SOCIAL DIMENSIONS OF FOOD INSECURITY AND COPING STRATEGIES: A CASE OF NEPAL

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Chandra Bahadur Thapa

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Tribhuvan University

Central Department of Sociology

Faculty of Humanities and Social Sciences

MPhil Program in Sociology

LETTER OF RECOMMENDATION

This dissertation entitled **"Social Dimensions of Food Insecurity and Coping Strategies: A Case of Nepal"**has been prepared by Mr. Chandra Bahadur Thapa under my supervision and guidance. I recommend this dissertation to the Evaluation Committee for its final evaluation and approval.

……

Pramod Bhatta, PhD

Supervisor

Central Department of Sociology

Tribhuvan University, Kirtipur,

Kathmandu, Nepal

Date:

Tribhuvan University

Central Department of Sociology

Faculty of Humanities and Social Sciences

MPhil Program in Sociology

LETTER OF APPROVAL

This dissertation entitled **"Social Dimensions of Food Insecurity and Coping Strategies: A Case of Nepal"**was submitted by Mr. Chandra Bahadur Thapa for the final examination by the research committee of the M.Phil. Program in Sociology, Faculty of Humanities and Social Sciences, Tribhuvan University, in partial fulfilment of the requirements for the Degree of Master of Philosophy in Sociology.

The research committee hereby certifies that this dissertation is found satisfactory and accepted for the degree.

Dissertation Evaluation Committee:

……...
Pramod Bhatta, PhD
Dissertation Supervisor

……...
Prof. Surendra Mishra, PhD
External Examiner

……...
Asst. Lecturer Guman Singh Khatri, PhD
External Examiner

……...
Associate Prof. Pasang Sherpa, PhD
Department Head, Central Department of Sociology

Date:

DECLARATION

I hereby declare that the dissertation entitled **"Social Dimensions of Food Insecurity and Coping Strategies: A Case of Nepal"**submitted by me to the Central Department of Sociology, Tribhuvan University is entirely original work prepared under the guidance and supervision of Dr. Pramod Bhatta. I have made due acknowledgments of all the ideas and information borrowed from different sources in the course of writing this dissertation. The result presented in this study has not been submitted and presented anywhere else for the award of any degree or other reason. I am solely responsible if any evidence is found against my declaration.

……

Chandra Bahadur Thapa

Date: 2025

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ABSTRACT

Food Security in Nepal is improving over the period. However, there is still high level of malnutrition and food insecurity in the country which varies with the socio-economic and geographical location of the households. In order to target programme and policies effectively,evidence are required about what types of households are most affected by food insecurity. This study provides evidences how social dimensions such as gender of household head, caste/ ethnicity, size of household, education of household head, income, place of residence (urban versus rural), ecological belt (mountain, hill and terai) are associated with the food insecurity through a systematic analysis.Further, the study also assessed the types of coping mechanismsadopted by different ethnic/caste groups to manage food insecurity situation. In order to contribute to generate evidences on those aspects, analysis of Nepal Living Standard Survey (NLSS) 2011 andNLSS IV 2024 data wasdone.

The analysis revealed that lower-income household; those with less educated household head, large family size, households residing in mountains, and rural residents are significantly more vulnerable to food insecurity. Analysis showed that the food insecurity decreases by increased level of education of household head;completing an education level of 11 or higher leads to 62.7% lower odds of experiencing food insecurity than the illiterate household head, indicating the impact of education on reducing food insecurity. Moreover, the food insecurity decreases as the household income increases; there is 82.6% lower odds of experiencing food insecurity by the households belonging to fifth quintile as compared to first quintile. Likewise, compared to urban residents, the rural residents are more likely to face food insecurityby 26%. The geographical belt showed that households in the mountain face more food insecurity.Additionally, caste and ethnic disparities further exacerbate food insecurity. However, there was no significant association in the food insecurity to gender of household head.The study highlights the coping mechanism adopted by insecure households, including reducing meal size, consuming less nutritious food, borrowing money or food and selling of assets to cope during food insecurity.

The study contributes to existing knowledge on food insecurity in Nepal by providing empirical evidence of its socio-economic determinants. Considering the findings, development practitioners and policy makers should consider where better targeting of food securityprogramme could be done. Targeting to the residents of mountain, Dalits, illiterate and rural households could be prioritized.

Key words: Food Insecurity, Gender, Ethnicity, Education, Income, Coping strategy.

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LIST OF ABBREVIATIONS

ANT	:	Actor-Network theory
CBS	:	Center Bureau of Statistics
CFS	:	Committee on World Food Security
CSAs	:	Community Supported Agriculture
CSR	:	Corporate Social Responsibility
FAO	:	Food and Agriculture Organization
FCS	:	Food Consumption Score
FIES	:	Food Insecurity Experience Scale
GHI	:	Global Hunger Index
HHs	:	Households
IPDs	:	Internally Displaced People
LDCs	:	Least Developed Countries
PEM	:	Protein Energy Malnutrition
MOH	:	Ministry of Health
NDHS	:	Nepl Demographic and Health Survey
NGOs	:	Non-governmatal Organization
NLSS	:	Nepal Living Standard Survey
NPC	:	National Planning Commission
NSO	:	National Statistics Office
PSUs	:	Primary Sampling Unit
PWD	:	People with Disabilities
SDGs	:	Sustainable Development Goals
WFP	:	World Food Programme

CHAPTER I
INTRODUCTION

1.1 Background of the Study

Nearly a billion people in developing nations remain at risk from hunger, malnutrition, and food insecurity. Achieving food security for everyone by 2030 is further complicated by the growing problems of obesity and micronutrient deficiency. Tackling the issue of food insecurity is important to achieve SDGs. It is crucial to raise awareness of the problems, difficulties, and limitations in attaining food security among professionals at all levels, including students, policy analysts, policy advisors, and policymakers (Sheryl, 2024).Since 2015, the frequency of undernourishment—the proportion of the population lacking regular access to sufficient calories—has remained constant, while the number of people who are hungry has increased from 785 million in 2015 to 822 million (Grebmer et al., 2019). In case of Nepal, 8.7% of the population (or roughly 2.5 million people) in Nepal is undernourished (Food and Agriculture Organization [FAO], 2019). One in five households consume an inadequate diet, and one in four are classified as food poor, according to the Food Consumption Score (FCS), a crucial measure of the state of food security (National Planning Commission [NPC], 2013). Moreover, 46 percent of preschoolers (under 60 months old) were found to have chronic under nutrition (NPC, 2013). Nepal is ranked 76th overall in the World Hunger Index for 2021.

The prevalence of hunger varies greatly among Nepal's various socioeconomic groups and geographic regions. The Far- and Mid-Western Hill and Mountain regions have the greatest rates of hunger. Some regions of the country have hunger indices that are near to or above 30, which indicates a very concerning situation (NPC, 2010).

Several national evaluations including the 2011 Nepal Living Standard Survey (NLSS III) also reveal the country's food insecurity issue. In NLSS III, households were examined to determine if they had ever had a food shortage or a financial hardship that prevented them from purchasing enough food for their family. They were also questioned about the coping mechanisms they used in response to these shortages. Food insecurity was examined from a rural versus urban, geographic, and socioeconomic group perspective. With regard the percentage of households experiencing the shortages of food for 5 days or more, there is no noticeable difference between urban and rural areas. About 43% of HHs experienced a

shortfall for 3 to 5 days, while around 14% experienced one to 2 days of such scarcity (CBS, 2011).

The 2022 Nepal Demographic and Health Survey (NDHS) discloses that 25% of children experience stunting (defined as being more than two standard deviations below the median height-for-age, indicating chronic malnutrition), with 6% experiencing severe stunting (over three standard deviations below the median). Additionally, 8% of children suffer from wasting (more than two standard deviations below the median weight-for-height, signifying acute or recent nutritional deficits), with 0.9% being severely wasted. Prevalence of children who are underweight remains at 19% (with 3.6% severely underweight), but there is also a 1% occurrence of overweight children (MoH et al., 2022). Regarding food security, nearly half of Nepalese households (48%) are food secure with year-round access to food. Amongst food insecure households, mildly food insecure, moderately food insecure and severely food insecure are 20, 22 and 10 percent respectively (MoH et al., 2016).

Nepal is striving to alleviate hunger and food insecurity. Many programmes have been launched and implemented to improve the food insecurity situation of the country, however, evidences presented above show the significant efforts have to be made despite improvement made over the years. Prevalence of Undernourishment in reduced to 8.7% in 2018 from 22% in 2001 (Grebmer et al., 2019).

There have been national and international studies focusing on food security and hunger situation. There isn't much evidence available analyzing the association of food insecurity and social dimensions. In this context, this study has tried to shed light to understand how the food insecurity is associated with the social dimension of the households, thereby generating additional knowledge in the area and help to policy makers, and development partners to better target the responses to address the food insecurity.

Based on the key data source Nepal Living Standard Survey (NLSS) III, 2011, social dimensions viz., ethnicity, gender of household head, education of household head, size of family, income of household, residence of household and geographical beltswas analyzed to see the association of these dimensions with the food insecurity status of the household. In order to get these results a secondary analysis of NLSS III data and further review of the relevant literatures was done.

Food security is not just a matter of production and availability but also deeply intertwined with social dimensions such as gender, ethnicity, education, household size, and income. These dimensions influence individuals' access to resources, decision-making power, and their overall capability to secure adequate food.

As mentioned in the earlier section, Nepal has made progress in reducing food insecurity, yet challenges remain. The prevalence of food insecurity varies significantly across different social and geographical strata. Understanding the social dimensions—ethnicity, gender, education level, household size, and economic status—is crucial for a comprehensive analysis. These dimensions shape the food security landscape by affecting access to resources, employment opportunities, and resilience to economic and environmental shocks.

In rural and urban divides, the differences in food security statuses highlight the importance of considering geographical context. The mountainous regions, for example, face distinct challenges compared to the Terai plains. Social factors such as caste and ethnicity also play pivotal roles, influencing dietary customs, access to land, and economic opportunities.

The interplay between food security and social dimensions is complex and multidirectional. For instance, a household's income level directly impacts its food purchasing power. Education influences dietary choices and awareness about nutrition. Gender dynamics within households can affect the allocation of food and resources, often leading to disparities in nutrition.

To deepen our understanding, let's consider the case of Nepal's diverse ethnic groups, where cultural practices and traditional roles influence food access and consumption. Additionally, the gender of the household head can influence decisions about food, thereby affecting the household's overall food security.

By studying these factors, we can understand the complex nature of food security and the important role that social dimensions play in shaping it. This approach not only aids in identifying the root causes of food insecurity but also in designing targeted interventions that address the specific needs and challenges of different groups within Nepal.

1.2 Statement of the Problem

Food Security in Nepal is improving over the period(NPC, 2018). However, there is still high level of malnutrition and food insecurity in the country. This also varies with the socio-economic and geographical location of the households. According to age, gender, ethnicity and caste, socioeconomic class, and geography, there are differences in the prevalence of under-nutrition. While stunting was significantly more common in boys (36%) than in females (35.7%), wasting and underweight were the opposite. Males waste 9.5% more than females do, and females are underweight 27.4% more often than males are. Geographically speaking, stunting is significantly more common (40%) in rural than in urban areas (32%). In contrast to the Hills and Terai, Nepal's Mountain region has the greatest frequency of both severe (19%) and moderate (47%) stunting (MoH, 2017). In contrast to other regions, Nepal's Mid-Western region (Provinces 5 and 6) has a higher prevalence (42%) of stunting (NPC, 2018).

A recent food security survey (WFP 2022) mentioned that food insecurity increased significantly in October 2022 with approximately 4.91 million people (16.8 percent) in Nepal not consuming an adequate diet (a 3.8 percent increase compared to June 2022). FIES estimates indicated 22 percent moderate and severe food insecurity and a 3 percent severe food insecurity. Nearly 1 in 8 households (12.2 percent) – a four-fold increase compared to June 2022 – reported that they did not have enough food to meet their daily needs in the week before the survey. Increased food prices (45 percent) and lack of money (42 percent) were the main reasons reported. Approximately 1 in 4 households (26.3 percent) reported using at least one food-based coping strategy (such as consuming less expensive food) in the previous week because they did not have enough food or money to buy food. Regarding the minimum recommended dietary diversity of children 6-23 months more than 45% did not meet the requirement (WFP, 2022).

Social dimensions such as gender, ethnicity, education, and household size are critical in understanding access to food, as they influence economic stability, resource allocation, and dietary preferences (Smith & Haddad, 2015). Further, geographical disparities significantly affect food security, with mountainous regions facing greater challenges in food accessibility compared to the Terai plains, highlighting the importance of geographical context in food security analysis" (Sharma et al., 2019).

In order to target programme and policies, evidences are required about what types of households are affected more by food insecurity. To the best of my knowledge, no study has systematically analyzed the relationship between social dimensions and food insecurity. There is a lack of comprehensive evidence on relations of food insecurity with the location of household (ecological belt), gender of household head, caste/ethnicity, education of household head, income of household, place of residence (urban or rural) and household size (family members). In order to contribute to bridge this evidence gap, analysis of Nepal Living Standard Survey (NLSS) 2011 data was done.

Evidence-based plan and policies are required to make the programmesresult oriented (Katie et al., 2009), however, we lack the evidence indicating the association of food insecurity with the social dimension of household and coping mechanism adopted by different caste/ethnic groups during the food insecurity. Considering this, this study has been done to fill the gap of knowledge in this area.

Hence the study answers the following research questions:

1. How is food insecurity associated with social dimensions (gender, caste/ethnicity, education, family size, income, place of residence and household location) in Nepal?
2. What coping strategies do various social groups use to alleviate the effects of food insecurity?

1.3 General Objective

To explore the association of food insecurity with the social dimensions of households and the coping mechanisms adopted by different social groups during food insecurity.

1.4 Specific Objectives

1. To assess the association of food insecurity with the gender of household head, caste/ethnicity, education of household head, size of family, household income, place of residence (rural versus urban) and geographical belt (mountain, hill and Terai) location of households.
2. To assess the coping mechanisms adopted by the different social groups.

1.5 Hypothesis

To investigate the association between food insecurity and the social dimensions, null hypothesis (H0) as well as alternative hypothesis (H1) for each variable was developed. The null hypothesis assumes there is no association between food insecurity and the variable in question (social dimensions), while the alternative hypothesis assumes there is an association.

Below is the process on the hypothesis testing for each variable:

Gender of the Household Head:

H_0 : There is no association between food insecurity and the gender of the household head.

H_1 : There is an association between food insecurity and the gender of the household head.

Caste/ethnicity:

H_0 : There is no association between food insecurity and caste/ethnicity.

H_1 : There is an association between food insecurity and caste/ethnicity.

Education of the Household Head:

H_0 : There is no association between food insecurity and the education level of the household head.

H_1 : There is an association between food insecurity and the education level of the household head.

Size of the family:

H_0 : There is no association between food insecurity and family size.

H_1 : There is an association between food insecurity and family size.

Income of the households:

H_0 : There is no association between food insecurity and household income.

H1 : There is an association between food insecurity and household income.

Residence (rural vs. urban):

H_0 : There is no association between food insecurity and residence (rural vs. urban).

H_1 : There is an association between food insecurity and residence (rural vs. urban).

Geographical belt (mountain, hill, and terai) location of households:

H_0 : There is no association between food insecurity and the geographical belt location of households.

H_1 : There is an association between food insecurity and the geographical belt location of households.

1.6 Operational Definitions

Food Security and food insecurity: The state in which 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. Whereas food insecurity is the condition in which individuals lack reliable access to a sufficient quantity of affordable, nutritious food, often leading to disrupted eating patterns and reduced food intake.

i) Gender of the Household Head

Operational Definition: The gender of the household head refers to the sex of the person recognized as the primary decision-maker and authority within the household. In the Nepalese context, this individual is responsible for managing household affairs and making critical decisions affecting the family's welfare. The categories are:

- **Male**: A household where the primary decision-maker is a male.
- **Female**: A household where the primary decision-maker is a female.

ii) Caste/Ethnicity

Operational Definition: Caste/ethnicity refers to the social groups to which the household head belongs, based on traditional Hindu caste hierarchy and ethnic classifications in Nepal. These groups are significant in the Nepalese context as they often determine social status, economic opportunities, and access to resources. The categories are:

- **Hill Brahmin**: Higher caste group traditionally involved in priesthood and teaching.
- **Hill Chhetri**: Warrior caste, often involved in military and administrative roles.
- **Hill Dalit**: Lower caste group, historically marginalized and engaged in menial jobs.
- **Hill Janajati**: Indigenous ethnic groups from the hilly regions, with distinct languages and cultures.
- **Muslim**: Followers of Islam, with their own distinct cultural practices.
- **Newar**: Indigenous people of the Kathmandu Valley, known for their rich cultural heritage and trading skills.
- **Terai Brahmin**: Higher caste group residing in the Terai plains, similar roles as Hill Brahmins.
- **Terai Dalit**: Lower caste group in the Terai, facing similar marginalization as Hill Dalits.
- **Terai Janajati**: Indigenous ethnic groups from the Terai plains, with distinct languages and cultures.
- **Terai middle caste**: Intermediate caste groups in the Terai, engaged in various professions.
- **Other**: Any other caste/ethnic group not listed above.

iii) Education of Household Head

Operational Definition: The education level of the household head reflects the highest formal educational attainment of the primary decisionmaker. Education is a critical determinant of socio-economic status and access to resources in Nepal. The categories are:

- **Illiterate or no formal education**: The household head lacks formal education and is unable to read or write.
- **Literate with less than grade five completed**: The household head can read and write but has not completed four years of formal schooling.
- **Completed grades 5-7**: The household head has completed between five to seven years of formal schooling.
- **Completed grades 8-10**: The household head has completed eight to ten years of formal schooling, including lower secondary education.

- **Completed grade 11 or higher**: The household head has completed higher secondary education (grade 11 and above) or higher education.

iv) Size of the Family

Operational Definition: The size of the family refers to the total number of individuals living in the household. Family size is an important factor in determining resource allocation and food security in Nepalese households. The categories are:

- **Small family size**: Operationally defined small family size households with up to four members.
- **Large family size**: Operationally defined large family size households with five or more members.

v) Income of the Households

Operational Definition: Household income refers to the total earnings of all members of the household from various sources, including wages, agriculture, business, remittances, and other income-generating activities. Income is a crucial determinant of a household's ability to access food and other necessities. For analytical purposes, all the survey households are categorized into income quintiles:

- **Lowest quintile**: The lowest 20% of households based on income.
- **Second quintile**: The next 20% of households based on income.
- **Middle quintile**: The middle 20% of households based on income.
- **Fourth quintile**: The next 20% of households based on income.
- **Highest quintile**: The highest 20% of households based on income.

vi) Residence (Rural Versus Urban)

Operational Definition: The residence of the household indicates whether the household is located in a rural or urban area. The households located in the municipality are taken as urban households. This classification is important as the location of residence influences access to services, infrastructure, and other economic opportunities. The categories are:

- **Urban**: Households located in municipalities with relatively higher population density and access to better infrastructure and services.
- **Rural**: Households located in rural municipalities with relatively lower population density and limited access to infrastructure and services.

vii) Geographical Belt (Mountain, Hill, and Terai) Location of Households

Operational Definition: The geographical belt refers to the ecological and geographical regions in Nepal where the household is located. These regions have distinct climatic conditions, topography, and socio-economic characteristics. The categories are:

- **Mountain**: Households located in the high-altitude mountainous regions of Nepal, characterized by harsh climatic conditions and limited agricultural potential.
- **Hill**: Households located in the mid-hill regions, with moderate climatic conditions and significant agricultural activities.
- **Terai**: Households located in the lowland plains, with fertile agricultural land and higher population density.

1.7 Rationale of the Study

The government of Nepal has put concerted efforts to reduce hunger and food insecurity. In order to make such efforts evidence based and effective, it is essential to gather information on who is food insecure, their location, the reasons behind their food insecurity, and the timing of their food insecurity. This information will help planners and policy makers to allocate resources and better targeting to reduce food insecurity and malnutrition in Nepal. These information are available, however, there is lack of comprehensive information how the food insecurity is associated with the different social-economic dimensions.

Further, review of literatures did not show specific studies analyzing association of social dimensions and food insecurity. In this context, information generated through this study is expected to add in the existing academic knowledge. This study, utilizing data from NLSS III and NLSS IV, includes a comprehensive analysis covering the entire country and representing three ecological belts.

1.8Organization of the Study

There are six chapters in the thesis. Introduction, statement of problem, general and specific objectives, hypothesis, and rationale of the study and organization of the report are included in the first chapter. The review of the literature is covered in the second chapter, and the research methodology for this study is covered in the third chapter. The fourth chapter is devoted to the analysis and interpretation of data. The fifth chapter is on coping strategies adopted by the households during food insecurity. The study's summary and conclusion are presented in the sixth chapter.

CHAPTER II
REVIEW OF LITERATURE

2.1 Theoretical Review

2.1.1 Sociological Analysis of Food Insecurity

While there isn't a single sociological framework specifically designed to analyze food insecurity, several existing frameworks and concepts can be applied to study its social dimensions. Marmot et al. (2006) elaborated Social Determinants of Health framework that focuses on the social, economic, and environmental factors that influence health outcomes. Food insecurity can be analyzed as a social determinant of health, as it affects individuals' nutritional status and overall well-being. By examining factors such as income, education, and neighborhood characteristics, researchers can identify populations at higher risk for food insecurity and develop targeted interventions. Similarly, Putnam, R. D. (2000) discussed social capital which refers to the resources individuals and communities can access through social networks and relationships. This concept can be applied to food insecurity by examining how social ties and community engagement can either mitigate or exacerbate the problem. For example, communities with strong social capital may be better equipped to organize and support food banks, community gardens, or other local initiatives to address food insecurity.Crenshaw (1989) discussed intersectionality which refers to the interconnected nature of social categories such as race, class, and gender, which create overlapping systems of discrimination or disadvantage. This concept can be applied to food insecurity by examining how different social identities and their intersections affect individuals' vulnerability to food insecurity. For example, single mothers of color might face multiple barriers to accessing food resources due to their gender, race, and socioeconomic status. Latour (2005) elaborated the Actor-Network Theory (ANT)as a sociological framework that focuses on the relationships between human and non-human actors in a network. In the context of food insecurity, ANT can help researchers explore the complex web of interactions between people, organizations, policies, technologies, and natural resources that shape access to food. This approach can reveal the interdependencies and power dynamics within food systems, highlighting potential points of intervention to improve food security.

Sociologists have examined food insecurity from various perspectives, including how it relates to social inequality, power dynamics, and social norms. Loopstra & Tarasuk, (2012) mentioned that "Food insecurity is a social problem, not just an individual one, and its roots lie in political and economic structures and policies that produce and sustain poverty and inequality." (p. 2). Further, Sacco, (2015) mentioned about the socio-economic inequality, "Food insecurity is not only a consequence of poverty but also an expression of social and economic inequality that is rooted in the social organization of capitalist society." (p. 150). Weaver & Hadley (2009) highlighted the power relations, "Food insecurity is a reflection of unequal power relationships in society, which are manifested in a range of social, economic, and political processes that produce and maintain food systems that are inadequate, unjust, and unsustainable." (p. 240). Alaimo et al., (1998) described as "Food insecurity is not just a matter of access to food, but also of access to social and cultural resources that enable individuals and families to participate fully in society." (p. 138)

Unfortunately, food security has not been a central topic for many classical sociologists. However, some sociologists have made observations or discussed issues that can be linked to food security indirectly.

Bourdieu (1984) stated, "Taste classifies, and it classifies the classifier." While not directly about food security, Bourdieu's work on taste and social class can be linked to the topic. Food preferences and consumption habits are influenced by social class, which can affect access to and distribution of food resources within a society.In "Distinction," Bourdieu examines the role of taste and cultural capital in shaping social class distinctions. He argues that preferences for certain types of food, art, and other cultural goods are influenced by social class and serve to reproduce social inequalities (Bourdieu, 1984).

Sen (1981) stated, "Starvation is the characteristic of some people not having enough food to eat. It is not the characteristic of there being not enough food to eat." Sen is an economist and philosopher, but his work on famines andentitlement has been influential in sociology as well. This quote highlights that food security issues often arise from unequal distribution and access to food resources, rather than an absolute lack of food.

Scanlan (2009) analyzed the progress and potential of sociological research on food security/insecurity He observed that several interconnected thematic clusters emerge in the

study of food security/insecurity: population, environment, and ecology; technology, development, and infrastructure; politics and global political economy; stratification, poverty, and inequality; and conflict, war, and militarization. These themes form the basis of the ever-evolving sociology of food security/insecurity, highlighting structural challenges, conflict, power, and inequality (DeRose et al.,1998).

Scanlan(2009) emphasized the need for "new discovery" to tackle the complexities of hunger and proposed expanding research through teaching and action. This would enable sociology to play a significant role in assisting the global population in envisioning a world free of hunger. He further suggested having thematic research in the following five areas to understand food security/insecurity and address the causes.

Population, environment, and ecology: Encourage a new "green" revolution that prioritizes sustainable agriculture, alternative energy, and conservation, instead of the previous focus on agricultural productivity at the expense of environmental health through harmful pesticides and fertilizers.

Technology, development, and infrastructure: Implement policies that simplify the sharing of surplus food, enabling distribution networks to collecting food from fields, grocery stores, and restaurants, and benefit from the goodwill of those willing to share salvageable food that would otherwise be wasted. Promote free flow of knowledge by targeting "information poverty" and its negative effects on human well-being and access to essential food.

Politics and the global political economy: Support local food systems and agriculture, such as Community Supported Agriculture (CSAs), co-ops, community gardens, farmers' markets, and restaurants using local products. Buy fair trade and organic products whenever possible and advocate for policies that enable farmers to compete globally.

Poverty, stratification, and inequality: Develop policies that enhance food security for the most vulnerable groups in society, focusing on long-term health. Such initiatives may include school meal programs, summertime replacements for these, and global equivalents of "head start" or "women, infants, and children" policies. Raise funds and volunteer time and energy, both locally and internationally, to acknowledge the right to food security for all citizens.

Conflict, war, and militarization: Create policies that foster peace and human security, acknowledging the potential for conflict arising from human deprivation. Encourage the redirection of government spending priorities from militarization towards human development (Scanlan 2009).

2.1.2 Theories of Food Security

To effectively analyze food security, an "integrated assessment" method that examines the interplay between ecosystems and social systems is needed (Harper, 2003). A multifaceted, interdisciplinary approach is best due to the numerous factors contributing to food security (Buttel 2000). Several theories and corresponding measures to capture these perspectives are as follows:

Neo-Malthusian views: Food security discussions often start with ecological concerns about population pressure and Earth's ability to support humanity (Bongaarts, 1996; Ehrlich & Ehrlich 1990). Sustainable societies must meet human needs without compromising future generations, ensuring a balance between human needs and Earth's capacity to fulfill them without irreversible environmental damage. Agricultural practices must maintain soil fertility and natural resources while producing sufficient output for markets and consumption. Population is an essential starting point, but it is not enough from a sociological perspective (Scanlan 2001a).

Techno-ecology theory: Techno-ecologists (Berry and Cline 1979; Boserup 1965; Simon 1998) argue that dire predictions for the planet are oversimplified. They assert that technology and human ingenuity are abundant resources that can overcome future challenges to the world's carrying capacity. This view emphasizes food availability and the need to adapt agricultural methods, as evidenced by the "Green Revolution" and the spread of new technology to less developed countries (LDCs). Fertilizer use and agricultural intensification exemplify human adaptation (Boserup 1965).

Modernization theory: This theory posits that LDCs should follow industrialized societies' path to achieve economic and social well-being (Rostow 1962; Kerr 1969). Modernization, essential for food security, involves increasing savings and capital investment rates, establishing modern institutions, and fostering a literate, technologically proficient

population. Modern societies tend to be well-fed, wealthy, educated, industrialized, and politically stable. Achieving modernization contributes to a nation's ability to secure food.

Dependency and world-system theories: Food security's global nature necessitates considering international factors affecting hunger (McMichael, 1994). These theories highlight the negative consequences of food security as an international phenomenon, examining a country's social change patterns and its progress toward development goals that aid in meeting food security needs. Key considerations include proletarianization or plantation agriculture's role in developing economies, trade patterns, food aid's potential disruption of local markets, and the transformation from subsistence to export-driven agriculture in the international capitalist order (Lappe et. al., 1998).

Urbanization: This perspective focuses on the disparity between rural and urban areas (Lipton 1977). Development tends to favor urban areas where economic elites hold political power and implement policies that benefit cities, leaving rural areas underdeveloped. The resulting rural-urban gap exacerbates rural poverty and powerlessness (Weede, 1996).

2.1.3 Food Security: Definition

Food security has been defined in various ways and concept is evolving over the period. Following are the key concepts and definitions provided.

The concept of food security seemed to resist a fixed definition and was frequently revised, especially during the 1990s, as new findings emerged. For instance, Swaminathan (1990) advocated for the FAO's definition of food security to be broadened to include nutrition security, which encompasses a balanced diet and safe drinking water. Separately, Molly Anderson of the Life Sciences Research Office (LSRO) of the Federation of American Societies of Experimental Biology proposed a definition of food security in 1990, which stated:

> "Access by all people at all times to enough food for an active, healthy life, and includes at a minimum: a) the ready availability of nutritionally adequate and safe foods, and b) the assured ability to acquire acceptable foods in socially acceptable ways (e.g., without resorting to emergency food supplies, scavenging, stealing, and other coping strategies). Food insecurity exists whenever [a] or [b] is limited or uncertain." (Andersen 1990; USDA 2009)

Meanwhile, the United States had multiple definitions at the time. According to USAID in 1992, food security exists:

> ". . . when all people at all times have both physical and economic access to sufficient food to meet their dietary needs for a productive and healthy life." (USAID 1992)

By 1996, the UN, through the Rome Declaration of the World Food Summit, had adopted a more comprehensive definition:

> "Food security exists 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." (FAO 1996a, 2003b)

Similarly, Frankenberger and colleagues in 1997 preferred the term "nutrition security" over "food security," suggesting that:

> "An individual is nutritionally secure when he or she has secure access to a nutritionally adequate diet, and the food consumed is biologically utilized such that adequate performance is maintained in growth, resisting or recovering from disease, pregnancy, lactation, and physical work." (Frankenberger et al. 1997).

Under the capability approach for analyzing food security situation; "access to food is not enough to understand food security, thus we further need to move to a broader analysis of basic capabilities such as being in a good health, being educated, and being able to take part in household decision making and community life" (Francesco and Pasquale, 2011).

2.1.4Conceptual Framework

Sen's Entitlement Approach centers on the idea that an individual's entitlements consist of various commodity bundles they can legally obtain based on the resources they have at their disposal. These resources could include what they can produce, what they can buy, what they are given, and the social safety nets they can access (Sen, 1984).

In the context of food security, this approach asserts that hunger and famine can occur not due to a lack of food availability but due to individuals losing their entitlement to food. This

can result from various factors, such as economic downturns, unemployment, or shifts in food prices, which can disrupt people's ability to acquire food.

This perspective emphasizes the importance of looking at individual access mechanisms to food, highlighting that policies aimed at increasing food production are not sufficient if individuals lose their entitlements to access this food.

Capability Approach: The Capability Approach extends beyond the entitlements to consider what individuals are actually able to do or be with the resources at their disposal. It emphasizes the freedoms or capabilities individuals possess to lead the lives they value and have legitimate reasons to value (Sen, 1999).

In terms of food security, this means considering whether individuals have the capability to access nutritious food, prepares it, and make dietary choices that allow them to live healthy lives. It's not just about having food available or even having access to food but being able to utilize the food in a way that contributes to well-being.

This approach suggests that interventions should not only aim to ensure that food is available, and that people have the resources to obtain it but also that they have the capability to use the food in a way that enhances their well-being. This could include education on nutrition, access to clean water and cooking facilities, and healthcare services.

Significance in Understanding Food Security:

Sen's framework is particularly significant because it highlights food security as a multidimensional issue, which cannot be fully addressed by merely increasing food supply or ensuring economic access to food. It requires an integrated approach that considers a range of economic, social, and individual factors.

By focusing on individual freedoms and entitlements, the approach underscores the importance of political and economic structures in shaping food security, suggesting that policies need to address underlying inequalities and empower individuals to enhance their capabilities.

This broader perspective is crucial for designing effective interventions and policies to combat food insecurity, ensuring that they are responsive to the complexities of individuals' lives and the broader socio-economic context.

Amartya Sen's Entitlement Approach posits that food insecurity arises not merely from a lack of food production but from the inequitable distribution of food and resources, and a deficiency in entitlements to food. Sen (1981) underscored that the root cause of hunger and undernourishment extends beyond food production to encompass the unequal distribution of food and the absence of entitlements to food. This perspective shifts the focus from mere availability to access, underlining that famine can occur even when there is food availability if people lack the entitlements to access it.

Expanding on this, Sen's Capability Approach provides a more nuanced view of food security, emphasizing the freedom to achieve well-being through access to various capabilities. According to Burchi and De Muro (2011), understanding food security requires a broader analysis that includes basic capabilities such as being in good health, being educated, and participating in community life, indicating that merely having access to food is not sufficient to ensure food security.

The conceptual framework diagram presented below integrates Amartya Sen's Capability and Entitlement Approach with the seven social dimensions of food insecurity.

Gender of Household Head: This dimension reflects the idea that the gender of the person leading the household can significantly affect the household's capabilities and entitlements. The gender roles and norms established in the society can influence access to resources, decision-making within the household, and opportunities for employment or education, all of which are crucial for accessing. For example, women may face more significant barriers in accessing land, credit, and other resources, which can limit their ability to produce or purchase food.

Education Level of Household Head: Education empowers individuals with knowledge, skills, and opportunities, enhancing their capabilities. An educated household head is likely to have better employment opportunities, thereby making them well informed decisions about nutrition and health, and can access information on farming or market trends.

Size of the Household: The number of members in a household affects its food requirements and the distribution of resources. The households with larger family members may face more significant challenges in providing adequate food for all members, affecting the overall food security status. Larger family size has more dependent family members, elderly and children, means higher dependency ratio (Sisha, 2020). This dimension reflects how the size of a household can limit or enhance its capabilities to access food.

Income of Household: Income directly measures a household's ability to purchase food. Household with higher income is likely to increase household's entitlements, allowing for better food choices and improved food security. This dimension demonstrate the importance of economic resources in the capability framework.

Residence (Urban or Rural): The location of a household in rual or urban influences its access to markets, resources, and information, all of these factors are critical for food security. Urban households might rely more on market entitlements and have different capabilities compared to rural households, which may have more direct access to food production resources.

Ecological Belt (Mountain, Hill, Terai): Geography plays a vital role in determining the types of food available, the methods of food production suitable for an area, and the challenges households face in securing food. The ecological belt affects the natural resources available to a household, influencing their capabilities and entitlements related to food.

Ethnicity: cultural practices, traditions, and social structures associated with ethnicity can shape dietary preferences, access to certain types of food, and participation in food production and access. Ethnicity can also influence the social capital and networks households have access to, affecting their food security strategies.

Four pillars of Food Security: Above social dimensions have the linkages with the four pillars of food security viz., availability, access, utilization and stability.

i) Availability of food: The physical presence of sufficient quantities of food, determined by production, supply chains, and imports. Social dimensions like geographical location and family size impact food availability.

ii) Access to food: The ability to obtain sufficient food through purchase, barter, or social support. Income, gender of the household head, education and caste/ethnicity can affect access to food.

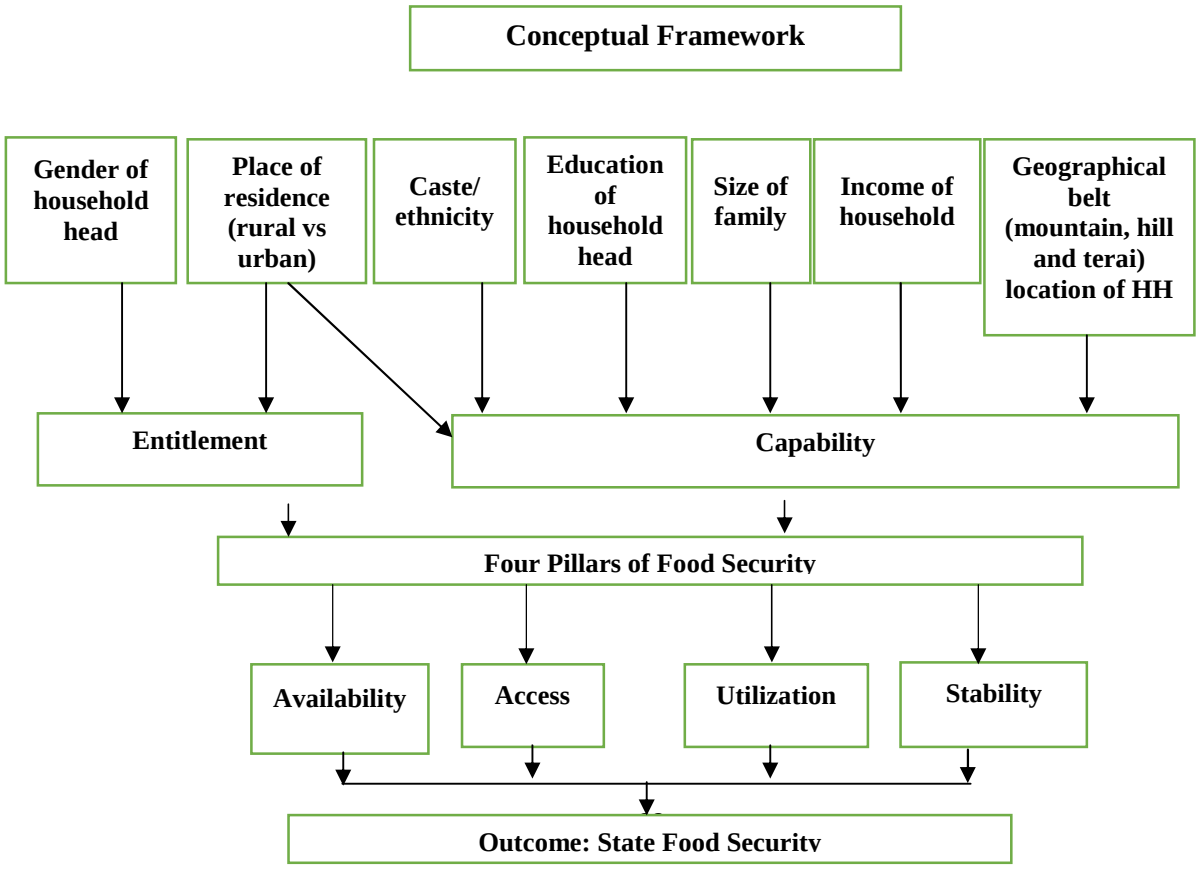
iii) Food utilization: The proper biological use of food, requiring a diet with adequate nutrients and the ability to properly prepare and consume food. Education of the household head influences food utilization through knowledge of nutrition and food preparation.

iv) Stability of three pillars overtime: The consistency of availability, access, and utilization of food over time, without significant fluctuations. Factors like income stability, geographical belt, and residence (rural versus urban) affect the stability of food security.

This conceptual framework integrates social dimensions with Sen's entitlement and capability approach and the four pillars of food security. It highlights how various social factors influence food security outcomes in Nepal, emphasizing the need for targeted interventions to address disparities and improve overall food security. Understanding these relationships is essential for policymakers and development practitioners to design effective strategies to combat food insecurity.

Figure 1

Conceptual Framework



2.2 Empirical Review

2.2.1 Food Insecurity: Global Regional and Country Context

The fight against hunger is significantly off course. According to current Global Hunger Index (GHI) projections, neither the world as a whole nor 47 specific countries will reach a low level of hunger by 2030. Only 25 percent of all countries are aiming to significantly reduce stunting in child by 2030, and about 28 percent are focusing to decrease wasting to below 3 percent. The latest projections on child mortality indicate that 53 countries need to accelerate their progress to meet the SDG target of reducing under-five mortality rates to 2.5 percent or less by 2030 (Grebmer et al., 2021).

Despite recent improvements in the food insecurity situation, 4.6 million people in Nepal still experience food insecurity, with 20% of households experiencing mild food insecurity, 22% experiencing moderate food insecurity, and 10% experiencing severe food insecurity (MOH et al., 2017).

Generally, food insecurity is more common among rural households than urban ones, where cost of food is usually high. Rural areas have a higher percentage of households experiencing severe food insecurity (11.7%) compared to urban areas (8.8%). At the provincial level, Karnali Province has the largest percentage of households experiencing severe food insecurity (17.5%), followed by Sudurpaschim Province (13%) and Madhesh (10.7%). Despite Madhesh's abundance of edible food grains, over 30% of families are classified as moderately to severely food insecure. This could be because of Madhesh's dense population, low-income people to afford food from markets, and the region's long-standing feudalistic land ownership system (NPC 2021).

Male-headed households, those with members working in both agriculture and related fields, the age of the household head, the proportion of irrigated land, the number of livestock owned, and owner-operated farms are all positively correlated with food security, according to the factors influencing household food security. Conversely, food security is adversely correlated with bigger household sizes and longer commutes to the closest market (Joshi & Joshi, 2017). Food security in eastern Nepal's Province 1 was found to be positively impacted by the household head's educational attainment. Despite playing an important role in ensuring household food security, households headed by women experienced higher levels of food insecurity than households headed by men. Furthermore, while larger household sizes had a negative effect on food security, households with members engaged in off-farm and non-farm

occupations, larger land holdings, and closer proximity to roads and markets all contributed favorably to food security (Joshi & Joshi, 2016).

2.2.2 Food Security and Social-Economic Dimension

Further root causes of hunger and malnutrition as identified by Committee on World Food Security (CFS) under demographic and social issues is gender, discrimination, level of education and decision-making ability (CFS, 2017).

Women make significant contributions to food security by producing more than half the world's food and providing more than 80 per cent of the food needs of food-insecure households and regions. Food security is therefore directly linked to women's food-producing capacity (Shiva, 2010), while research has shown that many women and girls are highly vulnerable to food insecurity (Sharma, 2019).

Consequently, illiteracy and generally low levels of education can significantly impede the economic development of individuals and their country. This directly impacts food security, as parental education has been shown to be a crucial factor in their own and their children's nutritional status. Children of illiterate parents consistently perform worse on nutritional status indices (Gibson, 2012).

A case study examined critically the role of gender in technology adoption on household resource allocation and thus on household food security and nutrition. The research found no relationship between the gender of the household head and food security for the technology adopters. It is more likely that technology adoption has no gender-biased impact on household food security. (Suresh et al., 2014)

Analysis of Bengal Famine (1943-44) was done considering the different variables; population density High population density and a high non-crisis death rate were, indeed, associated with bigger increases in the death rate. Higher literacy rates among the young—a proxy for living standards in the recent past—had the opposite effect. Again, high population density imposed a penalty through fewer births during the famine, whereas youth literacy offered some insulation against its impact (Cormac, 2015).

The food insecurity is not only related to the factors described above but the socio-political stability also. The 2011 famine in Somalia put humanitarian food security crises back on the

agenda of the international community. With its causes linked not only to environmental, climatic, and food price factors, but also to internal conflict, competition among regional powers, and the global war on terror, the Somalia famine revived many long-standing concerns about the link between extreme food security crises and stability, security, and other political imperatives (Barrett, 2013)

During this period, the focus on micronutrients and the issue of hidden hunger overshadowed concerns about PEM (Protein Energy Malnutrition). By the end of the decade, a more balanced and holistic view of nutrition began to take shape (Gibson 2012).

In the above definition UN definition seems more comprehensive, considering this definition there are four dimensions associated with the food security. These four dimensions or four pillars of food security refers to the FAO's (and others) food availability, access, utilization and stability (Gibson, 2012).

The availability of food is ensured through various sources, including domestic production, commercial imports, and food assistance. Food availability can be evaluated at different levels, ranging from regional to community-based assessments. On the other hand, access to food involves a household's capability to obtain sufficient food through home production, stocks, purchases, trade, gifts, loans, and aid. Utilization concerns a household member's capacity to effectively use the available food, encompassing nutrient absorption, food storage, processing, preparation, water and fuel usage, and hygiene conditions. Illness or substandard care practices can hinder proper utilization (NPC, 2013: 4). Stability aspect of the food security is the continuity of the three pillars of food security over the period of time.

This review of the key literatures and approaches for food security and hunger analysis to explain the prevalence of hunger and the factors leading to food insecurity revealed the complexity of matter. Food security is a multidimensional issue, embedded into social, economic, political and cultural processed which runs at different levels (Bishwakarma, 2012).

Food and nutrition insecurity is closely tied to gender justice, as women and girls are disproportionately affected by global economic processes and trends like climate change that impact food systems. Studies demonstrate a strong connection between gender inequality and food and nutrition insecurity. For instance, even with rapid economic growth in India, countless women and girls continue to face food and nutrition insecurity due to their lower

status compared to men and boys. These disparities are exacerbated by limited access to resources, education, and decision-making power, as well as the accepted burden of unpaid labor, such as caregiving, and the pervasive issues of gender-based violence, HIV, and AIDS. Despite these challenges and often limited access to markets, women comprise the majority of the world's food producers and typically manage their families' nutritional needs. However, their own food security and nutritional needs, along with those of their daughters, are frequently overlooked at the household level due to prevailing discriminatory social and cultural norms (Bridge, 2014).

2.2.3Poverty and Food Security

The linkages between poverty and food insecurity are complex and multidimensional. These issues are closely intertwined, as poverty often results in limited access to food and other resources, while food insecurity can exacerbate poverty by affecting people's health, productivity, and overall well-being. Poverty can restrict an individual's or household's access to resources necessary for food production or purchase. Poor households may lack the financial means to buy seeds, fertilizers, or other agricultural inputs, resulting in lower crop yields and food production (Adhikari & Bohara, 2013). Furthermore, poverty may limit a household's ability to purchase food in the market, affecting their food security status (Adhikari et al., 2017).

Poor households are increasingly susceptible to shocks, such as natural disasters, price fluctuations, or economic crises, which can severely impact their food security. In Nepal, the dependence on rain-fed agriculture and frequent occurrence of natural disasters like floods, landslides, and droughts can exacerbate food insecurity, particularly for poor and marginalized communities (Gentilini et al., 2014). Poverty is linked to malnutrition, as poor households often have limited access to diverse and nutrient-rich diets. Malnutrition can lead to various health issues, which in turn can affect people's ability to work and earn an income, perpetuating the cycle of poverty and food insecurity (NPC & WFP, 2013).

The poverty "gradual rise from middling to prosperous" is seen in college graduate; high school teacher; international labour migration of son; small holder. Further, "later-period rise from middling to well to do" in high school graduate; primary school teachers; high diversification; substantial land holding. (Mishra, 2017:87)

2.2.4 Social Dimensions and Food Security

Pandey (2020) found the relation with the caste and gender with food insecurity. In her study around 56 percent of women and 76 percent of Dalit women had experienced food insecurity. Further, she found the strong relations with ethnicity and food insecurity as well. Similarly, her study showed the level of education is related to food security, higher education has a role in protecting household from the impact of food insecurity (pp:01).

According to the Multi-Poverty Index of Nepal, in 2019, 17.4% of Nepalis, or just under five million people, were identified as multi-dimensionally poor, with an MPI of 0.074. The combined indicators revealed that the largest deficiencies were in adequate housing, clean cooking fuel, education, assets, and nutrition. The primary factors contributing to Nepal's ongoing multidimensional poverty are years of education and nutritional deprivation. The largest contributions to overall multidimensional poverty come from the lack of nutrition and schooling years (CBS et al., 2021). This demonstrates how nutrition and food security are directly related to one another and to poverty levels.

2.2.5 Causes of Food Insecurity

Food insecurity is driven by a complex interplay of immediate, underlying, and structural factors. Immediate causes like natural disasters like floods, droughts, landslides, and other natural disasters can cause crop failure and damage infrastructure, affecting food production and distribution (Pokharel et al., 2017), pest infestations and plant diseases can reduce crop yields and contribute to food insecurity (Khanal, 2018). Further, economic shocks like fluctuations in food prices, unemployment, or sudden loss of income can affect a household's ability to access food (FAO et al., 2020).

Poverty is the main barrier for food accessibility and affordability (Adhikari et al., 2017). Poor diet quality can lead to malnutrition, which exacerbates food insecurity by affecting health and productivity (NPC & WFP, 2013). Furthermore, inadequate infrastructure leading poor transportation, storage, and market facilities can hinder food access and distribution (Khadka & Nepal, 2020).

Weak governance and inappropriate policies can hinder food security by affecting resource allocation, land rights, and agricultural support (Sharma & Thapa, 2013). Inequality and

social exclusion: Unequal access to resources, discrimination, and marginalization of certain groups can exacerbate food insecurity (Carrard et al., 2016). Chambers (1994) asserts that "reversing the professional biases which ignore or devalue the knowledge and capabilities of poor people" (p. 125) is crucial for effective development interventions. This suggests that incorporating local knowledge and empowering communities can lead to better solutions for food insecurity. Climate change: Altered precipitation patterns, rising temperatures, and increased frequency of extreme weather events can negatively impact agricultural production (Smith & Davis, 2020).

Adhikari (2008) mention that if the production is sufficient to meet the food requirement in the different caste groups. He found that the food security is related to caste and ethnicity. "As the food production was not sufficient, questions were asked to ascertain their level of food self-sufficiency… In terms of caste, the position of Thakuri-Chhetri was better in compared to the Brahmins and the position of Dalits was very precarious. More than half of the Dalits could not produce food for more than three months in a year, about 43 percent could produce for 4-6 months only and 2 percent could produce 7-9 months. None of them were found to produce food sufficient for more than 9 months" (pp :221).

Further his research analyzed the social and gender inequality within the community and showed how it affects the food insecurity. He mentioned that "Women do not have access to ownership of property and resources. As a result, the position of women in the family and society is very low, which is a cause for the perpetuation of food insecurity" (Adhikari, 2008:237).

Addressing food security and nutrition is a significant task and it is within grasp of Nepal capacity. But Nepal still has a lot of work to do to address food insecurity. Natural catastrophes, such as floods, landslides, and earthquakes; climate change; poverty; inadequate infrastructure, particularly in remote and mountainous areas; urbanization and outmigration, which results in a feminization of agriculture; volatile food prices; and dietary changes, such as an increase in processed foods high in fat and sugar (NPC, 2018).

Amartya Sen argued that food insecurity is not just a matter of inadequate food production, but is also caused by the inequitable distribution of food and resources, and the lack of entitlements to food. He mentions that "the problem of hunger and undernourishment is not

just a matter of inadequate food production, but also of unequal distribution of food and the lack of entitlements to food" (Sen, 1981). Sen's theory of entitlements suggests that food insecurity is not caused by a lack of food, but by the inability of people to access food due to poverty, inequality, and social exclusion. According to Sen, food insecurity can be understood as a failure of entitlements, which are determined by a range of factors including income, social status, and political power. Sen argues that food insecurity is not just a matter of inadequate food production, but is also caused by the inequitable distribution of food and resources, and the lack of entitlements to food.

He further emphasized that "Famine is not so much a problem of food availability as it is a problem of entitlements" (Sen, 1981). "Food insecurity reflects the broader issues of poverty and inequality; thus, addressing food insecurity necessitates tackling these underlying causes" (Sen, 1999). "The problem of food insecurity cannot be solved by simply increasing food production. It requires addressing the underlying causes of poverty, inequality, and social exclusion" (Sen, 1999).

Sen's perspective on food insecurity emphasizes the importance of addressing the underlying causes of poverty and inequality in order to improve food security. Sen has argued that food security can be improved through policies that aim to increase access to resources, reduce inequality, and empower marginalized groups. According to Sen, improving food security requires a holistic approach that addresses the social, economic, and political factors that contribute to food insecurity.

In Nepal, 66% of the population works in agriculture, with almost 70% of those employed being women. Furthermore, a large number of women, Dalits, indigenous people, landless people, and smallholders (SHs) depend on agriculture and forest resources for their livelihoods. Regretfully, a large number of them are underpaid, unacknowledged, and pay rates vary by gender. Because they live in marginal and/or vulnerable areas from the perspective of natural disasters, and because they do not have equitable access to resources for investments, infrastructure, services, technology, skills, and knowledge, these groups of people and the food systems that are linked to them are continuously at risk of becoming unstable and unsustainable.

Deeply ingrained social and economic disparities in employment possibilities also make all actors more vulnerable and deprive them of their human rights, particularly women, indigenous people, and smallholders in the value chain. Furthermore, the legal system is biased, institutional procedures are weak, and women, people living in remote areas, smallholders, the elderly, people with disabilities (PWD), internally displaced people (IDPs), and others have limited ability to assert their rights. Furthermore, their lack of access to productive resources, a voice, and market and trade bargaining power is actually a rejection of their constitutional rights and entitlements.

Despite handling more than 70% of agricultural tasks, only 32% of women have formal property ownership, which has a direct impact on agricultural productivity. This has limited their ability to negotiate with market, participate in policy processes, and access financial resources and services.

Similar differences exist between regions with regard to sociocultural practices, economic well-being, caste and ethnicity, educational attainment, productive potential, and reliance on market resources. For instance, Karnali province has the highest rate of stunting in children under the age of five. Similarly, nutritional insecurity affects 49.1% of households in the lowest quintile compared to 16.4% of those in the richest quintiles. In terms of caste and ethnicity, the Newar community has a rate of 21.4%, compared to 41.9% for Terai/Madhesh populations. Nutritional insecurity is more common in families with higher levels of education (22.8%) than in illiterate families (45.7%) (MoHP, 2021). Furthermore, the suffering of Province 1 and Bagmati Province, which rely mostly on the market for food supply, differs from that of other provinces (NPC, 2021).

CHAPTER III
RESEARCH METHODOLOGY

3.1 Research Design

This study is done mainly based on the further analysis of Nepal Living Standard Survey (NLSS) III using only secondary sources. However, the NLSS IV 2022/2023 was released during the final submission of the thesis. So, the NLSS IV data were also analyzed to see the changes during the period NLSS III and NLSS IV. Relevant information and analysis are included in the respective sections.

As a follow-up to the first two rounds of living standard surveys, the CBS conducted the third phase of the survey, known as the Nepal Living Standards Survey 2010/11 (NLSS-III). The Living Standards Measurement Survey (LSMS) methodology, created and endorsed by the World Bank, was adhered to by all three studies. NLSS-III counted 7,020 households, of which 1,032 were from the panel sample and 5,988 were from the cross-section sample. The cross-section sample, which consists of 5,988 households, is the main focus of this investigation.

This study adopts a quantitative research design, focusing on the analysis of secondary data from the Nepal Living Standards Survey (NLSS) III. Quantitative research is chosen for its ability to provide structured and statistical insights into the complex issue of food insecurity in Nepal, enabling the analysis of relationships between various socio-economic variables and food insecurity status.

Utilizing secondary data from the NLSS III is justified due to the comprehensive and nationally representative nature of the data set. The NLSS III, with its extensive coverage across different ecological belts and development regions, provides a rich dataset for exploring the multifaceted aspects of food insecurity. This approach also leverages existing data, making the study more resource-efficient and allowing for a broader analysis than would be feasible with primary data collection.

The study is based on a cross-sectional design, analyzing data from 5,988 households. This design is suitable for describing the current status of food insecurity across different socio-economic groups in Nepal and identifying potential associations between these groups and food insecurity.

The analysis utilized the following key steps to generate the evidence to address the research question comprehensively.

Defining and Operationalizing the Variables: The key variables included food insecurity status (food secure or food insecure), education of the household head, gender of the household head, location of residence (urban or rural), ecological belts (mountain, hill, and terai), income, size of the family (less than 4 or more than 4), and ethnicity.

Creating Frequency Table: Frequency table or cross-tabulation was done to see the distribution of each variable and their association with food insecurity status.

Calculation of chi-square test statistic: Once the cross-tabulations was done, the chi-square test statistic to determine whether there is a significant association between each variable and food insecurity status was done. The chi-square test determines whether the observed association is statistically significant at a specified level of confidence (e.g., 95%).

Discussion and Interpretation the Results: The results of the cross-tabulations and chi-square tests were discussed and interpreted.

Running of logistic regression analysis: Finally, a logistic regression analysis was done to examine the independent effects of each variable on food insecurity status while controlling for other variables. The logistic regression allows us to estimate the odds of being food insecure for each level of each variable and identify the variables that are most strongly associated with food insecurity.

Cross-Sectional Design

Neuman (2014) states that cross-sectional research can be exploratory, descriptive, or explanatory, but it is most commonly associated with a descriptive approach. This method is typically the simplest and least expensive option, but it seldom captures social processes or changes. The survey by Edgell and Tranby (2007) on religion and beliefs about racial inequality, the existing statistics study of red and blue states by McVeigh and Sobolewski (2007), and the descriptive study on death penalty views by Unnever and Cullen (2007) are all examples of cross-sectional research. Determining whether a study is cross-sectional or longitudinal is not always straightforward, as it involves more than just the duration of the

study. The experiment on priming by Lowery and colleagues (2007) is considered longitudinal because it has "long-term effects" (4 days) in its title and incorporates time into its design. Researchers collected data at two separate time points and compared the data during analysis. In contrast, the survey study by Edgell and Tranby (2007) and the existing statistics study by McVeigh and Sobolewski (2007) are cross-sectional studies, even though data collection took place over several days or months. In these cases, researchers treated minor time differences in data collection as irrelevant and did not consider them in their study design (Neuman, 2014:44).

A cross-sectional study analyzes data at a single point in time, selecting participants based on specific variables of interest. While commonly used in developmental psychology, this method is also applied in various fields, including social science and education.

Cross-sectional studies are observational and categorized as descriptive research. They do not establish causal or relational connections, meaning they cannot determine the cause of a phenomenon, such as a disease. Researchers document information within a population without manipulating variables (Cherry, 2022).

This research approach can describe existing characteristics within a community, but it cannot establish cause-and-effect relationships between variables. It is often utilized to make inferences about potential relationships or to collect preliminary data that supports further research and experimentation.

Cross-sectional research is often used to identify prevailing characteristics within a population at a specific point in time. For example, a cross-sectional study might investigate whether exposure to certain risk factors correlates with particular outcomes.

This study is based on the cross-sectional study using the data from NLSS III and NLSS IV.

3.2 Domains of Required Information

In order to address the research problem following process and tasks was completed

- Identifying key social dimensionsrelated to food insecurity
- Analyzing the association between social dimensions and food insecurity

3.3 Nature and Sources of Data

Creswell (2014) explains that research approaches encompass plans and procedures that range from broad assumptions to detailed methods of data collection, analysis, and interpretation. This plan involves various decisions, which don't necessarily have to be made in a specific order. The primary decision concerns the approach to use for studying a topic. Factors influencing this decision include the researcher's philosophical assumptions, inquiry procedures (referred to as research designs), and specific research methods for data collection, analysis, and interpretation. The choice of research approach is also based on the research problem or issue being addressed, the researcher's personal experiences, and the intended audience for the study. Hence, research approaches, designs, and methods are three key terms that present information sequentially, from broad research constructs to narrow procedural methods.

Qualitative, quantitative, and mixed methods are the three different approaches. These approaches are more interconnected than they may first appear. Rather than being rigid categories, qualitative and quantitative approaches represent different points on a continuum (Newman & Benz, 1998). A study may lean more towards either qualitative or quantitative, while mixed methods research occupies the middle ground, incorporating elements of both approaches.

The distinction between qualitative and quantitative research is often characterized by the use of words (qualitative) versus numbers (quantitative) or closed-ended questions (quantitative hypotheses) versus open-ended questions (qualitative interview questions). However, a more comprehensive view of the differences between these approaches lies in the underlying philosophical assumptions researchers bring to the study, the research strategies used (e.g., quantitative experiments or qualitative case studies), and the specific methods employed in executing these strategies (e.g., collecting quantitative data using instruments versus gathering qualitative data through observation). Furthermore, there is a historical evolution to both approaches. Quantitative methods dominated social science research from the late 19th century until the mid-20th century. Interest in qualitative research grew during the latter half of the 20th century, accompanied by the development of mixed methods research.

3.4 Sample Design

The Nepal Labor Force Survey (NLFS-II) was the source of the modified sub-sample used in NLSS-III. A total of 800 Primary Sampling Units (PSUs) were chosen for NLFS-II, 400 of which were from urban areas and 400 of which were from rural regions. The PSUs for NLFS-II included wards, sub-wards, or combinations of wards, as was previously mentioned. The number of households was used as a measure of size, and these PSUs were chosen using a probability proportionate to size (CBS, 2011).

3.5 Cross-Section Sample

5,988 sample houses from 499 primary sampling units (PSUs) were included in the cross-sectional sample of the study. Additional analysis of the NLSS III data was carried out in order to fulfill the goals of the study(CBS, 2011). Households those experienced food shortages or if they did not have the money to buy enough food for their family in the 30 days before the enumeration day were taken as food insecure households. Households regarding the coping mechanisms they used when faced with shortages of this kind were also studied to analyze coping mechanisms.

3.6 Food Insecurity and Coping Options Questions in NLSS

The NLSS III was a nationwide household survey conducted from February 2010 to February 2011. This survey covered various aspects of household welfare, including the assessment of food security. To evaluate the food security situation, households food shortages status were taken in to consideration to assess the food insecurity situation. Further analysis was performed to examine the measures taken by respondents to address food shortages to study their coping mechanism (CBS, 2011).

The NLSS included a question under consumption (19.02) which asked, "Regarding your family's food consumption over the past month, which of the following is true?"

Response Options:

1. It was less than adequate for your family's needs
2. It was just adequate for your family's needs

3. It was more than adequate for your family's needs
4. Not applicable

These four possible responses were analyzed. The response 1 (it was less than adequate for the family needs) is treated as household facing food insecurity.

Further," IF THE ANSWER TO Q. (19.02) IS “1”, ASK:"

"Do you consider that you, or any member of your family eats too little food to live a healthy and active live? Yes or No." This is interpreted as household facing food insecurity situation.

3.7 Gender of Household Head

Analysis was done in terms of gender (male or female) of household head to analyze association of food insecurity with respect to the gender of the household head.

3.8 Caste/Ethnic Groups

The major caste/ethnic groups categorized for the analysis are as below:

1. Hill Brahmin and Chhetri,
2. Tarai Brahmin
3. Terai middle caste
4. Hill Terai Dalit
5. Tarai (Madhesi) Other Caste,
6. Hill Dalit,
7. Tarai Dalit,
8. Hill Janjati,
9. Tarai Janjati and
10. Mulsim
11. Others

3.9 Education of Head of Household

Following five categories of education of household is made.

1. Illiterate or no formal education

2. Literate with less than grade five completed
3. Completed grades 5-7
4. Completed grades 8-10
5. Completed grade 11 or higher

3.10 Size of the Household

In order to analyze the relation of family size of the household and food insecurity, two broad categories of small family size and large family size is made. These categories were made based on the original seven categories of NLSS ranging from one member to more than seven members as below:

Up to four members of family size is operationally defined as small family size and more than four that is five and above is as households with large family size.

3.11 Household Income

One of the areas of analysis to see association between food insecurity and household income in Nepal, for these respondents were categorized into quintiles based on quintiles of household income. The categorization of respondents into quintiles was used to analyze data related to income distribution and food security. Respondents were divided into five equal parts, known as quintiles. Each quintile will contain 20% of the sampled population. In practical terms:

- The first quintile (Q1) includes the 20% of households with the lowest income.
- The second quintile (Q2) includes the next 20% up the income scale.
- This pattern continues until the fifth quintile (Q5), which includes the 20% of households with the highest income.

Each quintile was labeled from "First" for the lowest income group to "Fifth" for the highest income group for reference and analyze the data.

Use of quintiles in analysis provides following benefits to the analysis:

1. Equitable Group Sizes: Quintiles ensure that each group contains an equal proportion (20%) of the study population, which facilitates fair comparisons across different income levels.

2. Highlighting Inequalities: By dividing the data into quintiles, it is possible to clearly observe disparities in food security, health, or other socio-economic outcomes across different income levels. This can be critical in understanding how wealth distribution impacts food accessibility and nutritional status.
3. Targeted Analysis and Policy Making: Using quintiles allows researchers and policymakers to identify which income groups are most at risk of food insecurity. This can help in designing targeted interventions that are more likely to address the needs of those who are most vulnerable.
4. Simplifying Complex Data: Categorizing data into quintiles simplifies the complex variations in income, making it easier to analyze and communicate findings to a broad audience, including stakeholders who may not be familiar with detailed statistical analyses.
5. Benchmarking and Monitoring Trends: Quintiles provide a consistent framework for tracking changes over time. This is useful in longitudinal studies or monitoring and evaluation processes to assess the effectiveness of economic or social interventions aimed at improving food security.

Analysis of the association between income and food insecurity, using quintiles helps to examine whether lower-income households have different levels of food security compared to higher-income households. This method can unveil patterns such as higher rates of food insecurity in lower income quintiles, which would justify the need for specific policy interventions aimed at these groups.

By using quintiles, the analysis can provide nuanced insights into how income influences food security, potentially influencing policy decisions aimed at reducing food insecurity through more equitable income distribution or targeted support programs.

3.12 Coping Options

The methodical approach used to look into the coping mechanisms that households in Nepal use when there is food insecurity. With an emphasis on analyzing data from the Nepal Living Standards Survey (NLSS) III, which offers thorough insights into household behaviors amid food scarcity. Using the secondary data from NLSS III, the study used a cross-sectional, analytical, and descriptive design. This design is useful for explaining the type and frequency

of coping mechanisms in various household demographics, socio-economic and geographic contexts at a given moment in time.

The main coping strategies are of insurance, crisis, and distress strategies—coping mechanisms grouped according to the severity of the situation—during periods of food insecurity. Dependent variable is food insecurity and independent variables are family size, gender of household head, household income, education of household head, and location (place of residence) and ecological belts.

Descriptive and inferential Analysis was carried out. Descriptive analysis includes cross-tabulations and frequency distributions that offer a summary of the kinds and prevalence of coping mechanisms in various households. Inferential Statistics includes Chi-Square Test, which is used to investigate relationships between categorical variables and ascertain whether the adoption of coping mechanisms is connected to various aspects of the household characteristics; and logistic regression analysis, which provides odds ratios to show the direction and degree of correlations.

The study recognizes the inherent limitations associated with the use of secondary data, including restrictions in the range of variables accessible and potential biases in the original data collection method. Furthermore, the cross-sectional design makes it more difficult to determine causal correlations.

Questions related to coping options were:

19.18 The NLSS III survey asked if the households in the past 30 days, the targeted household didn't have enough food or money to buy food, the household had to ... [COPING OPTION]."

1. Rely on less preferred and more affordable foods,
2. Borrow food or money, or depend on support from friends or relatives,
3. Buy food on credit,
4. Collect wild food, hunt, or harvest immature crops,
5. Consume seed stock reserved for the next season,
6. Send household members to eat at another location,
7. Send household members to beg,
8. Limit meal portion sizes,
9. Restrict adult consumption so children can eat,

10. Feed working household members at the expense of non-working members,
11. Budget available money and purchase prepared food,
12. Reduce the number of daily meals,
13. Go entire days without eating, and
14. Sell assets or jewelry to buy food (CBS, 2011).

Coping strategies are actions taken by people faced by stress or shocks. Coping options assessed in terms of its severity; Coping strategies vary from household to household, but the implications they have on people's livelihood and assets can generally be categorized into:

a) insurance strategies (reversible coping, preserving productive assets, i.e. reduce food intake, etc…);

b) crisis strategies (irreversible coping threatening future livelihoods, i.e. sale of productive assets, etc.); and

c) distress strategies (starvation and death, and no more coping mechanisms)

In the analysis of coping categories following three coping were taken as crisis strategies, as these coping mechanisms significantly affect the future livelihood options and social status. These include i) consume seed stock held for next season, ii) send household members to beg and iii) sell assets, jewelry to purchase food.

Assessing coping behaviour is a very important part of food security monitoring as it provides crucial information on the household access to food.

3.13 Household Income

In order to examine the association of household income and food insecurity, households were categorized in the quantiles and analysis was done.

3.14 Food Insecurity Measurements

Food insecurity measurements frequently used in Nepal includes Food Insecurity Experience Scale (FIES) and Household Food Insecurity Experience Scale. These measure the perception of household on food insecurity and collected the responses in the questions below.

The Food Insecurity Experience Scale (FIES) serves as an experience-based assessment tool for food security at the individual or household level. The FIES Survey Module (FIES-SM) comprises eight questions concerning people's ability to access adequate food and can be seamlessly integrated into a variety of population survey types. Focusing on the experiences of either the individual respondent or their entire household, the FIES-SM questions highlight self-reported food-related behaviors and experiences associated with growing challenges in obtaining food due to resource constraints (FAO, nd).

3.15 Food Poverty and Food Insecurity

Food poverty is an important contributing factor to health inequalities in industrialized countries; it refers to the inability to acquire or eat an adequate quality or sufficient quantity of food in socially acceptable ways (or the uncertainty of being able to do so). Synonymous with household food insecurity, the issue needs to be located within a social justice framework. ‘Food poverty’ and ‘food insecurity’ signify “the inability to consume an adequate quality or sufficient quantity of food in socially acceptable ways, or the uncertainty that one will be able to do so” (Elizabeth, 2012)

A large body of research document that the primary cause of food insecurity is low income. When income is constrained or limited, households may be forced to make difficult decisions that can result in a less-than-adequate supply of food (Vernesa, 2014).Food poverty is the inability to have a nutritious diet due to affordability or accessibility. It is primarily the result of low incomes. The immediate impact of food poverty is poor diet and lack of nutrients (Leire et al., 2015).

Based on research carried out by Statistics South Africa, which updates these two poverty lines, establishing the minimum socially acceptable standard to distinguish the non-poor from the poor in the country. These measures use three lines of poverty: the food poverty line (FPL); the lower bound poverty line (LBPL); and the upper bound poverty line (UBPL). The FPL sets the rand value below which one cannot purchase enough food to meet a minimum energy intake of about 2,100 calories per day. In 2014, this value was R400 per month (Jacqueline, 2018).

The National Statistics Office in Nepal used a two-step procedure to determine the food poverty line. First, a minimal calorie need per person is used to define the basic nutritional demands. Second, the food basket of the relatively poor (reference group) that would meet

their minimum caloric needs is identified and priced in order to estimate the food poverty line. The food basket of the designated reference group is used to calculate the average cost per calorie, or the "Food Poverty Line." The price of the projected minimum acceptable 2,236 kcal per capita per day is scaled up to determine the absolute food poverty threshold, and it is then annualized. In comparison to the food poverty level of NRs. 26,936 established in 2010–11, the new food poverty line (for NLSS IV) of NRs. 35,028 per person annually reflects the increasing expense of meeting minimum acceptable food demands. New (and improved) dietary patterns that include more meat, fruits, and nuts—all of which are comparatively more expensive—are demonstrated by the rise in food expenditures (NSO, 2024).

3.16 Analysis of Data and Hypothesis Testing

Chi Square Test:

A chi-square test was used to examine the relationship between the categorical variables, food insecurity. For each hypothesis test, the Chi-square statistical test was used to compare the p-value with a predetermined significance level (e.g., $\alpha = 0.05$). If the p-value is lower than the significance level, the null hypothesis is rejected and alternative hypothesis is accepted, indicating an association between food insecurity and the tested variable. If the p-value is greater than the significance level, this will lead to fail to reject the null hypothesis, suggesting no evidence of an association.

The chi-square test is an appropriate method for analyzing the association between categorical variables, such as food insecurity status and socio-demographic factors. It's commonly used to determine whether there's a significant association between two categorical variables in a contingency table. In the context of NLSS III data, where variables like food insecurity status, education level, gender, and caste are categorical, the chi-square test can help identify whether the distribution of one variable differs among the categories of another variable.

The key assumptions of the Chi-square test include having a sufficiently large sample size and ensuring that the expected frequencies in each cell of the contingency table are five or more to maintain the validity of the test. In the NLSS III dataset, given its large sample size, it's likely that these assumptions are met. However, it's crucial to check that the expected frequency condition holds across all cells in the contingency tables used.

While the chi-square test provides insights into associations between variables, its reliability can be influenced by the accuracy of self-reported data. Misreporting or bias in self-reported food insecurity and coping strategies can affect the results. However, the standardization of questions and the national scope of the NLSS III survey would help to mitigate individual reporting biases to some extent. The Nepal Living Standards Survey (NLSS) III, being a national survey, have implemented several measures to address and minimize the limitations associated with self-reported data. NLSS III has made provisions to test questionnaire design rigorously, training of enumerators, specific reference period to recall accurately, anonymity and confidentiality, structured interview process and data cross-verification.

In order to test the association between food insecurity and each of the variables using the chi-square test, contingency tables for each variable with food insecurity was created. As the chi-square test is suitable for categorical variables, some of the continuous variables like family size and household income were categorize as categorical. Following steps were taken:

Recoding of the variables was done as needed:

- Gender of household head (male and female)
- Caste/ethnicity of household head: (Hill Brahmin and Chhetri, Tarai Brahmin, Terai middle caste, Hill Terai Dalit, Tarai (Madhesi) Other Caste, Hill Dalit, Tarai Dalit, Hill Janjati, Tarai Janjati and Mulsim, others.)
- Education of household head: Converted into categorical (e.g., illiterate or 0 years of schooling, literate completed below grade 5, completed grade 5-7, completed grade 8-10, completed 11+).
- Family size: Converted into categorical (e.g., below 4 and 5 and above).
- Household income: Converted into categorical in quintiles.
- Residence (rural vs. urban): categorical.
- Geographical belt: categorical (mountain, hill, terai).

Created contingency tables for each variable with food insecurity and formulate contingency table:

$$E(i,j) = (row\_i\_total * column\_j\_total) / grand\_total$$

Calculated the chi-square statistic using the following formula:

$$X^2 = \Sigma [(O(i,j) - E(i,j))^2 / E(i,j)]$$

Here, O(i,j) represents the observed frequency in cell (i, j), and E(i,j) represents the expected frequency in cell (i, j).

Determined the degrees of freedom (df) for the chi-square test. The formula for df is:

df = (number_of_rows - 1) * (number_of_columns - 1)

Chi-square statistics compared the critical value from the chi-square distribution table, based on the determined degrees of freedom and the selected significance level (e.g., $\alpha = 0.05$).

Conclusion was made based on the Chi square statistics. If the calculated chi-square statistic was greater than the critical value, the null hypothesis (H0) was rejected that there is no association between the variable and food insecurity. Which suggests that there is a significant association between the variable and food insecurity. If the calculated chi-square statistic was less than or equal to the critical value, that leads to fail to reject the null hypothesis (H0). This suggests that there is no evidence of a significant association between the variable and food insecurity.

This process was repeated for each variable (i.e., gender, caste/ethnicity, education, family size, household income, residence, and geographical belt).

Multiple Logistic Regressions

Multiple logistic regression analysis was run to understand the impact of multiple predictors on the food security. To set up the multiple logistic regression model, all variables are in the appropriate format.

After preparing the data, multiple logistic regression analysis was run.

The model is below:

$$\text{Logit}(P(\text{food insecurity})) = \beta_0 + \beta_1(\text{Gender}) + \beta_2(\text{Caste/ethnicity}) + \beta_3(\text{Education}) + \beta_4(\text{Family size}) + \beta_5(\text{Household income}) + \beta_6(\text{Residence}) + \beta_7(\text{Geographical belt}) + \varepsilon$$

Here, "P(food insecurity)" represents the probability of a household having food insecurity, and "β" represents the coefficients for each independent variable. The error term, "ε," captures the unexplained variation in the model.

Once the model was fitted, the coefficients were examined and their corresponding p-values to assess the significance and direction of the association between food insecurity and each independent variable. If the p-value for a coefficient is less than the predetermined significance level (e.g., $\alpha = 0.05$), conclusion was made that there is a significant association between that independent variable and food insecurity. The sign of the coefficient indicates the direction of the association (positive or negative).

3.17 Limitation of the Study

The study focused on secondary analysis NLSS III and NLSS IV data. As this study is based on the secondary data, key dimensions were limited to gender of household head, education of household head, size of family, income of households, residence (rural versus urban) and geographical belt (mountain, hill and terai) location of households and caste/ethnicities groups disaggregated in the NLSS survey III. Further, the analysis is conducted to identify key coping strategies adopted by different caste/ethnic groups during the food insecurity.

Food (in)Security being the multidimensional concept influenced by multiple factors. However, considering the time and resources, only selected social dimensions namely gender of the household head, caste/ethnicity, education of household head, size of the family, income of the household, place of residence (rural versus urban) and geographical belt (mountain, hill and terai) location of households are analyzed to see the association of these variable with food insecurity of household.

CHAPTER IV
ANALYSIS AND INTERPRETATION OF DATA

As mentioned in the earlier sections, the study is mainly based on the NLSS III data. However, the NLSS IV 2022/2023 was released during the final submission of the thesis. So, considering this, the NLSS IV data were also analyzed to see the changes during the period NLSS III and NLSS IV. Relevant information and analysis are included in the respective sections.

4.1 Demographic Background of the Respondents

Populations differ by sex, age, race/ethnicity, marital status, and a host of other characteristics. Sex and age are the most important factors for demography and are essential for analyzing the demographic processes of fertility, mortality and migration. The demographic processes are all affected directly by sex and age, and these influences occur via biological, psychological, cultural, and social variables (CBS, 2014).

Under the demographic background of the households, location of households in terms of ecological belts (Terai, hill and mountain), place of residence (urban and rural), gender of household head, caste/ethnicity, education of household head, size of family was analyzed.

Table 1 categorizes the distribution of respondents based on the ecological belts of Nepal: Mountain, Hill, and Terai.

Table 1

Respondents as per the Ecological Belt

Ecological Belt	Frequency	Percent	Valid Percent	Cumulative Percent
Hill	3203	53.5	53.5	53.5
Mountain	408	6.8	6.8	60.3
Terai	2376	39.7	39.7	100.0
Total	5987	100.0	100.0	

Source: CBS, 2011, Nepal Living Standard Survey III

Out of total sample of 5,988, one household was omitted as indicated for not applicable. The distribution of sample household in term of ecological belt, hill occupies around 53.5 percent, terai around 39.7 percent. Similarly, mountain has 6.8 percent (Table 1).

The distribution shows a significant concentration of the households in the Hill and Terai regions, which are more accessible and traditionally more populated compared to the Mountain regions. The Hill region, constituting 53.5% of the sample, reflects its demographic prominence in Nepal, often associated with better access to resources and infrastructure compared to the Mountain region, which comprises only 6.8% of the sample. The Terai region, with 39.7%, is distributed where opportunity for agriculture, better infrastructure and market. This area contributes significantly to the country's food security.

In NLSS III, has the survey in fifteen domainsas discussed in the earlier section, comprised of the rural, urban and ecological belts. However, NLSS IV don't have the domains representing three ecological belts, although the number of analysis domains are same i.e., fifteen. In NLSS IV seven provinces with rural and urban categories (14 domains) and one separate domain for Kathmanducomprise 15 domains of analysis.Table 2 presents the distribution of respondents in the seven provinces.

Table 2

Respondents as per the Provinces

Province	Frequency	Percent	Valid Percent	Cumulative Percent
Koshi	1,416	14.75	14.75	14.75
Madhesh	1,392	14.5	14.5	29.25
Bagmati	2,028	21.13	21.13	50.38
Gandaki	1,200	12.5	12.5	62.88
Lumbini	1,416	14.75	14.75	77.63
Karnali	1,008	10.5	10.5	88.13
Sudurpaschim	1,140	11.88	11.88	100
Total	**9,600**	**100**	**100**	

Source: NSO, 2024. Nepal Living Standard Survey IV

Place of Residence:

The rural and urban categorization was based on the location of households, the households located in the metropolitan cities, sub-metropolitan cities, and municipalities to the category of urban areas and rural municipalities into the rural category (NSO, 2024).

Table 3 shows the respondents in terms of rural and urban setting. The information in the brackets is the household number and percent in the NLSS IV.

Table 3

Respondents as Per the Place of Residence

Place of Residence	Frequency	Percent	Valid Percent	Cumulative Percent
Rural	3900 (4068)	65.1 (42.4)	65.1 (42.4)	65.1 (42.4)
Urban	2087 (5532)	34.9 (57.6)	34.9 (57.6)	100.0 (100.0)
Total	5987 (9600)	100.0 (100.0)	100.0 (100.0)	

Source: CBS, 2011, Nepal Living Standard Survey III and NSO, 2024. Nepal Living Standard Survey IV

In terms of place of residence, urban and rural categorization was made. Respondents from rural category include around 65 percent (Table 3).

This table differentiates respondents based on their urban or rural residency. A significant majority, 65.1%, reside in rural areas, reflecting Nepal's largely agrarian society where a substantial portion of the population is engaged in agriculture and related activities. The urban population, at 34.9%, indicates the ongoing urbanization trend, yet underscores that a large part of Nepal's demographic still resides in rural settings, which can have implications for access to services and infrastructure.

Information in the brackets indicates the number of households in the rural and urban from NLSS IV. There is around 5 percent increase in the households residing the urban area and same percent is decreased in the rural area within the span of 12 years that is NLSS III and NLSS IV. This decrease in the rural household could by attributed to the effects of urbanization.

Gender of Household Head:

One of the key aspects of analysis in this study was relation with the gender of household and food insecurity. The term "household head" describes the individual (male or female) who is recognized by other household members as the leader of the household. The head is primarily in charge of and accountable for domestic matters. The holder and the head of the family are typically the same individual in Nepal (CBS, 2011).

Table 4 provides information on percentage of household with gender categorizations. Information in the brackets is the number of household and percentage in the NLSS IV.

Table 4

Gender of Household Head

Gender	Frequency	Percent	Valid Percent	Cumulative Percent
Male	4387 (5951)	73.3 (62.0)	73.3 (62.0)	73.3 (62.0)
Female	1600 (3649)	26.7 (38.0)	26.7 (38.0)	100.0 (100.0)
Total	5987 (9600)	100.0 (100.0)	100.0 (100.0)	

Source: CBS, 2011, Nepal Living Standard Survey III and NSO, 2024. Nepal Living Standard Survey IV

The head of a household is the individual recognized by other members as the primary authority and responsible for household affairs. In terms of gender distribution, approximately 73 percent of households are headed by males, while around 27 percent are headed by females as per the data from NLSS III (Table 4).

The table shows a predominant male headship in households (73.3%) compared to female headship (26.7%). This distribution highlights gender norms and roles within Nepalese society, where men are often seen as the primary breadwinners or heads of households. Female headship, while significant, is less common, which could reflect societal norms or the impact of male outmigration for employment, a common trend in Nepalese society.

Information in the brackets indicates the number of households' heads by gender. There is around 11% reduction in the households headed by men and same percent is increased households headed by women while comparing the results from NLSS III and NLSS IV. The

changes could be attributed to migration of male to different countries and outside the place of residence in search of employments (NSO, 2024).

Caste/Ethnicity

The last name or the family name reflects a person's caste and ethnic status or the distinct cultural identity of a person. In this sense it is an inbuilt position associated with certain kinds of status and rights by birth (CBS, 2014).

Table 5 provides information on key ethnic/caste groups of household head. There are 11 caste/ethnic groups included in the analysis.

Table 5

Caste/Ethnicity of Household Head

Ethnicity/ Caste Group	Frequency	Percent	Valid Percent	Cumulative Percent
Hill Brahmin	931	15.6	15.6	15.6
Hill Chhetri	1158	19.3	19.3	34.9
Hill Dalit	514	8.6	8.6	43.5
Hill Janajati	1366	22.8	22.8	66.3
Muslim	191	3.2	3.2	69.5
Newar	569	9.5	9.5	79.0
Terai Brahmin	36	.6	.6	79.6
Terai Dalit	182	3.0	3.0	82.6
Terai Janajati	353	5.9	5.9	88.5
Terai middle caste	638	10.7	10.7	99.2
Other	49	.8	.8	100.0
Total	5987	100.0	100.0	

Source: CBS, 2011, Nepal Living Standard Survey III

This table provides a snapshot of the ethnic diversity in Nepal, showing significant representation from Hill Brahmin, Hill Chhetri, and Hill Janajati groups, reflecting the diverse socio-cultural fabric of the nation. Respondents represent 11 Ethnicity /caste groups in the survey. Out of these categories hill Janajati constitute around 23 percent is followed by hill Chhetri around 19 percent. Third with higher percentage include hill Brahmin and is followed by Terai middle caste around 11 percent (Table 5).

The data can be instrumental in understanding the socio-economic dynamics since caste/ethnicity in Nepal is closely linked with access to resources, education, and employment opportunities, which in turn can influence food security status.

Education of Household Head

One of the dimensions of analysis was the education level of household head. Analysis is done in respect to the education level of household head. Education of household head is categorized in five levels i.e., i) illiterate, ii) literate up to grade five; iii) grade 5 to 7, iv) grade 8-10 and v) grade 11 and above.Table 6 provide the information on respondents with different level of education.

Table 6

Education of Household Head (NLSS III)

Education	Frequency	Percent	Valid Percent	Cumulative Percent
Illiterate	2657	44.4	44.4	44.4
Literate, or <5	828	13.8	13.8	58.2
completed [5-7]	767	12.8	12.8	71.0
completed [8-10]	688	11.5	11.5	82.5
completed 11+	1047	17.5	17.5	100.0
Total	5987	100.0	100.0	

Source: CBS, 2011, Nepal Living Standard Survey III

Around half (44.4 percent) of the household heads are illiterate. Literate who has education up to grade 5 is around 14 percent and five to seven grade is around 13 percent. Household heads with education grade 8 and above is around 29 percent (Table 6).

Education levels of household heads reveal that a significant portion (44.4%) has no formal education, which could have implications for their employment opportunities and income levels, thereby affecting their household's food security status. The progression in the education levels shown in the table indicates a potential for upward socio-economic mobility, which is crucial for improving the overall living standards and food security. The table 7 provides the respondents education level which is heads of the respective households in NLSS IV.

Table 7

Education of Household Head (NLSS IV)

Level of Education	Frequency	Percent	Valid Percent	Cumulative Percent
Illiterate	2895	30.2	30.2	30.2
Literate no schooling	324	3.4	3.4	33.5
Literate <5 grade	1175	12.2	12.2	45.8
Literate 5-7 grade	1489	15.5	15.5	61.3
Literate 8-10 grade	1830	19.1	19.1	80.3
Literate grade 11 and above	1887	19.7	19.7	100.0
Total	9600	100.0	100.0	

Source: NSO, 2024. Nepal Living Standard Survey IV

An analysis was done to see the education level of household head utilizing the NLSS IV data, in compared to the NLSS III illiteracy was reduced by around 14%.

Family Size

The size of the family is categorized into two groups i.e., i) large family size members 5 and more ii) small family size below 4. Information in the brackets is the number and percentage of households' size in NLSS IV.Table 8shows the number and percentage of households with small and large family size.

Table 8

Size of the Family

Members in the Household	Frequency	Percent	Valid Percent	Cumulative Percent
Below 5	3052 (6345)	51.0 (66.1)	51.0 (66.1)	51.0 (66.1)
5 and above	2935 (3255)	49.0 (33.9)	49.0 (33.9)	100.0 (100.0)
Total	5987 (9600)	100.0 (100.0)	100.0 (100.0)	

Source: CBS, 2011, Nepal Living Standard Survey III and NSO, 2024. Nepal Living Standard Survey IV

It is around 50 percent small size and 50 percent large size in NLSS III (Table 8). The almost equal distribution between small (below 4 members) and large (5 and above members) family sizes provides insights into household structures in Nepal. The size of the family can influence consumption patterns, economic stability, and food security. Larger families might

have different needs and coping strategies compared to smaller families, especially in resource allocation and food distribution within the household.

Information in the brackets indicates the family size of the households in the NLSS IV. There is significant increase in the percentage of households having small family size; there is increased percentage of around 15in the households with small family size as compared to the NLSS III and NLSS IV.

4.2 Food Security Status in the Household

The third round of the CBS Nepal Living Standard Survey (NLSS) follows the first and second round of survey conducted in 1995/96 and 2003/04. Updating data on people's living standards is the primary goal of the NLSS-III. The purpose of the study was also to evaluate how different government policies and initiatives affected the nation's socioeconomic developments over the previous seven years from 2003/04. The survey also sought to document the changes that previously enumerated households had undergone during the previous rounds of surveys.

In light of the aforementioned purpose, the NLSS III gathered information on consumer spending, migration, education, health, marriage and pregnancy history, job and time use, employment and unemployment, wage and salary, and demography, housing, and facility accessibility. Additionally, information was gathered on anthropometry, the tracking of households enumerated (in the previous surveys), credit and savings, absentee population, remittances and transfers, social assistance, adequacy of consumption and government services/facilities, agriculture, non-agricultural activities, and anthropometry (CBS, 2011).

Considering the availability of NLSS III and IV data this analysis was done. First part of the analysis include association of food insecurity with the selected social dimensions; second part of the analysis was on interplay of the social dimensions with the food insecurity and finally the coping options adopted by the households during the food insecurity,

Status of Household Food in/Security

Utilizing the NLSS III data status of food availability was assessed. Table 9provides the situation of households with adequacy of food in the households.

Table 9

Availabilityof Food in the Household

Status of Availability of Food	Frequency	Percent	Valid Percent	Cumulative Percent
Less than adequate	881	14.7	14.7	14.7
Just adequate	4975	83.1	83.1	97.8
More than adequate	131	2.2	2.2	100.0
Total	5987	100.0	100.0	

Source: CBS, 2011, Nepal Living Standard Survey (NLSS) III.

Based on the availability of food in the household, more than 83 percent of the households have just adequate food. Similarly, around 15 percent of households have less than adequate food (Table 9).

The predominance of households reporting "just adequate" food availability reflects a delicate balance in food security, where a significant portion of the population may be on the verge of food insecurity. The 14.7% of households reporting "less than adequate" food availability is critical, highlighting a segment of the population that is potentially vulnerable and might require targeted interventions to ensure food security.

Based on the adequacy of food availability in the households, householdswere categorized as food secure and food insecure households. Less than adequate food is operationally defined as food insecure household. Similarly, just adequate and more than adequate are categorized as food secure households. Table 10 shows the status of food insecure households.

Table 10

Households Characterized Based on Level of Food Insecurity

Food Security Status	Frequency	Percent	Valid Percent	Cumulative Percent
Food in-secured	881	14.7	14.7	14.7
Food Secured	5106	85.3	85.3	100.0
Total	5987	100.0	100.0	

Source: CBS, 2011, Nepal Living Standard Survey III

The table classifies households into 'Food Insecure' and 'Food Secured' categories based on their reported adequacy of food. This dichotomy provides a scenario of food security in the surveyed population. Accordingly, around 15 percent of the households found to be food insecure (Table 10).

As indicated in the earlier section, association of food insecurity with the relevant social dimensions was also carried out using NLSS III data. As the food poverty and food insecurity are closely linked,efforts were made to see the association of food poverty and social dimensions using Nepal Living Standard Survey IV data. This analysis has provided an insight on food poverty situation and its association. Table 11 provides the information on the level of food poverty prevalent in the households.

Households classified as food poor are those that are unable to pay the average cost per calorie, which is calculated using the food basket of the reference population. Operationally, food insecure households are classified as food poor households.

Table 11

Household category based on the food poverty

Food Poverty Status	Frequency	Percent	Valid Percent	Cumulative Percent
Food Poor	1637	17.1	17.1	17.1
Food Non-Poor	7963	82.9	82.9	100.0
Total	9600	100.0	100.0	

Source: NSO, 2024. Nepal Living Standard Survey IV

According to the analysis, 17.1 percent of homes are food poor, which indicates that about 17.1 percent of households are unable to pay the average cost per calorie, which is calculated using the food basket of the reference group that was identified.

4.3 Association between Food Insecurity and Social Dimensions

Association of Food Insecurity with Ecological Belt

Table 12presents the association between the ecological belt (Mountain, Hill, or Terai) and food insecurity status (food insecure or food secure) for a sample of households from the 2011 Nepal Living Standard Survey (NLSS) III.

The table shows the frequency and percentage of households within each ecological belt that are classified as food insecure or food secure. The Pearson Chi-Square statistic, degrees of freedom (df), and P-value are also provided to assess the relationship between the ecological belt and food insecurity.

Table 12

Association between Ecological Belt and Food Insecurity

Ecological Belt		Food Security Status		Total
		Food insecure	Food Secure	
Hill	Frequency	446	2757	3203
	% within belt	13.9%	86.1%	100.0%
	% within Food Insecurity	50.6%	54.0%	53.5%
Mountain	Frequency	117	291	408
	% within belt	28.7%	71.3%	100.0%
	% within Food Insecurity	13.3%	5.7%	6.8%
Terai	Frequency	318	2058	2376
	% within belt	13.4%	86.6%	100.0%
	% within Food Insecurity	36.1%	40.3%	39.7%
Total	Frequency	881	5106	5987
	% within belt	14.7%	85.3%	100.0%
	% within Food Insecurity	100.0%	100.0%	100.0%

Source: CBS, 2011, Nepal Living Standard Survey III

Chi-Square Tests

Value	Df	Asymp. Sig. (2-sided)
68.320[a]	2	.000
57.144	2	.000
5987		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 60.04.

The Pearson Chi-Square statistic is 68.320 with 2 degrees of freedom. The P-value is less than 0.000, which indicates a statistically significant relationship between the ecological belt and food insecurity status. This means that the food insecurity status of households is not independent of their ecological belt. In particular, the data suggests that households in the Mountain belt have the highest prevalence of food insecurity (28.7%), followed by those in the Hill belt (13.9%) and the Terai belt (13.4%). The Mountain region shows the highest percentage of food insecurity. This could be attributed to its harsh geography, which impacts agriculture and livelihood opportunities. Geographical isolation, limited infrastructure, and environmental factors contribute to the higher vulnerability in the Mountain belt compared to Hill and Terai regions.

Association of Food Insecurity with Province

An analysis was conducted to see if the food poverty was associated with the households located in the specific provinces. Table 13 provides the analysis of association of province and food poverty.

Table 13

Food Poverty Status as per the Province

Province		Food Poverty Level		Total
		Food Poor	Food Non-Poor	
Koshi	Frequency	187	1229	1416
	% within Province	13.2%	86.8%	100.0%
Madhesh	Frequency	269	1123	1392
	% within Province	19.3%	80.7%	100.0%
Bagmati	Frequency	203	1825	2028
	% within Province	10.0%	90.0%	100.0%
Gandaki	Frequency	79	1121	1200
	% within Province	6.6%	93.4%	100.0%
Lumbini	Frequency	282	1134	1416
	% within Province	19.9%	80.1%	100.0%
Karnali	Frequency	264	744	1008
	% within Province	26.2%	73.8%	100.0%
Sudurpaschim	Frequency	353	787	1140
	% within Province	31.0%	69.0%	100.0%
Total	Frequency	1637	7963	9600
	% within Province	17.1%	82.9%	100.0%

Source: NSO, 2024. Nepal Living Standard Survey IV

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	407.706[a]	6	.000
Likelihood Ratio	410.949	6	.000
N of Valid Cases	9600		

a. 0 cells (0.0%) have expected Frequency less than 5. The minimum expectedFrequency is 171.89.

Considering the NLSS IV food poverty line table 13 provides information on the status of food poverty in the seven provinces. By province, Gandaki has least food insecure households (6.6%) followed by Bagamati (10%) and Koshi (13.2%). Lumbini and Madhesh

has the similar situation of 19%, where as highest food insecurity is prevalent in Sudurpaschim (31%) and Karnali (26.2%) provinces respectively. Three provinces Gandaki, Bagamati and Koshi are below the national average food poverty (17.1%).

The association of the food poverty with the different provinces is significant.

Association of Food Insecurity with Place of Residence (Urban vs Rural)

Table 14 presents the association between the place of residence (urban or rural) and food insecurity status (food insecure or food secure) for a sample of households from the 2011 Nepal Living Standard Survey (NLSS) III. The table shows the frequency and percentage of households within each place of residence (urban or rural) that are classified as food insecure or food secure. The Pearson Chi-Square statistic, degrees of freedom (df), and P-value are also provided to assess the relationship between place of residence and food insecurity.

Table 14

Association between Place of Residence and Food Insecurity

	Place of Residence	**Food Security Status**		**Total**
		Food Insecure	**Food Secure**	
Urban	Frequency	165	1922	2087
	% within Place of residence	7.9%	92.1%	100.0%
	% within Food Insecurity	18.7%	37.6%	34.9%
Rural	Frequency	716	3184	3900
	% within Place of residence	18.4%	81.6%	100.0%
	% within Food Insecurity	81.3%	62.4%	65.1%
Total	Frequency	881	5106	5987
	% within Place of residence	14.7%	85.3%	100.0%
	% within Food Insecurity	100.0%	100.0%	100.0%

Source: CBS, 2011, Nepal Living Standard Survey III

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	118.362[a]	1	.000		
Continuity Correction[b]	117.531	1	.000		
Likelihood Ratio	129.013	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	118.342	1	.000		
N of Valid Cases	5987				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 307.11.
b. Computed only for a 2x2 table

The Pearson Chi-Square statistic is 118.362 with 1 degree of freedom. The P-value is less than 0.000, which indicates a statistically significant relationship between the place of residence and food insecurity status. This means that the food insecurity status of households is not independent of their place of residence. Specifically, the data indicates that food insecurity is more prevalent in rural households (18.4%) compared to urban households (7.9%)(Table 14).

This table contrasts food insecurity between urban and rural settings. A significant finding is the higher rate of food insecurity in rural areas (18.4%) compared to urban areas (7.9%), highlighting the rural-urban divide. Access to markets, employment, agricultural dependency, and infrastructure disparities as factors influencing these differences.

Table 15 below provides the information on association of food poverty with the rural and urban households considering the NLSS IV. Analysis reveals that the association is significant. Proportion of food poor/ insecure households are more in the rural area than the urban area. This finding is consistent with results of NLSS III data analysis.

Table 15

Association between Place of Residence and Food Poverty

Place of Residence	Food Poverty Level	Total

		Food Poor	Food Non-Poor	
Rural	Frequency	866	3202	4068
	% within Place of Residence	21.3%	78.7%	100.0%
Urban	Frequency	771	4761	5532
	% within Place of Residence	13.9%	86.1%	100.0%
Total	Frequency	1637	7963	9600
	% within Place of Residence	17.1%	82.9%	100.0%

Source: NSO, 2024. Nepal Living Standard Survey IV

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	89.558a	1	.000		
Continuity Correctionb	89.039	1	.000		
Likelihood Ratio	88.585	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	9600				

a. 0 cells (0.0%) have expected Frequency less than 5. The minimum expected Frequency is 693.68.

b. Computed only for a 2x2 table

Association of Gender of Household Head and Food Insecurity

The table 16presents data on the association between the gender of household head and food insecurity in Nepal, based on the Nepal Living Standard Survey (NLSS) III conducted in 2011. The table shows two categories of the gender of the household head: male and female, and their respective frequencies and percentages of food insecurity and food security. The total frequencies and percentages are also provided for the entire sample.

Table 16

Association between Gender of Household Head and Food Insecurity

Gender of HH Head	Food Security Status	Total

		Food Insecure	Food Secure	
Male	Frequency	616	3771	4387
	% within Gender of HH head	14.0%	86.0%	100.0%
	% within Food Insecurity	69.9%	73.9%	73.3%
Female	Frequency	265	1335	1600
	% within Gender of HH head	16.6%	83.4%	100.0%
	% within Food Insecurity	30.1%	26.1%	26.7%
Total	Frequency	881	5106	5987
	% within Gender of HH head	14.7%	85.3%	100.0%
	% within Food Insecurity	100.0%	100.0%	100.0%

Source: CBS, 2011, Nepal Living Standard Survey III

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5.937[a]	1	.015		
Continuity Correction[b]	5.738	1	.017		
Likelihood Ratio	5.816	1	.016		
Fisher's Exact Test				.017	.009
Linear-by-Linear Association	5.936	1	.015		
N of Valid Cases	5987				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 235.44.

b. Computed only for a 2x2 table

The table reveals that both male and female-headed households experience food insecurity, but female-headed households have a slightly higher percentage of food insecurity than male-headed households. Specifically, 16.6% of female-headed households are food insecure, while 14.0% of male-headed households are food insecure. Conversely, the majority of households, both male and female-headed, are food-secure with percentages ranging from 83.4% in female-headed households to 86.0% in male-headed households.

The chi-square test statistic of 5.937 with 1 degree of freedom and a p-value of 0.015 indicates that there is a significant association between the gender of the household head and food insecurity. In other words, the gender of the household head is a statistically significant predictor of food insecurity among households in Nepal. The results suggest that policymakers and program implementers need to pay attention to the differential impact of gender on food security and ensure that gender-responsive policies and programs are implemented to address the needs of female-headed households.

Female-headed households exhibit slightly higher food insecurity, which might reflect broader gender inequalities in access to resources and employment. Societal norms, gender roles, and economic opportunities impact food security among female-headed households.

Association of Gender of Household Head and Food Poverty

Table 17 shows the association of gender of household head with the food poverty.

Table 17

Association between Gender of Household Head and Food Poverty

Gender of HH Head		Food Poverty Level		Total
		Food Poor	Food Non-Poor	
Female	Frequency	661	2988	3649
	% within Gender of HH Head	18.1%	81.9%	100.0%
Male	Frequency	976	4975	5951
	% within Gender of HH Head	16.4%	83.6%	100.0%
Total	Frequency	1637	7963	9600
	% within Gender of HH Head	17.1%	82.9%	100.0%

Source: NSO, 2024. Nepal Living Standard Survey IV

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.698[a]	1	.030		
Continuity Correction[b]	4.578	1	.032		
Likelihood Ratio	4.670	1	.031		
Fisher's Exact Test				.031	.016
N of Valid Cases	9600				

a. 0 cells (0.0%) have expected Frequency less than 5. The minimum expected Frequency is 622.23.

b. Computed only for a 2x2 table

There is significant association of gender of household head with the food poverty. There is more likely to have food poor for the household who are female (18.1%) as compared to male headed (16.4%) household.

Association of Caste/Ethnicity of Household head and Food Insecurity

Table 18 presents the association between the ethnicity/caste group of household head and food insecurity in Nepal based on the data from the Nepal Living Standard Survey III conducted in 2011. The table shows the frequency and percentage of food-insecure and food-secure households by ethnicity/caste group of the household head.

Table 18

Association between Ethnicity/Caste of Household Head and Food Insecurity

Ethnicity of HH head		Food Security Status		Total
		Food Insecure	Food Secure	
Hill Brahmin	Frequency	66	865	931
	% within Ethnicity of HH head	7.1%	92.9%	100.0%
	% within Food Insecurity	7.5%	16.9%	15.6%
Hill Chhetri	Frequency	185	973	1158
	% within Ethnicity of HH head	16.0%	84.0%	100.0%
	% within Food Insecurity	21.0%	19.1%	19.3%
Hill Dalit	Frequency	176	338	514
	% within Ethnicity of HH head	34.2%	65.8%	100.0%
	% within Food Insecurity	20.0%	6.6%	8.6%
Hill Janajati	Frequency	198	1168	1366
	% within Ethnicity of HH head	14.5%	85.5%	100.0%
	% within Food Insecurity	22.5%	22.9%	22.8%
Muslim	Frequency	38	153	191
	% within Ethnicity of HH head	19.9%	80.1%	100.0%
	% within Food Insecurity	4.3%	3.0%	3.2%
Newar	Frequency	39	530	569
	% within Ethnicity of HH head	6.9%	93.1%	100.0%
	% within Food Insecurity	4.4%	10.4%	9.5%
Terai Brahmin	Frequency	3	33	36
	% within Ethnicity of HH head	8.3%	91.7%	100.0%
	% within Food Insecurity	0.3%	0.6%	0.6%
Terai Dalit	Frequency	41	141	182
	% within Ethnicity of HH head	22.5%	77.5%	100.0%

Ethnicity of HH head		Food Security Status		Total
		Food Insecure	Food Secure	
	% within Food Insecurity	4.7%	2.8%	3.0%
Terai Janajati	Frequency	42	311	353
	% within Ethnicity of HH head	11.9%	88.1%	100.0%
	% within Food Insecurity	4.8%	6.1%	5.9%
Terai middle caste	Frequency	91	547	638
	% within Ethnicity of HH head	14.3%	85.7%	100.0%
	% within Food Insecurity	10.3%	10.7%	10.7%
Other	Frequency	2	47	49
	% within Ethnicity of HH head	4.1%	95.9%	100.0%
	% within Food Insecurity	0.2%	0.9%	0.8%
Total	Frequency	881	5106	5987
	% within Ethnicity of HH head	14.7%	85.3%	100.0%
	% within Food Insecurity	100.0%	100.0%	100.0%

Source: CBS, 2011, Nepal Living Standard Survey III

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	249.688[a]	10	.000
Likelihood Ratio	229.944	10	.000
Linear-by-Linear Association	.375	1	.540
N of Valid Cases	5987		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.30

Overall, the table indicates that 14.7% of households in Nepal are foodinsecure. However, the percentage of food-insecure households varies significantly across different ethnicity/caste groups. The highest percentage of food insecurity is reported among Hill Dalit households, with 34.2% of these households being food-insecure. Similarly, the percentage of food-insecure households is relatively high among Muslim households (19.9%), Terai Dalit

households (22.5%), and Hill Chhetri households (16.0%). On the other hand, the percentage of food-insecure households is relatively low among Hill Brahmin households (7.1%), Terai Brahmin households (8.3%), and Newar households (6.9%).

The findings from the Pearson Chi-Square test reveal that the association between ethnicity/caste group of household head and food insecurity is statistically significant (Chi-Square=249.688, df=10, P-value<0.000), indicating that ethnicity/caste group is an important factor associated with food insecurity in Nepal. These findings suggest that policies and interventions aimed at reducing food insecurity in Nepal need to take into account the disparities in food insecurity across different ethnic/caste groups (Table 18).

Notable disparities exist, with Hill Dalits and Terai Dalits showing higher insecurity. This reflects underlying social and economic inequities. Historical marginalization, land access, and social discrimination as factors contributing to these disparities.

Association of education of household head and food insecurity

Table 19 presents the association between the education of household head and food insecurity (food insecure or food secure) for a sample of households from the 2011 Nepal Living Standard Survey (NLSS) III.

The table shows the frequency and percentage of households within each education level of household-headand classified as food insecure or food secure. The Pearson Chi-Square statistic, degrees of freedom (df), and P-value are also provided to assess the relationship between the education of household head and food insecurity.

Table 19

Association between Education of Household Head and Food Insecurity

Education of HH head	**Food Security Status**		**Total**
	Food Insecure	**Food Secure**	

Education of HH head		Food Security Status		Total
		Food Insecure	Food Secure	
<=0 years schooling	Count	565	2092	2657
	% within Education of HH head	21.3%	78.7%	100.0%
	% within Food Insecurity	64.1%	41.0%	44.4%
Literate, or <5 grade	Count	133	695	828
	% within Education of HH head	16.1%	83.9%	100.0%
	% within Food Insecurity	15.1%	13.6%	13.8%
completed [grade 5-7]	Count	90	677	767
	% within Education of HH head	11.7%	88.3%	100.0%
	% within Food Insecurity	10.2%	13.3%	12.8%
completed [grade 8-10]	Count	52	636	688
	% within Education of HH head	7.6%	92.4%	100.0%
	% within Food Insecurity	5.9%	12.5%	11.5%
completed grade 11+	Count	41	1006	1047
	% within Education of HH head	3.9%	96.1%	100.0%
	% within Food Insecurity	4.7%	19.7%	17.5%
Total	Count	881	5106	5987
	% within Education of HH head	14.7%	85.3%	100.0%
	% within Food Insecurity	100.0%	100.0%	100.0%

Source: CBS, 2011, Nepal Living Standard Survey III

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	222.822[a]	4	.000
Likelihood Ratio	253.192	4	.000
Linear-by-Linear Association	222.070	1	.000
N of Valid Cases	5987		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 101.24.

The Pearson Chi-Square statistic is 222.822 with 4 degrees of freedom. The P-value is less than 0.000, which indicates a statistically significant relationship between the education level of the household head and food insecurity status. This means that the food insecurity status of households is not independent of the household head's education level. In particular, the data suggests that as the education level of the household head increases, the prevalence of food insecurity decreases. Households with heads having no or very little education have the highest prevalence of food insecurity, while households with heads having completed 11+ years of schooling have the lowest prevalence of food insecurity.For example, among households where the head has had no education, 21.3% are food insecure, while among households where the head has completed 11 or more years of education, only 3.9% are food insecure.

The table also shows that among households where the head has had no education, a higher percentage are food insecure compared to households where the head has some level of education. For instance, 21.3% of households where the head has had no education are food insecure, while only 16.1% of households where the head is literate or has had less than 5 years of schooling are food insecure (Table 19).

Association of Educationof Household Head and Food Poverty

Table 20 shows the association of education of household head and food poverty. There is significant association of the education of HH head and food poverty.

Table 20

Association ofEducation of Household Head and Food Poverty

Education of HH Head		Food Poverty Level		Total
		Food Poor	Food Non-Poor	
Illiterate	Frequency	669	2226	2895
	% within Education of HH Head	23.1%	76.9%	100.0%
Literate no schooling	Frequency	66	258	324
	% within Education of HH Head	20.4%	79.6%	100.0%
Literate <5 grade	Frequency	227	948	1175
	% within Education of HH Head	19.3%	80.7%	100.0%
Literate 5-7 grade	Frequency	245	1244	1489
	% within Education of HH Head	16.5%	83.5%	100.0%
Literate 8-10 grade	Frequency	286	1544	1830
	% within Education of HH Head	15.6%	84.4%	100.0%
Literate grade 11 and above	Frequency	144	1743	1887
	% within Education of HH Head	7.6%	92.4%	100.0%
Total	Frequency	1637	7963	9600
	% within Education of HH Head	17.1%	82.9%	100.0%

Source: NSO, 2024. Nepal Living Standard Survey IV

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	203.280[a]	5	.000
Likelihood Ratio	222.164	5	.000
N of Valid Cases	9600		

a. 0 cells (0.0%) have expected Frequency less than 5. The minimum expected Frequency is 55.25.

Association of Size of the Family and Food Insecurity

Table 21shows the association between the size of the family and food insecurity. The table has two columns, one for food insecure households and one for food secure households, and two rows representing the two categories of family sizes. The first row indicates families with fewer than four members, while the second row shows families with five or more members.

Table 21

Association between the Size of the Family and Food Insecurity

Size of the Family		Food Security Status		Total
		Food Insecure	Food Secure	
Below 5	Count	387	2665	3052
	% within Size of the family	12.7%	87.3%	100.0%
	% within Food Insecurity	43.9%	52.2%	51.0%
5 and above	Count	494	2441	2935
	% within SIze of the family	16.8%	83.2%	100.0%
	% within Food Insecurity	56.1%	47.8%	49.0%
Total	Count	881	5106	5987
	% within Size of the family	14.7%	85.3%	100.0%
	% within Food Insecurity	100.0%	100.0%	100.0%

Source: CBS, 2011, Nepal Living Standard Survey III

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	20.544[a]	1	.000		
Continuity Correction[b]	20.214	1	.000		
Likelihood Ratio	20.571	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	20.540	1	.000		
N of Valid Cases	5987				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 431.89.

b. Computed only for a 2x2 table

The table shows that out of a total of 5,987 households, 3052 households had fewer than four members, while 2,935 households had five or more members. Of the smaller families, 387 were food insecure, and 2,665 were food secure. On the other hand, of the larger families, 494 were food insecure, and 2,441 were food secure. The percentages of food-insecure households within each size category are 12.7% and 16.8%, respectively.

The Pearson Chi-Square test shows that the association between the size of the family and food insecurity is statistically significant (p-value < 0.000), suggesting that family size is associated with food insecurity in the population studied. Overall, the table suggests that larger families are more likely to experience food insecurity compared to smaller ones (Table 21).

Association of Household Size and Food Poverty

Table 22depicts the association of size of the family and food poverty. There is no significant association of food poverty with the size of the household.

Table 22

Association between the Size of the Family and Food Poverty

Household Size		Food Poverty Level		Total
		Food Poor	**Food Non-Poor**	
Below 5 members	Frequency	805	5540	6345
	% within Household Size	12.7%	87.3%	100.0%
5 and above members	Frequency	832	2423	3255
	% within Household Size	25.6%	74.4%	100.0%
Total	Frequency	1637	7963	9600
	% within Household Size	17.1%	82.9%	100.0%

Source: NSO, 2024. Nepal Living Standard Survey IV

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	252.071[a]	1	.000		
Continuity Correction[b]	251.162	1	.000		
Likelihood Ratio	241.269	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	9600				

a. 0 cells (0.0%) have expected Frequency less than 5. The minimum expected Frequency is 555.05.

b. Computed only for a 2x2 table

The table shows that out of a total of 9600 households, 6345 households had fewer than four members, while 3255 households had five or more members. Of the smaller families, 12.7% were food poor/insecure, and 25.6% were food poor/insecure in larger family size.

The Pearson Chi-Square test shows that the association between the size of the family and food poverty is statistically significant (p-value < 0.000), suggesting that family size is associated with food poverty in the population studied. Overall, the table suggests that larger families are more likely to experience food poverty compared to smaller ones (Table 22).

Association of household income and food insecurity

Table 23presents the association between food insecurity and household income in Nepal, based on quintiles of household income. The table shows the number and percentage of households that experience food insecurity in each quintile of household income.

Table 23

Food Insecurity Based on Household Income

Quintile Group of HH income		Food Security Status		Total
		Food Insecure	Food Secure	
First	Frequency	353	844	1197
	% within Quintile Group of HH income	29.5%	70.5%	100.0%
	% within Food Insecurity	40.1%	16.5%	20.0%
Second	Frequency	225	973	1198
	% within Quintile Group of HH income	18.8%	81.2%	100.0%
	% within Food Insecurity	25.5%	19.1%	20.0%
Third	Frequency	155	1042	1197
	% within Quintile Group of HH income	12.9%	87.1%	100.0%
	% within Food Insecurity	17.6%	20.4%	20.0%
Fourth	Frequency	101	1097	1198
	% within Quintile Group of HH income	8.4%	91.6%	100.0%
	% within Food Insecurity	11.5%	21.5%	20.0%
Fifth	Frequency	47	1150	1197
	% within Quintile Group of HH income	3.9%	96.1%	100.0%
	% within Food Insecurity	5.3%	22.5%	20.0%
Total	Frequency	881	5106	5987
	% within Quintile Group of HH income	14.7%	85.3%	100.0%
	% within Food Insecurity	100.0%	100.0%	100.0%

Source: CBS, 2011, Nepal Living Standard Survey III

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	375.698a	4	.000
Likelihood Ratio	380.732	4	.000
Linear-by-Linear Association	360.478	1	.000
N of Valid Cases	5987		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 176.14.

The table reveals that the proportion of food insecure households decreases with an increase in household income. Among the households in the first quintile, 29.5% experience food

insecurity, whereas only 3.9% of households in the fifth quintile face the same problem. Incidence of food insecurity decreases with the increase of household income.

The chi-square test indicates that there is a significant association between household income and food insecurity (Pearson Chi-Square=411.452, df=8, P-value<0.000). Overall, the table highlights the importance of household income as a determinant of food insecurity, with lower income households facing a greater risk of inadequate food security than higher income households. (Table 23)

Association of household income and food poverty

Table 24 presents the NLSS IV data analysis results on association of food poverty status with the income quintiles.

Table 24

Food Poverty Based on Household Income

Household Income		Food Poverty Level		Total
		Food Poor	Food Non-Poor	
Poorest	Frequency	1123	598	1721
	% within Household Income	65.3%	34.7%	100.0%
2	Frequency	314	1494	1808
	% within Household Income	17.4%	82.6%	100.0%
3	Frequency	131	1722	1853
	% within Household Income	7.1%	92.9%	100.0%
4	Frequency	55	1900	1955
	% within Household Income	2.8%	97.2%	100.0%
Richest	Frequency	14	2249	2263
	% within Household Income	0.6%	99.4%	100.0%
Total	Frequency	1637	7963	9600
	% within Household Income	17.1%	82.9%	100.0%

Source: NSO, 2024. Nepal Living Standard Survey IV

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)

Pearson Chi-Square	3669.835[a]	4	.000
Likelihood Ratio	3258.229	4	.000
N of Valid Cases	9600		

a. 0 cells (0.0%) have expected Frequency less than 5. The minimum expected Frequency is 293.47.

The analysis shows that the proportion of food poor/insecure households decreases with an increase in household income. Among the households in the first quintile, thre is highest 65.3% experience food insecurity, whereas only 0.6% of households in the fifth quintile face the same problem. Incidence of food insecurity decreases with the increase of household income.

The chi-square test indicates that there is a significant association between household income and food insecurity (Pearson Chi-Square=411.452, df=8, P-value<0.000). Overall, the table highlights the importance of household income as a determinant of food insecurity, with lower income households facing a greater risk of inadequate food security than higher income households. (Table 24)

4.4 Food Insecurity Interplay of Social Dimensions

Adjusting for all variables with significant association, a combined regression was done to see the how different dimensions have the effect on food insecurity of a household.Logistic Regression was run for the analysis.The odds ratio was calculated for all factors of social dimensions, including the gender of household head, ethnicity of household head, household size, education of household head, residence, ecological belt, and household income.

Table 25presents the odds ratios of selected social dimensions and their association with food insecurity in households. The table is based on logistic regression analysis using the data from the Nepal Living Standard Survey (NLSS) III. The variables considered in the analysis are: i) Gender of the household head (male and female), ii) Caste/ethnicity, iii) Education of the household head, iv) Household income, v) Place of residence (urban and rural), vi) Geographical belt, and vii) Size of the family.

Table 25

Odds Ratios of Food Insecurity on Selected Social Dimensions

Variables in the Equation

Social Dimensions		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Gender	Male						1		
	Female	-.004	.092	.002	1	.966	.996	.832	1.193
Caste/ Ethnicity	Hill Brahmin			96.811	10	.000			
	Hill Chhetri	.531	.158	11.272	1	.001	1.701	1.247	2.320
	Hill Dalit	1.229	.167	53.833	1	.000	3.418	2.461	4.746
	Hill Janajati	.253	.158	2.574	1	.109	1.288	.946	1.753
	Muslim	.734	.241	9.265	1	.002	2.083	1.299	3.342
	Newar	.014	.220	.004	1	.949	1.014	.658	1.562
	Terai Brahmin	.477	.640	.557	1	.456	1.612	.460	5.645
	Terai Dalit	.824	.241	11.718	1	.001	2.280	1.422	3.656
	Terai Janajati	.171	.228	.560	1	.454	1.186	.759	1.855
	Terai middle caste	.407	.193	4.458	1	.035	1.502	1.030	2.191
	Other	-.561	.744	.567	1	.451	.571	.133	2.455
Household Income quintiles	First			154.209	4	.000			
	Second	-.534	.102	27.523	1	.000	.586	.480	.716
	Third	-.877	.113	60.626	1	.000	.416	.334	.519
	Fourth	-1.153	.130	78.905	1	.000	.316	.245	.407
	Fifth	-1.748	.173	101.563	1	.000	.174	.124	.245
Education of HH head	<=0 years schooling			45.787	4	.000			
	Literate, or < grade 5	-.234	.113	4.297	1	.038	.791	.634	.987
	completed [5-7]	-.429	.129	11.086	1	.001	.651	.505	.838
	completed [8-10]	-.699	.161	18.898	1	.000	.497	.363	.681
	completed 11+	-.986	.182	29.356	1	.000	.373	.261	.533
Place of residence	Urban						1		
	Rural	.231	.102	5.132	1	.023	1.260	1.032	1.540
Geographical belt	Mountain			31.858	2	.000			
	Hill	-.660	.130	25.833	1	.000	.517	.401	.667
	Terai	-.818	.154	28.228	1	.000	.441	.326	.597
Size of the family	Below 4						1		
	5 and above	.371	.084	19.558	1	.000	1.450	1.230	1.709
	Constant	-1.303	.246	28.091	1	.000	.272		

To assess the association of food insecurity with various factors using logistic regression, the model as mentioned below was run:

$\log(P(\text{food insecure}) / (1 - P(\text{food insecure})) = \beta_0 + \beta_1 * \text{Gender} + \beta_2 * \text{Caste/Ethnicity} + \beta_3 * \text{Education} + \beta_4 * \text{Family Size} + \beta_5 * \text{Income} + \beta_6 * \text{Residence} + \beta_7 * \text{Geographical Belt} + \varepsilon$

Where:

P(food insecure) is the probability of a household being food insecure

β_0 is the constant term, representing the baseline log odds of food insecurity when all variables are set to their reference categories

β_1, β_2, β_3, ..., β_7 are the coefficients for the variables included in the model, representing the changes in the log odds of food insecurity associated with a one-unit change in the corresponding variable

Gender is a binary variable, where 0 represents male-headed households and 1 represents female-headed households.

Ethnicity is a categorical variable with multiple categories, such as Hill Brahmin, Hill Chhetri, Hill Dalit, Hill Janjati, Tarai Brahmin, Terai middle caste, Hill Terai Dalit, Tarai (Madhesi) Other Caste, Tarai Dalit, Tarai Janjati, Muslim, and others.

Education is a categorical variable with levels representing the education of the household head: illiterate or 0 years of schooling, literate completed below grade 5, completed grade 5-7, completed grade 8-10, and completed 11+ grade

FamilySize is a binary variable, where 0 represents households with fewer than 4 members and 1 represents households with 5 or more members.

Income is a categorical variable with levels representing the income quintiles of the households.

Residence is a binary variable, where 0 represents urban households and 1 represents rural households.

Geographical belt is a categorical variable with levels representing the location of households: mountain, hill, and terai.

In the logistic regression model, the coefficients (β_1, β_2, ..., β_7) represent the change in the log odds of a household being food insecure for a one-unit change in the corresponding variable,

controlling for all other variables in the model. The odds ratio (Exp(β)) for each variable can be understood as the multiplicative change in the likelihood of food insecurity resulting from a one-unit increase in that variable, assuming all other variables remain constant.

This logistic regression analyzed the association of food insecurity with gender of household head, caste/ethnicity, education of household head, family size, household income, residence (rural vs. urban), and geographical belt location of households. The results are summarized below:

Gender: The reference category is male-headed households. The result showed no significant association between the gender of the household head and food security. The odds ratio for female-headed households is 0.996and indicates that female household being foods insecure havea slightly lower odd compared to the male headed households.

The negative coefficient (-0.004) indicates that the female households have a lower log odds of being food insecure compared to male heads household. However, this is statistically insignificant (p= 0.966 which is >0.05).

Ethnicity: The reference category is Hill Brahmin households. The results indicated that all except other caste group has higher odds of experiencing food insecurity. However, only Hill chhetri, hill dalit Muslim Terai Dalit and Terai Middle caste have significant association with food insecurity. Hill Dalit households are 3.42 times more likely to experience food insecurity compared to hill Brahmin households. .

Muslim exhibits an odds ratio of 2.083, reflecting 2.08 times more likely to be food insecure relative to Hill Brahmin households, pointing towards notable ethnic disparities. Hill Dalit households haveodds ratio of 2.280 illustrates a 2.28 times higher likelihood of being food insecure compared to Hill Brahmins. Other caste/ethnic groups (Hill Janajati, Terai Janajati, Terai Brahmin, Newar, Terai Dalit and Terai Janajati) have odds ratio >1 indicating higher food insecurity, but these results are not statistically significant (p>0.05).

Household Income quintiles: The reference category is the first income quintile. The results show that households with higher income quintiles have significantly lower odds of being food insecure than those in the first income quintile. The odds ratios for the second, third, fourth-, and fifth-income quintiles are 0.586, 0.416,0.316, and 0.174, respectively. This

indicates that higher household income is negatively associated with food insecurity. Similarly, third quintile has 58.4% lower odds of having food insecurity compared to the first quintile. This is similar for the fourth and fifth quintile, where the odds of experiencing food insecurity are 68.8% and 82.6% lower than the first quintile.

Education of household head: The reference category is household heads with no education (0 years of schooling). The analysis shows that households with more educated heads are significantly less likely to be food insecure. The negative coefficients for all education levels indicate that as the education level of the household increased the log-odds f food insecurity decrease to the reference group (illiterate household). All categories are statistically significant ($p<0.05$), indicating that education levels has a impact on food insecurity. The odds ratios for household heads who are literate or completed less than grade 5, completed grades 5-7, completed grades 8-10, and completed 11+ years of education are 0.791, 0.651, 0.497, and 0.373, respectively.

Literate or < Grade 5: Associated with a20.9% lower odds of experiencing food insecurity.Households where the head has completed grades [5-7] and [8-10] show a 34.9% and 50.3% lower odds of experiencing foodinsecurity, respectively. Completing an education level of 11 or higher leads to a significant 62.7% lower odds of experiencing food insecurity, indicating the impact of education on reducing food insecurity.

Place of residence: Using urban households as the reference category, the results indicate that rural households have significantly higher odds of being food insecure compared to urban households. The odds ratio for rural households is 1.260, indicating that rural households are more likely to be food insecure than their urban counterparts. Rural households face a 26% increase in food insecurity odds compared to urban households, indicating rural vulnerabilities.

Geographical belt: The reference category is households located in the mountain belt. The analysis shows that households in the hill and terai belts have significantly lower odds of being food insecure compared to households in the mountain belt. The odds ratios for households in the hill and terai belts are 0.517 and 0.441, respectively.

The Hill region shows a 48.3% less likely to be food insecure than Mountain areas, with the Terai region reflecting a 55.9% less likely to be food insecure. This suggests geographical factors playing an important role in food insecurity.

Size of the family: The reference category is households with fewer than four members. The results indicate that households with five or more members have significantly higher odds of being food insecure compared to households with fewer than four members. The odds ratio for households with five or more members is 1.450.

Larger families, with 5 or more members, experience a 45% higher likelihood of being food insecure as compared to the smaller family size i.e., fewer than 4 family members.

In summary, the logistic regression analysis suggests that household income, education level of the household head, place of residence, geographical belt, and family size are significantly associated with food insecurity. Gender does not appear to have a strong impact on food insecurity, while only the Hill Dalit ethnic group shows a significant difference in food insecurity compared to the reference group. Households with higher incomes, more educated household heads, urban residences, and smaller family sizes are more likely to be food secure. Households in the hill and terai belts also have higher odds of being food secure compared to those in the mountain belt.

These insights can guide targeted policy and programmatic interventions and emphasizing the need for a multifaceted approach that incorporates education, economic empowerment, and ecological belt strategies to address food insecurity in Nepal. Understanding the interplay of these factors can inform more context specific and effective policy-making, ensuring that interventions are tailored to address the unique challenges faced by different demographic groups within the Nepalese context.

Hypothesis Testing

Table 26presents the results of hypothesis testing to assess the association between food insecurity and various social dimensions. The result is interpreted for each social dimension as below:

Table 26

Result of Hypothesis Testing

Social Dimensions		Hypothesis	Result	Decision
Gender of household head	Male **(Taken as base)**	H0: There is no association between food insecurity and the gender of the household head.		
	Female		0.996 (0.966)	Not rejected
Ethnicity/ caste groups of household head	Hill Brahmin **(Taken as base)**	H0: There is no association between food insecurity and caste/ethnicity.		
	Hill Chhetri		1.701** (0.001)	Rejected
	Hill Dalit		3.418*** (0.000)	Rejected
	Hill Janajati		1.288 (0.109)	Not rejected
	Muslim		2.083** (0.002)	Rejected
	Newar		1.014 (0.949)	Not rejected
	Terai Brahmin		1.612 (0.456)	Not rejected
	Terai Dalit		2.280** (0.001)	Rejected
	Terai Janajati		1.186 (0.454)	Not rejected
	Terai middle caste		1.502** (0.035)	Rejected
	Other		0.571 (0.451)	Not rejected
Household Income	First quintiles **(Taken as base)**	H0: There is no association between food insecurity and household income.		
	Second quintiles		0.586*** (0.000)	Rejected
	Third quintiles		0.416*** (0.000)	Rejected
	Fourth quintiles		0.316*** (0.000)	Rejected
	Fifth quintiles		0.174*** (0.000)	Rejected
Education of Household head	<=0 years schooling **(Taken as base)**	H0: There is no association between food insecurity and the education level of the household head.		
	Literate, or < grade 5		0.791** (0.038)	Rejected

Social Dimensions		Hypothesis	Result	Decision
	completed [5-7]		0.651** (0.001)	Rejected
	completed [8-10]		0.497*** (0.000)	Rejected
	completed 11+		0.373*** (0.000)	Rejected
Place of residence	Urban **(Taken as base)**	H0: There is no association between food insecurity and residence (rural vs. urban). H1: There is an association between food insecurity and residence (rural vs. urban).		
	Rural		1.260** (0.023)	Rejected
Geographical belt	Mountain **(Taken as base)**	H0: There is no association between food insecurity and the geographical belt location of households.		
	Hill		0.517*** (0.000)	Rejected
	Terai		0.441*** (0.000)	Rejected
Size of the family	Below 4 **(Taken as base)**	H0: There is no association between food insecurity and family size.		
	5 and above		1.450*** (0.000)	Rejected
	Constant		0.72 (0.000)	

Gender of Household Head: The hypothesis (H0) states that there is no association between food insecurity and the gender of the household head. The result for female-headed households is not significant (p = .966, not below the usual threshold of .05), so the hypothesis is not rejected. This implies that food insecurity and the gender of the head of the household are not significantly correlated.

Ethnicity/Caste Groups of the Household Head: The hypothesis (H0) states that there is no association between food insecurity and caste/ethnicity. The results show that the hypothesis is rejected for Hill Chhetri ($p<0.05$), Hill Dalit ($p<0.05$), Muslin ($p<0.05$), Terai Dalit ($P<0.05$), and Terai middle caste ($p<0.05$), while it is not rejected for the remaining caste groups. This suggests that there is a significant association between food insecurity and the ethnicity/caste of the household head for some caste groups.

Household Income: The hypothesis (H0) states that there is no association between food insecurity and household income. The results show that the hypothesis is rejected for all income quintiles ($p < .001$ for all quintiles) and thus suggesting a significant association.

Education of Household Head: The hypothesis (H0) states that there is no association between food insecurity and the education level of the household head. The results show that the hypothesis is rejected for all education levels ($p < .05$ for all levels), suggesting a significant association between food insecurity and the education level of the household head.

Place of Residence: The hypothesis (H0) states that there is no association between food insecurity and residence (rural vs. urban). The result for rural households is significant ($p < .05$), so the hypothesis is rejected, suggesting a significant association between food insecurity and place of residence.

Geographical Belt: The hypothesis (H0) states that there is no association between food insecurity and the geographical belt location of households. The results show that the hypothesis is rejected for both Hill ($p < .001$) and Terai ($p < .001$) geographical belts, suggesting a significant association between food insecurity and the geographical belt location of households.

Size of the Family: The hypothesis (H0) states that there is no association between food insecurity and family size. The result for families with 5 or more members is significant ($p < .001$), so the hypothesis is rejected, suggesting there is a significant association between food insecurity and family size.

CHAPTER V
COPING MECHANISM ADOPTED BY DIFFERENT SOCIAL GROUPS DURING FOOD INSECURITY

5.1 Coping Mechanism Adopted During the Food Insecurity by Different Social Groups

This chapter provides the analysis of coping mechanisms adopted by various social groups during food insecurity, highlighting the types of strategies utilized and their distribution across different demographic categories. During the food insecurity situations, households resort to different coping mechanism to mitigate the impact of food insecurity.

Food Insecurity Status

Availability of enough food was taken key indicator of food insecurity. In order to assess the food insecurity respondents were asked if they have shortages of food in the last 30 days preceding enumeration. Around 7 percent households have responded positively to the question indicating facing food insecurity during the period (Table 27).

Table 27

Households Having Enough Food for 30 Days

Category	Frequency	Percent	Valid Percent	Cumulative Percent
No	413	6.9	6.9	6.9
Yes	5,574	93.1	93.1	100.0
Total	5,987	100.0	100.0	

Source: CBS, 2011, Nepal Living Standard Survey III

Based on this food insecurity situation, an analysis was done types of coping strategies adopted by the households to mitigate the impact of food insecurity. Coping strategies include different options to adapt out of key 14 strategies. Among the strategies three coping strategies were categorized as i) crisis strategy and remaining as ii) insurance strategy. Crisis strategies are more severe types of options that hamperthe future livelihood and have social image impact. These strategies include consuming seed stock held for next season, sending household members to beg and selling of assets, jewelry to purchase food. And remaining coping options are categorized as insurance strategies. Insurance strategies as more light that

do not hamper the future livelihood options. This category includes various coping strategies such as relying on less preferred and less expensive foods, borrowing food or money, seeking help from friends or relatives, purchasing food on credit, gathering wild food, hunting or harvesting immature crops, sending household members to eat etc. Since these strategies are not compromising further livelihood option they are termed as insurance strategies.

Table 28shows the types of coping strategies adopted during the food insecurity situation.

Table 28

Number of Households Adopting Coping Strategies During Food Insecurity

Coping Strategies	Frequency	Percent	Cumulative Percent
Insurance strategies only	333	80.6	80.6
Crisis strategies only	3	0.7	81.4
Both Insurance and Crisis strategies	77	18.6	100.0
Total	413	100.0	

Source: CBS, 2011, Nepal Living Standard Survey III

Analysis shows that majority, out of 413 food insecure households majority 333 households adopted insurance strategies and 3 household adopted crisis strategies only. However, 77 out of 413 households adopted both types of coping strategies to cope during the food insecurity (Table 28).

Households facing food insecurity adopted multiple coping strategies to mitigate the impact of food insecurity. Table 29shows the number of households adopting insurance strategies.

Table 29

Households Adopting Number of Insurance Strategies

Number of Strategies	HH Number	Percent	Valid Percent	Cumulative Percent
None	3	0.7	0.7	0.7
1	80	19.4	19.4	20.1
2	101	24.5	24.5	44.6
3	91	22.0	22.0	66.6

Number of Strategies	HH Number	Percent	Valid Percent	Cumulative Percent
4	57	13.8	13.8	80.4
5	44	10.7	10.7	91.0
6	22	5.3	5.3	96.4
7	7	1.7	1.7	98.1
8	3	0.7	0.7	98.8
9	2	0.5	0.5	99.3
10	1	0.2	0.2	99.5
11	2	0.5	0.5	100.0
Total	413	100.0	100.0	

Source: CBS, 2011, Nepal Living Standard Survey III

Among the households using insurance coping strategy, around 25 percent of households use two types of insurance strategies, this is followed by 22 percent adopting three and significant percent around 20 percent adopt only one strategy (Table 29).

Crisis strategies have the negative consequences on their future livelihood options and social status. So, an analysis was also done to see if households adopt these crisis strategies during the food insecurity. Table 30 shows the status of households adopting crisis strategies.

Table 30

Households Adopting Number of Crisis Strategies

Number of Strategies	Frequency	Percent	Valid Percent	Cumulative Percent
None	333	80.6	80.6	80.6
1	68	16.5	16.5	97.1
2	10	2.4	2.4	99.5
3	2	0.5	0.5	100.0
Total	413	100.0	100.0	

Source: CBS, 2011, Nepal Living Standard Survey III

During the food insecurity, only 19 percent households adopted crisis coping strategies. Analysis shows that around only 3 percent adopt multiple strategies (Table 30).

Table 31

Various Types of Coping Strategies Adopted by the Households

Coping Strategies	Category	Responses		Percent of Cases
		N	Percent	
Consuming less preferred and less expensive foods	Insurance	216	16.0	52.3
Borrow food or money	Insurance	275	20.3	66.6
Purchase food on credit	Insurance	235	17.4	56.9
Wild Food, hunting, harvest immature crops	Insurance	25	1.8	6.1
Consume seed stock	Crisis	53	3.9	12.8
Send HH members to eat elsewhere	Insurance	37	2.7	9.0
Begging	Crisis	16	1.2	3.9
Limit portion size at mealtimes	Insurance	170	12.6	41.2
Restrict consumption of adults	Insurance	68	5.0	16.5
Feed working members only	Insurance	31	2.3	7.5
Ration the money to buy prepared food	Insurance	16	1.2	3.9
Reduce the number of meals per day	Insurance	139	10.3	33.7
Skip entire day without eating	Insurance	46	3.4	11.1
Sell assets to buy food	Crisis	25	1.8	6.1
Total		1352	100.0	327.4

a. Dichotomy group tabulated at value 1.

Source: CBS, 2011, Nepal Living Standard Survey III

The analysis of coping strategies used by households reveals that approximately 67 percent of households cope by borrowing food or money. This is followed by 57 percent of households purchasing food on credit and 52 percent consuming less preferred and less expensive food. Least used coping strategies include rationing the money to buy prepared food and begging which is around 4 percent and this is followed by around 6 percent of households who manages by consuming wild food, hunting, harvesting immature crop and selling assets to buy food (Table 31).

An analysis was also done what types of crises coping strategies adopted by different households with education background of the household. Table 32shows the types of coping strategies adopted by households based on education of household head.

Table 32

Crisis Strategies Followed by Household Based on Education of Household Head

Education of HH Head		Crisis Strategies			Total
		Consume Seed Stock	Begging	Sell Assets to Buy Food	
<=0 years schooling	Frequency	34	11	19	64
	% within HH head education	53.1	17.2	29.7	
Literate, or <5	Frequency	9	4	3	16
	% within HH head education	56.3	25.0	18.8	
completed [5-7]	Frequency	6	0	1	7
	% within HH head education	85.7	0.0	14.3	
completed [8-10]	Frequency	2	1	1	4
	% within HH head education	50.0	25.0	25.0	
completed 11+	Frequency	2	0	1	3
	% within HH head education	66.7	0.0	33.3	
Total		53	16	25	94

Percentages and totals are based on responses.

a. Dichotomy group tabulated at value 1.

Source: CBS, 2011, Nepal Living Standard Survey III

Within the illiterate household heads majority around 53 percent consumed seed during the food insecurity situation which is followed by selling assets to buy food 30 percent and begging 17 percent. In terms of Literate education <grade 5 around 56 percent consumed seed, 25 percent resort to begging and around 19 percent selling assets to buy food. (Table 32).

An analysis was done to see status about the use of crisis strategy as per the place of residence. Table 33shows the information about the use of crisis strategies based on place of residence (rural or urban).

Table 33

Crisis Strategies Followed by Households Based on Place of Residence

Place of Residence		Crisis Strategies			Total
		Consume Seed Stock	Begging	Sell Assets to Buy Food	
Urban	Frequency	4	3	5	12
	% within residence	33.3	25.0	41.7	
Rural	Frequency	49	13	20	82
	% within residence	59.8	15.9	24.4	
Total		53	16	25	94

Percentages and totals are based on responses.

a. Dichotomy group tabulated at value 1.

Source: CBS, 2011, Nepal Living Standard Survey III

Analysis on place of residence shows that among the households using crisis strategy in the urban area majority coped through selling of assets to buy food around 42 percent; this is followed by consuming seeds 33 percent and begging 25 percent. In terms of rural households majority 60 percent cope by consuming seeds which is followed by selling of assets 24 percent and begging 16 percent (Table 33).

Table 34shows the different types of coping strategies adopted by different ethnic/caste groups.

Table 34

Household Coping Strategies Based on Ethnicity/Caste Groups

Ethnicity/Caste Group		HHs Coping Strategies			Total
		Insurance Strategies	Crisis Strategies	Both	
Hill Brahman	Frequency	23	0	3	26
	% within HHs coping strategies	6.9%	0.0%	3.9%	6.3%
Hill Chhetri	Frequency	40	1	18	59
	% within HHs coping strategies	12.0%	33.3%	23.4%	14.3%
Hill Dalit	Frequency	75	1	22	98
	% within HHs coping strategies	22.5%	33.3%	28.6%	23.7%
Hill Janajati	Frequency	91	0	12	103
	% within HHs coping strategies	27.3%	0.0%	15.6%	24.9%
Muslim	Frequency	14	1	4	19
	% within HHs coping strategies	4.2%	33.3%	5.2%	4.6%
Newar	Frequency	19	0	3	22
	% within HHs coping strategies	5.7%	0.0%	3.9%	5.3%
Other	Frequency	1	0	0	1
	% within HHs coping strategies	0.3%	0.0%	0.0%	0.2%
Terai Brahman	Frequency	2	0	0	2
	% within HHs coping strategies	0.6%	0.0%	0.0%	0.5%
Terai Dalit	Frequency	18	0	2	20
	% within HHs coping strategies	5.4%	0.0%	2.6%	4.8%
Terai Janajati	Frequency	16	0	3	19
	% within HHs coping strategies	4.8%	0.0%	3.9%	4.6%
Terai middle caste	Frequency	34	0	10	44
	% within HHs coping strategies	10.2%	0.0%	13.0%	10.7%
Total	Frequency	333	3	77	413
	% within HHs coping strategies	100.0%	100.0%	100.0%	100.0%

Pearson Chi-Square=21.819 df=20, p=0.350

Source: CBS, 2011, Nepal Living Standard Survey III

Analysis of coping strategies used by different ethnic/caste group shows that hill Dalits and hill Janajati use higher percentage of insurance coping strategy. This is followed by hill Chhetri and Terai middle caste 12 and 10 percent respectively. In terms of using crisis strategy only Hill Chhetri, Hill Dalit and Muslin used crisis strategies. When analyzed to see the use of both coping strategies Hill Dalit and Hill Chhetriare the one having higher percentage that is 29 and 23 percent respectively (Table 34).

Table 35shows the crisis strategies adopted by different ethnic/caste groups during the food insecurity situation.

Table 35

Households Adopting Crisis Strategies Based on Ethnicity/Caste of Household Head

ETHNICITY/CASTE		HH Adopting Crisis Strategies		Total
		No	Yes	
Hill Brahman	Frequency	23	3	26
	% within HH adopting crisis strategies	6.9%	3.8%	6.3%
Hill Chhetri	Frequency	40	19	59
	% within HH adopting crisis strategies	12.0%	23.8%	14.3%
Hill Dalit	Frequency	75	23	98
	% within HH adopting crisis strategies	22.5%	28.8%	23.7%
Hill Janajati	Frequency	91	12	103
	% within HH adopting crisis strategies	27.3%	15.0%	24.9%
Muslim	Frequency	14	5	19
	% within HH adopting crisis strategies	4.2%	6.3%	4.6%
Newar	Frequency	19	3	22
	% within HH adopting crisis strategies	5.7%	3.8%	5.3%
Other	Frequency	1	0	1
	% within HH adopting crisis strategies	0.3%	0.0%	0.2%
Terai Brahman	Frequency	2	0	2

ETHNICITY/CASTE		HH Adopting Crisis Strategies		Total
	% within HH adopting crisis strategies	0.6%	0.0%	0.5%
Terai Dalit	Frequency	18	2	20
	% within HH adopting crisis strategies	5.4%	2.5%	4.8%
Terai janajati	Frequency	16	3	19
	% within HH adopting crisis strategies	4.8%	3.8%	4.6%
Terai middle caste	Frequency	34	10	44
	% within HH adopting crisis strategies	10.2%	12.5%	10.7%
Total	Frequency	333	80	413
	% within HH adopting crisis strategies	100.0%	100.0%	100.0%

Pearson Chi-Square=15.595, df=10, P=0.112

Source: CBS, 2011, Nepal Living Standard Survey III

Analysis of use of crisis strategy revealed that Hill Dalits (29 percent) and Hill Chhetri (24 percent) have the highest percentage of using of crisis strategy during the food insecurity. This is followed by Terai Middle caste 12 percent (Table 35).

Overview of Food Insecurity and Coping Strategies Adopted

Food Insecurity

The analysis began by assessing the food security status of households. Around 7% of the households reported experiencing food shortages within the last 30 days, indicating a situation of food insecurity. This percentage represents a critical group that resorts to various coping strategies to mitigate the impact of food insecurity.

Coping Strategies Overview

Households employed two categories of coping strategies viz., insurance strategies and crisis strategies.Insurance Strategiesare less severe and do not compromise the household's future livelihood options. Examples of insurance strategy are eatingcheaper foods, borrowing (money or food), or reducing sizes of the meal etc. The Crisis Strategiesare those strategies

that can impact the household's social standing and future livelihoods such as begging, consuming seed stock, or selling assets.

Adoption of Coping Strategies

The findings indicate that the majority of food-insecure households (80.6%) primarily rely on insurance strategies. A smaller portion (0.7%) resorts exclusively to crisis strategies, while 18.6% of households utilize a combination of both insurance and crisis strategies to cope with food insecurity.

The analysis further shows that the majority adopt insurance strategies comprised of a diverse range of actions. The most common forms of strategy include borrowing food or money (66.6%), purchasing food on credit (56.9%), and consuming less preferred foods (52.3%).

Crisis Strategies are adopted by a small fraction of households, which indicates a severe level of desperation. These strategies are less frequently used due to their long-term negative consequences on households' livelihood and social well-being.

The analysis also examined how coping strategies vary among different ethnic/caste and education level. This reveals significant disparities. Certain groups, like Hill Dalits and Hill Janajatis, are more likely to adopt insurance strategies, which may reflect their relatively better access to social networks and community resources. In contrast, groups like Hill Chhetris are more inclined to engage in both insurance and crisis strategies. The educational level had also impact on selecting particular strategy. Households headwith no schooling are more likely to resort to crisis strategies, underscoring the link between education and the ability to secure more stable coping mechanisms.

Conclusion

In conclusion, the analysis of coping strategies shows that selection of coping strategy is highly influenced by household's socio-economic status, education levels, and ethnic backgrounds. While insurance strategies are predominant, the reliance on crisis strategies by a notable minority highlights.

CHAPTER VI
SUMMARY AND CONCLUSION

6.1 Summary

The association of different social dimensions when analyzed individually showed significantly associated with the food insecurity situation. However, a further analysis of all social dimensions namely gender of household head, ethnicity/caste of household head, household size, and education of household head, place of residence, income and ecological belt together showed some variation in the level of significance in the association with food insecurity situation. The gender of household head and ethnicity showed very weak evidence of association with the food insecurity situation. The logistic regression model shows that gender and some of the ethnic/caste group of household head does not show significant evidence of association with food insecurity after adjusting for education of household head, size of the households, household income, place of residence and geographical belt. After adjusting for other variables, it showed that the food insecurity in the household decreasesby 23.6% as the level of education of household head increases. Moreover, the food insecurity decrease by 35.5% as the household income increases. Similarly, with each increase in the household size, the food securityincrease by 55.7%. Likewise, compared to urban residents, the rural residents had more likely to experience food insecurityby 31.5%. The geographical belt showed that the households had less likely to face food insecurity as compared to the mountain.

Food insecurity situation of a household was affected by education of household head, size of the family, location of household (urban or rural), and income of household and ecological belts. However, there was no significant association with the gender of household head and ethnicity as mentioned above.

Analysis shows that households residing in the mountain belt are most food insecure and this is followed by hill and terai. When we see in terms of rural and urban setting the rural households are more likely to face food insecurity as compared to the households located in the urban area.

Gender and Food Insecurity

The association of gender of household head with the food insecurity is foundsignificant in single variable analysis, however;adjusted odd ratio did not show significant difference in food insecurity situation. That means the households with female household head and male household head did not show significant difference in deciding food insecurity situation of a household. The cross-tabulation of gender of household head and food insecurity showed association in chi-square test, while it is not significant in the logistic regression analysis, may suggest that the relationship between gender of household head and food insecurity is confounded by other variables. The logistic regression examined relationship between dependent variable (food insecurity) and multiple independent variables (education of household head, location of residence, income, size of family, ethnicity, etc.), while controlling for the effects of other variables. Thus, the significance of the gender of household head may be overshadowed by the effects of other variables in the model.

Agada (2014) discovered a outcome in her research, noting that in North Central Nigeria, most households were led by males, which could potentially enhance food security, as male-headed households have a greater capacity to mobilize labor compared to female-headed ones. Additionally, there is a strong connection between gender inequality and food and nutrition insecurity. For instance, in spite of India's rapid economic growth, countless women and girls continue to face food and nutrition insecurity as a direct consequence of their inferior status compared to men and boys (Bridge, 2014).

Education of Household Heads and Food Insecurity

Household having illiterate household head faces higher food insecurity. Around 21 percent of households with illiterate household head have the food insecurity situation. The food security situation improves with the level of education; this indicates that higher education of the household has lower percentage to food insecurity.

Family Size of Household and Food Insecurity

Household with larger number of family size faces high level of food insecurity. Analysis shows that households having four or below than four members found to be less affected by

food insecurity in comparison to households with 5 and more than five member of family member in the household.

Ethnicity/Caste and Food Insecurity

Ethnicity/caste did not show significant association with the food insecurity, however, the individual ethnicity/caste groups have shown association. Among the caste/ethnicity category hill Dalit, Muslim, Terai Dalit has the more likely to face food insecurity by 3.418, 2.083 and 2.280 times as compared to the hill Brahmin.

Shanta (2020) found that her research results indicated increased food insecurity among women of childbearing age in Nepal, especially within the Dalit community, even after taking into account other pertinent aspects. She noted that these outcomes were in line with existing studies, and the notably high occurrence of food insecurity among Dalits suggests that social exclusion plays a crucial role in food insecurity experiences. She emphasized that this information could be beneficial for policymakers and social work experts in deciding on approaches and targeted populations for initiatives focused on accomplishing the 2030 Sustainable Development Goals.

Location of Household (Ecological Belt and Rural or Urban Setting) and Food Insecurity

Status of food insecurity is high in the mountain belt. Similarly, food insecurity situation is more prevalent in themountain as indicated in the Nepal Demographic and Health Survey, 2016. Households belonging to the mountain have higher food insecurity (62 percent) compared to hill (53 percent) and terai (49 percent) belts. Similarly, analysis of the location of households (urban and rural) and food security situation was assessed; the analysis revealed that the rural households are more likely to face food insecurity as compared to the households located in the urban area. Around 18 percent of rural households are food insecure as compared to 8 percent of urban households

Household Income and Food Insecurity

Household income was divided into five quintiles—first being the lowest income quintile and fifth being the highest. There is strong evidence of association between food insecurity and household income. Around one third of the households belonging to the first group reported

that the food is ‘less than adequate’ in their household compared to very small percentage (around four percent) of the households in fifth group.

Coping Strategies Adopted by the Households During Food Insecurity

During the food insecurity situations, household resort to different coping mechanism to mitigate the impact of food insecurity. Analysis was done types of coping strategies adopted by the households to mitigate the impact of food insecurity. Coping strategies include different options to adapt out of key 14 strategies (three as crisis strategy and remaining as insurance strategy). Crisis strategies are more severe types of options that hampers the future livelihood and have social image impact. These strategies include consuming seed stock held for next season, sending household members to beg and selling of assets, jewelry to purchase food. And remaining coping options are categorized as insurance strategies. Insurance strategies as more light that do not hamper the future livelihood options. This category covers a variety of coping mechanisms, including relying on less expensive and preferred foods, borrowing money or food, asking friends or family for assistance, buying food on credit, gathering wild food, hunting or harvesting immature crops, sending household members to eat somewhere else, etc. They are called insurance strategies because they do not jeopardize future means of subsistence.

Analysis shows that majority households adopt insurance strategies and very small number of households adopt crisis strategies. Majority uses multiple strategies to cope during the food insecurity situation. Most used coping strategy is borrowing food or money; this is followed by purchase of food on credit and consuming less preferred and less expensive food. Least used coping strategies include rationing the money to buy prepared food and begging and this is followed by consuming wild food, hunting, harvesting immature crop and selling assets to buy food. Coping strategies adopted by different households with education background differs the illiterate household heads majority consumed seed during the food insecurity situation which is followed by selling assets to buy food and begging. The households residing in the urban area coped through selling of assets to buy food, consuming seeds and significant percentage (25) begging. However, majority of rural households cope by consuming seeds which is followed by selling of assets and begging.

Famida (2017) conducted a study in Bangladesh, which found that most households were significantly more likely to use a combination of financial and food-compromising coping

strategies. The research also showed that the educational level of the household head and women, the occupation of the primary income earner, household income, food insecurity status, assets, household size, and ownership of agricultural land were all independently and significantly correlated with the adoption of both financial and food-compromising coping strategies, rather than solely financial coping strategies.

6.2 Conclusion

In this study, the association between food insecurity and social dimensions of food insecurity viz., gender of the household head (male and female), caste/ethnicity (Hill Brahmin and Chhetri, Tarai Brahmin, Terai middle caste, Hill Terai Dalit, Tarai (Madhesi) Other Caste, Hill Dalit, Tarai Dalit, Hill Janjati, Tarai Janjati and Mulsim, others.), education of household head (illiterate or 0 years of schooling, literate completed below grade 5, completed grade 5-7, completed grade 8-10, completed 11+), size of the family (below 4 and 5 and above)), income of the households (in quintiles), residence (rural versus urban) and geographical belt (mountain, hill and terai) location of households was done using data from the 2011 Nepal Living Standard Survey.

The analysis, which employed chi-square tests and logistic regression, revealed significant associations between food insecurity and social dimensions caste/ethnicity, education level of the household head, family size, household income, residential location (rural vs. urban), and geographical belt. Interestingly, gender of the household head and ethnicity were the only factors that did not show a significant association with food insecurity. These findings enhance the understanding of the complex interplay of factors influencing food insecurity in Nepal and underscore the need for targeted interventions to address the issue among the most vulnerable populations.

The findings of this study shed light on the multifaceted nature of food insecurity in and its association with various socioeconomic and socio-economic factors mentioned above. A deeper understanding of these associations is critical for the design and implementation of effective policies and programmes to alleviate food insecurity.

The significant association between some of the caste/ethnicity categories and food insecurity highlights the role of social stratification and its implications on access to adequate food. Specific castes or ethnic groups may face unique challenges and require tailored interventions to address their particular circumstances.

Similarly, the education level of the household head was found to have a significant association with food insecurity. This finding emphasizes the importance of education in improving the overall well-being of households, as it may lead to better access to resources and information, as well as increased decision-making capacity.

The association between family size and food insecurity underscores the potential strain that larger families may experience when trying to fulfill the nutritional requirements of all individuals in family. This may require interventions that support family planning and nutritional education to ensure that resources are effectively allocated within households.

Household income was also found to be significantly associated with food insecurity, which is expected given that financial resources directly impact the ability to secure adequate food. Targeting low-income households with financial assistance or other support programs may help to addres food insecurity in these populations.

The analysis also identified a significant association between residential location (rural vs. urban) and food insecurity, indicating that rural populations may be more at risk of food insecurity because of factors like restricted access to markets, lower agricultural productivity, and fewer employment opportunities. Interventions targeting rural communities may be necessary to address these specific challenges.

Lastly, the location of household plays important role in food insecurity. This emphasized the need to consider the unique environmental and infrastructural barriers experienced by households in various topography such as mountainous, hilly, or Terai regions, when designing policies and programs for ensuring food security.

The lack of significant association between gender of the household head and food insecurity suggests that this factor may not play a major role in determining food security status. However, it remains essential to consider the potential gender dynamics within households that could influence access to and control over resources.

In addition, the study examined various coping strategies adopted by households, revealing that more than 80% of food-insecure households employed insurance strategies, while 18% of households utilized both coping strategies to manage food insecurity.

In conclusion, addressing food insecurity requires a comprehensive understanding of the various socio-economic factors influencing food security and development of targeted, context-specific policies and programmes. By considering the unique challenges faced by different population groups, policymakers and practitioners can design more effective strategies to improve food security and overall well-being in the country.

Considering the findings, development practitioners and policy makers should consider better targeting of the programme based on the evidence. Targeting of food security programmes to the poor of mountain regions, who are illiterate is most needy and targeted and prioritized first. This should be followed by Dalit communities residing in the terai who are illiterate.

Further, in order to better understand the implications of these results, future studies could be done to identify micro issues related to food insecurity especially the intra household food insecurity. Further, a study seems imperative in the urban area since the urban poor could be the most vulnerable at the cities and urban centers.

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APPENDIX

VARIABLES CODEBOOK

Ecological Belt

		Value	Count	Percent
Standard Attributes	Label	Belt		
Valid Values	1	Mountain	408	6.8%
	2	Hill	3203	53.5%
	3	Terai	2376	39.7%

Place of Residence

		Value	Count	Percent
Standard Attributes	Label	Place of residence		
Valid Values	0	Urban	2087	34.9%
	1	Rural	3900	65.1%

Family size

		Value	Count	Percent
Standard Attributes	Label	Size of the family		
Valid Values	1	Below 4	3052	51.0%
	2	5 and above	2935	49.0%

Gender of Household head

		Value	Count	Percent
Standard Attributes	Label	Gender of HH head		
Valid Values	0	Male	4387	73.3%
	1	Female	1600	26.7%

Education of Household Head

		Value	Count	Percent
Standard Attributes	Label	Education of HH head		
Valid Values	1	<=0 years schooling	2657	44.4%
	2	Literate, or <5	828	13.8%
	3	completed [5-7]	767	12.8%
	4	completed [8-10]	688	11.5%
	5	completed 11+	1047	17.5%

Ethnicity/Caste of Household Head

		Value	Count	Percent
Standard Attributes	Label	Ethnicity of HH head		
Valid Values	1	Hill Brahmin	931	15.6%
	2	Hill Chhetri	1158	19.3%
	3	Hill Dalit	514	8.6%
	4	Hill Janajati	1366	22.8%
	5	Muslim	191	3.2%
	6	Newar	569	9.5%
	7	Terai Brahmin	36	0.6%
	8	Terai Dalit	182	3.0%
	9	Terai Janajati	353	5.9%
	10	Terai middle caste	638	10.7%
	11	Other	49	0.8%

Food Insecurity Binary

		Value	Count	Percent
Standard Attributes	Label	Food Insecurity		
N	Valid	5987		
	Missing	0		
Labeled Values	0	Food Secure	5106	85.3%
	1	Food Insecure	881	14.7%

Number of Total Households

		Value	Count	Percent
Standard Attributes	Label	Percentile Group of HH income		
Valid Values	1	First	1197	20.0%
	2	Second	1198	20.0%
	3	Third	1197	20.0%
	4	Fourth	1198	20.0%
	5	Fifth	1197	20.0%