Integrated Farming Systems effect on Farmers Livelihood Security in Uttar Pradesh, India

ABSTRACT:

The aim of the present investigation was to determine the degree of livelihood security experienced by farmers in the Sultanpur region of Uttar Pradesh. Kurebhar and Dhanpatganj blocks were selected based on having the maximum acreage under an Integrated Farming System. Both primary and secondary data were used in the investigation. To achieve the objectives of the study, primary data were collected from 150 randomly selected farmers for the years 2021–2022. Six distinct measures of the security of livelihood were developed based on the condition of farmer households in the research location. The index score range for the indicators was 0 to 1. A household that has a higher indication number is likely to be more financially secure and well-off. The security of both health and education are under grave danger. The overall Household Livelihood Security index was found to be 0.54.

Keywords: Household Livelihood Security Index, Educational Security, Financial Security

INTRODUCTION

The Green Revolution increased grain yields dramatically throughout the world during the past 40 years, and individual animal output levels followed a similar trajectory. The current agricultural production system faces a tremendous challenge in providing food security for the rapidly expanding global population. This challenge is made more difficult by India's declining average farm size and financial restrictions on further agricultural investment because 80% of farm families fall into small and marginal farmer groups. Increasing productivity might be a key strategy to guarantee the security of food and nutrition for a sizeable population. This calls for the use of contemporary agronomic techniques and technology, which should boost the productivity of conventional agricultural systems (Manono et al., 2019). In the 20th century, agronomic practices such as the liberal application of inorganic fertilizers and pesticides greatly increased productivity; however, unfavorable environmental degradation and rising operating costs in agriculture raised concerns about the industry's viability and sustainability (Lal, 2011 and Maurya, 2017). The livelihood of millions of small farmers is threatened by environmental degradation resulting from unsustainable farming practices. The agricultural production systems in developing countries need to be enhanced for better sustainability and higher economic returns to increase income and food and nutritional security. A system known as

integrated farming (IFS) focuses on the strategic pairing of two or more agricultural enterprises and the efficient recycling of residue waste for better resource management with small and marginal farmers to increase income and provide employment for family laborers during the off-season. These businesses not only assist farmers in boosting their income but also aid in year-round employment for family members.

METHODOLOGY

In Uttar Pradesh, which has 75 districts, agriculture employs most of the rural people, with dairy farming being their primary source of income after crop cultivation. Sultanpur was specifically chosen for the study because it is one of the districts where dairy farming is mostly performed in addition to the agricultural system. Two blocks, Kurebhar and Dhanpatganj, were purposefully chosen based on the largest area under this agricultural technique. A list of all 14 blocks in Sultanpur district was ordered in increasing order based on the area under cultivation in the area.

The farmers' major information was gathered through personal interviews with the help of a pretested questionnaire. A variety of sources, including books, diaries, reports, and records of district and block headquarters, such as research papers, articles, and district statistical reports, were used to gather the pertinent secondary data.

The six livelihood outcomes that make up the Livelihood Security Index are evaluated based on status, quality, and accessibility. Relevant indicators are chosen from the CARE USA/Program Division/PHLS standard menu of indicators to measure the various livelihood outcomes. Each indication was given a ranking on a five-point ordinal scale, with the ranges being adjusted for the villages' circumstances. By averaging the results of the measures that were chosen, indicators for livelihood security such as food, economics, health, education, habitat, and social network security were computed.

1. Economic security

2. Food security

3. Health security

4. Habitat security

5. Educational security

6. Social network security

It is first necessary to standardize each component indicator as an index because each component is measured using a distinct scale. Jeyarajah (2016) prepared the standardized indicators of a household using the methodology chosen to construct the Human Development Index (UNDP, 2007). The individual indices can be calculated for each LSI component using the general formula:

$$\mathbf{Z_{index}} = \frac{\textbf{Actual value} - \textbf{Minimum value}}{\textbf{Maximum value} - \textbf{Minimum value}}$$

Thus, each index has a range of 0 to 1. The index is 0 if the variable's actual value is the minimum. The index is one if the actual value matches the maximum value. The formula for calculating the Household Livelihood Security Index (HLSI) involved averaging the standardized indicators.

$$\mathbf{HLSI} = \frac{\sum_{j=1}^{J} \mathbf{Z_{index}}}{J}$$

Were,

J = no. of indicators

Economic Security: this indicator is based on the farmer's household annual net income in the research region.

Food Security: this indicator is based on the farmer's household monthly food expenditures in the research area.

Health Security: the research area's accessibility to primary healthcare facilities and services is considered while determining merit.

$$\text{Health security index} = \frac{\sum W_i f_i}{\sum f_i} \quad (i = 0\ 1,2,\ldots.,5)$$

Accessibility in kilometers, where 0 to 2 km equals 5, 2-4 km equals 4, 4-6 km equals 3, 6-8 km equals 2, 8-10 km equals 1, and 10 km and above equals 0.

Habitat Security: this indicator is based on the market value of housing assets among the research area's households.

Education Security Index: the education index, which measures the sample farmers' levels of education, is calculated as

$$\text{Education index} = \frac{\Sigma W_i f_i}{\Sigma f_i} \qquad (i = 0\ 1,2,\ldots,5)$$

Education acquired, i.e., illiterate = 0, primary school = 1, middle school = 2, high school = 3, twelfth standard = 4, graduate & above = 5, and w_i= weights (0 to 5) and f_i= number of farmers.

Social Security Index: the social network status index, which is calculated as, illustrates the degree of participation and access to different information sources

$$\text{Social Security Index} = \frac{\Sigma W_i f_i}{\Sigma f_i}$$

achieved social security status, i.e. Access to social support from friends or the neighborhood =1, Access to the phone = 2, Access to the TV = 3, Participation at the village = 4, Participation at block level=5 and the number of farmers = f_i.

RESULTS

Economic Security Index

The economic security index for farmers in the research region was calculated to be 0.48. This index was determined based on the farmers' average yearly agricultural income, which was noted as Rs. 109,438.66 (Table 4).

Food Security Index

The food security index score for farmers in the research region was 0.45. This index was derived from the monthly average food consumption expenditure of the farmers, which was Rs. 12,918.66 (Table 4).

Health Security Index

The health security index for farmers in the study region was calculated to be 0.85. This index indicates a relatively high level of health security, possibly due to the presence of primary healthcare facilities in the gramme panchayats within the research area (Table 1).

Table 1: Accessibility of farmers under the IFS to primary (basic) health care centers in the study area

Accessibility (km of Distance)	Index

0-2	**70**
2-4	**48**
4-6	**32**
6-8	**-**
8-10	**-**
10 & above	**-**
Total	**150**
The Health Security Index	**0.85**

Source: Computed from field survey 2021-2022

Index of Habitat Security

The farmers in the research region received a habitat security index score of 0.43. This index reflects the quality and adequacy of housing, with the average value of farmhouses being Rs. 567,894.67.

Educational Security Index

The educational security index for farmers in the study area was computed to be 0.59. This index reflects the educational attainment levels of farmers, with a significant proportion having completed education up to the twelfth standard or above (Table 2).

Table 2: Farmer Education Levels in the Study Area Under the IFS:

Literacy Status	Index
Illiterate	18
Elementary School	16
Middle School	22
Senior High	23
The Twelfth Standard	37
Graduate & above	34
Total	150
Index of Educational Security	**0.59**

Source: Computed from field survey 2021-2022

Index of Social Security

The social security index for farmers in the research region was determined to be 0.46. This index considers factors such as participation in social groups, access to communication devices such as phones and televisions, and the availability of support from friends and neighbors (Table 3).

Table 3: Farmers' Social Security Status under the IFS

Particulars	Index
Availability of friends' and neighbor's support	22
Availability of a phone	43
Availability of TV	35
Participant at the village level	32
Participant in the block	18
Total	150
Index of Social Security	**0.46**

Source: Computed from field survey 2021-2022

Household Livelihood Security Index

The overall livelihood security index for farmers in the current study was 0.54 (Figure 1). This index summarizes the combined scores of economic, food, health, habitat, educational, and social security indices, indicating the overall level of livelihood security among farmers in the research region (Table 4).

Table 4: Livelihood Security Indices of Farmers under the IFS

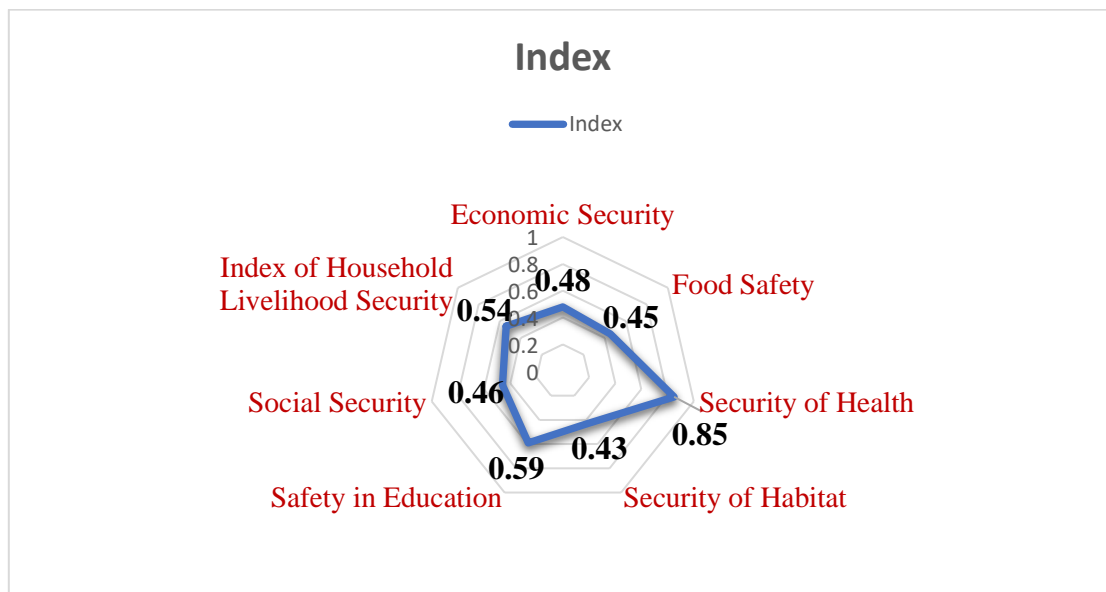| Indicators	Index
Economic Security	00.48
Food Safety	00.45
Security of Health	00.85
Security of Habitat	00.43
Safety in Education	00.59
Social Security	00.46
Index of Household Livelihood Security	**00.54**

Figure 1: Index of Household Livelihood Security

DISCUSSION AND CONCLUSION

Farmers in the research region have differing degrees of livelihood security, according to the findings. Indexes of social security, health, and education show comparatively greater levels i.e. 0.46, 0.85, and 0.59, respectively of security than do those of economic and food security i.e. 0.48, and 0.45, respectively, which point to moderate levels. Due to the availability of basic healthcare services, health security stands up as the most robust component of livelihood security in the study region.

These results highlight how livelihood security is complex and includes aspects related to the economy, society, health, education, and environment. To guarantee resilience and comprehensive livelihood development, it is imperative to attend to the various demands of farmers in these regions. Additionally, recent research by the National Statistical Office's Situation Assessment Survey (SAS) revealed that income is still a vital but precarious pillar of livelihood stability. Modest indicators in related studies show that tiny landholdings, irregular agricultural yields, and restricted access to financing frequently impede economic stability.

Additionally, areas that might use development and assistance were highlighted by the comparatively lower rankings for habitat and economic security. Attempts to improve housing conditions and increase farmers' income-generating options may help to improve livelihoods

in the area of interest as a whole. According to the National Statistical Office's most recent Situation Assessment Survey (SAS) report, farmers continue to face considerable challenges due to low and inconsistent agricultural revenues; in 2019, the average monthly income for agricultural families was Rs. 10,218. There have been suggestions for measures to increase economic resilience, including crop diversification, improved market access, and non-farm work options.

Overall, the study highlights varying levels of livelihood security among farmers, with moderate economic and food security indices but relatively higher health, education, and social security indices. Health security, attributed to accessible primary healthcare, emerges as the strongest dimension. A thorough evaluation of the many indices pertaining to the security of farmers' livelihoods is given by the research. It looks at important aspects that go into the farmers' overall Livelihood Security Index (LSI), providing important insights into their struggles and living circumstances. The results showed that farmers had a modest level of economic stability, with an Economic Security Index of 0.48. Their work prospects, credit availability, and income levels are all highlighted in this index. The Food Security Index, which is 0.45, indicates that there are difficulties in guaranteeing regular access to a healthy diet. The farmers' capacity to either grow or buy enough food for their families and themselves is reflected in this score. The Health Security Index, on the other hand, was 0.85, indicating that farmers often have decent access to medical facilities and services. This high ranking denotes good health outcomes and easy access to healthcare. At 0.43, the Habitat Security Index was lower, suggesting problems with housing and living conditions. This rating draws attention to any deficiencies in access to clean water, sanitary conditions, and shelter. With a score of 0.59 on the Educational Security Index, moderate access to education and educational resources is indicated. This points to various obstacles in the way farmers obtain literacy and educational growth.

Finally, the Social Network Status Index resulted in a score of 0.46, indicating a low level of community support and social capital. This high ranking denotes good health outcomes and easy access to healthcare. At 0.43, the Habitat Security Index was lower, suggesting problems with housing and living conditions. This rating draws attention to any deficiencies in access to clean water, sanitary conditions, and shelter. With a score of 0.59 on the Educational Security Index, moderate access to education and educational resources is indicated. This points to various obstacles in the way farmers obtain literacy and educational growth. Finally, the Social Network Status Index resulted in a score of 0.46, indicating a low level of community support

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STUDY HIGHLIGHTS

- **Economic and Food Security Challenges:** The farmers' modest Economic Security Index (0.48) and Food Security Index (0.45), which reflected their restricted access to finance, unstable income, and difficulties guaranteeing a steady supply of wholesome food, were indicative of these issues.

- **Strong Housing Conditions but Weak Health Security:** While a high Habitat Security Index (0.43) showed serious problems with housing, sanitation, and access to clean water, a high Health Security Index (0.85) suggested strong access to healthcare.

- **Educational Barriers:** Partial access to education was emphasized by a modest Educational Security Index (0.59), which also included challenges with literacy development and the accessibility of educational materials.

- **Weak Social Networks:** The Social Network Status Index (0.46) revealed low levels of social capital and little community support, which affected farmers' capacity to pool resources.

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