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Role of dairying in livelihood security of dairy farmers in aspirational districts of Andhra Pradesh

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Abstract

Dairying secures 8.4 million livelihoods annually and also plays a crucial role in providing the year round income, employment generation and nutritional support to the rural households. Livelihood security can be defined as 'adequate and sustainable access to income and resources to meet basic needs. The government of India initiative in the identified 117 aspirational districts programme, based on the forty-nine key performance indicators of five thematic areas viz. education, health and nutrition, agriculture, financial inclusion and water resources, basic infrastructure and skills had been initiated through various schemes and programmes. In this context, the current research was conducted in the aspirational districts of Andhra Pradesh state viz. Kadapa Vizianagaram and Visakhapatnam districts, to evaluate the part dairying plays in ensuring the dairy farmers' financial security. The primary data was collected through random sampling method from 180 respondents comprising of equal number of dairy and non-dairy farmers. 'Livelihood Security Index' (LSI) was developed to analyse the role of dairying in securing the livelihood of dairy farmers in aspirational districts. The study's key findings showed that the majority of dairy farmers (48.88%) belonged to a medium degree of livelihood security, whereas the majority of non-dairy farmers (44.44%) had a poor level of security. The present study conclude that dairying provides a better livelihood security to the dairy farmers which will also aid in securing a better livelihood for non-dairy farmers if they integrate as subsidiary occupation in the aspirational districts of Andhra Pradesh.

Keywords: Dairying, livelihood security, dairy farmers, aspirational

1. Introduction

Access to sufficient and sustainable sources of income and resources to meet basic needs is known as livelihood security. With an output of 209.96 million tonnes in 2020–21, India will continue to be the world's greatest milk producer (source: dahd.nic.in). Providing nutrition support, lowering rural poverty and unfairness, assuring food security for millions of rural households, and boosting economic growth, particularly in rural regions, are all benefits of dairying to developing nations' economics. 8.4 million farmers depend on the dairy industry for their annual income. The government of India launched a number of schemes and programs as part of its initiative in the 117 aspirational districts program based on the 49 key performance indicators of five thematic areas: education, health and nutrition, financial inclusion, agriculture and water resources, basic infrastructure, and skills (source: niti.gov.in). This study's primary focus is on how dairying affects the livelihoods of dairy farmers in Andhra Pradesh's aspirational districts. The research study was conducted in Andhra Pradesh's aspirational districts of Kadapa, Vizianagaram, and Visakhapatnam.

The districts were chosen based on the Government of India's Aspirational Districts Programme (ADP), which was launched in 2018 by NITI Aayog. The key performance indicators (KPI) under five thematic categories accounting to (49) forty-nine indicators were used to identify the most undeveloped districts.

2. Methodology

2.1 Livelihood Security Index

'Livelihood' is defined as adequate stock and flow of food and cash with an individual or a family to meet their basic needs (Acharya, 2006) [1]. According to the study, it was functionally characterized as the capacity of homestead families to get sufficient access to pay and different assets to address essential issues including nutrition, food, a healthy environment, health care, infrastructure, educational opportunities, social integration, resource allocation,

and community participation, among other things. The Livelihood Security Index (LSI) was initiated to explore the state of farmer's livelihood through Dairy farming in aspirational districts of Andhra Pradesh. This implies that the livelihood security of the respondents who were practising dairy farming i.e., Dairy farmers were compared with the farmers who do not practice dairying i.e., Non-dairy farmers; the significance of Dairy farming in maintaining livelihood security of the respondent farmers and families in the study area, could be assessed aptly.

2.2 Development of livelihood security index

The concept of livelihood security is multifaceted. The analysis of relevant literature (Gillingham and Islam, 2004) [5] on the "Livelihood Index," comprehensive components for assessment of LSI, were selected. The indicators of livelihood security which are chosen are Economic security, Health security, Food and Nutritional security, Institutional security, Infrastructural security and Social security.

2.3 Determination of scale values

To provide each of the Livelihood Security Index's dimensions a precise weighting (Scale Value) based on the value of each dimension. The Normalized Rank Order Method, as described by Guilford (1954) [3], was used to calculate the scale values. The technique has the particular advantage of being able to handle any number of variables and without requiring a large number of judges. According to protocol, the experts in the field were consulted after the scale's components were chosen, and they ranked the items based on how important they were thought to be in determining how secure the respondent farmers' livelihoods were. The rating procedure involved judges from the social sciences, extension educators, and academics. The Performa with the LSI dimensions was emailed to a total of 80 judges, who were asked to rate the dimensions based on how important they were to the security of farmers' livelihoods. Out of 80 judges, 35 responses had the set of indicators returned after they had properly documented their decisions. The responses were carefully reviewed, and those that weren't appropriate for item analysis were removed. The finalised item analysis of the 30 responses were taken into account for further processing. The 30 judges' rankings were compiled and shown in Table 1. Using the following formula, the proportions (p values) for the ranks given by each judge were calculated:

$$p = \frac{[(R_i - 0.5) * 100]}{n}$$

Where,

R_i = stands for the rank value of the dimension i in the reverse order as 7 to 1 and

n = indicates the number of dimensions ranked by the judges.

2.4 Relevancy test

The most crucial step in creating a valid and effective index is item analysis. The relevance of each indicator was rated by the judges using three point continuums, "Most Relevant," "Relevant," and "Least Relevant," with scores of 3, 2, and 1, respectively. The following formula was used to calculate the Relevancy Weightage (RW) and Mean Relevancy Score (MRS) for each of the specified indicators individually:

$$\text{Relevancy Weightage (RW)} = \frac{f_{xi*3} + f_{xii*2} + f_{xiii*1}}{f_x * 3}$$

Where,

- f_{xi} = Number of More Relevant response
- f_{xii} = Number of Relevant response
- f_{xiii} = Number of Least Relevant response
- f_x = Total Number of Judges
- f_{x*3} = Maximum possible score

$$\text{Mean Relevancy Score (MRS)} = \frac{f_{xi*3} + f_{xii*2} + f_{xiii*1}}{f_x}$$

Where,

- f_{xi} = Number of more relevant response
- f_{xii} = Number of Relevant response
- f_{xiii} = Number of Least relevant response
- f_x = Total number of Judges

The indicators with Relevancy Weightage (RW) > 0.80 and Mean Relevancy Score (MRS) > 2.40 were taken into consideration for inclusion in the Livelihood Security Index (LSI) utilizing these two criteria. Using this process, the judges' feedback was used to choose, modify, and rewrite the final indications for the various LSI aspects. For the purpose of gathering conclusive data from the respondents, a variety of items and statements were constructed under each indication.

Table 1: showing the scale values of index development

r _i	R _i	Seven Dimensions of Livelihood Security Index (LSI)							Σf	p	C
		Food and nutritional security	Economic security	Health security	Educational Security	Social security	Institutional security	Infrastructural security			
1	7	11	5	4	2	1	3	4	30	92.85	8
2	6	6	6	3	5	2	2	6	30	78.57	7
3	5	2	10	9	2	2	1	4	30	64.28	6
4	4	5	3	2	10	4	3	3	30	50	6
5	3	3	1	6	6	7	3	4	30	35.71	5
6	2	1	2	4	4	2	11	6	30	21.42	5
7	1	2	3	2	1	12	7	3	30	7.14	4
Σf		30	30	30	30	30	30	30	210	350	41
Σfc		200	187	177	177	151	160	178			
Sc		6.67	6.23	5.90	5.90	5.03	5.33	5.93		M=4.28 σ=0.45 SE=0.08	

r_i = Correct rank order, R_i = Reverse rank order, Σ = Sum, p = Proportion, C = C values of respective ranks, Sc = Scale value, σ = Standard Deviation, Standard Error = σ/√N

2.5 Computation of the composite index

Each LSI dimension has a different range of total scores since it uses a different number of indicators. In order to transform the overall score for each dimension into a unit score, the following simple range and variance were used:

$$U_{ij} = \frac{Y_{ij} - \text{Min } Y_{ij}}{\text{Max } Y_j - \text{Min } Y_j}$$

Where,

U_{ij} = Unit score of the i^{th} respondents on j^{th} dimension

Y_{ij} = Value of the i^{th} respondent on the j^{th} dimension

Max Y_j = Maximum score on the j^{th} dimension

Min Y_j = Minimum score on the j^{th} dimension

As a result, the score for each dimension will range from 0 to 1, with 0 representing the lowest Y_{ij} and 1 representing the highest Y_{ij} . The unit scores of each respondent will then be multiplied by the corresponding scale value for each dimension, and the results will be added up. To get the LSI for each responder, the score received was divided by the sum of the scale values.

$$LSI_i = \frac{\sum U_{ij} * S_j}{\text{Sum of scale values}}$$

Where,

LSI_i = Livelihood Security Index of i^{th} respondent

U_{ij} = Unit score of the i^{th} respondent on j^{th} component

S_j = Scale value of the j^{th} component

\sum = Sum

Thus, the score for each dimension, which ranges from 0 to 1, is 0 when Y_{ij} is at its minimum and 1 when it is at its greatest. The unit scores for each respondent were then multiplied by the corresponding scale value for each dimension and added together. To get the LSI for each responder, the score received was divided by the sum of the scale values.

2.6 Propensity Score Matching (PSM) technique

Propensity score matching technique (Rosenbaum and Rubin, 1983) was employed for comparing dairy farmers and non-dairy farmers with respect to overall livelihood security.

3. Results and Discussion

3.1 Livelihood security of the dairy farmers and non-dairy farmers

To determine the role of dairy farming in the livelihood security of the respondent's dairy farmers. A comparative study was conducted in the study region between two groups of farmers, namely dairy and non-dairy farmers. Farmers who owned at least one milch cattle were classified as dairy farmers and those who did not own any milch cattle were classified as non-dairy farmers. The indicator and composite index values were then compared between dairy and non-dairy farmers.

3.2 Comparison of characteristics between dairy and non-dairy farmers using propensity score matching

Propensity Score Matching (PSM) method was used to statistically compare livelihood of dairy and non-dairy farmers.

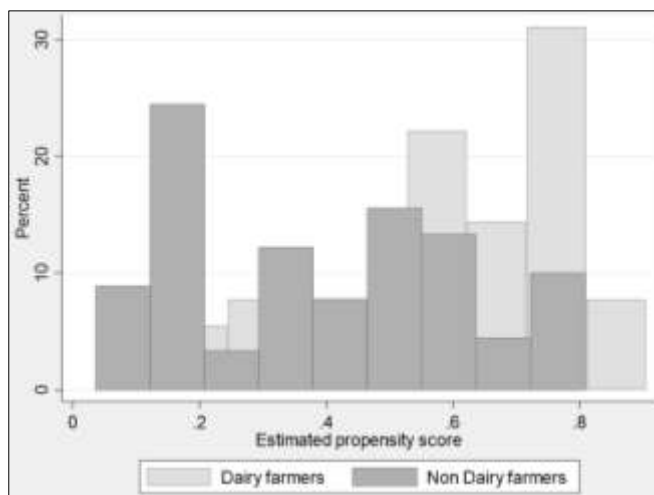


Fig 1: Graph showing the frequency distribution of propensity score of dairy and non-dairy farmers

It can be observed from the table 2 that livelihood security of dairy farmers had significantly higher than that of non-dairy farmers by 23.61 percent. Therefore, farmers who were practising dairying had more secured livelihood than the non-dairy farmers. The findings are in concurrence with (Lwelamira *et al.*, 2010) [6] and (Shivagangavva, 2022) [7].

Table 2: Average difference and gap analysis after propensity score matching of dairy and non-dairy farmers

Number of matches	Dairy	% Gap
m=1	0.170***	23.61%
	(0.016)	
m=3	0.165***	22.91%
	(0.015)	
m=5	0.163***	22.63%
	(0.015)	
Observations	180	

3.3 Livelihood Security Index

From the Table 3 it could be depicted that, composite index value for the dairy farmers is 0.72 and for the non-dairy farmers it is 0.56. The food and nutritional security of dairy farmers had highest index value of 0.86 followed by the health security (0.84), Institutional security (0.80), Infrastructural security (0.79), Social security (0.66), Educational security (0.54) and Economic security is at last with composite index value of 0.51.

In case of non-dairy farmers, food and nutritional security with index value of 0.72 followed by Health security (0.65), Infrastructural security (0.64), Institutional security (0.61), Social security (0.46), Educational security (0.45) and Economic security is at last with composite index value 0.40. The above data indicates that, both dairy farmers and non-dairy farmers have better Food and Nutritional security and have low Economical security the detailed comparison is listed below in separate indicators. The findings could be attributed to the order of importance/preference of focus on expenditure and awareness of the farm families on the food and nutrition.

Table 3: Composite Livelihood Security Index values of Dairy and Non-dairy farmers

Indicators	Index value	
	Dairy farmers (n=90)	Non-dairy farmers (n=90)
Food and Nutritional security	0.86	0.72
Economic security	0.51	0.40
Health security	0.84	0.65
Educational security	0.54	0.45
Social security	0.66	0.46
Institutional security	0.80	0.61
Infrastructural security	0.79	0.64
Composite index value	0.72	0.56

3.4 Overall livelihood security of the dairy farmers and non-dairy farmers

From the Table 4 it is clear that, 48.88 percent of the dairy farmers had medium level of livelihood security followed by high (37.77%) and low (13.33%), and in case of non-dairy farmer's 44.44 percent had low level of livelihood security followed by medium (35.55%) and high (20.00%). Dairy farmers had better livelihood security as compared to non-dairy farmers. The results are in accordance with (Shivagangavva, 2022)^[7].

Table 4: Distribution of respondents according to their overall livelihood security

Category	Dairy farmers (n=90)		Non-dairy farmers (n=90)	
	Frequency	Percentage	Frequency	Percentage
Low (< 0.52)	12	13.33	40	44.44
Medium (0.52-0.68)	44	48.88	32	35.55
High (> 0.68)	34	37.77	18	20
Mean	0.72		0.56	

4. Conclusion

In the light of the above findings, it is concluded that, "livelihood security" of the dairy farmers was observed to be significantly higher than the non-dairy farmers by 23.61 per cent in aspirational districts of Andhra Pradesh State. The overall livelihood security index for the dairy farmers was at 0.72 and in case of non-dairy farmers it is 0.56. Even though dairy farmers secure a better livelihood in every aspect, still there are some measures to be taken to ameliorate the dairying in the study area. The medium level of experience in dairy farming revealed that there is a need to improve the knowledge domain among the existing cattle management practices. Altogether, dairying has played a vital role in securing the livelihood of the dairy farmers, which will also aid in securing a better livelihood for non-dairy farmers if they integrate dairying as subsidiary occupation in the aspirational districts of Andhra Pradesh.

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