3.68 \pm 1.17$ ). The consistently negative skewness values (-0.30 to -1.06) show that most people answered at the higher end of the scale, which shows that these institutional and technical limitations are well known. The data shows important problems in institutions that are expected to make it harder to respond to climate change, such as lack of money, poor coordination across governments, and lack of localized climate knowledge. The high means and moderate standard deviations show that these are problems that are known to affect the whole system, not just a few people. Notably, technical capacity

difficulties (3.44–3.48) score slightly lower than budgetary/data problems. This may be because the organization has superior people resources than it does fiscal or infrastructure issues. These results show that climate resilience frameworks need focused changes in fiscal decentralization, data infrastructure, and coordination across several stakeholders.

#### 4.4.2 Other Challenges for Implementing LAPA

**Table 4.34 Items wise Challenges II**

Items	Min-Max	Mean	SD	Skewness
Insufficient municipal budget	1-5	3.32	1.19	-.58
Unequal budget distribution among municipalities	1-5	3.52	1.30	-.60
Low capacity	1-5	3.63	1.16	-.68
Lack of technical expertise and knowledge	1-5	3.61	1.10	-.75
Weak inter-governmental coordination	1-5	3.66	1.06	-.66
Not aligned with national adaptation policies	1-5	3.64	1.21	-.81
Lack of community involvement	1-5	3.44	1.19	-.55
Limited awareness or understanding	1-5	3.31	1.22	-.13
Marginalized groups are not included	1-5	3.33	1.18	-.29
Gender-sensitive approaches are not integrated	1-5	3.17	1.32	-.19
Effective monitoring/evaluation not conducted	1-5	3.27	1.18	-.08
Lack of transparency and accountability	1-5	3.07	1.37	-.20
Lack of localized climate data availability	1-5	3.44	1.26	-.39
No local-level climate forecasts and risk assessments	1-5	3.56	1.18	-.87

**Source:** Field Survey, 2025

The table shows a full evaluation of the institutional and operational issues that come up while adapting to climate change and governing it, using a 1-5 Likert scale (where higher scores mean more agreement). The results show that there is moderate to high agreement on all fronts, with systemic institutional deficiencies being the biggest issue. The most agreed-upon difficulties were connected to capacity, with "Weak inter-governmental coordination" (Mean=3.66, SD=1.06) and "Low capacity" (Mean=3.63, SD=1.16) coming out on top as the biggest problems. Budgetary problems are also a big part of the picture, with "Unequal budget distribution" (Mean=3.52) getting a higher score than "Insufficient municipal budget"

(Mean=3.32). This suggests that people may be more worried about perceived unfairness in how resources are distributed than about not having enough money. The results imply that the following should be given priority: upgrading climate data systems, closing technical capacity gaps, boosting coordination across agencies, and making sure that resources are distributed more fairly. These are all basic efforts that need to be taken to make climate adaptation more successful.

#### **4.4.3 Case Study**

Two case studies are presented in this section. Both cases reveal how financial constraints and exclusionary planning undermine LAPA's potential. Effective adaptation requires participatory budgeting, inclusive governance, and accountability mechanisms to ensure resources reach those most at risk.

##### **4.4.3.1: Budgetary Barriers to Climate Resilience**

*The implementation of the Local Adaptation Plan of Action (LAPA) in Panchkhal Municipality-3 has faced significant challenges due to financial and institutional constraints. Despite comprehensive planning that identified critical adaptation measures such as improved irrigation systems, drought-resistant crops, and early warning systems, the ward chairman S. Adhikari reports chronic underfunding has severely limited progress. The municipality receives inadequate climate adaptation budgets, forcing farmers to depend on fragmented NGO initiatives rather than coordinated government programs. Compounding these financial challenges is poor inter-agency coordination, with various departments and organizations working in silos, resulting in duplicated efforts and critical gaps in service delivery. Farmers like R. Pariyar further highlight issues of transparency, noting that limited funds are often redirected to less urgent projects due to political considerations. These systemic barriers have left many planned adaptation measures, including water conservation projects and climate-smart agriculture training, only partially implemented and inaccessible to most farmers. As local farmer S. H. Acharya poignantly observes, "We have good plans on paper, but without proper funding and leadership, they remain just plans."*

#### **4.4.3.2: Exclusion Undermines Climate Adaptation**

*The LAPA process in Kavrepalanchowk has struggled with inclusivity, particularly in engaging marginalized groups such as Dalit women and smallholder farmers. Ward member S. Pariyar, representing the Dalit community, reveals how superficial consultation processes have systematically excluded vulnerable populations from meaningful participation. Planning meetings typically involve only male landowners, neglecting the perspectives of women and tenant farmers who are primarily responsible for daily agricultural activities. This exclusion is reflected in the misalignment between program priorities and community needs, with infrastructure projects like irrigation canals receiving disproportionate attention compared to more pressing concerns such as seed banks or localized weather advisories for rain-dependent farms. Additionally, the use of technical language in documentation without local language translations has created information barriers for many farmers. These shortcomings have resulted in adaptation resources primarily benefiting larger landowners, while women farmers like S. M. Danuwar find themselves unable to access critical support. "They go through the motions of asking for our input, but our real needs are never addressed," Danuwar remarks. This case demonstrates how top-down planning approaches can exacerbate existing inequalities rather than fostering genuine climate resilience among the most vulnerable populations.*

#### **4.5 Narrative Data Analysis**

This section presents the key findings derived from the focus group discussions (FGDs) and key informant interviews (KIIs) conducted in the study area. The narrative findings are organized into six distinct themes, each corresponding to the specific research objectives.

##### **4.5.1 Theme 1: Farmers' Knowledge and Skills on Climate Change**

Farmers across Panchkhal Municipality-3 demonstrated a basic to moderate level of understanding regarding the concept of climate change. Most of them interpreted it through observable climatic shifts, especially in rainfall patterns and temperature.

R. Aryal shared, "Generally, the change in the climate or weather is what we understand as climate change. For example: irregular rain, random change in temperature of the surrounding, etc." She further elaborated, "Dry fields in farming season because of no rain, decrease in the production of crops due to

*high temperature, etc. are the problems created by climate change in farming."*

Similarly, S. Adhikari described climate change as, *"When the temperature of Earth's atmosphere, the current of the wind and high or low rainfall, etc. bring a change in the average climatic conditions of a place for a longer duration of time."*

The farmers' lived experiences significantly contribute to their awareness, as expressed by key informant Subita Dhungana: *"Since farmers experience the impacts of climate change firsthand and are directly affected by it, I believe — based on my experience — that they have a moderate to strong understanding of the issue."*

*"Generally, the change in the climate or weather is what we understand as climate change. For example: irregular rain, random change in temperature of the surrounding, etc."* (FGD\_II)

*"Dry fields in farming season because of no rain, decrease in the production of crops due to high temperature, etc. are the problems created by climate change in farming. When the temperature of Earth's atmosphere, the current of the wind and high or low rainfall, etc. bring a change in the average climatic conditions of a place for a longer duration of time, it is called climate change."* (FGD\_III)

#### **4.5.2. Theme 2: Farmers' Skills and Practices in Climate Change Adaptation**

Farmers are actively implementing various adaptive practices to mitigate the impacts of climate change. These include crop diversification, irrigation improvements, and the adoption of modern technologies.

S. K. Danuwar noted, *"Tunnel farming is being practiced,"* and described other strategies such as *"planting trellised/vine crops and crops that can sustain dryness, cold, and water."* Additionally, the use of *"percolation ponds (recharge ponds)"* was mentioned by several participants.

When asked about the source of this knowledge, K. Danuwar stated, *"We learned about these adaption methods from the trainings/instructions provided by the farmers' group and also from the program called 'Comprehensive discussion related to agriculture' conducted by the ward office. We also learn a few things from the news."*

These adaptive practices have begun to create a sense of empowerment among farmers, although gaps in full independence persist. As Shiva Hari Acharya

stated; *"We can conduct corrective measures to some extent but we still cannot do entirely everything on our own."*

*"Yes, in the past, we experienced climate change effect like: irregular rain, temperature change, drought, flood, etc. near our area."* (FGD\_II)

*"The agricultural practices in the local level are terribly affected by the difficulties created by climate change. Crops facing dry climate before adequate time, decline in the production of the crops, agricultural pests that destroy the crops, etc. are the common problems."* (FGD\_I)

#### **4.5.3 Theme 3: Perceived Effects of Climate Change Adaptation on Farmers' Vulnerability**

Farmers widely perceive adaptation practices as having a positive effect on reducing vulnerabilities related to climate change. Improved productivity, crop diversity, and irrigation have helped stabilize agricultural outcomes.

J. Thapa mentioned, *"We are now cultivating four types of crops, and production has increased. A more favorable environment has also been created for farmers, making cultivation easier."*

S. M. Danuwar emphasized that, *"Climate change adaptation tasks have contributed to the development of the agricultural production sector and have expanded business opportunities."* She added that these changes *"made a positive impact in agricultural production and lifestyle by creating self-employment at the local level."*

Similarly, R. Dhungana affirmed, *"Agricultural production has increased, and it is now possible to cultivate all four types of crops. Improvements such as better irrigation systems and the introduction of tunnel farming have significantly helped reduce the farmers' uncertainties and vulnerabilities."*

*"As adaption methods, we are using following practices: Percolation pond planting the type of crops that can sustain dryness, cold and water, using new technology and training, planting trellised/vine crops."* (FGD\_III)

*"We learned about these adaption methods from the trainings/instructions provided by the farmers' group and also from the program called 'Comprehensive discussion related to agriculture' conducted by the ward office. We also learn a few things from the news."* (FGD\_I)

*"We use different study materials, research and the frameworks provided by the treaty of United Nations Framework Convention on Climate Change*

*(UNFCCC) through the conference (COP). We also consulted with the experts related to the field." (FGD\_II)*

#### **4.5.4 Theme 4: Evaluation of Climate Change Adaptation Practices**

To evaluate the effectiveness of adaptation measures, local stakeholders employ participatory and observational methods. Field visits and regular communication with farmers are key tools for assessment.

R. Pariyar noted, *"Local government has been conducting field-trips and other programs to evaluate the success of adaptation tasks... helping farmers test whether seeds and fertilizer are free from pesticides and testing soil fertility."*

J. Thapa added, *"To determine the success... we conduct direct conversation and discussion meetings with the farmer groups and stakeholders. Also, we go to field trips regularly to observe and collect information."*

Despite these evaluation methods, some programs fall short due to a lack of institutional support, political instability, and insufficient funding. As noted by KII respondent S. H. Acharya,

*"Coordination with the government is very poor, and there is political and economic instability... lack of effective evaluation is also a major obstacle."*

*"Adaptation tasks have contributed to the development of the agricultural production sector and has expanded business opportunities." (FGD\_II)*

*"Farmers of this region have become self-reliant both socially and economically through agricultural production and animal husbandry, making Panchkhal a hotspot for agricultural development." (FGD\_III)*

*"The negative effect... is not a direct effect of the adaptation tasks but it is difficult to get our products to the outside market because of the difficulty in transportation and competitive market pricing." (Sanu Maya Danuwar)*

*"Local government has been conducting field-trips and other programs to evaluate the success of adaptation tasks." "We conduct direct conversation and discussion meetings with the farmer groups and stakeholders. Also, we go to field trips regularly to observe and collect information." (FGD\_I)*

#### **4.5.5 Theme 5: Implementation and Challenges of LAPA**

While public representatives are aware of LAPA and its objectives, many farmers appear unfamiliar with the term and its implementation. This reflects a communication and awareness gap at the community level.

S. Adhikari (Chairman) explained,

*"We are including adaptation work-plan based on local resources, tools, knowledge, skills and practice... cooperating with local people."*

However, he also acknowledged several major challenges: *"The major challenges of implementing LAPA in our community are poor coordination with the government, unfair distribution of budget, lack of monitoring and evaluation, and political and economic instability."*

S. H. charya highlighted additional challenges, including *"lack of technical knowledge and expertise, insufficient budget, and lack of political attention."*

To improve effectiveness, Sundar Adhikari recommended: *"By uniting local knowledge/traditional practices and coordinating with local people through conferences and discussions, we can increase the effectiveness of LAPA"*

*"We can conduct corrective measures to some extent but we still cannot do entirely everything on our own. To boost our confidence, we find it necessary to implement relevant climate change adaptation tasks in a well-planned way in the coordination with local government and local people."* (FGD\_I)

*"Challenges for implementing LAPA in our community are: Not being able to implement National Adaptation Program well, poor coordination with the government, unfair distribution of budget in wards/municipalities, lack of effective monitoring and evaluation, lack of transparency and accountability, political and economic instability, etc."* (FGD\_III)

#### **4.5.6 Theme 6: Recommendations and Support for the Future**

Participants provided valuable insights and recommendations to improve climate change adaptation in Panchkhal. These include strengthening institutional support, enhancing training, and ensuring participatory planning.

S. M. Danuwar stated, *"We need the support of local people and attention of the local government... to conduct more public awareness programs, technical trainings, and to make technology available."*

K. Danuwar added, *"We want the management of better teachings and trainings related to climate change adaptations. and further practices of improvement procedures."*

A. Sipkhan emphasized need for *"technology and skill-based training and orientation programs for collaboration to practice adaptation at local level."*

Key informant L. Danuwar reinforced that *"better adaptation to climate change should begin at the local level by focusing on skill development and productivity."*

S. Adhikari concluded with a policy-level recommendation: *"I strongly recommend the preparation of adaptation workplan based on identified problems and alternatives to improve the implementation of climate change adaptation strategies."*

*We need the support of local people and the attention of the local government as a whole to conduct more public awareness programs that includes upgrading knowledge, skill and technical trainings, involving more people. Local authorities can help us to market the local products and manage the local markets for us." (FGD\_II)*

*"We want the management of better teachings and trainings related to climate change adaptations. Better policies should be formulated and implemented effectively. And we need to identify the activities related to adaptation, making and implementing work-plan structure that fits in prioritization and development plan." (FGD\_III)*

The study reveals that while farmers in Panchkhal Municipality-3 possess a reasonable level of knowledge and practical skills in climate change adaptation, there are clear gaps in policy awareness, technical resources, and institutional support. Adaptation practices have reduced vulnerabilities and improved productivity, but challenges such as poor coordination, insufficient budget, and lack of inclusive planning hinder progress. Strengthening local implementation of LAPA, expanding training, and fostering collaborative governance models are essential for advancing climate resilience in the community. The findings reveal that while farmers and local authorities in Panchkhal are actively engaging in climate adaptation, gaps remain in knowledge dissemination, resource allocation, and policy implementation. Strengthening institutional support, improving market access, and enhancing participatory planning are critical for building long-term resilience. These observations highlight how erratic weather conditions have disrupted traditional farming cycles, leading to reduced yields and increased vulnerability. Public representatives also shared a similar perspective, linking climate change to long-term environmental shifts.

## CHAPTER V

### SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATION

#### 5.1 Summary of Findings

##### **Social-Demographic and Economic Characteristics of the Respondents**

The study asked 108 people to fill out a survey. Most of them were young, male, and Hindu. 53.9 percent were between the ages of 23 and 40, 61.1 percent were male, and 94.4 percent were Hindu. Most of them were married (87%) and spoke Nepali (87%). Their education levels were average: 62.1 percent had secondary education and only 6.5 percent had higher degrees. Most households (78.6%) had 3 to 6 individuals, and 68.5 percent of them supported 1 to 2 pupils in school. However, 20.4 percent of households did not have any students enrolled. Food security was generally good, with 81.5 percent of homes saying they had enough for more than 9 months. However, 4.6 percent of households said they were running out of food quickly (<3 months).

In terms of money, 75.1 percent of households made between Rs. 50,000 and Rs. 699,000, and 24.5 percent made more than Rs. 700,000. Spending was minimal, with almost 90 percent of households saying they spent less than Rs. 400,000. Education (average: Rs. 53,064) and food (average: Rs. 15,157) were big expenses, but some categories, such land rent and donations, showed a lot of variation, which shows that there are economic differences. Agriculture (average income: Rs. 164,550) and remittances (average: Rs. 196,759) were the main sources of income. Business and niche sectors like mushroom farming have a lot of income inequality. Irrigated land (mean: 3.26 units) was more uniformly spread out than rainfed land (mean: 1.57 units), and leasing was done mostly by a small number of households.

Over the course of five years, agricultural productivity changed a lot. Cereal production went down, but vegetable, fruit, and mixed crop production went up. The meat and poultry markets were very volatile, which suggests that the markets are sensitive. 80.6 percent of respondents had been members of a group for more than 10 years, which shows that they were quite involved in their communities. Overall, the results show that the economy is changing from an agricultural one to one with steady demographics but a lot of economic change. Education, agriculture, and remittances

are all very important for people's livelihoods. The data shows both resilience and differences. Most households have reasonable living standards, but a small number of them have trouble with money or food security.

### **Multiple Aspects of Climate Change**

The study's results show important patterns in how farmers get information, how climate change affects farmers, and how farmers think about these issues. Digital platforms (42.6%) and traditional media like radio and TV (38%) are the main sources of information, with community networks (13.9%) adding to them. Print media and experts don't play a big role. Farmers have a lot of problems in agriculture, with soil fertility loss (36.1%) and lower productivity (25.9%) being the biggest ones. Erratic rainfall (21.3%) and pesticide problems (16.7%) make these problems worse. Climate change is very real, with 75.9 percent of people experiencing both extreme cold and heat. Environmental effects are mostly caused by too much rain (46.3%) and loss of biodiversity (22.2%). Farmers are somewhat aware of climate change (mean scores of 2.50–3.02), but they are most aware of industrial pollution (3.02).

However, their inconsistent responses demonstrate that they don't know everything. Severe systemic hurdles make it hard for farmers to be resilient. These include high input costs (93.5%), lack of institutional support (89.8%), land price problems (84.3%), labor shortages (79.6%), and not enough storage (80.6%). These results show how important it is to have solutions that combine digital extension services, sustainable land management practices, targeted climate education, and policy changes that deal with financial and infrastructure problems in order to make agriculture more sustainable and help the region adapt to climate change.

### **Multiple Aspects of Climate Change Adaptation**

The study's results show that 108 respondents confront serious problems in farming and climate, with productivity losses (38.9%) and capital depletion (18.5%) being the most important issues. Most farmers deal with unpredictable weather (75.9% say temperatures are too high, and 46. Percent say there is too much rain), but they are strong and only 13 percent are thinking about moving because of climate change. Adaptation techniques prefer practical changes like switching animal breeds (29.6%)

and crop patterns (25.9%). However, dependency on chemical inputs (21.3%) is still high, even if more people are starting to farm organically (mean=3.76/5). Institutional reliance strongly favors government entities (86.1%) over NGOs (13.9% combined), which shows that trust networks are very state-centered. There are big gaps in skills training (62% didn't get any) and economic engagement (52.8% didn't make any sales), and land use modifications are quite limited (82.2% didn't make any). Labor management typically uses both family and outside networks (75%), which shows that social capital is well-balanced. The data shows that farmers are dealing with climate vulnerabilities using a mix of conventional and new methods. They are limited by a lack of knowledge and hurdles to market access, yet they still rely heavily on government support systems. These results show how important it is to have integrated interventions that include expanding climate-smart agriculture, targeted skills development, and better coordination amongst institutions to make this mostly government-dependent agricultural system more resilient.

### **Challenges for Implementing LAPA in Nepal**

The results show that climate adaptation governance has big problems at both the institutional and operational levels. Respondents strongly agreed (mean scores 3.32–3.71 across all factors) that there are systemic hurdles. When it comes to capacity, the most important issues are weak coordination between governments (Mean=3.66) and low institutional capacity (Mean=3.63). There are also big worries about budget constraints (Mean=3.32-3.52) and technical problems with localized climate data (Mean=3.44-3.56). Gender sensitivity (Mean=3.17) and integrating excluded groups (Mean=3.33) are two social inclusion areas that are a little lower, but they are still very important. The negative skewness (-0.08 to -0.87) and moderate standard deviations (1.06-1.37) show that most people agree that these institutions have problems, and that transparency mechanisms (Mean=3.07) are especially lacking. These results show that we need to quickly improve the coordination of multi-level governance, the technical and data infrastructure, the fair distribution of resources, and the systems of accountability in order to create effective climate resilience frameworks. Social inclusion should be a secondary focus in adaptation planning, but it should still be a priority.

## **5.2 Conclusions**

This study looked at what farmers in Panchkhal Municipality-3, Kavrepalanchok know about climate change adaptation, what they do, and what problems they face. It focused on how they see and respond to changes in the environment. The results show that farmers have a basic awareness of how climate change affects things, but they don't know much about how to adapt to it. Many people still use old-fashioned farming methods and quick fixes, such switching crop types or adding more chemicals, instead of switching to long-term, sustainable approaches. This gap in adaptive ability shows how important it is to have focused training programs that help farmers improve their technical skills in climate-resilient farming.

The study also indicated that farmers' vulnerability is greatly affected by activities taken to adapt to climate change. People who used adaptive measures like growing different kinds of crops, saving water, or farming organically said they lost less and their farms were more productive. However, these approaches are not widely used because people don't have access to localized climate data, they don't have enough money, and institutions don't assist them enough. Erratic rainfall, soil degradation, and severe temperatures are still threatening people's lives. This shows that existing adaptation efforts are not yet enough to protect people from climate hazards. Some of the biggest problems in putting Climate Change Adaptation Plans of Action (LAPA) into action in the study region are poor coordination between governments, a lack of technical knowledge at the local level, and an uneven allocation of resources. Farmers said they depended heavily on government support, but they also said that policies weren't always carried out or were hard to get to. Also, social issues like differences between men and women and being left out make it even harder to prepare for fair adaptation.

## **5.3 Recommendations**

The study's results showed that a collaborative approach that includes federal policy, local government action, private sector support, NGO support, and farmer-led efforts is necessary for Panchkhal to adapt to climate change. For the private sector to have a bigger effect, they need to cooperate with local governments and NGOs. The partnership program has to use farmer-Centric Models to make sure that solutions are

affordable, easy to get to, and made for smallholders. The private sector may promote sustainable agriculture and protect the long-term resilience of the supply chain by include climate adaptation in their business plans. By fixing problems with information, money, and institutions, stakeholders can make agriculture more resilient and less vulnerable to climate change. Below are the particular suggestions for the government and others involved in development:

**For the Federation:**

Create a National Climate-Smart Agriculture Policy that includes localized adaptation measures that focus on crop diversity, soil conservation, and farming that uses less water. Make climate data easier to get by setting up localized weather forecasting systems and early warning systems for farmers. Set aside special funds for climate adaptation to help smallholder farmers use more resilient methods, such as giving them money to buy organic inputs and crops that can survive drought. Improve Coordination with Local Governments to make sure that policies meet the needs of vulnerable people.

**For Local Government (Panchkhal Municipality):**

Implement Farmer Training Programs on climate-resilient approaches such as agroforestry, rainwater harvesting, and organic farming. Improve Irrigation Infrastructure by buying inexpensive, small-scale technology like drip irrigation and devices for storing water. Support Local Seed Banks to keep native crop types that can adapt better to changing weather. Set up Community-Based Adaptation Committees to help farmers share information and make decisions together.

**For the Private Market Sector:**

Buy and give out cheap, long-lasting farming tools including seeds that can survive drought, solar-powered irrigation, and sensors that measure soil moisture. Work with agri-tech entrepreneurs to make digital tools like weather apps and AI-based pest control. Make high-end markets for organic and climate-adapted crops, making sure that farmers get a fair price. Support contract farming methods that make sure there are purchase agreements for strong crop types. Provide smallholder farmers who are

at danger from climate change with loans and insurance that are flexible and fit their needs. Use "pay-as-you-harvest" finance mechanisms to lower the price of climate-smart inputs up front. Promote climate-resilient sourcing by putting farmers who use adaptive methods at the top of the list. Cut down on losses after harvest by spending money on climate-controlled transit and refrigerated storage. Push for tax incentives or subsidies for businesses who invest in technologies that help them adapt to climate change. Work with officials to make sure that private-sector projects support the country's climate resilience goals.

**For social organizations, I/NGOs:**

Use radio, mobile apps, and local workshops to run awareness campaigns about climate dangers and ways to adapt to them. Help demonstration farms show off climate-smart practices that work and get people to use them. Give farmers microfinance and insurance plans to help them get back on their feet after climate-related losses and put money into agricultural that can withstand the elements. Push for gender-inclusive adaptation programs that make sure women and other groups that are often left out have the same access to resources and training.

**For Cooperatives and Farmers' Groups:**

Set up Farmer Field Schools to explain the best ways to deal with pests, keep soil healthy, and rotate crops. Strengthen Collective Bargaining Power so that you may get better markets, fair prices, and help from the government. Use organic farming programs to lower the need for chemical fertilizers and plant climate-resilient crop types. Take part in local policy discussions to voice your concerns and have a say in how your city plans to adapt.

**5.4 Areas for Future Research**

To build on what was learned in Panchkhal Municipality, future study on how to adapt agriculture to climate change should look into a few important areas. First, researchers may look into how climate-smart farming practices that farmers are using affect crop yields, soil health, and the long-term viability of the farm. Second, research should look at the gender aspects of adaptation by looking at how women and other marginalized groups use and benefit from climate adaptation resources and

training programs. Third, we should look into how digital technology like smartphone weather alerts and AI-driven farming advice could help farmers make better decisions. Fourth, research might look at why national climate policies like LAPA don't always lead to successful local action by looking at problems with governance and funding. We should also look into how remittances might be used to pay for climate adaptation projects and how well traditional and contemporary farming methods work in comparison to one other. Also, research should look into how the commercial sector might become involved, such as through climate-smart value chains and farm insurance plans. Psychological research could look at how recurrent climate shocks affect farmers' mental health and their desire to try new things. Lastly, it would be helpful to do comparative research in Nepal's different agro-ecological zones to come up with adaptation strategies that work well in each area. These study directions would give policymakers evidence-based ideas on how to help smallholder farmers become more resilient to climate change by using more focused and effective interventions that mix social, economic, and technological approaches to adaptation.

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## ANNEXES

### Annex A: Household Survey Questionnaire

FARMERS' PERCEIVED KNOWLEDGE AND PRACTICES ON CLIMATE CHANGE  
ADAPTATION ACTION: A STUDY OF PANCHKHAL MUNICIPALITY-3,  
KAVREPALANCHOK

**प्रियउत्तरदाताहरू !**  
माथि उल्लेखित शीर्षकमा गर्न लागिएको यो अध्ययन स्नातकोत्तर शोधपत्र को प्रयोजनको लागि हो । यो अध्ययन तपाईंको महत्त्वपूर्णउत्तरहरूमा निर्भररहनेछ । यस अध्ययनको क्रममा तपाईंबाट प्राप्त सूचना अध्ययन प्रयोजन बाहेक अन्य प्रयोजकोलागी प्रयोग गरिने छैन । तपाईंको उत्तर तथ्याङ्क ऐन, २०१८ अनुसार गोप्य रहने छन ।

**खण्ड -क: उत्तरदाताको सामाजिक, आर्थिक र जनासांख्यिक पक्ष**

१. नाम : ..... उमेर ..... लिङ्ग : ..... सम्पर्कनं.....
२. स्थायी ठेगाना : जिल्ला : ..... न.पा./ गा. पा..... वार्ड नं . ..... टोल .....
३. धर्म .....
४. वैवाहिक स्थिति के हो ? i. अविवाहित ii. विवाहित iii. अलग बसेको iv. सम्बन्धविच्छेद v. विधवा/विधुर vi. विवाह नगरी बसेको
५. तपाईंकोमातृभाषाबताउनुहोस् |.....
६. तपाईंको उच्चतम शैक्षिकयोग्यता बताउनुहोस् | योग्यता..... विषय.....
७. तपाईंको परिवारमा कति जना सदस्य छन् ? तलको विवरण भर्नुहोस् |

उमेर समुह	महिला	पुरुष	जम्मा
०-१४ वर्ष			
१५-६५ वर्ष			
६५ वर्ष +			

८. तपाईंको छोराछोरी विद्यालय र कलेजमा अध्ययनरत छन् ?

श्रेणी	छोरा	छोरी	तह / कक्षा
सरकारी विद्यालय			
सामुदायिक विद्यालय			
निजी विद्यालय			
सरकारी कलेज			
सामुदायिक कलेज			
निजी कलेज			
विदेशमा अध्ययनरत			

९. परिवारको वार्षिक खर्च बताउनुहोस् |

कृषि खाद्यन्न सामग्री सँग सम्बन्धित	NRs.	खाद्यन्न सामग्री सँग असम्बन्धित	NRs.
खाद्यन्न		शिक्षा	
दाल		स्वास्थ्य	
सागसब्जी		सांस्कृतिक कार्य	
फलफूल		यात्रा र पर्यटन	
तेल		सुर्ती	
जडिवुटी / मसला		अनुदान/ उपहार	
माछा / मानु		पेय पदार्थ	
दुध / दुग्ध उत्पादन		जमिनको कर	
अन्य		जमिनको भाडा	
जम्मा		जम्मा	

१०. तपाईंको आर्थिक स्रोत खुलाउनुहोस् |

क्र.स	आर्थिक स्रोत	वार्षिक आय स्रोत ( रु.)
१.	कृषि	
२.	पशुपालन	
३.	ब्यापार	
४.	पन्डीपालन	
५.	च्याऊ खेती	
६.	नोकरी (सेवा)	
७.	वैदेशिक रोजगारी	
८.	श्रमिक (शारीरिक श्रम)	
९.	अन्य (खुलाउनुहोस्)	
	जम्मा	

११. तपाईंको जग्गाको विवरण दिनुहोस्

जग्गाको किसिम	क्षेत्रफल (रोपनीमा )
१. खेत	
२. पाखा ढारी	
३. घर/ घडेरी	
४. भाडामा लिएको	
५. भाडामा दिएको	

१२. जीविकोपार्जनमा आधारित कृषि उत्पादन र आयको प्रवृत्ति दिनुहोस् | (किन्टलमा)

श्रेणी	२०७६		२०७७		२०७८		२०७९		२०८०	
	उत्पादन	आय (रु.)	उत्पादन	आय (रु.)	उत्पादन	आय (रु.)	उत्पादन	आय (रु.)	उत्पादन	आय (रु.)
खाद्यान्न बाली										
फल हरु										
तरकारी										
मासु										
दुध										
पन्डी पालन										
अन्य										

१३. आफ्नो उत्पादनले तपाईंको परिवारलाई कति महिना खान पुग्दछ ?

३ महिना भन्दा कम	६ देखि ९ महिना
३ महिना सम्म	९ देखि १२ महिना
३ देखि ६ महिना	१२ महिना भन्दा बढी

१४. तपाईं कृषिमा लागु भएको कति वर्ष भयो ?

१-५ वर्ष	१०-१५ वर्ष
६-१० वर्ष	१५ वर्ष भन्दा माथि

१५. तपाईंको कुनै सदस्य रोजगारका लागि देश बाहिर गएका छन् भने तलको विवरण भर्नुहोस् |

देशको नाम	पुरुष	वर्ष	महिला	वर्ष	कहिले बाट

**खण्ड -ख: जलवायुपरिवर्तनसँग सम्बन्धित पक्ष**

१६. तपाईंले जलवायु परिवर्तन सम्बन्धी सूचनाहरू मुख्य रूपमा कसरी थाहा पाउनुहुन्छ ?  
 i. इन्टरनेट ii. रेडियो/टि.भी iii. छिमेकी iv. प्रबुद्धव्यक्ति v. पत्र पत्रिका vi. अनुभवबाट
१७. जलवायु परिवर्तनले कृषि क्षेत्रमा पार्ने मुख्य तीन असरहरू भन्नुहोस ।  
 i. उत्पादनमा कमी ii. अतिवृष्टि/अनावृष्टि iii. माटोको उत्पादनमा कमी iv. बालीरोग
१८. तपाईंले जलवायु परिवर्तन भएको कस्तो अनुभव गर्नुभएको छ ? १. जाडो २. गर्मी ३. जाडो र गर्मी
१९. तपाईंले मौसम परिवर्तनको सम्भावित भावि प्रभावहरूको बारेमा के के कुरा सुन्नु भएको छ ? । .बढीवर्षा ii. सामुन्द्रिक सतहमा वृद्धि iii. क्षयीकरण बढ्नु iv. कम वर्षा v. तापक्रम वृद्धि vi. तापक्रम घट्नु vii. रूख हरु मर्नेछन् viii सामुन्द्रिक तापक्रम बढ्दछ ix. जनावर र बोटविरुवामा घाटा

**२०. जलवायु परिवर्तनसँग सम्बन्धी धारणा**

क्र.स.	बयान	पूर्ण सहमत	सहमत	अनिर्णय	असहमत	पूर्ण असहमत
१.	मानविय क्रियाकलापले जलवायु परिवर्तन भएको हो					
२.	जलवायु परिवर्तन मुद्दामा विश्वको चासो रहेकोछ					
३.	औसत मौसमको अवस्था परिवर्तन हुनु जलवायु परिवर्तन हो					
४.	जलवायु परिवर्तनको कारणले विश्वमा तापक्रम बढिरहेको छ					
५.	जलवायु परिवर्तनले ओजन तहमा प्वाल पार्दछ					
६.	वन फडानी जलवायु परिवर्तनको कारण हो					
७.	रासायनिक मल बढी प्रयोग जलवायु परिवर्तनको कारण हो					
८.	उद्योगबाट निस्कने प्रदूषणको कारणले जलवायु परिवर्तन गर्दछ					
९.	फोहोरहरूको कमजोर ब्यावस्थापन कारण जलवायु परिवर्तन हो					
१०.	जलवायु परिवर्तनको कारणले बालीनालीमा किरालागदछ					

२१. तपाइको कृषि उत्पादनमा पार्ने असरहरू उपयुक्त के के हुन सक्छ ?

सि. न.	भनाईहरू	✓
१.	बाली समायोजन रणनीति सम्बन्धि अपर्याप्त सूचनाको पहुँच	
२.	जलवायु जोखिम व्यवस्थापन सम्बन्धि सरकारको सिमित योजना	
३.	बास बस्ने घर भन्दा खेति गर्ने जमिन टाढा भएको	
४.	जलवायु प्रक्षेपण गर्ने प्रविधिको अपर्याप्तता	
५.	सहयोगी संस्थागत सुविधाहरूको अभाव	
६.	समयमा कृषि श्रमिकहरू नपाउनु	

७.	मल, बिउ र कृषि सामानहरूको उच्च मूल्य	
८.	सिंचाईकोलागि उच्च मूल्य तिर्नुपर्ने	
९.	जग्गा किन्न वा जग्गा भाडाको उच्च मूल्य	
१०.	कृषि उत्पादनको लागि संस्थागत स्रोत थाहा नपाउनु	
११.	कृषि सामग्रीहरूको संचय गर्ने गोदामको अभाव	
१२.	मूल्य निर्धारण र बजारी करणको व्यवस्था	

**खण्ड ग: जलवायु परिवर्तन समायोजन सम्बन्धीत पक्षहरू**

२२. जलवायु परिवर्तनले तपाईंमा कस्तो प्रभाव पारेको छ?  
 i. सम्पत्तीमा क्षति ii. पशुधनमा क्षति iii. कृषि उत्पादनमा घाटा iv. रेमिट्यान्समा कमि v. स्वास्थ्य जोखिम  
 vi. पिउने पानीमा कमी vii. अनिर्णय viii. अन्य.....
२३. जलवायु परिवर्तन भएकै कारण यहाँबाट मानिसहरू बसाई सराई गरेका छ? १. छन् २. छैनन्
२४. के तपाईंले कहिल्यै जलवायु परिवर्तनको बारेमा परामर्श, बैठक, गोष्ठीमा भाग लिनुभएको छ? १. छ २. छैन  
 यदि छ भने i. सरकारी स्तरबाट ii. गैरसरकारी स्तरबाट iii. संयुक्त राष्ट्रसंघ iv. यूरोपियन यूनियन v. अन्य
२५. के मानिसले मौसम अनुसार आफुलाई परिवर्तन गर्न सक्दछ ?

सकदछ भने कसरी उल्लेख गर्नुहोस	सकदैन भने कसरी उल्लेख गर्नुहोस

२६. तपाईंले कृषि उत्पादन सम्बन्धी क्षमता र सीप विकास तालीममा सहभागी हुनुभएको छ ?

तालीमको नाम	अवधि	तालीम दिने संस्था	प्राप्त ज्ञान

२७. तपाईंले तापक्रममा परिवर्तन भएर कृषि कार्य गर्ने समय परिवर्तन गर्नुभएको छ ? १. छ २. छैन
२८. तपाईंले वर्षामा परिवर्तन भएर कृषि कार्य गर्ने समय परिवर्तन गर्नुभएको छ ? १. छ २. छैन
२९. कृषि श्रमिकको व्यवस्था कसरी गर्नुहुन्छ ? i. परिवार भित्रबाट ii. परिवार बहिरबाट iii. दुवैबाट
३०. पानी, सिंचाई, मल र किटनासक औषधि सम्बन्धी तलको विवरण दिनुहोस्

ऋतु	प्रति रोपनी	सिंचित जग्गा	सिंचाई नहुने जग्गा	जैविक मल	रासायनिक मल	किटनासक औषधि (धुलोमा)	किटनासक औषधि (तरलमा)
ग्रिष्म	खाद्यान्न बालि						
	नगदेवाली						
हिउँद	खाद्यान्न बालि						
	नगदेवाली						

३१. तपाईंसँग टनेल कृषि खेतीको अनुभवछ? १. छ २. छैन
३२. तपाईंलाई बेमौसमी कृषि उत्पादन के के र कति उत्पादन गर्नुहुन्छ?.....
३३. जलवायु परिवर्तन प्रभाव घटाउन तपाईं कुन रणनीति प्रयोग गर्नुहुन्छ ?  
i. फसलको प्रकारमा परिवर्तन गर्ने ii. जनावरकोविड परिवर्तन गर्ने iii. हरितगृह i v .अन्तर बालिप्रणाली v. पानि संकलन vi. अन्य.....
३४. अहिले तपाईंले बोटबिरुवा बचाउनलाई रुखको छहारी बनाउनु भएको छ ? १. छ २. छैन, छ भने कहिले बाट बनाउन थाल्नु भएको हो .....

३५. तपाईंले कृषि सम्बन्धि अभ्यास कसरी गर्नु भइरहेको छ | उपयुक्त स्थानमा (✓) लगाउनु होस् |

सि. सं.	अभ्यासहरू	पूर्ण असहमत	असहमत	अनिर्णय	सहमत	पूर्ण सहमत
१.	बहुबालिका प्रकारहरू प्रयोग गर्नु					
२.	जमिन साना सानामा टुक्रा गर्नु					
३.	बहुवैकल्पिक जमिन प्रयोगको अभ्यास					
४.	सिंचाइमा वृद्धि गर्नु					
५.	खेतीमा बाहेक अन्य रोजगारीमा लाग्नु					
६.	कृषिको उत्पादकत्वबढाउन लाग्नु					
७.	रासायनिक मलको प्रयोग गर्नु					
८.	जैविक मलको प्रयोग गर्नु					
९.	जैविक बालीको प्रयोग गर्नु					
१०.	बोटबिरुवा लगाउनु					
११.	बोटबिरुवामा छाँया पार्नु					
१२.	मल्लिचंग गर्नु					
१३.	जमिनको आकारमा परिवर्तन गर्नु					

३६. तपाईंले जलवायु परिवर्तनलाई अनुकूल बनाउन के रणनीतिहरू अपनाउनु भएको छ ?  
i. रोपण मिति परिवर्तन गरेर ii. बालीका प्रकारहरू परिवर्तन गरेर iii. बालिका प्रजातिहरू परिवर्तन गरेर iv. बालीनाली बाट पशुपालनमा बदलेर v. पशुधन बाट बालीमा बदलेर vi. पशुधन संख्या कम गराएर vii. खेती गरिएको जमिनमा कटौती गरेर viii. खेती गरिएको जमिन बढाएर ix. पानी संरक्षण प्रविधिको प्रयोग गरेर x. सिंचाइको प्रयोग गरेर xi. बोटबिरुवालाई छहारी बनाएर xii. रासायनिक मल र कीटनाशकहरूको प्रयोग परिवर्तन गरेर
३७. जलवायु परिवर्तनसँग समायोजन हुनबाली लगाउन जमिन परिवर्तन गर्नुभएको छ ? छ भने कहिले बाट र कति रोपनीमा ?.....
३८. तपाईंलाई कुन संस्थाले जलवायु परिवर्तन समायोजन कार्यमा सहयोग गर्नुपर्दछ जस्तो लाग्दछ ?  
i. नेपाल सरकार ii. गैह्र सरकारी सस्थाहरू iii. युरोपियन सङ्गठन iv. संयुक्त राष्ट्र सङ्घ v. अन्य.....

**खण्ड - घ: स्थानीय अनुकूलन कार्य योजना (लापा) कार्यान्वयन गर्दा आइपरेका चुनौतिहरू**

३९.	बयान	पूर्ण सहमत	सहमत	अनिर्णय	असहमत	पूर्ण असहमत
स्रोत परिचालन	पालिकाको अपर्याप्त बजेट पालिकाहरूमा असमान बजेट वितरण					
क्षमता निर्माण	कम क्षमता कम प्राविधिक विशेषज्ञता र ज्ञान					
समन्वय	सरकारबीचको समन्वय कमजोर छ राष्ट्रिय अनुकूलन नीतिहरूसँग जोडिएको छैन					
सामुदायिक संलग्नता	समुदायमा संलग्नता छैन सीमित चेतना वा समझ					
सामाजिक समावेशीकरण	सीमान्तकृत समूहहरू समावेशी छैन लैङ्गिक संवेदनशील दृष्टिकोणलाई एकीकृत गर्दैन					
अनुगमन र मूल्याङ्कन	प्रभावकारी अनुगमन/मूल्याङ्कन हुन सकेको छैन पारदर्शिता र जवाफदेहिताको अभाव					
जलवायु डेटा	स्थानीय जलवायु तथ्याङ्कको उपलब्धता छैन स्थानीय स्तरको जलवायु पूर्वानुमान र जोखिम मूल्याङ्कन छैन					
संस्थागत क्षमता	कमजोर प्रशासनिक क्षमता, कर्मचारी र संगठनात्मक सीपहरू लापा ढाँचा अन्तर्गत जिम्मेवारी लिनको लागि पर्याप्त अधिकार छैन					
जीविकोपार्जनमा प्रभाव	भविष्यमा जलवायु परिवर्तनको प्रभावको बारेमा अनिश्चितताहरू स्थानीय ज्ञान/परम्परागत अभ्यास एकीकृत गर्दैन					
दिगोपन	कार्यहरूको दिगोपन सुनिश्चित गर्दैन राजनीतिक र आर्थिक अस्थिरता					
स्थानीय द्वन्द्व	अवस्थित सामाजिक तनाव, द्वन्द्व, वा शासन मुद्दाहरू सामूहिक अनुकूलन प्रवर्द्धन गर्दा प्रतिस्पर्धात्मक रुचिहरू					
निजी क्षेत्रको संलग्नता	निजी क्षेत्रलाई संलग्न नगर्ने निजी लगानीलाई प्रोत्साहन नगर्ने					
प्राकृतिक स्रोत व्यवस्थापन	वन फँडानी, माटोको कटान, वा पानीको अभावको सामना गर्दै बढ्दो स्रोतको ह्रास र अत्यधिक दोहनको समस्या					
विपद् जोखिम न्यूनीकरण	प्रकोप जोखिम न्यूनीकरण प्रयासहरूलाई कमजोर पङ्क्तिबद्ध गर्दै प्रकोप प्रतिकार्य र जलवायु अनुकूलनको उचित समन्वय हुन सकेको छैन					

“सहयोगको लागि धन्यवाद”

## Annex B: FGD Guideline

### समूहगत छलफल (FGD) दिशानिर्देशहरू

#### कृषकको ज्ञान र कौशल

१. जलवायु परिवर्तन बारे के बुझ्नुहुन्छ? यसले तपाईंको खेती अभ्यासलाई कसरी असर गर्छ?
२. के जलवायु परिवर्तन प्रभावहरू (अनियमित वर्षा, तापमान परिवर्तन, खडेरी, बाढी) तपाईंले विगत केही वर्षहरूमा आफ्नो समुदायमा अवलोकन गर्नुभएको छ?
३. जलवायु परिवर्तनलाई सम्बोधन गर्न अभ्यास गरिरहनुभएको अनुकूलन उपायहरू के के हुन्?
४. तपाईंले यी अनुकूलन उपायहरूको बारेमा कसरी सिक्नुभयो?
५. के तपाईं जलवायु परिवर्तनसँग अनुकूलन गर्ने आफ्नो क्षमतामा विश्वस्त हुनुहुन्छ?
६. के त्यहाँ कुनै विशेष सीप वा ज्ञान छ जुन तपाईंलाई लाग्छ कि तपाईंसँग जलवायु परिवर्तनलाई राम्रोसँग अनुकूलन गर्न कमी छ?

#### असुरक्षामा अनुकूलन कार्यहरूको प्रभाव

१. तपाईंले जलवायु अनुकूलन अभ्यासहरू अपनाएपछि जलवायु प्रभावहरूका लागि तपाईंको जोखिम परिवर्तन भएको छ?
२. कसरी अनुकूलन कार्यहरू छन् (फसल ढाँचा परिवर्तन, सिँचाई सुधार) कम वा जलवायु परिवर्तन गर्न आफ्नो जोखिम बृद्धि?
३. के तपाईं जलवायु परिवर्तन अनुकूलनले तपाईंको कृषि उत्पादन र जीविकोपार्जनमा सकारात्मक वा नकारात्मक प्रभाव पारेको विशिष्ट उदाहरणहरू दिन सक्नुहुन्छ?
४. जोखिम कम गर्न अनुकूलन कार्य सफल छ कि छैन भनेर निर्धारण गर्ने कारकहरू के के हुन्?

#### लापा कार्यान्वयन र चुनौतीहरू

१. के तपाईंले लापा र तपाईंको क्षेत्रमा यसको कार्यान्वयनको बारेमा सुन्नुभएको छ?
२. स्थानीय स्तरमा लापा कार्यान्वयन कसरी गरिन्छ?
३. तपाईंको समुदाय वा क्षेत्रमा लापा कार्यान्वयन गर्न मुख्य चुनौतीहरू के के हुन्?
४. लापा कार्यान्वयन प्रभावकारी बनाउन के गर्न सकिन्छ भन्ने तपाईंलाई लाग्छ?
५. लापा कार्यान्वयनका लागि सरकारी सहयोग वा स्रोतहरू प्राप्त गर्न कुनै विशेष अवरोधहरू छन्?

#### सिफारिस र भविष्यको समर्थन

१. तपाईंको क्षेत्रमा जलवायु परिवर्तन अनुकूलन सुधार गर्न थप कुन समर्थन वा प्रशिक्षण आवश्यक छ?
२. स्थानीय स्तरमा तपाईं कुन प्रकारका अनुकूलन उपायहरू वा नीतिहरू बढी हेर्न चाहनुहुन्छ?
३. स्थानीय अधिकारीहरूले किसानहरूलाई जलवायु परिवर्तनको प्रभावसँग सामना गर्न कसरी सहयोग गर्न सक्छन्?

## Annex C: KII Guideline

### प्रमुख सूचनादाता अन्तर्वार्ता (KII) दिशानिर्देश

#### कृषकको ज्ञान र कौशल

१. तपाईंको अनुभवमा, किसानहरूले जलवायु परिवर्तनको मुद्दालाई कति राम्ररी बुझ्छन्?
२. स्थानीय कृषिमा तपाईंले अवलोकन गर्नुभएको सबैभन्दा सामान्य जलवायु परिवर्तन प्रभावहरू के हुन्?
३. जलवायु प्रभावहरू अनुकूल सम्बन्धी स्थानीय किसानहरूको ज्ञान र सीपलाई कसरी मूल्याङ्कन गर्नुहुन्छ?
४. के त्यहाँ विशेष कार्यक्रम वा पहलहरू छन् जसले किसानहरूलाई जलवायु अनुकूलनको बारेमा आफ्नो ज्ञान बढाउन मद्दत गरेको छ?
५. शिक्षण, कार्यशालाहरू, कृषि विस्तार सेवाहरू किसानहरूको अनुकूलन क्षमता सुधार गर्न यी कार्यक्रमहरू कति प्रभावकारी छन्?

#### असुरक्षामा अनुकूलन कार्यहरूको प्रभाव

१. तपाईंको दृष्टिकोणबाट, कार्यान्वयन गरिएको जलवायु अनुकूलन कार्यहरूले किसानहरूको असुरक्षा कम गर्न कति प्रभावकारी भएको छ?
२. के तपाईं अनुकूलन कार्यहरूको उदाहरणहरू प्रदान गर्न सक्नुहुन्छ जसले तपाईंको क्षेत्रमा राम्रोसँग काम गरेको छ? यी कार्यहरूले कसरी जलवायु परिवर्तनको जोखिम कम गरेको छ?
३. के त्यहाँ केसहरू छन् जहाँ अनुकूलन कार्यहरूले इच्छित परिणामहरू प्राप्त गरेनन्? यी कार्यहरूको असफलता वा सीमित सफलतामा कुन कारकहरूले योगदान पुर्यायो?
४. किसानहरूको असुरक्षालाई अझ राम्रोसँग कम गर्न अनुकूलन कार्यहरू कसरी सुधार गर्न सकिन्छ भन्ने तपाईंलाई लाग्छ?

#### लापा कार्यान्वयन र चुनौतीहरू

१. यस समुदायमा लापा को भूमिकालाई तपाईं कसरी वर्णन गर्नुहुन्छ?
२. स्थानीय क्षेत्रमा लापा कार्यान्वयन कसरी गरिन्छ?
३. स्थानीय स्तरमा प्रभावकारी अनुकूलन योजनाका लागि प्रमुख अवरोधहरू के हुन् (e.g., वित्तीय स्रोतहरू, राजनीतिक इच्छा, समन्वय मुद्दाहरू, स्थानीय अधिकारीहरूको क्षमता)?
४. लापा निर्माण र कार्यान्वयनमा सामुदायिक संलग्नताको स्तरलाई तपाईंले कसरी बुझ्नुहुन्छ? तपाईंको विचारमा लापा कार्यान्वयन सुधार गर्न के गर्न सकिन्छ?
५. स्थानीय क्षेत्रमा लापा कार्यान्वयनमा मुख्य चुनौतीहरू के के थिए?

#### सिफारिस र भविष्यको समर्थन

१. यस क्षेत्रमा जलवायु परिवर्तन अनुकूलन रणनीतिहरूको कार्यान्वयन सुधार गर्न के सिफारिस दिनुहुन्छ?
२. के त्यहाँ विशेष उपायहरू छन् जुन स्थानीय अधिकारीहरू वा राष्ट्रिय सरकारले किसानहरूलाई जलवायु परिवर्तनको अनुकूल बनाउन अझ प्रभावकारी रूपमा सहयोग गर्न लिनुपर्छ?
३. जलवायु अनुकूलन कार्यहरू अपनाउन सुधार गर्न किसान र स्थानीय सरकारी अधिकारीहरू दुवैका लागि कस्तो प्रकारको प्रशिक्षण वा स्रोतहरू फाइदाजनक हुने तपाईंलाई लाग्छ?

Annex D: Field Consent Letter

TRIBHUVAN UNIVERSITY  
त्रिभुवन विश्वविद्यालय  
CENTRAL DEPARTMENT OF RURAL DEVELOPMENT  
ग्रामीण विकास केन्द्रीय विभाग

Ref. No. ....

विभागीय प्रमुखको कार्यालय  
कीर्तिपुर, काठमाडौं, नेपाल।  
Office of the Head of Department  
Kirtipur, Kathmandu, Nepal.

Date मिति.....  
२०८१/१०/१२३

जो जससँग सम्बन्ध छ।

यस विभागमा स्नातकोत्तर तहमा अध्ययनरत रोल नं ३२ की श्री नन्दा कुमारी कठायतले चौथो सेमेस्टर पुरा गरी Perceived Knowledge and Practices of the Farmers on Climate Change Adaptation Action: A study of Panchkhal Municipality-3, Kavre. विषयमा शोध कार्य गरिरहनु भएकोले अनुसन्धान तथा खोजकार्यका लागि निज विद्यार्थीलाई आवश्यक सहयोग गरिदिनु हुन अनुरोध गर्दछु।

सह-प्रा.बिष्णु बहादुर खत्री  
विभागीय प्रमुख

सह-प्रा.बिष्णु बहादुर खत्री  
२०८१/१०/१०६

सह-प्रा.बिष्णु बहादुर खत्री  
२०८१/१०/१०६

सह-प्रा.बिष्णु बहादुर खत्री  
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## Appendix E: Field Photo Profile

