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RESEARCH PAPER

Exploring the Multi-Dimensional Factors influencing Food Security: A Case Study of District Nowshera, Pakistan

[1]Muhammad Hassan Safdar [2]Najaf Hussain* [3]Dr. Qasir Abbas

1. M. Phil Scholar, Institute of Agricultural and Resource Economics, University of Agriculture Faisalabad, Punjab, Pakistan
2. M. Phil Graduate, Institute of Agricultural and Resource Economics, University of Agriculture Faisalabad, Punjab, Pakistan
3. Lecturer, Institute of Agricultural and Resource Economics, University of Agriculture Faisalabad, Punjab, Pakistan

***Corresponding Author:** najafhussain512@gmail.com

ABSTRACT

This paper measures food security in district Nowshera, Khyber Pakhtunkhwa, using a multidimensional framework. It covers four dimensions: financial accessibility, physical accessibility, food utilization and food sustainability. It uses primary data from a field survey of randomly selected respondents. The results show that district Nowshera is 54.7 percent food secure, with urban areas being more secure than rural areas. Tehsil Pabbi and Tehsil Nowshera are more secure than Tehsil Jangeera. The lowest food security is found in the rural area of tehsil Pabbi. The study identifies some factors that influence food security, such as income, education, subsidies, farmer union, agricultural productivity and natural calamities. It suggests some policy implications to improve food security, such as increasing income, local food production, food aid support, education, financial subsidies and agricultural productivity, as well as reducing the impact of natural calamities.

KEYWORDS Access to Food Sustainability, Economic Access, Food Availability, Food Security, and Natural Calamities

Introduction

Food security is a comprehensive phenomenon and a burning issue of the day. It is the primary issue of all the developing countries, especially in a country like Pakistan. The policymakers all over the globe are trying to utilize their expertise and vital time to eliminate food insecurity. Various factors have an impact on food security, including agronomic, institutional, political, and climate. Climate change is considered as the most crucial factor influencing food security (Mahmood *et al.,* 2012).

Food security is defined as "a situation when all people, at all times, have social, physical and economic access to adequate safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (FAO, 2002). The definition of food security also refers to "safe and nutritious food" that is required for an active and healthy life. For an active and healthy life, the human body has to effectively utilize the available nutrients in the food used (Staatz *et al.,* 2009). Food insecure households are those who consume below the daily standard minimum recommended allowance (MRA). It is a caloric intake of 2350 cal. for an individual to be active and healthy (GOP, 2014).

The term food security was coined in international development literature in the 1960s. At that time, the conventional wisdom was that food insecurity was considered primarily as a shortfall in supply and high prices of food (Sijm, 1997). Those households are more food secure which have more earning persons in the family. The households having three earning persons have a higher chance to be food secure than those having one earning member in the family (Bashir *et al.,* 2010). The food security situation in Pakistan has been

extremely unstable due to the combination of environmental, socio-political and developmental instabilities (Bashir *et al.,* 2013).

Sustainable food security and per capita availability of wheat in Pakistan are very important. Pricing of wheat, bilateral regional trade strategies, policy concerns and climate changes have a vital impact on wheat production (Iqbal *et al.,* 2005). Currently, the international community seems committed and a large number of efforts have been made so far for bringing improvement in the food security situation all over the world (Fullmer, 2010). Food security is a condition for the fulfilment of food for everyone. Household food security is influenced by many factors and varies between individuals and households (Ni'mah *et al.,* 2023).

Wheat, the staple food crop of Pakistan, is given more importance in food security policies. The government focuses mainly on the production of wheat in the country. Usually, severe seasons damage the production of food. The rainfall damages wheat production at the time of harvesting, which eventually leads to a threat to food security in Pakistan (Janjua *et al.,* 2010).

Literature Review

There are many reasons responsible for food insecurity, including lack of technical assistance for agricultural productivity, lack of knowledge about the fertile land and climate and seasonal changes (Von Braun *et al.,* 2007). Similarly, there are many common risks which have seriously affected food production, i.e., severe weather, erratic rainfall, living in far remote areas and the worse situation of infrastructure facilities (Shahbaz *et al.,* 2010). Sometimes, a rise in income may have a negative effect on diet options based on preference, flavour, and choice of expensive but less nutritious food. The consumer is not afraid of less availability of food, rather he is afraid of wrong utilization of food (Ahmad, 2003). Sen (1982) found from his study that the real problem is poor access to food, affecting the availability of food at the national level.

Most of the rural population in sub-Saharan African countries faces hunger because of the heavy rainy season, because roads are mostly blocked, which creates problems for access to food (Bonnard, 1999). A rise in food prices pushes poor families to eat cheaper and less healthy food. Mostly they pull their children from school to cope with the situation, that affects the physical, social, and mental well-being of young people. Less nutritious foods may also affect the learning capacity, productivity and mortality rate in children (World Bank, 2003). No country has been able to get rid of poverty without growing productivity in its agriculture sector. Sustainability is one of the most important dimensions of food security (Timmer, 2008). Babu & Tashmatov (2006) found from their study that, an increase in the level of income is primarily measured as a determinant and a solution to food insecurity, because if the income of the individual decreases, the access to enough, safe and healthy food is supposed to be problematic.

The major aims of the study are to examine the extent of food security and analyse all the important factors that might affect the food security across the region in Nowshera, a district of Khyber Pakhtunkhawa. After presenting the introduction and a brief literature review in the first section, material and methods, results and discussion, conclusion and finally some policy implications have been presented in the preceding sections.

Material and Methods

Conceptual Framework

Food security has been one of the burning issues of the day. A lot of studies have been conducted on food security both in Pakistan and at the international level. Sijm (1997)

found from his study that the term food security was coined in international development literature in the 1960s and 1970s. Bonnard (1999) analysed in his study that most of the rural population in Sub-Saharan African countries faces hunger because of heavy rainy seasons. The roads might be blocked, which creates problems for access to food. Babu & Tashmatov (2006) found in their study that an increase in the level of income is primarily measured as a determinant and a solution to food insecurity. If the income of the individual decreases, then access to safe and healthy food is supposed to be problematic. Rosen & Shapouri (2008) found from their study that economic problems are extremely disturbing food security as an increase in prices can have challenging consequences on food security and particularly when the import volume of food items in less developed countries decreases. Massuanganhe (2008) examined in his study that, the large part of rural population of developing countries including Pakistan is depending upon the natural resources for their livelihoods.

It is apparent from the above discussion that different studies are available which discuss different aspects of food security. The current study is important in this context because it discusses the issue of food security in Nowshera, a district of KPK. It discusses four dimensions of food security (Economic access, access to food, food availability and sustainability). Most of the available studies do not discuss all of the four dimensions in a single study. The current study will be helpful for the researchers working in this field. They can explore the other areas of Pakistan.

Dimensional and Sub Dimensional Framework of the Study

To estimate the magnitude of Food Security in district Nowshera, data regarding four main dimensions were collected through a questionnaire. The study covers the following dimensions:

1. Economic Access
2. Access to Food
3. Food Availability
4. Sustainability

The dimensional and sub dimensional framework of the study is shown in Table 1:

Table 1
Dimensions Along with Cut off Values

Dimensions	Sub dimensions	Cut off
D_1 - Economic Access	Income from all Sources (Per capita Income in Pak rupees)	If income is ≥ poverty line (Rs. 2369.86) then D = 1 (Food Secure), and 0 – otherwise
D_2 - Access to Food	D_2d_1 - Local Food Production	1 - Yes, 0 - otherwise ≥ 1 Food secure
	D_2d_2 - Food Aid Support	1 - Yes, 0 - otherwise ≥1 Food secure
	D_2d_3 - Financial Support (Subsidies)	1 - Yes, 0 - otherwise ≥ 1 Food secure
D_3 - Food Availability	D_3d_1 - Access to Farmer Cooperative	1 - Yes, 0 - otherwise ≥1 Food secure
	D_3d_2 - Access to Agriculture Inputs	1 - Yes, 0 - otherwise ≥1 Food secure
D_4 - Sustainability	D_4d_1 - Frequent Flood	1 - Yes, 0 - otherwise <1 Food secure

	D_4d_2 - Erratic Rainfall	1 - Yes, 0 - otherwise <1 Food secure
	D_4d_3 - Low Agriculture Productivity	1 - Yes, 0 - otherwise <1 Food secure
	D_4d_4 - Livestock Diseases	1 - Yes, 0 - otherwise <1 Food secure
	D_4d_5 - Water Shortage for Agriculture	1 - Yes, 0 - otherwise <1 Food secure
	D_4d_6 - Unsafe Drinking Water	1-Yes, 0 - otherwise <1 Food secure

Profile of Sampling Distribution and Regional Structure of the Study

To obtain the core objectives of the study, a sample of 106 out of 120 sample size respondents were randomly selected and interviewed on the basis of comprehensive predesigned questionnaires. The 14 respondents were dropped because of statistical reasons, i.e., missing value and outlier. The profile of sampling distribution is shown in Table 2:

Table 2
Profile of Sampling Distribution

Tehsils	Sample size	Urban	Rural
Pabbi	49	10	39
Nowshera	42	17	25
Jangeera	15	03	12
Total	106	30	76

Data Sources

The core data for the study is based on a primary data, collected from the area under consideration, through a comprehensive questionnaire. The questionnaire consists of open-ended and closed-ended questions addressing the household family size, educational level, livelihood sources, food production, food consumption, food aid, agricultural extension services and coping mechanism. However, to accomplish the core objective of the study, the present study is based on 106 questionnaires containing the appropriate proportion of the respondents from each tehsil of the district Nowshera. The respondents were selected from different parts of the rural and urban areas of all three tehsils of the district Nowshera.

The Binary Logit Model for Food Security

The following binary logit model has been developed for food security as a dependent variable with a number of independent variables:

$$\ln(\frac{P}{1-P}) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \epsilon$$

Where,

P = Probability of being food secure (FS)

X_1 = Sources index

X_2 = Facilities index

X_3 = Natural calamities

X_4 = Education

X_5 = Financial support

X_6 = Farmers' cooperative sources access

X_7 = Low agricultural productivity

X_8 = Household region

β_i = Coefficient of variable X_i

ϵ = Error term

Results and Discussion

The study area across the region of the district Nowshera-KPK consists of three tehsils: Tehsil Pabbi, Tehsil Nowshera, and Tehsil Jangeera.

Table 3
Food Security Status in the District Nowshera-KPK

Tehsil	Urban		Rural		Overall	
	Percent	Contribution Percent	Percent	Contribution Percent	Percent	Contribution Percent
Pabbi	70.0	19.95	53.8	35.2	57.1	27.33
Nowshera	94.1	26.8	32.0	20.9	57.1	27.33
Jangeera	100.0	28.5	25.0	16.4	40.0	19.14
Overall	86.7	**24.7**	42.1	**27.5**	54.7	**26.18**

It is clear from the results, that the district Nowshera-KPK is overall 54.7 percent food secure. In urban area, this ratio is 86.7 percent, whereas in rural area, this is 42.1 percent. The district Nowshera-KPK consists of three tehsils: the Tehsil 1-Pabbi, the Tehsil 2-Nowshera, and the Tehsil 3-Jangeera. Each tehsil has a different level of food security, depending on the urban and rural population. In the tehsil Pabbi, 70.0 percent of the urban population and 53.8 percent of the rural population are food secure. In the tehsil Nowshera, 94.1 percent of the urban population and 32.0 percent of the rural population are food secure. In the tehsil Jangeera, 100 percent of the urban population and 25 percent of the rural population are food secure. The worst-condition lies in rural area of tehsil Pabbi, which contributes 16.4 percent in food security.

The food security status shows that there is a significant gap between urban and rural areas in terms of food security. The urban areas have a higher percentage of food secure households than the rural areas in all three tehsils. This may be due to various factors, such as income, education, access to markets, availability of food aid, and exposure to natural calamities. The study aims to explore these factors and their impact on food security in the district Nowshera-KPK.

Table 4
Binary Logit Model Results for Food Security: District Nowshera of KPK

Variable	dy/dx	P > |Z|
Sources index	0.0006972	0.000
Facilities index	1.80164	0.003
Natural calamities	-0.5631892	0.014
Education	0.3572108	0.010
Financial support	0.9454758	0.000
Farmers' cooperative sources access	0.6480991	0.000

Low agricultural productivity	0.5173349	0.008
Household region	0.9643611	0.048

The coefficient for the Sources index is 0.00069 with a positive sign and is statistically significant. This means that there is a positive and significant relationship between the Sources index and food security. The result from the table shows that, if there is a 1 percent positive change in the Sources index, the element of food security will become better by 0.00069 percent. Similar results were found in the study of (Bashir *et al.,* 2013), which analysed that households having income from Rs. 5001 to Rs.10000 had fifteen times more chances to be food secure as compared to those who belong to low-income group. Sidhu *et al.,* (2008) found from their study that an increase in the monthly income by Indian Rs. 1000 may reduce 30 percent chances of food insecurity at household level.

The coefficient for the facility index is 1.8 percent with a positive sign and is statistically significant. This means that there is a positive and significant relationship between the facility index and food security. It shows that, if there is a 1 percent positive change in the facility index, the element of food security will become better by 1.8 percent. Almost similar findings have been found in the study of (Chellaraj *et al.,* 1992).

The coefficient for the natural calamities index is 0.56 percent with a negative sign and is statistically significant. This means that there is a negative and significant relationship between the natural calamities index and food security. It shows that a one percent decrease in natural calamities index may increase food insecurity by 0.56 percent. These findings are somehow similar with the report of UK Parliament (2006). The coefficient for the household education is 0.357 and it is statistically significant. This means that there is a positive and significant relationship between the household education and food security. It shows that a one percent rise in education of household will be followed by an increase in food security by 0.357 percent. These results are consistent with (Bashir *et al.,* 2013; Amaza *et al.,* 2006).

The coefficient for a financial support or food subsidies for the food security is 0.94 and is statistically significant. It shows that if there is 1 percent positive change in financial support, the element of food security will become better as 0.94 percent. These findings are somehow consistent with (Truong, 2009), Food subsidy has positive impact on the food security of a household (Chellaraj *et al.,* 1992). The coefficient of membership of a farmer co-operative organization is 0.648 with a positive sign and is statistically significant. These results show that if a farmer belongs to the co-operative societies, then the level of food security may be better as 0.648 percent than otherwise. The co-operative societies educate their members on different issues and provide credit facility for their members.

The coefficients for a variable agricultural productivity is 0.517 with a positive sign and is statistically significant. It shows that an increase in agricultural productivity, the element of food security will become better as 0.517 percent. The same results were found in the study of Adil *et al.,* (2007). The coefficient for a household region is 0.964 with a positive sign and is statistically significant. It shows that a household belonging to an urban region may increase food security by 0.964 percent than if they belong to a rural background. Similar findings were found in the study of researcher Bashir *et al.,* (2010) and Staatz *et al.,* (2009).

Conclusion

Food security is an emerging challenge across the developing world and aggravating day by day, through diversifying its concerns and consequences. The study in hand employs the multidimensional framework, to estimate the magnitude of food security; thereby addressing the various dimensions of the problem, i.e., financial accessibility, physical accessibility, food utilization and food sustainability at various levels in the district

Nowshera, Khyber Pakhtunkhwa. The study is based upon the primary information, conducted through a field survey on the basis of a comprehensive questionnaire by the randomly selected set of respondents in the area under consideration. It is clear from the results that the district Nowshera is overall 54.7 percent food secure. In the urban area this ratio is 86.7 percent while in the rural area this is 42.1 percent. In the district Nowshera the Tehsil-1-Pabbi and Tehsil-2-Nowshera is 57.1 percent food secure, while the Tehsil-3-Jangeera is 40.0 percent food secure. In the tehsil Pabbi, 70.0 percent of the urban population and 53.8 percent of the rural population are food secure. In the tehsil Nowshera, 94.1 percent of the urban population and 32.0 percent of the rural population are food secure. In the tehsil Jangeera, 100 percent of the urban population and 25 percent of the rural population are food secure. The worst condition lies in the rural area of tehsil Pabbi as it contributes 16.4 percent in food security. The results of binary logistic regression show that the coefficient for the Sources index is 0.00069 with a positive sign and is statistically significant. The coefficient for the facility index is 1.8 percent with a positive sign and is statistically significant. The coefficient for the natural calamities index is 0.56 percent with a negative sign and is statistically significant at 5 percent level of significance. The coefficient for financial support or food subsidies for food security is 0.94 and is statistically significant. The coefficient of membership of farmer co-operative organization is 0.648 with a positive sign and is statistically significant. The coefficient for the variable agricultural productivity is 0.517 with a positive sign and is statistically significant at 5 percent level of significance.

Policy Implications

The results of the study show that income of the household has a positive link with food security, so steps might be taken to generate the level of income. The Facility Index (Local Food Production, Food Aid Support) has a significant and positive association with food security. The concerned authority might take steps to launch food aid support programs and enhance the local level of production. Natural calamities inversely affect the food security, so steps might be taken to minimize the effect of natural calamities. Level of education and financial subsidies have a strong positive association with food security. The steps might be taken to enhance the literacy rate and increase the financial subsidies. Farmer unions have also a strong positive association with food security, so formation of farm unions might be encouraged. There is a direct relationship between the agricultural productivity and the food security, government might take steps to increase agriculture productivity.

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