A STUDY ON THE LIVELIHOOD VULNERABILITY OF THE FARMERS IN ASPIRATIONAL DISTRICTS OF KARNATAKA, INDIA

Abstract

The study was conducted to access the livelihood vulnerability of the farmers in aspirational districtsinKarnataka.Livelihood vulnerability refers to the susceptibility of individuals or communities to adverse impacts on their means of sustenance and economic well-being, often stemming from external shocks or stressors. An ex-post facto research design was used. A sample size of 120 respondents were selected from Raichur and Yadgir districts using a simple random sampling technique. A well-structured interview schedule and Livelihood Vulnerability Index (LVI) which includes eight components *viz.,* Socio-demographic profile, livelihood strategies, social networks, food, water, health, climate variability and extremes, were use for data collection. Mean, cumulative frequency distribution and LVI were used for data analysis. The results revealed that the livelihood vulnerability index for Raichur was 0.484 and for Yadgir was 0.478. This indicates that the people in both districts are equally vulnerable to livelihood shocks and stresses. The medium level of LVI might be due to their dependency on more than one livelihood activities.

Keywords: Livelihood Vulnerability, Aspirational Districts, Farmers

1. Introduction

Agriculture, being the backbone of India's economy, is a critical sector that sustains the livelihoods of a significant portion of the population. In the context of Karnataka, one of India's agrarian states, the importance of agriculture is accentuated by the presence of aspirational districts where the socio-economic indicators demand special attention. These districts, while holding immense potential, also face unique challenges that impact the livelihoods of the farmers who rely on agriculture as their primary source of income.

This study delves into the intricate fabric of livelihood vulnerability among farmers in the aspirational districts of Karnataka. The term "aspirational district" is indicative of regions that, despite being endowed with rich agricultural resources, require targeted developmental efforts to uplift the standard of living of their residents. Understanding the livelihood vulnerability of farmers in these districts is pivotal for crafting policies and interventions that can enhance their resilience and contribute to sustainable rural development.

The vulnerabilities faced by farmers in these districts are multifaceted, encompassing factors such as climatic variations, market dynamics, access to resources, and socio-economic disparities. Climate change-induced uncertainties, fluctuating market prices, and inadequate infrastructure can exacerbate the challenges faced by farmers, making their livelihoods precarious. This study aims to unravel the complex interplay of these factors, providing insights into the vulnerabilities that farmers encounter in their pursuit of a sustainable livelihood

By focusing on the aspirational districts of Karnataka, this research seeks to not only highlight the challenges faced by farmers but also identify opportunities for improvement. It aims to contribute valuable knowledge to policymakers, development practitioners, and researchers, fostering a deeper understanding of the nuances of livelihood vulnerability in these regions. Ultimately, the findings of this study aspire to inform evidence-based policies and interventions that can enhance the resilience of farmers, promote sustainable agricultural practices, and catalyze positive transformations in the socio-economic landscape of the aspirational districts in Karnataka.

2. Methodology

2.1 Locale of the study

The study was conducted in Raichur and Yadgir Districts of Karnataka state in the year 2022-23. These districts were selected because they were declared as aspirational districts of Karnataka by the Government of India in the year 2018. they stand 1st and 2nd position in the district-wise Multidimensional Poverty Index of Karnataka state (National Multidimensional Poverty Index - NITI Aayog, 2021).

2.2 Selection of Respondents

Twelve villages, distributed across six different taluks, were chosen for inclusion in the study based on their population. Within each of these selected villages, ten farmers were randomly sampled using a simple random sampling method. Consequently, each taluk contributed 20 respondents to the study, resulting in a total of 120 respondents across the two districts

2.3 Livelihood vulnerability assessment framework

Livelihood Vulnerability is defined as instability in the well-being of individuals, households, communities and livelihoods regarding the change in their external environment in the form of sudden shocks, long-term patterns and seasonal cycles. After going through relevant articles and consulting with experts.

Vulnerability Analysis To measure the vulnerability, we used the method adopted by Hahn et al. (2009) to calculate the Livelihood Vulnerability Index. It is a composite index consisting of seven major components designed to assess the extent of vulnerability to livelihood risks resulting from climate change. However, in the analysis, there are 3 dimensions, 8 major components, and 27 indicators. The major components used in the present study are; Socio-Demographic Profile, Livelihood

Strategies, Social Networks, Health, Food, Water, Weather Sensitivity and Climate Variability and Extreme Events. Each of these components consists of several minor components that are prepared based on an extensive literature review and field survey. The following Table provides a detailed overview of this framework of analysis. The table also explains how each sub-component was quantified and their functional relation with vulnerability.

Following Hahn et al. (2009), the present study also used the balanced weighted average scheme (Sullivan, 2002). In this approach, weights are assigned in such a way that each of the eight components contributes equally to the overall vulnerability of the households.

$$\boldsymbol{Sdi} = \frac{\boldsymbol{actual\ i} - \mathbf{min}\ \boldsymbol{i}}{\mathbf{max}\ \boldsymbol{i} - \mathbf{min}\ \boldsymbol{i}}$$

The components measured in various scales are standardized using

Where SDI is the standardised value of the i^{th} component, $actual_i$ refers to the actual value of the i^{th} component, min i represents the minimum value of the i^{th} component, and max $_i$ refers to the maximum value of the i^{th} component

The standardised values of the sub-components were averaged using the equation

$$M_d = \frac{\Sigma_{i=1}^{n} Sd_i}{n}$$

where *Md* denotes the major component, $\Sigma^{n}_{i=1}Sd_i$ refers to the sum of the *i*sub-components, and *n* is the number of sub-components in the major component under consideration

The values for the eight major components were averaged using the equation

where LVI_d, the Livelihood Vulnerability Index for district *d*, equals the weighted average of the

$$LVI_d = \frac{\Sigma_{i=1}^{8} W_{Mi} M_{di}}{\Sigma_{i=1}^{8} W_{Mi}}$$

eight major components. The weights of each of the major components, W_{Mi}, are determined by the number of sub-components that constitute each major component and are included to ensure that all sub-components contribute equally to the overall LVI.

2.4 Statistical tools used

2.4.1 Co-efficientofCorrelation

Itwasusedtofindouttherelationshipbetweenthescoresofdependentandindependentvariables usingthe followingformula.

$$r = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{[n\sum x^2 - (\sum x)(\sum x)^2][n\sum y^2 - (\sum y)^2]}}$$

Where,

r=Co-efficientofcorrelationbetweenxandy

S*x*=Sum ofscores ofvariablex

S*y*=Sumof scores ofvariabley

Sx^2 =Sumofsquaresof scoresofvariablex

Sy^2=Sumofsquaresofscores of variabley

$(Sx)^2$ =Squareofsum ofvariable x

$(Sy)^2$=Square of the sumofvariabley

S*xy*= Sum of the product of variables x and y

n=Sizeof sample

2.4.2 Logistic regression

Logistic regression analysis was used to determine the extent of contribution of independent variables to the dependent variables. The Logistic regression equation fitted was,

$$\Pr(Y \leq j) = \ln\left(\frac{\sum pr(Y \leq \frac{j}{X})}{1-\sum pr(Y \leq \frac{j}{X})}\right) = \alpha_j + \beta_1 X_1 + \cdots + \beta_i X_i$$

Where,

Y is the livelihood vulnerability

α is a threshold

βi are estimated coefficients

Xi are independent variables

3. Results and discussion

3.1. Distribution of respondents according to their Livelihood Vulnerability Index

Based on the Livelihood Vulnerability Index (LVI) the sample farmers were categorized into not vulnerable (less than or equal to zero), least vulnerable (0.01 – 0.30), moderately vulnerable (0.31 -

0.60) and highly vulnerable (0.61 – 1) categories.

From Table 1, it was observed that 85.00 per cent of the respondents fall into the "moderately vulnerable" category, indicating a prevailing vulnerability among the surveyed population.vulnerabilityrefers to instability in the well-being of individuals, households, communities and livelihoods regarding the change in their external environment in the form of sudden shocks, long-term patterns and seasonal cycles. Following this, 12.50 per cent of respondents were "Least Vulnerable," reflecting a relatively small portion with lower vulnerability levels. while 2.50 per cent were “Highly Vulnerable," indicating a small but critical portion requiring immediate and targeted support. Lastly, none of the respondents fell into the "Not Vulnerable" category.

The above results indicated that the moderate vulnerability in this group could be attributed to various factors, which included limited access to irrigation sources and agricultural uncertainties. Climate stress further compounded their vulnerability, impacting crop yields and livelihoods. This was followed by restricted access to education and training opportunities that limited their ability to adapt to evolving economic demands. Reliance on a single source of income and inadequate healthcare facilities further contributed to their susceptibility, as many farmers relied solely on agriculture for their income. Fluctuations in crop prices and market conditions made them vulnerable to economic shocks.

Table1: Distribution of respondents according to their livelihood vulnerability index (LVI)

N =120

Sl.No.	Categories of LVI	F	%
1.	Not vulnerable (less than or equal to zero)	0	0.00
2.	Least vulnerable (0.01 – 0.30)	15	12.50
3.	Moderately vulnerable (0.31 - 0.60)	102	85.00
4.	Highly Vulnerable (0.61 – 1)	3	2.50

***F = Frequency, %= Percentage**

3.2 Livelihood vulnerability index LVI of major components of livelihood

The vulnerability index of 26 key indicators was computed into 7 major components of livelihood and presented in Table 2.

In Raichur, the relatively lower LVI score of 0.21 for the component socio-demographic characteristics has a limited impact on livelihood vulnerability. This is due to a diversified population with a mix of age groups, educational backgrounds, and household sizes. A stable and diverse demographic profile can contribute to resilience as it can mean a broad range of skills and experiences within the community. In Yadgir, the slightly higher score of 0.23 may reflect specific demographic characteristics, such as a higher concentration of vulnerable age groups, larger family sizes, or a lower literacy rate, which can lead to increased vulnerability. Understanding the specific demographics is essential for tailoring interventions to address the vulnerability in both districts.

With respect to the Livelihood Strategies component, Raichur's LVI score of 0.26 suggests that the district's livelihood strategies contribute to vulnerability to a moderate extent. This was be indicative of a need for diversification and adaptation of livelihood strategies. The reliance on a limited number of livelihood sources, especially if they are susceptible to external shocks, can lead to vulnerability. In Yadgir, the slightly lower score of 0.24 indicates a similar situation. In both districts, promoting income-generating activities that are less susceptible to external factors or improving access to skill development and training programs could help reduce vulnerability related to livelihood strategies.

With respect to the Social Networks component, the LVI score for the Raichur district was 0.60, and Yadgir, with a score of 0.59, could be attributed to factors such as limited access to social support systems, inadequate community infrastructure, low connectivity and communication networks, lack of inclusive social programs, and limited participation in social activities or organizations. These factors contributed to a weakened societal structure and hindered the district's ability to effectively respond to and cope with challenges and crises. Moreover, the limited participation in social activities or organizations led to weakened social ties, reduced social capital, and a diminished sense of belonging within the community. These factors collectively impacted the societal structure, resilience, and overall well-being of the communities in the Raichur district, hindering their development and progress.

Similarly, for food security, Raichur's LVI score of 0.28 and Yadgir's score of 0.27 suggest moderate to low vulnerability in food security. Several factors could contribute, including inadequate agricultural practices, limited access to food resources due to market constraints, or income disparities that hinder access to a nutritious diet. To address this vulnerability, interventions could focus on improving agricultural practices, enhancing market access for farmers, and implementing income support programs.

With respect to water, Raichur's high LVI score of 0.74 and Yadgir's score of 0.76 in the water component highlight a severe vulnerability to water-related factors in both districts. This vulnerability can be attributed to factors such as inadequate access to clean water sources, water scarcity due to inconsistent rainfall, and unreliable water management practices. Implementing water resource management and conservation programs, improving irrigation practices, and enhancing water infrastructure are essential steps to mitigate this vulnerability in both districts.

With respect to Health, both districts have an LVI score of 0.52 in the health component, indicating a moderate level of vulnerability related to healthcare access and infrastructure. Disparities in healthcare services, limited healthcare facilities, and challenges in healthcare delivery can be contributing factors. Addressing this vulnerability would require improving healthcare infrastructure, ensuring equitable access to healthcare services, and raising awareness about healthcare practices and hygiene.

With respect to climate variability and extremes, the high LVI scores of 0.760 for Raichur and 0.708 for Yadgir in the climate component signify vulnerability to climate-related factors. This vulnerability may result from the districts' susceptibility to extreme weather events, such as droughts or floods, which can significantly impact agriculture and livelihoods. Implementing climate-resilient agricultural practices, disaster preparedness measures, and climate-smart livelihood strategies can help reduce vulnerability to climate variability and extremes in both districts.

Table 2:Livelihood Vulnerability Index (LVI) of Major components of livelihood

N =120

Sl. No.	Major component	Raichur	Yadgir	Overall
1.	Socio-demographic profile	0.21	0.23	0.22
2.	Livelihood strategies	0.26	0.24	0.25
3.	Social networks	0.60	0.59	0.59
4.	Food	0.28	0.27	0.27
5.	Water	0.74	0.76	0.75
6.	Health	0.52	0.52	0.52
7.	Climate variability and extremes	0.76	0.70	0.73
Livelihood vulnerability index		**0.48**	**0.47**	**0.481**

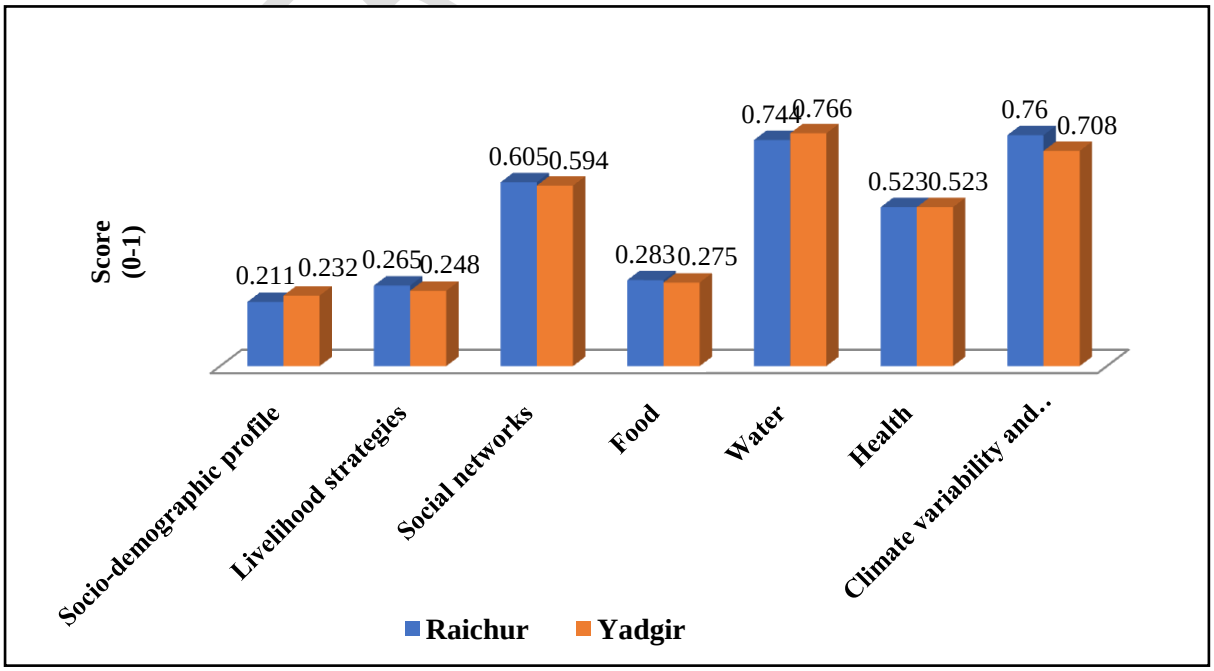

Fig. 1: Livelihood Vulnerability Index (LVI) of Major components of livelihood

3.3 Relationship of profile characteristics of the respondents with livelihood vulnerability

The Correlation coefficient r was calculated to study the relationship between independent variables and livelihood vulnerability and the results were presented in Table 3.

The results showed that among the fourteen independent variables, three of them showed a significantly positive correlation with adaptability practices at 1 per cent level, they are Landholding 0.547,Annual income -0.430 and social participation 0.409The correlation coefficients in the study reveal significant relationships between various factors and livelihood vulnerability. The probable reasons for this might be, firstly regarding landholdinga positive correlation indicates that landholding and livelihood vulnerability are positively related, implying that larger landholdings are associated with higher livelihood vulnerability. This could be because extensive landholdings demand more resources, investments, management, and following monocropping, thus exposing respondents to greater livelihood risks.

Conversely, a negative correlation highlights a significant inverse relationship between annual income and livelihood vulnerability. As annual income increases, livelihood vulnerability tends to decrease. This suggests that higher income serves as a protective factor against livelihood vulnerability, likely due to increased financial resources enabling individuals to better cope with adverse circumstances.

With increased social participation, livelihood vulnerability also tends to rise. This implies that more socially active respondents may face greater livelihood risks, possibly because of additional responsibilities or commitments associated with their engagement in social activities or networks.

Whereas, two variables showed a significant positive correlation at 05.00 per cent level of significance which includes family size -0.228 and farming experience -0.190 A significant negative correlation indicates that larger family sizes are associated with reduced livelihood vulnerability. This suggests that respondents with more family members experience lower vulnerability, potentially due to the support system and additional labour force within the family. This larger family size may signify enhanced social and economic resilience. Similarly, another negative correlation demonstrates that increased farming experience is linked to decreased livelihood vulnerability. This implies that individuals with more years of farming experience are less vulnerable, likely due to improved decision-making abilities, enhanced risk management, and better coping strategies honed over time.

While nine variables indicated no correlation, it is evident that the lack of statistically significant relationships between the profile characteristics age -0.131, education-0.142, family type 0.021, livestock possession 0.048, mass media utilization -0.028, economic orientation 0.003, extension contact -0.132, extension participation -0.058, and risk-taking ability 0.049 and livelihood vulnerability can be attributed to several reasons. Age, often considered a factor indicative of experience and resilience, might not have surfaced as significant due to the intricate interplay of variables; vulnerabilities could be influenced by economic conditions, health status, and community support networks rather than age alone. Similarly, education, although recognized as a determinant of

socioeconomic status, might not be a direct driver of vulnerability in this context. Other unexplored aspects such as the quality of education, access to specialized skills, or the presence of supportive social networks might be crucial factors influencing vulnerability. Family type, livestock possession, mass media utilization, and economic orientation, while essential in socioeconomic analyses, might not significantly impact vulnerability, potentially overshadowed by dynamic factors like market fluctuations or government policies. Moreover, the lack of significant correlations related to extension contact, extension participation, and risk-taking ability could indicate that the effectiveness of extension services, the nature of participation, and the individual perception of risks are intricate factors that demand deeper exploration.

Table 3: Relationship of profile characteristics of the respondents with livelihood vulnerability

N =120

Sl. No.	Independent variables	Pearson Correlation coefficient (r-value)	P-value
1.	Age	-0.131^{NS}	0.153
2.	Education	-0.142^{NS}	0.171
3.	Landholding	0.547**	0.000
4.	Family type	0.021^{NS}	0.821
5.	Family size	-.228*	0.012
6.	Farming experience	-0.190*	0.038
7.	Annual income	-0.430**	0.000
8.	Livestock possession	0.048^{NS}	0.601
9.	Social participation	0.409**	0.000
10.	Mass media utilization	-0.028^{NS}	0.761
11.	Economic orientation	0.003^{NS}	0.973
12.	Extension contact	-0.132^{NS}	0.151
13.	Extension participation	-0.058^{NS}	0.526
14.	Risk taking ability	0.049^{NS}	0.594

**. Significant at the 0.01 level (2-tailed).
*. Significant at the 0.05 level (2-tailed).
NS – Non significant

3.4 Logistic regression analysis of profile characteristics of the respondents with their livelihood vulnerability

The relationship of independent variables with the livelihood vulnerability of farmers was studied through logistic regression analysis and the results are presented in table 4. The result revealed that the three variables namely landholding, annual income, and Livelihood activities were found to be significant at 5 per cent level of probability with their livelihood vulnerability farmers. The R^2 value of 0.76 was obtained, which indicates that 76 per cent of the livelihood vulnerability of farmers was explained by the variables selected for the study.

It was observed from Table 4 that variables included in the study could explain 76 per cent of the variation in the livelihood vulnerability of farmers. Out of fifteen variables considered, only three variables namely landholding (-0.736), annual income (-1.917), and Livelihood activities (-0.695) were found to be negatively significant with the livelihood vulnerability of farmers. This indicates that for every 1 per cent increase in land holding livelihood vulnerability decreases by 0.736 per cent, for every 1 per cent increase in annual income livelihood vulnerability decreases by 1.917 per cent and for every 1 per cent increase in livelihood activity livelihood vulnerability decreases by 0.695 per cent. Hence, these three variables could be termed as good predictions for the livelihood vulnerability of the farmers.

Table 4: Logistic regression analysis of profile characteristics of the respondents with their livelihood vulnerability

N =120

Sl. No.	Independent variables	Livelihood vulnerability		
		Regression coefficient	Standard error	t- value
1	Age	0.086 NS	0.206	0.416
2	Education	-0.085 NS	4.130	-0.989
3	Landholding	-0.736**	0.138	4.050
4	Family type	0.090 NS	3.077	0.029
5	Family size	-0.015 NS	1.758	-0.652
6	Farming experience	-0.218 NS	0.189	-1.156
7	Annual income	-1.917**	5.599	3.425
8	Livestock possession	0.046 NS	2.187	0.433
9	Social participation	-0.226 NS	4.401	-0.051
10	Mass media utilization	0.215 NS	0.530	-0.406
11	Economic orientation	-0.152 NS	5.948	-0.026
12	Extension contact	-0.327 NS	0.302	1.084
13	Extension participation	-0.591 NS	7.627	-1.520

14	Risk-taking ability	-0.388 ^{NS}	5.080	0.667
15	Livelihood activities	-0.695**	0.138	0.466

**. Significant at the 0.05 level (2-tailed).
NS – non-significant
R= 0.85 R^2 = 0.76

4. Conclusion

This study focuses on the livelihood vulnerability of farmers in Karnataka's aspirational districts, specifically Raichur and Yadgir. Employing a Livelihood Vulnerability Index (LVI), the research identifies 85% of surveyed farmers as "moderately vulnerable," attributing this vulnerability to factors like limited irrigation access, climate uncertainties, market fluctuations, and socio-economic disparities. Beyond mere identification, the study offers a roadmap for improvement. Examining socio-demographics, livelihood strategies, and climate variability, it highlights issues such as severe water problems and climate impacts on agriculture. Correlation and regression analyses pinpoint significant predictors like landholding, income, and livelihood activities, emphasizing the need to address economic disparities and promote resilient livelihood strategies.

The study's results provide actionable insights for policymakers, advocating interventions in water resource management, climate-resilient agriculture, and income generation to mitigate vulnerability. Recognizing the importance of tailored approaches, the research underscores the need for interventions considering specific demographics and social networks in each district. In conclusion, this research contributes both academically and practically, offering guidance for targeted policies that enhance the resilience and well-being of farmers in Karnataka's aspirational districts.

5. References

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