A STUDY ON EFFECTIVENESS OF HOUSEHOLD FOOD SECURITY IN PUNJAB

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IN

MANAGEMENT

By

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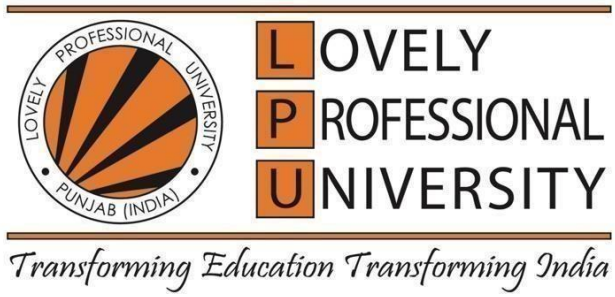

LOVELY PROFESSIONAL UNIVERSITY, PUNJAB

2022

DECLARATION

I, hereby declared that the presented work in the thesis entitled "**A STUDY ON EFFECTIVENESS OF HOUSEHOLD FOOD SECURITY IN PUNJAB**" in fulfilment of degree of **Doctor of Philosophy (Ph. D.)** is outcome of research work carried out by me under the supervision Dr. Tawheed Nabi working as Assistant Professor in the Department of Economics of Lovely Professional University, Punjab, India. In keeping with general practice of reporting scientific observations, due acknowledgements have been made whenever work described here has been based on findings of other investigator. This work has not been submitted in part or full to any other University or Institute for the award of any degree.

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CERTIFICATE

This is to certify that the work reported in the Ph. D. thesis entitled "**A STUDY ON EFFECTIVENESS OF HOUSEHOLD FOOD SECURITY IN PUNJAB**" submitted in fulfillment of the requirement for the reward of degree of **Doctor of Philosophy (Ph.D.)** in the Management is a research work carried out by Sugandh Arora (11720087) is bonafide record of his/her original work carried out under my supervision and that no part of thesis has been submitted for any other degree, diploma or equivalent course.

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Name of supervisor: Dr. Tawheed Nabi

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ABSTRACT

Background: *Food security is at the forefront of worldwide advancement plans. To guarantee that food security is a great food achievement, all individuals should have monetary, physical, and social methods to obtain nature's food, and manageable cycles should be established to fulfill this persistent need. Non-industrial nations, such as India, Bangladesh, Pakistan, and a few African countries, are troubled bythe double burden of population growth and the severe effects of ecological changes that lead to food poverty (Masipa, 2017; Niang et al., 2014). India is home to 8.9 percent of its population that is hungry and malnourished. Currently, almost 10 percent of the total population is affected (FAO, 2020). In the Global Hunger Index (GHI)2020 report, India ranked 94th out of 110 countries. India's nutritional and health difficulties are likely to deteriorate substantially in coming decades. These circumstances necessitate that long-term food security be examined not only in terms of current food availability but also in terms of accessibility, utilization, and sustainability. Punjab's significant contribution to India's food security is demonstrated by the fact that it contributed 14 percent of the country's total grain production from only 1.5 percent of the country's total land and supplied 33 percent of the country's total wheat purchases by public agencies in 2019–20 (GoI, 2020). Punjab's nearly double food grain output relative to the average Indian yield made it the "Granary of India" and a model for agricultural development until it began to experience the negative externalities of the green revolution. The success of Punjab's intensive agriculture has been criticized for being detrimental to the environment. Recent evidence of erratic precipitation and rising temperatures in the northern Indian plains, estimates of significant loss in gross margin per hectare from crops due to temperature rise and alarming depletion of natural resources, especially groundwater, in the state have endangered the sustainability of the state's agriculture and raised concerns about long-term food security at the national, regional and international levels. Therefore, the main aim of the present study is to identify the determining factors of household food security and covariates of vulnerability in the northern state of Punjab, India, along with the effectiveness of food security schemes and policies.*

Aim of the Study: *This research identified facilitating and demographic factors, consumption patterns, and covariates of vulnerability that affect beneficiaries and evaluated the performance of the PDS based on the satisfaction level ofbeneficiaries. Furthermore, it summarizes the approach suggestions and makes proposals for formative strategies at large.*

Research Design: *The present study is a descriptive, cross-sectional study conducted in the north Indian state of Punjab. Data were collected from respondentsof both rural and urban areas through a self-structured questionnaire adapted from "HFIAS." This study used the "multistage area sampling" technique. In the primaryphase, Punjab was geographically clustered into three different regions: Doaba, Majha and Malwa. In the Subsequent phase, 50 percent of the districts were selected from each geographical cluster, based on their high and low per capita income levels. Rural and urban areas were selected for each district. A three-stage design was employed in the rural and urban areas of Punjab. In the first stage, one town or city was selected based on the highest number of fair price shops in urban areas. In the second stage, 10 percent of the wards were randomly selected from each city/town, and one enumeration block (EB) from each sampled ward. Finally, households within each enumeration block (EB) were selected using simple random sampling. The data analysis was done with the help of Chi-square, measure central tendency, logistic regression, min-max method. Socio-economic factors of food security at the household level in all regions of Punjab were identified using a binary logistic regression. The consumption pattern and expenditure on food items among the Punjab respondents were analyzed using the mean, p-value and percentage. Exposure based on the economic and climatic aspects of vulnerability in rural and urban Punjab were examined with the help of percentage, mean, standard deviation and rank. Similarly, household food security coping strategies in rural andurban Punjab were calculated based on percentages, means, standard deviations and rankings. Finally, the effectiveness of household food security through percentage, mean, chi-square and functional grid through activity mapping for the National Food Security Mission (NFSM) is to lay out an empowering framework for the state-of-the-art execution of the Centrally Sponsored Scheme (CSS), bringing about expanded results concerning nature and extension. Accordingly, it would act as an aide for execution by the district*

collector and other significant District-level authorities, working with quick finding out about the scheme, its execution modalities and the obligations and obligations of different functionaries.

***Findings of the Study**: Analyses revealed that all four aspects had a significant impact on food insecurity. The results revealed that 56 percent of households were food insecure. Malwa had 61 percent food food-insecure households. Doaba and Majha Punjab fared well (58 and 45 percent, respectively). Four variables were statistically significant for Mahja, five for Doaba and nine for Malwa. Affordability, age and economic position were statistically significant and had positive impacts on food security in all three regions; however, the types of improvement varied. Therefore, this study considered the importance of these variables in each region. Analyses of consumption patterns revealed that rural households spent more per capita on pulses, whereas urban households spent more on the remaining vegetables, milk and its products, snacks and beverages. Milk and its products, fruits, vegetables, edible oils and beverages were luxury commodities in the provincial regions and became necessities in urban Punjab. Changes in food consumption patterns in rural and urban areas are influenced by income and expenditures. Thus, improving household consumption patterns, especially in rural regions, requires a balanced mix of beneficiary-oriented programmes. Most urban households have lost jobs due to the pandemic, which has increased household expenses due to mortality and morbidity. Irrigation can mitigate climate shock. A substantial majority of respondents in Punjab favored "borrowing money from relatives to deal with household food insecurity" and "buying food on credit to meet basic needs" whereas 6.10 percent of respondents observed "borrowing money from friends" as the least preferred income-based coping strategy. Restricting adults' consumption to secure food for small children was the most desired consumption based coping strategy, followed by "purchasing less expensive food" and "limiting portion sizes at mealtimes." Few respondents used income-based coping methods. In both regions, 5.88 percent of the respondents borrow from moneylenders or banks to cover basic needs. In Punjab, 16 percent of the respondents were highly dissatisfied with the proximity of FPSs and 42.6 percent were unsatisfied with the quality of the grains offered of the respondents, 39.45 percent were highly disappointed with the quality, while 52 percent were highly*

dissatisfied. The survey respondents were disappointed because they frequently received rotting or fungus-covered grain. Out of the respondents, 48.10 percent were highly dissatisfied with their food entitlement. Some family members' names were not on the ration card; therefore, they were not entitled to food. The exclusion of families and political intervention played a key rolein this portion. 42 percent of the Punjab respondents were highly dissatisfied with food grain entitlements. As rural respondents were highly disappointed with the measuring process, they did not receive the full quota. Most of the time, they did not obtain the full 30 kg of wheat; there was always an issue with the quantity measure and the actual weight of the package was less than 30 kg. Thirty percent of urban respondents were satisfied with the measurement process, but only 2.7 percent of rural households were satisfied. Punjab accounted for 41.76 percent of the dissatisfied respondents. Out of the respondents, 39.45 percent were highly dissatisfied with the timely availability of products and 42.6 percent were upset because they did not receive SMS on their phones and did not know about the proper availability. Out of the respondents, 52.1 percent were unsatisfied with on-time delivery. Urban and rural respondents reported clean PDS outlets. 48 percent of rural and 54.9 percentof urban residents strongly believed that digitization should be included in the PDS. A total of 6.86 percent of rural and 6.57 percent of urban respondents said that black marketing, leakage and corruption hindered PDS. 6.02 and 6.108 percent in rural and urban regions, respectively, knew people with bogus ration cards. Non- availability of food grains, grain deterioration, depot holder inefficiency, unjust grain distribution and preference for known people were also factors. The unavailability of rations and unpleasant salesmen are common difficulties in ration shops. The non-availability of food grains is attributed to storage and transport challenges, irregular government supply and a lack of government oversight and control (5.73 percent in rural areas and 5.82 percent in urban areas). Thus, challenges and problems undermine the efficiency and implementation of PDSs. Furthermore, this study presented an overview of a method developed for policy analysis on the functional grid of national food security, which describes the key elements of an activity approach based on public policy principles that help understand how and where these activities influenced rhetoric to reality grounds.

***Conclusion**:*

Household food security is associated with several factors. The different regions of Punjab are affected by various factors. Four variables were statistically significant for Mahja, five for Doaba and nine for Malwa. Affordability, age and economic position increased food security in all three regions. However, the types of improvements varied, whereas access to the market, distance to the market and farm income negatively affected food security at the household level. Therefore, it is necessary that the importance of these variables have no similar impact on each region. Furthermore, food-insecure households used both consumption and asset based coping strategies, but a large proportion of the respondents preferred to borrow money from their friends and relatives. Cutting meals, reducing meal frequency and selling assets are the main coping mechanisms of food-insecure households. Urban regions are highly vulnerable. Most urban regions were affected by employment loss and increased household expenses due to mortality and morbidity, as well as rural areas due to climate shocks. In the public distribution system, there are still problems such as the non-availability of food grains, deterioration of food grains and unsatisfactory quality and quantity of commodities. Most respondents blamed the government, not FPSs owners. People's general perception is that the government is responsible for every problem. Therefore, a major issue was found in policy formulation and implementation at the ground level. Therefore, policy formulation and execution are important issues. The present study aimed to frame a functional grid through activity mapping of food policy at the ground level and cover all root-level features followed by public finance principles. Although the Government of India initiated different schemes, such as the Public Distribution System, Mid-Day Meal and Integrated Child Development Scheme for BPL households by providing food items at a subsidized rate, because of the identification of BPL households based on old census data, incorrect inclusion and exclusion of beneficiaries and distributive loopholes, achieving household food security is far from satisfactory. Therefore, it is important to re-examine BPL beneficiary identification and confirm distributive fairness in PDS and other government initiatives. Future interventions should focus on strengthening households' capacity and resilience by expanding access to human, financial and physical resources. This study found that improving food availability and usage is

more important than extending food access for Punjab's food security framework. This study will help developing countries such as India, with similar public food distribution systems. These findings have implications for policymakers, scholars and stakeholders in India's most agriculturally productive state. As a public policy tool, it helps to build food security policy frameworks and state- and district-level plans and strategies.

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सर्वद्रव्येषुवर्ध्यै र् द्रव्यमाहुरनुत्तमम्।।
अहार्वत्वादनर्ध्वत्वादक्षत्वाच्च सर्वदा ॥

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(Sugandh Arora)

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LIST OF ABBREVIATIONS

Sr. No.	Description	Abbreviation
1.	AAY	Antyodaya Anna Yojana
2.	APL	Above Poverty Line
3.	BPL	Below Poverty Line
4.	CMR	Child Mortality Rate
5.	CSO	Central Statistical Office
6.	CSS	Central Social Scheme
7.	DAC	Department of Agriculture and Cooperation
8.	DBT	Direct Bank Transfer
9.	ESOP	Economic and Statistical Organization of Punjab
10.	FAO	Food and Agriculture Organization
11.	FRL	Food Related Lifestyle
12.	FSIN	*Food Security* Information Network
13.	FW	Farmers Welfares
14.	GHI	Global Hunger Index
15.	GOI	Government of India
16.	GP	Gram Panchayat
17.	GSDP	Gross State Domestic Product
18.	HFS	Household Food Security
19.	HFIAS	Household Food Insecurity Access Scale
20.	HYV	High Yielding Variety
21.	IBEF	India Brand Equity Foundation
22.	ICDS	Integrated Child Development Scheme
23.	IFAD	International Fund for Agricultural Development
24.	INR	Indian Rupee
25.	MDM	Mid-Day Meal
26.	MMR	Maternal Mortality Rate
27.	MNREGA	Mahatma Gandhi National Rural Employment Guarantee Act
28.	NFHS	National Family Health Survey

29.	NFSA	National Food Security Act
30.	NSSO	National Sample Survey Office
31.	PAFC	Punjab Agro Food grains Corporation
32.	PDS	Public Distribution System
33.	SAP	Structural Adjustment Programme
34.	SDGs	Sustainable Development Goals
35.	SRS	Simple Random Sampling
36.	TPDS	Targeted Public Distribution System
37.	UNDP	United Nations Development Programmes
38.	UNICEF	United Nations International Children's Emergency Fund
39.	USDA	United States Department of Agriculture
40.	VC	Vigilance Committee
41.	WFP	World Food Programme

CHAPTER-I
INTRODUCTION

1.1. Background of the Study

"Every man, woman, a child has the intangible right to be free from hunger and malnutrition." ***- World Conference (1974)***

In the early 1970s, because of the significant unpredictability of agricultural product prices and market turmoil in the currency and energy markets, food security was primarily centered on ensuring food availability and price stability for critical items (Berry et al., 2015). Food security must consider vulnerable and impacted individuals' fundamental necessities and behaviors (Shaw, 2007). According to the United Nations (1975), *"The continuous availability of adequate world food supply of basic commodities to maintain steady increases in demand and compensate for variations in production and pricing."* In 1970, it was estimated that a protein-energy shortfall would affect approximately 25 percent of its population. After gaining a better understanding of food security issues, a more comprehensive approach was established. The FAO expanded the notion of food security to ensure that vulnerable individuals have access to an appropriate supply due to better knowledge of how farming markets function under strain and how vulnerable residents become food insecure. Economic access to food has become a significant factor in determining food security (Berry et al., 2015).

After that, FAO (1983)"*Ensuring that all people have physical and economic access to the basic foods they require*." The World Bank's pivotal advance was to learn about destitution and hunger (World Bank, 1986). This study developed a global scale for food security by isolating persistent, destitution-related food frailty from intense, transient food uncertainty caused by regular and man-made disasters. These were reflected in the origination of food security being extended to incorporate "*Each individual approaches adequate nourishment for a functioning, solid life consistently"* (Berry et al., 2015). Furthermore, the Human Development Report of the United Nations Development Program (UNDP, 1994) investigated the prerequisites for human security. Second, food security was integrated into the

conversation on standard freedom as a federal retirement aide. Because food security research is usually context-dependent on which technical outlooks and policy concerns were studied, this complex and varied operational construct lackeda precise definition. International dialogues in preparation for the 1996 World Food Summit and Shaw (2007) redefined food security to reflect the intricate interactions between and among individuals, households, and even global levels to bring greater consistency to this complexity. According to F.A.O. (1996), "*Food security is achieved on all levels when all people have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences at all times*." With the emergence of the term "food security" in the middle-1990s, the concepts nutrition *security*" and "*food and nutrition security*" followed.

Consequently, food security is classified as a "nutrition and food security" subcategory. In "The State of Food Insecurity in the World 2001", the aspect of food security was enlarged to include the social component (FAO, 2002). Although eliminating poverty is vital, it alone will not accomplish this goal (FAO, WFP, and IFAD, 2012). The last formal adjustment was made during the World Food Summit (2009), adding a fourth characteristic of food security stability (FAO, 2009).

1.2. Meaning and Various Aspects of Food Security

Food security is a flexible term, as illustrated by multiple attempts at defining it in study and policy. Over 200 published reports on food security two decades ago indicated the definition's contextually sensitive qualities (Maxwell andSmith, 1992). In the World Food Summit (1974), food security was defined as "a sufficient global food supply of fundamental commodities to guarantee stable growth in food demand and to limit production and price instability." In contrast,the World Bank stated in 1986, "Equal access to adequate food for an active and healthy life." Furthermore, the World Food Summit (1996) defines food security as"*physical and economic access to sufficient, safe and nutritious food that meets dietary requirements and food preferences for an active and healthy lifestyle*." According to FAO (2002), "*Food security exists when all people have continuous physical, social and economic access to sufficient, secure and nutritious food that meets their dietary requirements*

and food preferences for an active and healthy lifestyle." The most recent revision to this notion occurred during *the World Food Security Summit (2009) when a final aspect - 'stability'-was acquainted as a momentary proportion of the food Framework's capacity to persevere through shocks, cataclysmic events, and unnatural calamities (FAO 2009).* Additionally, "Food Security" has grown to encompass acute Food Security. The affordability, production, and availability of food influence food security. The food supply alone does not provide food security, and access to food is crucial. According to the FAO 2008 report, four critical factors must be considered. Food security is contingent on food availability. Each country must ensure an adequate supply ofnutritious food. Second, food availability is crucial for every country's population toreceive sufficient nutrients. Domestic production, stockpiling, and food assistance provide these foods. Third, food production and security are inextricably linked (Conceicao et al., 2011). However, relying primarily on food production to meet nutritional needs is difficult due to resource restrictions and climate change.For instance, shortages of agricultural inputs, high population growth rates that exceed increases in productivity and trade, and poor marketing and transportation networks have reduced food availability. The third component is economically and physically accessible food, which refers to the means necessary for a nutritious diet. Food security requires both physical and financial availability (Kennedy et al., 2004).

According to FAO (2008), Food security encompasses four dimensions:

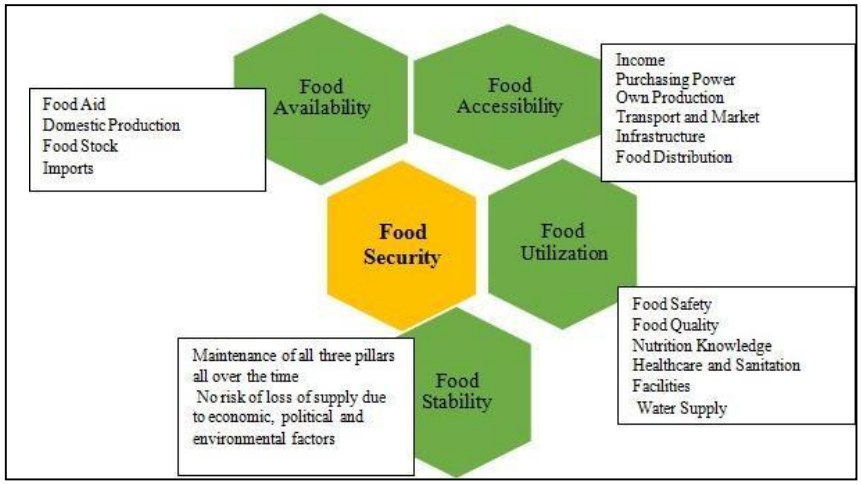
Availability: Food made nearby and food traded in other countries.

Affordability: Food can be transported to the buyer provided the latter has adequate finances to purchase. Physical and monetary accessibility are matched by socio-cultural availability, ensuring that food is socially acceptable and that well-being nets exist for the less fortunate.

Utilization: Individuals consume adequate quantity and quality of food to live a healthy and meaningful life and achieve their full potential. This level also includes sufficient, safe, and clean water and sanitation. Additionally, individuals must be physically healthy to process and absorb food properly.

The fourth aspect is concerned with **stability**, which affects the nation's, communities and the food chain system's ability to withstand shocks caused by natural and man-made disasters. Food security can occur at several levels. National availability, accessibility at the household level and individual utilization and stability may be understood as time dimensions that affect all levels. All four parameters must ensure comprehensive food security. Food accessibility can be classified into two categories. Physical access to food refers to transportation,storage, processing, and marketing. Along with purchasing power, economic accessibility is frequently viewed as the most crucial indication of access to nutritious foods. Individual food insecurity is exacerbated by insufficient aggregate economic growth, the nonexistence of employment opportunities, an absence of incentives to participate constructively in the market, the unfavourable consequences of national monetary policy and a lack of training or job skills. Utilization describes the optimal means by which the body utilizes several nutrientsfound in meals. This indicates an understanding of correct food preparation, storage,and nutrition. Utilization contributes to food security by ensuring that people accessnutritious foods, safe drinking water, adequate sanitation, and healthcare. Thus, their physiological requirements were satisfied. In impoverished and developing countries, clean water and sanitation are vital components of a healthy lifestyle (Mara 2003). Food security is a complex issue that is critical for maintaining all aspects of food security. Recent events have emphasized the need for sustainability,the fifth pillar of food security.

Figure 1.1 Important Aspects of the Household Food Security



Source: Rely et al., 1999; Rely et al., 1995 and FAO, 2010

Sustainability considers ecological, biological and climate change indicators at the regional level, which can disturb food security for future generations (Berry et al., 2015).

The World Summit and FAO (2009) definition of food security used the phrase "*four pillars of food security: availability, accessibility, utilization and stability"*. However, this pillar representation of the concept is slightly misleading because the four dimensions are interconnected, relatively static and distinct. Four-dimensional weighting imposes a barrier to showing the four pillars, as it requires an average weighting of 25 percent for all four aspects. However, as illustrated by all the elements, not all components of food security are critical. Their relative importance varies by circumstance and country (Berry et al., 2015). As accessibility in underdeveloped countries is dependent on the transportation infrastructure, physical accessibility is restricted. Economic access is a crucial obstacle to food security in wealthier countries. Following a natural disaster, such as an earthquake, ensuring that resources are available, accessible, usable, and stable is critical. Under these disparate circumstances, the weights of the four dimensions should not be comparable. Rather than pillars, the road is a more appropriate metaphor for the relationships between the four components of food security.

1.3. Food Insecurity

Food insecurity develops when there are difficulties with the food consumption cycle. Food insecurity is defined as "any situation in which the availability of nutritionally adequate and safe foods, or the ability to obtain such foods in socially acceptable ways, is limited or uncertain." Food instability, as drilled in the United States, occurs when there is (1) vulnerability to future food accessibility and access, (2) An inadequacy of the amount and kind of food fundamental for a solid way of life, or (3) the need to gain food in socially incorrect ways (National Research Council, 2006). Aside from the most well-known requirement, deficient monetary assets can emerge when there is accessibility and openness, yet they cannot be consumed owing to physical or different limits, such as oppressed work (National Research Council, 2006). Priority should be given to the most disadvantaged and

vulnerable, emphasizing health equity. They are threatened by a variety of natural and anthropogenic disasters. Additionally, they require immediate improvement in their ways of coping with food insecurity. Contrary to the widespread assumption, the groups of people most vulnerable to food insecurity, such as migrants, disabled and aged persons, are frequently excluded from food security surveys, exaggerating the problem.

1.3.1. Association between Food Security and Food Insecurity

Individual food security or insecurity level is determined by combining food demands and coping strategies. All aspects of food security can be affected by stressors and are further connected to food insecurity. Anxieties are elicited at multiple levels, including national, domestic and individual levels. In other words, the two processes are linked by recursive feedback loops in which stress causes coping behaviors that may or may not be appropriate. These responses must be changed until food security is restored (Ping & Berry, 2018).

1.3.2. Household Food Security

Household food security (HFS) is defined as households that have secure and permanent access to a diverse range of foods in adequate quantities and varieties to enable all household members to live a healthy, active and productive life. According to Gillespie and Mason (1991), an HFS is a term refers to a household's members' self-perceived ability to receive sufficient food, whatever they choose. Thus, it is critical to link national and household food security. Both terms refer to adequate food availability to meet food requirements, leading to a healthy and active lifestyle. This implies that food is secure in quality, quantity, safety, cultural acceptance and future aspirations and national food security is critical for laying thegroundwork. However, what matters most is food security for each household and family member (Jenkins and Scanlan, 2001; Bickels et al., 2000). According to Benson (2004), "A person's capacity to reach his or her full personal and economic potential is greatly dependent on his or her level of nutrition security." However, several household criteria, including household income, consumption patterns, housing conditions, social etiquette, interests and preferences, all contribute to establishing an

individual's food security within their family. Each household member contributes to the manufacturing of everyday products and assists in achieving the required level of food security. HFS is determined by physical access to food and appropriate purchasing power. Adequate nutrition is required at the household level to meet the health needs of all the members. It is likewise affected by non-food factors, such as great wellbeing, clean practices and social principles. Along these lines, while family food security is important for general dietary prosperity, it is not the focus of this study.

Table 1.1 Four Aspects of Household Food Security Status and their Definitions

HFS Status	Definition
Food Secure	Households exhibit no or minimal signs of food insecurity.
Food Insecure (Without Hunger)	Concerns about the adequacy of the household food supply and changes in household food management are indicators of food insecurity, such as decreasing food quality and greater use of unconventional coping mechanisms. However, members' food intakeis reported to have decreased little or not at all.
Food Insecure with Hunger-Lesshousehold Severe	Food insecurity is a prevalent problem among households. Household members' concerns regarding the adequacy of food supply and food management changes, including decreased food quality and increasing reliance on unconventional coping mechanisms. However, members' food intake has decreased little or not at all.
Food Insecure with Severe Hunger	In this stage, all households who are having children have reduced their food intake to a degree indicative of hunger. This has previously occurred in some other families with children at a less severe severity. However, adults in households with and without children consistently experienced more significant reductions in food intake.

Source: Bickel et.al, 2000

1.4. Conceptual Framework on Effectiveness of Household Food Security

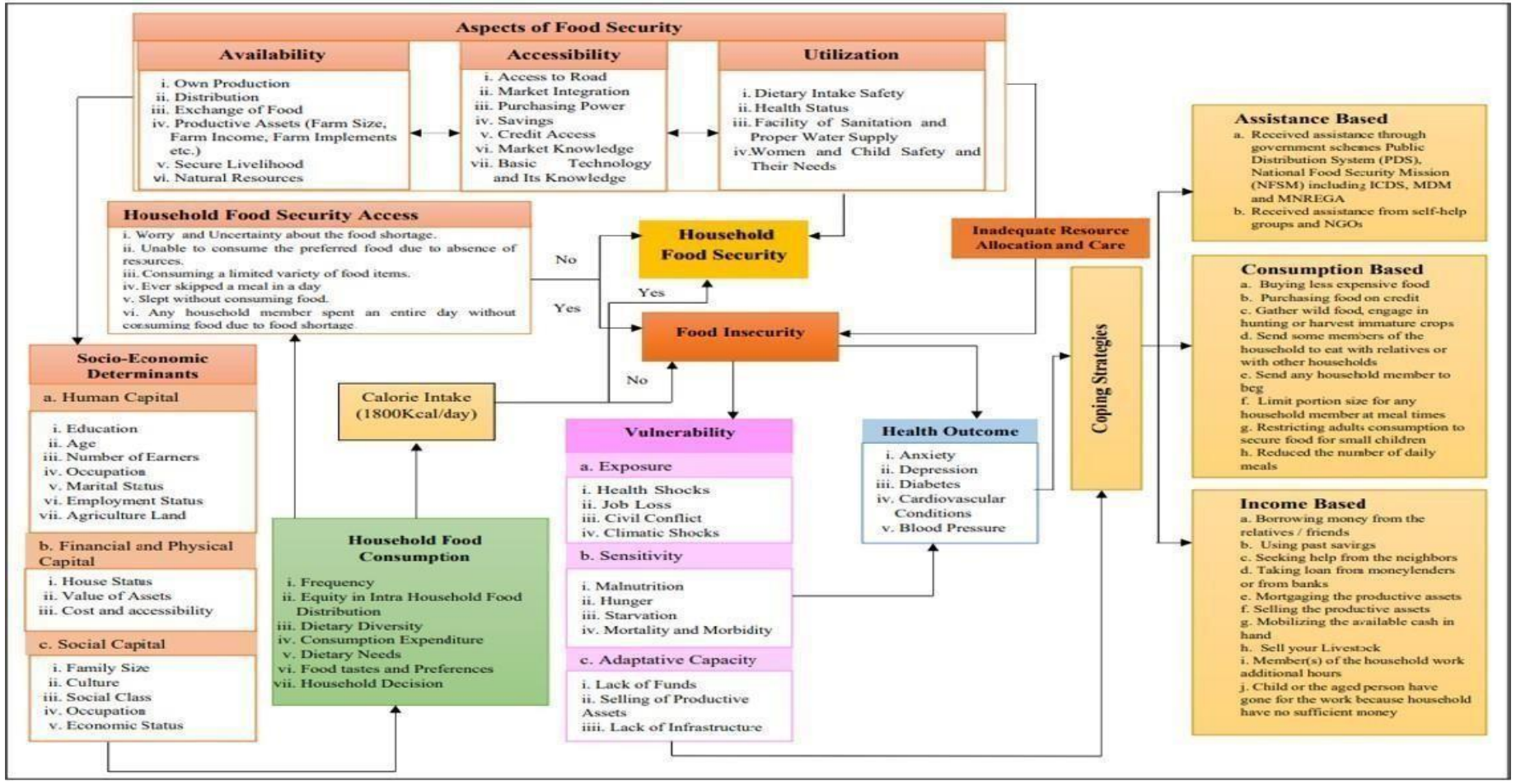
The conceptual framework for various aspects of the HFS is shown in Figure 2. The framework is categorized into five major sections: aspects of food security, socioeconomic factors, consumption patterns, vulnerability, and coping mechanisms. The present framework on household food security explored the integrated trans disciplinary pathway among the various aspects of food security, viz. food

availability is measured in terms of its physical existence in a country or region; food accessibility is measured in terms of the ability to acquire food through self-production, purchases, gifts and borrowing and utilization; or the capacity to derive all biological assistance from food is measured in terms of food safety and individual health status, socioeconomic determinants, consumption patterns, vulnerability statuses and tentative coping strategies employed by in response to insufficient food access, income challenges and food insecurity.

1.5. Food Security around the World

Food security has been at the forefront of global development for decades. To achieve food security, people must have economic, physical, and social means of acquiring nutritious food and sustainable mechanisms to meet this ongoing demand (Rosenzweig, 2020). When these needs are not met, several issues can develop, such as people suffering from malnutrition owing to insufficient nutrients. This is a significant problem, with an estimated 821 million malnourished individuals worldwide (Rosenzweig, 2020). The food system faces various economic and climatic threats to its network. These challenges include climate change, population increases and changes in income ((Rosenzweig, 2020). These concerns threaten the global food security pillars of accessibility, availability, utilization, and stability (FAO, 2021). *The United Nations Sustainable Development Goals (SDGs, 2016) point of "Zero Hunger" by 2030 features the basic idea of designating public assets for food security, especially in unfortunate nations. As indicated by SDGs (2016), The Zero Hunger objective, which zeroed in on the annihilation of ailing health and all-inclusive admittance to food, is aspirational land ostensibly one of the most moving SDGs to accomplish because of restricted monetary assets and their inconsistent appropriation, imbalance in admittance to assets and dynamic authority over how to utilize them, ecological hardship, and delayed struggle.*

Figure 1.2: Conceptual Framework Base on Household Food Security

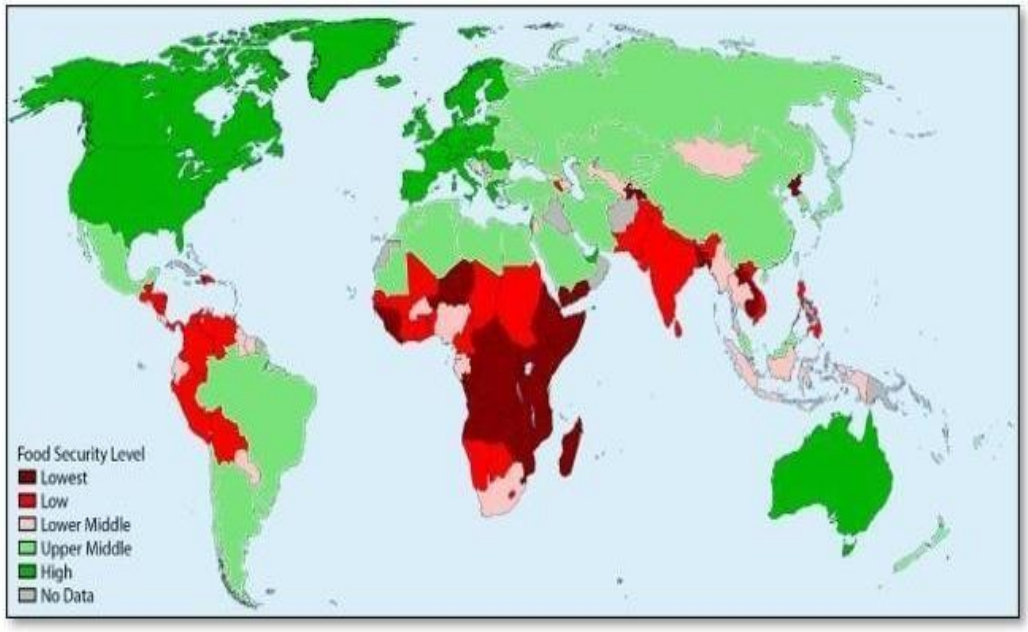


Source: *Author's work based on literature review*

These elements are exacerbated by environmental change. Emerging nations, such as Bangladesh, Pakistan, India, and a few African countries, face a double weight of massive population development and extreme natural deviations that lead to food instability (Niang et al., 2014; Masipa, 2017). Perhaps the most challenging SDG is due to scarce economic resources and inadequate circulation, injustice in access to resources and decision-making authority over their use, environmental deterioration, and protracted conflict. Climate change has exacerbated these factors. Developing countries, such as Bangladesh, Pakistan, India, and several African countries face two contemporary challenges: rapid population expansion and hunger, highlighting the global scale of food and nutritional insecurity (FAO et al., 2020). According to FAO (2020), approximately 690 million (8.9 percent) of the world's population are hungry and if these trends continue, this figure will approach 840 million, or nearly 10 percent of the world's population. In addition, most of the world's malnourished population (381 million) abides by Asia and Africa (approximately 250 million). As indicated by these gauges, the world is missing a mark regarding the essential advancement toward accomplishing Zero Hunger by 2030.

Moreover, the seriousness of food insecurity, ailing health and hunger would fall apart because of the COVID- 19 pandemic's effect on every aspect of human existence, supply chains and business valuable open doors for many individuals (Laborde et al., 2020). Rapid population increase, chronic poverty, malnutrition in Sub-Saharan Africa, diminishing agricultural production and environmental degradation are projected to exacerbate food insecurity. *Africa's poverty rate moved from 7.6 percent to 19.1 percent somewhere in the range of 2014 and 2019, over two times that worldwide (FAO et al., 2020). With the prolonged time of COVID shocks, hunger and food insecurity in the local region will worsen. Before the century, Sub-Saharan Africa's populace was anticipated to arrive at 3.78 billion, expanding food interest (United Nations, 2019).* South Asia has a similarly dreadful state. The "South Asian Enigma," which demonstrates persistent poverty despite economic progress, has been extensively documented by politicians and researchers (Ramachandran, 2007; Haen et al., 2011 and Rao, 2020). On the Global Hunger Index, South Asia and Sub-Saharan Africa ranked falling into *"severe hunger"* (Grebmer et al., 2020).

Figure 1.3. World Level Food Security



Source: Bingxin et al., 2010 and FAO, 2008

Numerous challenges associated with food security have been addressed in most studies. Food insecurity is a global issue that affects all countries, not just emerging countries. Both affluent and developing countries face hunger, malnutrition and obesity. South Asia and Africa have garnered the most attention for food insecurity. In addition, Southeast Asia, Central Asia, Latin America and more developed nations such as Australia, Canada and the European Union (EU) are affected by their economic instability and lack of government statistics (Pollard and Booth, 2019; Haen et al., 2011). This is a multifaceted issue that encompasses nutritional and environmental problems. With the accumulation of evidence of stunting and malnutrition in children, the food security narrative has shifted from emphasizing energy, calories and nutrition. According to the World Food Security Report (2012), food security is achieved "*when all people, at all times, have physical, social and economic access to food that is safe and consumed in sufficient quantity and quality to meet their dietary needs and food preferences and is supported by an environment that provides adequate sanitation, health services and care, enabling them to live a healthy and active life*."

Finally, Zero Hunger is not exclusively concerned about annihilating hunger and working on nourishing levels; it centers around accomplishing these targets through

the improvement of reasonable horticulture, since it is pivotal for achieving a more significant level of reasonable and quality food creation. As farming utilizes more than 3/4 of families in many rising economies, the SDGs of destroying appetite and neediness are inseparably connected to practical horticulture (United Nations, 2015a). In 2018, the number of people facing moderate-to-severe food insecurity increased globally from 22.3 percent (1.64 billion) in 2015 to 25.8 percent (1.96 billion). Food insecurity affects most people in developing countries. According to the World Bank (2018), "*South Asia accounts for 32 percent of the world's 1.96 billion moderate/severely food insecure people, Sub-Saharan Africa accounts for 30 percent, East Asia and the Pacific account for15 percent, Latin America and the Caribbean account for 10 percent, 7 percent in the Middle East and North, and 1 percent in North America. Sub-Saharan Africa (54.9 percent) has the highest proportion of people experiencing moderate or severe food insecurity, followed by South Asia (34.3 percent), Latin America (31.6 percent), the Middle East and North Africa (30.8 percent)."* In 2018, around 113 million individuals confronted intense Hunger in 53 nations, announced by FSIN (2019), which further expanded to 135 million because of deteriorating food insecurity in conflict-impacted states (FSIN, 2020).

1.6. Paradox of Food Security in India

Contemporary food security in developing countries such as India may be a significant paradox, defying generally accepted development principles and food safety. First, India's agricultural productivity growth has not been accompanied by a drop in food insecurity and poverty. India suffers from a divide between agriculture and nutritional security (Headey et al., 2012). Second, there is limited evidence that considerable advances in agricultural policy and improved agricultural production have improved the nutritional status of women and children.

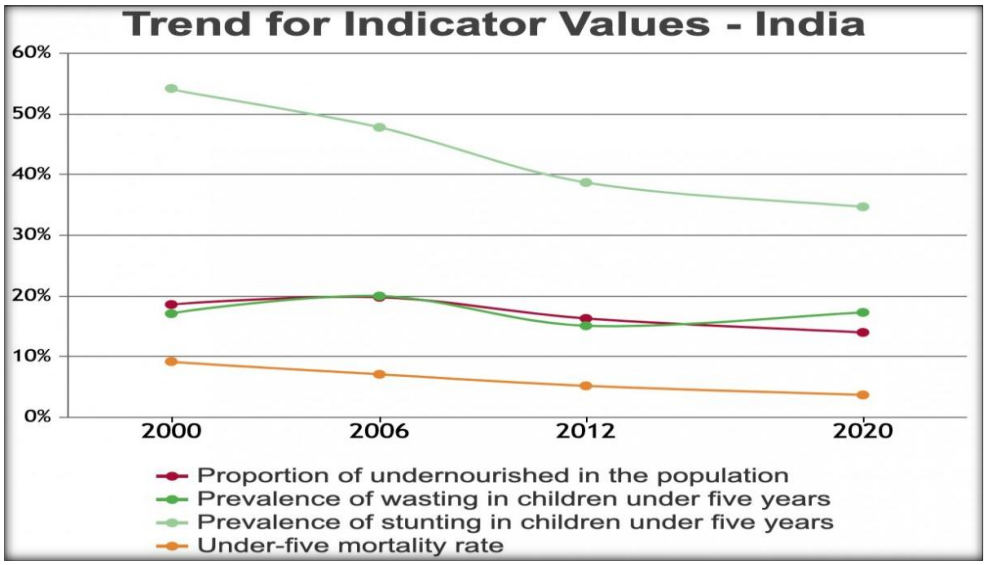
India's strong economic growth over the past few decades has been accompanied by a corresponding decline in poverty and malnutrition rates. According to Jayal (2013), the 1990s economic liberalization policies resulted in "India’s Rising" and “Shining" economic growth rates. Nonetheless, the country's ascension and revival were not mirrored in the same manner as its human capital. The government

maintained that no country had ever experienced severe famine due to citizens' political capacity to resist and speak out. Hunger, food insecurity and malnutrition are all "invisible" problems.

While India's democracy has avoided widespread famines since its independence, it has failed to eradicate chronic hunger and malnutrition. India's food insecurity is even more surprising, given the country's leading INR. The agricultural sector in India's recent tendency toward self-sufficiency in food has been well documented (Kumar et al., 2012; Beddington et al., 2012; Kumar and Raju, 2017). However, all its accomplishments are negated regarding food security, as the country has a long history of starvation. India accounts for 14.5 percent of the world's hunger (FAO, 2019). India is ranked 94th in the recently released GHI (2020), Pakistan is ranked 78th, Bangladesh 75th and Nepal 73rd in the Extreme Hunger category. Sri Lanka ranks 64th among moderately hungry countries.

Additionally, shifting climatic regimes may lead to long-term food security challenges in India (Campbell et al., 2016; FAO, 2008). According to the Global Hunger Index (GHI, 2020), many people in India are malnourished due to nutritional deficiencies. In 2016, 38.7 percent of children under five were classed asbeing "below average" in their height (Bene et al., 2016). This is a common symptom of chronic malnutrition in children and expectant mothers and frequently impairs a child's physical and mental development (Jeyaseelan et al., 2016). Approximately 15 percent of the population are malnourished. Dietary consumption and diversity, disease burden (compounded by a lack of women-specific sanitation and hygiene requirements) and empowerment and education of women have played a significant role in India's malnutrition epidemic. While increasing food intake is vital to prevent malnutrition, it is insufficient. Nevertheless, it is a critical component of the general progress in a variety of social and health indicators, most notably sanitation. Ironically, India's malnutrition crisis coexists with an excess of food as of September 2020 and the country has access to70 million tonnes of rice and wheat reserves, more than enough to ensure the country's abolition of hunger.

Figure 1.4 Trend for the Indicator Values in India



Source: GHI, 2020

India's high prevalence of hunger is commonly accredited to diminishing relative incomes, insufficient production from small and marginal farmers and the absence of a universal public distribution system (PDS) (George and McKinsey, 2019). Additionally, food grain stockpiles are exhausted and fruits, vegetables and other perishables are in short supply, accounting for approximately 78 percent of total consumption.

The pandemic enhanced specific segments of the Indian population's vulnerability. Transportation restrictions disturb the food supply chain, with farmers dumping their products on roadways, exacerbating the problem of food accessibility (Bhavani and Rampal, 2020). Furthermore, in India, 92 percent of the labor force is employed in the informal sector, including construction workers, domestic helpers, and street vendors (Chakraborty, 2021). Approximately 450 million migrants work in small, medium, or large firms in an informal economy. During the state-wide lockdown, casual laborers faced job loss, insecurity and disruptions in cash flow, allof which directly affected their food security. Many people walk to their hometowns without sufficient food or nutrition (Gupta, 2020). According to Thomas (2020), India's poorest workforce segments would lose approximately INR 4 trillion in income during the first two months of a shutdown, or about 2 percent ofthe country's annual GDP.

The vulnerable population relies on government flagship programs, such as mid-day meals (MDM) and Integrated Child Development Services (ICDS) to fulfill elementary needs. The government established a 'take-home rations program,' and a manufacturing unit capable of generating these rations was unavailable (Managal, 2020). Similarly, various procedural failures resulted in a considerable number of pupils going hungry while expected to receive grains of allowance, rather than MDM. The Mahatma Gandhi National Rural Job Guarantee Act (MNREGA), arural employment guarantee program, was suspended during the initial weeks of lockdown (Dutta et al., 2020). Multiple feeding programs constitute a significant reason why India has a high degree of food security.

However, this is the case of a state that interferes with the national food distribution system. As a result, it has been determined that hunger must be eliminated to meet the poor's basic dietary requirements. Food security is ensured by the e-dispersion arrangement of items, which conveys food grains on time and at a scaled-down cost to sections of the populace living beneath the neediness line and is unfit to manage the cost of market costs for their food. Because of population development and asset requirements, India's wholesome challenges will be overcome in the next few decades. India's current populace of 1.26 billion is anticipated to extend 1.6 billion by 2050, outperforming China as the world's most populous country (United Nations, 2015). Along with water scarcity, declining soil fertility and land degradation, risk has been one of India's most severe concerns owing to climate change (Roberts, 2001). This situation requires an examination of long-term food security regarding current food availability, accessibility, consumption and sustainability.

1.7. Research Objectives

1. To identify the determinants of food security at the household level in Punjab.
2. To study the food consumption pattern of rural and urban areas of Punjab.
3. To analyze the vulnerability to food security in Punjab.
4. To examine the effectiveness of food security through the Public Distribution System.

1.8. Need of the Study

Punjab's economy is primarily agrarian (Singh, 2002). As a small state covering only 1.5 percent of the country's geographical area, agricultural contribution to Gross State Domestic Product (GSDP) has decreased from 49 percent in 1980-1981 to 28 percent in 2019-20, with approximately 26 percent of the workforce engaged in farming and related activities. Punjab's massive commitment to the country's sanitation should be visible in the way that it subsidized around 14 percent of all food grain creation in India, while covering less than 1 percent of the all-out land region and providing approximately 33 percent of complete wheat obtainment by open organizations in 2019-20 (GOI, 2020). Punjab acquired the moniker "Silo of India" because its significantly multiplied food grain yield contrasted with thetypical Indian yield. It remained an excellent example for all Indian states until it began to endure the worst part of the green upheaval's negative externalities.

1.8.1. Aspects of the Availability

The rise of agribusiness in Punjab, aided by serious cultivation rehearses, is progressively being scrutinized to cause and hamper ecological expenses for the area (Khus, 2015; Swaminathan and Bhavani, 2013; Dhillon et al., 2011). Punjab could boost its planting intensity to 189 percent and produce 18 percent and 12 percent of India's wheat and rice, respectively, owing to favorable agro-climatic conditions and broad adoption of green evolution technologies. It increases the state's food availability and security.

On the other hand, a persistent reliance on wheat and rice (paddy) cultivation and an overdependence on subsurface water supplies have cast doubt on Punjab's agricultural viability. Current cropping patterns, mainly reliant on wheat and rice, are excessively intensive and lack diversity, which may jeopardize the state's overall agricultural viability. Reduced crop diversity, particularly during the Kharif season, emphasizes rice intensification and a regime of free electricity for thefarming sector, which has harmed groundwater resources. An excess of fertilizers, pesticides and overcapitalized farm machinery jeopardized the economic sustainability of Punjab's farm enterprises. Water scarcity poses a threat to food safety and agricultural viability (Goel al., 2010; Goel, 2011; Khush, 2015). In 12 districts of Punjab, heavy

metals in drinking water, such as uranium, lead and arsenic, have resulted in the establishment of a carcinogenic belt (World Bank, 2014). Rice and wheat agriculture using HYV requires high-acid fertilizers, which can be hazardous to the ecological health and fertility of the soil and contribute to land contamination. Pesticide use has increased considerably in Punjab, from 3000 to 6900 MTs, harming the internal areas of communities and posing a threat to food security and sustainability. Recent evidence of climbing temperature and erratic precipitation in northern Indian fields, approximations of a significant misfortune ingross edge per hectare from creation due to expansion in temperature (Choudhary and Sirohi, 2022) and disturbing fatigue of normal belongings, especiallygroundwater, in the state (Kaur and Vatta, 2015; Kaur et al., 2010; Srivastava et al., 2017), have imperilled the state (Vatta and Taneja, 2018). Land degradation has emerged as a danger to the state's food security in the Malwa region of Punjab. Intensive agricultural practices, straw burning, increased pesticide use and soilsalinity due to over irrigation are the most identified elements contributing to Punjab's land degradation problem.

1.8.2. Aspect of Accessibility

Due to a lack of commission, transportation and labor expenses in Punjab, proprietors of PDS outlets engaged in black marketing (PTI, Chd., 2015) andleakage in the public distribution system exceeded 75 percent (Dhiman, 2013). Punjab Agro Food Grains Corporation (PAFC) also suffered damage due to irrational storage methods, a lack of covered silos and slow grain transport to other states, among other factors. During 2011-12, Gujarat, West Bengal, Rajasthan, Punjab and Uttar Pradesh were ranked I, II, III, IV and V, respectively, based on their leakage percentages of 67.6,65.3, 60.9, 58.8 and 57.6.(Dreze and Khera, 2015).

1.8.3. Aspect of Utilization

The most incredible performer in terms of availability, Punjab performed poorly on the quality and safety index, with a score of 0.4244 (Palanisamy, 2021). However, nutritional protection is insufficient, as indicated by problems with food absorption caused by a lack of health care facilities, safe drinking water and sanitation. Additionally, there has been a significant deterioration in the consumption of calories and proteins over the last few decades, which is even more pronounced in rural zones

(Narang et al., 2016). Punjab has one of the lowest health expenditures as a percentage of Gross State Domestic Product (GSDP), at 0.65 percent, with a far smaller share of government spending. Rural areas have a lower standard of living than cities do (CSO, 2015). According to the National Family Health Survey (NFHS-3), one in every five adults aged 15–49 years is malnourished in Punjab. Punjab has been one of the three states with the slowest MMR since 2015. MMR increased in five states that failed to prevent maternal deaths, according to the S.R.S. report (2020), with Punjab ranking third. In Punjab's Ludhiana district,which has the largest migrant population and the highest maternal mortality rate, 59 fatalities occurred in 2018-2019 and 65 deaths occurred in 2019-2020. Malnutrition and anaemia are significant public health problems in Punjab. According to NFHS- 4, "about 54 percent of women in Punjab have anaemia, with 42 percent having mild anaemia, 11 percent having moderate anaemia and 1 percent having severe anaemia." Most districts in the Malwa area scored poorly on the food utilization index because of low female literacy rates and limited access to potable water. Although numerous studies on various aspects of food security have been conducted globally and in India at the national, state (Kumar et al., 2012; Kumar & Ayappan, 2014; Pandey, 2015) and regional levels (Adnan et al., 2012; Sahu et al., 2017; Kumar et al., 2020), they have omitted the sustainability component, which iscritical for ensuring long-term food security without explicitly (Berry et al., 2015). However, it constructed a countrywide atlas of food security sustainability (Vepa et al., 2001). However, the literature does not attempt to understand the effectiveness of household food security in Punjab to find that availability, affordability, and accessibility facilities are adequate in the state and covariates of vulnerability to HFS-level coping strategies during shocks and stress. This study aims to determine the effectiveness of Household Food Security in Punjab through activity mapping ofthe food security scheme.

1.9. Study Structure

The present study contains eight chapters.

Chapter-1 provides a brief introduction to food security, including the definitions and problems addressed in the study, a statement of the study's needs, research questions, objectives, hypotheses and limitations.

Chapter-2 presents a comprehensive review of the literature on household food security, consumption patterns, dietary diversity, vulnerability, the effectiveness of various food security programs and coping strategies, including consumption, income shocks and stress.

Chapter -3 details the methodology utilized in the research, including a description of the locations, research design, sampling strategy employed, selection and measurement of research variables, operational principles, data collection and statistical tools used to analyze the data.

Chapter-4 discusses the numerous socioeconomic characteristics and food security determinants in the sample households.

Chapter -5 examines the differences in consumption patterns between rural and urban areas of Punjab.

Chapter -6 focuses on criteria for determining food security and vulnerability.
Chapter-7 emphasizes the effectiveness of PDS in urban and rural Punjab with activity mapping of the NFSA.

Chapter-8 Summary, conclusion, suggestions, future research opportunities and policy implications are discussed in this chapter.

CHAPTER–II
LITERATURE REVIEW

A review of the literature on previous work is vital to understanding the problem and providing the necessary guidance and comments for the study's objectives to be met. The literature draws attention to these research gaps and provides insights to researchers and academicians in several dimensions. Various aspects of the literature were reviewed, including socioeconomic determinants, consumption patterns, vulnerability, coping strategies, the effectiveness of PDS and various food security schemes. Therefore, a summary of the research conducted by previous researchers has been discussed under the following headings:

2.1. Numerous Variables of Household Food Security

Multiple studies have been conducted to ascertain the numerous aspects that affect food security in various contexts and levels using various variables and approaches. Numerous studies have examined household characteristics such as family size and structure (Pervaiz et al., 2017; Tefera, 2014; Pervaiz et al., 2017), gender (Oluwatayo, 2008; Arene and Anyarji, 2010; Tefera, 2014; Pervaiz et al., 2017) and age (Oluwatayo, 2008; Silva et al., 2016; Kidane et al., 2005; Kabbani and Wehelie, 2004; Iram and Butt, 2004). Other studies have examined economic aspects such as income level (Oluwatayo, 2008; Arene and Anyarji, 2010; Tefera, 2014; Abu and Soom, 2016; Pervaiz et al., 2017; Akukwe, 2020), food commodity market prices and consumption patterns (Makombe et al., 2010; Onianwa and Wheellock, 2006). Several studies have focused on farm production, fertilizer application, cow ownership and farm size (Kidane et al. 2005; Pervaiz et al. 2017; Oluwatayo 2008; Misselhorn 2005; Makombe et al. 2010). According to a study conducted in Nepal using logistic regression, any program targeting small landholders, landless farmers, employment prospects, caste and occupation is economically active. As family size increases, the likelihood of food insecurity increases, whereas irrigation availability increases, reducing food insecurity (Maharjan and Joshi, 2011; Tefera and Tefera, 2014). Additionally, it was discovered that many male members and households residing in the Terai region were food-secure. The geographic sensitivity of rural household food security in three regions of Pakistan was explored using logistic regression (Bashir et al., 2013). The findings indicate that tailored region-specific

strategies are necessary to improve Punjab's food security. In Bangladesh, logistic regression analysis found that the family head, age, income, and level of education had a significant impact on HFS. However, many dependents are harming food security (Ali et al., 2016). Nagla (2007) emphasized the diverse cultural and social relevance of food and eating patterns in India. Consumption is determined by a household's socioeconomic features, age, ownership of property, income, and access to the public distribution system (Kumar and Sharma, 2013). Additionally, Power (2010) stated that food choices are firmly ingrained in social conventions, personal beliefs and habits and goals, making it difficult to intervene and change dietary behaviors. The intersection between healthy and sustainable diets is a good starting point. Social standards can be altered if European diets become eco-friendly. However, according to Verain et al. (2012), socio-demographic characteristics alone are insufficient for segmenting sustainable food consumers. Personality factors, (FRL food-related lifestyle) variables and behavioral variables should all be incorporated in future sustainability research, so the researcher proposes including them in the current study. The logic and dynamics of contemporary consumer society and its epistemologies, ethics, mythologies and cosmologies are distinct.

Each of these is distinct from those of other eras and locations. This viewpoint on the prominence of consumption in ten contemporary societies is scary. However, evading the issue has not help policymakers: a significant change in consumption patterns has necessitate engaging with the "vanguard of history." A deliberate procedure is expected to make it simple to act all the more reason, includingguaranteeing that motivating force structures and institutional standards favor a feasible way of behaving, empowering admittance to support ecological choices, connecting with individuals in self-improvement drives and exhibiting ideal changes in government strategies and practices (Jackson, 2005). Extra exploration is important for determining the attributes of different subgroups of manageable food purchasers and their expected utility in advancing the maintainable turn of events (Verain et al., 2012). Customers' sensitization to critical thinking, data collection and analysis, decision-making, problem-solving and sustainable purchasing must begin earlier in infancy. It should last for the duration of one's life (Süle, 2012). McDonald et al. (2012) state that additional research is necessary to ascertain how individuals fall into three typological categories. This raises the question of whether individuals can be

effectively treated. They are raised or socialized as gray consumers, translators, or pickers. Changing consumption patterns in the middle class revealed a desire for enhanced health and intellectual growth. Roux and Nantel (2009) demonstrated that the hierarchical interpretation of"worry" or "awareness" has substantial ramifications. Indeed, it appears that the bulk of field treatments targeted at enhancing consumers' "consciousness" begin with more concrete acts (e.g., minor behavioral adjustments) and advance to more abstract activities (e.g., changing your mindset about consumption in general). In this regard, "Food for Life "is a conscious organization established on the crucial knowledge that spiritual treatments can be used to resolve the world's problems. According to Laskar and Rakib (2019), household size, head literacy, total land ownership, married household heads, total remittances received and head incomeare all key determinants in achieving a high level of dietary diversity (Ali et al., 2019). The survey revealed that almost all children consumed starch, followed by milk or milk derivatives and meaty meat. The multivariate study indicated that children whose mothers had a higher education level and skilled workers had higherDDS than their peers. The DDS revealed a considerable positive correlation between household wealth status and DDS. Children who grew up in food-secure households had a higher DDS than those who grew up in food-insecure households.

Table 2.1. Main Determinants from the Previous Studies:

Sr. no	***Author***	***Year***	***Study Area***	***Sample Size***	**V*ariables***
1	Harris-Fry et al.	2017	South Asia		Income of the Household Members, Consumption Pattern Buying and Bargaining Power, Social Status, Tastes and Preferences, Family Members Relationship, Wealth, Occupation, Land Ownership, Household Size, Religion, Education and Nutrition Knowledge
2	Anand et al.	2019	Bengaluru	700 respondents	Work Type, Work Location, Education, Housing Type, Access to Water, Household Size, Family Structure and Migration Status
3	Narayanan	2015	India		Production, Food Grain Stocks, and Inflation

4	Payne et al.	2016	Rural Rajastha, India	403 Respondents	Age, Religion, Caste, Marital Status, Currently Pregnant, Number of Children
5	Karmakar and Sarkar	2014	West Bengal	19 Districts	Population and Income, Food expenditure and Size of Class
6	Joshi et al.	2019	Delhi, India	907 respondents	Gender of the Household Members, Education Level, Occupation, Household Size, Family Size, Age Level, Earning Members, Technology Access, and Knowledge, Good Health-Being, Zero Hunger, Gender Equality, Energy Facility, Proper Water and Sanitation Facility
7	Kumar et al.	2017	South Asia		Income Pathway, Agriculture Pathway, Health and Nutrition Behavior and Social Accounting Training
8	Tarozzi	2005	Andhra Pradesh, India		Child Nutritional Status, Production,Weight-for-Age, Price
9	Sengupta and Mukhopadhyay	2016	India		Economic and Environmental Factors
10	Nnakwe and Yegammia	2002	Coimbatore, India		Educational and Income Level, Dentaland Hunger Position, Area of Dwelling and Meal Pattern
11	Humphries et al.	2017	Ethiopia, India, Peru and Vietnam	1,757, 1,825, 1,844, 1,828 respondents	Age, Gender, Dietary Diversity, Education, Height
12	Sidhu et al.	2008	Punjab, India		Household Income, Size, Worker Population, Household Laborer, Household Type
13	Mastiholi et al.	2018	North Karnataka, India	770 respondents	Age, Religion, Socio-Economic Status, Religion, HFIA, Dietary, Hemoglobin and Marital Status
14	Chandrasekhar et al.	2017	Maharashtra, India	2630 respondents	Child Anthropometry, Residence Area, Mother's Education, Wealth Index, Ration Card, Religion, Household Food Security, Household Characteristics, Child Characteristics, Social Group and Religion

Source: Based on Author's Compilation

Pervaiz et al. (2017) found that family size and the household head's self-possession of agricultural land, as opposed to family ownership, appeared to be positively associated with household food insecurity. This finding highlights the importance of

enhancing farming communities' educational and economic opportunities. Abegaz et al. (2017) examined food security as being greatly influenced by rain shocks, lack of off-farm income and household location. To ensure food security, farmers must plan their farming efforts during each rainy season and the availability of off-farm income-generating activities should be increased. Huluka and Wondimagegnehu (2019) examined how human, natural, and physical capital plays a significant role in explaining HDD variation in the study scenario. HDD is strongly and positively influenced by livelihood measures such as farm production diversification and nonfarm income.

Similarly, outcomes related to one's livelihood, such as meal frequency and household wealth status, positively affected HDD. Sidique and Muhammad (2019) discovered that numerous factors affect household food security, including the household head's education level, amount of food purchased, quantity of non-food expenditure, size of the land and location. As a result, the study recommends that governments, international organizations and donor agencies pay closer attention to the food expenditure of households and provide them with alternative social security benefits, as many poor people lack easy access to employment and educate children on the value of education and its role in enhancing their living standards.

2.2. Consumption Patterns in Urban and Rural Areas

According to certain surveys, the share of spending on food consumption has declined, whereas expenditure on non-food products has increased. Cereal supply in rural areas is dwindling rapidly, whereas the supply in urban areas is decreasing at a falling rate (Vanktesh et al., 2016; Priyabrata, 2014). The changing food consumption environment in India has had a significant impact on the country's development. India's shifting food consumption environment was positivelyassociated with the development of the food and beverage sector. Marketing administration convenience, sophistication and health are just a few elements that directly contribute to the growing sales and profitability of India's food and beverage industry. India's consumer expenditures are expected to climb by 13 percent annuallyfor the next three years (Zaware and Louis, 2014). The proportion of spending on cereals and grains is significantly higher in rural areas than in urban regions.

Simultaneously, spending on other food items, such as milk products, fish and meat, fruits, vegetables, nuts, and drinks, has increased dramatically in India's urban and rural sectors (Surendran and Madhavan, 2015). Around 80-85 percent of people consume commercially processed food and consumer preferences have shifted significantly away from nutrient-dense diets (Gupta et al., 2018; Mitra, 2011).

This study examines the consumption patterns of milk and its products and their determinants by incorporating primary and secondary data. The link between total expenditure and expenditure on major commodity groups is defined using a regression analysis. This study was conducted to estimate expenditure and income elasticity, analyze expenditure inequality, and ascertain the factors affecting the consumption of milk and its products in provincial and urban regions (Gavhane et al., 2013; Randhwa and Chahal, 2005). Almost identically, eating habits have shifted globally, increasing the use of pre-packaged foods that typically include high quantities of sugar, fat, saturated fatty acids and trans-salts (Jones & Richardson, 2007). Consumers have been more conscientious and aware of their health and weight control over the past few decades and are generally more aware of their daily energy requirements and food nutrients (Niva and Makela, 2007). Food consumptionhas varied, with an increased intake of vegetables, meat, and fish, but a minor drop incereal and pulse consumption. Consumption diversity is low in the northeasternstates compared to other states in India, whereas production diversity is low to moderate in northeastern states. According to the study, dietary and productiondiversity are favorably and firmly related. Kaur (2018) used the Gini coefficient, a measure of consumption disparity between urban and rural consumers and found thatconsumption disparity was more significant in urban regions than in the rural regionsof Punjab. Singh and Gupta (2016) monthly per capita consumption spending analysis by the state found that states with a high overall per capita expenditure also increased food and non-food expenditure, both in urban and rural areas.

Additionally, it noted fewer states above the national average in urban regions thanin rural regions. Furthermore, the study found that non-food consumptionexpenditures are more heavily weighted in urban areas than in provincial areas. More et al. (2015) observed that the dietary intake of rural and urban households for all food types except leafy vegetables and sugar was significantly lower than the recommended dietary

limit (RDA). However, green vegetable and sugar consumption was above the recommended daily allowance. In rural and urban homes, nutritional insufficiency was primarily detected in calories, with a modest incidence of protein shortage. However, the fat consumption was higher than the recommended limit. Zaidic and Haider (2017) discovered that despite increased food availability and per capita income, the country's average calorie consumption per adult equivalent remains below 2350 Kcal. The aggregate scenario may increase vulnerability to poverty, increase illness burden across the country and decrease productivity. Satriaa and Mayasaria (2019) found that socioeconomic status affects the pattern of household food intake in general, with urban areas prioritizing foods with a higher nutritional value than rural regions. While food commodities remain a necessity in East Java, rural households are often more susceptible to price and income changes than are urban households. Venkatesha et al. (2016) indicate that local production diversification has a major impact on consumption patterns. Government policies should encourage agricultural diversification, especially in the northeastern states, to increase dietary diversity and desirable nutritional outcomes. Sahoo and Madheswaran (2014) found that Odisha's consumer expenditure was lower than India's; according to the report, the middle-income group has seen its portion of overall expenditure decline over the last year. The lower-income group experienced a faster increase in percentage expenditure than the higher-income group. Rural areas experienced a faster increase in non-food expenditure than metropolitan areas. Grain consumption decreases in expenditure share across all income categories.

2.3. Aspects related to the Public Distribution System

Massive changes were applied to the PDS in the 1990s. An urban bias was discovered in the PDS, which primarily excluded rural communities fromdistribution (Howes and Jha 1992; Dantwala, 2006). Public expenditure is also an issue when a leakage occurs. India is currently experiencing a severe economic crisis. Therefore, it would not sustain the expenses of subsidizing all citizens (Ramaswami and Balakrishnan, 2002; Dutta and Ramaswami, 2001; Deininger and Deininger, 2001). One key aspect of the neoliberal reforms that India began in the early 1990s was the welfare program's improvements, which culminated in theimplementation of a new targeted system in 1997. State interventionism, widely accepted as the prevailing attitude for decades following independence, has been disputed because of its demonstrable economic and

distributional inefficiencies (Deininger and Deininger, 2001; Corbridge and Harriss, 2000; Radhakrishna and Subbarao, 1997). Neoliberal ideology presented the answer as consisting of two consecutive actions: a continuation of cuts to public social security while implementing competition in the country's economy (Corbridge and Bris et al., 2000). This kind of government, known as "New Public Management," has been credited with encouraging effectiveness by discouraging the state from becoming involved and using business incentives. The primary problem discovered in the PDS in the Anantapur district of Andhra Pradesh was its failure to properly reach thepoor. There are significant issues, primarily inadequate and irregular supplies, and scarcity of information about when the ration has been provided.

The village residents were inadequately informed and unwarded. None of the respondents was satisfied with the amount of rice they received. Kumar (2010) evaluated Targeted Public Distribution System (TPDS) operations and inefficiencies in Indian states, *viz., Assam, Bihar, Chhattisgarh, Mizoram, Rajasthan and Uttar Pradesh* from 2006 to 2007. About 60 percent of the families in the six districts believed that shop owners were engaged in the black marketing of PDS food goods by delivering food products to the open market. Of approximately 35 percent to 40 percent of households, the majority were dissatisfied with the quality of PDS rice. Most people in Assam and Mizoram opted for the PDS variety, but a sizable minority (20 percent) preferred local combinations. Recently, Alamu (2011) found that PDS had a positive impact on Tamil Nadu. The Tamil Nadu government operates a universal PDS that provides food handouts to all eligible households, including a maximum of 20 kg of rice each month. People are conscious of these advantages. Every household member knows the pricing and location of the PDS ration outlets. The distribution of this information is noteworthy. Corruption isreduced when the public is aware of it. It is not just the population but also the government that drives the PDS to action. Using data from 2004 to 05 to 2007-08, Khera (2011) revealed that the percentage of rural families obtaining grains from PDS increased from 27 percent to 33 percent. In addition, in various states, the rate of BPL families that the government is keen to subsidize has increased by about ten percentage points, including in UP, where it rose from 6 percent to 18 percent, in Orissa, where it increased from 22 percent to 36 percent and in Chhattisgarh where itincreased from 25 percent to 47 percent, as well as in Kerala where it increased from40 percent to 59

percent. Access was high in areas such as Andhra and Himachal Pradesh and Tamil Nadu. 81 percent of respondents said it was easy, 69 percent claimed it was easy and 88 percent rated it very simple. According to Himanshu and Sen (2013), in-kind food transfers have increased their importance in alleviating poverty and improving nutrition. The study also found that twelve-district NCAER research conducted by Kumar (2010) suggests that most residents in Bihar are satisfied with their governments. However, not all studies agree with these findings. The findings of Khera (2011) revealed similar results in a nine-state study examined in which the authors found that 80 percent of respondents felt that PDS was "essential" in their lives and 98 percent considered it "at least somewhat important" or "very important." Further, respondents preferred in-kind food transfers over cash transfers in all states, except Bihar. PDS played a significant role in reducing povertyin the Papum Pare District of Ghana (Dreze and Khera, 2013). Approximately 73 percent of households in the Papum Pare district (2009-10) purchased PDS and the poverty gap index was lowered by 39 percent. Of the BPL households in Bihar, 18 percent did not receive all their PDS entitlement, while 97 percent of the BPL households in Papum Pare district did. It is estimated that India PDS (Public Distribution System (PDS) substantially affects rural poverty. These effects areparticularly significant in places where the PDS operates appropriately.

The Structural Adjustment Programme (SAP) was part of India's economic liberalization program. It was put in place in 1991 to end the ongoing fiscal crisis and relaunch the economy by implementing neoliberal reforms. The project's foundation was the notion of markets as a tool to correct the nation's inefficiencies, which considered the state's duty to preserve property rights and, as a final step, served as a backstop to marketing efficiencies (Corbridge and Harriss, 2000). The state chose to stay out of the market, which limited the possibility of system-wide inefficiency (Harvey, 2005). This conception of a neoliberal solution typified India's the early 1990s, with market openness serving as the primary driver and stateintervention as a hindrance. This has resulted in changes in social support systems to enable better management of the economy. The Structural Adjustment Programme dictated reductions in public expenditure, which caused the PDS to suffer as a result.

According to World Bank economists, the system is rigged, favoring "miserly

transfers at exorbitant cost". However, because fiscal expenditures affect the private market, this unfair system favors the rich over the poor (Ramaswami and Balakrishnan, 2002). As a result, concerns arose, which contributed to creating the new targeted PDS, which, rather than universal provision, instead reserved support for those whose annual income was less than the poverty line. The new PDS, launched in June 1997, brought about two critical structural changes: a shift in priorities and resource allocation. First, the program's resources were moved away from universal distribution to channel led subsidies restricted to the BPL (also knownas the "bottom of the pyramid") category with a considerable amount of leeway granted to states to maintain a minimum subsidy for the APL (also known as "ordinary people"). To help the poorest of the ineffective, immense assistance was instituted via the Antiyodaya Anna Yojana (AAY) plan. In compliance with periodically updated income-based poverty thresholds, qualifications for both BPL and AAY categories have been defined. Second, the universal PDS assigns goods to states based on theoretical needs.

Food grains in the targeted system are allocated based on the state's relative poverty; the central government calculates each state's poverty incidence and then gives based on these figures (Tritah 2003). Subsidies for essential products were set aside for the needy to benefit those who needed them. Fiscal subsidy spending for the central government effectively decreased because of the targeted PDS (Umali-Deininger and Deininger, 2001). The third significance of this change was that residents who relied on government-subsidized PDS commodity distributions decided to drop out of the program and begin purchasing their items on the open market. Targeting, as it provides the means to reduce fiscal expenditure while providing a means to help the significant population that is poor and malnourished, is supported by a different school of thought in the social protection debate. Another stream of criticism states that targeted PDSs do not sufficiently mitigate exclusion errors, resulting in widespread disruption of food security, as in the cases of Swaminathan (2008), Khera (2011a) and Himanshu (2011). The change to a focused PDS experience that has occurred in the 29 states can be seen in Kerala. Kerala's state-level PDS was recognized before 1997 as working the best in India (Swaminathan, 2002). Of the entire state population, 97 percent received PDS through the universal system and its impact on beneficiaries' nutritive value was significant (Kumar, 1979). As of 1997, the state system faced three

entitlement access difficulties, which persisted after targeting and lowered the food grain allocation to the state to less than 10 percent of pre-targeting supplies (Swaminathan, 2002). Based on the results, it was projected that there was an incidence of poverty of 25 percent in the state, resulting in more minor commodities being given to recipients. Re-estimating poverty from 25 percent to 42 percent affected entitlement to support even though there was a reduction in available supplies. To date, several public distribution methods have yielded disparate results. PDS has been used more often in developing economies in the early stages of growth. Bangladesh, Cambodia and Pakistan's public distribution schemes have played a substantial role in increasing the number of registered girls who have graduated from school (Ahmed et al., 2007). The PDS in India has been functioning for more than five decades, which is approximately 50 years.

Approximately 40–50 percent of the population are non-poor and buy subsidized wheat and rice. Howes (1992) claims that approximately half of the public distribution system (PDS) benefits end up in the hands of non-poor citizens. Information regarding the PDS was previously released, saying that resources and commodities have been less accessible. This has had a minimal impact on thenutritional status of the target population (Khera, 2011). Food subsidies in India haveattempted to study the PDS problems in several regions. Only southern states, suchas Andhra Pradesh, Tamil Nadu and Kerala, have experienced partial system success(Ali et al., 2016). In Punjab, the organization and operation of PDS were investigated and it was found that leakage plagued the state's operation. Punjab had amajor stake in the open market diversion of food grains, amounting to approximately 76 percent of all diverted food grains. Another 13 percent were diverted to the APL households. Ten percent of the grains that entered the BPL programme reached the intended beneficiaries. It has been proposed that price gouging, commodities being stolen and leakage and misappropriation can be reduced by applying a common issue-price strategy (Paljeet and Kaur, 2014). However, keeping in mind the population's food insecurity and hunger, it is insufficient to merely provide food subsidies. Instead, it is important to properly distribute the grains in a well-reasoned manner (Ghaia et al., 2010). Grounded in variables such as subsidized food, transfer of income and involvement of the weaker section, a second comparative study on PDS (Anderson et al., 2013) found that the program is not properly targeted and the poor and non-poor obtain subsidy

benefits. Previous studies have reported how weakgovernmental institutions control food prices and regulate the PDS, which influences the quality of food items (Ramaswamy and Balakrishnan, 2002).

The study concludes that a rise in food prices does not lead to demand changes, if subsidized grains are still available. When open market prices are the same as those for subsidized commodities, grain quality becomes the deciding factor. Most households in the APL Program decided to opt out of the program in 1997 because of the steep drop in subsidy allocation. Also, the overall off take of grains reduced purchases from the PDS from 4.64 tons in 1997 to 1.71 tonnes in 2001 (Khera, 2011-b). Kerala is one of the states in which an APL subsidy is provided. However, many former beneficiaries have effectively been cut off because they are somewhat small. After the client base suddenly reduced, many ration shops went out of business (Krishna Kumar, 2000). Because there was such a significant fall in food grain supplies and because the APL had been removed from purchase, ration stores could no longer operate, leading to debt, which caused a wave of suicides among ration dealers. Accordingly, most PDS participants conduct illicit business in the private market, where prices are higher and they enjoy considerable gains. Leakage of PDS goods on the private market, which the committee on PDS called "rice mafia" reduces the long-term viability of the PDS, as the body of scholars mentions. Systematic leakage in a program hinders normal functioning (Saini et al., 2017). While various governments have enacted different accountability methods over time,targeting has led to a reduction in customers of ration shops, who now have a more difficult time starting new businesses due to a lack of available resources. Khera, 2011 study examined the PDS dealers and observed that "corruption has become a need of economic existence for the PDS dealers." This significantly undermines the potential of PDS to be beneficial for those who use it. India's progress from a state- level system to the Aadhaar PDS is an important aspect of social policy at the state level and is integrated with the federal system. The central government decides to purchase and allocate resources based on the total population and per capita consumption (Tritah, 2003).

Table 2.2. Summary of Various Issues found in the PDS

Author	***Issues***
Aher et al.(2017)	• Bribery • Uneven distribution • Ration forgery
Bhattacharya et al. (2017)	• Identified beneficiaries • Urban bias • Extensive leakages
Biswal andJenamani (2018)	• Inclusion and exclusion error • Storage • Transportation • Distribution • Bogus ration card
Chatterjee(2020)	• Transportation • Hampering agricultural logistic and supply chain
Chhabra and Chopra(2016)	• Grain leakage • Distribution error
Chhabra etal. (2020)	• Grain leakages • Diversions • Black marketing and corruption
George andMcKay (2019)	• Leakage • Corruption • Diversion of grains
Gowd KK(2020)	• Exclusion and inclusion errors • Issues in the Biometric Authentication System • Food grain diversion • Bogus and ghost cards
Granheim et al. (2020)	• Food leakage • Operational efficiency
Kaur (2019)	• Procurement • Warehousing • Wastage • Food adulteration and frauds • Inferior food quality • Corruption
Kumar and Mohanty (2012)	• Fraud • Corruption • Black marketing • Inefficiency in the operational management

Kumar andPal (2013)	• Diversion and leakage of food grains • Bogus cards • Lack of transparency
Menon(2018)	• No UID member has been registered • UID has been registered but with mistakes • UID has been registered and confirmed, but biometricauthentication was unsuccessful • No mobile number has been registered • The mobile number has been registered, but OTP doesnot reach the beneficiary
Masiero (2015)	• Leakage • Inclusion and exclusion errors • Market Diversion • Rice mafia
Masiero and Prakash (2019)	• Leakages • Illegal diversions of goods • Rice mafia • Market Diversion • Ghost cards
Pathak, etal. (2020)	• Exclusion errors • Leakages in PDS • Black marketing of food grains • Disrupted supply chain
Satyanarayana and Rajasekhara (2019)	• Transparency Issue • Poor governance and operational services • Delivery mechanisms • Exclusion errors • Inclusion errors • Diversion of grains • Duplicate cards
Shukla et al. (2015)	• Procurement • Transportation • Storage • leakage and spoilage
Singh S. etal. (2020)	• Absence of genuine distinguishing proof of recipients • Issues of bogus cards • Spillage of food grains during the interaction • Absence of decentralized information base to storeinformation, yet more significantly • Issue of trust and a solitary wellspring of truth • Lack of real time information

Source: *Based on Author's Compilation*

The state governments administer and manage the PDS, determining important details such as off-take, where ration stores are located and what items are made available under the program (Tritah, 2003). To address this issue, states have the option of modifying prices. They are responsible for operating decisions related to program management to speed delivery and counteract diversion at the subnational level (Khera, 2011b).

Several governments embraced PDS computerization at an early stage, reacting to a set of multiple crises that all occurred as a result of the current campaign. The process began by constructing a digital database established at the sub-district administrative unit (taluk) level. Within the database, details of all the users of the PDS were recorded. Schedule slipping was directly attributed to the introduction of a software package that automated the basic operations of PDS at Taluk Supply Agencies (TSOs). These administrative offices oversee the PDS administration in a local area. During Phase Three, which began in 2012, the distribution system was integrated with Aadhaar. Rice, wheat, sugar, kerosene and other necessary goods are distributed to people at lower costs under the PDS, which is the Indian government's primary social welfare and antipoverty initiative. For nearly 50 years, it has remained one of the most critical components of the safety net program and is the most comprehensive in terms of coverage and public expenditure on subsidies. PDS distributes food commodities (rice, pulses, sugar, wheat, and edible oils) and non- food commodities (coal, kerosene, and fabric) to customers at below-market rates via a network of fair price stores spread throughout the country (Gulati et al., 2012).

This Distribution network has also supplied grains for the massive 'food for work' campaigns launched due to drought (Sharma, 2002). Therefore, it is necessary to review the research and important literature undertaken by researchers, economists, and policymakers in India and overseas. Most studies on the Public Distribution System focus on its functioning owing to its failure to serve the BPL, urban biasness, distance coverage issue and lack of transparent and accountable distribution arrangements (Iynger, 2003; Narayan, 2004; Jacob, 1992). Sampark and Soman (2008) identified a flaw in India's PDS schemes: they omit many worthy individuals and families for conceptual and operational reasons. The conceptual issue is the inadequacy of utilizing income to identify impoverished people for the PDS. Operational concerns include the enormous administrative burden, non-availability

of identity cards for qualified families and the provision of substandard food grains. Srinivasan and Jha (2001) showed that the scheme was ineffective because of insufficient and unreliable beneficiary identification, unavailability of the FPS, inadequate administrative arrangements for affecting loss recovery, unrecovered custom milled rice (CMR), annual verification of ration cards and periodic inspection of the FPS.

The low proportion of PDS purchases in total purchases indicates that PDS addresses the substantial needs of the poor and works against their interests by increasing open-market prices (Suryanarayana, 1991). Several studies have emphasized that the vigilance committee should be made visible, accountable, and responsible for PDS to function effectively and successfully. FPSs should also focus on non-controlled goods: the number of cards shown at each FPS should be increased and cereal production should be increased. FCIs should play a supportive role in identifying thepoor and developing PDS to improve their food security (Nakkiran, 2004; Dutta and Ramaswami and Dutta, 2001 and Jha and Srinivasan, 2001). The PDS is inextricably linked to anti-poverty efforts because it is the only one capable of delivering critical commodities to meet the basic dietary requirements of poor households, regulate market prices and distribute food grains to recipients of welfare and anti-poverty programs. Perhaps, the most remarkable shortcoming of the development management method is the absence of a credible beneficiary delivery system. The PDS has been in operation for approximately four decades. The Government of Indiaand State Governments have made numerous revisions to the Act to make its contentand implementation more relevant to the general public and boost its efficacy.

The state food corporation's inability to lift food grains over allocations is a significant limitation to the successful implementation of PDS (Gupta et al., 2015). Ithas been noticed that due to resource constraints, state agencies and fair price shop sellers are significantly slower in lifting food grains. Consumers are often not informed of prior months/arrears, a fortnight creating an opportunity for diversion and undermining the scheme's primary aim. In 1998, Tata Economic Consultancy Services conducted research in response to many complaints regarding the diversion of PDS grains into the open market. At the national level, 36 percent of wheat grains and 31 percent of rice were diverted. The diversion was concentrated in the north- eastern and north-eastern districts. Although the number of fair price shops is insufficient, many appear

closed. One of the most frequent concerns regarding PDS is the presence of substandard food grains (Dutta and Ramaswami, 2001). The poor quality of PDS wheat demonstrates inefficiencies in the operational public sector. The appearance of a quality discrepancy at the retail outlet results from inefficienciesin the marketing chain such as poor purchasing decisions, carelessness with storage and handling and inferior services at ration shops. Another troubling aspect of India'sPDS is that a considerable proportion of subsidized food grains and other essential goods intended for distribution do not reach the intended beneficiaries and end up in the market.

The differential between the open market and subsidized amounts of these items under PDS determines the leakage's appeal. A difference exists if a comparison is performed between the figures for stocks lifted and those sold to consumers, equating to system leakage. It is estimated that slightly more than one-third of the food grains given to the PDS do not reach the program-intended recipients; they leakout of the program. Some of these losses are legitimate in transit and storage;otherwise, they are disposed of in the open market (Sharma, 2007). Another major cause of diversion is the arbitrariness of the authorities, who have refused to allow any losses or smaller margins for all in the distribution chains, that is, transporters and firearms dealers. Dealers must make losses of PDS commodities good by compensating their clients. Leakage is merely a means to this end. Many people believe that it exists, but nobody can deny its existence. Delinquent behavior has many stages and can be found across several locations, starting with legitimate shipping charges, which are kept artificially low for a time and then they are not adjusted for many years and, again, they do not allow any losses for the customer or the retail location (Tritah, 2003). In terms of economics, it might be argued that, if the PDS grain of the poor is lower than the non-PDS grain of the non-poor, the entireeffort, from a welfare perspective, is a waste of money.

2.4. Vulnerability in the Context of Food Security

Numerous studies have sparked three recent insights into vulnerability. While adequate research has been conducted on the theoretical components of vulnerability, policy solutions to covariate risk may include disaster risk reduction and related rainfall insurance. To address idiosyncratic exposure, growing family admittance to monetary sources such as credit is essential (Heltberg et al., 2015). Although experimental studies analyzing their execution exist, there is a lack of detailed

exploration of their implementation (Klasen and Waibel, 2015; Povel, 2015). Second, regardless of the expanded event of covariate shocks, particularly in non-industrial nations such as Pakistan, most of the weak research centers on the outcomes of eccentric shocks (Kurosaki, 2015). Third, because most weak research has been conducted on provincial families alone (Gunther and Harttgen, 2009),metropolitan neediness continues to be restricted (Christiansen and Todo, 2014;Haddad et al., 1999). This is especially evident in Pakistan, where practically all suitable explorations of neediness risk centers around provincial families. McCulloch and Baulch (2000) and (2002), laid out that rustic Pakistan's destitution issue' for the most part, includes unfortunate temporary homes, as opposed to constantly unfortunate ones (Mansuri and Healy, 2002). In addition, the review revealed that the peculiar development is essentially lower for landed families in Peshawar's provincial areas. It utilizes weakness measures on a dataset from the Peshawar region's rural areas. This suggests that an exhaustive arrangement of weakness markers can be used to determine weak families (Kurosaki, 2006; Kurosaki, 2010). A review revealed that admittance to monetary foundations safeguards provincial individuals from wellbeing-related quirky shocks and thatmore landed families are less powerless against covariate flood shocks (Kurosaki, 2015). While these investigations make significant commitments, Pakistan's rapid urbanization requires an evaluation of metropolitan family vulnerability (Rabbani, 2015). Mugera and Schilizzi (2016) observed that weakness was more pervasivethan destitution and that neediness-initiated openness is more common than risk- induced vulnerability.

Furthermore, idiosyncratic risk outweighs covariate exposure. According to research conducted by Zemedu and Mesfin (2014), Kesra has a significant rate of food insecurity. According to the vulnerability assessment, more households will face more insecurity in the future. Furthermore, probit regression analysis revealed that gender, per capita income, and climate change adaptation through shifting planting patterns likely diminished household food security status. Consequently, it is advisable to diversify livelihoods, adapt to climate change and promote activities that increase per-capita income. According to Das (2017), vulnerable households are primarily defined by poverty and idiosyncratic risk. Additionally, states that perform poorly on PDS are more susceptible. Families with consistent sources of income and higher labor participation rates are less sensitive to shocks. Increased urbanization significantly

reduces people's vulnerability to food insecurity. According to Shah et al. (2019), studies of livelihood practices are strongly related to the effects of food security, climate variability, and calamities. Household social networks showed no discernible effect. Musyoka et al. (2020) discovered a credible link among changesin physical infrastructure, household vulnerability and coping methods in the face of shocks. Urban and rural households increased their infrastructure-supported ex-post coping mechanisms in response to food security shocks such as savings and borrowing. Rural families adopted these measures at a greater rate of five percentagepoints. Finally, it suggested that household susceptibility to general shocks decreased, with the decrease being more significant for urban households; rural households' vulnerability to food shocks decreased more than that of urban households.

2.5. Coping Strategies of Household Food Security

Food-insecure households have been adopting a variety of coping mechanisms. To defend their necessities, households might embrace food and non-food-based coping mechanisms, or blend both (Ruel et al., 2010). Recent research has linked several coping methods to household food insecurity and individual food consumption.

These coping methods are related to poverty indices such as income and expenditure and seasonal variations in staple food production (Ahamad and Khondker, 2010). Previous Research Has Shown that poor households use various coping methods, both food and non-food. Fewer foods, smaller meal sizes, rice consumption, skipped diets and selling resources account for reactions to food shortages (Gundersen and Ziliak, 2018). Family members or acquaintances donate food to food-poorhouseholds (Asesefa et al. 2018). Droughts, floods, sicknesses, pests and diseases areexamples of income shocks that may trigger coping mechanisms. Income smoothing is a subset of asset and consumption smoothing. Asset Smoothing aims to maintain productive income-generating assets even in poor times. Portfolio diversification has been identified in asset-smoothing research (Dercon 2002). Ex-risk asset smoothing techniques as often as possible have negligible exchange and opportunity costs, permitting families to retain short-run shocks (DeLoach and Smith-Lin, 2018). A reduction in utilization, missing suppers, or utilizing interpersonal organizations (Échevin and Tejerina, 2013; Kazianga and Udry, 2006; Zimmerman and Carter, 2003) has been examined in different investigations. According to Ashraf and Routray

(2013), dry spells decrease family pay. Zimmerman and Carter (2003)recognized helpful and non-useful resources such as animals and land. Families dealing with health crises may sell animals or use reserve funds for smooth utilization (DeLoach and Smith-Lin, 2018; Islam and Maitra, 2012; Isoto et al., 2017). Drought causes a few families to exhaust their financial and grain reserves and even sell their livestock (Kazianga and Udry, 2006). In labor markets, families can smooth their utilization by working more off ranches. In general, families with additional resources are more resilient to shocks. The precise coping mechanism varies with the degree of shock.

2.6. Research Gap

Most literature is dedicated to investigating India's cultural trends and patterns. From the literature review, it is clear that food security must encompass more than mere availability for the needy. Earlier studies provide a basis for arguing that each dimension of food security may have a distinct impact on the welfare of beneficiaries. However, most previous studies have focused primarily on trends, patterns and identifying the determinants of various dimensions. The crucial issues examined in these studies included household food security and consumption patterns on a primary basis, the distribution mechanism, activity mapping of the NFHS scheme and other government policies and the effectiveness of FPS in urban and rural areas. While analyzing the impact of food security on welfare, most studies considered only a single dimension of food security and a single welfare measure. However, this study analyzes how various dimensions of food security affect various dimensions of household welfare. Thus, this study attempts to analyze the impact of three different dimensions of food security on the welfare of beneficiary households, covering food consumption patterns and vulnerability aspects. However, many studies have failed to examine the effectiveness of PDS at the household level. To preserve consistency and cohesiveness, the study needs to conduct regular research to identify the present gaps and potential future research correctly. So, for that reason, the current study is being undertaken. However, Punjab did not have region-wise analysis. Unfortunately, few studies have attempted to simultaneously examine the state and district levels of food security. Therefore, research on patterns, trends and factors is required to provide reliable information on the food security of individuals at the household level in Punjab. Therefore, the current study reviews empirical evidence and collects data via surveys and research from stakeholders and other government sources.

CHAPTER – III
RESEARCH METHODOLOGY

Before embarking on the research design, a comprehensive understanding of the research methods and data analysis is required. Thus, the current study establishes a framework for data collection and analysis. This chapter describes the research methodology in depth, including the study population, sample design, sample size and statistical techniques used to analyze the data. This chapter is divided into three sections. Section I examines the research design and includes information about the research topic, objectives, hypotheses, sample design and sample size estimation. Section II discusses the research instrument, its validity, and its reliability. Section III describes the statistical methods used for data analysis.

SECTION- I

3.1. Research Design

To carry out the present study, a descriptive, cross-sectional research approach was employed in the northwest Indian state of Punjab, where data were collected from households in both rural and urban areas of Punjab through a self-structured schedule adapted from the "*Household Food Insecurity Access Scale (HFIAS)" and "U.S. Household Food Security Survey Module: Six-Item Short Form Economic Research Service (USDA)."*

3.1.1. Research Topic

"A Study on Effectiveness of the Household Food Security in Punjab."

3.1.2. Research Questions

Against this backdrop, intriguing questions have been posed. To begin with, what are the food consumption patterns in the rural and urban areas of Punjab? Second, how effective is Punjab's PDS and NFSA in attaining household food security? Third, are the state's availability, pricing and accessibility facilities adequate? Most importantly, this study investigated the factors associated with vulnerability to HFS and determined the methods that should be used to detect constraints and how they might be addressed.

3.1.3. Research Objectives

1. To identify the determinants of food security at the household level in Punjab;
2. To study the food consumption pattern of rural and urban areas of Punjab;
3. To analyze the vulnerability of food security in Punjab;
4. To examine the effectiveness of food security through Public Distribution System.

3.1.4. Hypotheses

The process of conducting a systematic analysis of a phenomenon involves testing a predetermined hypothesis. Therefore, a literature analysis was conducted to generate hypotheses on many factors of household food security in Punjab. These hypotheses provide quantitative statistical evidence for food security and insecurity. Based on the literature review and study, the research objectives following the hypotheses were framed. The following hypotheses were formulated to test this occurrence:

1. **The hypotheses was framed to identify the factors that influence food security at the household level in Punjab:**

Ho_1: There is no significant association between level of education and household food security.

Ho_2: There is no significant association between monthly income and household food security.

Ho_3: There is no significant association between marital status and household food security.

Ho_4: There is no significant association between age and household food security.

Ho_5: There is no significant association between sex of the household and household food security.

Ho_6: There is no significant association between farm size and household food security.

Ho_7: There is no significant association between cattle ownership and household food security.

Ho_8: There is no significant association between the household size and household food security.

2. **The hypothesis framed to study the food consumption patterns of rural and urban areas of Punjab are as follows:**

Ho_1: There is no significant difference between food consumption and expenditure among rural and urban households.

3. **The hypothesis was framed to analyze the vulnerability of food security in Punjab:**

Ho_1: There is no significant association between vulnerability and the nutritionalstatus of household members.

4. **The hypotheses framed to examine the effectiveness of food security through the Public Distribution System is as follows:**

Ho_1: There exists no significant difference between urban- rural beneficiaries with the proximity of FPSs.

Ho_2: There exists no significant relationship among urban-rural beneficiaries' satisfaction with the quality of grains provided.

Ho_3: There is no significant association between urban-rural consumers and rightly charged pricing.

Ho_4: There is no significant gap between urban-rural cardholders with the behavior of the dealer.

Ho_5: There is no significant difference between urban-rural beneficiaries regarding the operating hours of the PDS outlets.

Ho_6: There is no significant association between urban-rural cardholders regarding the entitlement of food grains to all the family members

$Ho_{7:}$ There is no significant difference between urban-rural beneficiaries satisfaction regarding measuring accuracy measurement.

Ho_8: There is no significant difference between urban-rural consumer satisfaction regarding the availability of products on PDS outlets.

Ho_9: There is no significant difference between urban and rural customer satisfaction regarding the limpidity in the PDS outlets.

3.1.5. Profile of the Study Area

Punjab is located in northwestern India. Punjab is an agriculturally favorable state that is scientifically classified as an agricultural state (Grover, 2017). Punjab is self-sufficient in food production and is the central pillar for taking part in the country's

the 1960s green revolution, contributing a significant amount of food grains to the country. Agriculture provides financial aid to more than 70 percent of Punjab's population, with over 60 percent residing in rural areas. It is small and large, occupying only 1.5 percent of the nation's land area and supplying around two-thirds of the food grains consumed each year (Grover, 2017). Punjab is geographically separated into three regions: *i) Majha, ii) Malwa and iii) Doaba* (Government of Punjab, India). The Majha region is primarily located between the Beas and Ravi Rivers. The territory is north of Sutlej, from the junction of Beas and Sutlej at Harike in the Tarn Taran district to the Ravi River. This place was in the heart (central portion) of theold Punjab region, so it was named *Majha* and comprised the districts of*Amritsar, Gurdaspur, Taran Taran and Pathankot.* Malwa spreads beyond the borders of the Punjab state all the way to Haryana's Ambala district. This region accounts for approximately 60–70 percent of the land area of the state. The inhabitants are referred to as 'Malwai.' They are primarily concentrated in *Barnala, Bathinda, Fatehgarh Sahib, Faridkot, Fazilka, Firozpur, Ludhiana, Malerkotla, Mansa, Moga, Mohali, Muktsar, Patiala, Ropar and Sangrur*. Doaba is the area of theSatluj and Beas rivers. Furthermore, the area is known as *"Bist Doab*" or *"Jalandhar Doab."* The term Doaba is formed of two words: '*Do*', which means two and '*Aab*', which means water or river; hence, the phrase Doaba translates as the territory between two rivers, which includes the districts of *Jalandhar, Kapurthala, Nawanshahr and Hoshiarpur*.

3.1.5.1. Geographical Description

Punjab is bordered by Jammu and Kashmir to the north, Rajasthan and Haryana to the south, Himachal Pradesh to the northeast and Pakistan to the west. It has an extended latitude range of 29.30°to 32.32° North and a longitude range of 73.44° to 76.50° East (Government of Punjab, India). Punjab covers an area of 50,362 sq. km in total, of which 47,847.4 sq.km are rural and 2,514.6 sq. km are urban (Census of India, 2011). District Firozpur is the most incredible area in Punjab, with 5,305 square kilometers, whereas district Fatehgarh Sahib is the smallest, covering 1180 square kilometers. It averages 300 meters (980feet) above sea level. It spans the boundary from the southwest to northeast. It ranges from 180 m or 590 feet from the southwest and more than 500m or 1600 feet from the northeast border.

3.1.5.2. Characteristics of Population

Table 3.1 shows several distinctive qualities of Punjab. It demonstrates a higher proportion of the population living in rural areas (62.52 percent) and a literacy rate of 75.84 percent. Over the last decade, Punjab's population growth rate has been 13.89 percent, with a density of 551 people per square kilometer.

Table 3.1. Characteristics of Population in Punjab, India

Particulars	Rural	Urban	Total
No. of households (in lakhs)	33.58	21.54	55.13
Total population			
Individuals (in lakhs)	17.34	10.39	27.74
Population share (in percent)	62.52	37.48	100
Male (in lakhs)	90.93	55.45	14.63
Female (in lakhs)	82.50	48.53	13.10
Literacy rate (percent)			
Persons	71.42	83.18	75.84
Male	76.62	86.67	80.44
Female	65.74	79.21	70.73
Gender Ratio (Female per 1000 Males)	907	875	895
Decadal growth of population (percent)			
Persons	7.75	25.86	13.89
Male	6.77	24.11	12.74
Female	8.85	27.91	15.21
Population density (persons per sq.km)	362	4136	551

Source: Census of India (2011).

3.1.5.3. Profile of Working Population in Punjab, India

The profile of the working population of Punjab is shown in Table 3.2. Punjab has a total workforce of 98.97 lakhs (35.67 percent). The household industry employed the least number of people. There is a significant disparity between primary workers and marginal employees, agricultural labourers, and land farmers. However, the unemployed outnumber the working population.

Table 3.2. Profile of Working Population in Punjab, India

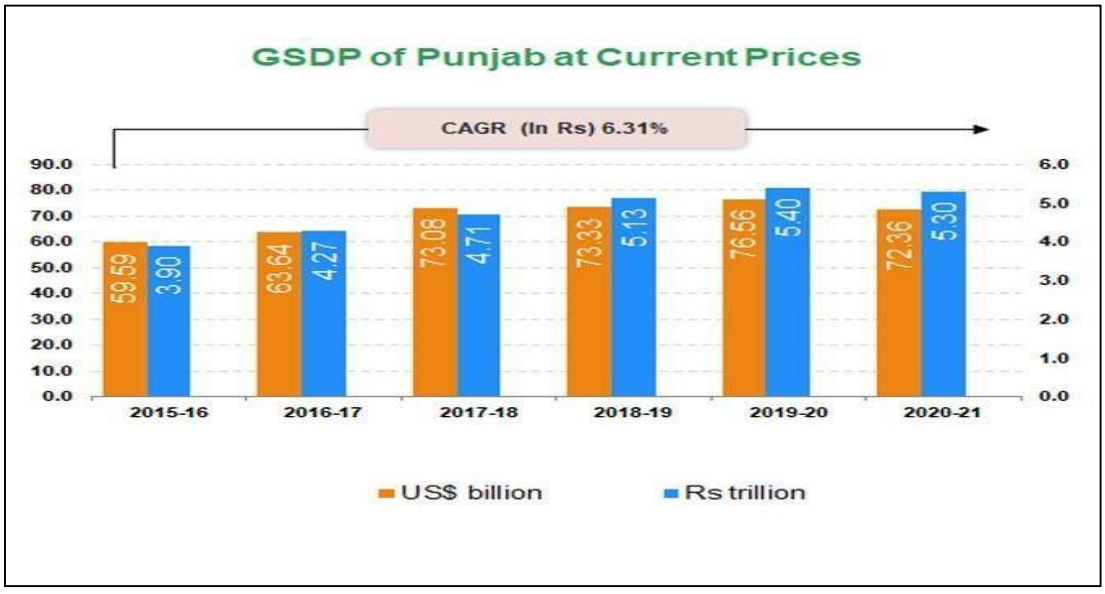
Particulars	Rural	Urban	Total
Total workers (in lakhs)	61.79	37.18	98.97
Working population (in percentage)	35.63	35.75	35.67
Non-working population (in lakhs)	11.16	66.80	178.45
Main workers (in lakhs)	51.07	33.43	84.50
Marginal workers (in lakhs)	10.72	3.74	14.46
Cultivators (in lakhs)	18.40	94.51	19.34
Agricultural labourers (in lakhs)	14.74	1.13	15.88
Household industry workers (in lakhs)	2. 35	1.50	3.85
Other workers (in lakhs)	26.29	33.59	59.88

Source: Census of India (2011).

3.1.5.4. GSDP and PCI in Punjab

Punjab's economy is the 16th largest in India, with a GDP of US$70 billion in 2020-21 and as per capita GDP of US$ 2,090, putting it 19th among Indian states.

Figure 3.1. GSDP during different Decades in Punjab

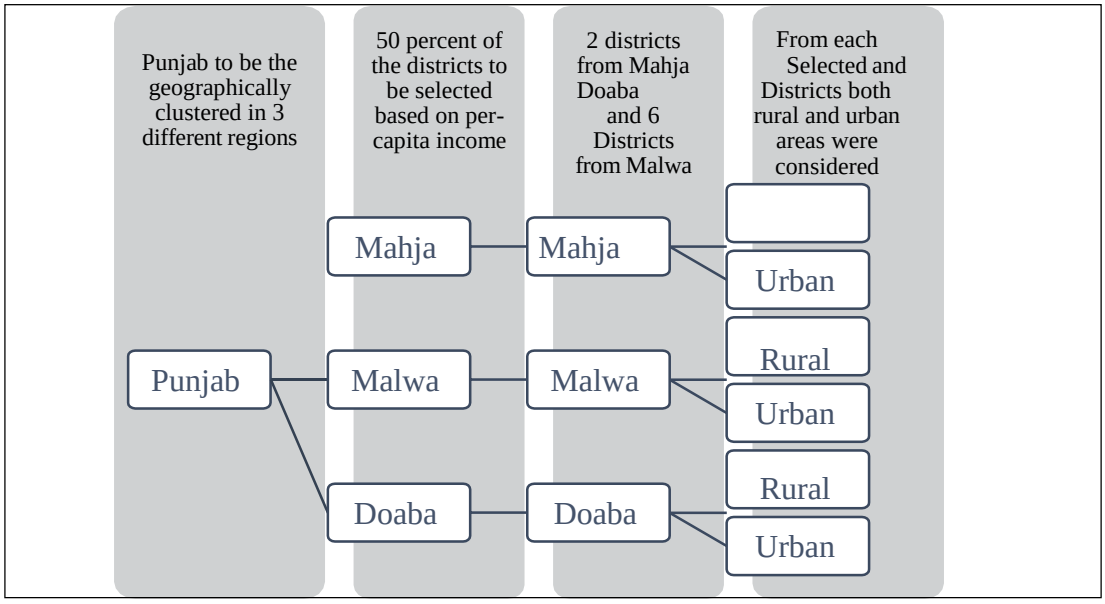


Source: Ministry of Statistics and Programme Implementation (MSPI) and Indian Brand Equity Foundation (IBEF)

3.1.6. Sample Design

The study employed a "multistage area sampling" strategy utilizing the Punjab Census data (2011) (Malhotra and Dash, 2012). The first phase of the sampling technique was the geographical clustering of Punjab in 3 regions, namely Majha, Doaba and Malwa. In the second phase, 50 percent of the districts were selected from each geographical cluster based on high and low per-capita income (Kumaraswamy, 2008). The second phase involved selecting two districts from each geographical cluster, based on their high per capita income (Anjana et al., 2011). Amritsar and Gurdaspur were chosen as the capital cities of the Majha Region. Nawanshahr and Hoshiarpur were selected from the Doaba region. Six districts were selected in the Malwa region: Rupnagar, SAS Nagar, Ludhiana, Muktsar, Mansa and Ferozepur.

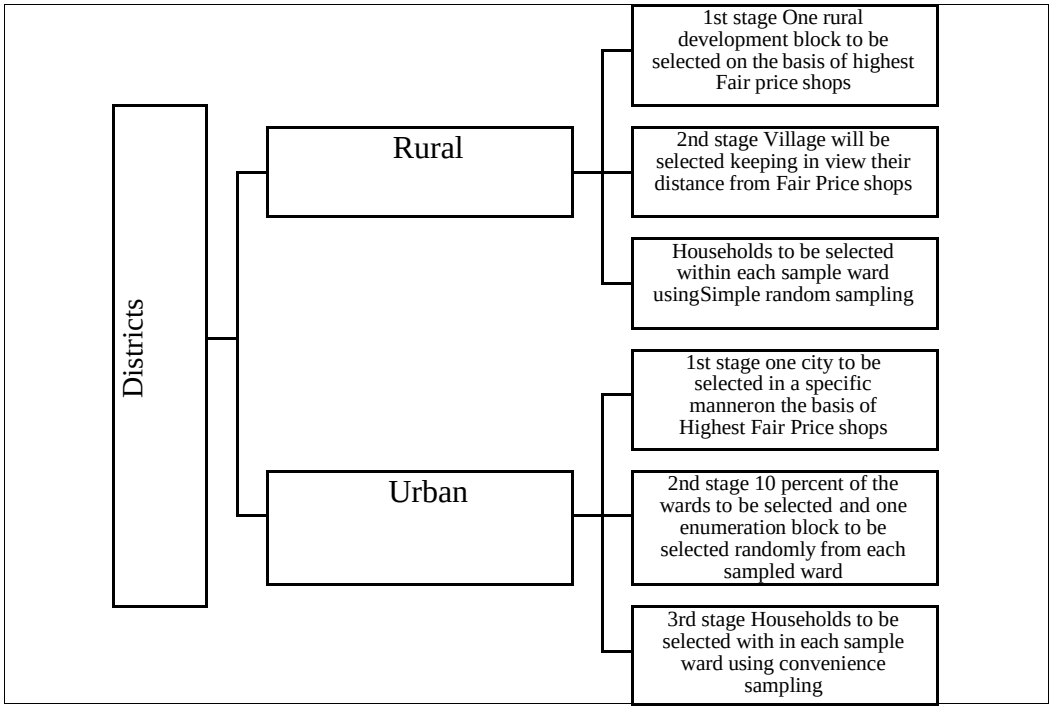
Figure 3.2. Study Sampling Strategy



***Source**: Based on Author's Compilation*

Figure 3.3. shows the various phases of the sampling design in rural and urban Punjab, which indicates that both rural and urban areas were considered from each selected district. A three-stage method was employed in rural and urban areas of Punjab. A three-stage technique was used in rural areas.

Figure 3.3. Phases of the Sampling Design in Rural and Urban Punjab



***Source**: Based on Author's Compilation*

One rural development block was selected based on the highest FPS availability in the first stage. Two villages were selected from the development block for the second stage. The villages were chosen based on their proximity to the FPSs. The final step involved the selection of households using simple random sampling.

A three-stage approach was followed in urban areas. In the first stage, one city was chosen based on the availability of shops that offered the best value. In the second stage, 10 percent of each ward was randomly selected and one enumeration block was randomly chosen from each sample ward. A household was then randomly selected for the survey within each enumeration using Simple Random selection and the household head was selected for the study. Finally, households were determined using SRS without replacement methodology from the corresponding enumeration block.

A total of 55 primary sampling units (PSU) were taken, including 20 villages and 35 enumeration blocks from the urban locality. From each selected primary sample unit, 10 households secondary sample units (SSU) were selected using a random sampling technique without replacement (Thakur et al., 2016; Tripathy et al., 2016).

3.1.7. Estimation of Sample Size

The sample size was estimated from both rural and urban areas based on prior estimates of a risk factor prevalence of 50 percent, with a 95 percent confidence interval (CI) (Thakur et al., 2016; Anjana et al., 2011) and a recommended margin of error of 5 percent (0.05), as per the STEPS manual approach. The 384-person sample was altered by the design effect (1.5). A sample size of 576 was derived using the design effect value to create statewide outcomes by sex (male, female), age group, and domicile of urban and rural regions. Where *Z* denotes *the 95 percent confidence level*, and the confirmed *Z value is 1.96*. Additionally, p is the predicted incidence of food security and *e* represents *the margin of error* using *the sample size* calculation formula (Cochran, 1977).

$$n = Z^2 (p) (1-p) / e^2$$

Where,

'n'= Sample size

'Z'= Z statistic for confidence level.

For a confidence level of 95 percent, the conventional *Z-value was 1.96.p= estimated prevalence of food security*

and *e= margin error*.

Table 3.3. Estimation of Sample from the Urban and Rural Areas

S. N	Region	District	Per-Capita (Y)	Town/City	Wards (10percent)	Village	Urban Households	Rural Households
1	**Majha**	Amritsar	98599 (High)	Amritsar (84)	8	2	84	20
2		Gurdaspur	72940 (Low)	Gurdaspur (24)	2	2	20	20
3	**Doaba**	S.B. S	129366 (High)	S.B.S (17)	2	2	20	20
4		Hoshiarpur	119913 (Low)	Hoshiarpur (31)	3	2	32	20
5	**Malwa**	Rupnagar	133707 (High)	Rupnagar (17)	2	2	20	20
6		S.A. S	132532 (High)	S.A.S (33)	3	2	32	20
7		Ludhiana	128353 (High)	Ludhiana (95)	9	2	108	20
8		Shri Muktsar	92786 (Low)	Muktsar (23)	2	2	20	20
9		Mansa	89864 (Low)	Mansa (21)	2	2	20	20
10		Ferozepur	86593 (Low)	Ferozepur (24)	2	2	20	20
	Punjab	**Selected based on the highest no. of Fair Price Shops**			**35 PSU**	**20 Villages**	**376**	**200**

Source: *Based on the author's compilation*

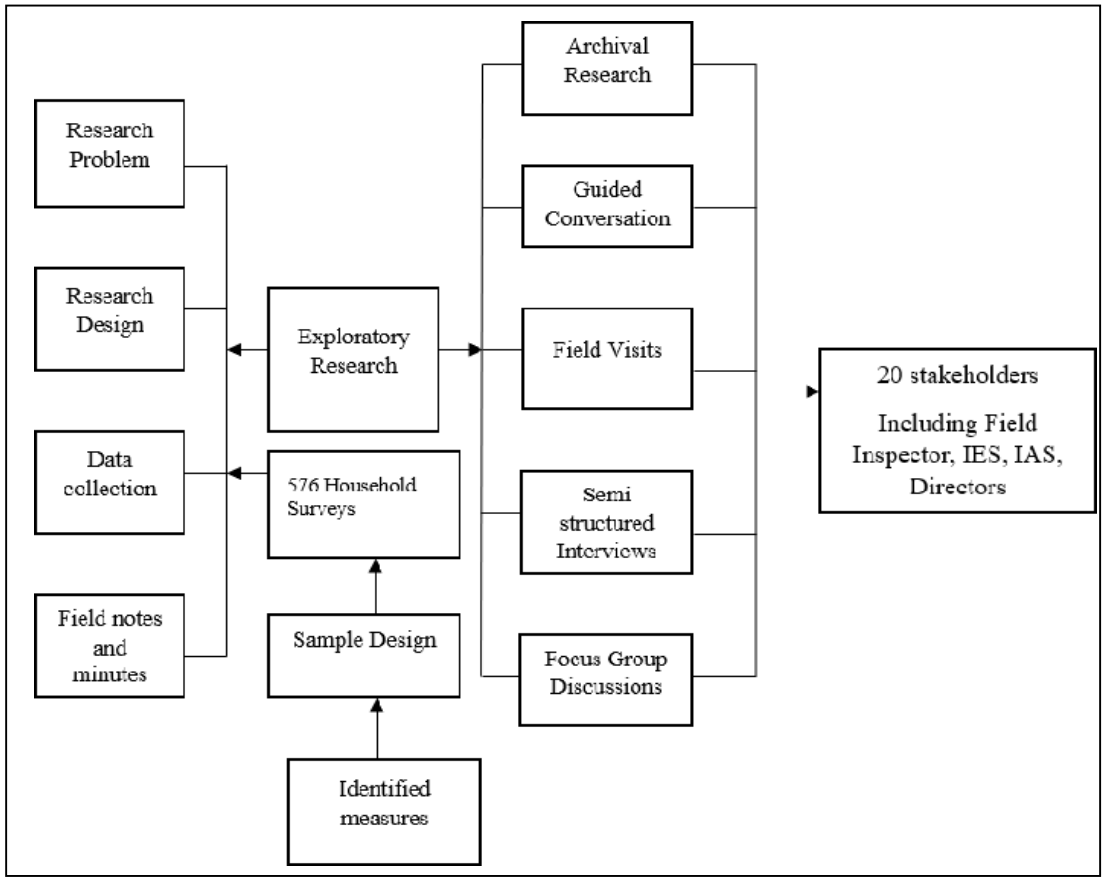
3.1.8. Sources of Information

This study focuses on the various determinants and other household aspects of food security. Primary data were obtained from sampled families via personal visits and inquiries with head households utilizing a well-designed and pre-tested routine. The Schedule survey collected household livelihoods, including household demography,

food production, marketing, consumption of food products, household assets and total consumption expenditures, including satisfaction regarding quality, quantity and prices. The primary data were gathered using a pre-structured schedule. The schedule was developed according to definitions in the literature. The preliminary draft of the schedule was modified based on the responses provided by respondents in the pilot survey and the final schedule **(Appendix I)** had seven sections, as follows:

- Household Characteristics
- Food Consumption Frequency
- Aspects Related to Household Food Security Participation of Households in Food Assistance Household Members' Health Status
- Programs of Food Assistance
- Household Coping Mechanisms in the Face of Food Scarcity and Income Shocks

Figure 3.4. Methodological Flow and Research Study Pattern



Source: *Based on the author's compilation*

Although the scale used in this study was derived from literature, it was validated using Cronbach's alpha. The interviews took place over six months, from October 2020 to March 2021. However, verbal consent was obtained from the respondents before conducting in-depth interviews. In addition, confidentiality regarding their identities and responses was ensured to maintain confidence throughout the interviews.

The following section of the study involves identifying and contacting various stakeholders to acquire access to the field survey. After identifying stakeholders, they were approached via email, LinkedIn, telephone conversations, and personal visits. The authors employed naturalistic inquiry to observe their daily lives and interactions with many stakeholders in their natural environments (Chopra, 2014). Group talk is frequently utilized to elicit diverse perspectives and ideas. According to Grover et al. (2016) and Longhurst (2003), performed semi-structured interviews in which participants were asked pre- determined open-ended questions to elicit debate. Field notes, minutes and recordings were used. Transcribing and organizing content in Microsoft Word (2013). Secondary resources were gathered from a variety of government documents and reports, including the Economic Survey of India (ESOI), National Sample Survey Organization (NSSO), Statistical Abstract of Punjab, Statistical Abstract of India, Ministry of Agriculture and Statistics, Economic and Statistical Organization of Punjab (ESOP), and Ministry of Statistics and Program. Additionally, a thorough household enumeration of cardholders was conducted in all districts of Punjab to obtain secondary data on ration cards, number of fair pricing retailers and social groupings.

SECTION-II

3.2. Research Instrument

A self-structured schedule was used in the present study to access household food security. The schedule is divided into seven sections. Section1 discusses the *socio-demographic and economic profiles and basic characteristics of households*. '*Food consumption patterns and their frequencies'* are discussing in Section 2. Sections 3 and 4 of the schedules *measure Household Food Security Access and Household participation in food assistance*. Section 5 focuses on *'the health status of family members*, followed by Section 6, *which discusses food assistance programs*. Lastly, the schedule has been emphasized on *'the coping mechanism in the household during food shortage and income shocks'* for which the Likert scale was used.

3.2.1. Content Validity:

The term "*content validity*" refers to evaluating content for its relevancy, clarity, and modification. According to Kimberlin and Winterstein (2008), "*Content validity is concerned with the extent to which the items generated to operationalize the construct give a sufficient and sample representative of all the things that may be used to assess the target construc*t." Content validity is the judgmental procedure in which an attempt is made to determine whether our questionnaire includes those behaviors that are relevant to the domain (Dar and Mishra, 2019). According to Kumar and Sadeeq (2020), "*Content validity is assessed by trusting the proficiency of the experts who have a thorough knowledge about the domain or construct under study*." Typically, it is determined by relying on the expert's knowledge who has a thorough understanding of the subject or construct under investigation. These subject experts are requested to provide their feedback regarding the matter, ambiguity, and language. Experts are given access to scale and requested to provide input on its contents, ambiguity and language and check the items or questions that have been genuinely measured the constructs that have been studied. Their responses are recorded and examined to make informed judgments regarding each item's usefulness and efficiency. The survey items were derived from earlier research and adapted for the current study. To determine the content validity of the selected items, they were shown to 7 experts representing some top research universities like ICFAI Business School, Hyderabad, BITS Pilani, Goa, and Jain University, Bangalore. In addition, certain survey items were modified/restructured in response to expert criticism. Thus,

the study instrument's content validity was proven.

3.2.2. Pilot Testing

According to Bashir (2016, pp. 71), "*Pilot testing is done to check the internal consistency of the statements by analyzing the Cronbach's Alpha*." Pilot research was conducted in Amritsar and Gurdaspur, using 110 self-administered questionnaires. The respondents chosen for pilot testing represented the head of the household polled in this study. Each respondent completed the schedule in approximately 20-25 minutes on average.

3.3.3. Reliability

The term "reliability" refers to the degree to which the findings are consistent. Bestowing Jope (2000), reliability is "the degree to which results are consistent across time and accurately represent the overall population under study; if the results of a study can be replicated using a similar approach, the research instrument is regardedto be reliable." Thus, dependability is broadly defined as the consistency with which ascale can repeatedly produce the same findings (Carmines and Zeller, 1979). Typically, researchers divide dependability into internal and external reliabilities. Internal reliability refers to the internal correlations among items and external reliability refers to the generalizability of the study's findings (Black, 1999). According to Farooq (2017, pp. 81), "*The most widely used method to measure reliability is Cronbach's alpha, which ranges from to 0-1 and can be used to measure the reliability of dichotomous, Likert, nominal and ordinal scales* ". According to Carmines and Zeller (1979), internal consistency can be determined by examining *the Cronbach's alpha.* External reliability can be determined using test–retest reliability. According to Nunnally (1994), the threshold value for Cronbach's alpha value should be a minimum of 0.7 to determine the measure's validity. The value of "Cronbach's alpha" for risk factors, coping strategies and prevention strategies constructs was above 0.70, as presented in Table 3.2.4, thereby certifying the reliability of all constructs. The Cronbach's alpha value of coping strategies measure was 0.764, but two items were deleted" send children to beg and gather wild food, hunt or harvest immature crops." The Cronbach's alpha for the Household Food Security Access Scale was 0.820. The reliability of management of the PDS measure was initially observed to be 0.725, which is above the threshold level.

Table 3.4 Reliability of Coping Strategies, Household Food Security Access Scale and Management of PDS

Construct	Item Code	Cronbach's Alpha if Item's Deleted	Cronbach's Alpha	Items Label
Coping Strategies	C1	0.759	0.764	I prefer to buy cheap food
	C2	0.766		Purchases food on credit
	C3	0.746		Gather wild food, engage in hunting and harvest immature crop
	C4	0.747		Send children or any other household member to eat elsewhere
	C5	0.753		Send any household member to beg
	C6	0.742		Limit portion size at mealtime for any member of the household
	C7	0.763		Restrict consumption by adults for small children to eat
	C8	0.772		Reduce the number of meals eaten in a day
	C9	0.739		Skip an entire day without eating anything
	C10	0.736		Borrow money from relatives
	C11	0.738		Taking a loan from moneylenders to meet
	C12	0.752		Mortgage productive assets
	C13	0.74		Received assistance from Govt/NGOs
	C14	0.732		Work on additional hours
	C15	0.784		Sell your livestock
	C16	0.691		Use Savings
Household Food Security Access Scale	AS1	0.761	0.820	Worry about the food shortage
	AS2	0.792		Not able to eat preferred food due to lack of resources
	AS3	0.768		Have eaten a limited variety of food
	AS4	0.758		Ever missed a no. of meals per day
	AS5	0.796		Any household member goes to sleep without eating the food
	AS6	0.847		Did any of the household members go a whole day and night without eating anything

Management	MP1	0.698	0.725	Satisfied with the quality of food
	MP2	0.705		Location of the FPSs
	MP3	0.664		Getting the full availability of food
	MP4	0.684		Price of ration that you go to
	MP5	0.69		Working hours of FPSs
	MP6	0.678		Commodities are available on time
	MP7	0.667		Satisfied with the behavior of FPS owner
	MP8	0.676		Satisfied with present measuring the process
	MP9	0.687		Present operating hours of FPS
	MP10	0.7		Satisfied with the present system
Climate Constraints	CC1	0.729	0.793	Drought
	CC2	0.751		Flood
	CC3	0.837		Famine
	CC4	0.800		Hail
	CC5	0.758		Frost
	CC6	0.758		Epidemic
	CC7	0.729		Soil degradation
	CC8	0.752		Agricultural Diseases
	CC9	0.813		Livestock diseases
Economic Constraints	EC1	0.632	0.711	Food price inflation
	EC2	0.625		Labor constraints
	EC3	0.647		Lack of funds
	EC4	0.645		Dwindling in government food supplies
	EC5	0.819		Low remittances from friends and family
	EC6	0.628		Job loss
	EC7	0.757		Increased household expenditures due to morbidity/mortality
	EC8	0.626		Others (specify)

Source: Author's calculations based on primary data.

SECTION-III

3.3. TOOLS FOR DATA ANALYSIS

The collected data were entered into *the Statistical Package for the Social Sciences* (SPSS 26.0) for analysis. The data were cleaned and outliers were removed from the dataset. Descriptive statistics (including the mean, media, frequency, percentage, and standard deviation) were examined to understand the nature of the data. Mean (X) is a fundamental concept of statistics and mathematics. In statistics, it measures the central tendency of a probability distribution. "*Mean is estimated by taking the sum of all observations in a dataset divided by the total number of observations in a given data set*" (Kumar and Sadeeq, 2020). Generally, the median is described as the median value arranged in assorted, descending, or ascending list of numbers. Occasionally, the mediancan be more descriptive for a dataset than the mean value. "*For an odd number of observations, the middle number is the median value and if there is an even number of observations, the median is the mean of the two middle values*" (Kumar, 2016). The *chi-square (χ^2) statistic measures the difference between the observed and expected frequencies of the outcomes of a set of events*' (Kumptala et al., 2013). Chi-square tests were performed to check whether the two variables were associated. This helps study the differences in categorical variables, mainly when the study variables are nominal in nature (*e.g.*, Gender, Region, etc.). For computerized data analysis, tools viz. Microsoft Excel and SPSS 26.0 were used to check the Binary Logistic regression and the min- max method. Logistic regression is performed when the dependent variable is nominal or categorical (Burns and Burns, 2008). According to Field (2009), it "*determines the impact of multiple independent variables presented simultaneously to predict membership of one or other of the two dependent variable categories*."

The logistic regression equation can be expressed as follows:

$Zij = \beta 0 + \beta 1X1 + \beta 2X2 + \beta 3X3 + \ldots\ldots \beta nXn$

Where,

Zij = Probability of i^{th} households of region

$\beta 0$ = the constant of the equation

β 1,2,3, = the coefficient of the predictor variables

X1,2, ... respectively = the predictor variables

SECTION-IV

3.4. STUDY LIMITATIONS

The results and conclusions of the present study cannot be applied generally before considering the following limitations.

1. The present study was restricted to the North Indian state of Punjab. Therefore, cultural, socio-economic, and geographical differences may vary beyond this region and the results cannot be generalized as a whole.
2. The present study selected districts from each geographical cluster based on high and low per capita incomes. Therefore, the study's findings may have varied if all 23 districts of Punjab were included.
3. Therefore, collecting the primary data of household food consumption based on memory recall is subject to bias. Furthermore, food security cannot be measured in terms of quality because nutrition experts determine the nutrient composition of food items.
4. Some respondents did not provide information because of political interventions, social constraints, or prohibitions.
5. The data were obtained through cross-sectional surveillance, from which a causal relationship could not be identified.

CHAPTER- IV

SOCIO-ECONOMIC DETERMINANTS OF HOUSEHOLD FOOD SECURITY

Food security ensures that every household member has access to nutritious and culturally appropriate food. It is a complex issue influenced by several factors, including *input availability, price, credit availability, farm size, employment opportunities and socioeconomic household characteristics such as technological adoption, farming practices, education, gender, age and family size and composition*. These elements vary in importance among countries, regions, nations, and local, family and individual levels, because they are multidimensional issues that incorporate economic uncertainty. Three critical factors–food availability, accessibility, and utilization–directly and indirectly affect household food security. Availability refers to the abundance of food produced by an organization. Access to food is associated with poverty reduction and simply having food is insufficient. Vulnerable households shouldbe able to acquire essential items and consume food that meets all nutritional requirements (Doppler, 2002; Abdullah et al., 2019). Any positive changes in the models recorded above can increase family food security by expanding food accessibility, access and utilization. These can be seen as potential approach switches foraccomplishing food security. Training and innovation take-up, for instance, may be usedas strategy switches for long-term policy interventions. In comparison, input accessibility, costs and financial accessibility may all function as strategic switches for short-run policy interventions.

This chapter addresses the socioeconomic characteristics of the study respondents and the factors that influence food security in Punjabi households. Three sections are included in this chapter. Section I highlights the socio-demographic characteristics of all the regions of Punjab. Section II identifies the socioeconomic factors that influence all the areas of Punjab. Finally, Section III provides a summary and concludes the paper.

SECTION- I

SOCIO-ECONOMIC DETERMINANTS OF HOUSEHOLDS IN REGIONS OF PUNJAB

4.1.1. Food Security Status of Household in Each Region of Punjab

According to FAO (2008), *"A situation that exists when all people at all times, have physical, social and economic access to sufficient, safe and nutrition's food that meets their dietary needs and food preferences for an active and healthy life."* HFS status was calculated using the simple average method. Because the dependent variable, food security, is qualitative and dichotomous in nature, it can only have two values: existence or absence. The standard binary response method was either 0 or 1. The number *'1' indicates food security*, while a value of *'0' indicates food insecurity* (Coleman-Jensenet al., 2011). A total score of 6-23 was achieved through data analysis, with the highest score indicating food insecurity (6-12) and the lowest score indicating food security (13-23). Due to the dichotomous nature of food security, the study hypothesized that various demographic, socio-economic and other factors would influence food security status in the specific locality depicted in Table 4.1. Studies have indicated that food security status varies significantly between states and even within the same region (Abdullah et al., 2019; Coleman et al., 2011; Barfield et al., 2006).

Table 4.1 compares the HFS conditions in each of Punjab's regions. According to the findings, the prevalence of food insecurity was high, on average, at 45 percent in the Majha. On the other hand, the Malwa and Doaba regions of Punjab were the most affected, with over 61 percent of households experiencing food insecurity.

Table 4.1. Household Food Security Status in Punjab

Food Security Status	**Doaba** (n=91) (percent)	**Majha** (n=142) (percent)	**Malwa** (n=343) (percent)	**Punjab** (n=576) (percent)
Food Security	39 (42)	78 (55)	137(39)	254(44)
Food Insecurity	52(58)	64 (45)	211(61)	322 (56)

Source: Author's calculations based on primary data.

Table 4.2. Description of Variables used in the Binary Logistic Regression

Variable	Description	Type
Food Security (**Dependent Variable**)	Food security status of household It takes value 1 if household is food secure and zero otherwise	Dichotomous
Independent Variables		
Gender	Sex of the household head	Dichotomous
Age	Age of the household (in years)	Continuous
Marital status	Marital status of the household head	Dichotomous
Social Group	Social status of the household	Categorical
Family Type	Total members in the household	Dichotomous
Dependent Member	Household member who is dependent on the household head	Categorical
Education	Education level of the household head	Categorical
Economic Status	Economic status of the household	Categorical
Monthly Income	Monthly income of the households (in rupees)	Continuous
Work Status	Type of the work	Categorical
Assets	Owning assets by the household	Dichotomous
Status of the house	Type of housing in which an individual resides	Dichotomous
Type of the house	Form of the house including room	Dichotomous
Present Earning	Total earning hands in household	Dichotomous
Monthly Expenditure	Monthly food and non-food expenses of the households	Continuous
Source of drinking water	From where the household get the potable water	Categorical
Plenty of Potable Water	Enough Availability of the water	Dichotomous
Treat Water	Process of the filtering the water	Dichotomous
Source Of Cooking	Source used by household for preparing the food	Categorical
Sanitation Facility	Area used by the household members that includes a toilet, urinal, sink, or shower	Categorical
Affordability	Able to buy the food items	Dichotomous
Accessibility	Able to access the market and transportation facility	Dichotomous

Source: *Based on Author's Compilation*

4.1.2. Socio-Demographic Profile of the Respondents in Different Regions of Punjab.

The descriptive statistics of the socio-demographic determinants are presented in Table 4.3, which describes all three regions of Punjab. The head of the household was hired to collect data because all household decisions, especially financial decisions, were made by men. Out of 142 Mahja respondents, 92 percent of respondents were maleand the rest were female. In most houses, the male member is responsible for providing shelter and food for his family.

In rare cases, females lead households. Further, it was found that 31 percent of respondents were business people, followed by homemakers, salaried, retired, cultivators and others. Out of 343 Malwa respondents, 262 respondents were male and the rest were female. A large proportion of the 292 respondents were married. Age shows that 56 percent of the respondents were 41–60 years, followed by 60 years and above (16 percent), 21-40 years (27 percent) and only 1 percent of respondents were aged up to 20 years.

Moreover, 23 percent of respondents were homemakers, 43 percent were businesspeople, 19 percent of the respondents were others, 1 percent were retired, 8 percent were salaried and students accounted for only 4 percent. The results highlighted that most respondents had a primary level of education,followed by secondary (21 percent), graduate (12 percent), illiterates (24 percent) andpost-graduate (2 percent).

The analysis revealed that 9 percent of respondents were from joint families. A large proportion of households had four to six members, followed by six members and above (5 percent) and up to three members (33 percent). Social groups, family type education, dependent members, economic status, assets, source of drinking water, treatment water and affordability are significant factors in the Malwa region. Furthermore, food security status is more prevalent in the Mahja region than in the Malwa region. Table 4.3. highlighted that out of 91 Doaba respondents, 82 percentwere male and the remaining 18 percent were female. A large proportion (84 percent) of respondents were married and 16 percent of respondents were single. Age shows that 51 percent of the respondents were 41-60 years, followed by 60 years and above (5 percent), 21-40 years (42 percent) and only 2 percent of the respondentswere aged up to 20 years. Moreover, 9 percent of the respondents were homemakers, 47 percent were businessmen, 16 percent of the respondents were others, 22 percent of respondents were salaried. The results highlighted that a large proportion of respondents had a primary level of education, followed by secondary (11 percent), graduate (9 percent), illiterates (18 percent) and post-graduate (4 percent).

Table 4. 3. Socio-Demographic Profile of the Different Regions of Punjab

Socio-Demographic Variables	Mahja (n=142) (percent)	Malwa (n=343) (percent)	Doaba (n=91) (percent)
Gender			
Male	130 (92)	262 (76)	75 (82)
Female	12 (8)	81 (24)	16 (18)
Marital Status			
Single	12(08)	51(15)	15(16)
Married	130(92)	292(85)	76(84)
Age Group			
Upto 20 years	07(06)	04(01)	02(02)
20-40 years	40 (28)	94(27)	38(42)
40-60 years	43 (30)	191 (56)	46(51)
60 years and above	52 (36)	54(16)	05 (05)
Work Status			
Salaried	20 (14)	28 (08)	20 (22)
Business	43 (31)	148 (43)	43 (47)
Cultivator (Farming)	10 (07)	20 (06)	5 (06)
Homemaker	8 (06)	78 (23)	8 (09)
Retired	25 (18)	05 (01)	00 (00)
Others	34 (24)	64 (19)	15 (16)
Education Level			
No Formal Education	12 (08)	83 (24)	17 (18)
Primary	69 (48)	138 (40)	52 (58)
Secondary	28 (20)	73 (21)	10 (11)
Graduate	25 (18)	48 (12)	8 (9)
Post-graduate	08 (06)	06 (02)	4 (04)
Others	00 (00)	00 (00)	00 (00)
Family Type			
Nuclear	117 (82)	312 (91)	80(88)
Joint	25 (18)	31(09)	11(12)
Household Size			
Upto 3 members	23 (16)	213 (62)	03 (03)
4 to 6 members	83(58)	114(33)	78(86)
6 members and above	36 (26)	16 (5)	10(11)
Social Group			
SC	18(12)	68(20)	18(20)
ST	09(07)	10(02)	09(10)
OBC	20(14)	67(19)	08(08)
Gen	95(67)	196(58)	56(62)
Others	00(00)	02(01)	00(00)

***Source**: Author's calculations based on primary data.*

In Mahja, respondents with secondary and graduation levels of education accounted for a similar percentage share, followed by primary (48 percent), secondary (20 percent), graduate (18 percent), no formal education (8 percent) and post-graduation (6percent). A large proportion of households had four to six members, followed by six members and above and up to 3 members, respectively. The results revealed that 67 percent of the respondents belonged to the general category, followed by the SC, ST and OBC social groups. Moreover, 43 percent of respondents were business people, 23 percent were homemakers and others accounted for only 1 percent of respondents in the Malwa region. The results highlighted that a large proportion of respondents had a primary level of education (43 percent), followed by secondary (21 percent), graduate (12 percent), no formal education (24 percent) and post-graduation (2 percent).

4.3. Socio-Economic Profile of the Respondents in all Regions of Punjab

Table 4.4. revealed that 76 percent of households had a monthly income of ₹ 5,000-15,000 and 06 percent of households had the lowest monthly income of less than ₹ 5,000 in Mahja. In Malwa, it was found that 48 percent of the respondents had a monthly income of ₹ 15,000-25,000, whereas in Doaba, results showed that half of the proportion were having of ₹ 5,000-15,000 (48 percent) and of ₹ 15,000–25,000. It was found that 68 percent of the households were able to purchase goods and necessities. It was found that households with two or fewer than two members (89 percent) from the family were presently earning. It was found that 18 percent of respondents were from joint families. Moreover, it was observed that the status of the respondents in the case of status of the house (98 percent) and type of the house (48 percent) is high, as per the standard of living. Only 7 percent of the respondents in Mahja had agricultural land. A bare minimum of 9 percent of respondents in Mahja and Doaba owned livestock and in Malwa, it was 12 percent.

Table 4.4. Economic Profile of the Respondents in Different Regions of Punjab

Economic Status	Mahja (n=142) (percent)	Malwa (n=343) (percent)	Doaba (n=91) (percent)
Monthly Income			
Less than ₹ 5,000	08 (06)	08 (02)	01 (01)
₹ 5,000-15,000	108 (76)	112 (33)	43(48)
₹ 15,000-25,000	24 (17)	165(48)	43 (48)
₹ 25,000 and above	02(01)	58(17)	04(04)
Present Earning			
Less than 2	127 (89)	318(93)	86 (94)
2-4 members	14(09)	21(06)	4(05)
More than 4 members	1(02)	4(01)	1(01)
Economic Status			
APL	96(68)	275(68)	73(80)
BPL	43(30)	62(30)	18(19)
AAY	3(2)	6(2)	01(01)
Status of the House			
Owned	139 (98)	331(96)	89 (98)
Rent	03 (02)	08 (03)	02 (02)
Lease	00(00)	04(01)	00(00)
Type of the House			
Kachha	25(18)	33(9)	10(11)
Pucca	68(48)	197(58)	73(80)
Semi-Pucca	49(34)	113(33)	08(9)
Agriculture Land			
Yes	10(07)	25(07)	02(02)
No	132(93)	318(93)	89(98)
Livestock			
Yes	13(9)	42(12)	08(09)
No	129(91)	301(88)	83(91)
Affordability			
Yes	97(68)	243(70)	67(74)

***Source**: Author's calculations based on primary data.*

4.1.4. Aspect of Accessibility in Different Regions of Punjab

Regarding market accessibility, most of the households were neutral (94 percent), (93 percent) and (97 percent) in Majha, Malwa and Doaba, respectively, but in the rural area, out of 20 respondents, seven respondents disagreed about accessibility, including health facilities, schools, and financial institutions. Moreover, 90 percent agreed in Mahja, 87 percent in Malwa and 78 percent in Doaba agreed about the proper provision of transport facility and the remaining 10 percent of respondents in Majha, 13 percentin Malwa and 22 percent in Doaba are facing the issue of transport accessibility, including

road infrastructure, connectivity issues and proper transportation. The results revealed that a household member traveled 5.4 km to access the nearest market place, 83 percent of respondents traveled less than 5.4 km and 24 percent were traveled far away.

Table 4.5. Accessibility Aspects of Household Food Security in Different Regions of Punjab

Accessibility Aspect	Mahja (n=142) (percent)	Malwa (n=343) (percent)	Doaba (n=91) (percent)
Market Accessibility			
Strongly Agree	00(00)	04(01)	00(00)
Agree	05(01)	07(02)	01(01)
Neutral	130(94)	320(93)	88(97)
Disagree	04(03)	09(03)	02(02)
Strongly Disagree	03(02)	03(01)	00(00)
Transport Facility			
Yes	128(90)	300(87)	71(78)
No	14(10)	43(13)	20(22)
Nearby Market			
Yes	118 (83)	307(89)	65 (71)

***Source**: Author calculation based on primary data*

4.1.5. Food Utilization Household Food Security in Different Region of Punjab

Household food utilization could be impacted by cooking, water and sanitation facilities. Unhygienic food preparation and consumption can have an inverse effect on family members' health. Unhealthy people are unable to assimilate the daily required amount of food, which has an impact on the food and nutrition status of homes, even when sufficient food is available. As shown below, most of the respondents were using public tap (68 percent), followed by piped water (15 percent), tube well (9 percent) and Canal Water (8 percent) and households (26 percent in Majha), (22 percent in Malwa) and (41 percent in Doaba) facing scarcity of water and 49 percent of the respondents were not using any means to purify the water. Moreover, in the Majha and Doaba regions, urban and rural areas are facilitated by sanitation facilities. However, in Malwa, 3 percent of the respondents in rural areas still did not have proper sanitation facilities. And using the well source of cooking but some of the households are still using the Chula with 18 percent dung cake and 3 percent used wood, which endangers the health of household members. This may decrease the productivity of household members and lead to hunger, malnutrition, and food insecurity.

Table 4.6. Utilization Aspects of Household Food Security in Different Regions of Punjab

Utilization Aspect	Mahja (n=142) (percent)	Malwa (n=343) (percent)	Doaba (n=91) (percent)
Source of Drinking Water*			
Piped Water	22(15)	47(13)	22(24)
Tube well/ Borehole	13(09)	57(16)	18(20)
Protected Well	00(00)	00(00)	00(00)
Public Tap	95(68)	210(61)	51(56)
Canal Water	12(08)	25(07)	00(00)
Other	00(00)	04(03)	00(00)
Plenty of Water			
Yes	105(74)	270(78)	54(59)
No	37(26)	73(22)	37(41)
Treat Water			
Yes	72(51)	190(65)	52(51)
No	70(49)	153(45)	39(49)
Sanitation Facility *			
Flush Toilet	111(78)	158(46)	81(89)
Pit Latrine	31(22)	138(40)	08(09)
Ventilated Improved Pit Latrine	00(00)	09(02)	02(02)
Open Field	00(00)	26(07)	00(00)
Community Toilet	00(00)	12(03)	00(00)
Source of Cooking*			
Electricity	00(00)	05(02)	00(00)
Dung Cake	18 (13)	30(09)	24(26)
Wood	03 (2)	03 (01)	02 (2)
Kerosene	00 (00)	00 (00)	00 (00)
Coal	00 (00)	00 (00)	00 (00)
Biogas	00 (00)	04(01)	00 (00)
LPG	121(85)	301(87)	65(72)
Others	00 (00)	00 (00)	00 (00)

***Source**: Author's calculations based on primary data.*
Note: *Data in parenthesis represents the percentage*
*Multiple Response

SECTION-II

4.2. FACTORS AFFECTING THE SOCIO-ECONOMIC DETERMINANTS OF HOUSEHOLD FOOD SECURITY IN DIFFERENT REGIONS OF PUNJAB

4.2.1. Socio-Economic Determinants of Household Food Security in All region of Punjab

This section presents the findings of the binary logistic regression model regarding the socioeconomic factors of HFS in the Punjab region. The results are shown in Table 4.7 gender composition plays a significant role in determining a household's food security. Kassie et al. (2014) examines the relationship between FS and gender composition in rural Kenya. Specific visible and discernible traits have been blamed for the disparity in FS between male- and female-headed households. The results revealed that gender was not a significant determinant (p = 0.736), but the probability of the incidence of food insecurity was lower among male respondents than among female respondents. According to Kantor and Wood (2012), female families are more insecure than male families. Women are primarily responsible for food processing and preparation (Ibnu, 2011). Women's primary issue is the lack of finance and marketing services due to gender-biased customs. Ages 21-40 years *(p = 0.015)* and 41-60 years *(p = 0.035)* and, on the other hand, were significant predictors of family food security. Age 21-40 was significant in all regions of Punjab, but age 41-60 years was significant in Malwa and Majha but insignificant in Doaba. Marital status was an insignificant determinant of household food security among all regions of Punjab.

Table 4.8. displays the socio-characteristics of the HFS in all three regions of Punjab, based on geographical clusters. The study results revealed that with an increase in education level, the probability of the incidence of food insecurity reduces significantly among educated respondents compared to illiterates. The analysis shows that higher education (0.000) was significant in the Malwa and Majha regions and insignificant in the Doaba region. Similarly, social group was an essential determinant in Mahja (0.07) and Doaba (0.011). Family type was insignificant in the Malwa (p = 0.272) and Doaba (0.416) determinants. Food insecurity rises among joint family respondents. Similarly, households with more than 3 members (p = 0.101) in Malwa and Doaba (p = 0.972) were not significant determinants of food security but significant in the Majha region. Family size was not

statistically significant in Malwa and Doaba. This means that family structure and size are inversely related to food security. The findings indicate that increasing the size of a family by a single individual reduces the likelihood of HFS. Similarly, increasing the number of members earning one doubles the possibility of food security. According to Bashir et al. (2010), families with three or more earning individuals have a greater possibility of food security than households with only one or two earning members.

Table 4.7. Basic Characteristics of Household Food Security in Different Regions of Punjab

Basic Characteristics	Malwa			Majha			Doaba		
	B-value	**Std. Error**	***p*-value**	**B-value**	**Std. Error**	***p*-value**	**B-value**	**Std. Error**	***p*-value**
Gender (Female)									
Male	0.265	0.784	0.736	-0.478	0.312	0.126	-0.410	0.717	0.568
Age (Below 20 years)									
21- 40 years	2.223	0.105	0.015*	2.223	0.909	0.015*	2.223	0.105	0.015*
41- 60 years	0.022	0.442	0.002*	1.404	0.94	0.035*	-0.177	0.302	0.559
60 years and above	0.813	0.442	0.442	0.136	0.258	0.598	0.813	0.442	0.442
Marital Status (Married)									
Single	0.671	0.820	0.413	0.313	0.368	0.395	-1.762	0.900	0.050*
Constant	-1.335	0.834	0.110	-0.715	0.367	0.052	2.246	1.509	0.137

Source: Authors' calculations based on primary data.
* Significant at 5 percent level

Table 4.8. Social Characteristics of Household Food Security in Different Regions of Punjab

Socio Characteristics	Malwa			Majha			Doaba		
	B-value	**Std. Error**	***p*-value**	**B-value**	**Std. Error**	***p*-value**	**B-value**	**Std. Error**	***p*-value**
Education (No Formal Education)									
Lower Education	0.463	0.302	0.126	-3.802	0.563	0.000*	-23.287	0.912	0.998
Higher Education	-3.465	0.597	0.000*	-3.465	0.597	0.000*	-22.307	11.276	0.998
Social Group (Unreserved)									
Reserved Group	0.318	0.388	0.413	-0.772	0.284	0.007*	-2.052	0.803	0.011*
Family Type (Nuclear)									
Joint	-0.559	0.508	0.272	1.039	0.498	0.037*	0.741	0.912	0.416
Dependent Member (Less than 3)									
More than 3	0.694	0.423	0.101	-0.758	0.318	0.017*	0.021	0.617	0.972
Constant	-1.691	0.871	0.052	2.720.	0.682	0.000*	21.969	12.276	0.998

Source: Authors' calculations based on primary data.
**Significant at 5 percent level.*

Table 4.9. Economic Characteristics of Household Food Security in Different Regions of Punjab

Economic Determinants	Malwa			Majha			Doaba		
	B-value	Std. Error	*p*-value	B-value	Std. Error	*p*-value	B-value	Std. Error	*p*-value
Economic Status (BPL and AAY)									
APL	1.122	0.462	0.015*	-1.171	0.321	0.000*	-1.447	0.670	0.031*
Work Status (Salaried)									
Business	1.539	0.502	0.002*	0.138	0.376	0.713	1.539	0.502	0.002*
Cultivators	0.184	0.721	0.799	0.184	0.721	0.799	0.184	0.721	0.799
Homemaker	0.818	0.519	0.115	0.818	0.519	0.115	0.818	0.519	0.115
Retired	0.59	0.321	0.066	1.539	0.502	0.002*	0.59	0.321	0.066
Others	0.184	0.721	0.799	2.383	0.562	0.000*	0.184	0.721	0.799
Monthly Income (Less than ₹ 15,000)									
₹ 15,000-30,000	0.428	0.500	0.112	0.327	0.293	0.264	0.674	0.488	0.167
Above ₹ 30,000	0.59	0.321	0.066	0.59	0.321	0.066	0.339	0.552	0.540
Assets (Low)									
High	0.759	0.483	0.116	0.739	0.275	0.007*	-0.145	0.584	0.804
Status of the house (Rent)									
Owned	20.609	3.681	0.999	1.882	1.111	0.090	21.909	40192.97	1.000
Type of the house (Kachha)									
Pucca	0.674	0.488	0.167	-0.183	0.419	0.662	0.645	0.813	0.427
Present Earning (Less than two members)									
2-4 members	0.535	0.513	0.297	0.535	0.513	0.297	-0.642	0.988	0.516
More than 4 members	0.107	0.553	0.847	0.739	0.275	0.007*	0.107	0.553	0.847
Monthly Expenditure (Less than ₹ 10,000)									
₹ 10,000-15,000	-0.043	0.367	0.908	-0.043	0.367	0.908	-0.043	0.367	0.908
₹ 15,000-30,000	-0.196	0.460	0.670	-0.183	0.419	0.662	-0.196	0.460	0.670
Constant	-22.585	2563.681	0.999	0.275	0.702	0.695	0.544	1.346	0.686

Source: Authors' calculations based on primary data.
**Significant at 5 percent level.*

The results of logistic regression are shown in Table 4.9. revealed that the economic status APL was the most promising and significant factor of HFS in all regions of Punjab respectively; it was (0.015) in Malwa, (0.000) in Majha and (0.031) in the Doaba region. Work status shows that businessmen (p = 0.002) in theMalwa and Doaba regions were significant economic determinants. Irrespective of the results, businessmen reported a higher probability of food security incidence than homemakers, retirees, and others. However, the most vulnerable section is daily wages and farmers. If proper provision from the government has been provided, such as an increase in wages and payments, special welfare schemes could help them. Moreover, income groups were recognized as insignificant determinants of food security in all regions. The remaining assets of the house and present-earning members more than 4 members (0.0070) were significant in the Majha region and negligible in the other areas. Table 4.10. highlights the physical characteristics of HFS in the Punjab region. The source of drinking water through public taps and other sources was significant in the Majha region and insignificant in other areas. Similarly, water treatment was significant in the Majha region. Affordability was the most promising determinant and was significant (0.000) in all three areas of Punjab. The sources of cooking and sanitation facilities were found to be insignificant determinants. However, the probability of increasing sanitation facilities and improved cooking sources leads to better health status, which directly relates to the utilization aspect of household food security.

Table 4.10. Physical Characteristics of Household Food Security in Different Regions of Punjab

Physical Characteristics	Malwa			Majha			Doaba		
	B-value	**Std. Error**	***p*-value**	**B-value**	**Std. Error**	***p*-value**	**B-value**	**Std. Error**	***p*-value**
Source of Drinking Water (Public Tap)									
Public Tap and Others	0.350	0.418	0.402	0.583	0.244	0.017*	0.702	0.551	0.202
Plenty of Portable Water (No)									
Yes	-0.003	0.452	0.995	0.088	0.280	0.753	0.702	0.551	0.202
Treat Water (No)									
Yes	0.326	0.359	0.364	-0.494	0.228	0.031*	-0.298	0.485	0.540
Source Of Cooking (Gas Chula)									
Chula and Others	-0.155	0.556	0.780	-0.196	0.340	0.564	0.161	0.565	0.776
Sanitation Facility (Pit Latrines)									
Flush toilet and others	-0.798	0.465	0.086	0.350	0.418	0.402	20.105	28357.26	0.999
Affordability (No)									
Yes	-1.510	0.402	0.000*	1.065	0.253	0.000*	-2.327	0.619	0.000*
Constant	-0.081	0.605	0.893	-0.425	0.379	0.262	-21.061	28357.26	0.999

***Source**: Authors' calculations based on primary data.*
**Significant at 5 percent level.*

SECTION III

4.4. SUMMARY AND CONCLUSION

This study corroborates the findings of Jean and Habyarimana (2013), who concluded that all components have a substantial impact on FS. The analysis revealed that 56 percent of the sampled households in Punjab were food insecure. The situation is particularly concerning in the Malwa region, where more than 61 percent of the sample households were food insecure. In contrast, the conditions weremuch better in the Doaba and Majha Punjab regions (58 and 45 percent, respectively). A significant disparity in HFS was detected across all areas. The socio-economic profile of HFS in Punjab revealed that 92 percent of the 142 Majha respondents were male and the remainder were female. 92 percent of the respondents were married, while the remaining respondents were single. Age revealed that 50 percent of respondents were aged of 41-60 years, followed by those aged 60 and over (36 percent), those aged 21-40 years (11 percent) and those aged up to 20 years (3 percent).

Additionally, 31 percent of the respondents were business owners, followed by homemakers, salaried, retired, cultivators and others. A large proportion of the 292 respondents were married. Age shows that 56 percent of the respondents were 41–60 years, followed by 60 years and above (16 percent), 21-40 years (27 percent) and only 1 percent of respondents were aged up to 20 years.

Moreover, 23 percent of respondents were homemakers, 43 percent were businesspeople, 19 percent of the respondents were others, 1 percent were retired, 8 percent were salaried and students accounted for only 4 percent. The results highlighted that most respondents had a primary level of education, followed by secondary (21 percent), graduate (12 percent), illiterates (24 percent) and post-graduate (2 percent).

The analysis revealed that 9 percent of respondents were from joint families. A large proportion of households had four to six members, followed by six members and above (5 percent) and up to three members (33 percent). Social groups, family type education, dependent members, economic status, assets, source of drinking water, treatment water and affordability are significant factors in the Malwa region. Furthermore, food security status is more prevalent in the Mahja region than in the

Malwa region. Table 4.3. highlighted that out of 91 Doaba respondents, 82 percent were male and the remaining 18 percent were female. A large proportion (84 percent) of respondents were married and 16 percent of respondents were single. Age shows that 51 percent of the respondents were 41-60 years, followed by 60 years and above (5 percent), 21-40 years (42 percent) and only 2 percent of the respondentswere aged up to 20 years. Moreover, 9 percent of the respondents were homemakers, 47 percent were businessmen, 16 percent of the respondents were others, 22 percent of respondents were salaried. The results highlighted that a large proportion of respondents had a primary level of education, followed by secondary (11 percent), graduate (9 percent), illiterates (18 percent) and post-graduate (4 percent). According to the analysis, 52 percent of respondents were from joint families. A large proportion of households had four to six members, followed by six members and above (20 percent) and up to three members (10 percent). Social group, family type education, dependent members, economic status, assets, source ofdrinking water, treat water and affordability are significant factors in the Malwa region. Household food consumption may be influenced by supply of cooking, water and sanitation. Unhygienic food preparation and consumption adversely affect the health of household members. Malnourished people cannot assimilate the daily essential amount of food, which affects the food and nutrition status of homes, even when food is available. Most of the respondents used public taps (68 percent), followed bypiped water (15 percent), tube wells (9 percent) and canal water (8 percent) and households (26 percent in Majha), (22 percent in Malwa) and (41 percent in Doaba) were experiencing water scarcity, with 49 percent of respondents not purifying theirwater. Additionally, while both urban and rural areas in the Majha and Doaba regions had adequate sanitation facilities, 3percent of respondents in Malwa's rural areas still lacked adequate sanitation facilities. While most families use a well for cooking, some people continue to use the Chula, which contains 18 percent dung cake and 3 percent wood, endangering the health of household members. This may reduce the productivity of household members, resulting in hunger, malnutrition, and food insecurity. Regarding market accessibility, most households (94 percent), (93 percent) and (97 percent) in Majha, Malwa and Doaba, respectively, while in the rural region, out of 20 respondents, seven disagreed with the accessibility of health facilities, schools and financial institutions. Additionally, 90 percent were agreed upon in Mahja, 87 percent in Malwa and 78 percent in Doaba about the transportation

facilitythat they have adequate provision for 10 percent of respondents in Mahja, 13 percentin Malwa and 22 percent in Doaba reported issues with transport accessibility, including road infrastructure, connectivity and proper transportation. On average, a household member traveled 5.4 kilometers to reach the nearest market, with 83 percent traveling less than 5.4 kilometers and 24 percent traveling further. Gender was not a significant predictor of FS ($p = 0.736$), but male respondents had a lower risk of experiencing food insecurity than did female respondents. In contrast, ages 21-40 years ($p = 0.015$) and 41-60 years ($p = 0.035$) were significant predictors of family food security. Ages 21-40 were significant in all regions of Punjab, although ages 41-60 were significant in Majha and Malwa, but not in Doaba. Marital status was an insignificant predictor of household food security across all Punjab areas.

The study's findings indicate that, as one's level of education increases, the likelihood of experiencing food insecurity decreases dramatically compared to illiterates. Higher education (0.000) was substantial in the Majha and Malwa regions, but insignificant in the Doaba region. Similarly, in Malwa (0.07) and Doaba, social group was a significant factor (0.011).

Although family type was not a significant determinant ($p = 0.272$) in Malwa and Doaba (0.416), the results indicated that it was a significant factor associated with household food security. However, food insecurity increased among respondents in joint families. Similarly, households with more than three people ($p = 0.101$) and households with more than three members ($p = 0.972$) in Malwa and Doaba were not significant predictors of food security but were in the Majha region.

The results of logistic regression revealed that the economic status of APL was the most promising and significant factor of food security in all three regions of Punjab; respectively, it was (0.015) in Malwa, (0.000) in Majha and (0.031) in Doaba region. The analysis shows that businessmen ($p = 0.002$) in Malwa and Doaba regions are significant economic determinants. Regardless of the results, businessmen reported a higher probability of food security incidence than homemakers, retirees and others. Additionally, the income group was identified as a non-significant predictor of food security in all regions. The house's remaining assets and current earning member (0.0070) were considered in the Majha region, but were small in the other regions.

Physical parameters of HFS in the Punjab region. The source of drinking water from public taps and others was considerable in the Majhja region but inconsequential in another. Water purification has been identified as a key issue in the Majha region. The most promising variable was affordability (0.000) in all the three Punjab regions. Cooking sources and sanitation facilities were determined tobe minor variables. But the probability of increasing the sanitation facility and improved cooking source leads to the better health status which directly relates withthe utilization aspect of the household food security. Mukhtar (2011) and Dojocho (2010) advocated for food security, availability and accessibility.

As more people engage in self-employment, agriculture and other economic activities, there is a trend toward reducing or eliminating food insecurity. According to the analysis, food availability, accessibility, use, and stability are all significant drivers of food insecurity. Thus, the variables examined in the study (i.e., food availability, accessibility, and utilization) were found to be significant predictors of food insecurity in the Punjab state. The following recommendations are offered considering the study's findings to improve HFS and thus, regional and national food security. Given that the frequency of food insecurity increases with household size, efforts should be made to improve programs and policies that promote appropriate family planning and limit the number of children to those that the home can adequately support. Agriculture should be promoted to increase foodavailability and legislation to combat food hoarding. Food accessibility should be addressed by establishing an efficient rural transportation system that enables farmers to transport their produce to the market at a lower cost.

The conclusions of this study indicate that the provinces' three regions are distinct from one another. Out of 21 variables fitted in the binary logistic regression model, three determinants significantly influence household food security in Punjab. Gender, age, social group, family type, education, monthly income, assets, the status of the house, type of house, present earnings, monthly expenditure, plenty of portable water, treated water, source of drinking water and sanitation facility were not significant factors. It was revealed that out of the variables in all divisions, four in Mahja and six in Doaba and twelve factors were significant in the Malwa region. In addition, the variables of food security vary greatly among them; hence, employing a blanket policy approach to combat food insecurity is strongly discouraged.

Therefore, it is essential to understand local contexts before pursuing policy alternatives. Affordability, employment status and economic position were found to promote food security in all three locations but in different ways. Thus, it is recommended that these variables be considered for each region. Similarly, knowledge is critical not only for earning a living but also for food consumption and safety.

Table 4.11. Significant Explanatory Variables of Household Food security in Punjab

Variables		**Majha**	**Malwa**	**Doaba**
Gender				
Age	21-40	Positive	Positive	Positive
	41-60	Positive	Positive	
	60 above			
Marital status				Negative
Social Group		Negative		Positive
Family Type		Positive		
Dependent Member		Positive		
Education	Higher Education	Negative	Negative	
	Lower Education	Negative		
Economic Status		Negative	Positive	Negative
Monthly Income				
Work Status (Business)		Positive		Positive
Assets		Positive		
Status of the house				
Type of the house				
Present Earning (More than 4 members)			Positive	
Monthly Expenditure				
Source of Drinking Water		Positive		
Plenty of Portable Water				
Treat Water		Positive		
Source of Cooking				
Sanitation Facility				
Affordability		Positive	Negative	Negative

Source: Based on the Author‘s compilation.

CHAPTER- V

HOUSEHOLD FOOD CONSUMPTION PATTERNS WITHIN RURAL AND URBAN PUNJAB

Food preferences may be a critical driver of demand in the 21st century. Numerous determinants may influence food preferences, including income development, urbanization advancement, demographic structural changes, health and environmental concerns, increased female employment and market transitions (Cobiac et al., 2018; McCluskey, 2015; Mergenthaler et al., 2009). According to Mankiw (2007), income is related directly to consumption. The Central Bureau of Statistics defines household consumption patterns as the proportion of household spending allocated to food and non-food items. Food spending continues to be the most significant component of family expenditure, as food is a necessary nutrient forevery human being (Ahmad, 2015). Household food consumption is determined by income, earnings, market prices and taste. India's consumption standards vary significantly between rural and urban areas and among social classes. Food preferences among households in rural and urban regions may also evolve differentlygiven the extreme heterogeneity of these two groups (Huang and David, 1993; Regmi, 2001). Economic discrepancies between the rich and poor have been noticed, owing to the low rate of economic change among the poor, who generally do not benefit from development programs. However, there are persistent inequalities between affluent and poor, men and women and rural and urban areas. Thus, the present chapter discusses consumption patterns in the urban and provincial regions of Punjab. This chapter is divided into four sections: Section I highlights the household food consumption patterns in rural-urban areas of Punjab. Section II discusses the frequency of food patterns in Punjab. Section III highlights household per-annum consumption expenditure on food items and per-capita consumption expenditure on food items. Finally, Section IV presents the summary and conclusions.

SECTION-I

5.1. FOOD CONSUMPTION PATTERN IN URBAN AND RURAL AREAS OF PUNJAB

5.1.1.Household Food Consumption Pattern

According to FAO (2010), "*Food security is the access of all people having enough food to live an active and healthy life."* Regarding food consumption practices, the indicators included the number of meals, decision-making and consumption patterns. As per table 5.1. shows that 67 percent of respondents reported that they consumed three meals per day, followed by 29 percent who had two meals a day in the urban area of Punjab, which showed that almost 253 households consumed proper food during a day. On the other hand, only 56 percent of households in rural areas consumed three meals per day and 12 percent of households consumed only one meal per day. 23 percent of households skipped meals a day due to fund shortages and resource scarcity. Even the consumption patterns of urban and rural areas changed during the previous year due to uncertain changes in the economy. Pandemics have even influenced the economy as a whole. It was noted that about 19 percent and 59 percent of rural and urban households had improved their consumption of vegetables and legumes. In contrast, around 18 percent of urban and 16 percent of rural households increased their consumption of animal and milk products.

On the other hand, some families reduced their diet by 4 percent in urban areas and 9 percent in rural regions in the preceding year because of the harmful impact of shocks. Considering the effect of intra-household decision-making on food purchase, preparation and consumption, female respondents have a greater likelihood of achieving a high level of dietary diversity than their male counterparts, indicating that a household is more likely to be food secure when female respondents have the authority to make food preparation decisions. When females make consumption decisions, families are far more likely to consume diverse diets. These findings reveal that women might significantly improve the quality of food consumed by households if they are empowered and provided with more resources. This study corroborated Axinn's (1997) observation that women's significant influence on household consumption contributes to increased variation in household diet. These findings also

confirm that Quisumbing et al. (1998) claimed that because women prepare food, their choices are impacted by their knowledge about various foods' nutritional benefits and their ability to allocate household budgets to nutritious foods. However, the results in Table 5.1. indicates that 57 percent of urban females make food preparation and consumption decisions. However, in rural regions of Punjab, male dominance remained at about 47 percent of households where men made the decision, indicating that approximately 28 percent of families were food insecure.

Table 5.1. Food Consumption Practices among the Urban and Rural Respondents in Punjab

Food Consumption Practices	**Urban (376)**		**Rural (200)**	
How many meals do you have in a day?				
Once	00(00)		23(12)	
Twice	112(29)		65(32)	
Thrice	253(67)		112(56)	
More than thrice	11(4)		00(00)	
Who decides food purchasing and consumption decisions				
Husband	58(15)		94(47)	
Wife	212(57)		53(26)	
Children	43(12)		16(8)	
Anyone among the households	63(16)		37(19)	
Is the household food consumption different in the past 12 months compared to the prioryears				
Yes	320(85)		147(73)	
No	56(15)		53(27)	
If yes, what modifications were made	**Increase**	**Decrease**	**Increase**	**Decrease**
Meals per day	23(07)	15(04)	00(00)	14(09)
Consumption of staple food	58(18)	28(09)	00(00)	04(03)
Consumption of legumes and vegetables	62(19)	20(06)	87(59)	00(00)
Consumption of animal and milk products	58(18)	15(04)	23(16)	03(02)
Others (specify)	20(06)	21(07)	14(09)	02(01)

Source: Author's Calculation based on Primary Data
**Note: Data in the parathesis shows percentage*

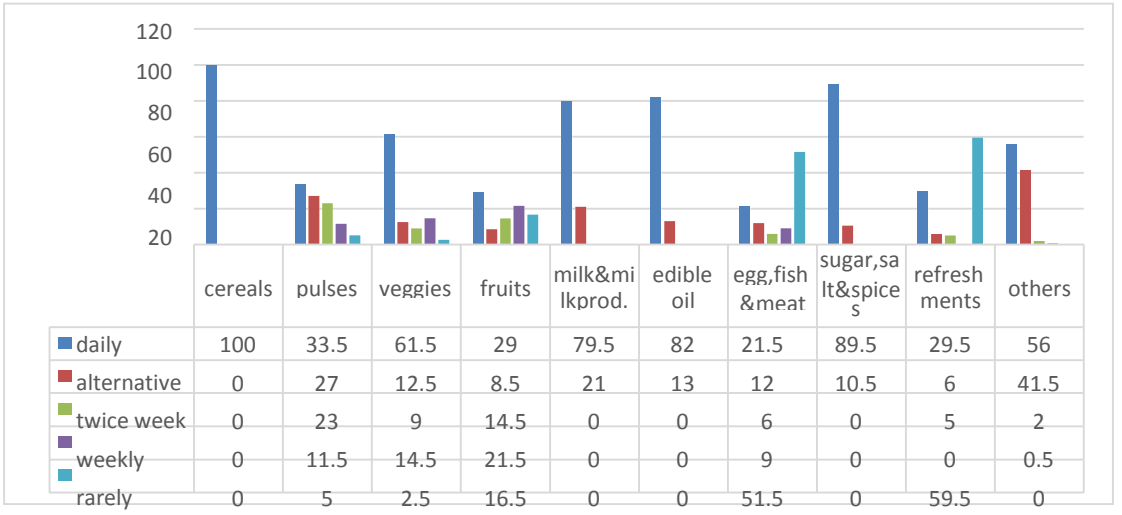
SECTION-II

5.2 COMPARISON AMONG THE URBAN AND RURAL HOUSEHOLDS RELATED TO THE FOOD FREQUENCY PATTERN

5.2.1 The Food Frequency Pattern of Urban and Rural Households in Punjab

Evaluation of food frequency is a typical and cost-effective way to assess a subject's average diet. Questions were asked to determine how family members consumed a particular food category. Cereals were consumed daily by all sample households in the urban regions, as indicated by the percentage of food consumption presented in Figure 5.1. Regarding intake of pulses, 212 sampled households consumed pulses daily, followed by 16.4 percent and 13.08 percent twice per week and the last 10.3 percent of rural families consumed pulses weekly. Regarding vegetables, 7.4 percent of households eat them twice per week, followed by 84.5 percent daily and 4.2 percent every week. More than half of the households (58 percent) consumed fruits daily, followed by those who consumed fruits twice a week (10.3 percent), rarely(13.2 percent) and weekly (3.9 percent). 92 percent of households consumed milk and milk products daily, whereas 8 percent of households consumed milk and milk products intermittently. Cereals were found to have the highest consumption, followed by milk and milk products, pulses, vegetables and fruits.

Figure 5.1. Frequency of Food Patterns in Urban Punjab

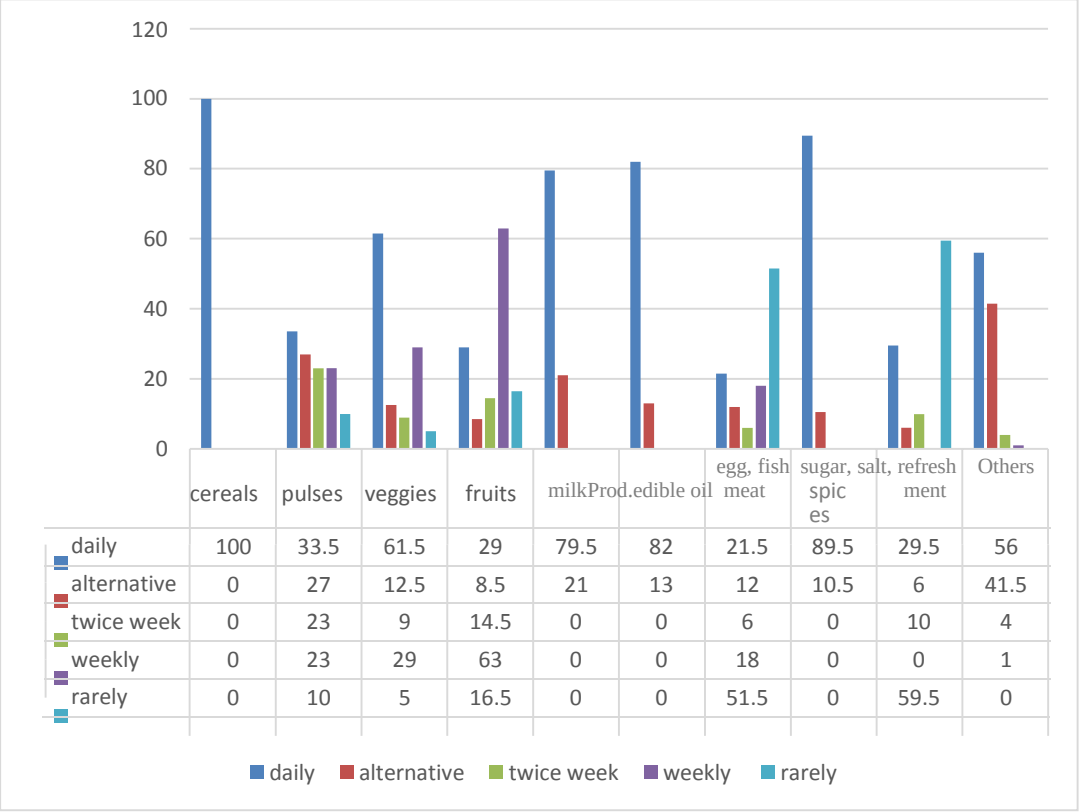


	cereals	pulses	veggies	fruits	milk&milkprod.	edible oil	egg,fish &meat	sugar,salt&spices	refreshments	others
daily	100	33.5	61.5	29	79.5	82	21.5	89.5	29.5	56
alternative	0	27	12.5	8.5	21	13	12	10.5	6	41.5
twice week	0	23	9	14.5	0	0	6	0	5	2
weekly	0	11.5	14.5	21.5	0	0	9	0	0	0.5
rarely	0	5	2.5	16.5	0	0	51.5	0	59.5	0

Source: Author's compilation based on the primary data.

Figure 5.2 shows the food consumption frequency of the sampled households in 10 rural regions. It is evident from the data that all sample households consume cereals daily. Regarding pulses, 27 percent of households used them intermittently, whereas 33.5 percent consumed them daily. 23 percent twice a week and 11.5 percent of households consumed pulsesevery week in chickpea, green gram, black gram and pigeon pea. Followed by approximately 61.5 percent of households consumed vegetables daily, followed by 9 percent twice a week and 12.5 percent alternately. About 31.5 percent of households consumed fruits weekly, followed by 29 percent daily and 16.5 percent rarely. Further exploration of Figure 5.2 shows that milk and milk products were consumed by the majority (79percent) of sample households daily and the rest (21 percent) consumed alternately. Refreshment sources such as alcohol, lemon juice and sugarcane juice consumption were highcompared to urban areas and 29.5 percent of households consumed refreshment daily. Cereal intake was ranked first, followed by milk and milk products, vegetables, pulses, and fruits, respectively.

Figure 5.2. Frequency of Food Patterns in Rural Punjab



	cereals	pulses	veggies	fruits	milkProd.	edible oil	egg, fish meat	sugar, salt, spices	refreshment	Others
daily	100	33.5	61.5	29	79.5	82	21.5	89.5	29.5	56
alternative	0	27	12.5	8.5	21	13	12	10.5	6	41.5
twice week	0	23	9	14.5	0	0	6	0	10	4
weekly	0	23	29	63	0	0	18	0	0	1
rarely	0	10	5	16.5	0	0	51.5	0	59.5	0

Source: Author's compilation based on the primary data.

SECTION-III

5.3. STRUCTURE AND PATTERN OF HOUSEHOLD FOOD CONSUMPTION IN PUNJAB

The food consumption structure was used to determine the items consumed by households in Punjab. Consumption patterns are defined as the proportionate share of total consumption expenditure on food items by households and total annual consumption expenditure on food items.

5.3.1. Consumption Expenditure and Production of Food Items in Rural and Urban Regions of Punjab

Table 5.2. shows the consumption expenditures and production of food items in the rural and urban regions of Punjab. In urban areas, rice consumption expenditure was 33.123 times greater than that in rural Punjab. There was very little difference found between the purchasing power of the respondents among rural and urban areas, i.e., 0.162. However, the results revealed that there is a significant difference between the rural and urban rice monthly expenditures, with a t-value of -2.094 and p-value of 0.037. The mean scores of ragi were 0.089 and 0.204 in the rural and urban areas, respectively. The results for urban and rural areas revealed no production had been done. Similarly, expenditures on ragi were lower in rural areas. As people in urban areas are more health-conscious, they prepare their flour by mixing the proportion of various items such as flour, grams, ragi and jowar. Therefore, ragi expenditure was higher in the urban region of Punjab. Similarly, no Jowar production was found in either rural or urban regions, as far as the expenditure of Jowar was higher in the rural part of Punjab. The rural area's purchasing power was higher than that of the urban area (159.340 and 218.619). Similarly, no significant association was observed between rural and urban purchasing power and expenditure on wheat, jowar, or ragi. The mean values of oat purchase and expenditure among the rural and urban regions were (1.639 and 1.643) and (59.802 and 58.730) with p-values of 0.967 and 0.737, respectively. The expenditure of pulses in rural areas was higher than that in urban areas. Most respondents consumed pulses daily. However, there was no significant association between pulses' urban and rural consumption expenditure. The mean score of the vegetables in a rural area in the case of purchased, produced and

expenditure (14.267, 4.089 and 581.728) was and in urban areas, it was 15.368, 1.619 and 649.947, respectively. The analysis revealed a significant difference between rural and urban vegetable consumption expenditure, production and purchasing of vegetables, with p-values (0.002, 0.000 and 0.024). Similarly, a significant difference was witnessed between the rural urban fruits production, consumption and purchasing power with p- value 0.040 in case of purchase and 0.002 in the case of production, the analysis observed that production of fruits was much higher in rural Punjab and the p-value of expenditure on fruits was 0.024. The results observed in the case of edible oil, there was no significant association found between the rural and urban expenditure on edible oil and no production was found. The expenditure on milk was found to be higher in the rural regions of Punjab, with a mean score of 1450.794 due to the higher milk production found in rural areas.

Compared to their counterparts in other areas, there was no significant relationship between urban and rural commodities including ragi, jowar, edible oil, milk product, egg and meat, beverages, other, wheat oats and pulses, whereas vegetables, fruits, spices, sugar and one category of rice, that is, rice monthly expenditure, had a t-value of morethan 1.96 and the p-value was 0.037. On the other hand, there was a significant difference between rural and urban vegetables, fruits, spices and sugar and rural rice monthly expenditure and urban rice monthly expenditure.

Table 5.2. Per Capita per month Consumption Expenditure on Foods Items among Consumers in Punjab

(INR. /Capita/month)

Category	Commodity	Rural X	Urban X	Std. Dev Rural	Std. Dev Urban	t-value	P-value
Rice	Purchased	6.153	6.315	7.922	11.755	-0.608	0.543
	Produced	4.579	4.577	328.802	374.489	0.002	0.999
	Expenditure	288.411	321.534	15969.009	64711.167	-2.094	0.037*
Ragi	Purchased	0.089	0.204	0.201	6.693	-0.838	0.403
	Produced	0.000					
	Expenditure	2.587	3.590	129.274	384.141	-0.778	0.437
Jowar	Purchased	0.931	0.831	1.249	1.149	1.041	0.298
	Produced	0.000					
	Expenditure	32.277	28.942	1377.873	1269.965	1.045	0.297
Wheat	Purchased	46.312	45.384	159.340	218.619	0.794	0.428
	Produced	3.366	1.720	310.999	160.696	1.175	0.241
	Expenditure	507.698	506.508	81115.446	88510.452	0.047	0.962
Oats	Purchased	1.639	1.643	1.118	1.997	-0.041	0.967
	Produced	0.000					
	Expenditure	59.802	58.730	1268.617	1483.794	0.336	0.737
Pulses	Purchased	7.183	7.243	11.354	6.853	-0.221	0.825
	Produced	0.248	0.217	6.406	7.263	0.136	0.892
	Expenditure	619.950	631.746	62150.744	67380.498	-0.535	0.593
Vegetables	Purchased	14.262	15.368	17.050	16.154	-3.100	0.002*
	Produced	4.089	1.619	16.410	21.499	6.646	0.000*
	Expenditure	581.728	649.947	117368.348	123866.841	-2.263	0.024*

Fruits	Purchased	8.045	8.878	19.824	25.110	-2.055	0.040*
	Produced	3.069	1.616	30.821	21.627	3.172	0.002*
	Expenditure	385.470	434.709	55624.280	75571.931	-2.259	0.024
Edible oil	Purchased	4.921	5.074	3.864	4.366	-0.875	0.382
	Produced	0.000	0.000	0.000	0.000	65535.000	0.000*
	Expenditure	586.634	588.968	97236.373	91198.137	-0.087	0.931
Milk and	Purchased	35.465	35.550	237.534	239.267	-0.063	0.950
	Produced	10.050	5.529	1592.535	581.25	1.473	0.412
	Expenditure	1388.020	1450.794	579562.228	653868.864	-0.926	0.355
Egg and Meat	Purchased	4.614	4.593	0.736	0.773	0.282	0.778
	Produced	0.782	0.942	3.723	5.312	-0.886	0.376
	Expenditure	137.822	149.550	153215.132	169718.365	-0.338	0.736
Sugar and Spices	Purchased	1.020	1.153	0.079	0.178	-4.549	0.000*
	Produced	9.842	8.698	23.268	16.254	2.874	0.004*
	Expenditure	572.376	495.291	86176.415	90475.379	2.987	0.003*
Beverages	Purchased	3.658	3.759	1.669	1.377	-0.924	0.356
	Produced	2.010	1.878	3.542	3.025	0.823	0.411
	Expenditure	167.178	163.000	33980.555	29704.069	0.266	0.790
Other	Purchased	3.619	3.672	0.745	0.741	-0.707	0.480
	Produced	4.198	4.122	6.170	6.749	0.347	0.729
	Expenditure	298.218	299.062	51042.330	53035.654	-0.043	0.966

Source: Author's Calculation based on Primary Data
*Significant at 5 percent level.

SECTION-IV

5.4. SUMMARY AND CONCLUSION

The analysis in this chapter showed that although there were apparent disparities among urban and rural consumers regarding consumption expenditure, the distribution of per capita consumption expenditure was somewhat fair in provincial areas compared to the urban areas of Punjab. The results showed that approximately 19 percent of the consumption of vegetables and legumes increased in rural areas and59 percent in urban regions, similar to the consumption of milk and its products, which increased during the epidemic. On the other hand, 18 percent of rural households and 16 percent of urban households decreased their consumption due to the adverse impact of the shocks, such as job loss and increases in prices for their families. Regarding food preparation and consumption, 57 percent and 26 percent of females in the urban and rural regions, respectively, took the decisions, which showed that 28 percent of rural households were food insecure. As per the household per annum consumption expenditure in both regions, enormous amounts are spent onmilk and its products. The results revealed that food expenditure was 7 percent greater in urban regions than in rural ones. The per capita expenditure on pulses in rural areas was much higher in urban areas, whereas the vegetable per capita expenditure was higher in urban regions. In the analysis, per capita expenditure on pulses was significantly higher in rural areas and rested vegetables, milk and its products, refreshments and beverages were significant in urban areas. In both regions,cereals were necessary for all households. Therefore, the consumption frequency is daily. It was found that expenditure on cereals was higher in urban households. Milk and its products, fruits, vegetables, edible oils and beverages are luxury food items for rural households, while they are basic for urban households. This signifies that theshifting consumption pattern of food in rural and urban households was influenced byexpenditure and income. Hence, to improve household consumption patterns, especially in rural areas, the planning strategy for development should be a judicious mix of beneficiary-oriented programs.

CHAPTER- VI

VULNERABILITY OF HOUSEHOLD FOOD SECURITYINPUNJAB

According to Leon (2006), "*Vulnerability is commonly defined as the degree to which a system is likely to experience harm due to hazards*." When shocks to the food supply impair a household's capacity to receive safe and nutritious food, food vulnerability is referred to as food vulnerability. Vulnerability is a result of biophysical and socioeconomic systems that operate on a variety of scales and influence households. *'The vulnerability of a HFS can be defined as its exposure, sensitivity, and adaptive capacity*' (Agyei et al., 2012; IPPC, 2007; McCarthy et al., 2001). According to Fellmann (2012), Agyei et al., (2012) and IPPC (2007), "*Exposure refers to food- related shocks that affect an access to safe and healthy food and is broadly defined as the degree to which a system faces risk, shock, or hazard." When* shocks occur, they create ripples throughout the system. While a covariate shock has the same effect across households, communities, and nations, an idiosyncratic shock may arise in the household level and have a different impact (Lovendal and Knowles, 2005). Shocks to the food supply jeopardize household food security. For instance, the frequency and intensity of droughts and floods might imperil food availability and result in domestic food crises. Food-related shocks motivate households to mobilize their assets and employ various loss management tactics to strengthen their food security. When evaluated through vulnerability, a household's ability to respond is referred to as its adaptive capacity. Adaptive capacity is described as a household's ability to cope successfully with the impact of food-related shocks (Engle, 2011). A household with a high capacity for adaptation will undoubtedly find it simpler to adjust to food insecurity. Adaptive capacity is frequently viewed as a desirable trait for lowering a system's vulnerability (Polsky et al., 2007; IPPC, 2007). Naturally, when households are frequently subjected to shocks, they resort to possessions to deal with the resulting stress. Households with more assets and opportunities for survival often enjoy greater long-term food security (Wooller et al., 2013). When only a percentage of a household's available assets are utilized, the ability to respond to future emergencies is preserved. Comparatively, households that already deprived and food insecure may be forced to consume a greater share of their assets while still lacking sufficient food. If a household's possessions and means of subsistence cannot sustain the shock, they resort to more desperate measures' ways

for coping. Asa result, households experience varying degrees of food insecurity across time, including chronic, transitory, cyclical, and temporal. In the food security literature, these cascades of food insecurity are referred to as the degree of food stability, whereas in the vulnerability research, they are referred to as sensitivity. In this context, sensitivity refers to a household's intrinsic vulnerability to food shocks (Feldmann, 2012). The sensitivity component quantifies the first-order effect of food shocks on households (Hahn et al., 2009; Antwi-Agyei et al., 2012), and it can be used in a vulnerability to food insecurity index to refer to prior or cumulative experiences of food insecurity, such as stunting, child mortality, and hunger within the household. Thus, the current chapter analyses the vulnerability to food insecurity index, a multi-dimensional indication of the risk of receiving a covariate shock (exposure), the cumulative experience of food insecurity (sensitivity), and households' coping mechanisms (adaptive capacity). Section I highlights the vulnerability and household food status among the rural and urban respondents of Punjab. Section II analyzes the covariate shocks based on the climaticand economic level of rural and urban areas. Section III discusses the various coping abilities of household’s basis on consumption and income-based strategies. Section IV highlights the summary and conclusion.

SECTION-I

6.1 HOUSEHOLD FOOD SECURITY AND VULNERABILITY STATUS AMONG HOUSEHOLDS IN RURAL AND URBAN PUNJAB

The food security status of households and vulnerability was calculated using the simple average method. A total score of 6-23 was obtained, where the highest score indicated the in- food security (6-12) and the low score indicated food security (13-23) and in case of the vulnerability if the value is greater than 51 then it is vulnerable, value less than 51 is considered as 'not vulnerable'. Table 6.1. outlined those 31 respondents in the rural and 67 respondents in the urban are not vulnerable.

Table 6.1. Household Food Security and Vulnerability Status in Punjab

Household food security		Rural Status		Total	Urban Status		Total
		Non-vulnerability	Vulnerability		Non-vulnerability	Vulnerability	
Food Status	Insecure	31	117	196	67	148	263
	Secure	13	39	53	60	52	113
Total		44	156	200	127	249	376
Number of Observation: 576							
Chi-square		0.672			26.062		
p- value:		0. 412			0.000*		
Pearson's R value		-0.058			-0.262		
Spearman Correlation		-0.058			-0.262		

Source: Author calculation based on primary data Note: * Significant at 5 percent level.

However, they are food insecure on the other side, 39 respondents in the rural and 52 in the urban are food secure, but they are lying under the vulnerable categories. The results show that the chi-square value for the urban area is 26.062 and the p-value is 0.000, which shows that there is a significant association between the vulnerability and food insecurity among the urban respondents, while the chi-square value for the rural region is 0.672 and the p-value is 0.672 which showed that there is nosignificant relation is found between the household food insecurity and the vulnerability status of the rural respondents.

SECTION-II

6.2 COVARIATE SHOCKS BASED ON CLIMATIC AND ECONOMIC STATUS AMONG HOUSEHOLDS IN RURAL AND URBAN PUNJAB

As per IPPC (2007), openness characterizes as the event of shocks that imperil household food security. The food vulnerability index is often characterized by its seriousness and span (Krishnamurthy et al., 2014). One inadequacy of this concept is that the presence of a shock does not necessarily, in every case, suggest that it could be utilized as an intermediary for openness in a specific geographic region. For example, malaria in a family does not necessarily infer that families in that area are more powerless to the sickness. Accordingly, rethink openness to incorporate the likelihood of encountering a shock. Thus, rethink openness to incorporate the likelihood of encountering a shock. Consider a family that is roosted on an incline (a risky state of food uncertainty); the openness, for this situation, is the likelihood that this family might encounter a shock or a push that will hasten a critical fall into a more hazardous degree of food insecurity. Using this concept, the exposure factors in this study derived are not at the home level but the enumeration area (community level).

Table 6.2 summed up that exposure based on data by examining the proportion of households in rural regions affected by drought (883) and famine (882). Fog (710) and epidemic beset most the urban households. Thus, data reveals that all rural households are heavily reliant on agriculture production and cattle farming, making them particularly vulnerable to drought and famine. Similarly, urban households are harmed by uncertain climate and weather changes. On the other hand, economic aspects show that households in the rural areas have affected by the health issues (642) like diabetes, tuberculosis, malnutrition, and child mortality issues and mostly expenditure incurred on increased household expenditures due to morbidity/mortality (495). In contrast, households in the urban area are given the value of 1595 to represents the increase in the prices of significant commodity and rest 2nd ranking given to mostly expenditure incurred on increased household expenditures due to morbidity/mortality same as the rural area. Thus, the analyses represent that households in the urban area are impacted with the food price shock and uncertain in the economic stability, whereas the rural households are mostly impacted with the climatic change. In overall Punjab, Frost and epidemic (17.21 percent) affected the households and analyses showed that after frost and epidemic, soil degradation (11.64 percent) impacted the households at the

large scale followed by hail, frost, flood and famine. In economic constraints, the majority of households were affected by the food price inflation (high prices) with 13.59 percent and differentshocks that general Punjab households experienced by their family size where, Job loss (13.58 percent) because of the covid-19 outbreak, which becomes the further reason of risk and shocks due to which most of the households were faced lack of funds (12.13 percent), Increased household expenditures due to morbidity/mortality (9.90 percent), low remittance from friends and family (16.71 percent). These major constraints, risks, and shocks were the major reason for the household vulnerability, which had the greatest impact on the food uncertainty, particularly during the Covid-19 outbreak. Consequently, the investigation showed household vulnerability had a significant effect on the household insecurity in the urban region and overall Punjab but has an insignificant impact in the rural areas of Punjab.

Table 6.2. Refining the Exposure based on the Climatic and Economic Aspects of Vulnerability in Rural and Urban Punjab

Vulnerability	Item	Rural				Urban				Punjab			
		Total	Percentage	Mean	Standard Deviation	Total	Percentage	Mean	Standard Deviation	Total	Percentage	Mean	Standard Deviation
Climatic Constraints	Hail	284	5.702	1.42	0.56	658	8.643	1.732	0.701	942	8.03	1.623	0.675
	Livestock diseases	284	5.702	1.42	0.56	691	9.077	1.818	0.818	975	8.30	1.625	0.674
	Agricultural Diseases	286	5.742	1.43	0.57	657	8.630	1.729	0.702	943	8.04	2.000	0.823
	Soil degradation	457	9.175	2.285	0.71	912	11.980	2.400	0.777	1372	11.67	2.361	0.758
	Fog	679	13.632	3.395	0.82	1002	13.162	2.637	0.979	1681	17.21	1.627	0.627
	Epidemic	696	13.973	3.48	0.72	1317	17.299	3.466	0.685	2013	17.21	1.680	0.765
	Flood	702	14.094	3.51	0.65	655	8.604	1.724	0.703	1357	8.02	2.360	0.760
	Famine	710	14.254	3.55	0.68	810	10.640	2.132	0.848	1520	9.88	3.484	0.673
	Drought	883	17.727	4.415	0.88	911	11.966	2.397	0.780	1794	11.66	3.482	0.675
Economic Constraints	Food Price Inflation	349	8.833	1.745	0.70	1595	15.650	4.197	0.733	1944	13.59	3.509	0.693
	Labor constraints	642	16.249	3.21	0.75	1200	11.774	3.158	0.779	1842	12.45	3.208	0.751
	Lack of funds	620	15.692	3.1	0.83	1334	13.089	3.511	0.713	1954	12.13	3.136	0.800
	Dwindling in government food supplies	457	11.567	2.285	0.71	937	9.193	2.466	0.841	1394	9.18	2.404	0.804
	Low remittances from friends and family	457	11.567	2.285	0.71	1331	13.059	3.503	0.663	1788	16.71	4.272	0.795
	Job loss	286	7.239	1.43	0.57	1218	11.951	3.205	0.750	1504	13.58	3.506	0.660
	Increased household expenditures due to morbidity/mortality	498	12.604	2.49	0.92	1357	13.314	3.571	0.735	1855	9.90	2.589	0.963
	Others (specify)	642	16.249	3.21	0.75	1220	11.970	3.211	0.752	1862	12.45	3.212	0.752

***Source**: Author's calculation based on primary data*

SECTION- III

6.3 COPING STRATERGIES OF HOUSEHOLD FOOD IN SECURITY IN RURAL AND URBAN PUNJAB

Food insecure households exhibits a range of coping techniques that reflects their vulnerability (Kyan, 2009). In the phase of idiosyncratic shocks such food cost expansions, environmental change and catastrophic events, families might utilize the food-based survival techniques or monetary based methods for dealing with stress or followed the mix of the two strategies to safeguard their essential requirements (Ruel et al., 2010 and FAO, 2008). Table 6.3 outlined the coping strategies employed by households to meet the basic requirement of consumption in Punjab. Coping strategies were categorized as consumption coping strategies and income-based coping strategies. A large proportion of respondents used income-based coping strategies followed by consumption-based strategies.

Furthermore, it was found that a large proportion of respondents preferred "*borrowing money from the relatives to cope with household food insecurity"* and "*purchasing food oncredit to fulfill the basic requirements"* as the foremost coping strategies in Punjab. Whereas 6.10 percent of respondents observed "*borrowing money from friends"* as the least preferred income-based coping strategy.

The analysis results revealed that 17 percent of respondents restricted adults' consumption tosecure food for small children as the most preferred consumption-based coping strategy, followed by "*buying less expensive food*" and "*Limit portion size for any household member at meal times"*.

Lastly, a very small proportion of respondents utilized income-based coping strategies. It was found that 5.88 percent of respondents agreed to utilize "*Taking loan from moneylenders or from banks*" as an income-based coping strategy to meet the basic requirement in urban and rural areas of Punjab.

Table 6.3 Coping Strategies of Household Food Security in Punjab

Coping Strategies		Rural			Urban			Punjab		
		Percentage	Mean	Std. Deviation	Percentage	Mean	Std. Deviation	Percentage	Mean	Std. Deviation
Consumption Coping Strategies	Reduced the number of daily meals	9.04	1.76	0.96	8.868	1.718	0.835	8.87	1.7330	0.822
	Send any household member to other houses	11.97	2.33	0.90	12.558	2.524	0.930	12.56	2.454	0.928
	Limit portion size for anyhousehold member at mealtimes	13.46	2.62	1.20	13.791	2.737	1.051	13.79	2.695	1.108
	Skip whole day without eating	13.79	2.685	0.96	12.972	2.458	0.850	12.97	2.535	0.898
	Buying less expensive food	15.39	2.995	1.33	13.976	2.597	1.191	13.98	2.731	1.260
	Restricting adults' consumption to securefood for small children	15.75	3.065	1.17	17.376	3.568	1.160	17.38	3.396	1.190
	Purchasing food on credit	20.58	4.005	1.05	20.458	3.997	0.983	20.46	3.998	1.009
Income Coping Strategies	Taking loan from moneylende rs orfrom banks	5.73	1.785	0.67	5.882	1.787	0.807	5.88	1.787	0.764
	Borrowing from friends	5.78	1.8	0.74	6.097	1.879	0.723	6.10	1.852	0.732
	Selling the productive Assets	6.02	1.875	0.70	6.108	1.847	0.742	6.11	1.855	0.730

	Mortgaging the productive assets	6.25	1.945	0.94	8.109	2.739	1.349	8.11	2.463	1.283
	Sell your livestock	6.86	2.135	0.88	6.579	1.924	0.907	6.58	1.998	0.906
	Received assistance from self-help groups and NGOs	7.65	2.38	1.25	7.842	2.387	1.233	7.84	2.383	1.243
	Seeking help from the neighbors	7.90	2.46	1.038	7.729	2.289	0.918	7.73	2.348	0.964
	Member(s) of the household work additional hours	8.14	2.535	1.076	7.729	2.289	0.918	8.54	2.596	1.129
	Child or the aged personhave gone for the work because household haveno sufficient money	10.30	3.205	1.18	8.109	2.739	1.349	10.72	3.256	1.180
	Using past savings	10.72	3.335	1.21	11.310	3.484	1.217	11.31	3.435	1.219
	Borrowing money from the relatives	12.1	3.77	0.98	11.678	3.437	1.239	11.68	3.547	1.172
	Mobilizing the available cash in hand	12.48	3.885	1.29	9.400	2.316	1.117	9.40	2.855	1.396

Source: Author's calculation based on primary data.

SECTION-IV

6.4. SUMMARY AND CONCLUSION

The study showed the different covariates of the vulnerability related to economic and climatic risks with a low and elevated degrees of seriousness of household food insecurity and types of coping strategies adopted by both the provincial regions and urban households. Most households were more likely to adopt the income-based coping strategies than the consumption coping strategies. Assuming of these coping strategies decreased the household vulnerability accelerating the scope for breaking the vicious cycle of poverty and household food insecurity. Analyses of the predictor of the vulnerability of food insecurity addressed multiple aspects of vulnerabilities, including economic and climatic change, and found that both economic and climatic factors significantly affect the household food insecurity in urban and overall Punjab but insufficient association in rural households but it was observed that due to pandemic outbreak majority of households experienced the job loss and increased the household expenditure due to morbidity (13.58 percent) and mortality (9.90 percent). From the approach, viewpoint, results proposed that administrativespecialists and policy and strategy makers must offer economic and financial assistance to vulnerable households. Such support should incorporate DBT (Direct Bank Transfer), doorstep deliveries and food packets.

CHAPTER –VII

EFFECTIVENESS OF PUBLIC DISTRIBUTION SYSTEM AMONG THE HOUSEHOLD RESPONDENTS OF PUNJAB

Satisfaction is a feeling of pleasure or disappointment that comes from comparing the benefits of actual performance with people's expectations. The real target of the PDS in Indiais to guarantee the supply of essential consumer goods at subsidized prices to poor people andthe weak class to protect them from the rising costs of these food grains and maintain the minimum nutritional level of the weaker section of society. Thus, the distribution system needs to focus on the various factors that affect the degree of utilization and access for the consumer, where large official machinery is involved in this system, both at the central and state levels, to make it beneficial for the public. The effectiveness of the Public Distribution System is a measure based on the responses given by the household members during this study through the satisfaction level regarding the performance of the Public Distribution System. The work of different agencies and government expenditures involved in PDS can only be effective if the public is satisfied with the system's performance. Section I analyses the perception and satisfaction level of PDS consumers regarding the quality, price, quantity of commodities, and other issues related to the distribution of these commodities. These issues include the consumption of time to get the ration cards, the inadequacy of thequantity and bad quality of ration goods, location of the FPS, non-availability of food items,unfair behavior of dealers, and black marketing by dealers. An analysis of these PDS factors may reveal not only managerial aspects but also the overall impact of the PDS policy on consumers and describe the objective of establishing PDS outlets. Section II examines the main reasons for the unavailability of commodities in time at the FPS. Section III explains the consumer preference for PDS and Direct Bank Transfer. Finally, Section IV presents the summary and conclusion.

SECTION-I

7.1. UTILIZATION OF PUBLIC DISTRIBUTION SYSTEM AND SATISFACTION LEVEL OF PDS RESPONDENTS IN RURAL AND URBAN PUNJAB

7.1.1. Type of Ration Cards

In this section, rural and urban respondents had various types of ration cards. Table 7.1. is evident about the details of the ration cards among households in urban and rural areas. Out of the 576 respondents, 522 respondents from Punjab had a ration card form, with the majority having a blue card (37.93 percent). Out of respondents, 18.58 percent of respondents had Blue + BPL, and 12.67 percent of respondents had APL.It was found that of the respondents, 9.38 percent did not have a ration card, followed by 14.18 percent of respondents who did not require a ration card because they had better financial conditions. Owing to government instability, 55.55 percent faced bureaucratic difficulties. Households were facing this issue on par. Out of respondents, 10.51 percent moved their own place, had applied for the ration card, but did not get the ration card, and 9.25 percent of the respondents did not have a ration card because it was misplaced and lost, respectively. In urban areas, most respondents (89.62 percent) had ration cards. Among the respondents, 33.53 percent of respondents had blue cards, 15.13 percent had Blue+BPL, 12.46 percent had APL, and 27.89 percent had smart and Aadhar-based cards. Similarly, 92.5 percent of the respondents had a ration card in rural areas. As shown in table 7.1. Out of 185 respondents, 45.94 percent had Blue Card, 24.86 percent had Blue+BPL card, 12.97 percent respondents had APL, and approximately 8 percent had smart and Aadhar-based cards. 7.5 percent of the respondents in rural areas and 10.37 percent in urban areas did not have a ration card. Most of the reasons behind this in both rural (80 percent) and urban (46.15 percent) respondents were facing bureaucratic difficulties.

Table 7.1 Details of Ration Cards among the Respondents of Urban and Rural Punjab

Details of Ration Cards	Urban (376)	Rural (200)	Punjab (576)
Are you a ration cardholder?			
Yes	337 (89.62)	185 (92.5)	522 (90.62)
No	39 (10.37)	15 (7.5)	54 (9.38)
If you are not having ration card			
Not required	08 (20.51)	00 (00)	08 (14.18)
Lost	03 (7.69)	02 (13.33)	05 (9.25)
Bureaucratic difficulties	18 (46.15)	12 (80.00)	30 (55.55)
Moved but not transferred	10 (25.64)	01(6.66)	10 (18.51)
Asking Money	00 (00)	00 (00)	00 (00)
Other (Specify)	00 (00)	00 (00)	00 (00)
Type of ration card you are having			
APL	42 (12.46)	24 (12.97)	66 (12.64)
BPL	36 (10.68)	12 (0.064)	48 (9.19)
AAY	00 (00)	00 (00)	00 (00)
Blue card	113(33.53)	85 (45.94)	198 (37.93)
Blue+BPL	51(15.13)	46 (24.86)	97 (18.58)
Blue+AAY	01(0.02)	03 (1.62)	04 (0.76)
Others (Specify)	94 (27.89)	15 (8.10)	105 (20.11)

Source: Author's calculations based on primary data.
Note: Data in the parathesis shows percentage*

7.1.2. Satisfaction Level of PDS among Household Respondents of Rural and Urban Punjab

This section explains the penetrates to assess the various factors influencing the satisfaction level of PDS respondents concerning a) the location of FPS, b) quality of products, c) price charged by FPS, d) dealers' services, e) behavior of FPS dealers, f) working hours of FPS, etc. In the case of the Public DistributionSystem, it is important to assess the constant awareness and satisfaction level of consumers of PDS related to the working of fair price shops. Thus, an attempt was made to fulfill this objective by applying percentages, and validity was verified using the chi-square test only. To assess their level of satisfaction, a separate interview schedule consisting of questions related to the PDS respondents' satisfaction was prepared. Responses were collected using a five-point rating scale (strongly agree, agree, neutral, disagree, and strongly disagree).

Table 7.2. Satisfaction Level of Surveyed Respondents in Rural and Urban Regions of Punjab

Variable of satisfaction level		Satisfaction Level of PDS Consumers in Punjab					
		Highly Dissatisfied	Dissatisfied	Average	Satisfied	Highly Satisfied	**Total**
Proximity of Fair price shops	Rural	18 (9.72)	59 (31.89)	17 (9.189)	84 (45.40)	7 (3.783)	**185 (100)**
	Urban	03 (0.89)	3 (0.89)	1 (0.3)	50 (13.3)	280 (74.3)	**337 (100)**
	Total	21 (4.022)	62 (11.87)	18 (3.44)	134 (26.67)	287 (54.98)	**522 (100)**
Satisfied with the quality of grains provided	Rural	73 (39.45)	78 (42.16)	12 (6.48)	5 (2.70)	17 (9.18)	**185 (100)**
	Urban	20 (5.93)	178 (52.81)	25 (7.41)	101 (30.05)	13 (3.8)	**337 (100)**
	Total	93 (17.81)	256 (49.04)	37 (7.088)	106 (20.30)	30 (5.74)	**522 (100)**
Commodities prices were rightly charged	Rural	00 (0.00)	00 (0.00)	00(0.00)	175 (94)	10 (06)	**185 (100)**
	Urban	01 (0.3)	03 (0.9)	02 (0.6)	88 (26.1)	243 (72.1)	**337 (100)**
	Total	01 (0.19)	3 (0.37)	02 (0.38)	260 (49)	253 (48)	**522 (100)**
Quantity supplied was adequate	Rural	89 (48.10)	46 (24.86)	5 (2.70)	20 (10.81)	25 (13.52)	**185 (100)**
	Urban	140 (28.28)	154 (31.12)	39 (7.88)	150 (30.30)	12 (2.42)	**337 (100)**
	Total	229 (44)	200 (38.31)	44 (8.42)	170 (32.05)	37 (7.08)	**522 (100)**
Behavior of the dealer was appropriate	Rural	12 (6.48)	10 (5.40)	24 (13)	50 (27.02)	89 (48.10)	**185 (100)**
	Urban	10 (2.96)	01 (0.3)	16 (4.74)	103 (27.3)	207 (54.9)	**337 (100)**
	Total	22 (4.21)	11 (2.10)	40 (7.66)	153 (29.31)	296 (56.70)	**522 (100)**
Working hours of the PDS outlets	Rural	18 (9.72)	59 (31.89)	17 (9.189)	84 (45.40)	7 (3.783)	**185 (100)**
	Urban	04 (1.186)	02 (0.59)	105 (31.157)	05 (1.48)	169 (50.14)	**337 (100)**
	Total	22 (4.21)	61 (11.68)	122 (23.37)	89 (17.04)	176 (33.71)	**522 (100)**

Food-grain entitlement	Rural	89 (48.10)	24 (13)	10 (5.40)	50 (27.02)	12 (6.48)	**185 (100)**
	Urban	128 (38)	58 (17.21)	12 (3.56)	129 (38.27)	10 (2.96)	**337 (100)**
	Total	217 (41.57)	82 (15.70)	22 (4.21)	179 (34.39)	22 (4.21)	**522 (100)**
Accuracy in measuring process	Rural	78 (42.16)	73 (39.45)	12 (6.48)	5 (2.70)	17 (9.18)	**185 (100)**
	Urban	140 (28.28)	12 (2.42)	39 (7.88)	150 (30.30)	154 (31.12)	**337 (100)**
	Total	218 (41.76)	85 (16.28)	51 (9.77)	155 (29.69)	171 (32.75)	**522 (100)**
Availability of products ontime	Rural	73 (39.45)	78 (42.16)	12 (6.48)	05 (2.70)	17 (9.18)	**185 (100)**
	Urban	20 (5.93)	178 (52.81)	25 (7.41)	101 (30.05)	13 (3.8)	**337(100)**
	Total	93 (17.81)	256 (49.04)	37 (7.088)	106 (20.30)	30 (5.74)	**522 (100)**
Limpidity in the PDS outlets	Rural	12 (6.48)	10 (5.40)	24 (13)	50 (27.02)	89 (48.10)	**185 (100)**
	Urban	10 (2.96)	01 (0.3)	16 (4.74)	103 (27.3)	207 (54.9)	**337 (100)**
	Total	22 (4.21)	11 (2.10)	40 (7.66)	153 (29.31)	296 (56.70)	**522 (100)**

VARIABLES	**CHI-SQUARE VALUE**
Proximity of Fair Price Shops	12.569
Satisfied with the quality of grainsprovided	58.598
Commodities prices were rightlycharged	23.514
Quantity Supplied was adequate	32.430
Behavior of the dealer was appropriate	16.435
Working hours of PDS outlets	30.58
All household members get food-grain entitlement	80.904
Accuracy in measuring process	23.647
Availability of product on time	67.24
Limpidity in the PDS Outlet	42.453

Source: Author's Calculation based on primary data.

Note: Data in the parathesis shows percentage*

Chi-square ($\chi 2$) test: significant at 5 percent.

Table 7.2. shows the fulfillment level of households in both urban and rural regions, in which 45.40 percent of the respondents from rural areas agreed with the proximity of FPSs. Only 13.3 percent respondents from urban regions agreed with this closeness. Only 3.783 percent of respondents from rural regions were exceptionally satisfied, and 74.3 percent of respondents from urban regions were profoundly dissatisfied with the nearness of the FPSs. While respondents (9.18 percent) from rural regions and just 0.03 percent from urban regions were normal, nearness FPSs were a concern. Only 0.89 percent of urban respondents and 31.9 percent of rural respondents were disappointed with the locality of the FPSs. Table 7.2. reported that there were different perspectives in the question of the fulfillment level of households regarding nearness. In Punjab, around 11.87 percent of the respondents were not satisfied with the nearness of the FPSs, where in the respondents, 4.022 percent were exceptionally disappointed, and 54.98 percent of respondents were profoundly agreed with the locality of the fair price shops. While computing χ^2 value from the data to determine the significant difference in the opinions of beneficiaries of urban and rural areas regarding the proximity of FPSs, it was revealed that the calculated value $\chi^2 = 12.569$. Hence, the alternative hypothesis was accepted, representing a significant difference between the views of consumers belonging to urban and rural areas regarding the proximity of FPSs.

Further, table 7.2. shows that 9.18 percent of rural regions and 3.8 percent of respondents from urban areas were profoundly fulfilled over the quality of grains given by FPSs. It was observed that around 49.04 percent of respondents in the Punjab region were disappointed with the quality of grains. In addition, 39.45 percent were profoundly disappointed with the quality of the grains, although 52.81 percent of the respondents were disappointed. According to the field survey, the respondents were disappointed because, often, they got grains that were spoiled and huedin the dark. While determining χ^2 esteem from the information to determinethe massive distinction according to buyers of urban and rural areas regarding the qualityof provided by FPSs, it was discovered that the determined worth 58.598 is more than thetable worth 9.48 at a 5 percent degree of importance. Thus, the elective theory is acknowledged and invalid speculation was dismissed, which addresses that there is a huge distinction between the perspectives on purchasers having a place with metropolitan and rustic regions regarding the nature of the results of FPSs.

The table 7.2. also shows that 94 percent of respondents were satisfied with the charged FPS prices in rural areas. As far as urban areas were concerned, they did not have any issue regarding the charged FPS prices, and 72.1 percent of respondents in the urban area were highly satisfied with the price charged because only 2 INR per kgfor wheat were charged, but they demanded more commodities, such as rice, dal, and oil. The calculated value of χ^2 was 23.514, which revealed that there was no significant association between rural and urban areas regarding the commoditiesprices being charged. On the other hand, regarding the quantity supplied, 48.10 percent of rural respondents and 28.28 percent of urban respondents were highly dissatisfied with the adequate quantity supplied. Most respondents (30.30 percent) in the urban area were satisfied that the quantity supplied was adequate, and the calculated value of χ^2 was 32.430, which revealed that there was no association between the satisfaction of quantity supplied in the urban and rural areas.

Table 7.2. of the study exhibits that in the rural areas, 48.10 percent were highly satisfied and 54.9 percent of urban households were highly satisfied; only 10 respondents (2.96) in the urban area were highly dissatisfied and 6.48 percent in the rural area. The calculated value ofχ^2 was 16.435, which showed that there was no significant relationship among the satisfaction of the urban and rural households' responses regarding the level of satisfaction related to the behavior of the dealers.

The satisfaction levels related to the working hours of the FPSs are shown in Table 7.2. explained that 45.40 respondents in the rural area were satisfied with the operating hours of the PDS outlets, and approximately half of the respondents in the urban areas were highly satisfied with the availability and working hours of the PDS outlets. In Punjab, 4.21 number of the participants were highly dissatisfied with the PDS working hours. No association was found among the rural and urban respondents regarding the working hours of the PDS outlets.

Satisfaction related to the entitlement of the food grains found that 48.10 percent of the respondents were highly dissatisfied with the entitlement of the food grains, some of the family members name were not mentioned on the ration card that's why they were not entitled food grains, exclusion of the families and political intervention were played a major role in this part. Whereas, it was observed that 38 percent of the respondents

were highly dissatisfied in the urban areas. The same proportion of respondents (38.27 percent) was satisfied in this section, but the overall results showed that approximately 41.57 percent of the respondents from Punjab were highly dissatisfied with the entitlements of the food grains. As the rural respondents were highly disappointed with respect to the measuring process, it was found that they were not getting the full quota, most of the time they were not getting the full 30 kg of wheat,and there is always an issue in the quantity measure: the actual weightage of the package is less than 30 kg, where 30.30 percent of the respondents satisfied the urban region regarding the measuring process, but only 2.70 percent of rural households were satisfied. Overall, 41.76 percent of respondents in Punjab were highly dissatisfied. Similarly, in the case of the availability of the products on time, 39.45 percent of the respondents were highly dissatisfied and 42.6 percent were dissatisfied because they did not receive SMS on their phones and did not know about the proper availability; as in the urban area, 52.1 percent of the respondents were dissatisfied withthe availability on time.

Limpidity of the PDS outlets here, similar results were found among the urban and rural respondents; 48.10 percent in the rural and 54.9 percent in the urban were strongly agree in this case because digitalization has now been opted under the PDS. The e-PDS helps to avoid malpractice. To avoid the delay and quick disposal of the consumers, the number of ration cards per shop should not exceed 500, separate doorsshould be there in the FPS for entrance and exit or door step delivery must be opted, supply from the central pool should be regular and proper, separate dates should be fixed for each block within a municipal ward, provision should be made for special counters for women, and the PDS should be kept open on days and even on holidays so that causal and daily workers could purchase the food items in those days so that they did not lose their pay on regular pay. To avoid delays in disbursement, goods should be pre-weighed, pre-packed, and kept ready for delivery. In addition, it can be concluded that to improve the overall functioning of the FPS, most ration cardholders suggested that improving the quality of all food items and the quantity of grains provided should be enhanced. Other suggestions included, the govt. should also fix income limits above which the persons should be denied the benefits of the PDS, the govt. should exclude the high salaried urban professionals from the purview of the PDS and the inclusion of more categories of rural poor and Sufficient arrangements for the transportation and the warehousing processes of the PDS are implemented by the state government to ensure

adequate and timely availability of food items in each region.

7.1.3. Targeted Public Distribution System to Serving the Targeted People

In this section, it was seen that the primary purpose of the government's establishment of PDS outlets was successfully implemented. First, it was observed that the Targeted Public Distribution System served the targeted people; the results are shown in Table

7.2. showed that 15.57 percent of the respondents said yes that the PDS was implemented adequately and served the targeted beneficiaries properly, but 78.98 percent of the respondents were not in the favor; they were unsatisfied because while the primary survey, most of the respondents in the rural areas did not have ration cards currently due to political intervention. Their ration cards were canceled after a change in the party. Furthermore, it was found that 66.48 percent of rural areas and 92.87 percent disagreed that the PDS did not serve the targeted people, as shown in Table 7.3

Table 7.3. Public Distribution System to Serving the Targeted People

Is the Targeted Public Distribution System serving the Targeted People	Yes	No
Rural	62 (33.51)	123 (66.48)
Urban	24 (7.21)	313 (92.87)
Total	86 (15.57)	436 (78.98)

Source: Author's calculations based on primary data.
Note: Data in the parathesis shows percentage*

Table 7.4. which explained the reasons for and problems suffered by beneficiaries and other households. Table 7.4. revealed that *political intervention* is the main pitfall that obstructs the effective functioning of the PDS, with mean scores of 3.35 and 10.72 percentage in rural areas and in the urban area with a mean score of 3.48 and 11.31.

Similarly, with the root cause of the political intervention, more non-targeted people received the benefits, which are shown in the table: 8.14 percent in rural areas and 7.72 percent in urban areas. As per the survey, respondents of the rural and urban areas responds that many of the above poverty families have BPL cards while a substantial proportion of the poorest do not have a ration card. The results are presented in Table 7.4. shows that 6.86 and 6.57 percent of the rural and urban respondents revealed that black marketing, leakage, and corruption hampered the effectiveness of the PDS. The

next major issue is the prevalence of Bogus rations cards, about 6.02 and 6.10 percent in rural and urban areas, respectively, revealed that they knew those persons who had cards with the fictitious name of the owners. Other reasons were non-availability of food grains, deterioration of food grains, inefficiency of the depot holder, unfair distribution of food grains, and preference for known persons. The unavailability of the ration and rude behavior of dealers is the most frequent problem faced by people visiting ration shops. It has been found that the non-availability of food grains is due to various reasons, such as storage and transport problems, irregular supply from the government, and lack of government supervision and control, with 5.78 percent in rural areas and 6.097 percent in urban areas. So, all the above issues and problems overshadow the effectiveness and the implementation of PDS schemes. Public Distribution shops are not located in narrow streets or places; therefore, overcrowdingmay be avoided to a maximum extent. On the PDS notice board, card numbers for which the goods are to be distributed on each and every day may be displayed so that the beneficiaries need not spend two to three hours availing the essential goods. Civil Supplies Corporation has to immediately forward the essential commodities to fair priced shops as soon as they procure. New goods are distributed to consumers at the PDS. A shortage of stock is due to the diversion of PDS goods to the open market. Hence, it is suggested that surprise inspection must be carried out by government officials to verify the stock level maintained at PDS so that trading of PDS goods in anopen market may be contained. Employees of PDS shops have to initiate the necessarystep for ordering necessary goods in advance when the stock level reaches the minimum level, so there is no problem of bringing goods late to the shop every month.PDS officials should inform staff members at PDS to respect elderly people and instruct PDS employees to avoid using harsh words toward the general public. Based on the number of beneficiaries available in an area, a more significant number of PDS have to be established, which means that overcrowding on public distribution shops should be avoided. Most consumers believe that essential commodities are not supplied on time at the PDS. Hence, to enhance consumer satisfaction, officials should look after and initiate the necessary steps to distribute goods in time without failing toultimately benefit. Most of the consumers agreed that all essential commodities were not available at the same time at the PDS.

Table 7.4. Responses Regarding the Targeted Public Distribution to System Serving the Targeted People

Reasons	Rural				Urban				Punjab			
	Total	Percentage	Mean	Std. Deviation	Total	Percentage	Mean	Std. Deviation	Total	Percentage	Mean	Std. Deviation
Inclusions of non-targeted people in BPL	507	8.14	2.535	1.076	870	7.729	2.289	0.918	1377	8.54	2.596	1.129
Bogus ration card	375	6.02	1.875	0.70	702	6.108	1.847	0.742	1077	6.11	1.855	0.730
Adulteration in the food grains	360	5.78	1.8	0.74	714	6.097	1.879	0.723	1074	6.10	1.852	0.732
Black marketing	427	6.86	2.135	0.88	731	6.579	1.924	0.907	1158	6.58	1.998	0.906
Exclusion of targeted people	389	6.25	1.945	0.94	1041	8.109	2.739	1.349	1430	8.11	2.463	1.283
Political intervention	667	10.72	3.335	1.21	1324	11.310	3.484	1.217	1991	11.31	3.435	1.219
Others	357	5.73	1.785	0.67	679	5.882	1.787	0.807	1036	5.88	1.787	0.764

Source: Author's calculation based on primary data

Hence, it is suggested that staff members of the PDS plan the stock availability of essential commodities well in advance. Thus, all essential commodities can be purchased by the general public in a single place. The diversion of PDS goods in the open market is due to political party members' interference with PDS activities. Hence, it is advisable forboth ruling and opponent parties not to interfere in PDS day-to-day activities or divert PDS goods in the open market. Further, it is recommended that legal authorities instigate stringent action against the parties who divert PDS goods in the open market. In most places, public distribution shops are not opened regularly, whereas in certain areas, PDS function on a half-a-day basis because of the scarcity of employees. Hence, the government must recruit necessary staff members and depute them to shops where employees are in shortages. In any private enterprise, a feedback mechanism is adopted to ascertain consumers' expectations and identify the problem they face to resolve their grievances, if any. No such practice is followed by public distribution shops. Hence, it is suggested that feedback from the general public about the functioning of PDS and PDS officials should initiate necessary steps to redress consumers' grievances. Staff members of the PDS compel the general public to purchase unwanted goods that are not needed. Hence, it is suggested that such unfair practices should be discontinued in fair price shops.Consumers should have the full liberty to buy goods that they need. Elderly persons cannot procure goods at the PDS because of the distance between fair price shops. Hence, PDS officials are advised to rent public distribution shops nearest to the beneficiary's residence.

SECTION-II

7.2. REASONS FOR NON-AVAILABILITY OF FOOD ITEMS AT PDS OUTLETS

7.2.1. Main Reasons for Non-availability of Commodities on time at FPS

Table 7.5. shows the main reasons for the non-availability of food commodities at the PDS outlets in rural and urban Punjab. It was found that 67 percent of the respondents inPunjab faced irregular supply from the government. Similarly, in rural areas, 84.76 percentof the households responded that there was no appropriate food grain supply through the government. The results revealed that 79.79 percent of urban respondents had non-availability of food items due to a lack of government supervision. This is followed by the heavy rush and a long queue, which is the other major hindrance to the non- availability of food on time (58.08 percent), irregular government supply (53.53 percent),hoarding, black marketing (48.98 percent), transportation problems (6.60 percent), and carelessness of depot holders (5.55 percent). In rural areas, the major reasons for irregular supply were transportation problems (76.15 percent) and lack of government supervision (74.17 percent). It was found that in Punjab, the main reasons for the non-availability of commodities in time at FPS were the lack of government supervision and irregular supply from the government, whereas in the rural area, the major reasons were irregular supply (84.76 percent) and transportation problems (76.15 percent). This was followed by a lack of government supervision (74.17 percent) and others (such as hoarding and black marketing) with 67.54 percent. So, it can be concluded that, according to ration card holders, Irregular supply from the govt. secured was the primary major reason for the non-availability of commodities in time at FPS. Other reasons included lack of government, supervision and control, black marketing by the dealers, storage problems, transport problems, social service, and carelessness of the FPS dealers.

Table 7.5. Urban and Rural Households Responses Regarding the Main Reasons for Non-Availability of Commodities in Time at FPS

Reasons	Rural (n=151)	Urban (n=198)	Punjab(n=349)
Irregular supplies from the Government	128 (84.76)	106 (53.53)	234 (67.04)
Transportation problem	115 (76.15)	12 (6.60)	127 (36.38)
Storage constraint	108 (71.5)	109 (55.05)	217 (62.17)
Carelessness of the dealers/ depot managers	22 (14.5)	11 (5.55)	33 (9.45)
Long queue	98 (64.90)	115 (58.08)	213 (61.03)
Lack of government supervision and control	112 (74.17)	158 (79.79)	270 (77.36)
Others (Specify)	102 (67.54)	97 (48.98)	199 (57.02)

Source: Based on Author's Compilation

Note* *Data in parenthesis shows the percentage*

SECTION-III

7.3. Investigating Preference between Public Distribution System and Direct Bank Transfer

The provision of transfers as a mechanism for redistribution is one of the government's most essential responsibilities. However, issues have always existed regarding their equitable and efficient distribution. Even though in-kind transfer presupposes effective and transparent government machinery and proactive public administration, its execution is marred by reported leakages, corruption, unaccountable government machinery, etc. By contrast, cash transfer ensures an efficient rural market, improved banking networks, and enhanced rural connections. However, the current enabling conditions do not appear sufficient (Khera, 2014). Table 7.6. shows the percentage of urban and rural households in Punjab, assigning reasons for direct bank transfers and PDS preferences**.** Interestingly, in the rural area, only 31.35 percent of the respondents preferred DBT and in the urban areas, almost 45.10 percent, while a staggering 68.64 percent in rural areas and 54.09 percent in urban households preferred public distribution systems. This can be linked to the accessibility of the FPS in the surrounding areas, while the status quo bias or endowment effect cannot be ruled out. Additionally, complications associated with cash transfers are significant. This is evidenced by nearly two-thirdsof the respondents' anxiety regarding safety issues and currency transfer irregularities.

Table 7.6. Percentages of Urban and Rural Households in Punjab Assigning Reasons for Preference to DBT and PDS

Preferences and Proximity	Rural		Urban		Punjab	
	DBT	PDS	DBT	PDS	DBT	PDS
Preferred Mode of Transfer	31.35	68.64	45.10	54.09	46.55	53.45
Ease Accessibility of Food	-	63.43	-	51.89		57.89
Irregular in cash transfer	-	48.56	-	28.06		32.46
Quantity of food	-	34.89	-	46.7		43.65
Banking facilities	-	53.65	58.06	-	23.46	35.64
Reasonable prices	-	68.79	-	43.7		54.78
Fulfillment of basic requirement	-	72.48	-	53.6		68.76
Other basic requirements not met	8.98	-	4.67	-	5,87	
Less leakage	7.39	-	39.6	-	28.64	
Own Preferences	9.07	-	15.6	-	12.64	

Source: *Author's Calculation Based on Primary Data*

More than two-thirds also cited a lack of banking services as a contributing factor in the rural area, but proper banking facilities were found in the urban areas, so urban respondents were in favor of DBT. Quantity and quality matter for households when expressing their choices. In addition, food sufficiency in terms of amount led many of them (34 percent in rural areas and 46.7 percent in urban areas) to recognize the significance of food transfer. This appears to imply quality assurance under the current system, thereby providing evidence of improved institutional assistance, even though food insecurity remains an issue for many. Those who favored cash mentioned its fungibility as the primary reason, as it allowed them to freely exercise their preferences. Households lacking other fundamental necessities appear to prefer cash. Additionally, it was shown that monetary transfers limit leakage. In contrast to the numerous reasons mentioned for the preference for food, justifications for cash did not receive as much attention in Punjab's urban and rural regions.

SECTION-IV

7.4. Summary and Conclusion

This study aimed to examine the adequacy of India's current food endowment program's public conveyance framework as well as the basic factors that affect its adequacy. A few hypothetical and relevant contemplations have been used to study household preferences. The majority of the 522 respondents in Punjab who held ration cards were blue card holders (37.93 percent). Out of total respondents, 18.58 percent had Blue + BPL, and percent had APL. It was determined that 9.38 percent of the respondents lacked ration cards, followed by 14.18 percent of the respondents whose financial circumstances had improved to the point where they no longer required ration cards. Owing to the government's instability, 55.55 percent encountered bureaucratic impediments. Similarly, the same problem affects households. 51 percent of the respondents who had relocated and applied for ration cards but did not receive them were without them, while 9.25 percent of the respondents who had misplaced or lost their ration cards were without them. The bulk of urban respondents held ration cards (89.62 percent). Among the respondents, 33.53 percent possessed blue cards, 15.13 percent had Blue+BPL cards, 12.46 percent possessed APL cards, and 27.89 percent possessed smart and Aadhar-based cards. Similarly, 92.5 percent of rural respondents possessed ration cards. 45.94 percent of the 185 respondents possessed a blue card, 24.86 percent possessed a Blue+BPL card, a total of 12.97 percent were APL, and around 8 percent possessed a smart card and an Aadhar-based card, respectively. The results revealed that 7.5 percent of rural and 10.37 percent of urban households did not have ration cards. Most rural (80 percent) and urban (46.15 percent) respondents mentioned bureaucratic hurdles as their cause.

The level of satisfaction of households in the research area, with the rural respondents, 45.40 percent agreed with closeness to FPSs. In contrast, only 50 respondents from metropolitan regions agreed with proximity. Only 3.783 percent ofrespondents from rural locations were highly satisfied with the vicinity of the FPSs,whereas 74.33 percent of respondents from urban areas were highly satisfied. Only 0.89 percent of urban respondents were unsatisfied with the closeness of FPSs, compared to a total of 31.9 percent of the rural respondents responded. There were differing opinions regarding the extent of household satisfaction with proximity. In Punjab, 4.022 percent of respondents were extremely dissatisfied and 11.37 percent disagreed withthe location

of FPSs, whereas 54.98 percent of respondents were extremely satisfiedwith the locality of fair pricing shops. Calculating value from the data to determine whether there was a significant difference in the opinion of consumers in urban and rural areas regarding the proximity of FPSs, it was discovered that the calculated value of chi-square (12.569) was greater than the table value of 9.48 at the 5 percent significance level. Thus, the alternative hypothesis was accepted and the null-hypothesis was rejected, indicating that there was a substantial difference between the perspectives of urban and rural consumers about the vicinity of FPSs. A total of 9.81 percent of rural respondents and 3.8 percent of urban respondents were satisfied with the FPS grains. A total of 42.6 percent of the rural respondents were unhappy with the grain quality. Out of the respondents, 39.45 percent were highly disappointed with quality, while 52 percent were unsatisfied. The survey respondents were dissatisfied because they often had moldy or fungus-covered grains. The estimated number of 58.598 is greater than the table value of 9.48 at the 5 percent level of significance. The alternative hypothesis is accepted and the null-hypothesis is rejected, indicating that urban and rural consumers have different perceptions of FPS product quality. 94 percent of respondents were satisfied with the FPS costs in rural areas. In urban areas, 72.1 percent of respondents were satisfied with the FPS rates because only 2 INR per kg for wheat was charged, but they demanded rice, dal, oil, etc. The calculated value of the chi-square was 23.514, indicating that there was no significant connection between rural and urban commodity prices. Quantity supplied 48.10 percent of the rural respondents and 28.28 percent of the urban respondents. Surprisingly, the calculated value of chi-square was 32.430, indicating that there was no correlation between the satisfaction of quantity supplied and appropriate in both urban and rural locations. Out of the rural respondents, 48.10 percent were highly satisfied, whereas 54.9 percent of the urban respondents were satisfied. Only ten urban respondents (2.96 percent) were highly satisfied. A total of 6.48 percent of rural residents were unsatisfied. The computed value of 2 was 16.435, indicating that there was no significant relationship between urban and rural household *satisfaction with dealers' behavior*. Almost half of the respondents in rural and urban areas were satisfied with the availability and working hours of PDS outlets. Only 4.21 percent were extremely dissatisfied with the PDS's operating hours. The working hours of the PDS outlets did not differ between rural and urbanrespondents. The entitlement to food grains was severely unsatisfactory by 48.10 percent of the respondents because some family members' names were not recorded on the ration card; thus, they were not

entitled to food grains. The exclusion of families and political meddling were critical factors in this portion. Thirty-eight percent of the urban respondents were dissatisfied. In this part, of the respondents, 38.37 percent were satisfied; however, 42 percent of the Punjab respondents were unsatisfied with food grain entitlements.

Same as the rural respondents were highly dissatisfied with the measuring process, it was found that they were not getting the full quota; most of the time, they were not getting the full 30 kg of wheat; there is always an issue in the quantity measure,actual weightage of the package is less than 30 kg; 30 percent of urban respondents were satisfied with the measuring process, but only 2.7 percent of rural households were. Punjab respondents were unhappy, 39.45 percent of respondents were severely unsatisfied with product availability, and 42.6 percent were upset because they did not receive SMS on their phones and did not know about proper availability. A total of 52.1 percent of the respondents were unsatisfied with timely availability. Similar results were reported among urban and rural respondents regarding the PDS outlets' brevity: 48 percent in rural areas and 54.9 percent in urban areas. E-PDS reduces malpractice. To avoid delay and quick disposal of consumers, the number of ration cards per shop should not exceed 500, separate doors should be there in the FPS for entrance and exit or door step deliveryshould opt, and supply from the central pool should be regular and proper, separate dates should be fixed for each block within a municipal ward, a special counter for women should be provided, and the PDS should be kept open on days and even on holidays so the Goods should be pre-weighed, pre-packed, and ready for delivery to avoid delays. To improve the overall functioning of the FPS, most ration card users have proposed improving food quality and grain amount.

Other recommendations include setting salary restrictions above which people are denied PDS payments, excluding high-paid urban professionals from the PDS, and including more rural poor categories. The state government must provide sufficient transportation and warehousing facilities for the PDS to ensure timely food availability in each region. Political intervention was the primary obstacle to the PDS's proper operation, with a mean score of 3.35 and 10.72 percent in rural areas and 3.48 and 11.31 percent in urban areas. Similarly, the non-targeted population benefited more from political intervention, as seen in the table: 8.14 percent in rural areas and 7.72 percent in urban areas. According to rural and urban survey respondents, many of the above-poverty families have BPL cards, whereas the poorest have no ration cards. The

share of rural and urban respondents were 6.86 percent and 6.57 percent, respectively, said that black marketing, leakage, and corruption hinder the PDS. 6.02 and 6.108 percent of rural and urban residents, respectively, said they knew people with bogus ration cards. Non-availability of food grains, grain deterioration, depot holder inefficiency, unjust grain distribution, and preference for known people were also factors. The most common issues customers encounter at ration shops are the unavailability of rations and rude vendors. It has been found that the non-availability of food grains is due to various reasons, such as storage and transport problems, irregular supply from the government, and lack of government supervision and control, with 5.73 percent in rural areas and 5.82 percent in urban areas. The main reasons for food shortages at PDS shops in rural and urban Punjab. It was found that 67 percent of the respondents in Punjab faced irregular supply from the government.

Similarly, in rural areas, 84.76 percent of the households responded that there was no appropriate food grain supply through the government. The results revealed that 79.79 percent of urban respondents had non-availability of food items due to a lack of government supervision. This is followed by the heavy rush and a long queue, which is the other major hindrance to the non-availability of food on time (58.08 percent), irregular government supply (53.53 percent), hoarding, black marketing (48.98 percent), transportation problems (6.60 percent), and carelessness of depot holders (5.55). In rural areas, after the irregular supply, the primary reasons were transportation problems (76.15 percent) and lack of government supervision (74.17 percent). As a result, it was found that in Punjab, the main reasons for the non-availability of commodities in time at FPS were the lack of government supervision and irregular supply from the government, whereas in rural areas, the significant reasons were erratic supply (84.76 percent) and transportation problems (76.15 percent). Followed by lack of government supervision (74.17 percent), others (such as hoarding and black marketing) with 67.54 percent and soon. Thus, it can be concluded that, according to ration card holders, irregular supply from the govt. secured was the primary reason for the non-availability of commodities in time at the FPS. Other reasons included lack of government, supervision and control, black marketing by the dealers, storage problems, transport problems, social service, and carelessness of the FPS dealers. The percentage of urban and rural households in Punjab indicates the reasons for direct bank transfers and PDS preferences. Interestingly, in the rural areas only 31.35 percent of the

respondents were preferred DBT and in urban areas almost 45.10 percent, while staggering 68.64 percent in rural households and 54.09 percentin urban households preferred public distribution systems. This can be linked to theaccessibility of the FPS in the surrounding areas, while the status quo bias or endowment effect cannot be ruled out. Additionally, complications associated withcash transfers are significant. This is evidenced by nearly two-thirds of the respondents' anxiety regarding safety issues and currency transfer irregularities. More than two-thirds also cited a lack of banking services as a contributing factor in the rural area, but proper banking facilities were found in the urban areas, so urban respondents were in favor of DBT. Quantity and quality matter for households when expressing their choices. In addition, food sufficiency in terms of amount led many of them (34 percent in ruralareas and 46.7 percent in urban areas) to recognize the significance of food transfer. This appears to imply quality assurance under the current system, thereby providing evidence of improved institutional assistance, even though food insecurity remains an issue for many. Those who favored cash mentioned its fungibility as the primary reason, as it allowed them to exercise their preferences freely. Households lacking other fundamental necessities appear to prefer cash. Additionally, it was shown that monetary transfers limit leakage. In contrast to the numerous reasons mentioned for the preference for food, justifications for cash did not receive as much attention in Punjab's urban and rural regions. Therefore, all the above issues and problems overshadow the effectiveness and implementation of PDS schemes. As money is fungible, it can be misapplied to temptation items. As considerable segments of the population still live below the poverty line and continue to experience a high hunger rate, basic food needs must be met. If cash substitutes are transferred in kind under these conditions, basic food needs may not be met for everybody because fungibility would increase. Consequently, eradicating hunger is not an immediate priority. Moreover, a cash transfer system may be disadvantageous for many illiterate or less educated individuals. In conclusion, it may be concluded that while money transfer may be advantageous for some transfer programs, the effectiveness of in-kind transfer may be demonstrated for others. In India, universal cash transfers for all welfare programs may not be viable. Specifically, in its current distribution, the food subsidy plan reaches the intended recipients without significant difficulty, while satisfying the stated goals of availability, accessibility, and quality. Consequently, it may be prudent to continue the plan to its existing shape.

CHAPTER -VIII

SUMMARY, CONCLUSION AND POLICY IMPLICATIONS

The food security situation in India shows the positive implications for the entire population when there is an adequate supply of food for all, but the national level picture is not clear at par with households and individual levels. The pervasive hunger, poverty, and market imperfections became a major contributing factor to the lack of essential commodities, resulting in inflation. As a result, it became challenging for the poor to fulfill their basic requirements, and hence, they continued to be deprived of necessities. The effects of food shortages, droughts, andwars all resulted in the emergence of a severe shortage of essential commodities', forcing government bodies to take decisive action in order to meet the basic needs of the people. Thus, to address such problems, necessary steps are regularly implemented, under which food grains are procured from surplus zones and given to food-deficit areas. However, in India, food availability can't just be about managing shortfalls and dealing with bad situations (Das, 2011).

Therefore, it is important to have an economic control system combined with state involvement to assist low- income groups. Moreover, there is a requirement for a Central National Supply Management System to be established. Particularly for basic commodities, because the open market system does not actively contribute to the well-being of the lower-income class people. Presently, the Government of India is playing a significant role in eradicating these food shortage challenges through the implementation of various initiatives and plans. From independence, a strong emphasis has been placed on five-year plan schemes and their performance and it was often highlighted that the Public Distribution System (PDS) is a social- welfare program that has been mainly established by government bodies to regulate and maintain the appropriate availability of essential commodities to the most vulnerable groups in both urban and rural regions. The Agriculture Price Policy in India was implemented during the five-year plan period with the primary goal of ensuring a continuous supply of essential food items to the poor class at an affordable price. Furthermore, poverty reduction and hunger eradication are two of the most critical objectives of Rural Development Programs in India. The overall objective of this study is to assess the food security at the household level in the Northwestern state

and identify the food secured and insecure households with all the three aspects of household food security. This chapter summarizes the rationale of the study, significant findings, and policy implications through the functional grid of the NFSA scheme. Lastly, policy recommendation draws to the notice and suggestions are made for future study.

8.1. The Rationale of the Study

Punjab is an agricultural economy (Singh and Singh, 2002). Despite just making up

1.5 percent of the country's land area and employing roughly a 26 percent of the people, agriculture's proportion to the GSDP has fallen from 49 percent in 1980-81 to 28 percent in 2019-20. In 2019–20, Punjab supplied around 33 percent of total wheat procurement by governmental agencies, demonstrating its importance to its food security. Punjab was dubbed "India's Granary" because it nearly doubled food grain productivity. For all Indian states till the green revolution's negative externalities began to harm it. Aspects of ADA: Rise in agriculture in Punjab, helped by intensive farming practices, is increasingly criticized for harming the environment (Dhillon et al., 2010; Khus, 2015; Swaminathan and Bhavani, 2013).

Punjab may boost its planting intensity to 18.9 percent and produce 18 percent of India's wheat and rice due to favorable agro-climatic conditions and extensive adoption of green revolution technologies. It increased food security and food availability in the state. Although dependent on underground water supplies, Punjab's agricultural viability is doubtful. The state's current cropping patterns, based on wheat and rice, are too intensive and lack diversity, endangering the state'soverall agricultural viability. Reduced crop diversification, especially during the Kharif season, and a free electricity policy for farmers have damaged groundwater supplies. Oversupply of fertilizers, pesticides, and farm equipment has hampered Punjab's economic sustainability. Water scarcity threatens food security and agriculture (Ghuman et al., 2010; Goel, 2011 and Khush, 2015). In drinking water, uranium, lead, and arsenic have caused a carcinogenic belt in 12 Punjab districts (World Bank, 2014). HYV rice and wheat growing require high-acid fertilizers, which can affect soil health and fertility and cause pollution. Pesticide use has risen from 3000 to 6900 MT in Punjab, endangering people's interiors, and jeopardizing food security and sustainability. Increasing evidence of erratic precipitation and increasing

temperatures in the northern Indian plains (Choudhary and Sirohi, 2020) and alarming depletion of natural resources, particularly groundwater have jeopardized the state's economic future (Kaur and Vatta, 2015; Sidhu et al., 2010; Srivastava et al., 2017 and Vatta and Taneja, 2018).

Punjab's food security is threatened by land degradation, particularly in the Malwa region. Intensive farming, straw burning, increased pesticide use, and soil salinity due to over-irrigation are essential contributors to Punjab's land degradation problem. Disability feature: In Punjab, lack of commission, transportation, and labor charges led to black marketing (PTI, Chd., 2015), and public distribution system leakage reached 75 percent (Dhiman, 2013). Irrational storage practices, absence of covered silos, and slow grain shipment to other states harmed Punjab Agro Food Grains Corporation (PAFC). Distribution of India's PDS leakages in the respective states were 67.6, 65.3, 60.9, 58.8, and 57.6 percent in Gujarat, West Bengal, Rajasthan, Punjab, and Uttar Pradesh in 2011. Although, according to Khera and Dreze (2015), Punjab was the most accessible as of scored 0.4244 on quality and safety. Problems with food absorption due to lack of health care facilities, safe drinking water, and sanitation imply nutritional protection is severely inadequate. Also, calorie and protein consumption has been fallen significantly, especially in rural areas (Narang et al., 2016).

Punjab has one of the lowest health expenditures per capita, at 0.65 percent, and a much smaller share of government spending. Rural areas have poorer living standards than cities (CSO, 2015). According to the NFHS-3, one in every five adults age of 15 to 49 year in Punjab is malnourished. Since 2015, Punjab has had the slowest MMR development. The SRS report (2020) ranked Punjab third among five states that failed to prevent maternal fatalities. In the Ludhiana district of Punjab, the biggestmigrant population and maternal mortality rate, 59 people died in 2018-2019 and 65 in 2019-2020. Punjab's public health issues include malnutrition and anemia. According to NFHS-4, "about 54 percent of women in Punjab have anemia, with 42 percent mild, 11percent moderate, and 1 percent severe." Most Malwa districts scored poorly on the food usage index due to low female literacy and insufficient availability of potable drinking water. While, numerous global and Indian studies on food security have been conducted, many have overlooked the sustainability aspect, critical for ensuring long-term food security (Berry et al., 2015). However, Vepa et

al. (2004) have created a national food security map. Still, there is a lack of research on the effectiveness of family food security in Punjab and the variables of household food security vulnerability and coping methods during shocks and pressures. The objectives of the present study are as follows with their findings:

8.2. Socio-Economic Determinants of Household Food Security in Punjab

This study found that food availability, accessibility, utilization, and stability all had a significant impact on food insecurity. The study found that 56 percent of Households in Punjab were food insecure. Almost 61 percent of sample households were food insecure in the Malwa region. However, the situation in Doaba and Majha Punjab was considerably better (58 and 45 percent, respectively). The drivers of food security differed significantly across the regions.

Affordability and availability of drinking water are essential factors in Malwa region. Mahja region also has more food insecurity than the Malwa region. Kitchen, water and sanitization supplies may affect food consumption. Unhygienic food preparation and eating can harm household health. Most respondents (68 percent) utilize public taps, followed by piped water (15 percent), tube wells (9 percent), and canal water (8 percent). While both urban and rural communities in Majha and Doaba have adequate sanitation, 3 percent of respondents in Malwa's rural districts do not. While most families use a well for cooking, others still use the Chula, which includes 18percent dung cake and 3 percent wood, threatening household members' health. This may lead to hunger, malnutrition, and food insecurity. In Mahja, Malwa, and Doaba, most households (94 percent) disagreed with market accessibility. In contrast, in rural areas, seven outof twenty disagreed with access to health care, schools, and banking institutions. Additionally, 90 percent of respondents in Majha, 85 percent in Malwa, and 78 percent in Doaba felt that transportation is adequate, whereas 10 percent in Mahja, 13 percent in Malwa, and 22 percent in Doaba identified concerns with road infrastructure, connection, and proper transit. The average household member went 5.4 kilometers to the nearest market, with 83 percent traveling less and 24 percent traveling more. Male respondents had a lower probability of food insecurity than female respondents ($p = 0.736$). Ages 21-40 ($p = 0.015$) and 41-60 ($p = 0.035$) were significant predictors of household food security. Ages 21-40 were significant in all Punjab regions, whereas 41-60 were significant

only in Mahja and Malwa. In all Punjab locations, marital status was not having effect on household food security. The study found that compared to illiterates, the incidence of food insecurity falls considerably with education. Higher education (0.000) was prominent in Mahja an Malwa but not in Doaba. A similar effect was seen in Malwa (0.07) and Doaba (0.02). (0.011). It was found that family type related to household food security in Mahja and Doaba (0.416) but not in Mahja and Doaba ($p = 0.272$). In combined families, food insecurity rose. In Mahja and Doaba, larger residences ($p = 0.010$) and households ($p = 0.972$) were not significant predictors of food security, but in Malwa, they were significant had been impacted.

Economic status of APL was the most promising and significant determinant of food security in all three Punjab regions: (0.015) in Mahja, (0.000) in Malwa, and (0.031) in Doaba. Regardless of the results, businessmen reported a higher chance of food security incidence than homemakers, retired, and others ($p = 0.002$). In all regions, the income group was found to be a non-significant predictor of food security. The house's residual assets (0.0070) and present earning member (0.0070) were large in Malwa but little elsewhere. Drinking water from public taps and others was found to be significant in the Malwa region but insignificant elsewhere. Water purification was also noted as a major issue in Malwa.

Accessibility was the most promising characteristic (0.000) in all three Punjab regions. Suppression of small variables like cooking source and sanitization. However, better cleanliness and cooking facilities lead to better health, directly related to the utilization element of household food security. This study found that the province's three areas are distinct. In the binary logistic regression model, 17 variables influenced household food security in Punjab. These are gender, age of the household head, social group, family type, education, monthly income, Assets, status of the house, type of the house, present earning, monthly expenditure, plenty of portable water, treat water, source of drinking water, sanitation facility, affordability, marital status, economic status, source of drinking water. Four variables are statistically significant for Mahja, five for Doaba, and nine for Malwa. Furthermore, the determinants of food security also varied across all of them;*hence a blanket policy approach to target food insecurity is highly discouraged. Before implementing any policy, itis critical to understand the local context. Affordability, Age, and Economic status were found to improve food security across all the three regions*

but varied in their types. It is, therefore, recommended that keep the role of these variables in mind for each area.

8.3. Household Consumption Pattern in Urban and Rural Punjab

Contrary to popular belief, rural consumers spend less per capita than their metropolitan counterparts. During the epidemic, the consumption of vegetables and legumes grew by 19 percent in rural areas and by 59 percent in urban areas. In contrast, 18 percent of rural Punjab families and16 percent of urban Punjab families reduced consumption due to adverse shocks such as job loss and price increases. Regarding food preparation and consumption, 57 percent of urban females and 26 percent of rural females made decisions, indicating that 28 percent of rural families were food insecure. Milk and its products account for a large portion of household consumption spending in both regions. The data showed that food expenditure was 7 percent higher in cities than rural areas. Pulses per capita expenditure in rural areas was INR 838.27, whereas vegetable per capita expenditure was more remarkable in urban areas. Rural households spent more per capita on pulses, whereas urban households spent more on remainder vegetables, milk and its products, and snacks and beverages. Cereals were a necessity in both locations. So, it was consumed daily. Urban households spent more on cereals. Milk and its products, fruits, vegetables, edible oils, and beverages were luxury commodities in rural areas and necessities in urban areas. Changing food consumption patterns in rural and urban areas were influenced by income and expenditure. Thus, improving household consumption patterns, especially in rural regions, requires a balanced mix of beneficiary-oriented programs.

8.4. Vulnerability of Household Food Security in Punjab

Punjab is having higher urban poverty rate than the rural poverty rate, featuring the significance of zeroing in endeavors in urban regions in Punjab. In Ludhiana, one of the urban communities focused on the new program; the urban poverty rate is about two times the provincial destitution rate. Even the results of the study also addressed that predictor of the vulnerability has a significantly impact on Punjab asa whole and in the urban regions where as the vulnerability has insignificant impacton the rural region of Punjab. The analysis showed that most households in the urban area experienced job loss due to the Pandemic situation, which furtherincreased the

household expenditure due to mortality and morbidity. When faced with climate shocks, irrigation is a possible solution. This calls for continuous support for irrigating farmers and those who now farm dry-land and wish to switchto irrigation or diversify their crop portfolio. Farmers must be informed about acceptable environmental practices and the repercussions of not following them.

The policy impact results showed that policymakers and governments should support the less fortunate in society with food and cash assistance. A large sample size allowed for strong results as well as a fuller characterization of these particularly susceptible urban households. The study found that food insecurity is prevalent in Punjab's cities.

In future, a comprehensive study on sustainability of food security in rural and urban areas will be carried out. Urban and rural households face various covariate and idiosyncratic shocks. Different institutions safeguard these households using appropriate models. High development and pay-creating projects may not necessarily, in all cases, diminish weaknesses. A blend of well-being net social security procedures is significant for further developing opposition and versatility of families. They assume a substantial part in declining level disparities and accordingly decreasing segregation in the public eye. Weaknesses are looked across the whole life cycle, and an alternate arrangement of approaches like joblessness protection and annuity plans are required. Procedures in Punjab ought to be zero in on weakness, hazard appraisal, and its major contributing elements. This is even more expected with regards to food and sustenance arrangements. Great sustenance is significant for the supportable turn of events. A blend of the notable highlights of miniature money, wellbeing, protection and business-related programs should be soaked up in the social insurance techniques for poor people.

8.5. Effectiveness of Public Distribution System

Most of the 522 respondents in Punjab who held ration cards were blue card holders (37.93). 18.58 percent of respondents had Blue+BPL, 66 percent had APL, and the remaining percentages were as follows: It was determined that 9.38 percent of respondents lacked ration cards, followed by 14.18 percent of respondents whose financial circumstances had improved to the point where they no longer required ration cards. Due to the government's instability, 55.55 percent encountered

bureaucratic impediments. Similarly, the same problem afflicted households. Fifty-one percent of respondents who had relocated and applied for ration cards but did not receive them were without them, while 9.25 percent of respondents who had misplaced or lost their ration cards were without them. Most rural (80 percent) and urban (46.67 percent) respondents mentioned bureaucratic hurdles as the cause. Political intervention is the primary obstacle to the PDS's proper operation, with a mean score of 3.35 and 10.72 percent in rural areas and 3.48 and 11.31 percent in urban areas. Similarly, the non-targeted population benefited more from the political intervention, as seen in the table, 8.14 percent in rural and 7.72 percent in urban.

According to rural and urban survey respondents, many of the above poverty families have BPL cards, whereas the poorest have no ration cards. 6.86 percentand 6.57 percent of rural and urban respondents said black marketing, leakage, and corruption hinder the PDS. 6.02 and 6.108 percent of rural and urban residents say they know people with bogus ration cards. Non-availability of food grains, grain deterioration, depot holder inefficiency, unjust grain distribution, and preference for known persons were also factors. The most common issues customers encounter at ration shops are non-availability of rations and rude vendors. It has been found that the non-availability of food grains is due to various reasons like storage and transport problems, irregular supply from the government, and lack of government supervision and control, with 5.73 percent in rural and 5.82 percent in the urban. The main reasons for food shortages at PDS shops in rural and urban Punjab. It was found that 67 percent of the respondents in Punjab faced irregular supply from the government. Similarly, in the rural area, 84.76 percent of the households responded that there was no appropriate food grains supply through the government. The results revealed that 79.79 percent of the urban respondents having non-availability of food items due to the lack of government supervision.

Followed by the heavy rush and a long queue is the other major hindrance of non - availability of food on time (58.08 percent), irregular government supply (53.53 percent), others such as hoarding, black marketing (48.98 percent), transportation problem (6.60 percent) and carelessness of depot holders (5.55 percent). In rural areas afterthe irregular supply, major reasons were transportation problems (76.15 percent) and lack ofgovernment supervision (74.17 percent). As a result, found that in Punjab, the main reasonsfor non-availability of commodities in time at FPS were

the lack of government supervision and irregular supply from the government, whereas in the rural area,the major reasons were irregular supply (84.76 percent), transportation problems (76.15 percent).

Followed by lack of government supervision (74.17 percent), others (such as hoarding and black marketing) with 67.54 percent and soon. So, it can be concluded that, according to ration card holders, irregular supply from the govt. secured was the primary major reason for the non-availability of commodities in time at FPS. Other reasons included lack of govt. supervision and control, black marketing by the dealers, storage problems, transport problems, social service, and carelessness of the FPS dealers. The percentage of urban and rural households in Punjab assigning the reasons for direct bank transfer and PDS preference. Interestingly, in the rural areas only 31.35 percent of the respondents were preferred DBT and in the urban areas almost 45.10 percent, while a staggering 68.64 percent in rural and 54.09 percent in the urban households preferred public distribution system. It can be linked to the accessibility of FPS in the surrounding areas, while status quo bias or endowment effect cannot be ruled out. Additionally, the complications linked with the cash transfer are significant. This is evidenced by nearly two-thirds of respondents' anxiety regarding safety issues and currency transfer irregularities. More than two-thirds also cited a lack of banking services as a contributing factor in the rural area but proper banking facility found in the urban areas, so urban respondents were in favor of the DBT. Quantity and quality matter to households when expressing their choices. In addition, food sufficiency in terms of their amount led many of them (34 percent in rural areas and 46.7 percent in urban areas) to recognize the significance of food transfer. This appears to imply quality assurance under the current system, therefore providing evidence of improved institutional assistance, even though food insecurity remains an issue for many. Those who favored cash mentioned its fungibility as the primary reason, as it allows them to exercise their own preferences freely. The households that lack other fundamental necessities appear to prefer cash. Additionally, it was shown that monetary transfers limit leakages. In contrast to the numerous reasons mentioned for the preference for food, the justifications for cash did not receive as much attention in Punjab's urban and rural regions. So, all the above issues and problems overshadow the effectiveness and the implementation of PDS schemes. Because money is fungible, it can be misapplied

toward tempting items. As considerable segments of the population are still living below the poverty line and continue to experience a high hunger rate, basic food needs must be met. If cash substitutes in-kind transferred under these conditions, basic food needs may not be met for everybody since fungibility would increase. Consequently, eradicating hunger may not be an immediate priority. Moreover, the cash transfer system may be disadvantageous to many uneducated or poorly educated individuals. In conclusion, it may be concluded that while monetary transfer may be advantageous for some transfer programmes, the effectiveness of in-kind transfer may be demonstrated for others. In India, universal cash transfers for all welfare programs may not be a viable option. Specifically, the food subsidy plan, in its current manner of distribution, reaches the intended recipients without significant difficulty while satisfying the stated goals of availability, accessibility, and quality. Consequently, it may be prudent to continue the plan in its existing shape.

8.6. Policy Implications

To resolve the issue of vulnerability, poverty, and hunger awareness programmes on ensuring sustainable food security and how to cope with idiosyncratic risks should be organized at offices, public meetings, religious gatherings, educational institutions and exclusively in women's organizations so that awareness about food policies and schemes among households because there are significant gaps in scheme discoveries in which they are eligible for.

- A blanket policy approach with target food security is profoundly deterred. It is vital to realize the nearby circumstances before sending off any arrangement choices with the goal that the state can appropriately make use. Therefore, it is essential to comprehend the local context before pursuing policy alternatives. Affordability, employment status,and economic position were discovered to promote food security in all three locations, but in different ways. Thus, it is recommended that these variables be considered for eachregion
- The results revealed that female-headed households are more food insecure than male- headed households. The government and international organizations must focus on female-headed households and give them with social security allowance, as majority areimpoverished and unemployed.
- Further it was observed that education is a key factor. The residents should

be taught the importance of knowledge and its function in raising a person's standard of living because knowledge is vital for earning a living, food consumption, and safety. Finally, Government should boost remittances, says. So, residents can have better standard of living and generate more employment opportunities.

- Crops and land are significant components in a household's food security. Every year, natural calamities, pest assaults, mismanagement, and more waste numerous food crops and products. In rural areas, drought and starvation plagued most homes, especially in Shri Muktsar Sahib and Ferozepur**.** A properpolicy should be formulated to safeguard the household from the negative effects of natural calamities. The notion of crop insurance should be introduced.
- Apparent disparities among urban and rural consumers regarding consumption expenditure, the distribution of per capita consumption expenditure was somewhat fair in provincial areas compared to urban areas of Punjab. It signifiedthat the shifting consumption pattern of food in rural and urban households wasinfluenced by expenditure and income. Hence, to improve the households'consumption patterns, especially in the rural areas, the planning strategy for the development should be a judicious mix of beneficiary-oriented programs like MDM, ICDS and Integrated Rural Development Programme.
- To diminish spillage of food grains, one significant advance is to verify whether the food grain disseminated through the PDS is gotten by an eligible household. Gathering biometric data of all cardholders in a family (top of the family and different individuals from the family), connecting it with their Aadhar number and putting away the information might tackle the issue. This will likewise empower any individual from a family to gather month-to-month proportions. Field visits revealed that matching the thumb impression and retina recognition of older individuals turns into a challenge in Punjab. The government of India has stepped up to direct a pilot run in no less than one localof each state by introducing electronic weighing machines and providing food grain just to families whose biometric data is verified. The unique identifier of the proportion of cardholders could turn into the Aadhar number all things considered. In any case, the extent of Aadhar enrolment is

still very low. It is exceptionally vital to finish the enrolment cycle of Aadhar alongside the assortment and capacity of biometric data of cardholders so electronic gauging machines can be introduced and utilized.

- A huge extent of PDS recipients is uneducated and will most likely be unable to peruse the data on the presentation board. Subsequently, data connected with the PDS can likewise be dispersed through mindfulness crusades directed by NGOs and government authorities consistently in towns. The presentation of a SMS alert at the recipient level is a significant measure to increment mindfulness. The SMS ready office is being executed by Punjab's food and common supplies division. When the month-to-month standard of food grains is set free from godowns to the fair cost retailer, an alarm is shipped off the nearby panchayat/company part. At the same time, information assortmentperception uncovered blended reactions to the SMS ready plan. All states ought to embrace a plan to send an SMS to recipients toward the start of the month in regards to their qualification and the specific cost to be paid at the FPS.Regardless of whether all recipients have cell phones, they could get this data from their friends or neighbors. Mindfulness crusades regarding the complaint redressal system ought to be led with the assistance of nearby NGOs and common society. The subtleties of appointed authorities and useful helplines ought to be made accessible to recipients through show sheets at FPSs.
- The PDS is a foundation of government strategy answering nourishment and food security. Nonetheless, loaded with shortcomings decline in its ability to simply disperse food to those in need. One reaction has been the execution of the NFSA in 2013, which has fortified the PDS by giving legal support. As proven by the survey, strategy changes focused on working on the functional efficiencies and maintainability part of the PDS and NFSA are indispensable for its prosperity. The PDS will be unable to dispose of the issue of lack of healthy sustenance and youth grimness or mortality in India. Yet, it can lessen the degrees of craving in India whenever executed really. Incorporating the PDSwith different intercessions, including those that will build straightforwardness and responsibility, might expand its capability to understand each resident on the right track to nutritious food while proliferating great wellbeing.

8.7. Policy Analysis and Implications of National Food Security Mission

The National Food Security Mission (NFSM) is to lay out an empowering framework for state-of-the-art execution of the Centrally Sponsored Scheme (CSS), bringing about expanded results concerning nature and extension. In that capacity, it would act as an aide for execution by the District Collector and other significant District-level authorities, working with fast finding out about the Scheme, its execution modalities, and obligations of different functionaries. Since public administrations are imposing business models, authorities frequently neglect the issue of consumer loyalty while carrying out strategies (Andreasen, 1994). According to the findings, beneficiaries are rational consumers with preferences, expectations, and restrictions who make well-informed decisions to maximize value. Such policy initiatives can be successful if they participate productively inthe system. As a result, incorporating consumer happiness as an important performance metric for such developmental initiatives is a crucial policy implication of the research findings.

This action planning was arranged utilizing an assortment of sources, including a survey of existing plan rules, handouts, and alterations given by the Department of Agriculture, Cooperation, and Farmers Welfare (DAC and FW), Government of India (GOI), and conversations with the key work force, including IAS, IES officials, and Food Inspectors of the Department of Food and Supplies and Consumer Affairs. The current movement planning for NFSM execution utilized an insightful methodology made sense of in three stages, thinking from first standards of public money and responsibility, and existing experimental information to give way ahead to tending to the responsibilities regarding food security which is addressed in Appendix III. Nonetheless, it is intended that this detailed activity mapping would encourage discussion among policymakers, academicians and other stakeholders on the relative contribution and impact of a National Food Security policy framing thoroughly.

NFSA has enhanced the overall functionality of TPDS; however, there are still a few areas that need to be addressed. According to the review, it was analyzed that many states/UTs have not implemented the NFSA. To begin with, the Act's implementation was delayed in most states/UTs, which was a severe infraction.

Many states and territories did not issue new ration cards, and others declared all former TPDS recipients eligible for NFSA benefits. Even the field survey in Punjab also showed that only 13 percent of respondents were having the Aadhar based ration card, rest were using an old ration card.

More importantly, states/UTs that did not take advantage of the NFSA to begin TPDS reforms have not been able to reap the full benefits. A major NFSA violation has been the protracted delay in delivering universal maternity benefits. The Central Government failed and has not provided the necessary funding for the two other NFSA-related programs, ICDS and MDM. According to the NFSA, the Central Government must ensure that all Anganwadi (childcare centers) and schools have the necessary facilities to serve children hot, cooked meals. Instead, by modifying the budget pattern of these programs, the Central Government has shifted the financial responsibility of these programs to the states/UTs.

As more evidence of the experience of substituting in-kind food subsidies with cash transfers becomes available, states/UTs will have more information on which to base their decision. On the other hand, the DBT (Direct Bank Transfer) and food coupons implemented in certain states, including Punjab, have not shown a significant impact. Households in Punjab have prioritized the PDS against the DBT. The same has been found in the preliminary study as well as in this study where 94 percent of respondents were in favor of PDS because the system fulfills the essential requirement and got the food items at reasonable prices. The 'directbenefit transfer experiments' in Punjab revealed the limitations of cash transfers' effectiveness in densely populated areas. It would be basic to guarantee that the necessities for cash moves exist in a nation where more than 70 percent of the populace lives in provincial regions.

The review utilized a blend of logical methodology, thinking from the first standards of public finance and from first standards of responsibility, and existing observational exploration to propose a way forward for PRIs in handling the obligation regarding food security mission. Three forces are meeting up to bring the issue of the connection between nearby government and food security on to the plan. To proceed with the strategy outlining the primary errand is to characterize the applicable parts of the arrangement of help with unbundling of capacities with five

conventional stages *viz.* Setting Standards, planning, asset creation, operation and management and monitoring and evaluation. These are at a degree of over-simplification that they are typical to practically all open administrations like essential training, general wellbeing and provincial water that are assignable to the PRIs in the Eleventh Schedule of the Constitution.

Further, this useful unbundling lines up with the movement planning exercise embraced by the Government of India. The course of food security through NFSA is perplexing and there is not a great explanation to accept that every one of the components ought to be completed at a similar degree of obligation. A conversation of whether the adequacy of food security overall would be improved by being the obligation of the state, region, or the GP is neither practical nor logically intelligible as there is not a great explanation to accept these exercises have a place at a similar level. And yet, basically assigning simultaneous obligations to all degrees of government without clearness on jobs is additionally not accommodating. In the Indian setting, there are five expected degrees of legislative purview for each capacity center, state, block, town, and village. The two parts of unbundling useful and jurisdictional give us the unbundled network of capabilities and locales, with abilities and exercises in the lines and purviews in the sections which is displayed under the Table 8.1:

Step 1. Unbundling: **Categorizing the Elements into Subcategories**

The first step is to catalog the components necessary for the provision, referred to as Unbundling. Table 1 shows the unbundling of features and functional matrix for allocating the activities.

Table 8.1 Functional Matrix for the allocation of the activities

Broad Categories	Activity	Level of Governance				
		Central	State	Districts	Panchayat	Gram Panchayat
Setting Standards	10	6	8	4	6	6
Planning	3	1	2	1	1	1
Asset Creation	4	3	4	2	1	1
Operation and Management	35	20	31	23	18	15
Monitoring and Evaluation	13	7	10	6	4	3

***Source**: Based on Author's Compilations*

In the layout of the functional matrix, the three significant issues in pushing forward with decentralization are:

- distributing the legislative obligation regarding capacities across the levels of the PRI between locale and GP
- settling the ambiguities innate in the ongoing circumstance in which there are quite many simultaneous‖ obligations, and
- fostering achievable progress that adjusts the capacities, money, and functionaries in a rational framework.

Step 2. Applying Public Finance Criteria

How might one choose how to isolate obligations for the variety of unbundled tasks related to the National Food Security Mission across different degrees of government? Who will be responsible for doing the exercises? What are the elements used to make this assurance? The four good public money measures for deciding the size of the locale responsible for a capacity are addressed in Table 8.2:

Table 8.2 Functional Allocation based on Principle of Public Finance

Principle of Public Finance	Level of Governance	
	Higher	Lower
Economies of Scale (tend to push the services)	✓	×
Externalities (extent of external effect)	✓	×
Equity (equalization)	✓	×
Heterogeneity (state of being diverse)	×	(More heterogeneity leads to lower governance)

Source: *Based on Author's Compilation*

Step 3. Applying Accountability Criteria

What are the fundamental analytical criteria for determining the nature of operations or duties to establish their appropriate governmental level? Three features of activity or role within an activity impact the proper level of accountability presented in Table 8.3:

Table 8.3. Functional Allocation based on Principle of Accountability Criteria

Principle of Accountability	Level of Governance	
	Higher	Lower
Discretionary (require decisions to be made using individual judgment in the local contex**t)**	×	✓
Transactions (requires several repeated transactions at the lower level)	×	✓
Technical (Where can performance be better inferred – locally or technically**)**	✓	×

Source: *Based on Author's Compilation*

- Frame and implement a decentralized food grain price-fixing policy.
- Every Panchayat should have access to food grain procurement and storage facilities.
- Transparency in PDS management is required in the purchase, storage, and distribution.
- The NFSA grievance mechanism and surveillance system should be separate entities. Recognize that the institutional setting responsible for implementation or management cannot and should not handle grievances.
- Proactive reforms are required to increase agricultural productivity, enable scientific storage, protect farmer livelihoods, and control and reduce agrarian commodity prices.
- A single department cannot combat malnutrition. It requires different departments to play their roles effectively and in synergistic convergence.
- The existing provision allocation of supplementary nutrition is not adequate. It must be raised to Rs.8.50 per child.
- The ICDS program should also draw free food grains from FCI along the lines of the Mid-Day Meal Scheme.
- At present, the government has targeted for the transformation of only 5 percent of Anganwadi Centers into creches in the entire 5 Year Plan. It should be treated as an annual target and pursued with vigorous commitment.
- It should be aimed that by year 2023, each Anganwadi Centre would have its own building, toilet, safe drinking water and be equipped with all related facilities and that the Centre would be operated by at least 2 Anganwadi workers and one helper.

- Community-based management of malnutrition should be adopted throughout the country.
- It should be made clear that the government shall institute a policy to food, social security, health, child development, and education.

8.8. Scope for Future Research

Future research can be carried out to cover the following areas of study:

- The extensive scope for future research on the sustainability of the National food security act through agricultural innovations, financial analysis, and strategic aspects.
- New studies can be conducted based on the role of community-based organizations in the food management of the Fair price shops.
- Future work on this examination might incorporate an expanded example size spread across a few areas. The impacts of the recognized variables (demographic, working with, impending) should be additionally considered to grasp the component and the fundamental purposes more readily behind them. Structure condition displaying and factor investigation might be utilized for capturing individual elements and the level of impact of every variable.
- A techno-monetary examination of the six-month supply chain might yield a money-saving advantage proportion and assist better grasping arrangement execution. This would be basic to gauging the manageability of the approach in the long term.
- The current research focused on eleven districts of Punjab, where the effectiveness of household food security, consumption patterns and satisfaction level of consumers was analyzed. Similarly, the other states and districts of the country can be targeted.
- To study the effectiveness of household food security, proper measurement can be done through nutrition security and arthrometry measurement.
- To investigate cultural diversity regarding food security as different cultures have different food patterns and habits.

8.9. Conclusion of the Study

This research identified facilitating and demographic factors, consumption patterns and covariates of the vulnerability that affect beneficiaries and assesses the PDS's

execution in light of distinguished variables. Further, the study summed up generalized policy implications and makes proposals for formative strategies. The findings of this study will help develop economies, for example, India, which runs comparable public food distribution frameworks. Factors influencing recipients connected with the adequacy of PDS incorporate “hassle,” “leakages,” “storage,” “interval of grain distribution,” “one-time payment,” “grain trade,” “exploitation by middlemen”, “communication,” “age,” “gender” and “employment.” Recipients trust that with bi-annual distribution framework "hassle" and "spillages" have diminished yet "timespan dispersion" and "one-time installment" is a challenge for them. Since the last two factors significantly influence beneficiaries inclination the approach creators need to design critical mediations. A portion of the significant generalizable approach suggestions in view of this examination are that (1) decentralization is essential for the progress of food arrangements and these foundational mediations will be compelling provided that they are firmly grounded in applicable requirements of recipients and upheld by managerial endeavors and meticulousness, (2) such intercessions shouldn't disruption the situation with recipients as a judicious buyer and strategy producers ought to understand the significance of consumer fulfillment in effective execution of comparative formative strategies, (3) beneficiaries “trust on the framework characterizes his/her eagerness to acknowledge the approach intercessions and partake to make it fruitful; following through on responsibilities by organization can help fortifybeneficiaries” trust on the framework, and (4) correspondence with recipients and different partners in regards to new improvements is basic for strategy's prosperity; vagueness and vulnerability because of absence of straightforwardness can be adverse to such approach intercessions. Explicitly for six months to month conveyance framework it is suggested that (1) recipient trust and fulfillment ought to be made vital strategy execution markers, (2) the public authority ought to offer calculated help to recipients in type of containers, or airtight stockpiles like PICS (Purdue Improved Cowpea Storage) sacks for putting away half-year privilege, (3) choice of loan for money related flexibility of recipients by means of FPS will be truly valuable, (4) since advancing females as top of the families is one of the excellent target of new atta-dal (wheat- pulses) conspire under NFSA 2013, orientation-based impetuses for females can expand their commitment with the framework, (5) dispersion of grains ought to occur on fixed pre-decided dates imparted well ahead of time; the state

ought to bend over backward to convey grains on time and (6) moreover, this plan ought to be carried out with a choice to return to a month-to-month dissemination framework when wanted by recipients and this ought to be plainly imparted to them. Fluctuations in food prices and production require more stabilization to normalize the consumption pattern. As results found, the food consumption pattern needs a direction for the people living in rural and urban areas of Punjab. Because the inappropriate diet plan and consumption affects the nutritional status of the household members irrespective of income level.

In all expresses, monetary consideration of each family is an absolute requirement for carrying out an approach of money moves, and the Jan-Dhan Yojana can be an excellent guide in laying out this extensive arrangement. A few cynics have often contended that such money moves might advance liquor utilization and render food unreliable for families. In this unique situation, it is critical to take note that an exploration directed in 2011 by the Government of Delhi and SEWA under the GNCTD-UNDP project inspected the impacts of supplanting PDS proportions with cash moves for BPL families in a west Delhi district.

The underutilization aspect of food security manifests itself in the household's total nutritional status. Malnutrition is not simply a characteristic of the poor but also non-poor households. It is not always clear to everyone which foods and feeding methods are most beneficial for their family members, particularly young children. Malnutrition, abnormal growth rate, and vitamin inadequacy are not readily apparent to the average individual. Therefore, government intervention such as ASHA workers for National Rural Health programs in this area should be streamlined so as to increase nutrition awareness and reduce disease prevalence.

In rural areas, few amenities such as safe drinking water and sanitation facilities for the household (Shri Muktsar and Ferozepur). In 2014, the Indian government started the "Swachh Bharat Scheme." Under this mission, safe drinking water, water disposal, and sanitation will be provided to every home in both rural and urban regions. The government should oversee the program to ensure that it reaches the intended households.

The BPL households require more measures to overcome food insecurity through

food assistance programs. BPL households will benefit significantly from intensive food and cash transfer programs paired with rural development projects. These efforts and activities will help the long- term stability of food security.

The inverse relation between family size and food security underscores the need to advance family arranging techniques to keep up with more modest families. Both region and public legislatures ought to heighten their ability building endeavors by putting resources into and bringing issues to light about the significance of instruction at more elevated levels, as well as by advancing country training programs pointed explicitly at females to expand their insight into the nourishing medical advantages of a shifted diet.

Encourage gender-based resource allocation and women's empowerment programs to enhance household welfare and reduce gender disparity in decision-making. When females oversee dietary decisions, households are far more likely to consume a wide variety of foods compared to when males are in charge. This might be reminiscent of female job in upgrading the nature of food devoured in families assuming they were given greater power and assets.

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Schedule

Sr. No. | | | |

Dear Sir/ Madam

I am Ph.D. research Scholar of Mittal School of Business, Lovely Professional University. I am conducting research on A Study on Effectiveness Of Household Food Security In Punjab. I assure you that the information provided to me will be strictly confidential and used for research purposes. Your name or other information that could identify you will not appear in the study record or report. Your participation is voluntary, but it will be very invaluable to us. I will greatly benefit if you kindly participate and answer my questions to the very best of your knowledge. You can withdraw yourself anytime during the interview in case you feel uncomfortable. The completion of this schedule is significant for the study's overall design. I shall be highly thankful for the precious time you will spend with me for the survey. Your suggestions will be highly valued.

Sugandh Arora
Research Scholar (11720087)
Lovely Professional University, Punjab

Supervised By:
Dr. Tawheed Nabi (Assistant Professor)
Lovely Professional University, Punjab

- Sampled Questionnaire filled by the respondent

Section 1: Information Related to Household Members

Basic Household Information
Name of Respondent: Satwinder Kaur Division: East Ludhaian District: Ludhaina Region/Tehsil/Sub-Division: East Ludhiana The locality of household: Friends Colony Mobile No.: xxxxxxxxxx Date of Visit: **20 Jan, 2021**

1.1: Demographic and Socioeconomic Profile of the households

Gender Male ☐ Female ■
Age (in years) Less than 20 ☐ 20-30 ☐ 30-40 ■ 40-50 ☐ 50-60 ☐ 60 and above ☐
Marital status Single ☐ Married ■ Divorced ☐ Widow ☐
Economic status: APL ■ BPL ☐ AAY ☐
Social group: SC ☐ ST ☐ OBC ■ GEN ☐ Others (specify)…… ☐
Education: No formal education ☐ Primary ☐ Secondary ☐ Graduation ☐ Post-Graduation ■ Others (specify) …….
Occupation: Salaried ☐ Business ■ Labor Agriculture Retired Homemaker Others (specify) ----------
Family type: Nuclear ■ Joint ☐ ☐
Household size Up to 3 members ☐ 4 to 6 members ■ 6 and above members ☐
Monthly household income (in Rupee) Less than 5000 5,000-15,000 15,000-25000 25,000 and above
Average monthly expenditure (in Rupee) on following items: Food Items: --2500----- Clothing: ----500-------- Rent:_xxxx __ Health:1000_ Travelling:_200_ Education: -------1000---------- Recreation: -----700---------- Utilities (electricity, water, cable, recharge): ----800---------- Savings:_____1000_____ Miscellaneous: -----1500----------
Number of family members presently earning-------01----------
Number of dependents in family----------02----------
Status of house:

Owned ■ Rent ☐ Lease ☐

Type of house?
Kachha ☐ Pucca ☐ Semi Pucca ■

How many rooms are there, including kitchen?
One ☐ Two ☐ Three ■ Others (specify)----------

What is the primary source of cooking?
Stove ☐ Chula ☐ Gas Chula ■ Induction Stove ☐ Others (specify)----------

Which type of cooking fuel is primarily used? (Multiple responses)
Electricity ☐ LPG ■ Biogas ☐ Kerosene ☐ Coal ☐ Wood ☐ Dung Cake ☐ Others (specify)----------

Source of drinking water (Multiple responses)
Piped Water ☐ Tube well/ Borehole ☐ Protected Well ☐ Public Tap ■ Water Tanker ☐ Canal Water ☐ Others (specify)-------

Do you get plenty of potable water?
Yes ☐ No ■

If no, in which months do you face the scarcity?.....June and July.....

Do you treat the water to make it safer to drink?
Yes ■ No ☐

Sanitation facility (Multiple responses)
Flush Toilet ■ Pit Latrine ☐ Ventilated Improved Pit Latrine ☐ Open Field ☐ Community Toilets ☐

Assets owned by the household for house and farm

Sr. No.	Assets	Yes/ No	Number	Value
1.	House	Yes	01	xx
2.	Car	No	00	xx
3.	Motor Cycle	Yes	01	xx
4.	Bicycle	No	00	xx
5.	Television	Yes	01	xx
6.	Oven	No	00	xx
7.	Refrigerator	Yes	01	xx
8.	Air conditioner	No	00	xx
9.	Sewing Machine	Yes	01	xx
10.	Furniture (Bed, Sofa, Table, etc.)	Yes	03	xx
11.	Computer or laptop	No	00	xx
12.	Tractor	No	00	xx
13.	Other farm equipments	No	00	xx

Do you have any agricultural land?
Yes ☐ No ■

Total land size (in Hectares):
Allocated to food crops --------xx----------
Allocated to cash crops----------xx----------

Land holding (in hectares)
Less than 2 ☐ 2-5 ☐ More than 5 hectares ☐

Do you quickly access the market for agricultural products?
Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree ☐

What is the most significant irrigation mode? (Multiple responses)
Deep tube well ☐ Shallow tube well ☐ Govt Cannel ☐ Tank ☐ Pond ☐ Private Canal ☐ Others (specify) ……

Does this household own any Livestock?
Yes ☐ No ■

How many animals do you have currently?

Name	Number
Cow	xx
Buffalo	xx
Goat and Sheep	xx
Horse	xx
Poultry	xx
Others (specify)	xx

What is the most important occupation of the household?
Agriculture Farming ☐ Agriculture Labor ☐ Business ■ Hawker ☐ Others (specify)……..

Section 2: Frequency of Food Consumption

2.1 Food Consumption Practices

1. How many meals do you have in a day?
   Once ☐ Twice ☐ Thrice ■ More than thrice ☐
2. Who decides food purchasing and consumption?
   Household Head ☐ Wife ■ Children ☐ Others (specify)----------
3. Is the household's food consumption different in the past 12 months compared to the prior year?
   Yes ■ No ☐

4. If yes, what modifications were made? The list is as follows:

Type of changes	Increased	Decreased
Meals per day	✓	×
Consumption of staple food	×	✓
Consumption of legumes and vegetables	✓	×
Consumption of animal and milk products	✓	×
Others (specify)…(Consumption of Beverages)	✓	×

2.2. Household Dietary Diversity Food Group

1. How often do you eat one or more foods from the following groups and monthly per-capita expenditure on food groups? (Mark the responses.)

Sr. No	Food Groups		Daily	Weekly	Monthly	Occasionally	Never	Quantity Purchased	Agriculture Produced at Home	Monthly Expenditure
1.	Cereals	Rice	✓	×	×	×	×	5kg	×	350
		Wheat	✓	×	×	×	×	10kg	×	250
		Ragi	×	×	×	×	✓	00	×	00
		Jowar	×	×	×	✓	✓	1kg	×	20
		Oats	×	×	✓	×	×	½ kg	×	30
2.	Pulses and their products		✓	×	×	×	×	8kg	×	450
3.	Vegetables and Legumes		✓	×	×	×	×	12kg	×	400
4.	Fruits		×	×	✓	×	×	5kg	×	200
5.	Edible oil, Butter, or fat		✓	×	×	×	×	5ltr	×	230
6.	Milk and Milk products		✓	×	×	×	×	30kg	×	1200
7.	Egg, Fish, Meat			×	×	×	✓	00	×	00
8.	Sugar, salt, spices		✓	×	×	×	×	8kg	×	100
9.	Beverages, Refreshments, and other Processed food		×	✓	×	×	×	3 bottles	×	250
10.	Other Food items which you consume commonly		×	×	×	✓	×	2kg	×	80

Section 3: Aspects Related to the Household Food Security

3.1 Household Availability, Accessibility and Affordability

1. Are food items easily available from the nearby market?
   Yes ■ No ☐
2. Is there any transport facility available for the purchase of different food items?
   Yes ■ No ☐
3. How frequently do you access the market for this household?
   Regularly ☐ Alternative days ☐ Weekly ■ Monthly ☐ Others (specify)……
4. Do you afford all three meals of a day?
   Yes ☐ No ■
5. The following statements relate to the household food security in the past seven days:

Sr. No..	Statements	Never	Rarely	Sometimes	Very Often	Always
1	Did you worry about the food shortage?	×	×	✓	×	×
2	Unable to consume the preferred food due to absence of resources.	×	✓	×	×	×
3	Consuming a limited variety of food items.	×	×	×	✓	×
4	Have you ever skipped a meal in a day?	×	✓	×	×	×
5	Slept without consuming food.	✓	×	×	×	×
6	Any household member spent an entire day without consuming food due to food shortage.	✓	×	×	×	×

3.2 Household Shocks, Stress and their Consequences

1. Please describe the impact of the following shocks that occurred in the last 12 months.

Sr. No.	Stress	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1.	Drought	×	✓	×	×	×
2.	Flood	×	✓	×	×	×
3.	Famine	×	✓	×	×	×
4.	Hail	×	×	×	✓	×
5.	Frost	×	×	✓	×	×
6.	Epidemic	×	×	×	×	✓
7.	Food Price Inflation	×	×	×	×	✓
8.	Agricultural Diseases	✓	×	×	×	×
9.	Livestock diseases	✓	×	×	×	×
10.	Others (specify) Death of family member	×	×	×	×	✓

2. Have you or a member of your household used the safety net in the recent year?
   Yes ☐ No ☐

3. Have you used any food aid other than safety net Programmes in the last 12 months?
Yes ☐ No ■
(a). If yes, how many household members were aided by the safety net programmes…..xx.....
(b). From which programme have you or any household member was benefitted?

Safety Net Programmes	Participating Households	Number of Benefitted Months	Monthly Benefits Received	
			In cash	In another form
Food for work	×	×	×	
Direct assistance	×	×	×	

3.3. Reasons for Food Shortages

1. Is there any food shortage in the household in the last 12 months?
Yes ☐ No ■
2. What were the primary causes of the food shortage?

Sr. No.	Main reasons		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	Decline in farm production because of	a) Climate change	×	×	×	✓	×
		b) Pest and diseases	×	✓	×	×	×
		c) Labor constraints	×	×	×	✓	×
		d) Time restrictions	×	×	×	×	✓
		e) Soil degradation	×	✓	×	×	×
		f) Inadequate quality of agricultural inputs used	✓	×	×	×	×
2	Lack of funds		×	×	×	✓	×
3	Dwindling in government food supplies		×	✓	×	×	×
4	Low remittances from friends and family		×	×	×	×	✓
5	Increase in food prices		×	×	×	×	✓
6	Job loss		×	×	✓	×	×
7	Increased household expenditures due to morbidity/mortality		×	×	×	×	✓

Section4: Household Participation in Food Distribution System

4.1 Household Participation in Food Assistance

1. Are you a ration cardholder?
Yes ■ No ☐ If yes…..... Then fill Q2.
If no, what are the main reasons for not having a ration card?
Not required ☐ Lost ☐ Bureaucratic difficulties ☐ Moved but not transferred ☐ Asking money ☐ Other (specify)-.
2. Which category of ration card do you have?
APL ☐ BPL ☐ Antyodaya Anna Yojana (AAY) ☐ Others (specify)……Adhar based Ration Card……
3. From how many years do you have the ration card? (Year of issue) ……01 year…...
4. Number of household members listed -------03----------
5. Do you use your ration card?
Yes ■ No ☐
If yes, how many times you accessed the Public Distribution System in past 12 months? ----------Bi-annual--------
6. How frequently you use a ration card to purchase various essential commodities?
Regularly ☐ Occasionally ■ Never ☐
7. Distance of your residence from the nearest fair price shops?
Less than 1km ☐ Between 1-2 km ■ More than 2kms ☐
8. Whether food commodities are available on time at fair price shops?
Yes ☐ No ■
If no, what are the main reasons for the non-availability (Multiple responses)
i) Irregular supplies from the government ☐
ii) Transportation problem ☐
iii) Storage constraint ☐
iv) Carelessness of the dealers/depot managers ☐
v) Long queues ■
vi) Lack of government supervision and control ■
viii) Others (specify): ----------
9. Do you feel that more food options are available than what they are now providing?
Yes ■ No ☐
10. How many food items do you usually get from the public distribution outlet in a month and how much you actually pay for this?

Food Items	Quantity(kg)	Price (Rs/per Kg)	Total Value (Rs)

Wheat	60	2	120
Rice	×	×	×
Sugar	×	×	×
Pulses	×	×	×
Others (specify)	×	×	×
Total	60	2	120

If not sufficient in 10h fill, then 11th question

11. If no, how much food grain are you purchasing from the open market and at what price?

Food Items	**Quantity(kg)**	**Price (Rs/per Kg)**	**Total Value (Rs)**
Wheat	xx	xx	Xx
Rice	5kg	70	350/-
Sugar	3kg	120	360/-
Pulses	8kg	50	400/-
Others (specify)…..(oil and refined)	3kg	210	630/-
Total	19kg	450	1740

12. Please specify the level of satisfaction with the functioning of local Public Distribution System outlets?

S. No	**Statements**	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
1	Satisfied with the quality of grains provided	×	×	×	✓	×
2	Quantity supplied was adequate enough	×	✓	×	×	×
3	Proximity of Fair price shops	×	×	×	×	✓
4	All household members get food grain entitlement	×	✓	×	×	×
5	Commodities prices were rightly charged	×	×	×	×	✓
6	Working hours of the PDS outlets	×	×	×	✓	×
7	Availability of products on the time	×	×	✓	×	×
8	Behavior of the dealer is appropriate	×	×	×	×	✓
9	Accuracy in measuring process	×	×	✓	×	×
10	Limpidity in the PDS outlets	×	×	×	✓	×

13. Have you ever complained about irregularities of Public Distribution System outlets?

Yes ☐ No ■

14. Is the Targeted Public Distribution System serving the targeted people?

Yes ☐ No ■ Can't say ☐

If no, then what are the reasons? (Multiple Reasons)

S. No	**Reasons and Problems**	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
1	Inclusions of non-targeted people in below poverty line	×	×	✓	×	×
2	Bogus ration card	×	×	×	✓	×
3	Adulteration in the food grains	×	×	✓	×	×
4	Black marketing	×	×	×	✓	×
5	Exclusion of targeted people	×	×	×	✓	×
6	Political interventions	×	×	×	×	✓
7	Others (specify)…(Hoarding)……	×	×	×	✓	✓

4.2. Direct Bank Transfer

1. Does senior-most female in your family have a bank or post office account linked with an Aadhar card?
   Yes ■ No ☐
2. Where do you have an account?
   Nationalized Bank ■ Cooperative Bank ☐ Post Office ☐ Others (specify)…….
3. Are you getting any amount under the Direct Bank Transfer Scheme?
   Yes ☐ No ■
   a. If no, why are you not getting this amount? -----xxxx-------
   b. If yes, whether this amount is enough to meet your household food requirements?
   Yes ☐ No ☐
4. Did you receive this amount in one installment per month?
   Yes ☐ No ☐
6. Are you spending this entire amount on food grain?
   Yes ☐ No ☐
   If no, on which other items do you spend the amount?
   Medicines ☐ Children's fee ☐ Others ☐

4.3. Comparative Analysis of Public Distribution System and Direct Bank Transfer

15. Which of these systems is better?

Public Distribution System ■ Direct Bank Transfer □

Then give your order of preference (with reasons)

1.	**Fulfill the Basic Requirements**
2.	**Easy accessible**
3.	**Reasonable**

Section 5: Health Status Among Household Members

1. Anthropometry (Measure the height and weight of the household members)

Name	Gender	Age (in years)	Weight (in Kg)	Height (in the foot)
Satwinder Kaur	**Female**	**38**	**59**	**5'2**
Sukhprakash	**Male**	**40**	**83**	**5'6**
Balraj	**Male**	**15**	**60**	**5'0**

2. Does anybody in your house suffer from common illness such as fever, coughing and diarrhea in the last 30 days?

Yes ■ No □

If yes, can you please specify

Name	Fever		Cough		Diarrhea		Did he/she receive any treatment?		How many days was he/she suffered from the disease?	How long he/she was unable to follow the routine activities
	Yes	No	Yes	No	Yes	No	Yes	No		
Satwinder Kaur	**yes**	**xx**	**yes**	**xx**	**xx**	**xx**	**yes**	**xx**	**10days**	**7 days**
xx	**xx**	**xx**	**xx**	**xx**	**xx**	**xx**	**xx**	**xx**	**xx**	**xx**

3. Has anybody suffered from the epidemic disease in the family during the last 12 months?

Fully □ Partially ■ Rarely □

4. Has physician ever diagnosed any household member with significant morbidity (such as cataracts, tuberculosis, hypertension, heart disease, high blood pressure, or diabetes) in the last 12 months?

Yes □ No ■

If yes, can you please specify the details

Name	Cataract	Tuberculosis	Blood Pressure	Heart Disease	Diabetes	Leprosy	Asthma	Polio	Paralysis	Mental illness	AIDS	Other (Specify) Long-term illness	Did he/she receive any treatment	How many days was he/she unable to do everyday activities due to illness
	(Cured and Not Cured)													
xx	**xx**	**xx**	**xx**	**xx**	**xx**	**xx**	**xx**	**xx**	**xx**	**xx**	**xx**	**xx**	**xx**	**xx**
xx	**xx**	**xx**	**xx**	**xx**	**xx**	**xx**	**xx**	**xx**	**xx**	**xx**	**xx**	**xx**	**xx**	**xx**
xx	**xx**	**xx**	**xx**	**xx**	**xx**	**xx**	**xx**	**xx**	**xx**	**xx**	**xx**	**xx**	**xx**	**xx**
xx	**xx**	**xx**	**xx**	**xx**	**xx**	**xx**	**xx**	**xx**	**xx**	**xx**	**xx**	**xx**	**xx**	**xx**

6. Food Assistance Programmes

6.1 Regarding Mid-day Meal Schemes

1. Does any child currently go to school?
   Yes ■ No □
2. Are they provided with a mid-day meal at school?
   Yes □ No ■
3. How frequently do they receive a meal?
   Regular □ Irregular □
4. Children get a sufficient quantity of food under this scheme?
   Yes □ No □
5. How do you rate the food quality given in the Mid-day meal?
   Very Good □ Good □ Poor □ Very Poor □ Neutral □
6. Do you think that the mid-day meal scheme has any importance?
   Yes ■ No □

6.2 Regarding Integrated Child Development Scheme Center

1. Do you know about ICDS center (Anganwadi) services?
   Yes ■ No □ **(If No, skip to 6.3)**
2. During the last 12 months, are you accessing the ICDS center?
   Yes □ No ■ **(If No, skip to 4)**
3. What kind of services did you received during the last 12 months from ICDS Centre?

Sr. No.	Statements	Yes	No
1.	Supplementary food for children below six years of age	**xx**	**xx**
2.	Supplements for pregnant women	**xx**	**xx**
3.	Supplementary nutrition for adolescent girls (11-18 years)	**xx**	**xx**

4. Why didn't you access ICDS?
   No ICDS center provision in the area □ Services are inferior □ Center does not work □

6.3 Regarding MGNREGA Scheme

Sr. No	Statements	Yes	No
1.	Are you aware of MGNREGA?	Yes	
2.	Has any member of your house engaged in this scheme?		No
If yes, then fill in the below particulars			
3.	a. H. ID and Name	xx	
	b. Having a job card?	Yes ☐	No ■
	c. Worked under this scheme (days)		
	d. Days you want job		
	e. Work location	In the locality ☐ Outside ☐ Anywhere	
	f. Daily wages (in Rs.)		
4.	If no, why did you not participate in this scheme?	Applied but rejected ☐ Fewer Wages ☐ Others (specify) ☐	

6.4 Regarding Other Programmes

Has any household member ever benefitted from the following programmes or schemes in the last 12 months?			
Sr. No.	**Programmes/Schemes**	**H.H Member ID and Name**	**Total Benefits (in Rs.)**
1.	National Old Pension scheme	×	×
2.	Widow's Pension scheme	×	×
3.	Maternity Benefits	×	×
4.	National Disability scheme	×	×
5.	Rural householding programmes	×	×
6.	Assistance from NGOs	×	×
7.	Single girl child cash transfer	×	×
8.	Asha	×	×
9.	Self Help Groups	×	×
10.	Other (Specify)	×	×

Section7: Coping Mechanism to Deal Food Shortage and Income Shocks

7.1 Consumption Coping Strategies

Is anyone in your household have to engage in any following behaviors due to lack of food or money to buy food? How would you cope with that situation in the last 12 months					
Statements	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
a. Buying less expensive food	×	×	×	**a.**	×
b. Purchasing food on credit	×	×	×	×	**b.**
c. Gather wild food, engage in hunting or harvest immature crops	**c.**	×	×	×	×
d. Send some members of the household to eat with relatives or with other households	**d.**	×	×	×	×
e. Limit portion size for any household member at meal times	×	×	**e.**	×	×
f. Restricting adults' consumption to secure food for small children	×	**f.**	×	×	×
g. Reduced the number of daily meals	×	**g.**	×	×	×
h. Skip whole day without eating	**h.**	×	×	×	×

7.2 Income Shocks Coping Strategies

Is anyone in your household have to engage in any following behaviors during the income shocks? How would you cope with that situation in the last 12 months					
Statements	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
a. Borrowing money from the relatives	×	×	×	×	**i.**
b. Borrowing from friends	×	×	×	×	**j.**
c. Seeking help from the neighbors	×	×	**k.**	×	×
d. Taking loan from moneylenders or from banks	×	×	×	×	**l.**
e. Mortgaging the productive assets	×	×	×	**m.**	×
f. Selling the productive assets	×	**n.**	×	×	×
g. Mobilizing the available cash in hand	×	×	×	**o.**	×
h. Received assistance from self-help groups and NGOs	×	**p.**	×	×	×
i. Member(s) of the household work additional hours	×	×	×	×	**q.**
j. Child or the aged person have gone for the work because household have no sufficient money	**r.**	×	×	×	×
k. Sell your Livestock	**s.**	×	×	×	×
l. Using past savings	×	×	×	**t.**	×

Thank you for your valuable time

Validation of the questionnaire was done from the following academicians:

ACADEMICIANS

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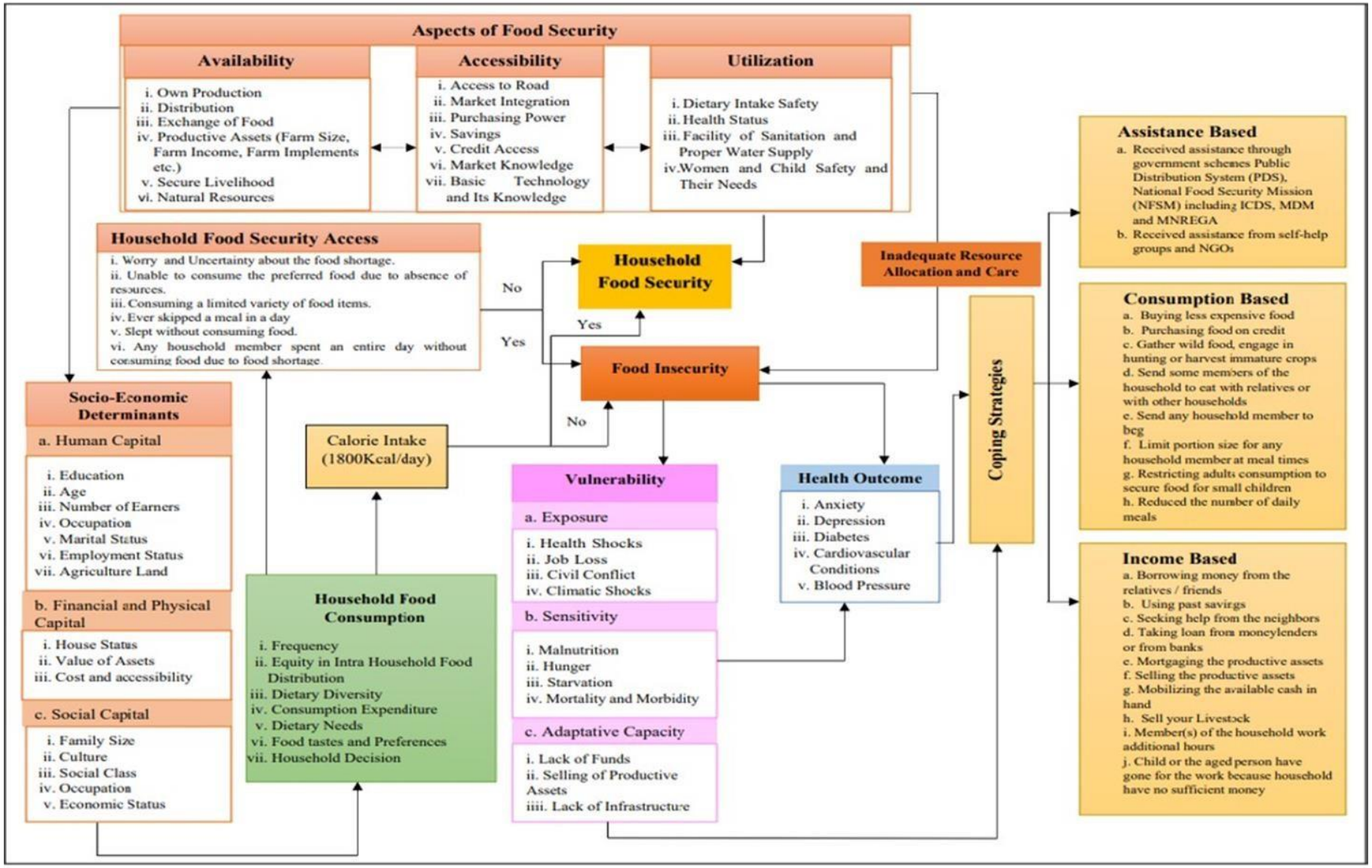
Title: A Conceptual Framework on Household Food SecurityAuthors: Dr. Tawheed Nabi and Sugandh Arora

Food security is a contentious, changing, multidimensional concept that includes existing and emerging dimensions such as availability, physical access, affordability, consumption, and utilization. Additionally, it contains agroecosystem sustainability and resilience elements, which have gained increased recent acceptance on policy agendas (FAO, 2012b). Food security is considered the fundamental necessity that any household has besides other allocations like budget and resources. Feeding the world sustainably is one of our society's grand challenges. Almost all nations strive to maintain food reserves with better and more effective procurement policies. The present framework focuses on the micro concept. The present framework on household food security explored the integrated transdisciplinary pathway among the various aspects of food security *viz.*, availability of food in terms of its physical presence in a given country or region; access to food as reflected by the ability to obtain food from own-production or through purchases and borrowing; utilization orthe ability to derive full biological benefits from food, based on food safety and personal health. The socioeconomic determinants which ultimate effect on household food consumption and how these determinants and aspects coupled with food preparation practices and choice preference ultimately influence the food which is bought and consumed. Additionally, explained the impact vulnerability status and tentative coping strategies that households employ in response to insufficient food access, income challenges and food insecurity. Thus, researchers and policymakers may analyze the effectiveness of food security at the household level using both descriptive and inferential statistics. Nonetheless, it is intended that this detailed framework at the household level would encourage discussion within disciplines and provide a method of communicating to policymakers, academicians and other stakeholders the relative contribution or impact of a given research endeavor on food security.

Figure 1.2: Conceptual Framework Base on Household Food Security



Source: *Author's work based on literature review*

Title: Functional Grid of National Food Security Mission through Activity Mapping Author: Dr. Tawheed Nabi, Dr. Vijay Srivastava, Sugandh Arora

The purpose of the present activity mapping for the National Food Security Mission (NFSM) is to establish an enabling system for cutting-edge implementation of the Centrally Sponsored Scheme (CSS), resulting in increased outcomes in terms of nature and scope. As such, it would serve as a guidefor implementation by the District Collector and other important District-level officials, facilitating rapid learning about the Scheme, its implementation modalities, and the duties and responsibilities of various functionaries. This activity mapping was prepared using a variety of sources, including a review ofexisting scheme guidelines, circulars, and amendments issued by the Department of Agriculture, Cooperation, and Farmers Welfare (DAC & FW), Government of India (GoI), and discussions with key personnel, including IAS, IES officers, and Food Inspectors of the Department of Food and Supplies and Consumer Affairs. The present activity mapping for NFSM implementation used an analytical approach explained in three steps, reasoning from first principles of public finance and accountability, and existing empirical data to provide a path forward for addressing the responsibilities for food security which is represented in **Table no. 4.** statistics. Nonetheless, it is intended that this detailed activity mapping would encourage discussion within disciplines and provide a method of communicating to policymakers, academicians and other stakeholders the relative contribution or impact of a given research endeavour the National Food Security policy framing thoroughly.

Step-1 Unbundling: Classifying the elements into subcategories

The first step is to catalogue the components necessary for the provision referred to as Unbundling. Table 1 shows the unbundling of elements.

Table 1: Functional Matrix for the allocation of the Activities

Broad Categories	Level of Governance				
	Central	State	Districts	Panchayat	Gram Panchayat
Setting Standards					
Planning					
Asset Creation					
Operation and Management					
Monitoring and Evaluation					

Step-2: Applying Public Finance Criteria

How would one decide how to divide duties for the array of unbundled operations associated with the National Food Security Mission across multiple levels of government? Who shall be accountable for carrying out the activities? What are the factors used to make this determination?The four classic public finance criteria for determining the size of the jurisdiction accountable for a function are represented in table2:

Table 2: Functional Allocation based on Principle of Public Finance

Principle of Public Finance	Level of Governance	
	Higher	Lower
Economies of Scale (tend to push the services)	✓	×
Externalities (extent of external effect)	✓	×
Equity (equalization)	✓	×
Heterogeneity (state of being diverse)	×	✓ (More heterogeneity leads to lower governance)

Step-3: Applying Accountability Criteria

What are the fundamental analytical criteria for determining the nature of particular operations or duties to establish their appropriategovernmental level? Three features of activity or role within an activity impact the proper level of accountability presented in table3:

Table 3: Functional Allocation based on Principle of Accountability Criteria

Principle of Accountability	Level of Governance	
	Higher	Lower
Discretionary (require decisions to be made usingindividual judgment in the local contex**t)**	×	✓
Transactions (requires several repeated transactionsat the lower level)	×	✓
Technical (Where can performance be better inferred – locally or technically**)**	✓	×

Table 4: Functional Allocation in National Food Security Mission based on Principles of Public Finance and Accountability

Activities	Unbundled Category	Principles of Public Finance				Principles of Accountability			Level of Governance				
		Economies of Scale	Externalities	Equity	Heterogeneity	Discretionary	Transactional Intensive	Technical	Centre	State	District	Panchayat	Gram Panchayat
Identification of potential beneficiaries	Setting Standard	Low	low	High	High	High	High	Low				✓	✓
Information empowerment	Operations and Management	High	High	High	Na	Na	High	Na		✓	✓	✓	✓
Eliminating non-protein calorie and nutrition energy deprivation	Setting Standard	High	Low	High	High	High	Na	Na		✓			
Safe drinking water and environmental hygiene	Operations and Management	High	High	High	Low	High	High	Na	✓	✓	✓	✓	✓
Road, pipe water, and electricity accessibility	Operation and Management	High	High	High	Low	Na	High	Na	✓	✓	✓	✓	✓
Focus on saving and procuring Ground Water	Setting Standard	High	High	Na	Low	Na	High	Na	✓	✓	✓	✓	✓
Design and technology development workshop	Operations and Management	Na	Low	Low	High	Na	High	High		✓	✓		
Enhancing purchasing power through sustainable livelihood	Operations and Management	High	High	High	Low	High	High	Na	✓	✓	✓	✓	✓
Special attention to Women and Children regarding health and nutrition	Setting standards	High	High	High	High	Na	High	Na	✓	✓	✓	✓	✓
Linking calamity management	Setting Standard	High	High	High	Low	Na	High	Na	✓	✓	✓	✓	✓
Greater market access to farm product	Operation and Management	High	High	Low	Na	Na	High	Na		✓	✓	✓	✓
Creation of sustained employment by strengthening the rural employment	Operation and Management	High	Na	High	High	Na	High	Na		✓	✓	✓	✓
Logistic support to facilitate Operation of Programme	Operation and Management	High	High	Low	Na	Na	High	High		✓	✓		
Simplified logistical Grains movement of grains from markets to beneficiaries/ Allotment to district and transport arrangements	Operation and Management	High	Low	Low	Na	High	High	Na		✓	✓	✓	

Site selection and Location of FPSs	Operation and Management	Na	High	Low	Na	High	Na	Na			✓	✓	✓
Production of Seedlings through decentralized nurseries preferably trying with SDGs	Planning	High	Low	Low	Na	Na	High	Na				✓	✓
Automation of FPSs	Asset Creation	High	High	Low	Na	Na	Na	High	✓	✓	✓		
Encourage state Transparency Portal	Operation and Management	High	High	High	Low	Na	Na	High	✓	✓	✓		
Elimination of bogus cards and errors	Monitoring and Evaluation	Low	High	High	High	Na	Na	High			✓	✓	✓
Minimize the leakage of food grains	Monitoring and Evaluation	Low	Na	High	Low	Na	Na	High	✓	✓			
Improve the availability of food grains at FPSs	Operation and Management	Low	Low	High	High	Na	Na	High	✓	✓			
Installation of EPOS and IRIS Scanner and Electronic Weighing Machine	Operation and Management	High	High	Medium	Na	Na	Na	High	✓	✓			
Distribution of Wheat through Aadhar Based/ Biometric	Asset Creation	High	High	Low	High	Na	Na	High	✓	✓			
District Grievance Redressal	Monitoring and Evaluation	High	Medium	Medium	High	Na	Na	High	✓	✓	✓		
Enforcement, Inspection and Vigilance	Operation and Management	High	Medium	High	Low	Na	Na	High		✓	✓	✓	
Doorstep Delivery Mechanism	Operation and Management	High	Low	Medium	High	Na	Na	High		✓	✓	✓	✓
Aadhar Seeding status	Monitoring and Evaluation	High	Low	High	High	Na	Na	High	✓	✓	✓		
Maintain a record of the sale money retained	Monitoring and Evaluation	Na	High	Na	High	Na	Na	High	✓	✓	✓	✓	
Supervise and Support Services of PDS projects	Operation and Management	High	Medium	High	High	Na	Na	High	✓	✓	✓	✓	✓
Monitor functioning of Schemes in the District	Monitoring and Evaluation	High	High	Low	Na	Na	Na	High		✓	✓		
Checks and cross-checks by concerned officials with the program in procurement and distribution of nutrition material and other medicals	Monitoring and Evaluation	High	High	Na	Na	Na	Na	High	✓	✓			

Manage demand-driven funds for the infrastructure at the panchayat level	Operation and Management	High	High	Medium	Na	Na	Na	High		✓	✓	✓	
Proper accountability of leased in and Leased farmers	Monitoring and Evaluation	High	High	Na	Na	Na	Na	High				✓	✓
Promoting Public and Private Partnership in procurements	Asset Creation	High	High	Na	Na	Na	High	Na	✓	✓			
Develop data collection formats for the impact monitoring input-output and process-based monitoring on respective indicators	Monitoring and Evaluation	High	Na	High	Na	High	Na	High	✓	✓		✓	✓
Appropriate MSP	Planning	High	Medium	Na	Na	Na	High	Na	✓	✓			
Bonus by a state to farmers	Monitoring and Evaluation	Na	High	High	Medium	Na		Na		✓			
Food grain meeting quality parameters procured	Operation and Management	High	Na	High	Low	High	Na	High	✓	✓			
Information and communication technology	Operation and Management	Na	Na	Na	Na	High	Na	High	✓	✓			
Real-time information on the status of the movement of food stock by the central pool	Operation and Management	High	High	Na	Na	High	Na	High	✓	✓			
Licensing of FPSs and management of shops by Women or their acquittance	Operation and Management	Na	High	High	Low	High	High	Na		✓		✓	
Grain Banks	Assets	High	Medium	High	Na	Na	High	Na	✓	✓		✓	✓
Introducing and Awareness of Schemes a) DBT b) Food Coupons c) Stamps	Setting Standard	High	High	High	Na	High	Na	Na	✓	✓		✓	✓
Participation of Women (Eldest women will be head)	Setting standards	Na	High	High	Na	Na	Na	Na	✓	✓			
Human Life Cycle Approach	Setting Standards	High	High	Low	Medium	High	High			✓			
Adequate Quantity and Quality of food	Operation and Management	High	High	Na	High	Na	Na	Na		✓			
Procurement price, issue price to state, and subsidies	Operation and Management	High	High	High	Na	High	High	Na	✓	✓			

Lifting stocks and Warehousing a) Contingency Storage Depot	Operation and Management	High	Medium	Low	Na	High	High	Na	✓	✓	✓		
Anganwadi Child Care Development a) Setup b) Workers are responsible for selecting participants c) Organization nutrition and health education classes d) Medical officer e) Maintaining records of immunization f) Health status and attendance g) Supervise project staff of women and child welfare department including Anganwadi workers h) Involve women GP members in supervising the functioning of Anganwadi centers	Operation and Management	Medium	High	High	Na	Na	High	Na	✓	✓	✓	✓	✓
Mid-day meal a) Inductive menu's b) Involving members status c) Supplementary school feeding d) Supplementary Nutrition Packets i) Children up to 6-14	Operation and Management	High	High	Na	Na	Na	High	Na	✓	✓			✓
ICDS (Integrated Child Development Plan) a) Nutritional meal b) Free Charge to lactating mother c) Maternity Benefits	Operation and Management	High	High	Na	Na	Na	High	Na	✓	✓			✓
Integrated Rural Development Programme	Operation and Management	High	High	Na	Na	Na	High	Na	✓		✓		✓
Jawahar Gram Samridhi Yojana	Operation and Management	High	High	Na	Na	High	Na	Na	✓	✓		✓	✓

Training of Rural Youth for self-development employment	Planning	High	High	Na	Na	Na	High	Na		✓	✓		
Availability of health care centers	Asset Creation	High	High	High	Na	High	High	Na		✓	✓	✓	✓
Soil Sustainability	Setting standards	High	High	Na	Na	Na	High	Na		✓		✓	✓
Delivery of acceptance notes and Weighing Check- memos	Operation and Management	Medium	Medium	Low	Na	High	High	Na	✓	✓	✓	✓	✓
Crop year on commodity Bags	Setting Standard	High	Medium	Na	Na	Na	High	Na	✓	✓			
Rental for warehousing	Operation and Management	Low	High	Na	High	Na	High	Na		✓			
Market evaluation studies	Operation and Management	Na	Na	Na	Na	High	High	Na			✓		
Techno-economic feasibility studies	Monitoring and evaluation	Na	Na	Na	High	Na	High	High	✓	✓			
Areas requiring particular study for the uplift of the weaker sections viz SC&ST	Monitoring and Evaluation	Na	Na	Na	High	High	High	Na		✓	✓		
Financial assistance for preparation of legal, paralegal standards, audits, and other documents leading to labeling/certification	Operations and Management	High	High	Na	High	High	High	Na	✓	✓	✓		
Financial assistance to organizations for evolving and developing a mechanism	Operations and Management	High	High	Na	High	High	High	Na	✓	✓	✓		
Conducting workshops seminars on the issue of specific nature related to food security	Operation and Management	Na	Na	High	Na	High	Na	Na		✓	✓	✓	✓

List of Publications

I. Published Paper

1. Determinants Affecting Household Food Security in India: A Critical Review. *Int. J. of Economic Policy in Emerging Economies* (Inderscience - Scopus) *15*(2-4), 317-330.
2. Challenges of Digital Transformation and Indian Public Distribution System: A Systematic Review. *Journal of Hunan University (Natural Sciences)*, *Vol.* 48 No.6, 57-84.

II. Under Review

1. Prevalence of Household Food Security and Health-Related Quality of Life: Special Consideration on the Expectant Mothers in Punjab. *The Indian Economic Journal* (Sage, B-Category) (Forthcoming Issue with manuscript ID: IEJ-2022-0117.RV1)