Does the Climate Change Adaptation Policy address Food Security: A case study of Humla District, Nepal

By
Gyan Laxmi Shrestha
MPPG 9th Batch

October 2020

South Asian Institute of Policy and Governance (SIPG)
North South University

Does the Climate Change Adaptation Policy address Food Security: A case study of Humla District, Nepal

By

Gyan Laxmi Shrestha

MPPG 9th Batch

Supervisors

Prof. Dr. Sk. Tawfique M. Haque, Ph.D. and Dr. Purna B. Nepali, Ph.D.

A thesis

Submitted in Partial Fulfillment of the Requirement for the Award of Degree of Masters in Public Policy and Governance (MPPG)

October 2020

South Asian Institute of Policy and Governance (SIPG)

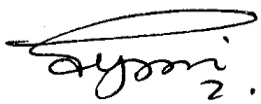
North South University

Dedication

I would like to dedicate this piece of work to my father Late Mr. Ganesh Man Shrestha for his inspiration and my professor Late Mr. Madav Prasad Bhusal for his guidance.

Declaration

I declare that the dissertation entitled "Does Nepal's Climate Change Adaptation Policy address Food Security: A case study of Humla District, Nepal" submitted to the PPG Program of North South University, Bangladesh for the Degree of Master in Public Policy and Governance (MPPG) is an original work of mine. No part of it, in any form, has been copied from other sources without acknowledgement or submitted to any other university or institute for any degree or diploma. Views and expressions of the thesis bear the responsibility of mine with the exclusion of PPG for any errors and omissions to it.



28 October 2020
Gyan Laxmi Shrestha
ID No. 1929002085

ACKNOWLEDGEMENT

Carrying out a thesis is often supposed to be an individual task, however as many would agree, it is not so. I believe it to be teamwork as several people were involved to make my task successfully. I am finding difficulty in writing this page as too many people have helped me during my research. It seems it is not possible to include all those names here. Among those unnamed ones are the people in the study village who made a warm and hearty welcome. The inputs derived from their experiences have proved to be extremely helpful in meeting the objectives of my study. All credit for my success in this work thus goes to them.

I would like to express my heartfelt thanks and appreciation to my research supervisors Prof. Dr. Sk. Tawfique M. Haque PhD., Director, SIPG, North South University (NSU), Dhaka and Dr. Purna B Nepali, PhD., Associate Professor and Program Director, Master of Public Policy and Governance (MPG) Kathmandu University School of Management (KU SOM), for their keen interest, innovative ideas, constructive criticisms, supervisions, and persistence guidance while pursuing this research. Further, I would like to express my deep sense of gratitude to Professor Dr. Salahuddin M. Aminuzzaman, Adviser, SIPG, Dr. Rizwan Khair, PhD., Associate Professor, SIPG, and Dr. Mahfuzul Haque, Assistant Professor, SIPG. I take an opportunity to thank Dr. Ishtiaq Jamil, Professor, Department of Administration and Organization Theory, University of Bergen (UiB) Norway for their invaluable suggestions during the preliminary drafting of the research proposal and the entire thesis work.

I would also like to thank Prof. Dr. Steinar Askvik, Ph.D., Professor, Department of Administration and Organization Theory, and Dr. Martina Vukasovic, Ph.D., Associate Professor, Department of Administration and Organization Theory, University of Bergen (UiB) Norway for their guidance. I also express my heartfelt thanks to Mr. Sazzad Nayeem, Research Assistant SIPG for his continuous help. I would also like to thank Mr. Tulasi S. Sigdel, Director of Studies, Nepal Administrative Staff College (NASC) for his continuous support.

I wish to take this opportunity to express my gratitude towards my respected mother Ms. Sabitri Maya Shrestha whose continuous support, encouragement, and care have made this work attainable. Next, I wish to thank Mr. Arjun Darji and Mr. Dharma Lama for their assistance during field research. This research would not have been complete without his help. My extreme thanks go to my brother Mr. Gyan Raj Man Shrestha and sister-in-law Mega Rawal for their support for the preparation of this report. I take pleasure in recording thanks to my dearest friends Mr. Anil Kumar Gupta and Mr. Phanindra Dahal for their encouragement and relentless support. And finally, I would like to express my thanks to all those who have helped me in my study. Finally, I would like to express my gratitude to SIPG, NSU for enriching my level of knowledge, and assembling an environment for quality research.

Gyan Laxmi Shrestha

October 2020

ABSTRACT

Food insecurity in Nepal has been growing due to a decline in per-capita food production, stagnation of the agricultural sector, and mostly the issues of Climate Change. This escorts to efforts on climate change adaptation interventions to which the Government of Nepal has adopted the Local Adaptation Plan of Action. This scenario puts into question how implementations of climate change adaptation policies effect food security. The survey was done with the objectives to explore the effects of Climate Change adaptation policy on food security, to assess the impacts of climate change on food security, factors affecting the implementation of climate change policy, and local level participation in the implementation planning process.

Survey research was carried out in Simkot Rural Municipality of Humla district to answer above mentioned questions. It was carried out in 40 households within the age range of 30-70 years chosen purposively, 5 cases, and 14 Key Informant Interviews. The nature of the study is explorative and has applied the mixed method to collect data. Both the primary and secondary data were exceptionally used to meet the objectives of the study. The household survey and Key Informant Interviews were used for collecting primary data using tools like semi-structured questionnaires, schedules. The analysis shows a correlation between dependent variable-implementation of Local Adaptation Plan of Action (LAPA) for food security and independent variables-policy design, the authority of local level bureaucrats, participation, and inter-governmental coordination.

The LAPA interventions were on agriculture and food security, mitigation, and adaptation of climate-induced disaster, management of forest, biodiversity and water resources, climate change awareness, training on improved cooking stove, embankment for landslide, irrigation, drinking water, plantation, community forest user group, distribution of seeds and greenhouse, tunnel, and off-season farming.

The theory on implementation by Van Horn and Van Meter and Winter's Integrated Model of Policy Implementation were reviewed to identify factors affecting implementation of LAPA; Top-down and Bottom-up approach of implementation to identify participation of stakeholders and authority; entitlement and resilience capacity and food security, Sustainable Livelihood approach, Sen's Entitlement approach were reviewed to understand food security, livelihood activities and resilient capacities.

The finding revealed respondents were aware of changes in climate experiencing an alteration in precipitation and temperature leading to change in length of the growing period, the difference in harvest time, crop damage. The food-sufficiency months were 4-6 months. The factors affecting food unavailability was lack of proper irrigation facility, unfavorable monsoon, and low production. The price of food items rises with less production and lack of transportation and hence the household income was insufficient to purchase food. The findings disclose that the respondents have a positive response on the nature of locally identified most affected sectors; nature of immediate, urgent, and long-term plans; proper implementation of policy, rules, and regulations. The study revealed that the majority have autonomous participation which is the major factor for implementation of LAPA for food security and also female participation. The communication and coordination were found satisfactory with the district level which was revealed by Key Informants but was not satisfied with the livelihood options identified locally. The policy design was perceived as highly satisfied but it does not have significant relation with food security. The authority of local level bureaucrats was perceived as positive towards the implementation of LAPA for food security but is significantly positive to only food stability. The nature of participation, composition, and female participation seems autonomous and positive and has a positive but weak correlation with food availability. The perception of inter-organizational coordination was found to be positive and also positive to food availability and stability. The findings of the study stated that the implementation of climate change policy (LAPA) for food security has a major but negligible impact only on food availability. Lack of enough resource and institutional arrangement gap in the institutional arrangement, capacity in

implementation and mechanisms, making a real based plan, elite capture are the factors affecting the implementation of LAPA.

Therefore, major policy recommendations have been put to address food insecurity as the development of sustainable agriculture, increase in production and equitable distribution, establish food storage and distribution system, ensuring women participation in scientific research of food and nutrition policy, ensure meaningful participation in the mainstream of state mechanism and ensure their access to productive resources.

Key Words: *Climate Change, Food Security, Implementation of LAPA, Policy design*

Contents

List of Tables

List of Figures and charts

List of Abbreviation

AD	Anno Domini
APP	Agriculture Perspective Plan
BSPN	Biogas Support Programme Nepal
CAPAs	Community Adaptation Plan Of Action
CBS	Central Bureau of Statistics
CDM	Clean Development Mechanism
CERs	Certified Emission Reductions
CO_2	Carbon-dioxide
COP	Conference of Parties
COVID-19	Corona Virus Disease-2019
DFID	Department for International Development
DHM	Department of Hydrology and Meteorology
DNA	Designated National Authority
FAO	Food and Agriculture
FGD	Focus Group Discussion
GDP	Gross Domestic Product
GLOF	Glacier Lake Outburst Flood
GOs	Government Organizations
GON	Government of Nepal
GHG	Green House Gas
HH	Household
I/NGOs	International/Non-Governmental Organization
IPCC	Inter-Governmental Panel on Climate Change
KII	Key Informant Interview
LAPA	Local Adaptation Plan for Action
MDG	Millennium Development Goals
MoEST	Ministry of Environment, Science and Technology
MoF	Ministry of Finance
MoFE	Ministry of Forest and Environment
NAP	National Adaptation Plans
NAPA	National Adaptation Programme of Action
NASC	Nepal Administrative Staff College
NGOs	Non-Government Organizations
NPC	National Planning Commission
PDS	Public Distribution System
PEM	Protein-Energy Malnutrition
SLF	Sustainable Livelihoods Framework
SPSS	Statistical Package for the Social Sciences
UN	United Nations

UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
VDC	Village Development Committee

CHAPTER-I
INTRODUCTION

1.1 BACKGROUND

Once an exporter of rice, Nepal now faces a food deficit. Still, agriculture is the mainstay of the Nepalese economy. It employs more than 78 percent of the economically active population though the sector has shrunk and accounts for about 27.6 percent of Gross Domestic Product (GDP)in the current Fiscal Year 2017/18 (MoF, 2018). Eighty-three percent of the population depends on agriculture and the same population resides in a rural area (CBS, 2011). The focus of government efforts has been put on enabling dependence on weather conditions, an increase in productivity, and also diversifying the range of crops. According to the latest estimates by the Food and Agriculture Organization FAO (2019), there are 704 million severely food insecure people in the world. From a total of two billion with food insecurity, 52 percent are in Asia which is 1.04 billion. Further in the year 2018, total food insecurity is much higher for Southern Asia i.e. 34.3 percent than for Eastern Asia i.e. less than 10 percent (FAO, 2019)

Climate change undoubtedly is a global problem leading to water shortages that would have significant effects on the agriculture sector. IPCC, 2007 defines climate change as "a statistically significant variation in either the mean state of the climate or in its variability, persisting for an extended period". Furthermore, IPCC predicts an increase in global temperature of an estimated increase of 1.8-4 degrees Celsius, as the global average by 2090-2099. This warming will not be equal over the world, as IPCC has modeled some areas to potentially be more exposed to a warmer climate than the global average, the Himalayas being one of these areas (IPCC, 2007). It is the change in average meteorological conditions experienced in a particular locale over a specified period. It occurs concerning the variation of latitude and terrain feature and change in precipitation pattern, ocean area, and glaciers. The changes are attributed directly or indirectly to human activity which alters the composition of the global atmosphere and that is in addition to natural climate variability. Climate changes are more due to

external forces and less due to natural internal processes such as emission of volcanic gases, changes in ocean circulation, and fluctuations in solar output, and so forth.

IPCC reports have highlighted the urgency for adaptation. It has been estimated that the rise of greenhouse gas emissions could be 25 to 90 percent by 2030 relative to 2000. The Earth could warm by 3°C during this period. IPCC predicts serious effects in agriculture including a reduction in crop yields in tropical areas which leads to increased risk of hunger and an increase in climate-sensitive diseases (malaria) including the risk of extinction of both plant and animal species by 20 to 30 percent (UNFCCC, 2007).

In response to the future climate change both the agricultural and forestry systems are predicted to alter exhibiting transitions in livelihoods and landscapes (Steenwerth et al., 2014). It is one of the single greatest challenges worldwide. “Climate change and increasing climate variability and extremes are affecting agricultural productivity, food production, and natural resources, with impacts on food systems and rural livelihoods, including a decline in the number of farmers” (FAO, 2019). Climate hazards like floods, drought, hail storms and extreme temperatures, unpredictable rainfall soil erosion, deforestation are recurring events in Nepal creating severe threats in agriculture. As a result of the major shift is experienced worldwide in the ways of food production, distribution, and consumption which led to new challenges of food security, nutrition, and health. There is some basis of understanding food security and different aspects in literature while a widely accepted definition originates from the FAO annual report on food security, “The State of Food Insecurity in the World 2001” (Peng & Berry, 2018). FAO (1996) describes it as “when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life”. The four dimensions of food security identified are in line with different levels as Availability, considered for the national level, Accessibility as household, utilization as an individual, and the last stability is been considered as a time dimension affecting all the levels. To have complete food security, all of these dimensions must be intact (Peng, 2019)

South Asia has experienced severe floods, record-breaking heat waves, increasing rainfall variability, and the rapid melting of glaciers in 2019 (Leung, Russell, & Connell, 2019) Climate change is undoubtedly exacerbating these extreme events with clear signals that such impacts will be intensified in the future (IPCC 2018), particularly in parts of South Asia. Climate Change adaptation turns out to be a critical tool of actions by the governments and those exposed populations essentially the poor and most vulnerable to cope with the intensified risk (Singh, 2020). Ghimire (2007) has stated that the discussion of climate change "formally entered in Nepal in 1992 when Nepal became a part of the United National Framework Convention on Climate Change (UNFCCC) at the Rio Convention, 1992" (Ghimire, 2007). This clarifies that Nepal was concerned with the future consequences of climate change. The country is susceptible to disasters, including flash floods, GLOF, and melting snow in the mountains and droughts and inundation in the terai (Malla, 2008).

1.2 STATEMENT OF THE PROBLEM

Access to sufficient food in a sustainable way is a fundamental human right that needs to be enjoyed by everyone no matter the age, gender, nationality, or religion of the individual. However, it is the right that has constantly been violated. Climate is particularly an important driver of food system performance. Its variability and change currently place significant stress on food production and availability.

Climate change is fast becoming a major issue of concern to both Nepal and Nepalese. Climate change is already threatening Nepal's food security, human habitats, water resources, and tourism sectors seriously. Nepal and the entire greater Himalaya region will be facing multiple challenges due to climate change. Mountain landscape including our Himalayan glaciers, the central part of the water towers of South Asia - agriculture, health, forests, and pastures are already showing indications of climate change impacts. If we add increasing fuel and food crisis to climate change-related problems, Nepal's national agenda such as poverty reduction, water management, and human safety and security will face unimaginable challenges, and Nepal will further get exposed to increasing natural and human-made disasters. The mountain regions are more

vulnerable because it has been seen that both the warming trends as well as the impacts are magnified due to the extreme changes in altitude over small distances. The majority of Nepalese people's source of livelihood is agriculture which relies strongly on the monsoon systems and indications are strong that the monsoon pattern especially rainfall timing, frequency, duration, and intensity all may be altered by climate change. Traditionally, people have been adapting to small changes in weather patterns and climatic variations but as these changes intensify peoples' ability to adapt will be challenged and they simply may resort to deal with.

The local communities have identified climate change as a responsible source of declining crop and livestock production in terms of agriculture and food security. The changes in stream-flow, more intensive, and potentially erratic monsoon rainfall and flooding have risk the vulnerable subsistence farming economy of Nepal(Thakur & Karki, 2018). FAO states that all four dimensions of food security, availability, access, stability, and utilization of food will be affected by climate change (FAO, 2006). In this picture, the livelihoods of two-thirds of the labor force in Nepal basically from the rural poor will be at high risk if agricultural production is adversely affected by climate change (Pant, 2015)

Agriculture remains the backbone of the economy providing a livelihood for over 80 percent of the population and in-order-to contribute to climate change adaptation its development should take place in such a way as to improve livelihood security, in particular among the poorest. It is crucial to understand the factors having roles in the effective implementation of an adaptation plan to address food security. The Government of Nepal, 2011 states that the Local Adaptation Plan of Action (LAPA) ensures the proper adaptation for agriculture and food security to the vulnerable communities due to climate change. It is important to learn if the implementation of climate changes adaptation policy effect food security. Hence, this study will aim at highlighting the climate change adaptation policies in food security and shed light on the consequences of climate change basically in four aspects of food security.

1.3 RESEARCH QUESTION

From the above mentioned discussions following research question have been posed:

- How implementations of climate change adaptation policy effect food security in Nepal?

1.4 OBJECTIVE OF THE STUDY

The general objective of this study is to explore and examine the effects of Climate Change adaptation policy in food security referencing to Simikot Rural Municipality of Humla district. The specific objectives are:

- To assess the impacts of climate change on food security
- To analyze the factors affecting the implementation of Climate change policy (LAPA) for addressing food security
- To evaluate the local level participation in the implementation planning process.

1.5 SIGNIFICANCE OF THE STUDY

The global assessments on the impact of climate change on the agriculture sector have ambiguously large variations across and even within the countries. Climate change is one of the major elements that will enhance the increase of risks to and decrease the productivity in agriculture basically of the developing countries. This way the countries are likely to become dependent on imports while the farmers lose market share in the agriculture trade as the production could be heightened in developed countries putting impacts on the shift of world food production.

The agricultural pattern of farmers in Nepal is still traditional and highly depends on rainwater and seasons while yet two-thirds of its population depends on agriculture for their livelihood. Henceforth even slight changes in the local and regional temperatures, the form and the amount of precipitation, pattern of rainfall, soil moisture content, and sunshine and cloudiness intimidate the agriculture sector at large. Moreover, climate

change boosts the occurrence leading to disaster. With this, extreme events like floods, droughts, and hailstorms can too have a drastic impact on agriculture. The trend of rising temperatures and precipitation leads to more pests and weeds ultimately leading to a decrease in agricultural productivity. This condition directly impacts the state of food security. Therefore, thinking over the threats, the Government of Nepal has formulated policies related to climate change adaptation obliging food security. To this very situation, the implementation pattern must be well analyzed. For this purpose, this study intends to assess the impacts of climate change on food security and analyze the effects of policies on food security issues. Finally, this study will be of some help for National Development Planners in formulating and implementing policies especially directed towards impacts of climate change on food security.

1.6 LIMITATIONS OF THE STUDY

The limitation of the study are stated below:

- The alarming situation of the COVID-19 pandemic has made the researcher handicapped for the study.
- This study has focused on the impacts of climate change adaptation policies especially in food security hence other areas apart from food security will not be included.
- Due to time and resource constraints, the researcher might be handicapped to confine the study within a community.
- These various limitations of the study may bring about some problems in generalizing on the impact of implementation policies of climate change adaptation in food security. Hence, the findings of the study might not be generally conclusive.

1.7 ORGANIZATION OF THE STUDY

This thesis has been organized into three chapters.

Chapter one presents the introduction and background of the study, statement of the problem, research question, research objective, significance of the study, and limitation of the study.

Chapter two presents the review of the existing literature, the theoretical framework, analytical framework, variables, indicators, and operational definitions.

Chapter three details the methodological overview of the study. It clarifies the research approach; selection of the study area; sampling technique; sources of data collection; tools for data collection and methods of data analysis.

Chapter four specifics a brief description of the study area.

Chapter five presents a data analysis and presentation. The data generated for the study are analyzed and presented in graphical, tabular representation. The analysis of both qualitative and quantitative data is presented.

Chapter six covers a summary of the entire research work with discussion and conclusion and policy recommendation.

CHAPTER II

LITERATURE REVIEW AND THEORY

2.1 INTRODUCTION

This chapter presents reviews of the existing literature associated with the research topic. It will provide literature on key concepts of climate change, food security, and adaptation. Also, it will provide reviews on related research, policies, information, and ideas relating to the context of the world, South-Asia, and Nepal at large.

2.2 Definition of Key terms

Climate Change

"Climate change in IPCC usage refers to any change in climate over time, whether due to natural variability or as a result of human activity. This usage differs from that in the Framework Convention on Climate Change, where climate change refers to a change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods" (IPCC, 2007)

"Adaptation denotes the adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities" (IPCC, 2007)

"Vulnerability is the degree to which a system is susceptible to and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, the sensitivity and adaptive capacity of that system" (IPCC, 2007)

Food Security

The FAO defines food security as "a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that

meets their dietary needs and food preferences for an active and healthy life"(FAO, 2008). This very definition acquaints with four major dimensions of food security viz. Physical availability of food; Economic and physical access to food; Food utilization; stability of the other three dimensions over time.

The first dimension of food security is the availability of sufficient food, which is the overall ability of the agricultural system to meet the demand for food. Agro-climatic essentials of crops and pasture production; socio-economic and cultural factors covering overall range; and the performance with the response to markets by the farmers are its sub-dimensions.

The second dimension is stability which relates those individuals who are at high risk of losing their access either temporarily or permanently to the resources that are needed to consume adequate food. It is either due to the inability to ensure ex-ante against the shocks or due to the lack of enough reserves toward smooth consumption ex-post or also the both. Climate variability is a significant cause of unstable access.

The third dimension, access, necessarily includes access to adequate resources (entitlements) for obtaining appropriate food for a nutritious diet by the individuals. Here, entitlement implies all set of commodities to which a person has command given the legal, social, economic, and political provisions. The purchasing power of the consumer, the real incomes, and food prices are key elements though it does not need to be entirely monetary while including the traditional rights.

Lastly, it is utilization which incorporates all food safety and quality traits of nutrition. Health, sanitary conditions across all food chains is the sub-dimensions. Acquiring an adequate quantity of food is not enough if one is not able to make use of it rather is always falling sick (FAO, 2008).

The report on the state of food security and nutrition in the world by FAO states "undernourishment and severe food insecurity seems to grow entirely in the regions of

Africa, and also South America, while the situation seems stable in most of the regions in Asia" (IPCC, 2007).

2.3 Addressing Food security:

Food security is considered a basic human right which has also been documented by the government of Nepal with great significance in guaranteeing food security to its people. In-spite-of this, the tendency of food security is deteriorating; the effects of climate change are ambiguous. Nonetheless, drought episodes and flooding have become frequent; there are insignificant improvements in nutrition which is slow, while reliance on remittances is increasing which has been the main driver of economic growth. Food assistance has been a part of Nepali society for many years. It began as the Dharma *Bhakari* (religious store) system that was founded on voluntary donations for emergency food stock by households which were then distributed during times of crisis.

2.4 Review of the National Plans and Policies regarding food security and climate change:

2.4.1 Food security:

Fourth five-year plan (1970-1975)

The agricultural development programme in the plan period was targeted to attain the following objectives through the maximization of output. It intended in increasing production of every crop, yields per land area, and per-capita yields. The objectives were "to ensure rising levels of consumption; to provide greater exports; to supply an adequate amount of industrial raw-materials; to develop greater purchasing power for a larger segment of the population, and to generate a capital base for savings and a broader tax base"(NPC, 1970)

Fifth five-year plan (1975-1980)

The fifth five-year plan focused on specialization in production of cash crops and food grains production in the southern part of the country, livestock enhancement in the

northern region while horticulture expansion in the central hills. It also intended to uplift the regional development constructed based on climate patterns, diverse topographical state, and natural resources of the country by providing a basic framework and guidelines (NPC, 1975).

Eighth five-year plan (1992-1997)

The scenario of the nutritional status of Nepalese people was low in the majority. The chief reasons for both malnutrition and low nutrition were identified as the scarcity of food grains, imbalance in distribution, poverty, illiteracy, and the lack of health services. Likewise, the various nutrition surveys find out that the Nepalese children were plagued by protein-energy malnutrition (PEM). The national nutrition survey of 1975 A.D estimated that the poor, female, and children were suffering from a low height and weight, dumbness, goiter, anemia, and blindness due to malnutrition and micro-nutritive complications in iodine and vitamin-A deficiency. The commitment of Nepal to the World Summit for children, 1990 an objective was set to improve nutritional conditions for children and development by 2000 A.D. The government was also determined for progress in the nutritional conditions amongst women and the rural population. In this context, the policies concerned with nutrition were embraced in the 8^{th} plan (NPC, 1992)

Policies were on emphasizing the agriculture sector for increasing the production of nutritive food like milk, vegetables, fish, and meat. Launching a supplementary food supply programme was another policy for an effective food supply system which was for the communities badly affected with a scarcity of food and nutrition and geographically constrained. These policies aimed to enhance employment and income opportunities. Likewise, dissemination of information on applicable baby food preparation at village and community level; increase in the awareness on nutritive food and nutrition education at the primary level also incorporate agriculture, health target project, and adult literacy. Programmes on the measurement of height, weight, and arm of children who are under three years of age were in the policy, breastfeeding, and also

supplementary food programme. The plan also had a policy on programmes on measuring arm, height and weight of children less than three years of age, weight measurement for women specifically pregnant and breastfeeding mothers, supplementary food programmes for child nutrition, also on the information of nutritious food and kitchen garden for low nutrition level women. Programmes of micro-nutrient supply for areas with a micro-nutrient deficiency; institutionalization of collecting statistics of nutrition which was taken as indicators of effects of the development plan; and strengthening National Nutrition coordination committee were in the plan to reinforced and nutrition surveillance unit was aimed to be set up in maintaining inter-regional coordination for effective implementation of health, education, agriculture, and local development sectors.

Ninth five-year plan: (agriculture) (1997-2002)

The ninth plan had objectives in the agriculture sector for accomplishing targets set by the APP which were in production, employment, income growth, and food security sectors that were contributing to poverty alleviation through the increase in productivity of resources and employment opportunities by rapid economic growth from agricultural sector; lessening impacts on the environment through the amalgamation of natural resources of the agricultural sector and external production. Strengthening the agro-based industry was another objective through commercializing and diversifying the agriculture sector. Women leadership development in production programmes through their involvement and participation in agricultural development and enhancing the nutritional situation of people through an increase in the production of nutritious food and food grains for promoting food security (NPC, 1998).

Tenth Five-Year Plan (2002-2007)

The tenth plan had objectives and targets regarding agriculture. The sectoral objectives were:

- Reduction in poverty via escalation of the agricultural sector in production, productivity, and income and subsidize food and nutritional security.
- Contribute to sustainable production and growth in agriculture through research and technology development, use and protect agro-biodiversity while balance environment sinking the pollution by external responses.
- Promotion of agro-based industries and enterprises with participation of both private and cooperative sectors by endorsing export opportunities and enhance the internal market (NPC, 2002)

Three-year interim Plan (2007/8-2009/2010)

Food sovereignty is taken as a basic element of human rights which is also recognized by the Interim Constitution of Nepal, 2007. This interim plan necessarily puts focus on the policies and programmes relating to the four pillars of food security viz. availability, accessibility, stability, and utilization of food. For this, the food security plan was focused on the major objective of making healthy and productive life through the improvement of the situation in national food sovereignty and nutrition of the targeted people (NPC, 2007).

The basic objectives of the plan were to increase national self-reliance in basic food products; improve nutrition situation; enhance the standard, quality, and hygiene of food products consumed by the household and that are available in the market; improve the capacity of managing food insecurity arising due to crisis conditions as droughts, floods, famines, landslides, fires, etc. and escalate access to food by the people during food insecurity.

Twelfth Development Plan (2010/11-2012/13)

The long term aim of the twelfth development plan was to ensure the food sovereignty of every citizen by strengthening all aspects of food and nutrition security in a coordinated manner. While the plan had objectives on:

- To increase the country's self-sufficiency in basic foods items and improve the food and nutrition situation
- To enhance the quality and hygiene of food items
- Increase access to food for food risk groups and increase their ability to manage a food crisis (NPC, 2010)

Thirteenth Development Plan (2013/14-2015/16)

The thirteenth plan had the aim to ensure the right to food sovereignty of the citizens by strengthening all aspects of food and nutrition security and had objectives on

- Ensuring food and nutrition security through increasing the supply of basic food items by increasing agricultural and livestock production and improve the food and nutrition consumption situation
- Ensuring food security by identifying areas and groups at risk of food insecurity and increasing access to quality food(NPC, 2013)

Fourteenth Development Plan (2016/17-2018/19)

The fourteenth development plan portrays the creating conditions for regular and adequate, clean, and nutritious food availability. It had the aim of achieving food and nutrition security through sustainable access to food and increased consumption. While the objectives were:

- To ensure food and nutrition security, increase the supply of basic food items by increasing agricultural and livestock production, and improve the food and nutrition consumption situation.
- Ensuring food security by identifying areas and groups at risk for food security and increasing access to compliant food items.
- To establish proportional and equitable food and nutrition distribution system(NPC, 2016)

Fifteenth Development Plan (2019/20-2023/24)

The goal and objectives of the 15th development plan related to food security are:

The goal of the 15th plan is to ensure food and nutrition security by increasing the availability and access to clean and nutritious food.

The objectives are:

- Ensuring basic food availability in areas and groups at risk of food insecurity and malnutrition
- To increase access to food by improving income generation through agricultural and non-agricultural enterprises
- Improving the distribution system of quality food items by enhancing the hygiene of food items (NPC, 2019)

2.4.2 Climate Change

During the UN Conference on Environment and Development Act Rio de Janeiro, Brazil, Nepal signed the United Nations Framework Convention on Climate Change (UNFCCC) on 12 June 1992. The instrument of authorization was given to the Convention Depository on 02 May 1994 and UNFCCC come into power in Nepal on 31 July 1994. The parties to the convention adopted the Kyoto Protocol on 11 December 1997 to appliance the convention effectually. Article 12 of the protocol has provisioned for Clean Development Mechanism (CDM) to support parties that are not incorporated in Annex 1 in attaining sustainable development goals and contribute the final objective of the convention and to support those included in Annex in accomplishing agreement with limitation of quantified emission and commitments for a reduction under Article3. CDM Provides opportunities to parties not included in Annex 1 to profit from project activities resultant of Certified Emission Reductions (CERs), and parties included in Annex 1 to meet their compliance commitments. The Government of Nepal submitted instruments of consent to the Kyoto Protocol on 16 September 2005 to its depository. In

consequence, the Kyoto Protocol entered into force in Nepal in December 2005. To fulfill the primary objects from CDM activities, the Government of Nepal had allocated the then Ministry of Environment, Science and Technology (MoEST) (now Ministry of Environment) solely accountable for Designated National Authority (DNA) on 22 December 2005. To initiate DNA activities, MoEST has constituted the Steering Committee on 7 April 2006.

The first CDM project of Nepal was registered by Biogas Support Programme Nepal (BSPN) under AEPC in the form of two project packages comprising 19396 domestic rural biogas plants. The CDM project had already entered into carbon trading at the international level deriving a carbon credit benefit of US$ 7 per ton of CO_2 equivalent saved by the rural biogas plant in Nepal.

For facing the encounters of climate change and solve problems faced by the country, increase the benefits from the climate change convention and succeed in existing efforts and utilize the opportunities the urgent requirement for formulation and implementation of a national policy was realized and hence Climate Change policy 2067 was drafted from Ministry of Environment. The policy objectives were set for addressing concerns of climate change as a climate change center and strengthen prevailing institutions; instrument climate adaptation-related programmes and increase the benefits through mitigating adverse impacts and increasing positive impacts; reducing GHG emissions by endorsing the clean energy, alternative, and renewable energies, and by increasing energy efficiency and encouraging the use of green technology; enhancing climate adaptation and resilience capacity of communities.

The government of Nepal has recently prepared the National Adaptation Programme of Action (NAPA) through a consultative process. It is considered a strategic tool for assessing climatic vulnerability, and it methodically responds to issues of climate change adaptation through evolving suitable adaptation measures. The document has identified six priority thematic areas identified under the NAPA process taking into consideration the overarching goals of poverty reduction and Millennium Development Goals (MDG)

including agriculture and food security, energy, forests, water resources, biodiversity, urban settlements, infrastructure, public health, and climate-induced disaster. The major objectives of NAPA are:

- Assessing and prioritizing the vulnerabilities of climate change and detect adaptation measures,
- Proposal development for primacy activities,
- Formulate, assess and complete the NAPA document
- Develop and retain a platform for learning and knowledge management, and
- Improve a multi-stakeholder framework of action on climate change.

It has been expected that the NAPA process will continue even after the completion of the NAPA document preparation while the process will be owned by the country and mainstream its outcomes to the national development agenda. NAPA foresees that this will put a contribution to livelihood diversification, building community resilience, and poverty reduction.

2.4.3 Policy interventions to combat food insecurity

Policies, Strategies, and Frameworks:

Nepal's National Climate Change Policy (2011): The policy foresees a country secure from the hostile impacts of climate change seeing climate justice. The policy expects it to contribute to a prosperous society through the pursuit of human development, environmental conservation, and sustainable development. The policy has objectives of minimizing GHG emissions through the rise in the usage of clean energy; enhance climate adaptation and resilience capability of local people for efficient management and optimal exploitation of natural resources, and implementing a low-carbon development path through the pursuance of climate-resilient socio-economic development. The National Climate Change Policy, 2011 is the main policy document that has been addressed for the first time on mitigation and adaptation of climate change issues distinctly in Nepal (GON, 2011).

National Adaptation Programme of Action (NAPA): Nepal prepared its National Adaptation Programme of Actions (NAPA) for climate change in September 2010 for addressing the most critical and instant requirements for adaptation with the decisions made by the seventh session of Conference of Parties (COP) held in Marrakesh and also party to the UNFCCC as a least developed country. The effective implementation of NAPA was subjected to enhance opportunities in helping ecosystems and climate-vulnerable communities in coping with the argumentative impacts of climate change and advance livelihoods addressing the needs for adaptation (NAPA, 2010).

National Framework on Local Adaptation Plan for Action 2011 (LAPA): Nepal adopted LAPA for localizing climate change adaptation and to ensure the assimilation of both resilience and adaptation in local to the national process of planning. This framework ensures inclusive, flexible, responsive, and bottom-up planning. It contributes to conducting vulnerability and adaptation assessment; sensitizing people and stakeholders; identification, selection, and prioritization of adaptation options; and formulation and implementation of the adaptation plan. It is the framework that provides an opportunity in developing and implementing a stand-alone LAPA for integrating adaptation possibilities to both the planning and implementing the process. The framework was implemented in 90 Village Development Committees and 7 municipalities of the country while for community forests, about 2200 community adaptation plan of action (CAPAs) were developed (Ministry of Environment of Nepal, 2011).

The Thirteenth Periodic Plan (2013/14-2015/16) has embraced the green development approach to alleviate climate change impact. Both climate change and the environment have been considered as a cross-cutting issue. It has put a focus on the implementation of NAPA via LAPA at the local level (NPC, 2013)

National Adaptation Plans (NAP): A process was launched in 2015 for the formulation and implementation of NAP for addressing both the medium and long-term adaptation needs and lessens climate vulnerabilities. It was also meant for promoting the

integration of climate change adaptation to the sectoral policies, strategies and plans, and programmes. It was aimed to be formulated through country-driven, wide consultation, participatory and transparent approaches; and concerned ministry-led thematic working groups. The thematic areas and cross-cutting issues of NAP were the development of efficient irrigation and water management systems, adaptive technologies, varieties, and breeds; the advancement of climate-resilient agricultural practices; climate information services with sectoral information and early warning systems; improvement in grain, food storage, and distribution systems; upgrade financial services and insurance; and development and strengthening of farmers' networks and institutions (MoFE, 2018)

South Asian Context

Bangladesh

(Roy, Dev, & Sheheli, 2019) in their research paper entitled, "Food Security in Bangladesh: Insight from available literature" sought after the situation of food security in Bangladesh. The researchers have systematically studied and investigated available literature and different dimensions of food security related to Bangladesh. Their study reveals that though Bangladesh has made extraordinary progress in the last few decades in food availability, food accessibility, and food utilization still it is not in the case of food stability. The people lack dietary diversification leading to nutritional imbalance and numerous factors challenge food security.

(Nath, 2015) in his research paper, "Food Security of Bangladesh: Status, Challenges and Strategic Policy Options" have used a political-economic approach to address food security problems under the market economy environment and the proactive policy actions of the government of Bangladesh. He has analyzed the alternatives of self-reliance and self-sufficiency strategies for articulating appropriate food security policy options for Bangladesh in the long run where he concludes on high attention to be provided to the uncertainty of international trade, land scarcity of the country, climate

change, and environmental hazards, a necessity in increasing production of nutritious food and the uncertainty in the employment of the people in the country.

(Hossain & Majumder, 2018) on their research paper, “Impact of climate change on agricultural production and food security: A review on coastal regions of Bangladesh” found the probable impacts on sectors viz. coastal agriculture, livestock, and fisheries which are a major source of livelihood and food security for the coastal people who are hard poor while the contribution of women is major in ensuring food security of the family. They found that those women are threatened to acquire food security and climate vulnerability due to prevailing gender-poverty interconnection, socio-economic, and political aspects. They also discovered that the impact of power on marginalized women and food insecurity is due to the failure to address through existing policies and adaptation mechanisms.

(Yu, Alam, Khan, & Ruane, 2010) in their paper, “Climate Change Risks and Food Security in Bangladesh” identified that Bangladesh intends to depend on the agriculture sector for both income and livelihoods while the existing efforts continue to be limited and not proportionate with the likely climate impacts. Hence policies that help the households build resilience to existing climate risks have to be promoted. Next that stimulation of the agriculture sector in achieving rural growth and support sustenance livelihood.

Sri-Lanka

(Esham, Jacobs, Sunith, & Rosairo, 2018) in their research paper titled “Climate change and food security: a Sri Lankan perspective” wanted to learn a broader perspective on food security issues in Sri Lanka. They found that there are several climate-induced distresses for food security including a decline in agriculture productivity, food loss, and low livelihood resilience capacity of the poor and also high undernourishment/child malnutrition. They suggested that a holistic approach is necessary which can ensure climate resilience of the food system, nutrition caused by climate change. They also suggested the need for a climate-smart agriculture system that would address food

security and its dimensions; and a need for research on climate change impacts on the food system in Sri-Lanka.

India

(Pillay & Kumar, 2019) in their research paper, “Food security in India: evolution, efforts, and problems” have examined the efforts by India in achieving food security, the problems, and challenges. They concluded three major key strengths of the Indian food security system. First, attaining self-sufficiency in the production of cereals and creating the Public Distribution System (PDS) which has helped in preventing famines successfully. Next is the system of procurement and capacity in building larger buffer stock and finally, the strong political and administrative will to withstand and progress the PDS.

(Ramaraj & Suresh, 2019) in their research work, “Food safety and security in India- a study” shades light upon challenges of food security in India and derives that the very reason for starvation is a scarcity of food grains and failure of exchange entitlement. For this, they suggest that the government has to focus on long-term oriented development programs than short-term policy; the need for quality employment creation; the need for rejuvenation of the Indian agricultural sector; and kingpin of technology to attain food security.

(Chatterjee & Khadka, 2015) in their book, “Climate Change and Food Security in South Asia” put forward policy recommendations for the South Asian countries to combat food insecurity and minimize the impact of climate change. They put the focus on bilateral initiatives in tackling climate change and food security through the establishment of a food bank to enhance food security in the region, intellectual property rights and sharing of knowledge and experience, and share and transfer of technology to promote economic growth. Last, climate resilience agriculture and research and development in the sector to adapt to the changing climate.

2.5 Theoretical/ Analytical framework

2.5.1 Theoretical Perspective

Social scientists employ diverse theories and concepts to facilitate the analysis of social phenomena. Hence, the theories and concepts are the guides for social phenomena conceptualization. This study will utilize different theoretical approaches for making the understanding of food insecurity and how to cope with it. For this purpose, the entitlement approach, livelihood framework approach will be the theories in the study. While the theoretical model of public policy implementation and three approaches of implementation, viz. top-down, bottom-up, hybrid, and integrated model; implementation theory by Van Horn's and Van Meter are reviewed to analyze the process of implementation. The concept of food insecurity provides a framework for examining the situation of food security in the study area. The Sustainable Livelihood approach speaks on the livelihood activities that households depend on a broader perspective. The Entitlement approach is used for assisting theory in the discussion of household resources related to food insecurity.

2.5.1.1 Top-Down Approach

The top-down implementation is creating a policy decision through executive order while the authoritative decisions are located at the center by actors who search for producing anticipated effects (Matland, 1995). It pursues to develop policy advice that is generalizable and get reliable and recognizable patterns in behavior across diverse policy sectors (Matland, 1995). The top-down approach to adaptation, sometimes known as an 'impacts' approach, is historically main. The emphasis of top-down valuation is normally to assess the probable effects of climate change in a given climate scenario and to evaluate the efficiency of adaptation measures to lessen adverse impacts projected (Carter, 2007). It studies by referring to the past and present experience of events. This approach makes pretty much literature on the threats and opportunities due to climate change in a region and provides information on the extent of impacts that might be caused (Brown, M., & K. and Pringle, 2011).

2.5.1.2 Bottom-up Approach

The theory suggests studying the present scenario at the recipient level and helps analyze the real causes which put influence to that level. The approach advocates reaching the people and not goes with prescriptive advice. The implementation strategy is formed embracing the target group and service deliverers as they believe they are the actual policy implementers (Matland, 1995). Hence, it is more of a 'community-based' and participatory approach. Climate policies can best be dealt with by the use of a participatory approach (Mearns & Norton, 2010).

2.5.1.3 Hybrid Approach

The new approach, the hybrid approach is pioneered with the consolidation of elements of both top-down and bottom-up approaches. The approach is focused on implementation research amplifying the strengths from both approaches and facilitate at different levels (Matland, 1995)

2.5.1.4 Winter's integrated model of Implementation

The model of an integrated model of implementation was crafted by the integration of both top-down and bottom-up approaches of the policy implementation. Winter (2003), states the model focuses on both implementation behavior and outcomes. It concerns the authorized policy objectives as a dependent variable and standard for evaluation. This very standard is chosen from the democratic point of view as goals formulated in the legislature and the laws have a particular legitimate status that is relevant for holding government accountable. This model helps provide a comprehensive factor of affecting implementation result-performance and outcome of the policy. Here, Winter states that the model provides a set of factors and mechanisms which affect both the output and outcomes of the implementation. (Winter, 2003) As depicted in the figure below, Winter comes up with sets of conditions which have impacts on outcomes of implementation viz: policy formulation and policy design, the behavior of both the organizational and the inter-organizational implementation, bureaucratic will at street-

level, target group behavior and socio-economic context having enormous impacts on all conditions (Winter, 2012)

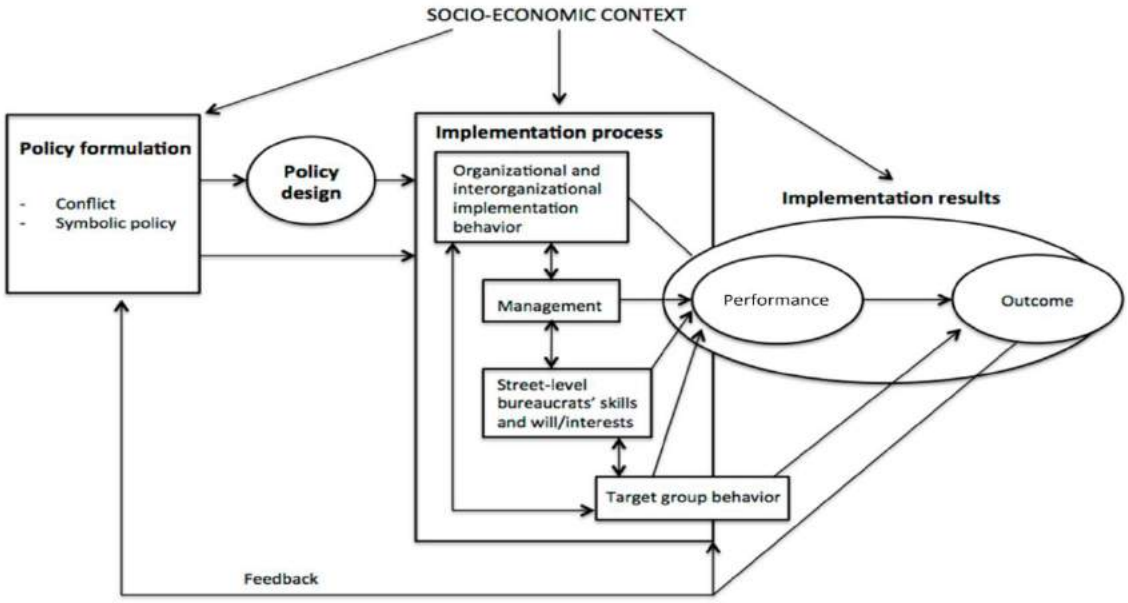


Figure 2. 1 *Winter's Integrated Implementation Model*

Source: Adopted from Winter (2003)

The model implies that the implementation comes about by the enactment of implementation and the outcomes depend on the implementation process which is defined with the three other variables viz. street-level bureaucratic will, organizational and inter-organizational behavior, and the target group behavior.

2.5.1.5 Van Meter and Van Horn Theory of Implementation

Donald S. Van Meter and Carl E. Van Horn, 1974 are the developers of this profound theory of implementation. The framework delivers on the interrelationship between these factors which are involved in the formulation of policy and the performances to the environment which is within the organization. It is a systematic and well-structured framework of policy implementation. The model demonstrates six components viz. policy standards and objectives; policy resources; characteristics of implementing agency; inter-organizational communication and enforcement activities; social, economic, and political conditions and dispositions of implementers(Van Meter & Van Horn, 1974).

a. Policy standards and objectives:

According to Meter and Horn, “the identification of performance indicators is a crucial stage in the analysis in terms of factors that determine the performance of the policy. Essentially, the performance indicators assess the extent to which the policy’s standards and objectives are realized”(Van Meter & Van Horn, 1974). The overall goals of the policy are defined by the decision standards and objectives while act away from the generalities of the legislative document to deliver concrete and more specific standards on assessing program performance. While in a few cases these standards and objectives are self-evident and easily measurable in contrast to the complex nature of goals.

b. Policy Resource

In this second factor, the model shades light upon the resources of policy that include funding appropriateness and also the effective implementation of the framework concerning the technical assistance offered. It indicates that the agencies must look after the funding of policy while if left vague the agencies have to either find the source or make use of their resources. Hence, effective implementation of the policy is defined by the ability to utilize available resources.

c. Inter-organizational communication and enforcement activities:

Van Meter and Van Horn emphasized appropriate communication and coordination amongst and in between the organizations as it determine the effectiveness of the implementation of set standards and objectives. Inconsistency and unclear standard of policy objectives only lead to difficulty in achieving it. According to Meter and Horn, the provision of technical advice and assistance; and normative, remunerative, and coercive power are essential enforcement activities in terms of inter-organizational communication. The normative and remunerative powers influence policy implementers over socialization and participation while they try cultivating associates at the level of implementation and try to implement policies willfully. While at the same time they believe that coercive power in enforcement activities can be used to check and balance the implementation activities.

d. Characteristics of the implementing agencies:

The size of the staff of the agency, degree of hierarchical control, office political resources, degree of open communication, both formal and informal linkages of agencies with the policy formulation and policy enforcing body matters the policy performances.

e. Social, economic, and political conditions

The impact of social, economic, and political conditions is huge in the policy implementation while Hon and Meter believe that it has even more massive effects on the performance of the implementing agencies.

f. Disposition of implementers

The disposition of implementers is the nature of the implementers and their capacity or ability and willingness to understand the policy, technical know-how, ethics and empathy are the values that they possess. The authors believe in three components in the implementer's viz. perception, the direction of response, and intensity of response as important while putting more emphasis on the understanding of implementers on the standards and objectives of the policy. This is due to the reason that it forwards the decision of success and failure of the policy.

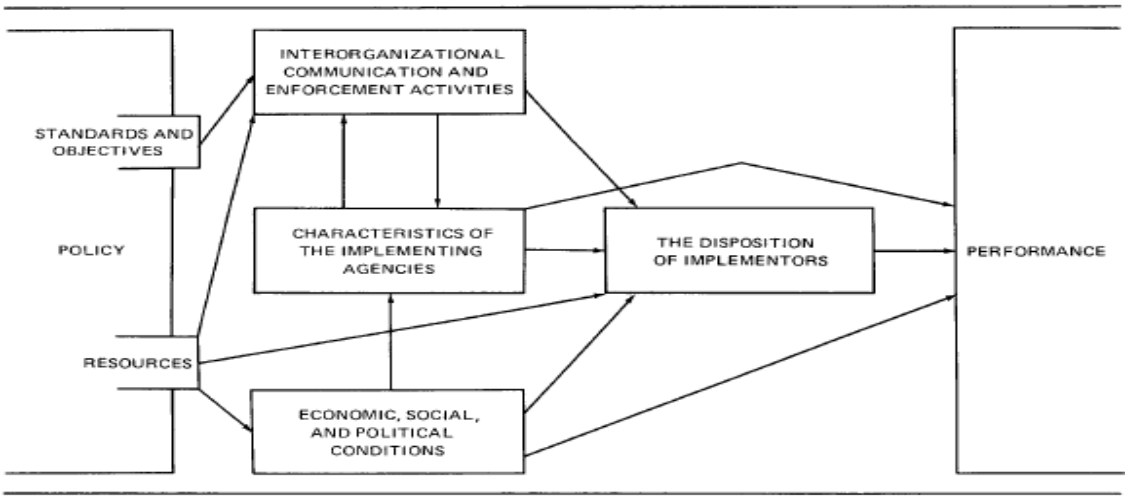


Figure 2. 2 *Model of Policy Implementation Process*

Source: (Adopted from Van Meter & Van Horn, 1974)

2.5.1.6 The entitlement approach to starvation and famines

The entitlement approach to starvation and famines recognized by Amartya Sen concentrates on the ability of people to command food through the legal means available in the society, including the use of production possibilities, trade opportunities, entitlements concerning the state, and other methods of acquiring food. The approach ponders on those means of imposing food that is legitimized by the legal system in operation in that society (Osmani, 1993).

The author believes that the ownership of food is one of the most primitive property rights, and in every society, rules are governing this right. “The entitlement approach concentrates on each person's entitlements to commodity including food and views starvation as resulting from a failure to be entitled with enough food” (Sen, 1981). This is an approach of certain generality as it does not try to embrace all probable influences which can in principle reason starvation. For instance, illegal transfers (e.g. looting), and choice failures (e.g. owing to inflexible food habits).

2.5.1.7 The Sustainable Livelihoods framework

For having a better understanding of the ways where people cultivate and retain their livelihoods, the Swift River Local Advisory Committee constructed an instrument, the Sustainable Livelihoods Framework (SLF) with the support of the Institute of Development Studies. “The Livelihoods framework encompasses the skills, assets (both material and social) and the approaches which will be used by individuals and communities to survive. The sustainability element implies that these individuals or communities can confront and overcome moments of stress and/or crisis and that they can maintain or even improve current and future skills and assets without exploiting their supply of natural resources”(UNDP, 2017). This is an analytical framework for understanding various factors that can affect choices around subsistence and to assess how they interact.

The SLF embraces a systems approach for knowing livelihoods, while delivers a way of conceptualizing this from the goods or capital people require; the means through which

people earn their living; the circumstance to which specific kind support is planned; and several factors that can reinforce subsistence bounciness in the time of stress and crisis. The SLF is involved in considering the understanding of vulnerability and its context; analysis of different kinds of capital and a strategy for protecting livelihoods.

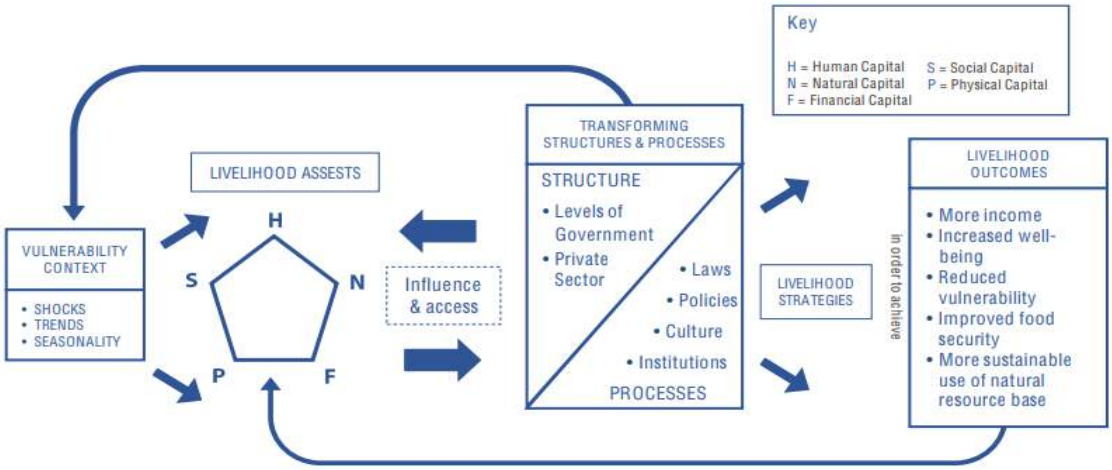


Figure 2. 3 *Adopted from Sustainable Livelihood Framework. DFID, 1999*

2.5.2 Synthesis of the Theories

As the researcher will be focused on the implementation of Climate Change adaptation policy to address food security, the researcher will use Van Horn and Van Meter's theory on implementation and Winter's Integrated Model of Policy Implementation for understanding the factors that affect the implementation of LAPA for addressing Food Security. Likewise, LAPA is also considered as a bottom-up approach. While the Climate Change Policy and National Adaptation Programme of Action (NAPA) are considered a top-down approach, the approaches of top-down and bottom-up approaches of implementation are documented to identify the participation of the stakeholders and authority at the research area. Similarly, to understand the livelihood activities smallholder farmer households depend on a broader perspective Sustainable Livelihood approach will be chosen and Sen's Entitlement approach is will be chosen as an associate theory in the discussion on household resources concerning food insecurity.

2.6 Analytical Framework

With the reviewed literature on theories of implementation, the Sustainable Livelihood approach, and the Entitlement approach, the researcher will be using only the theoretical elements which are relevant to the research. The elements of policy design, authority, participation, intergovernmental coordination, entitlement to commodity, resilience capacity will be the independent variables of the study. These are vital for having effective implementation of the policies. While on the other hand, implementation of LAPA for Food security will be used as the dependent variable. The analytical framework for the research and the relationship between the independent variables and the dependent variable of the study is presented in the figure below:

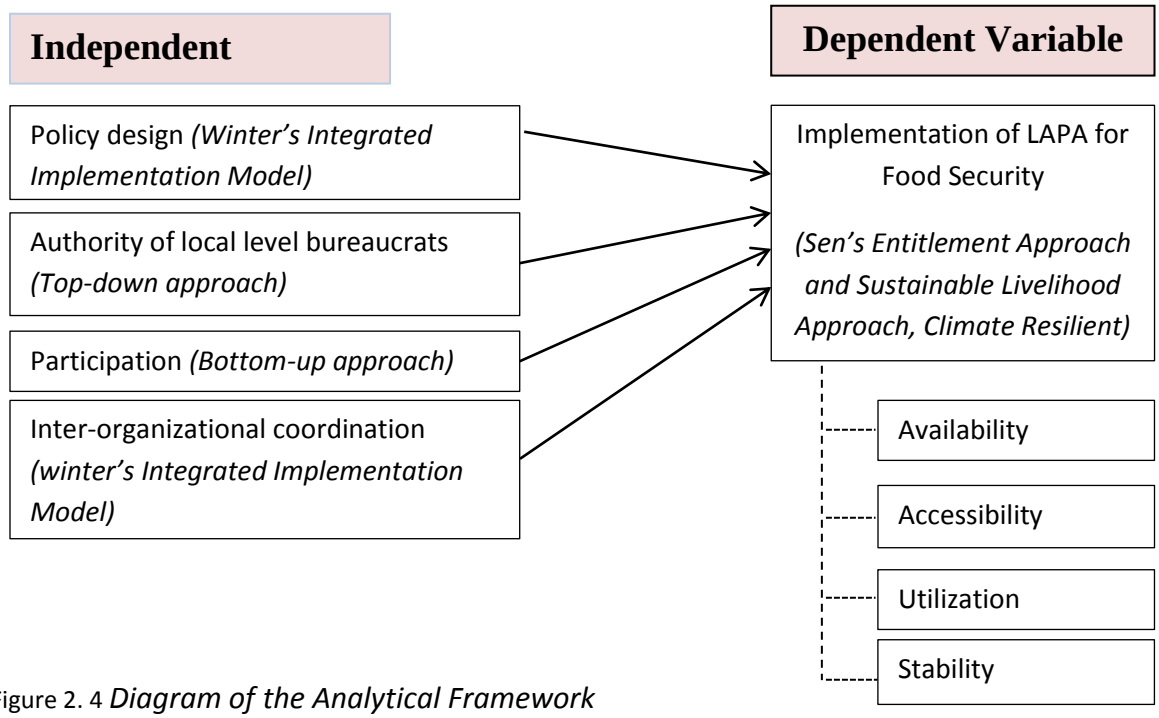


Figure 2. 4 *Diagram of the Analytical Framework*

(Source: Adopted from theories of implementation: Winter's Integrated Implementation Model, Top-down approach, Bottom-up approach, Sen's Entitlement Approach, and Sustainable Livelihood approach, 2020)

2.6.1 Operationalization of the Independent Variables

S.N	Variables	Operational Definition	Indicators of the variable	Collection Method
1	Policy design	consists of goals and instruments outlined in the policy document for achieving goals and objectives	• Clarity of objectives • Compliance with standards	Questionnaire Survey. (Policy Makers, Elected Leaders)
2	Authority of local level bureaucrats	carrying out of a policy decision – by executive order, statute, or court decision; while the authoritative decisions are located centrally by actors who pursue to produce desired effects	• Implementation of policy, rules and regulations • Mobilization of Resources	Questionnaire Survey. Key Informant Interview (Bureaucrats, Elected Leaders)
3	Participation	reaching the people and not goes with the prescriptive advice	• Nature of participation • Composition of Participation • Female Participation	Questionnaire Survey. Key Informant interview (Bureaucrats, Elected Leaders, Officials)
4	Inter-Organizational coordination	different degree of commitment and coordination	• Flow of information to local stakeholders • Communication with district level	Key Informant interview Bureaucrats, Elected Leaders, officials)

2.6.2 Operationalization of the Dependent Variables

S.N	Variables	Operational Definition	Indicators	Collection Method
1	Availability	availability of sufficient food, i.e. ability of the agricultural system to meet food demand	Production Distribution	Questionnaire Survey

2	Accessibility	access of individuals to adequate resources (entitlements) to acquire appropriate foods for a nutritious diet	Affordability Access to markets	Questionnaire Survey. FGD
3	Utilization	utilization embraces all food safety and quality aspects of nutrition; its sub-dimensions are related to health including sanitary conditions through the entire food chain	Health status Quality of food Intra household food	Questionnaire Survey. Key Informant interview
4	Stability	Stability relates to individuals who are at high risk of temporarily and or permanently losing their access to the resources needed to consume adequate food	Incomes Market stability	Questionnaire Survey. Key Informant interview FGD

2.7 Chapter Conclusion

This chapter on the literature review and theory explained a detailed discussion on the importance of implementation planning for adaptation at the local level. The varied factors like social, cultural, institutional factors affect the implementation of adaptation plans at the local level. This chapter also enlightens on the terminologies, concepts, and literature about the implementation of policies and plans related to food security and climate change. The literature review reveals the importance of formulation and implementation of national adaptation plans at the local level to combat the impacts of climate change in food insecurity as to guarantee food security. Relevant theories and approaches, and frameworks on implementation have been discussed. Besides based on theories and approaches both the dependent and independent variables are developed. Lastly, an analytical framework has been developed as a ground for analysis, and both the variables of dependent and independent variables are defined.

CHAPTER-III

METHODOLOGY

3.1 Introduction

This chapter presents research methods that provide clarification on how the study was conducted. The methodology is generally a guideline with a description of the method for conducting the research using specific methods, tools, and techniques. The chapter starts with the philosophy of the study, research design, sampling and sample size, data collection tools and procedures, data management, analysis and interpretation, ethical standards, and study variables which as presented as follows:

3.2 Philosophy of the study

The integration of both qualitative and quantitative approaches for a study is widely accepted in many areas of the research study. “A mixed method involves merging of qualitative and quantitative research and data. Qualitative data tends to be open-ended without predetermined responses while quantitative data usually includes closed-ended responses such as found on questionnaires or psychological instruments”(Creswell, 2014a). For revealing realities regarding the effects of climate change adaptation policy implementation on food security in the Humla district, scientific techniques were implied. The techniques include highly structured procedures, orally administered questionnaires, and in-depth cases. The techniques were employed through an in-depth interview.

In this study, quantitative methods have been applied mainly to measure the pattern and distribution of food insecurity and also to trace its general association with other relevant socio-economic categories. In particular, it has been applied to trace variables such as income, agricultural production, environmental attributes, and some variables relevant to the quality of life which serve as indicators and determinants of food in/security.

The approach of Qualitative research comprises a wide range of approaches which do not rely on numerical measurements rather emphasizes one or a small number of cases,

uses intensive interviews or an in-depth analysis, to be extensive in method, encompassing concern on all of a particular unit or event (King, Keohane, & Verba, 2019). Therefore the qualitative approach was used as the research is explorative and to address the objectives of the research.

A case study was also employed as a research strategy as the approach helps in probing deep and intensive with the issues (Yin, 2003).“Cases are bounded by time and activity, and researchers collect detailed information using a variety of data collection procedures over a sustained period”(Creswell, 2014b)

3.3 Research Design

“Research design is a blueprint for a mechanical process of data-gathering and evaluation”(King et al., 2019). It is a systematic approach to conduct a scientific study by a researcher. To select an appropriate research design for the study, I considered the purpose, research question, and philosophical assumption based on which I have used exploratory research design. The reason behind using exploratory research design for my study is to reveal the realities of the effects of climate change adaptation policy implementation on food security.

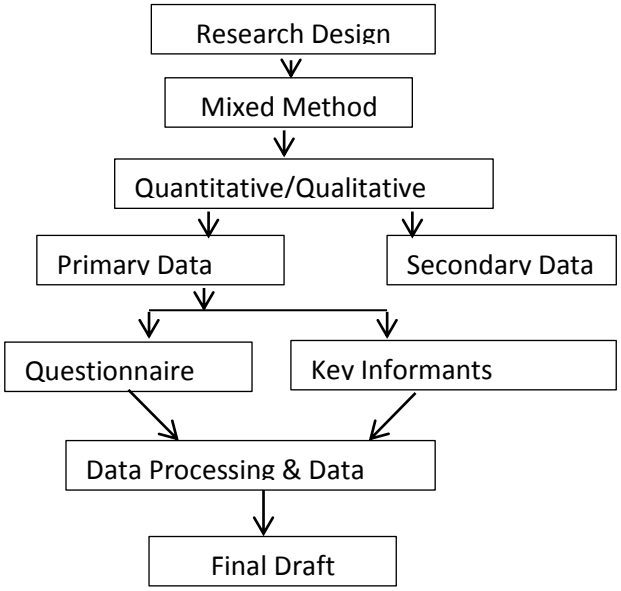


Figure 3. 1: ***Proposed Research Design***

3.4 Selection of the study area

Unit of Analysis

The unit of analysis for the research was two wards of Simkot Rural Municipality of Humla, Karnali Province namely Dadafaya, ward-7, and Simkot ward-5. These areas were selected for the research due to the reason that it is highly food insecure, vulnerable to climate change and the rural municipality has implemented LAPA. Due to the geographical inconvenience and also the alarming pandemic situation, those two wards were selected based on food insecurity and LAPA implementation and convenience of the researcher.

3.5 Selection of the Study Area

The study area for the research work was the Simkot Rural Municipality of Humla district. The former district of Humla is now called as Humla District Coordination Committee which is located in province 6 in the mid-western region in Nepal. In terms of geopolitics, most of its area is in the high Himalayan and high Mountain range. It consists of seven rural municipalities. It is adjacent to the Mugu district and Tibetian region of China in the east, Bajhang district, and Tibetan region of China in the west, Mugu and Bajura districts in the south while Tibetian region of China in the north. The Simkot Rural Municipality is located at Simkot, Humla district, Karnali Province of Nepal which is a local government of Nepal.

3.6 Sampling and Sample Size

3.6.1 Sampling method:

A non-probability sampling design in the form of a purposive sampling method was adopted and thought to be appropriate to collect the data. It was used to gather the information on people's participation and factors affecting the implementation of LAPA and people's perception about the implementation of LAPA for which, the participants involved in the LAPA planning phase and the stakeholders were chosen as a sample.

Sample Size:

Altogether 40 households within the age range of 30-70 years from each ward were chosen randomly depending upon their availability during the time of HHs survey, five respondents were chosen for the case study while 14 key informants were chosen for Key Informant Interview.

3.6.2 Tools and Procedures of Data Collection

The study has used both primary and secondary sources of data information to reveal the effect of policy implementation of climate change adaptation on food security. The primary source of data was collected through key informant interviews and sample surveys using a structured questionnaire schedule. Similarly, the secondary source of data such as journals, articles, paper reports, books, websites, and records was used. It was derived from various sources viz. reports and records of the study area, concerned secretariats, and different published and unpublished documents such as books, journals, reports, articles, and records of different GOs and I/NGOs, and through online documents and other relevant sources.

3.6.3 Data Collection Technique

3.6.3.1 Sample Survey:

A Structured questionnaire was designed to gather information on respondent's perception towards climate change, perception of agricultural production, food security, and factors affecting the implementation of policies regarding climate change and food security and demographic information.

The questionnaire for the interview was finalized after having a series of meetings with peers, examiners, and subject experts in the field of climate change. The questionnaire was also pre-tested to eliminate imperfect items. After the finalization of the questionnaire, the survey was conducted. Due to the effect of global pandemic COVID-19, it was not possible to visit the study area physically hence the researcher consulted with the focal person of the study area and request him to provide cell numbers of the

HH. After receiving cell No. of HH, the researcher had informed the objective of the research and request to provide information related to climate change and food security. Before administering the questionnaire, the respondents were informed that their involvement is voluntary and have the right to withdraw their consent or discontinue participation at any time. The researcher also assured that all of the answers will be confidential and will not be shared with anyone and exclusively be used for the research purpose only. After his/her consent, the researcher asked HH in the Nepali language. It took 30-45 minutes to complete. While asking the question, the respondent was fully assured that they understood what the question meant. The questions were also repeated for clear understanding. Based on his/her responses, the researcher filled up a questionnaire.

This was used for gathering information on respondent's perception towards climate change, perception about agricultural production, food security, factors affecting the implementation of policies regarding climate change and food security, and demographic information. Here, the perception survey was necessary for the information regarding the implementation techniques.

3.6.3.2 Key Informant interview:

In the difficult condition due to COVID-19, data was also collected over the phone from the Key Informants to get insights on the perception regarding the changes in climatic conditions, agricultural practices, production, and impacts of climate change on food security and also to gather information on policy implementation impacts in food security. It was taken as a cross-checking for the data obtained from the household survey. The elderly people in the rural municipality who knows the history of settlement in the study area and had been residing there for about three decades were chosen as a key informant. Likewise, officials, Agriculture Development Officer, social mobilizer, health post authorities, and social workers were also the key informants.

3.6.4 Tools for Data Collection

To use the above-mentioned techniques, different tools such as semi-structured questionnaire, checklist, schedules, etc. were used to extract data and information which could help in meeting objectives of the study set forth. A brief discussion on these tools has been made hereunder:

3.6.4.1 Structured questionnaire for HH survey:

It is the main tool directed to generate the primary data. A structured questionnaire was prepared for the survey. All the respondents were purposively selected setting the criteria that they had been settling in the study area for at least three decades. The interview questionnaire comprised of various sections so that information required for meeting the objectives of the study be gained systematically.

3.6.4.2 Schedule for key informant interview:

For key informant interview, a schedule was prepared to get information on changes in climatic conditions during the past three decades and also agricultural practices and agricultural production in the past and the present, and likewise for the implementation status of climate change adaptation and food security policies.

3.6.4.3 Likert Scaling

For the study, a five-point likert type was developed to measure the perception and attitude of the respondents regarding climate change and its impact on food security, and the implementation of LAPA.

3.7 Reliability and validity

The concept of validity and reliability is essential for assuring the authorization of the knowledge, which is claimed by a researcher. According to Patton, “validity and reliability are two factors which any qualitative researcher should be concerned about while designing a study, analyzing results and judging the quality of the study”(Patton, 2002). This relates to the question “How can an inquirer persuade his or her audiences

that the research findings of an inquiry are worth paying attention to?"(Lincon & Guba, 1985)

Reliability and validity are conceptualized as trustworthiness, rigor, and quality in the qualitative paradigm. It is also through this association that the way to achieve validity and reliability of research gets affected by the qualitative researchers' perspectives which are to eliminate bias and increase the researcher's truthfulness of a proposition about some social phenomenon (Denzin, 2009) using triangulation. Then triangulation is defined to be "a validity procedure where researchers search for convergence among multiple and different sources of information to form themes or categories in a study"(Creswell & Miller, 2010) Thus, the data and the instruments must be validated. In this line, I present the following procedures on the reliability and validity of this study:

Content validity is related to adequate and effective measurement of elements, skills, and behaviors. For which the research instruments and data were reviewed by the experts. Based on the reviews the unclear and vague questions were revised and few ineffective questions were discarded. Internal validity is related to the equivalence of findings with reality. In this case, the reliability and validity of the research data, six methods as suggested by Merriam, 1998 viz triangulation, long-term observation at the research site, member checks, participatory or collaborative modes of research, peer examination, and researcher's bias. The use of the mixed-method design in itself meets a condition of triangulation. A varied kind of qualitative and quantitative methods as of questionnaires, interviews were applied to collect data relevant to food security in Simkot Rural Municipality. Collecting data over one technique might be questionable, weak, and biased while conversely collecting data from different techniques and sources confirm findings and are sure that the data are valid. In the case of internal reliability, the strategy of mechanically recorded data has been used where the interviews have been recorded and preserved so that it can be reanalyzed.

The external validity on the other hand is concerned with the relevance of findings with other settings or subjects. It is concerned with the replication of the study. The findings

of this research like social relation, climate change, the interaction of the institutions, and implementation are constant with the studies in other contexts and settings. Likewise, for external reliability, the methods of data collection and analysis need to be explicitly explained (Zohrabi, 2013). This research is based on a mixed research method while the questionnaire, interviews, collected quantitative data are analyzed in descriptive statistics and the qualitative data are analyzed through descriptive and thematic interpretations. In this regard, all procedures assure broadly reliability and validity of the study.

3.8 METHODS OF DATA ANALYSIS

All the data collected through the above-mentioned techniques were put together to process and classify to meet the objectives. The data was coded and recoded for open responses. The data were analyzed under different related headings. The data generated from the Key Informant Interview was analyzed under the related objectives of the study. The findings of the dependent variable and independent variable were discussed sequentially with particular relevant analysis through literature review and KII interviews. Also, a critical analysis was done on the collected data to find the linkage between the dependent and independent variables. The data was analyzed using Statistical Package for the Social Sciences (SPSS) software programme for achieving required information using simple statistics like frequencies, percentage, mean, and was presented using statistical tools like a table, graph, and pie-chart.

Chapter Conclusion

This chapter provides detailed information on the methodology that was followed in the study. It has given details on the study area, sampling technique, sources of primary and secondary data collection, tools for data collection, and methods of analysis of the collected data.

CHAPTER-IV
DESCRIPTION OF THE STUDY AREA

4.1 Profile of the Study Area

The Simkot Rural Municipality from Simkot Humla, Karnali Province of Nepal was chosen for this research. The research was conducted in two wards of the municipality. The area was selected for the research due to the reason that it is highly food insecure, vulnerable to climate change and the municipality has implemented LAPA. This rural municipality was established in 2017 (2073 BS) as a local government of Nepal while the headquarters of it is located in Simkot of Humla district. The village development committees Simkot, Bargaun, Dandaphaya, Syada, and they were incorporated to form the rural municipality when all old VDCs and municipalities were replaced into new local level bodies by the Ministry of Federal Affairs and General Administration. The rural municipality is surrounded by Kharpunath Rural Municipality on the East and South, Namkha Rural Municipality on the North and West. The total area of the municipality is 785.89 square kilometers consisting of 11,557 total populations according to 2011 (2068 BS) (Office of Simkot Rural Municipality, 2019)

4.1.2 Physical and social infrastructure:

The rural municipality lacks most of the physical infrastructure. It is the only district that does not have road connectivity while the road connections within the district are recently built. It becomes difficult to operate during rainy and snowfall days. Almost every household has a facility for electricity and the Primary Health Care Centre is located in the rural municipality area.

Table 4. 1. Description of the study area

S.N	Research Area	Dandafaya Ward 7	Simkot Ward 5
1	Total population	3018	1700
2	Total Households	450	312
3	Caste/Ethnicity	Chhetri (75.82%) and Dalit (24.17%)	Chhetri(75.88%) and Dalit (24.12)
4	Land self-owned		
	With Irrigation facility Rainwater Pakho Probability for irrigation	92 358 0 450	0 270 35 305

Source: (Office of Simkot Rural Municipality, 2019)

MAP 4.1 Location map of Simkot Rural Municipality

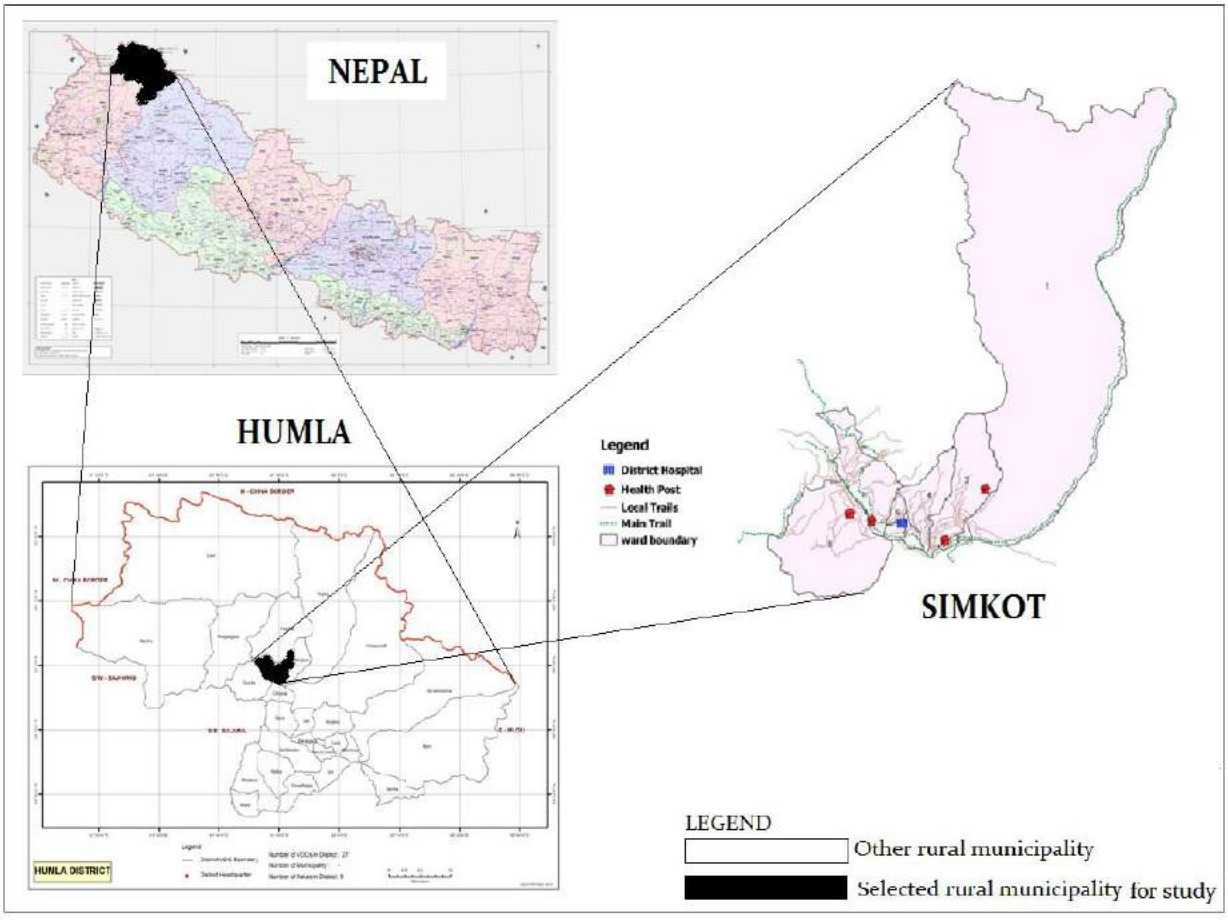


Figure 4. 1 Location map of Simkot Rural Municipality

Table 4. 2 Demographic and Socio-Economic Characteristics of Respondents

Characteristics	*f*	%
Gender		
Male	31	77.5
Female	9	22.5
Age		
21-30	6	15.0
31-40	24	60.0
41-50	6	15.0
51-60	4	10.0
Caste/Ethnicity		
Brahmin/Chhetri	25	62.5
Adibasi/Janajati	11	27.5
Dalit	4	10.0
Education Status		
Illiterate	4	10.0
Literate	5	12.5
Primary Level	6	15.0
Lower Secondary level	14	35.0
Secondary	8	20.0
Higher Education	3	7.5
Occupation/Employment		
Agriculture	24	60.0
Business	2	5.0
Service	3	7.5
Wage Labour/ Porter	11	27.5
Total		100

Source: Field Survey, 2020

The above Table 4.2 depicts the demographic and socio-economic characteristics of respondents that include gender, age, caste, education, and occupation/employment. The total number of male respondents was higher than females. The age of the respondents was classified broadly into four categories viz. 21-30, 31-40, 41-50, and 51-60 year. Three-fifths (60%) of respondents were from 31-40 years category which was followed by 41-50 and 21-30 both years category with (15%), and the category of 51-60 years (10%). By Caste/ethnicity, the highest proportions (62.5%) of the respondents are from Brahmin/Chhetri and the lowest are Dalit (10%). On the education status of the respondents, (35%) have completed lower secondary level followed by (20%) of the secondary level. (15%) of the respondents have completed primary level, (7.5%) have higher education while (12.5%) were literate and (4%) were illiterate. Concerning the

occupation, the respondents mentioned that agriculture is the major occupation with the share of (60%) followed by wage labor/porter (11%), service (3%) and only (2%) respondents are reported that they have a business.

CHAPTER -V
DATA ANALYSIS AND PRESENTATION

In this chapter, the information of the collected data, its analysis, and its interpretation is presented. The perception of local towards climate change, its impacts on food security, and the insights of the district level bureaucrats, political leaders, and local people on LAPA implementation were analyzed for achieving the objective of the study. Those who were involved and who were aware of LAPA were taken into consideration for the survey.

5.1 CLIMATE CHANGE: STATUS, PERCEPTION, AND IMPACTS

This chapter deals with climate change: status, perception of climate change and food security, perception of impacts on food security, adaptation policy effect dealing with the survey results, discussion, and its reflection on both dependent and independent variables.

5.1.1 Perception of Respondents on Climate Change

In the study, the perception of climate change perceived by the respondents and the result obtained is described under rainfall pattern and temperature while other climatic variables are described on other related topics further.

Out of the total respondents, more than four-fifths (87.5%) of the respondents were aware of climate change and according to them, they have felt it in their daily activities basically on agricultural production. The majority (95%) of the respondents in the study area said that the climate is changing over time as they have felt the changes in rainfall patterns and temperature as shown in Table 5.1 below.

Table 5. 1 Perception of the respondents regarding knowledge on climate change

Climate change-related knowledge	Yes		No		Total	
	f	%	f	%	f	%
Heard about climate change	35	87.5	5	12.5	40	100
Climate is changing over time	38	95.0	2	5.0	40	100

Source: Field Survey, 2020

5.1.2 Perception regarding rainfall and temperature

5.1.2.1 Rainfall

Rainfall is the major factor that has a chief impact on agriculture. The vulnerability becomes a peak in the areas with no or very poor alternative sources of irrigation. As agriculture is almost rain-fed and the majority of the farmers depend on monsoon in Nepal, the changes in the rainfall pattern make vast alterations in agricultural production.

Table 5. 2 Perception of the respondent on rainfall timing and pattern

Climate change-related knowledge	Yes		No		Total	
	f	%	f	%	f	%
Change in rainfall timing and rainfall pattern	34	85.0	6	15.0	40	100

Source: Field Survey, 2020

The above table 5.2 shows that a large proportion of the respondents (85%) in the study area reported that there has been a change in rainfall patterns and timing. There used to be timely and regular rainfall in the past days and was predictable but now it has become unpredictable as they used to have monsoon starting early in the months of Jestha which has shifted to Baisakh month. Among the respondents who noticed a change in timing and pattern of rainfall said that there is a decrease in the rainfall pattern over time. The respondents said there has been a decrease in rainfall patterns for 30 years. They added that the rainfall pattern has become irregular than in past days as they received short and heavy rainfall causing floods and landslides.

Those respondents who have noticed a decrease in the rainfall timing and rainfall pattern said that agricultural production and yield has been decreasing continuously due to less and untimely rainfall. The respondents said that the production was high in comparison to the current level while there is an increase in the use of urea and other chemical fertilizers for a few years but the yield decreased with time.

5.1.2.2 Temperature

Table 5.3 below depicts the percentage of the respondents recalling changes in the temperature. Among them, four-fifths (80%) of the respondents have noticed changes in temperature. The respondents noticed an increase in temperature during summer and the winter while 20% of the respondents experienced that there was no change in temperature.

Table 5. 3 Perception of the respondent on temperature

Climate change-related knowledge	Yes		No		Total	
	f	%	f	%	f	%
Change in temperature	32	80.0	8	20.0	40	100

Source: Field Survey, 2020

The respondents believed that they have noticed an increase in temperature for many years. The winter days have become less and have experienced hotter days in winter season adding that winter season has shifted from the months September to November. The increase in temperature however has favored winter crops while lack of irrigation facility has not let them be benefited.

View on climate change impacts

The LAPA district coordinator highlighted on impacts of climate change in temperature and rainfall in Simkot rural municipality, Humla district. He stated that the number of winter days has decreased by two months and the time of extreme winter has also decreased by one month while the time of summer has increased by three months and the time of extreme heat has remained the same. The experience of summer becoming hotter and winter is warm or not that cold as it used to be in past days.

Source: KII, LAPA district coordinator, 2020

The local leader shared his view on the temperature. In the past days, the temperature

would be 15-16 while now It's 20-26. He further said, that there used to be timely and regular rainfall in the past days which was predictable while now it is unpredictable. Adding to it, monsoon starting early in the months of Jestha which has shifted to mid of Ashar month. The seasonal rainfall has decreased by one month and shifted back by one month and there is not as much rainfall as before.

Source: KII-1 and 2, 2020

5.1.2.3 Perception of the snowfall, cropping pattern, and drought:

The perception of the snowfall, change in cropping pattern, landslide, and drought are very important for understanding the impacts of climate change for which, the view of key-person information has been presented below:

Perception of the impacts of climate change with the local representatives

Changed Climate Calendar (Present and before 30 years)

The chairperson and vice-chairperson of Simkot rural municipality who had been staying over forty years at the study area provided insights relating to snowfall, change in cropping pattern, landslide, and drought.

The chairperson said, "Now the snowfall has started to decrease and the time of snowfall has also decreased by 2 months and the time of heavy snowfall has also decreased by 1 month. The duration of snow remaining and melting has changed. It is seen that the snow is melting sooner than old days". He added, the increased heat, diarrhea, increased incidence of skin diseases, and also increased incidence of animal diseases and insects.

Similarly, the vice-chairperson shared that the changes in cropping patterns have been experienced. The rainfall pattern has become irregular than in past days for more than 30 years and has received heavy rainfall which has caused landslides and danger in

agricultural land. Earlier, due to abundant snowfall, the spring water in winter would erupt in Chaitra and Baishakh while during fall; it would be in Ashar and Shrawan. While now due to less snowfall, there is no spring water during winter. The changes in seasonal rainfall and temperature irregularities have led to a decline in agricultural activities such as planting, harvesting, and production. He said that there are changes in the flowering and fruiting time of food crops. The change is seen in the crop calendar. Likewise, new varieties of food: cauliflower, onion, offseason vegetables, tomato, cabbage, cucumber is now available which was not seen in past days. Drought has been found to increase fires. Earlier there was no problem of drought but now the problem of drought is experienced.

Source: KII-1 and 2, 2020

This shows that both the rainfall pattern and temperature in the area has been continuously changing over the years. The impacts of the change have been experienced minor and at large. Though the increase in temperature might have favored the winter crops due to lack of irrigation facilities, they have not been able to get benefit from it.

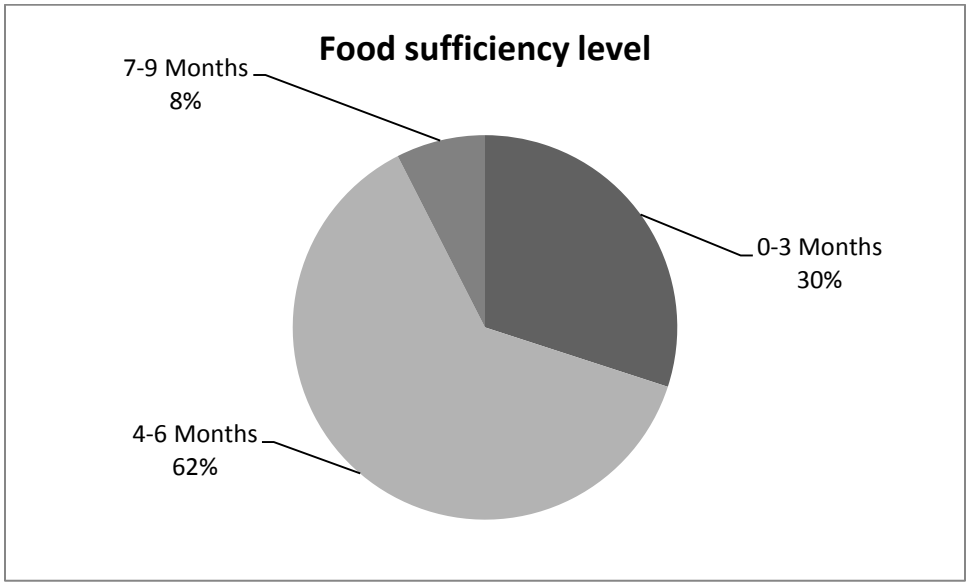
5.2 IMPACTS OF CLIMATE CHANGE ON FOOD SECURITY

5.2.1 Food Availability and Climate change

Status of food sufficiency months from own production

Self-sufficiency is understood as the degree to which own production covers the felt needs of the households and population. The respondents reported the following status as shown data in the following figure.

Figure 5. 1 Food Sufficiency level from own production



Source: Field Survey, 2020

The above figure 5.1 depicts that at present three-fifths (62.5 %) of the total HHs have food sufficiency up to 4-6 months followed by 30 percent HHs have 0-3 months and 7.5 percent have 7-9 months of food sufficiency from own production. None of the HHs has food sufficiency for the whole year. Hence the availability of food through own production is insufficient. According to the respondents, their food production has been decreasing due to lack of agricultural land, irregular rainfall, lack of irrigation facility, climate change.

Food deficit months

The food insufficiency months for the respondents are due to reasons varied. Table 5.4 below depicts the food insufficiency months as perceived by the respondents. The highest food insufficiency month (76.9%) is April *(Baishakh)* followed by March and May *(Chaitra and Jestha)* while the lowest food insufficiency month is perceived to be mid of October and November (Kartik and Mangsir) months.

Table 5. 4 Food insufficiency months of the respondents

Food insufficiency months	Responses		Percent of cases
	f	%	
Poush	11	5.1%	28.2%
Magh	17	7.9%	43.6%
Falgun	26	12.1%	66.7%
Chaitra	28	13.1%	71.8%
Baishakh	30	14.0%	76.9%
Jestha	28	13.1%	71.8%
Ashar	21	9.8%	53.8%
Shrawan	16	7.5%	41.0%
Bhadra	12	5.6%	30.8%
Asoj	9	4.2%	23.1%
Kartik	8	3.7%	20.5%
Mangsir	8	3.7%	20.5%
Total	214	100.0%	548.7%

Source: Field Survey, 2020

View from Key Informant on food deficit

The representative from Dadafaya states that food insufficiency has been a problem. Food production has been at a decreasing rate due to the fact of climate change and its impacts like drying water resources, lack of irrigation facility, unfertile and insufficient land due to increasing population, deforestation, and landslides. The food deficit months remain from the mid of Falgun to mid of Shrawan viz 15 February-15 August.

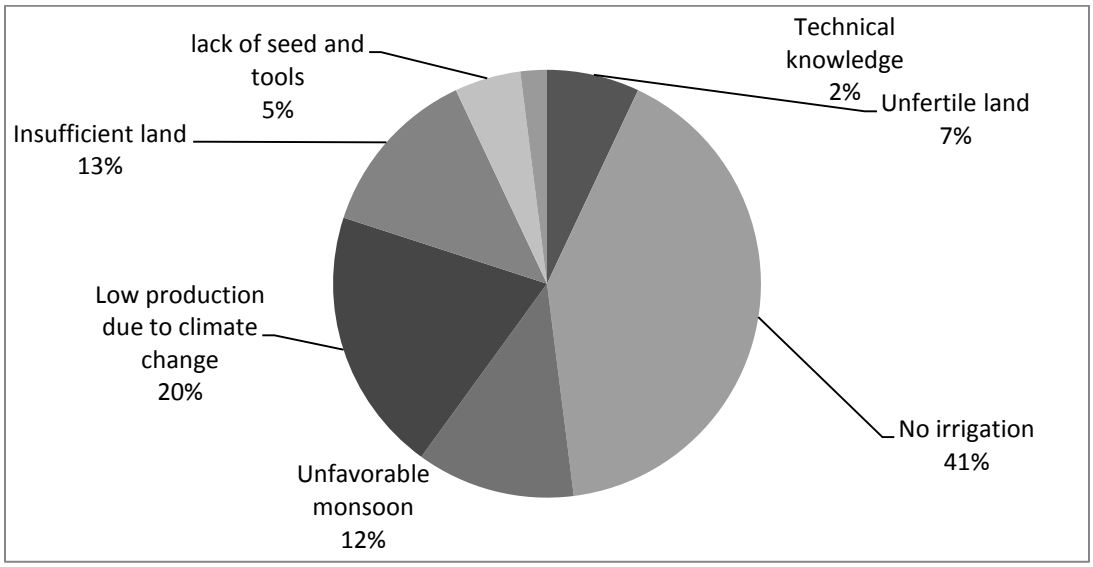
-Source: KII-2, Dadafaya, 2020

Household Level obstacles for Food Availability:

Certain difficulties and limitations have been picked by the respondents in the following Fig. 5.2. The majority of the respondents (41%) said that the main cause for the factors affecting food unavailability was the lack of proper irrigation facilities. 20 percent of respondents reported low production due to climate change, followed by 13 percent

who claimed insufficient land. 12 percent of the respondents said unfavorable monsoon, followed by 7 percent of respondents who said unfertile land. 5 percent said due to lack of seed and tools while 2 percent of respondents believed that it is due to lack of technical knowledge.

Figure 5. 2 Factors affecting food unavailability



Source: Field Survey, 2020

CASE-1

Shankar Bohora from Simkot-5 shared his experience regarding food security. According to him, Nepal Khadhya Sanstha provides food items to which the whole Humla depends and they get it over a coupon. The staff gets A-grade food items. The local market vendors' put a high price of food products due to the high cost of shipping which is possible only via air and few bring using mule and sheep. The food is available for all twelve months provided from Nepal Khadhya Sanstha while he said that the food provided is believed to be of quality. The accessibility to food items seems to be easy but costly. In terms of food utilization, he found the system of having food together to be very good. He added that he haves his food sitting with the family. Usually, his mother or elder sister-in-law would feed them.

(*Source: Survey, 2020*)

CASE-2

Bali Rawat, representative of the village shared his views on Climate Change. He said that the spring water was available in the previous days and now it is almost dry. In past days, food items like fapar, jau, moga, choti, potato, pumpkin were grown while now new items like cauliflower, onion, off-season vegetables, millet are grown. New hybrids of cauliflower, cabbage, carrot, ladies finger, tomato, gram (for house use) are grown. The local seeds are also in the practice of growing. He claimed that there is a lot of change in temperature while the rainfall patterns have been changed leading to increased cases of landslides. New Insects have not been found in production though caterpillar used to be seen during Baishakh/Jestha in apple, cauliflower, chino-kagune but no new types of insects found yet. He further said production amount has been decreased due to lack of farmers, and livestock, organic manure was there while previously population also was less. At present, the population has increased but due to their migration/study purpose so there are fewer who work in the field hence production has decreased.

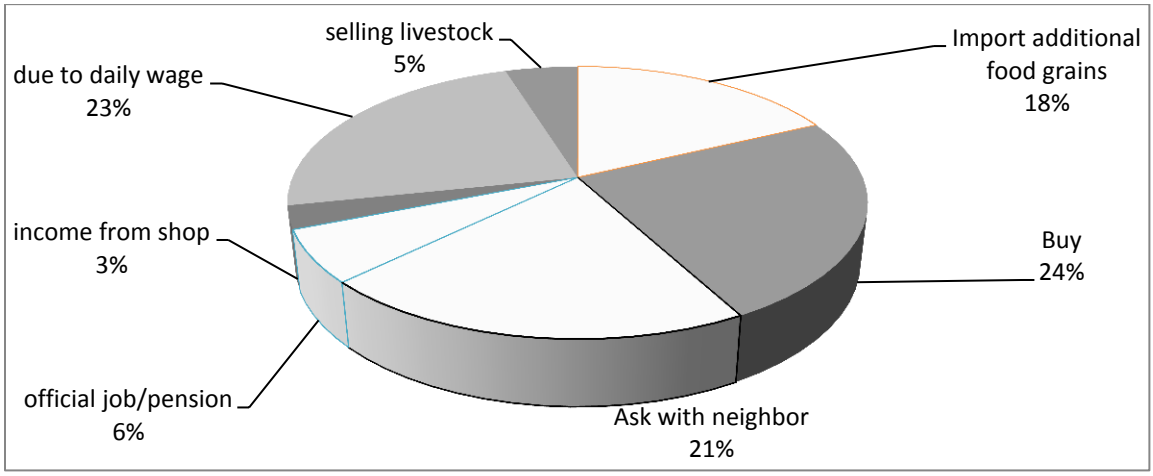
According to him the food availability at present from self-production throughout the year is only for 6/7 percent household.20/22 percent household survives for 6/7 months and 50 percent of households for only 2/3 months. Three wards are near to the market which takes 5/6 hours of walking distance. In the previous days there used to be dzo (chauri), jhuma, telguni-belguni, horse, mule, ox, jhopa, sheep, goats were available livestock now new hybrid cow are also found brought from China and he-goat brought from India are also available. The number of livestock per household has been decreased as in previous days one household had 25-30 cow and jhopa while now most of the people have left livestock farm. In previous day's livelihood was based on livestock farming which is not seen now.

(*Source: Survey, 2020*)

Coping mechanisms adopted for Food Availability

Fig5.3 below depicts 24 percent of the respondents said that they buy their necessary food products from the market to cope with food insecurity. 23 percent of the respondents reported the incomes from their daily wages. 21 percent said they ask with their neighbor and return them when they have. Among the respondents 18% stated that they import additional food grains, 6 percent stated they're earning from official job/pension is used during food deficit. Other income supportive coping activities were by selling livestock (5%) and income from the shop (3%).

Figure 5. 3 Coping Mechanisms of Respondents for Food Availability



Source: Field Survey, 2020

View from Key Informant on coping mechanisms

This district lacks industries and other income sources and hence it's almost like zero. There is a tendency of collecting herbs during seasons for income. Five to six years back few hotels were seen as people used to walk via the district to other places also as it is the route on the way to Mansarowar.

- Source: KII, 3 Simkot, 2020

5.2.2 Impacts of Climate change on Food availability and Agriculture

Change in length of growing period of food products

The table 5.5 below shows that a larger portion (92.5%) of the respondents has experienced changes in the length of the growing period of food products while 7.5 percent perceived that there is no change in the production over the last 15 to 20 years. The majority of the respondents said irregular rainfall and temperature changes are the major factors for the change in the length of the growing period of food products.

Table 5. 5 Perception of respondents on the changes in the length of growing period of food products

Perception of respondents on changes in the length of growing period of food products	*f*	%
Yes	37	92.5
No	3	7.5
Total	40	100.0

Source: Field Survey, 2020

The difference in harvest time

The table 5.6 below shows that the respondents also experienced a difference in the harvest time of food products. Almost 95 percent of the respondents noticed the difference while only 5 percent of respondents perceived the change in harvest time.

Table 5. 6 Perception of the respondents on the difference in harvest time

The difference in harvest time	***f***	**%**
Yes	38	95.0
No	2	5.0
Total	40	100.0

Source: Field Survey, 2020

Respondents by perception on climate change responsible for crop damages

Regarding the perception of respondents on crop damages Table 5.7 below depicts that the majority of the respondents (60%) agreed on it as an impact of climate change. Out of the total respondents, (35%) partially agreed on climate change responsible for crop damages while (5%) were neutral on the statement.

Table 5. 7 Climate change responsible for crop damage

Climate Change responsible for crop damages	*f*	%
Strongly Agree	24	60.0
Partially Agree	14	35.0
Neither agree nor disagree	2	5.0
Total	40	100

Source: Field Survey, 2020

Irrigation facility

The irrigation facility in the study area is not much obtainable. They depend on monsoon hence they have to face the challenges of the change in rainfall pattern and rainfall timing. From table 5.8 below, (52.5%) respondents are partially dissatisfied with the irrigation facility that they have while 7 percent are dissatisfied. 32.5 percent of the respondents are partially satisfied while only 7.5 percent are satisfied with the irrigation facility that they have.

Table 5. 8 Satisfaction with irrigation facility

Satisfaction with irrigation facility		
Strongly satisfied	3	7.5
Partially satisfied	13	32.5
Partially dissatisfied	21	52.5
Dissatisfied	3	7.5
Total	**40**	**100.0**

Source: Field Survey, 2020

CASE 3

Hira Bahadur Shahi is from Dadafaya Ward-7. He was one of the stakeholders of the LAPA. He had taken the responsibility as a chairperson of the Consumer Committee of LAPA. According to him, climate change had been impacting majorly in agriculture due to changes in the pattern of rainfall, increased drought and the problem like landslides during monsoon is yet prevalent in the area. Besides, agriculture in total depends on the seasonal rain and lacks a proper irrigation facility. This mainly puts an impact on food security. He adds that the food was sufficient only for 3-6 months that was produced on

their own while people are compelled to go to China and work as a laborer (carry wood) and buy needed foodstuffs.

Changes due to LAPA: The introduction of LAPA had delivered livelihood programmes like imparting awareness concerning climate change and its impacts; training on modern improved cooking stoves throughout the village; and distribution of stoves at a reasonable price, embankment for landslide; plantation/afforestation; distribution of seeds and establishment of community forest user group, etc. has made changes in the livelihood. According to him, people have learned about the climate and impacts that it has made. He was overjoyed in sharing the impacts of improved cooking stoves which has made their life easy while minimized health risks and it saves fuel which is different from the difficult traditional method.

The projects of greenhouse cultivation have helped to produce green leafy vegetables which were absent before LAPA intervention.

(*Source: Survey, 2020*

5.2.3 Food Availability and LAPA

Various agricultural opportunities have been practiced in the study area. Agriculture is the major source of livelihood and food security and is identified as a major theme in LAPA. Thus, few agricultural interventions were connected to agriculture which has helped in the food availability of people at Humla. This has helped in the availability situation. The perceptions of locals on the effectiveness of the agricultural interventions and food availability situation after the interventions have been presented below in table 5.9.

Table 5. 9 Effectiveness of options for food production and change in food availability situation

Options provided for food production by LAPA	***f***	**%**
Very Effective	21	52.5
Effective	13	32.5
Satisfactory	5	12.5
Ineffective	1	2.5
Total	40	100.0
Food availability situation after intervention implementation of LAPA	***f***	**%**
Major effect	13	32.5
Moderate effect	20	50.0
Minor effect	6	15.0
No effect	1	2.5
Total	40	100.0

Source: Field Survey, 2020

The above table reveals that most of the respondents (52.5%) found the intervention of the agriculture sector, options provided for food production very effective followed by 32.5 percent to be effective and 12.5 percent found it satisfactory while 2.5 percent perceived it to be ineffective. Likewise, the condition of food availability after the intervention implementations had a major effect had conceived a major effect by 32.5 percent of respondents. Most of the respondents (50%) thought it had a moderate effect followed by 15 percent to be a minor effect while 2.5 percent thought it did not affect the situation of food availability.

5.2.4 Food Accessibility and Climate Change

Adequacy of household income for food affordability

Regarding food accessibility, it is needed to know the sufficiency of household income to purchase food items, if the food items found in the market are affordable and the access to market, condition of roads and foot trails to reach the market. In this regard, Table. 5.10 below shows that the household income is sufficient for only 7.5 percent of the total respondents to purchase food items while 22.5 percent lack sufficiency. The income is somewhat sufficient for 22.5 percent to purchase food items and somewhat insufficient for the majority (47.5%) of the respondents. In the case of affordability of

food items found in the market, the respondents were asked if they agree with market food price is affordable for which most of the respondents 67.5 percent strongly disagreed with the statement while (32.5) percent partially disagreed.

Table 5. 10 Respondents experience and insight on food accessibility

Sufficiency of household income	***f***	**%**
sufficient	3	7.5
somewhat sufficient	9	22.5
somewhat insufficient	19	47.5
insufficient	9	22.5
Total	40	100.0
Market food price		
Partially Disagree	13	32.5
Strongly Disagree	27	67.5
Total	40	100.0

Source: Field Survey, 2020

Access to markets

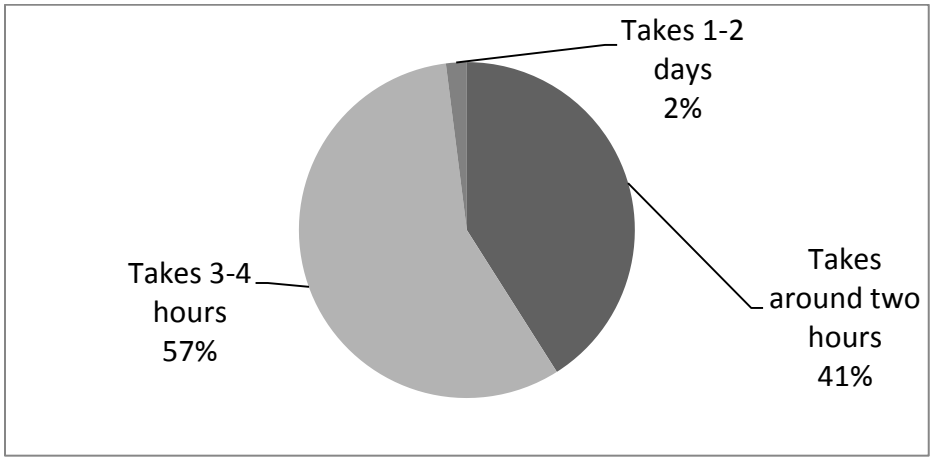
In response to the situation of access to the market, the present condition of road access to reach the nearest market was queried to be evaluated. For which 67.5 percent claimed it to be in good followed by 20 percent fair and 12.5 percent excellent as shown in table 5.11 below. In response to the total time taken to fetch food items, the fig.5.4 depicts that the market for the majority of the respondents (57%) is located in three-four hours periphery followed by 41 percent of respondents needed around two hours to fetch food items. While 2 percent are those for whom it takes more than a day.

Table 5. 11 Road access

Road access to the nearest market	***f***	**%**
Excellent	5	12.5
Good	27	67.5
Fair	8	20.0
Total	40	100.0

Source: Field Survey, 2020

Figure 5. 4 Time taken to fetch food items



Source: Field Survey, 2020

Food price

Table 5.12 below depicts that less than two-fifths (35%) of the total respondents strongly agreed that the price of food items is rising due to less production caused by climate change while 42.5 percent partially agreed with the statement. 10 percent of respondents partially disagreed while 12.5 percent could not state their view and were neutral to the statement. Likewise, the table also depicts the perception of the respondents on the statement if the damage of roads and foot trails is due to extreme events caused by climate change to which the majority of the respondents 62.5 percent partially agreed to the statement while 25 strongly agreed. While only 5 percent partially disagreed with the statement.

Table 5. 12 Perception of respondents on the price of food items

Price of food items caused by climate change and low production		
Strongly Agree	14	35.0
Partially Agree	17	42.5
Neither agree nor disagree	5	12.5
Partially Disagree	4	10.0
Total	40	100.0
Damage of roads and foot trails due to extreme events caused by climate change		
Strongly Agree	10	25.0
Partially Agree	25	62.5

Neither agree nor disagree	3	7.5
Partially Disagree	2	5.0
Total	40	100.0

Source: Field Survey, 2020

View from Key Informant on food accessibility

The food is sufficient hardly for three to nine months while for most people, their food is sufficient for only three months. There is a trend of people going to China and work as a porter to buy needed food items from there. The district is heavily dependent on the food provided by the Nepal Khadhya Sansthan. The district still lacks road connectivity hence food items are brought from the flight. Transportation is only via air, Plane; Mule; Sheep; Goat; few also brought from neighboring districts like Bajura, Mugu. He further states that if the cost of sugar is 60 per kg then they needed to pay 180 per kg which is triple the real price. He claims that the price of food is around triple the price in the area than markets and some double due to transport cost.

- *Source: KII-1, Simkot,2020*

5.2.5 Food Accessibility and LAPA

Though the programmes and interventions under LAPA are not directly related to food accessibility, even then the interventions which were regarding agricultural intensification, awareness on climate change, and its impact and embankment for landslides have impacted in intensifying household incomes and access to the market. Hence, the perceptions of the people on its effectiveness and food accessibility situation after the interventions have been presented below in table 5.13 below.

Table 5. 13 Perception of respondents on adaptation activities and its effectiveness

LAPA regarding its adaptation activities	***f***	**%**
Appropriate	29	72.5
Slightly appropriate	10	25.0
Inappropriate	1	2.5
Total	40	100.0

Effectiveness of interventions in intensifying household income	*f*	%
Very Effective	9	22.5
Effective	13	32.5
Satisfactory	17	42.5
Ineffective	1	2.5
Total	40	100.0

Source: Field Survey, 2020

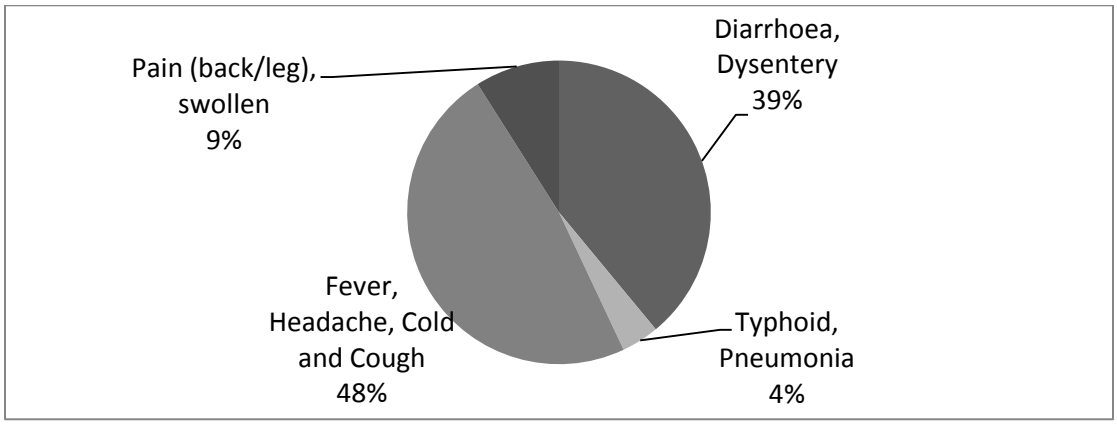
The above table shows that 72.5 percent reported that the adaptation activities are appropriately followed by 25 percent who believed it to be slightly appropriate while 2.5 percent said it to be inappropriate. The effectiveness of interventions in intensifying household income was valued as very effective by 22.5 percent of respondents and 32.5 percent addressed it to be effective. Most of the respondents (42.5) percent admitted it to be satisfactory while only 2.5 percent said it ineffective.

5.2.6 Food Utilization and Climate Change

Health status

Fig.5.5 below depicts types of diseases frequently occurring illness among the respondents. Most of the respondents 39 percent of the respondents faced diarrhea, dysentery followed by 48 percent of respondents facing fever, headache, cold, and cough. Nine percent faced pains (back/leg, swollen) while the rest of the respondents suffered from typhoid and pneumonia.

Figure 5. 5 Types of disease mostly faced by the respondents



Source: Field Survey, 2020

State of food consumption pattern and intra-household food consumption

Table 5.14 below shows the perception of the respondents on their intra-household food consumption and state of food consumption pattern. Most of the respondents (72.5%) perceived that their intra-household food consumption is satisfactory and 20 percent perceived it to be strongly satisfactory. Likewise, regarding the state of food consumption pattern related to quality and nutrition, mostly (75%) stated their perception that there is a moderate improvement in consumption patterns while 15 percent believed that it has improved.

Table 5. 14 Perception of respondents on intra-household food consumption and state of the consumption pattern

Intra-Household food consumption	***f***	**%**
Strongly satisfactory	8	20.0
Satisfactory	29	72.5
Neither satisfactory nor dissatisfactory	3	7.5
Total	40	100.0
State of Food Consumption Pattern (quality and nutrition)	***f***	**%**
Improved	6	15.0
Moderate Improvement	30	75.0
Neutral	4	10.0
Total	40	100.0

Source: Field Survey, 2020

Condition of drinking water

Table 5.15 below shows the perception of drinking water of the respondents of which 60 percent believed that their drinking water is probably not safe followed by 12.5 percent who believed it is certainly not safe. Around 20 percent perceived probably safe while 7.5 percent of the respondents were unknown about the safety of their drinking water.

Table 5. 15 Perception on condition of drinking water

Condition of drinking water is safe	***f***	**%**
Probably	8	20.0
Neutral	3	7.5

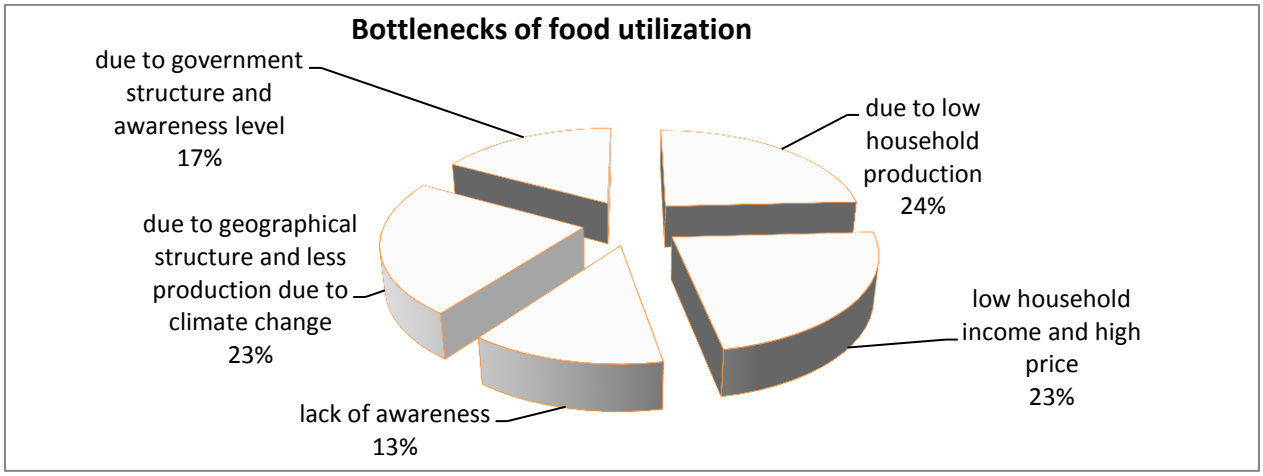
Probably not	24	60.0
Certainly not	5	12.5
Total	40	100.0

Source: Field Survey, 2020

Bottlenecks in food utilization

Fig.5.6 describes the problems found in the intra-household food distribution. 24 percent of respondents report that the main cause was due to low household production. 23 percent of respondents report that the main cause was due to geographical structure and less production due to change in climate and the same proportion of the respondents reported low household income and high price. 17 percent of the respondents claimed to governmental structure and awareness level while others were lack of awareness.

Figure 5. 6 Bottlenecks of food utilization of the respondents



Source: Field Survey, 2020

5.2.7 Food utilization and LAPA

Several interventions are prepared under LAPA plans for the safety of nutrition, health of the people. Hence the respondents were asked about the appropriateness of health and food utilization related activities arranged in LAPA programmes. The perceptions of the local people on its association with impacts on food utilization have been assessed as presented in table 5.16 below.

Table 5. 16 Perception of respondents on the appropriateness of interventions on health and food utilization

Health & Food Utilization activities and LAPA	*f*	%
Appropriate	11	27.5
Slightly appropriate	26	65.0
Neutral	3	7.5
Total	40	100.0

Source: Field Survey, 2020

The above Table 5.16 shows that 65 percent of the respondents believed the interventions to be slightly appropriate in food utilization and in improving health, 27.5 percent of respondents believed the interventions to be appropriate and 7.5 percent were neutral to the statement.

5.2.8 Food stability and climate change

Food Storage:

Food storage of food products is needed for its long term use. For identification of the types of the food storage system in the study area, the view of key-person information is presented below:

View from Key Informant on food storage and time for contamination-free

Mostly food is stored inside a pit that is made where it is assumed that it remains safe and free from contamination for three months. Likewise, it is also stored in storage (bhakari) wooden and tin.

-Source: KII-4, 2020

Impacts of Climate change on Food stability

The impacts of climate change on food stability is observed in the experience of the respondents on new kind of diseases in stored food, destruction of crops, new diseases in field crops and range of agricultural pests and increase the ability of pest population to survive the winter and attack spring crops. Table 5.17 below shows that 70 percent

believed that the pest ability to survive the winter and attack spring crops is experienced while 30 percent did not experience the range. Regarding new diseases in the field crops, 72.5 percent of respondents noticed new kinds of diseases in their field crops while 27.5 percent of the respondents did not notice it. Regarding the failure of crops due to climate change, 70 percent of respondents did not perceive the reason while 30 percent believed in it. The new diseases in stored food, only 12.5 percent of the respondents noticed a new kind of disease in their stored food while 87.5 percent believed they did not notice. The respondents who did not notice diseases claimed that as the food is not sufficient hence, it is consumed before it gets a disease.

Table 5. 17 Perception of respondents on the impacts of climate change on food stability

Elements	Yes		No		Total	
	f	%	*f*	%	*f*	%
Sustained pests	28	70	12	30	40	100
New diseases in field crops	29	72.5	11	27.5	40	100
Failure of crops	12	30	28	70	40	100
New kind of disease in stored food	5	12.5	35	87.5	40	100

Source: Field Survey, 2020

Worsen rain-fed agriculture and continuation of food supply

To perceive the impacts on rain-fed agriculture and continuity of food supply, the perception of the respondents were analyzed where the extent of worsened stability of rain-fed agriculture due to the changes in the amount and timing of rainfall within the season and an increase in weather variability and if maintaining the continuity of food supply when production is seasonal is challenging were inquired as shown in table 5.18 below. The table depicts that most of the respondents (80%) believed that rain-fed agriculture has been enough worsened while 20 percent believed it has worsened to some extent. Likewise, 65 percent of the respondents strongly agreed that maintaining the continuity of food supply is challenging when production is seasonal while 35 percent partially agreed with the statement.

Table 5. 18 Impacts on rain-fed agriculture and food supply

Worsened stability of rain-fed agriculture	*f*	%
Enough	32	80.0
To some extent	8	20.0
Total	40	100.0
Maintaining the continuity of food supply		
Strongly Agree	26	65.0
Partially Agree	14	35.0
Total	40	100.0

Source: Field Survey, 2020

View from Key Informant on food stability

People go to China and other places to work as labour, carry firewood, and earn. They buy food items like flour from the place. It is also due to a lack of road connection. Also, food is provided from Khadya Sansthan which is not good from the side of sustainability.

Source: KII-4, 2020

5.2.9 Food Stability and LAPA

The LAPA interventions on the intensification of income and access have been in the LAPA plans and implementation.

Hence the respondents were asked about the appropriateness of interventions and its impacts in the intensification of income and access to adequate food amount and availability of the food products related activities arranged in LAPA programmes. The perceptions of the local people on its association with impacts on food stability have been assessed as in table 5.19 below.

Table 5. 19 Impacts of LAPA implementation in Food Stability

income due to the LAPA programmes has intensified your access to adequate food amount	*f*	%
Strongly Agree	1	2.5
Partially Agree	19	47.5
Neither agree nor disagree	9	22.5
Partially Disagree	11	27.5

Total	40	100.0
programmes under LAPA have helped in the food items available		
Enough	1	2.5
To some extent	9	22.5
Very Less	22	55.0
Negligible	8	20.0
Total	40	100.0

Source: Field Survey, 2020

The table depicts that only 2.5 percent of the respondents strongly agreed with the intensification of income and access to adequate food amount but 47.5 percent partially agreed. 22.5 percent of the respondents were neutral with the statement while 27.5 percent responded it as partially disagrees. Similarly, regarding assistance in the availability of food items throughout the year in the market, most of the respondents (55%) responded very little assistance followed by (22.5%) to some extent and (20%) negligible while only 2.5 percent believed it to be enough.

5.3 Implementation of Climate Change Policy (LAPA) and Food Security

To assess information under the implementation of the Local Adaptation Plan of Action for attaining food security which is my dependent variable, in Simkot of Humla district, series of interactions with the ward level authorities, LAPA coordinators, and people's perceptions on the nature of climate change problems, plans and livelihood options and views on LAPA programmes for food security were generated to verify the analysis.

5.3.1 Interventions under LAPA in Simkot Rural Municipality:

View from Key Informant on interventions under LAPA

The LAPA district coordinator highlighted the types of interventions made for Simkot Rural Municipality where he stated agriculture and food security forest and bio-diversity management, mitigation and adaptation of climate-induced disaster, management of water resources were given high priority in LAPA activities. Likewise, awareness related to climate change and its impacts, training on modern/improved cooking stove and

distribution of such stoves throughout the village, embankment for landslide, irrigation, drinking water, plantation/ reforestation, community forest user group establishment, distribution of seeds and greenhouse, tunnel, the introduction of off-season farming was conducted.

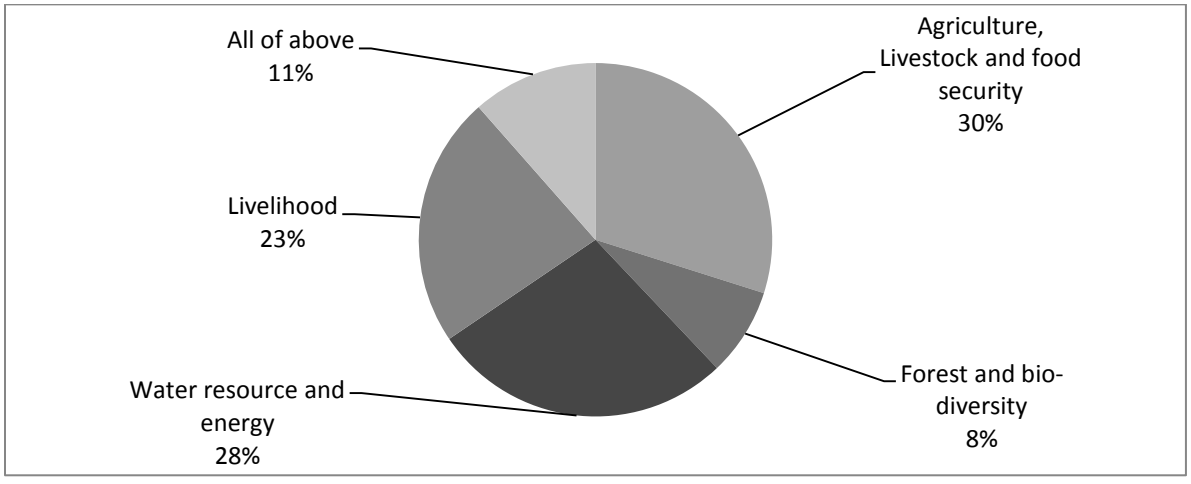
Source: KII, LAPA district coordinator, 2020

5.3.2 Climate change problems and livelihood options in Humla District

5.3.2.1 Locally identified sectors affected due to Climate change

Local Adaptation Plan of Action Framework, 2011 advocates the local identification of the climate-induced problems, issues, and the affected sectors. Fig.5.7 depicts the locally identified sectors most affected by climate sectors in Simkot in which most of the affected sector (30%) is agriculture, livestock and food security followed by water resource and energy (28%). 23 percent stated that livelihood as mostly affected sectors while only 8 percent believed it to be forest and bio-diversity. Almost 11 percent of the respondents perceived that mostly affected sectors include all.

Figure 5. 7 Locally identified sectors which are mostly affected due to climate change:



Source: Field Survey, 2020

View from Key Informant on sectors affected by climate change

The representative from the rural municipality underlined the problem of agriculture and food security, landslides, forest and biodiversity management, and water resources due to climate change. He added it is also due to a lack of awareness. These have been highlighted in the LAPA interventions.

-Source: KII-5, 2020

To ascertain the satisfaction of people in the locally identified climate change problem in their community, the respondents were queried of which almost respondents (85%) were strongly satisfied while 12.5 percent were satisfied partially. The rest of the respondents (2.5%) were neutral as they viewed that the locally identified problems are highly influenced by the elites and political leaders as in Table 5.20 below.

Table 5. 20 People's satisfaction on locally identified sectors

Satisfaction on nature of locally identified climate change problems	*f*	%
Strongly satisfied	34	85.0
Partially satisfied	5	12.5
Neither satisfied nor dissatisfied	1	2.5
Total	40	100.0

Source: Field Survey, 2020

The insights from the key informants underlined the major problems due to climate change and that from the locals hence it seems the presence of awareness about the problems in the area.

5.3.2.2. Nature of immediate, urgent, and long term plan

The Local Adaptation Plan of Action Framework, 2011 articulates that the communities need to prepare their immediate, short, and long-term plans to mitigate climate-induced impacts and lessen the vulnerability of the community. Hence the respondents were inquired concerning the satisfaction on the nature of the plans as below:

Table 5. 21 People's satisfaction on the nature of immediate, urgent and long term plan

People's satisfaction on immediate, urgent and long term plan	*f*	%
Strongly satisfied	29	72.5
Partially satisfied	9	22.5
Neither satisfied nor dissatisfied	1	2.5
Partially dissatisfied	1	2.5
Total	40	100.0

Source: Field Survey, 2020

The above table 5.21 articulates the level of satisfaction on the nature of immediate, urgent, and long-term plans of which the majority of the respondents (72.5%) revealed their strong satisfaction followed by partial satisfaction (22.5%). While 2.5 percent could not present their view and the remaining 2.5 percent were partially dissatisfied both of which were due to poor implementation.

5.3.2.3 Livelihood Options

The local identification of livelihood options is mandatory according to the LAPA framework 2011 for building resilience capacity at the local level. In this, the satisfaction level of the respondents in locally identified livelihood options was identified as:

Table 5. 22 People's satisfaction on the nature of livelihood options

People's satisfaction on nature of livelihood options	*f*	%
Partially satisfied	9	22.5
Neither satisfied nor dissatisfied	3	7.5
Partially dissatisfied	4	10.0
Dissatisfied	24	60.0
Total	40	100.0

Source: Field Survey, 2020

The above Table5.22 depicts that almost respondents (60%) were not satisfied with the livelihood options which were identified in their community. Ten percent of respondents were partially dissatisfied while 22.5 percent were partially satisfied with the livelihood options. The rest of the respondents (7.5%) remained neutral. The respondents who were not satisfied believed that the actions which were adapted

during LAPA implementation were helpful even then they are not much worthy in case of income and economy.

CASE-4

San Bahadur Sahi from Dadafaya Ward-7 is a stakeholder of the LAPA programme. He also took participation during the LAPA planning. He shared his experience of the programme to be slightly supportive of livelihood. He said that the self-sufficiency from their production was 3-4 months while after LAPA, it has brought slight difference due to incomplete programmes, if the irrigation programme and embankment was finalized it would have given more productivity. There is still a high risk of a landslide which might swipe away the whole settlement so had the programmes were completed; it would be fruitful to us. Nonetheless, the interventions of LAPA have brought changes in the community he added. Delightfully he explained the positive impacts of LAPA interventions. He said after the distribution of the Improved cooking stove, almost all households are "smoke-free areas" while he explained that he has less firewood consumption, decreased eyes, nose, and throat infection, and decreased deforestation. The introduction of irrigation and soil testing and information provided on types of crops that can be produced, fertile soil, and to what extent it will maintain its fertility, etc. through the LAPA programme has helped in growing crops and vegetables accordingly. Likewise, he continued with bright happiness that he has been growing non-season vegetables which have made a slight improvement in his production while sometimes sell the products in case it is abundant. Offseason potatoes are grown which is due to awareness from the LAPA programme. Hence he said his production has a bit improved after the intervention of LAPA.

(*Source: Survey, 2020*)

5.3.2.4 Policy Design

Policy design is the backbone for the implementation of any policy and framework. Hence, in this research the perception of local people regarding the level of officials in having a clear idea on LAPA objectives and targets and if the provisions are followed properly in the selection and implementation process under LAPA has been discussed.

Table 5. 23 Perception of respondents on the policy design

Officials have a clear idea of LAPA objectives and targets	***f***	**%**
Strongly Agree	37	92.5
Partially Agree	3	7.5
Total	**40**	**100.0**
provisions in the selection and implementation process		
Strongly Agree	38	95.0
Partially Agree	2	5.0
Total	**40**	**100.0**

Source: Field Survey, 2020

Table5.23 above depicts that almost all of the respondents (92.5%) strongly agreed that the officials have a clear idea on LAPA objectives and targets while 7.5 percent agreed partially to it. Regarding the perception of respondents on whether the provisions are followed in the selection and implementation process under LAPA, the majority of the respondents (95%) strongly agreed while 5 percent provided partial agreement.

A political assertion in the selection of programmes

A political assertion in the selection of programmes and activities in any plan is one of the important factors in analyzing the proper selection and implementation of any policy and framework. Hence, the perception of respondents on the extent of the political assertion in the selection of programmes under LAPA has been discussed. Table5.24 below shows that a greater part of the respondents (95%) perceived that there is not any political assertion in the selection of programmes under LAPA but 9 percent believed that a little political assertion is present in the selection of programmes under LAPA.

Table 5. 24 Perception of respondents on the political assertion in the selection of programmes under LAPA

the political assertion in a selection of programmes under LAPA	*f*	%
A little bit	2	5.0
Not at all	38	95.0
Total	**40**	**100.0**

Source: Field Survey, 2020

5.3.2.5 Authority of Local-level Bureaucrats

Authority is an important factor for the proper implementation of any policy and framework. In this research, the perception of local people about implementation of policy, rules and regulations, and mobilization of resources by the authority has been discussed.

Implementation of policy, rules and regulations and authority in the mobilization of resources

The perception of respondents on the extent of local level bureaucrats having authority in the implementation of policy, rules, and regulations and authority on the mobilization of resources has been put into discussion.

Table 5. 25 Respondents by perception on the authority

Perception of respondents on implementation of policy, rules, and regulations	*f*	%
Very High	32	80.0
High	3	7.5
Low	5	12.5
Total	40	100.0
Perceptions on the mobilization of resources by the local authority		
Very High	32	80.0
High	3	7.5
Low	5	12.5
Total	40	100.0

Source: Field Survey, 2020

Table5.25 above states that the majority of respondents (80%) perceived very high proper implementation of policy, rules, and regulations by the local authorities in climate adaptation while 7.5 percent perceived it to be high followed by 12.5 percent who believed low implementation in the community. The respondents (80%) believed that the authority on the mobilization of resources is very high and 7.5 percent leveled it high. 12.5 percent were not satisfied and leveled low regarding the local authority on the mobilization of resources. This displays majority of people have belief and faith in the implementation of policy, rules, and regulations (LAPA) by the local authority.

View of KII on local authority

The local authority shared his view on the responsibilities and implementation of policy rules and regulations. He addressed that the responsibilities are given to the locals of the rural municipality. Works are performed without any duplication. He added that it is evaluated and is performed with the coordination of each unit

-Source: KII-9, 2020

5.3.2.6 Participation

The proper implementation of LAPA considers participation as central for the local level implementation plan. To guarantee proper representation in implementation, nature, composition, and female participation has to be addressed.

Nature of Participation and satisfaction on the nature of participation in the LAPA process

The nature of participation is the key to any planning process of which autonomous participation defines actual participation. Forced and compulsion in participation is not fruitful as it remains inactive and is only for the sake of numbers wanted. Hence the nature of participation of the respondents and their perception about the nature of participation during the LAPA planning process has been discussed.

Table 5. 26 Respondents by nature of participation and satisfaction level in LAPA process

Nature of participation	***f***	**%**
Compulsory	7	17.5
Autonomous	33	82.5
Total	40	100.0
Satisfaction on the nature of participation	***f***	**%**
Strongly satisfied	35	87.5
Partially satisfied	4	10.0
Neither satisfied nor dissatisfied	1	2.5
Total	40	100.0

Source: Field Survey, 2020

The above Table5.26 describes that most of the respondents (82.5%) participated in autonomous while 17.5 percent participated as a compulsion. Among those who participated as compulsion revealed that their participation was made compulsory for the reason that they are active in the social activities in the study area. Regarding satisfaction, the nature of participation in the LAPA process mostly (87.5%) was strongly satisfied followed by partial satisfied 10 percent while 2.5 percent remained neutral. Hence, this shows that the community participated almost full though few were asked to take participate as compulsion while mostly they were satisfied with the nature of participation.

Composition of stakeholder's involvement

The composition of stakeholders and their involvement in the implementation plan of LAPA at the local level is identified important in LAPA for better a plan process. Hence the composition of stakeholders and perception on its effectiveness at Simkot was acquired as in the following table.

Table 5. 27 Composition of stakeholder involvement and its effectiveness

Stakeholder's engagement	***f***	**%**
Political parties	8	10.5%
Government	17	22.4%
Communities	19	25.0%
I/NGOs	11	14.5%
All of the above	21	27.6%
Total	76	100.0%
Effectiveness of composition of stakeholder's involvement	***f***	**%**
Very Effective	32	80.0
Effective	7	17.5
Satisfactory	1	2.5
Total	40	100.0

Source: Field Survey, 2020

The above Table5.27 shows that the majority of the respondents (27.6%) opined that all types of stakeholders were present in the planning process followed by 25 percent for communities, 22.4 percent for the involvement of the government sector. Likewise, 14.5 percent of respondents stated the involvement of I/NGOs and 10.5 percent was for the political party. Concerning the effectiveness of the composition of the stakeholder's involvement, 80 percent regarded to be very effective followed by (17.5%) effective, and 2.5 percent of respondents thought it to be satisfactory. This reveals that there were different stakeholders involved and most respondents thought the composition to be very effective.

Female Participation

Female participation in the local level planning process is addressed to be crucial as a matter of fact that they are most vulnerable to climate change. Hence their involvement in the local level planning is essential which is also mandatory for the LAPA framework, 2011.

Table 5. 28 Respondents by satisfaction on the number of female participation

Satisfaction on the number of female participation	*f*	%
Strongly satisfied	34	85.0
Partially satisfied	4	10.0
Partially dissatisfied	2	5.0
Total	40	100.0

Source: Field Survey, 2020

The above Table5.28 depicts that most of the respondents (85%) were strongly satisfied with the number of female participation during the planning process of LAPA followed by (10%) partially satisfied while the remaining (5%) were partially dissatisfied with the number. This shows that female participation was satisfactory in the local level planning process.

View of KII on the composition of stakeholder's participation

The local bureaucrat of the rural municipality highlighted, "involvement of Rural Municipality Committee members, local committee and consumer committee during the planning process in LAPA programme. There is a lot share of local people and LAPA. The demand for the plan from each ward is asked leading to the identification of need and how LAPA can address them is discussed".

The chairperson of the rural municipality stated, "there was the involvement of chairperson of the rural municipality, each ward, administrative officer, planning unit, and the citizens. Female participation is present also due to the law of compulsory 33 percent representation and few of them are in vital positions too. While the participation of locals is very high during performing all activities in preparing process or in implementing process minimum 50 percent female is involved. There was proper representation from all sectors including government, political parties, Dalit communities, and women."

- Source (KII 9 and 1), 2020

5.3.2.7 Inter-organizational coordination

Inter-organizational coordination plays a vital role in the success of any policy in its implementation. Hence, coordination with the stakeholders, municipality, and user groups is essential. The success in policy implementation depends on the flow of information by the concerned authority to the local people and the stakeholders. Likewise, communication within the concerned authorities is equally essential for a successful policy and framework implementation. In this regard, the response on the perception of the flow of information to the local stakeholders and communication and coordination with the district level was accessed.

Table 5. 29 Respondents by perception of respondents on inter-organizational coordination

Perception of respondents on the flow of information to the local stakeholders	***f***	**%**
Strongly satisfied	22	55.0
Partially satisfied	8	20.0
Partially dissatisfied	7	17.5
Dissatisfied	3	7.5
Total	40	100.0
Perception of respondents on communication and coordination with district level	***f***	**%**
Strongly satisfied	13	32.5
Partially satisfied	19	47.5
Neither satisfied nor dissatisfied	1	2.5
Partially dissatisfied	5	12.5
Dissatisfied	2	5.0
Total	40	100.0

Source: Field Survey, 2020

The above Table5.29 depicts the perception of respondents on the flow of information to the local stakeholders by the concerned authorities of which 55 percent of respondents are strongly satisfied with the nature of the flow of information followed by 20 percent of partial satisfaction. Among respondents, 7.5 percent were dissatisfied while the rest of the respondents (17.5%) were partially dissatisfied. Hence, it portrays that the majority of the respondents believe in the flow of information to the local

stakeholders by the concerned authority which is satisfactory. Regarding perception for communication and coordination with the district level, 47.5 percent of the respondents were partially satisfied followed by 32.5 percent who were strongly satisfied. The respondents (12.5%) and (5%) were partially dissatisfied, and totally dissatisfied respectively. This reveals that the majority believed in satisfactory communication and coordination within the concerned authorities.

View of KII in inter-organizational coordination

The local leader of the rural municipality said that each activity was with coordination and advice with the local government. There is proper communication with the authority and the local people and the stakeholders. The present change in the structure has brought some chaos as the programme under LAPA does not seem to be that transparent.

- *Source: KII-13, 2020*

The secretary of the rural municipality revealed that the communication with the district is usually one way as the sent plan is sometimes unheard. Sometimes though the proposals and plans are discussed at the local levels, it turns out to be different during the implementation like the funds would arrive according to its pre-planned budget.

- *Source: KII-6, 2020*

5.4 Key Relationship among Variables:

To outline if there is a correlation between the variables, a Pearson correlation coefficient was adopted. The correlation portrays the strength of linear dependence of the two variables and it is used to understand the strong and weak consequence on the implementation of LAPA for food security. The values are in between +1 and -1 where the values close to +1, zero, and -1 indicate a high positive, zero, and high negative correlation among the two factors.

Table 5. 30 Correlation between variables

Indicators of Independent variables	Implementation of LAPA for Food Security			
	Food Availability	**Food Accessibility**	**Food Utilization**	**Food Stability**
Policy Design	.187	.079	.135	-.043
Authority of local level bureaucrats	.282	-.250	.058	.372*
Participation Related	.277	-.142	-.150	-.035
Inter-organizational coordination	.347*	-.366*	-.004	.209

*. Correlation is significant at the 0.05 level (2-tailed).

The correlation in the above table5.30 demonstrates that the policy design has a greater impact on food availability, accessibility, and utilization though has a weak correlation. While has a negative or no significant impact on food stability. With response to the authority of local level bureaucrats, the results indicate that it has a significantly positive-relation with food stability while negative in food accessibility. Likewise, it has a positive but weak correlation with food availability and food utilization. The participation has no significant relationship with food accessibility, food utilization, and stability while has a positive but weak correlation with that of food availability. Similarly, inter-organizational coordination has a significantly positive-relation with food availability while a significantly negative-relation with food accessibility. It has a negative correlation with food utilization but has positive but weak relation with food stability.

5.5 Factors affecting the implementation of the policy

Getting the right policy implementation is very elusive and critically important. The gaps and challenges for policy implementation are necessary to get identified. Several factors influence policy implementation. Better will be the implementation of a policy if the

factors affecting the implementation are acknowledged. So, through the explorative study, the factors affecting the implementation of the policy have been pointed as:

The findings on factors affecting the implementation of climate change policy (LAPA) suggested the influence of various affecting causes. The results comprehend that due to political instability and the institutional factors, the focal ministry (Climate change policies and strategies) is not able to be unchanged and address the issues that arose. Similarly, the lack of human resources is another factor for effective implementation. The gap in the institutional arrangement, capacity in implementation, and mechanisms for adaptation at the local level are prevalent. The findings also suggested that the absence of capacities in local elected bodies towards implementation at the local level. Besides these, other factors were difficulty in making real based plan and difficult to form a local consumer committee; selection of some programmes was only for elites or those having access; the influence of elite person seen on implementing LAPA activities due to which poor and marginalized people were excluded from getting benefit from it; and the staff under LAPA programme would not stay at the site which might lead to ineffective implementation.

CASE-5

Dev Bhandari, Chairperson of Landslide Control Consumer Committee, Simkot-5 had worked in the last phase at Simkot ward. He said that the area has steep land hence is highly vulnerable to landslides which threaten in sweeping away fertile land. On top of that, there is no rain on-time inversely are facing drought. After the introduction of LAPA, he was aware of consumer committees that worked for the embankment of agricultural land and have put a gabion wall order to halt water flow from the river. The programmes under LAPA have brought many changes in livelihood strategies. A Forest user group was created and plantation of trees was done also pieces of training were provided for the community forest.

Food items are transported from Surkhet, Nepalgunj to Simkot. He said that "rasan card"

was used to distribute food from Khadya Depo. He sadly said that whatever the quality is they need to have it than to die of hunger. The people residing in the upper part of Humla have easy access to China so they can go and work there and bring food then come to Simkot. He added that they are compelled to work outside as labor as their food is not sufficient throughout the year.

Suggestions: All programmes were good but still it would have been better if pieces of training were provided by institutionalizing the consumer committee and also people would have gained more knowledge. Likewise, the projects have been provided but training would aware of all members.

Still, people have to depend on food from Khadya Sansthan else food found in the market is extremely high so if the district had transport connectivity, food items at the local market could be affordable and quality.

LAPA was more focused on landslide but if training on modern agriculture system, new kind of gain economic output; it would have helped in sustainable agricultural production. So the programmes are yet not enough people are still doing traditional agriculture.

(*Source: Survey, 2020*)

CHAPTER-VI

SUMMARY: DISCUSSION, AND CONCLUSION

6.1 Summary

This study was carried out in Simkot rural municipality of the Humla district. The study was done using a mixed-method combined with both qualitative and quantitative techniques. The Key Informant Interview and Questionnaire Survey were used for collecting data for the study. The questionnaire was designed on a Likert scale and was analyzed with the use of SPSS. The analysis was chiefly carried out in frequency, percentage, and correlation to observe the relationship between the dependent and independent variables. The results and discussions are described in chapter-IV and chapter-V.

6.2 Theoretical Contribution

The theories for the study were reviewed related to implementation. After the literature reviewed on implementation of policies on climate change and food security, exposed that the area on implementation of LAPA for food security was untouched. Hence to understand the factors that affect the implementation of LAPA for addressing food security, theory on implementation by Van Horn and Van Meter and Winter's Integrated Model of Policy Implementation were reviewed. Likewise, as LAPA is considered as a bottom-up approach and Climate Change Policy and National Adaptation Programme of Action is considered as a top-down approach, and to identify the level of participation of the stakeholders and authority, Top-down and Bottom-up approach of implementation were reviewed. While to understand the livelihood activities, entitlement and resilience capacity and food security, Sustainable Livelihood approach, Sen's Entitlement approach were reviewed.

LAPA is articulated to build a resilient capacity over participation at the local level. Hence, the level of officials in having a clear idea on LAPA objectives and targets, perception of participation and inter-organizational coordination were the independent variables to learn the status of its implementation. The dependent variable was

implementation of LAPA for food security where the indicators to validate it were availability, accessibility, utilization, stability while the locally identified sectors affected due to climate change, nature of immediate, urgent and long term plan, and livelihood options were also analyzed. The following sections recapitulate major findings, conclusion, policy recommendations, and further policy research.

6.3 Major Findings

The major findings of the research concerning the research objectives are discussed in this section. The study has directed findings regarding the perceptions of climate change and its impact on food security. The study has attained it through the perception of respondents for climate change aspects, its impacts on four pillars of food security viz. food availability, accessibility, utilization, and stability. The study has also directed findings regarding the implementation of the LAPA framework, 2011 for attaining food security in Simkot rural municipality of Humla district. The study has acquired implementation of LAPA framework, 2011 for food security through the satisfaction on the situation of food availability, accessibility, utilization and stability after the implementation and also the nature of identified problems, nature of immediate, urgent and long term plans and people's participation. Hence the major findings of the research are:

6.3.1 Climate change on food security

The climate change on food security was measured by scrutinizing the understanding level of the local people regarding climate change and its impacts basically in temperature and precipitation; impacts of climate change in food security.

Perception of respondents on climate change

The findings regarding the impact of climate change have been revealed the experience of temperature increasing during the last few years while winter days have been decreasing. The frequency of precipitation has decreased during the last ten years but the intensity has increased resulting in landslides and decreases in agricultural production and yield. New diseases have destroyed the crops and the landslides have

affected agricultural production. The time and level of snowfall have been decreasing by two months and would melt soon respectively which has resulted in the drying of spring water. The irregular rainfall pattern, change in cropping pattern is experienced for more than 30 years have impacts on food security.

Food availability

The findings result that the state of food availability from their own production is sufficient for 4-6 months to most of the respondents. Most of the respondents revealed that major factors affecting food unavailability were no irrigation, low production due to climate change, and unfavorable monsoon. Most of the respondents opt for buying from the market and daily wage to meet the essential food requirement. Similarly, the KII revealed that the production is at a decreasing rate due to the impacts of climate change causing drying water resources, landslides, flowering, and fruiting time. The people opt for seasonal herb collection for income. The majority of the respondents believed that irregular rainfall and temperature changes are the major factors for the change in the length of the growing period, harvest time, and damages of food products.

Food accessibility

Findings on food accessibility predict that the sufficiency of household income to purchase their food item is not significant while the price of food items in the market is to be found very high. The KII also stated that it is due to lack of own food availability and mostly nil road connectivity, and damages of roads during extreme events caused by climate change. While the food items needed to be brought via plane this would triple the real price. Regarding the access to markets, it is found to be good.

Food Utilization

The findings on food utilization revealed that the health status of the people is mostly deteriorated by usually seen diseases are fever, headache, cold and cough while no new diseases are experienced.

Most of the respondents are satisfied with their intra-household food consumption pattern and food consumption pattern is moderately improving but disagree with the good condition of drinking water. The majority of the respondents revealed the geographical structure and less production due to climate change and low household production as the bottlenecks of food utilization.

Food Stability

The findings revealed that the food is stored in a traditional storage system (*Bhakari*, wooden, and tin) that preserves food items for nearly three months. Most of the respondents believed that the impact of climate change on food stability is due to sustained pests and new diseases in the field crops. Likewise, they believed stability status is enough worsened due to rain-fed agriculture and mostly agreed that it has left over the continuation of the food supply in the market. Similarly, KII revealed that people go to China and work to earn as labor, carry firewood, and buy food items needed.

6.3.2 Implementation of LAPA for Food security

The implementation of LAPA on Food security was measured with the satisfaction level of the respondents concerning locally identified problems, nature of immediate, urgent, and long term plan and livelihood options, and effectiveness of the implementation regarding food availability, food accessibility, food utilization, and food stability.

The respondents stated agriculture, livestock and food security, water resource, and energy as major climate change problems to which they are strongly satisfied. It was recognized that they were alert about climate change impacts and problems in their area. Concerning the nature of preparing their immediate, urgent, and long-term plan, the majority of respondents were strongly satisfied. Similarly, for the perception of respondents on the nature of livelihood options, most of the respondents were dissatisfied due to the reason that the actual economic improvement was absent.

Policy design and Food security

The findings regarding policy design revealed that there is no significant relationship with food security. Comparatively policy design has a positive relation to food availability than to food accessibility and food utilization. Gloomily it has a negative correlation with food stability. However, the respondent's perception of respondents on policy design regarding clarity of objectives and targets, and compliance with standards is highly agreed. This indicates that people have faith in the aptitude in policy design.

Authority of local level bureaucrats and food security

The findings from the authority of local level bureaucrats revealed that it has a significantly positive-relation with food stability and has a positive weak correlation with food availability and utilization but negative to food accessibility. Even then, the perception of people is very high on authority regarding mobilization of resources and implementation of policy; rules and regulations which display that majority have faith in the ability to implement policy, rules, and regulation and mobilize resources by the local authority.

Participation and food security

The findings from the participation discovered that nature, composition, and female participation has a positive but weak correlation with food availability but no significant relationship with food accessibility, food utilization, and food stability. Besides the majority of respondents said that the nature of their participation during the implementation planning process was autonomous and was strongly satisfied. The engagement of stakeholders was from government, community, political leaders, and NGOs and most of the respondents believed the composition to be very effective. They were also very satisfied with the number of female participation in the implementation planning process. KII stated that the participation of participants represented all sectors including government, political parties, Dalit communities, and females which is also due to the law of 33 percent representation and their participation is very high while 50 percent female were involved.

Inter-organizational coordination and food security

The findings on inter-organizational coordination exposed that it has a significantly positive-relation with food availability and positive but weak relation with food stability while inversely negative relation with food accessibility and food utilization. The majority of respondents believed in the flow of information to the local stakeholders by the concerned authority, and communication and coordination with the district level and assumed to be satisfactory. KII stated that there is no duplication of programmes and there is the existence of communication and the flow of information is satisfactory though the communication with the district is usually seen one way as sometimes sent plans are unheard and also sometimes the plans turn out to be different during implementation.

6.3.3 Factors affecting the implementation of Climate change policy (LAPA)

The findings on factors affecting the implementation of climate change policy (LAPA) suggested the following points:

- The results figure out that the focal ministry (Climate change policies and strategies) is not able to be stable and take a stance to address the issues that arose due to political instability and the institutional factors,
- Lack of enough resources and institutional arrangement is another factor for effective implementation.
- The gap in the institutional arrangement, capacity in implementation, and mechanisms for adaptation at the local level are dominant.
- The findings were also submitted in the absence of capacities in local elected bodies to implement at the local level.
- Difficulty in making real based plan and difficult to form a local consumer committee
- Selection of elite based programmes or those having access;
- Influence of elite person on implementing LAPA activities due to which poor and marginalized people were excluded from getting benefit from it

6.4 Conclusion

The change in rainfall pattern and temperature, climate-induced extreme events like drought, flood, hailstones, and landslides create risk in agricultural production which leads to food insecurity. The major problems in food insecurity were low production due to climate change followed by lack of irrigated land, unfavorable monsoon, landslide, and unfertile land. The local markets access for selling and purchasing food items found in the study area was satisfying but the price of the food items was not affordable to all people.

LAPA, a noteworthy framework capacitates and builds resilience capability at the local level for the impact of climate change. It is revealed that there is no national-level agreed indicator to measure the progress of the policies, plans, and frameworks. The national climate change policy has not reflected priorities and targets that are to be achieved. Hence, participatory and inclusive policy formulation and strategies development and the outcome indicators as a reduction in vulnerability, locally develop their strategies and increase in adaptive capacities in vulnerable communities are analyzed. The impacts of climate change are at the local level even though it is a global problem. The poor are hardest hit by climate change and are more vulnerable to its impact as they cannot afford the mitigation measures.

The findings indicated the implementation of LAPA appears satisfactory to the respondents regarding the nature of locally identified problems, plans, and livelihood options. Agriculture, livestock, and food security and water resource, and energy were recognized as major climate change problems. The policy design was perceived as highly satisfied and faith in it though it had no significant relation with food security. The authority of local level bureaucrats was perceived positive on the implementation of LAPA for food security but is significantly positive to only food stability. The nature of participation, composition, and female participation seems autonomous and positive and has a positive but weak correlation with food availability. Similarly, the perception of inter-organizational coordination was found to be positive and also positive to food

availability and stability. Hence, the implementation of climate change policy for food security has a major but negligible impact only on food availability than on food accessibility, food utilization, and food stability. Likewise, the political and institutional factors, resource constraints, capacity and expertise of human resources, reality-based plan, elite capture, and top decisions, etc. are the factors affecting the implementation of climate change policy for food security.

6.5 Policy Recommendation

Based on the discussion and conclusions, the policy recommendations are stated below:

- Identifying the most vulnerable communities/groups in terms of food insecurity (The fundamental question is who are the hungry ones - the most marginalized in terms of socio-economic, political opportunities)
- There should be immediate, short term long term strategies to address food insecurity
- Development of sustainable agriculture, increase in production and equitable distribution
- Establish a food storage and distribution system
- Ensuring women (ensuring intersectionality) participation in scientific research of food and nutrition policy. Greater inclusion of women in design and participation in agricultural programmes will hence improve food and nutrition security. Their responsibility in food production, preparation, and intra-household distribution.
- In long term: Ensure their meaningful participation in the mainstream of state mechanism and ensure their access to productive resources
- Undertake research and development on analyzing best practices. The agriculture sector can benefit from crops and varieties having high nutritional value and improve the nutrition sensitivity of agriculture programmes.
- The extension of agriculture on recommending and supporting farmers on farming, handling post-harvest, and storage of varied food crops in their fields.
- Develop a value chain in domestic and global markets to farmers
- Improved technology and develop food and nutrition policy

- Capacity development of key stakeholder
- Dietary diversity to ensure nutrients
- Local people and communities at the grass-root levels, excellently aware to minimize the climate issues at the local and national levels.
- the inter-sectorial coordination within the government can be broken into sectoral divisions for making policy and government programmes especially agriculture and climate change programmes
- whether is now during the pandemic or even when the pandemic was not there- the most hard-hit are the people who suffer from any kind of problem is those who are historically marginalized hence their best interest should be the centrality of any policy discourse

6.6 Further Policy Research

Further studies are necessary to understand the ground reality of climate change and its impacts on food security with the intervention of other food security policies. This study offers several insights that can be a reference point for further study. Few of the potential areas which could not be uncovered by the present study basically due to the COVID situation, but could be useful for further researches are:

- The policy options and its impacts of both direct and indirect policy interventions employed to ensure food security could be studied while this study is delimited to only climate change policy.
- The study on effects of combined policies would be interesting like agriculture policies, education on consumptions, food security, climate change, regulatory actions, and pricing policies to make healthy food more accessible to the vulnerable and marginalized population.
- This study is also delimited to the effects of the implementation of LAPA on food security. Therefore, the study of public policies that are applied for the promotion of better income distribution is necessary to be researched.

- Studies can also be done on policies related to agro-food policies, adaptation policy, and strategies, building resilience, sustainable agricultural technologies.
- The study is delimited to 59 respondents due to the COVID situation causing it to impossible to travel to the research area. Hence, this type of research could be conducted by visiting the research area and more numbers of respondents.

Bibliography

Brown, A., M., G., & K., and Pringle, L. (2011). *Managing adaptation: linking theory and practice*. Retrieved from www.ukcip.org.uk

Carter, T. . (2007). *GENERAL GUIDELINES ON THE USE OF SCENARIO DATA FOR CLIMATE IMPACT AND*. Helsinki, Finland.

CBS. (2011). CBS. In *National Population and Housing Census 2011*. Kathmandu.

Chatterjee, B., & Khadka, M. S. (2015). *Climate Change and Food Security in South Asia* (B. Chatterjee & M. Khadka, Eds.). D-217, Bhaskar Marg, Banki Park Jaipur 302016, India: CUTS International.

Creswell, J. . (2014a). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (Fourth). Oliver's Yard 55 City Road London, UK: SAGE Publications Ltd.

Creswell, J. W. (2014b). *Research Design: Qualitative, Quantitative, and Mixed methods approach* (4th ed.). 2455 Teller Road, Thousand Oaks, California 91320: SAGE PUBLICATIONS.

Creswell, J. W., & Miller, D. L. (2010). *in Qualitative Inquiry*. (October 2012), 37–41.

Denzin, N. K. (2009). *The research act: A theoretical introduction to sociological methods*. Newyork McGraw-Hill: Rutgers-The State University New Jersey.

Esham, M., Jacobs, B., Sunith, H., & Rosairo, R. (2018). Climate change and food security : a Sri Lankan perspective. *Environment, Development, and Sustainability*, *20*(3), 1017–1036. https://doi.org/10.1007/s10668-017-9945-5

FAO. (2006). *The State of Food Insecurity in the World, Food and Agriculture Organization*. Rome.

FAO. (2008). *Food Security Information for Action: Food Security Concepts and Frameworks*.

FAO. (2019). Review of The State of Food Security and Nutrition in the World, 2019. In *World Nutrition* (Vol. 10). https://doi.org/10.26596/wn.201910395-97

Ghimire, S. (2007). *Climate Change in Nepal / Himalaya :* 1–33.

GON. (2011). *Climate Change Policy, 2067 (2011)* (Vol. 2067).

Hossain, M. S., & Majumder, A. K. (2018). *IMPACT OF CLIMATE CHANGE ON AGRICULTURAL PRODUCTION AND FOOD SECURITY : A REVIEW ON COASTAL REGIONS OF BANGLADESH*. *8*(1), 62–69.

IPCC. (2007). *Climate Change 2007: Impacts, Adaptation, and Vulnerability* (2007th ed.; M. Parry, O. Canziani, J. Paultifof, L. P. van Der, & C. Hanson, Eds.). 32 Avenue of

the Americas, New York, NY 10013-2473, USA: Cambridge University Press.

King, G., Keohane, R. O., & Verba, S. (2019). Designing Social Inquiry. In *Designing Social Inquiry*. https://doi.org/10.1515/9781400821211

Leung, J. Y. S., Russell, B. D., & Connell, S. D. (2019). Adaptive Responses of Marine Gastropods to Heatwaves. *One Earth*, *1*(3), 374–381. https://doi.org/10.1016/j.oneear.2019.10.025

Lincon, Y. ., & Guba, E. . (1985). *Naturalistic Inquiry*. Beverly Hills, CA: SAGE PUBLICATIONS.

Malla, G. (2008). Climate Change and its impact on Nepalese Agriculture. *The Journal of Agriculture and Environment.*, *9*.

Matland, R. E. (1995). Synthesizing the Implementation Literature: The Ambiguity-Conflict Model of Policy Implementation. *Journal of Public Administration Research and Theory*, *5*, 145–174. https://doi.org/10.1093/oxfordjournals.jpart.a037242

Mearns, R., & Norton, A. (2010). *Social Dimensions of Climate Change: Equity and Vulnerability in a Warming World*. https://doi.org/10.1596/978-0-8213-7887-8

Merriam, S. (1998). *Qualitative Research and Case Study Application in Education* (Second). Sansome Street, San Francisco, California: Jossey-Bass Inc.

Ministry of Environment of Nepal. (2011). *National Framework on Local Adaptation Plans for Action Climate Change Management Division*. 56.

MoF. (2018). Ministry of Finance, Nepal - Economic Survey 2017-18. In *Department of Economic Affairs, Economic Division, Government of Nepal*.

MoFE. (2018). *Nepal's National Adaptation Plan (NAP) Process: Reflecting on lessons learned and the way forward*. 54. Retrieved from http://napglobalnetwork.org/wp-content/uploads/2018/07/napgn-en-2018-nepal-nap-process.pdf

NAPA. (2010). (National Adaptation Programme of Action). National Adaptation Programme of Action to Climate Change, Ministry of Environment. *Government of Nepal*, (September), 1–96. Retrieved from www.moenv.gov.np

Nath, N. C. (2015). *Food Security of Bangladesh : Status, Challenges, and Strategic Policy Options Food Security of Bangladesh-Status, Challenges, and Strategic Policy Options*.

NPC. (1970). *Fourth Five Year Plan (1970-1975)*. Kathmandu, Nepal.

NPC. (1975). *Fifth Five Year Plan (1975-1980)*. Kathmandu, Nepal.

NPC. (1992). *Eighth Five Year Plan (1992-1997)*. Kathmandu, Nepal.

NPC. (1998). *Ninth Five Year Plan (1997-2002)*. Kathmandu, Nepal.

NPC. (2002). *Tenth Five Years Plan (2002-2007)*. Kathmandu, Nepal.

NPC. (2007). *Three Year Interim Plan (2007/08-2009/10)*. Kathmandu, Nepal.

NPC. (2010). *Twelfth Plan (2010/11-2012/13)*. Kathmandu, Nepal.

NPC. (2013). *Thirteenth Plan (2013/14-2015/16)*. Kathmandu, Nepal.

NPC. (2016). *Fourteenth Plan (2016/17-2018/19)*. Kathmandu, Nepal.

NPC. (2019). *Fifteenth Plan Approach Paper (2019/2020-2023/2024)*. Kathmandu, Nepal.

Office of Simkot Rural Municipality. (2019). *Profile of Simkot Humla*.

Osmani, S. R. (1993). *The Entitlement Approach to Famine: An Assessment*.

Pant, K. (2015). *Climate Change And Food Security In Nepal*. (March). https://doi.org/10.3126/aej.v13i0.7582

Patton, M. Q. (2002). *Qualitative evaluation and research methods* (third). Thousand Oaks, California: SAGE PUBLICATIONS.

Peng, W. (2019). The Concept of Food Security. *Encyclopedia of Food Security and Sustainability*, 1–7. https://doi.org/10.1016/B978-0-08-100596-5.22314-7

Peng, W., & Berry, E. M. (2018). The concept of food security. *Encyclopedia of Food Security and Sustainability*, (January), 1–7. https://doi.org/10.1016/B978-0-08-100596-5.22314-7

Pillay, D. P. K., & Kumar, T. K. M. (2019). Food Security in India: Evolution, Efforts and Problems. *Strategic Analysis*, *42*(6), 595–611. https://doi.org/10.1080/09700161.2018.1560916

Ramaraj, K., & Suresh, K. (2019). *FOOD SAFETY AND SECURITY IN INDIA – A*. (January).

Roy, D., Dev, D. S., & Sheheli, S. (2019). *Food Security in Bangladesh: Insight from Available Literature*. (February). https://doi.org/10.18502/jnfs.v4i1.401

Sen, A. (1981). *Poverty-and-famines: An Essay on Entitlement and Deprivation*. Walton Street, Oxford O X: Claredon Press.Oxford University Press.

Singh, C. (2020). Climate Change Adaptation in the Global South. *Indian Institute for Human Settlements*, (January), 1–90.

Steenwerth, K. L., Reynolds, M. P., Sandoval Solis, S., Sischo, W. M., Lubell, M. N., Msangi, S., … Jenkins, B. M. (2014). Climate-smart agriculture global research agenda: scientific basis for action. *Agriculture and Food Security*, *3*(1), 56. Retrieved

from http://dx.doi.org/10.1186/2048-7010-3-11

Thakur, S. B., & Karki, G. (2018). *Climate change impacts on agriculture and livestock in Nepal*. (July).

UNDP. (2017). *Application of the Sustainable Livelihoods Framework in*. Panama City, Panama.

UNFCCC. (2007). *Climate Change: Impacts, Vulnerabilities and Adaptation in Developing Countries*. Martin-Luther-King_Strasse 8 53175 Bonn, Germany.

Van Meter, D. S., & Van Horn, C. . E. (1974). THE POLICY IMPLEMENTATION PROCESS: A Conceptual Framework. *Administration and Society*, *6*(2), 445–488.

Winter, S. (2012). *The SAGE Handbook of Public Administration*. https://doi.org/10.4135/9781446200506

Yin, R. K. (2003). *Case Study Research_ Design and Methods, Third Edition, Applied Social Research Methods Series, Vol 5 (2002).pdf*. London: SAGE PUBLICATIONS.

Yu, W. H., Alam, M., Khan, A. S., & Ruane, A. C. (2010). *Climate Change Risks and Food Security in Bangladesh*.

Zohrabi, M. (2013). *Mixed-Method Research : Instruments, Validity, Reliability and Reporting Findings*. *3*(2), 254–262. https://doi.org/10.4304/tpls.3.2.254-262

Annex-I Interview Questionnaire for Survey

NORTH SOUTH UNIVERSITY
Questionnaire for research on
Does Nepal's Climate Change Adaptation Policy address Food Security: A case study of Humla District, Nepal 2020

Namaste! I am Gyan Laxmi Shrestha, a student from North South University, Bangladesh. As a partial fulfillment of the study of my master's course I am doing a survey on Food Security. The purpose of this study is to explore the effects of Climate Change adaptation policy in food security in reference to the Simikot Rural Municipality of Humla district. The results of the survey will help to find out whether the climate change adaptation policy addresses food security. I request you to be open and honest as much as possible in your answers. Your name is optional and the information that you have provided will be kept confidential and will not be used in other than the research purpose.

A. General Background

Q.N	Questions	Options	Coding	Remarks
101	Name (Optional)	……..		
102	Village Name	Dadafaya	1	
		Simkot	2	
103	Sex	Male	1	
		Female	2	
104	Age	20 Years	1	
		21-30	2	
		31-40	3	
		41-50	4	
		51-60	5	
105	Education	Illiterate	1	
		Literate	2	
		primary level	3	
		Lower secondary level	4	
		secondary	5	
		Higher Education	6	
106	Caste	Brahmin/Chhetri (1,2)	1	
		Adibasi/Janajati	2	
		Dalit (3)	3	
		Others	4	
107	Religion	Hindu	1	
		Buddhist	2	

		Christian	3	
		Others	4	
108	Occupation	Agriculture1	1	
		Business 2	2	
		Service 2	3	
		Wage Labour/Porter	4	
		Others	5	
109	Total Land holding	…….		
110	Food sufficiency level	0-3 months	1	
		4-6 months	2	
		7-9 months	3	
		10-12 months	4	
		More than 12 months	5	

B. Food Availability related:

Q.N	Questions	Options	Coding	Remarks
201	How long is your product enough?	More than enough	1	
		Whole year	2	
		Don't know	3	
		A few months	4	
		Not enough	5	
202	A climate change impact is responsible for crop damages, harvest time, crop losses, and diseases and pests. Do you agree?	Strongly agree	1	
		Partially Agree	2	
		Neither agree nor disagree	3	
		Partially Disagree	4	
		Strongly disagree	5	
203	Are you satisfied with the irrigation facility that you have?	Strongly satisfied	1	
		Partially Satisfied	2	
		Neither Satisfied nor Dissatisfied	3	
		Partially dissatisfied	4	
		Dissatisfied	5	
204	How effective are the options provided for food production by LAPA?	Very Effective	1	
		Effective	2	
		Satisfactory	3	
		Ineffective	4	
		Very Ineffective	5	
205		Major effect	1	

	What is the output of Food availability situation after implementation of LAPA programmes?	Moderate effect	2	
		Neutral	3	
		Minor effect	4	
		No effect	5	

206	How do you cope food deficit? Specify	Import additional food grains	1	
		Buy	2	
		Ask with neighbor	3	
		Job/pension	4	
		Income from shop/business	5	
		Daily wage	6	
		Selling livestock	7	

207	In your experience, what was the factor affecting food unavailability in your house?	Unfertile land	1	
		No irrigation	2	
		Unfavorable monsoon	3	
		Insufficient land	4	
		Lack of seed and tools	5	
		Lack of Technical knowledge	6	
		Low production due to climate change	7	

C. Food Accessibility related

Q.N	Questions	Options	Coding	Remarks
301	Is your household income sufficient to purchase food items?	Sufficient	1	
		Somewhat sufficient	2	
		Neutral	3	
		Somewhat insufficient	4	
		Insufficient	5	
302	The food items found in the market are affordable. Do you agree?	Strongly agree	1	
		Agree	2	
		Neither agree nor disagree	3	
		Disagree	4	
		Strongly Disagree	5	
303	The price of food items is rising due to less production caused by climate change. Do you agree?	Strongly agree	1	
		Agree	2	
		Neither agree nor	3	

		disagree		
		Disagree	4	
		Strongly Disagree	5	
304	How do you evaluate the present condition of time taken and distance to reach the nearest market?	Excellent	1	
		Good	2	
		Fair	3	
		Poor	4	
		Very Poor	5	
305	Damage of roads and foot trails due to extreme events caused by climate change. Do you agree?	Strongly agree	1	
		Agree	2	
		Neither agree nor disagree	3	
		Disagree	4	
		Strongly Disagree	5	
306	How do you feel about LAPA in regard to its adaptation activities?	Appropriate	1	
		Slightly appropriate	2	
		Neutral	3	
		Inappropriate	4	
		Absolutely inappropriate	5	
307	Do you think the programmes are effective in the intensifying in household income?	Very Effective	1	
		Effective	2	
		Satisfactory	3	
		Ineffective	4	
		Very Ineffective	5	

D. Food Utilization related:

Q.N	Questions	Options	Coding	Remarks
401	How do you evaluate the state of food consumption pattern? (quality and nutrition)	Improved	1	
		Moderate Improvement	2	
		Neutral	3	
		Partially deteriorated	4	
		Deteriorated	5	
402	Do you think your intra-household food consumption is satisfactory?	Strongly Satisfactory	1	
		Satisfactory	2	
		Neither satisfactory nor dissatisfactory	3	
		Dissatisfactory	4	
		Strongly Dissatisfactory	5	
403		Definitely	1	

	drinking water is safe?	Probably	2	
		Neutral	3	
		Probably not	4	
		Definitely not	5	
404	Do you agree that new kind of diseases is due to low quality of food and impact of climate change?	Strongly agree	1	
		Agree	2	
		Neither agree nor disagree	3	
		Disagree	4	
		Strongly Disagree	5	
405	Do you think that the health and food utilization related activities arranged in LAPA programmes are appropriate?	Appropriate	1	
		Slightly appropriate	2	
		Neutral	3	
		Inappropriate	4	
		Absolutely inappropriate	5	
406	What do you think is the bottlenecks in food utilization?	low Household production	1	
		Low household income and high price	2	
		Lack of awareness	3	
		Due to geographical structure and less production due to climate change	4	
		Due to government structure and awareness level	5	

E. Food Stability related:

Q.N	Questions	Options	Coding	Remarks
501	To what extent the changes in the amount and timing of rainfall within the season and an increase in weather variability have worsened	Enough	1	
		To some extent	2	
		Neutral	3	
		Very Less	4	

	stability of rain-fed agriculture?	Negligible	5	
502	Maintaining the continuity of food supply when production is seasonal is therefore challenging. Do you agree with the statement?	Strongly agree	1	
		Partially Agree	2	
		Neither agree nor disagree	3	
		Partially Disagree	4	
		Strongly Disagree	5	
503	Do you think your income due to the LAPA programmes has intensified your access to adequate food amount?	Strongly agree	1	
		Partially Agree	2	
		Neither agree nor disagree	3	
		Partially Disagree	4	
		Strongly Disagree	5	
504	Do you think the programmes under LAPA have helped in the food items available throughout the year in the market?	Enough	1	
		To some extent	2	
		Neutral	3	
		Very Less	4	
		Negligible	5	

F. Related to Climate change policy (LAPA)

Q.N	Questions	Options	Coding	Remarks
601	How often have you heard about Local Adaptation Plan of Action (LAPA)?	Often	1	
		Sometimes	2	
		Don't know	3	
		Rarely	4	
		Never	5	
602	What are the locally identified sectors which is mostly affected due to climate change	Agriculture production and food security	1	
		Forest and bio-diversity	2	
		Water resource and energy	3	
		Livelihood	4	
		All of Above	5	
603	What are the sectors identified by LAPA which is mostly affected due to climate change	Agriculture production and food security	1	
		Bio-diversity, Deforest and landslide	2	
		Water resource/irrigation	3	

		and energy		
		Livelihood	4	
		All of Above	5	
604	Are you satisfied with the nature of locally identified climate change problems?	Strongly satisfied	1	
		Partially Satisfied	2	
		Neither Satisfied nor Dissatisfied	3	
		Partially dissatisfied	4	
		Dissatisfied	5	
605	How satisfied are you with the nature of identification of climate change impacts by LAPA? People's satisfaction on nature of livelihood options	Strongly satisfied	1	
		Partially Satisfied	2	
		Neither Satisfied nor Dissatisfied	3	
		Partially dissatisfied	4	
		Dissatisfied	5	
606	Are you satisfied with the nature of immediate, urgent and long term plan prepared by LAPA?	Strongly satisfied	1	
		Partially Satisfied	2	
		Neither Satisfied nor Dissatisfied	3	
		Partially dissatisfied	4	
		Dissatisfied	5	
607	How much similarity do you find in the program chosen by the locals and implemented?	A lot	1	
		To some extent	2	
		Don't know	3	
		A little bit	4	
		Not at all	5	

G. Policy Design

Q.N	Questions	Options	Coding	Remarks
701	The officials have good idea on LAPA objectives and targets are clear. Do you agree?	Strongly agree	1	
		Partially Agree	2	
		Neither agree nor disagree	3	
		Partially Disagree	4	
		Strongly Disagree	5	
702	The provisions are followed proper in selection and implementation process under LAPA. Do you agree?	Strongly agree	1	
		Partially Agree	2	
		Neither agree nor disagree	3	
		Partially Disagree	4	
		Strongly Disagree	5	

703	How much is the political assertion in selection of programmes under LAPA?	A lot	1	
		To some extent	2	
		Don't know	3	
		A little bit	4	
		Not at all	5	

H. Authority of local level bureaucrats

Q.N	Questions	Options	Coding	Remarks
801	To what extent do you consider local level bureaucrats have authority in implementation of policy, rules and regulations?	Very High	1	
		High	2	
		Don't know	3	
		Low	4	
		Very Low	5	
802	In your opinion, to what extent do you think Local level bureaucrats have authority on mobilization of resources?	Very High	1	
		High	2	
		Don't know	3	
		Low	4	
		Very Low	5	

I. Participation Related

Q.N	Questions	Options	Coding	Remarks
901	What was the nature of your participation in LAPA?	Compulsory	1	
		Autonomous	2	
902	Who are the stakeholders whose engagement was throughout the implementation planning?	Political parties	1	
		Government	2	
		Communities	3	
		I/NGOs	4	
		All of above	5	
903	Are you satisfied with the nature of your participation during LAPA plan process?	Strongly satisfied	1	
		Partially Satisfied	2	
		Neither Satisfied nor Dissatisfied	3	
		Partially dissatisfied	4	
		Dissatisfied	5	
904	How do you evaluate the composition of stakeholder's involvement?	Very Effective	1	
		Effective	2	
		Satisfactory	3	
		Ineffective	4	
		Very Ineffective	5	

905	How useful do you think the participation of the female members in planning process?	Very useful	1	
		Somewhat useful	2	
		Useful	3	
		To some extent useless	4	
		Showy and useless	5	

J. Inter-organizational coordination

Q.N	Questions	Options	Coding	Remarks
1001	How do you find the flow of information by local level authority on climate adaptation to the local stakeholders?	Strongly satisfied	1	
		Partially Satisfied	2	
		Neither Satisfied nor Dissatisfied	3	
		Partially dissatisfied	4	
		Dissatisfied	5	
1002	How satisfied are you with the Communication and coordination with District level?	Strongly satisfied	1	
		Partially Satisfied	2	
		Neither Satisfied nor Dissatisfied	3	
		Partially dissatisfied	4	
		Dissatisfied	5	
In your opinion, what has to be done for an effective policy implementation?				

(Thank you for your treasured contribution)

Annex-II Schedule for KII Interview

Climate Change and Food Security

1. What are the main crops/vegetables produced in Simkot?
2. Have you found any difference in between market price during transplanting and harvesting period?
3. What is the trend of use of fertilizer?
4. What are the sources of drinking water? What is the demand of water?
5. Is there a sufficient supply of water for drinking and other purposes? From where do you fetch your water and how far?
6. What is the condition of irrigation facility? (at present and in the past)
7. Has the crop calendar changed/shifted? (Please make a table and include data on it)
8. Trend of use of seed for cultivation:
    a. Do you buy new hybrid seed for cultivation?
    b. What is the condition of local seeds?
    c. Is the natural plant propagation rate increasing / decreasing/ as usual?
9. Could you say something about farming practice
10. Have you felt any changes in temperature? Yes ( ) No ( )
    d. If yes, how many years before?
11. How often do you have rainfall? Have you felt any partiality in it? How about drought?
    e. Have you faced any big harm due to heavy rainfall and drought?
12. Have you ever heard about global warming/climate change? How serious a threat do you think climate change would be to
        a. You and your family……
        b. Your local community……..
13. Have you faced any problems in selling your produced goods due to climatic disorder?
    f. Eg: crop damage…..
    g. What is the condition of market access?
    h. For agriculture input
    i. To sell output
    j. To buy food and other items
14. Do you think that there is change in land suitability? (Lead to desertification of agricultural land)
15. Have you ever noticed any changes in your agriculture production? What kind of changes?
16. Do you ever have a food shortage in your community?
17. Have you seen any new crop disease?
18. Have you faced any problems regarding damage of crops by pests and insects?

19. Is there practice of crop diversification, intensification and mixed cropping pattern?

20. Do you think there has been decrease in production of livestock/

21. Do you think climate change is the major reasons behind these problems?

22. Have you taken any measures to minimize these threats? What actions were taken (or should be taken) to help you and community to cope with these threats?

23. What are the food products that are produced basically for market purpose?

24. How are they sold in the market? Do you think you get the price in the market or is it less than the cost of your production?

Climate change adaptation policy effect on food security: Implementation of LAPA

1. How did you get involved in LAPA planning process?
2. Could you elaborate on initiation of LAPA in the district? How is the essence of it in this district?
3. Do you find the essence of implementation of LAPA in addressing food security?
4. Who do you think are the responsible agents for planning and implementation of LAPA? What are their roles?
5. Who are the stakeholders and their participation level? What percent of female are involved in it?
6. How are the actions and activities proposed and promoted during the process of LAPA? Do you think the implementation activities are alike the proposed or do they differ?
7. Are the resources mobilized in a satisfying level under the implementation of LAPA for addressing food security? Do you think the local authority has power in mobilizing the resources? Could you exemplify the resources?
8. How is the information delivered within the organization and other stakeholders? Could you elaborate on the mechanism?
9. Does the coordination and communication mechanism with the district level satisfy the implementation process?

Annex-III Seasonal calendar

Activities	Baishakh	Jestha	Ashar	Shrawan	Bhadra	Ashoj	Kartik	Mangsir	Poush	Magh	Falgun	Chaitra
Maize		P/PE/S				H/C						
Millet		P/PE/S				H/C						
Barley												
Potato												
Wheat		H/C					P/PF	S				
Rice			P/PE/S				H/C					
Beans												
Mustard												
Buckwheat												

S : Sowing/Seeding
P: Ploughing/Field preparation
W: Weeding
H: Harvesting
C: Carrying harvested crops to house
T: Transplanting

PF: Putting fertilizer to field

ANNEX-IV Changed Climate Calendar

Areas	Indicators	Time	Baishakh	Jestha	Ashar	Shrawan	BHadra	Ashwin	Kartik	Mangsir	Paush	Magh	Falgun	Chaitra	Changes seen over time (fluctuations)
Temperature	Number of warm days	Before		***	***	***									The time of summer has increased by 3 months and the time of extreme heat has remained the same
		Now	***	***	***	***	***							***	
	Number of cold days	Before						***	***	***	***	***	***	***	The number of winter days has decreased by 2 months and the time of extreme winter has also decreased by 1 month
		Now							***	***	***	***	***		
Rainfall and its pattern	Seasonal Rain	Before		***	***	***	***								The seasonal rainfall has decreased by one month and shifted back by one month and there is not as much rainfall as before
		Now			***	***	***								
	Winter rain	Before													Earlier there was no rain in winter but now there is less snow and has rain
		Now									***	***	***		
	Snowfall	Before							***	***	***	***	***	***	Now the snowfall has started to decrease and the time of snowfall has also decreased by 2 months and the time of heavy snowfall has also decreased by 1 month
		Now									***	***	***	***	
	Frost	Before						***	***	***					Frost time has decreased by one month now than before
		Now							***	***					
Behavior of plants	Flowering Time	Before	***												The behavior of native apple seedlings has been observed, according to which the time of fruiting and flowering has been moved forward by 1 month
		Now												***	
	Fruiting time	Before		***											The behavior of native apple seedlings has been observed, according to which the time of fruiting and flowering has been moved forward by 1 month
		Now	***												
e of outbr	ht incide	Before													Earlier there was no problem of drought but

		Now	***	***										***	now the problem of drought is found
	Incidents of flood and landslides	Before			***	***									With the change in the timing of rains, the incidence of floods and landslides has also shifted
		Now				***	***								
Livelihood activities	Buckwheat (sowing and harvesting time)	Before		***					***						Buckwhear used to be sown in Jestha and harvested in Kartik but now it is sown in Ashar and harvested in Asoj
		Now			***			***							
	Barley(sowing and harvesting time)	Before		***						***					Barley was first sown in Mangsir and harvested in Jestha but now it is sown in Kartik and is harvested during Jestha
		Now		***					***						
Physical information	Spring burst	Before		***	***	***									Earlier, due to abundant snowfall the spring water in winter would erupt in Chaitra and Baishakh while during fall, it would be in Ashar and Shrawan. While now due to less snowfall, there is no spring water during in winter
		Now				***									
	Before means that it was more than 30 years and now it means the past 5 years														

ANNEX-V Historical overview of Climate disasters for the last 30 years and its impacts

Type	Years	Times
Fire	1985-2017 A.D	18
Thunderstorm	1992-2017 A.D	6
Hailstones	1988-2016 A.D	11
Snowfall	1978-2011 A.D	6
Avalanche	2013 A.D	1
Outbreaks of disease and insects	Since 2068	Every year

Type	Years	Times	Impacts/Effects
Landslide	1985 A.D to 2017 A.D	17	Ward: 1, 3, 4, 5, 7, 8 : Swept away houses, water tanks, wooden bridges, water mills, 16 *ropanies* of agricultural land, a huge impact on production, 13 *Jhuma*, roadways closed for 3 months
Flood	1990 and 2004 A.D	2	Ward-2: two houses were swept away of which 2 lakhs of damage, agricultural land was swept away, 6 water mills, 1 wooden bridge
Drought	1975 to 2017 A.D	13	Lack of food grains, Dried foodgrains, Lack of fooder for the animals, difficulty in drinking water as the source was dry, Ward-3: Decreased production of potato and millet, difficulty in saving seeds Ward-4: 50.60 Quintal of food grains got damaged, Increased in female workload, lack of fodder and firewood