

Household-level Food Insecurity in Hunza Valley, Pakistan: An Experience-based and Psychosocial Assessment

**Bushra Pervaiz^{1*}, Mahboob Sultana², Muhammad Qasim Manzoor³
and Muhammad Yaseen⁴**

Abstract

Food security is an important phenomenon especially when its measurement goes beyond mere availability of food to its affordability and assimilation. The instant study employed a direct measurement of food insecurity at the household level in Hunza Valley, Gilgit Baltistan (GB), Pakistan. The Household Food Insecurity Access Scale (HFIAS) which is an experience-based tool to measure food insecurity at household level was used with certain adaptations and additional modules of socio-economic parameters. Primary data was collected on a structured questionnaire from 340 respondents during October to November, 2023. The representative sample was drawn by employing stratified random sampling technique to capture the difference in psychosocial assessment of food insecurity among population living in three distinctly separated locations of Hunza Valley i.e. Central Hunza, Lower Hunza and Upper Hunza. HFIAS was found to be a valid and consistent instrument for assessing the frequency and reliability of food accessibility in Hunza. It was observed that roughly four out of five households showed anxiety and uncertainty about food insecurity, and they were equally concerned about quality and quantity of food they consumed. Overall, 41.6% of households were food secure, 5.5% of households were mildly food insecure whereas 40.9% and 12.0% of households were found to be moderately food insecure and severely food insecure respectively. With respect to diversity of food insecurity, the Central Hunza was found to have better situation as compared with Lower Hunza and Upper Hunza.

Keywords: Household Food Insecurity; Food Insecurity Access; HFIAS; Hunza Valley; Gilgit Baltistan; Pakistan

¹Bushra Pervaiz, PhD, Assistant Professor/HOD, Department of Economics, Lahore Leads University, Pakistan. (**Corresponding Author** - E-mail: bushra19@live.com)

²Mahboob Sultana, MPhil (Economics) Scholar, Department of Economics, Lahore Leads University, Pakistan

³Muhammad Qasim Manzoor, PhD, Assistant Chief, Planning & Development Board, Government of Punjab, Lahore, Pakistan

⁴Muhammad Yaseen, PhD, Assistant Professor, Department of Agricultural Extension & Rural Studies, University of Sargodha, Sargodha, Pakistan

1. Introduction

The global population is expected to reach about 9.8 billion by 2050. This anticipated increase questions the world's ability to fulfill the food demand in future (Dorling, 2021). Food security is the ability of a household to obtain an acceptable amount of food on a regular basis using a combination of product, barter, borrowings, food assistance, or gifts. Food insecurity refers to a situation characterized by consistent lack of access to sufficient quantity of nutritionally adequate and safe food, or in other words food insecurity is an uncertain ability to obtain socially acceptable food in a reliable manner (Food & Agriculture Organization (FAO), 2008). The issue of food insecurity highlights that people are hungry not merely due to the lack of their ability to generate food in enough quantity rather because of the fact that they cannot afford to buy food in required quantity and quality (Pervaiz, Manzoor & Pervaiz, 2022; Zhou, et.al., 2019).

Despite being prominent cereal producers on the global level, both Pakistan and India face the stark reality that the region continues to endure hunger, and the South Asia is classified as one of the world's most food insecure regions. Pakistan is grappling with the dire consequences of food insecurity since its inception. Pakistan has taken significant steps in recent years to improve food security and is approaching self-sufficiency in terms of the food dietary energy accessible to its population (Asghar & Ahmad, 2015).

According to the Global Hunger Index 2022, Pakistan holds 99th position out of 126 countries. With a score of 26.1, Pakistan's hunger level is categorized as 'Serious'. Pakistan is the 5th most populous country in the world and it is a home to approximately 58% of people suffering from malnutrition, and around 20% of them face food insecurity. This places Pakistan among the nations experiencing food insecurity at a critical level (Von Grebmer et al., 2022). The households often face challenges in meeting their nutritional needs due to limited access to markets with fewer food options and lower availability of various food items compared to urban areas (Bashir, Schilizzi & Pandit, 2013). Consumption of food items were below the recommended nutritional requirement in Punjab province of Pakistan (Pervaiz et.al., 2017).

It is important to acknowledge that the food security situation is not consistent throughout the country. Due to variations in topography, socioeconomic factors and physical conditions across different regions, some areas still face greater challenge in achieving food security. Particularly, mountainous regions often experience higher levels of poverty and may struggle with food insecurity (Khan, 2011). Almost 61% of Pakistan's land area is mountainous which accommodates roughly 40 million people (Pakistan Bureau of Statistics, 2013). The variations in economic performance between countries with mountains and without mountains can be attributed to differences in their population size, income levels, road infrastructure, governance factors and the varying effects of external price shocks. Pakistan's mountainous regions are extremely diverse, both in terms of agro-ecological capacity and access to services provided by institutions, resulting in varying food security challenges (Khan, 2011). The individuals residing in mountainous regions face a significant risk of experiencing food insecurity due to multiple factors. These factors include low agricultural productivity; reliance on subsistence economies; challenges posed by rough terrain

and adverse climates; inadequate infrastructure; limited market access; geographical isolation; susceptibility to natural vulnerabilities; and the great expense associated with food production and transportation (Rasul, 2010), (Huddleston et al., 2003) and (Tiwari & Joshi, 2012).

The Hunza is a valley in the mountainous territory of Gilgit Baltistan (GB) located in the northern side of Pakistan. Due to its mountainous terrain and limited means of communication with the country's main population, the Hunza could be regarded as the most vulnerable part of Pakistan with respect to food security. The inhabitants of the Hunza use glacier water for drinking and cultivation of selected crops on a limited area. Usually, natural disasters destroy the water channels and create scarcity of water in the locality. This also causes flash flood that hits the houses, agricultural land and Kara Korum Highway (KKH) and all this directly aggravates the situation of food insecurity. During 2022, Shishper glacier severely damaged the Hassan Abad Bridge which was the Hunza's only bridge connecting it with KKH. It also destroyed many houses and agricultural area near the flash flood area. This caused the blockage of KKH and created uncertainty about food security in the Hunza because the greater part of food items was brought from adjoining provinces i.e. the Punjab and the Khyber Pakhtunkhwa (KPK). Finally, the price of food items went up and it created a spell of hyperinflation in the Hunza.

This current study was planned to look into the unique geographical and natural characteristics of the Hunza. This main objective of the study was to analyze the food insecurity access and propose strategies for improvement in the food insecurity situation of the Hunza. This study could be regarded as the first of its kind which presented a framework dedicated to food accessibility in the Hunza and border areas of Pakistan. An experience-based assessment tool of Household Food Insecurity Access Scale (HFIAS) was mainly used for psychosocial assessment of food insecurity in the region (Coates, Swindale & Bilinsky (2007) . This scale had already been validated successfully and found reliable in the context of Pakistan (Pervaiz, Manzoor & Pervaiz, 2022).

2. Research Design and Data Collection:

This research was carried out in Pakistan's Hunza Valley which is situated at a distance of 581 km from Islamabad - the capital of Pakistan. The Hunza is a mountainous area which is surrounded by glaciers. The total population of District Hunza is nearly 70,000 and population growth rate is 1.18% per annum. The Hunza district is officially divided into three parts i.e. Central Hunza, Upper Hunza (Gojal) and Lower Hunza (Shinaki). The total sample size of 340 was proportionately divided into three parts according to population of respective part of the Hunza i.e. 221 (65%) Central Hunza, 68 (20%) Upper Hunza, and 51 (15%) Lower Hunza. These three localities were further divided into villages. In upper Hunza, some villages were far away, sparsely located and had poor connectivity. Therefore, the respondents were approached when they came to market at Central Hunza for grocery.

To evaluate food accessibility in District Hunza region, a comprehensive and structured questionnaire was developed. The part one of the questionnaire was adapted from HFIAS 9-items whereas the part two included questions related to demographic and socio-economic characteristics of the population. The data for the

instant study was collected in Fall season during October to November, 2023. Before conducting the survey, the pre-testing of the questionnaire was done for evaluating it in local context and possible improvement of phrases, definitions or questions.

The respondents were interviewed face to face, and their responses were carefully recorded regarding their concerns about uncertainty and insufficiency of food during last four weeks by recalling their memory. The demographic information was also collected. Some important terms were carefully explained to the respondents for better understanding e.g. "Households" means those people who live in one house and share their meal; "Lack of Resources" means that the households do not have sufficient resources to consume on their meal; and "three meals per day" were regarded as standard mealtimes in a day. Further, the people in the Hunza use tea with local bread especially in morning breakfast which was regarded as full meal.

The HFIAS 9-items questions were related to decrease in the quality and variety of food, decrease in the quantity of food consumed during meals, and ultimately, missing meals altogether and experiencing hunger throughout the day. If the respondent's answer was "Yes" then the gradation or severity of the situation was also recorded i.e. "Rarely (1-2 times)", "Sometimes (3-10 times)", and "Often (more than 10 times)". On the basis of HFIAS 9-items questions score, the households were divided into four groups i.e. "food secure", "mildly food insecure", "moderately food insecure" and "severely food insecure". The "food secure" households *never* experienced food insecurity during last four weeks and similarly, "mildly food insecure", "moderately food insecure" and "severely food insecure" households experienced food insecurity during last four weeks *1-2 times, 3-10 times or more than 10 times* respectively.

3. Results and Discussions

The data was analyzed by using IBM SPSS Statistics 26 software. The sample size included both male and female household heads. A total of 229 household heads (67.0%) were male whereas 111 (32.6%) were female. It was observed that a total of 324 households (95.3%) had their own houses. Meanwhile, a total of 100 household heads (29.4%) were Govt. employees, 87 (25.6%) were private employees and 153 (45.0%) were self-employed.

The analysis was accomplished in two stages: Firstly, HFIAS was analyzed for whole of Hunza district, secondly, the differences among three regions of the Hunza were also explored into by looking into such sub-regions of the Hunza independently.

4. Validation and Reliability of HFIAS

The internal consistency of the questionnaire was evaluated in order to establish the validity and reliability of a questionnaire meant for determining the prevalence of food insecurity in the Hunza, Pakistan. Cronbach's Alpha is a statistical measure that is used to examine the internal consistency or reliability of a test or questionnaire (Cronbach, 1951). It quantifies the extent to which the questions in a test are correlated with each other and measure the same underlying construct (Kline, 2014). Cronbach's Alpha was calculated using the whole scale of food insecurity as well as two sub-scales: food quality and food quantity. The entire scale comprised all the 9-Items, whereas the food quality sub-scale featured four HFIAS food quality items and the food quantity sub-scale included five HFIAS food quantity items.

The Cronbach's Alpha value for the complete scale was 0.996, according to the analytical results shown in Table-1. Furthermore, the Cronbach's Alpha score for food quality was 0.855, whereas it was 0.980 for food quantity. A high alpha value indicated strong internal consistency, suggesting that the items were reliable and measured the intended construct. A Cronbach's Alpha value of 0.6 to 0.9 is widely considered as indicating adequate instrument dependability (Tavakol & Dennick, 2011). These findings validated the internal consistency of the HFIAS utilized in this study.

Table 1: Internal Consistency of HFIAS

Sr. No	Scale	Cronbach's Alpha	HFIAS Items (n)
1	Food Security (Full-scale)	0.996	9
2	Food Quality (1 st Sub-scale)	0.855	4
3	Food Quantity (2 nd Sub-scale)	0.980	5

5. Food insecurity access in relation to household conditions

The conditions of households associated with food insecurity access were evaluated by respondents' responses against HFIAS 9-items questions. The results given at Table -2 showed that in District Hunza, the experience of food insecurity (accessibility) responses of "Yes" ranged from 93.2% to 1.5%. The most consistent experience was found against question No. 3 "*Did you or any household member eat a limited variety of food due to a lack of resources?*" It was observed that a total of 93% households which participants in the survey ate certain food they did not like to ate, showed concern about insufficient variety, registered nutritional adequacy, and were unable to consume favorite foods due to shortage of resources.

The question No. 8 and 9 i.e. "*Did you or any household member go to sleep at night hungry because there was not enough food?*" and "*Did you or any household member go a whole day without eating anything because there was not enough food?*" had the least affirmative response. Only 15% respondents responded that they had to face such adverse situations in previous four weeks. Results showed that respondent had limited variety of food due to a scarcity of resources. Question No. 5 and 6 were about the skipping of meal due to lack of resource. It was observed that 86% households answered "Yes" against question No. 5, and 70% households responded "Yes" in question No. 6. Question No. 8 and 9 had the least affirmative responses.

Table 2: Food insecurity in the household condition related to access

HFIAS Questionnaire-9 Items	No	%	Yes	%
Q1-"Did you worry that your household would not have enough food?"	51	15.0	289	85.0
Q2-"Were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?"	30	8.8	310	91.2

Q3-“Did you or any household member eat a limited variety of food due to a lack of resources?”	23	6.8	317	93.2
Q4-“Did you or any household member eat food that you preferred not to eat because of a lack of resources to obtain other types of food?”	33	9.7	307	90.3
Q5-“Did you or any household member eats a smaller meal than you felt you needed because there was not enough food?”	47	13.8	293	86.2
Q6-“Did you or any other household member eat fewer meals in a day because there was not enough food?”	101	29.7	239	70.3
Q7-“Was there ever no food at all in your household because there were not resources to get more?”	318	93.5	22	6.5
Q8-“Did you or any household member go to sleep at night hungry because there was not enough food?”	335	98.5	5	1.5
Q9-“Did you or any household member go a whole day without eating anything because there was not enough food?”	335	98.5	5	1.5

6. Estimation of HFIAS Domains

According to HFIAS guidelines the scale has been divided in to three sub-domains of food insecurity (access): Anxiety or uncertainty over food; perception that inadequate quality of food; and insufficient quantity of food and its consequences (Coates, Swindale & Bilinsky (2007). Households were asked to recall the history of food consumed in the previous four weeks. First question was about anxiety or uncertainty about food, Q2, Q3, Q4 were about the quality and variety of food with relation to resources, which they consumed during last four weeks. Q5, Q6, Q7, Q8 and Q9 were asked about the insufficient quantity of food which they were consumed due to lack of resources.

6.1 Anxiety and Uncertainty related to Food Insecurity

Anxiety or uncertainty is the sub-domain of HFIAS. The Question No. 1 “Did you worry that your household would not have enough food” measured the anxiety or uncertainty of households which they experienced during last four weeks. The results given in Table - 3 showed that 289 (85%) households responded positively whereas only 51 (15%) respondents answered as “No”. Further, the region wise analysis was also carried out which showed that respondents in central Hunza experienced the least anxiety or uncertainty about food insecurity as compared with upper and lower Hunza (Central Hunza: 80.09%; Lower Hunza: 89.04% and Upper Hunza: 91.18%).

Table 3 : Anxiety and uncertainty about food Insecurity in the Hunza

Questionnaire Item	Responses categories	N=340	(%)
	No	51	15.0

Q 1. "Did you worry that your household would not have enough food?"	Yes	289	85.0
"How often this happened?"	Rarely	30	8.8
	Sometimes	187	55.0
	Often	72	21.2

6.2 Inadequate Quality of Food

Inadequate quality of food is the second sub-domain of the HFIAS, it measures food insecurity (access) related to food quality. Question 2, 3, and 4 relates to the views of poor quality of meals of households (including variety and food type preferences). The table - 4 shows that the highest positive response was recorded against 93.2% of the respondents against question No. 3 "Did you or any household member eat a limited variety of foods due to lack of resources". Question No. 2 and 4 had affirmative score of 91.2% and 90.3% respectively. All three questions had the food insecurity score more than 90%, this indicated that surveyed respondents experienced inadequate quality of food more frequently during past four weeks due to lack of resources. Results indicated that due to lack of resources, households during the previous four weeks ate limited variety and limited amount of food, and any member of the household skipped at least one meal.

Table 4 : Insufficient Quality of food in the Hunza

Question No.	Questionnaire Items	Responses categories	Responses Frequency (%)
Q 2.	"Were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?"	No	8.8
		Yes	91.2
Q 2 a.	"How often this happened?"	Rarely	7.1
		Sometimes	68.1
		Often	24.8
Q 3.	"Did you or any household member eats a limited variety of foods due to a lack of resources?"	No	6.8
		Yes	93.2
Q 3 a.	"How often this happened?"	Rarely	5.67
		Sometimes	71.6
		Often	22.7
Q 4.	"Did you or any household member eats food that you preferred not to eat because of a lack of resources to obtain other types of food?"	No	9.7
		Yes	90.3
Q 4 a.	"How often this happened?"	Rarely	9.4
		Sometimes	71.9
		Often	18.6

6.3 Inadequate Quantity of food Consumption

The third domain of HFIAS is the insufficient food quantity and its effects, it measures the experience of inadequate quantity of food consumption and its consequences which households faced during last four weeks. Question No. 5, 6, 7, 8 and 9 were related to perceptions of limited household food quantity and its consequences. The highest score was observed in Question No. 5 i.e. “*Did you or any household member eats a smaller meal than you felt needed because there was not enough food*”. A total of 86.2% respondents experienced that they ate small meal then they felt needed. Question No. 8 and 9 had least affirmative responses of 1.5% as given in Table - 5.

Table 5 : Inadequate Quantity of food Consumption in the Hunza

Question No.	Questionnaire Items	Responses categories	Responses Frequency (%)
Q 5.	“Did you or any household member eats a smaller meal than you felt you needed because there was not enough food?”	No	13.8
		Yes	86.2
Q 5a.	“How often this happened?”	Rarely	9.2
		Sometimes	75.1
		Often	15.7
Q 6.	“Did you or any other household member eat fewer meals in a day because there was not enough food?”	No	29.7
		Yes	70.3
Q 6a.	“How often this happened?”	Rarely	14.6
		Sometimes	71.6
		Often	13.8
Q 7.	“Was there ever no food at all in your household because there were not resources to get more?”	No	93.5
		Yes	6.5
Q 7a.	“How often this happened?”	Rarely	22.7
		Sometimes	36.4
		Often	40.9
Q 8.	“Did you or any household member go to sleep at night hungry because there was not enough food?”	No	98.5
		Yes	1.5
Q 8a.	“How often this happened?”	Rarely	40.0
		Sometimes	60.0
		Often	0.0
Q 9.	“Did you or any household member go a whole day without eating anything because there was not enough food?”	No	98.5
		Yes	1.5

Q 9a	“How often this happened?”	Rarely	60.0
		Sometimes	40.0
		Often	0.0

7 Household food insecurity Access Incidence

According to HFIAS guidelines households were divided into four kinds: “Food Secure”, “Mildly Food Insecure”, “Moderately Food Insecure” and “Severely Food Insecure”. The prevalence of each stage is determined through surveys or assessments that utilize the HFIAS tool and specific criteria for categorizing households based on their responses and food access indicators. The households belonging to these stages of food security are described as below:

Food Secure households have reliable access to sufficient food for an active and healthy life. Food secure households do not experience anxiety or uncertainty regarding their food availability or access. *Mildly Food Insecure households* may have some anxiety or concern about their ability to obtain adequate food, but the quantity, quality, and variety of food they consume are not significantly compromised. Households experiencing mild food insecurity may employ coping methods such as consuming less preferred or cheaper foods or relying on social networks for support. *Moderately Food Insecure* households signifies that they have started to experience a more significant disruption in their food intake. They may have reduced the quantity or quality of their meals and may need to engage in more severe coping strategies. This stage often involves compromises in dietary diversity and meal skipping due to limited resources or access to food. *Severely Food Insecure* household represent the highest stage of food insecurity wherein they experience severe disruptions in their food intake resulting in significant hunger and even starvation. These households often face extreme coping strategies, such as skipping meals for extended periods or going without food altogether. Severe food insecurity can have severe consequences for the health and well-being of individuals and families.

The results of the data analysis in the Hunza District showed that 41.6% households were classified as food secure, 5.5% were mildly food insecure, 40.9% were moderately food insecure and 12.0% were severely food insecure.

Later on, the regional disparity within the Hunza District regarding food security situation was also explored. It was observed that the incidence of food security was not uniform amongst the three regions of the Hunza District. The Table – 6 shows that the Central Hunza was the most food secure region within Hunza District wherein 44.5% households were found to be food secure in comparison with only 34.0% households in Lower Hunza and 37.4% in Upper Hunza. Similarly, Lower Hunza registered highest number of households categorized as moderately food secure.

Table - 6 Household food insecurity Access Incidence in the Hunza

Region/ Sub-regions	Food Secure (%)	Mildly Food Insecure (%)	Moderately Food Insecure (%)	Severely Food Insecure (%)
Hunza District	41.6	5.5	40.9	12.0
Central Hunza	44.5	6.1	35.6	13.7

Upper Hunza	37.4	4.4	48.2	10.7
Lower Hunza	34.0	4.4	55.9	5.2

8 Conclusion

It is concluded as a result of instant study that the HFIAS is a valid and consistent instrument for assessing the frequency and reliability of food accessibility in the Hunza. This conclusion is in line with other similar studies conducted in different countries which found HFIAS as a reliable tool to measure food accessibility e.g. in Iran, Tanzania and Lebanon (Salarkia, et. al., 2014; Knueppel, et. al., 2010; Naja, et. al., 2015).

The situation of food security was quite worse in the Hunza. People faced a lot of anxiety and uncertainty about food insecurity (85% households had such concerns). Similarly, people were highly concerned about quality and quantity of food they consumed (91.2 % households compromised on quality and 86.2% on quantity of food consumed). Such findings appeared to be broadly in consonant with the findings of National Nutritional Survey of Pakistan conducted in 2018 (NNS, 2018). According to this survey, Gilgit Baltistan had the 2nd highest rate of stunting in the country i.e. 46.6%).

Further, it was observed that 41.6% households were food secure and 40.9% was moderately food insecure in the Hunza which was quite different from the findings of Nutritional Survey of Pakistan 2018. As per this survey, Gilgit Baltistan was assessed to have 75.6% population as food secure and only 7.5% as moderately food insecure. These findings may help for policy makers to develop better food security policy for the Hunza which appeared to hit badly during last few years.

References

- Asghar, Z., & Ahmad, M. (2015). Socio-Economic Determinants of Household Food Insecurity in Pakistan. *International Journal of Economics and Empirical Research (IJEER)*, 3(1), 6-18.
- Bashir, M., Schilizzi, S., & Pandit, R. (2013). Regional sensitivity of rural household food security: The case of Punjab, Pakistan. *The Journal of Animal and Plant Sciences*, 23(4), 1200-1206.
- Coates, J., Swindale, A., & Bilinsky, P. (2007). Household Food Insecurity Access Scale (HFIAS) for measurement of food access: Indicator guide: version 3.
- Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, 16(3), 297-334.
- Dorling, D. (2021). World population prospects at the UN: our numbers are not our problem? In *The Struggle for Social Sustainability* (pp. 129-154). Policy Press.
- Food and Agriculture Organization (FAO) (2008). *Food Security Information for Action. Practical Guides*. Rome, Italy: European Commission, FAO Food Security Program; FAO, 2008.
- Huddleston, B., et al. (2003). Towards a GIS-based analysis of mountain environments and populations. Environment and Natural Resources working paper, 10.
- Khan, A. (2011). Mapping and measuring of multidimensional poverty in Pakistan: Static and dynamic approach. Arid Agriculture University Rawalpindi, Pakistan.

- Kline, P. (2014). *An easy guide to factor analysis*; London, Routledge.
- Knueppel, D., Demment, M., & Kaiser, L. (2010). Validation of the household food insecurity access scale in rural Tanzania. *Public Health Nutrition*, 13(3), 360-367.
- Naja, F., Hwalla, N., Fossian, T., Zebian, D., & Nasreddine, L. (2015). Validity and reliability of the Arabic version of the Household Food Insecurity Access Scale in rural Lebanon. *Public Health Nutrition*, 18(2), 251-258.
- NNS (2018). National Nutrition Survey of Pakistan 2018, Ministry of National Services Regulation and Coordination in collaboration with UNICEF and DFID, Government of Pakistan, Islamabad
- Pakistan Bureau of Statistics (2013). *Agricultural Statistics of Pakistan 2012-13*. Ministry of Planning, Development and Special Initiatives, Government of Pakistan, Islamabad.
- Pervaiz, B., Li, N., Manzoor, M.Q., & Yaseen, M. (2017). Socio-economic characteristics of farming community and food security situation in Punjab, Pakistan. *Journal of Agricultural Science*, 9(8), 130-142.
- Pervaiz, B., Manzoor, M. Q., & Pervaiz, R. (2022). Estimation and Validation of Adapted Household Food Insecurity Access Scale in Lahore–Pakistan. *Sustainable Business and Society in Emerging Economies*, 4(2), 581-590.
- Rasul, G. (2010). The role of the Himalayan mountain systems in food security and agricultural sustainability in South Asia. *International Journal of Rural Management*, 6(1), 95-116.
- Salarkia, N., Abdollahi, M., Amini, M., & Neyestani, T. R. (2014). An adapted Household Food Insecurity Access Scale is a valid tool as a proxy measure of food access for use in urban Iran. *Food Security*, 6(2), 275-282.
- Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education*, 2, 53.
- Tiwari, P. C., & Joshi, B. (2012). Natural and socio-economic factors affecting food security in the Himalayas. *Food Security*, 4, 195-207.
- Von Grebmer, K., Bernstein, j, Resnick D, Wiemers M. et al. (2022). *Global Hunger Index: Food Systems Transformation and Local Governance*. Bonn: Welthungerhilfe; and Dublin: Concern Worldwide, 2023
- Zhou, D., Shah, T., Ali, S., Ahmad, W., Din, I. U., & Ilyas, A. (2019). Factors affecting household food security in rural northern hinterland of Pakistan. *Journal of the Saudi Society of Agricultural Sciences*, 18(2), 201-210.