Livelihood Security of Farm Households in Eastern Dry Zone of Karnataka - An Economic Analysis

A. P. Bhavya[*], B. C Ashwini and K. B. Umesh

Department of agricultural economics, UAS, GKVK, Bengaluru-65, India

*Corresponding author

A B S T R A C T

The present research work makes an effort to understand the livelihood security of farmers adopting various farming systems like Crop + Sheep, Crop + Dairy, Crop + Dairy + Sericulture and Crop + Dairy + Horticulture in EDZ of Karnataka. The livelihood index has been developed for farm households under different sub components like Economics, food, health, education, habitat, social participation and composite index. The composite livelihood security of C + D + H farming system was 0.49 higher than the other farming systems. In case of economic security, C + D + H farming system households had highest index (0.42) than the other farming systems. The dairy and sericulture components contribute highest to the total income in the existing farming system. Hence, the addition of enterprises like dairy, sericulture, sheep, horticulture, which are suitable to the zone can add to the income, besides enhancing the nutritional and livelihood security of the farm households.

Introduction

Indian agriculture is characterized with huge labour force, rank first with the world's highest net cropped area and rank second in farm output in the world. However, agricultural growth in India is decelerating every year (12.89 % in 1975 to 2.1 % in 2017) (www.indianstat.com) and at the same time the government is trying hard to double the farm income. Hence, there is a need to integrating different farming systems to provide better livelihood is the need of hour to enhance the farm income (Harishkumar *et al.,* 2016). Farming system is the result of interaction among several interdependent components like crops, dairy, poultry, sericulture, piggery, sheep, goat, fisheries, bee-keeping etc. (Norman, 1978). Livelihood refers to adequate stock and flow of food and cash with an individual to meet their basic needs and livelihood security means secured ownership of, access to resources and income earning activities, including reserves and assets to offset risk, ease shocks and meet contingencies (Shyamli *et al.,* 2013; Ijarotimi and Oyeneyin, 2005). The concept of household livelihood security allows for a more comprehensive understanding of poverty, malnutrition, dynamic and complex strategies that the people use for survival. With this background, effort is made to

analyze livelihood security of farmers who practice various farming systems like crop + sheep, crop +dairy, crop + dairy + sericulture and crop + dairy + horticulture in the Eastern dry zone of Karnataka.

Materials and Methods

In present study, a random and purposive sampling procedure has been adopted for the selection of districts, taluks, villages and farmers. In the first stage, purposively Kolar district representing the eastern dry zone of Karnataka was selected based on the rainfed farming with ground water irrigation system followed in agriculture. In the second stage, based on the major farming systems practiced in the district, three taluks were selected Viz, Bangarpet taluk representing Crop + Sheep (C + Sh) faming system, Kolar for Crop + Dairy + Sericulture (C + D + S) farming system, and Mulbagal representing both Crop+ Dairy (C + D) and Crop + Dairy + Horticulture (C + D + H)farming systems. In the third stage, three villages from each taluk were randomly selected, and for each village 10 samples were collected make a total sample size of 120.

The data were collected from primary and secondary sources. Personal interview method was followed to collect the primary data using pre-tested schedule. The collected data was analyzed using conventional methods like frequency, averages and proportion. Livelihood security index was developed to estimate the livelihood security status of the different farm households.

Livelihood security index

Conceptual frame work The household livelihood security index (HLS) uses a balanced weighted average approach with a large number of indicators, where each indicator is assumed to contribute equally to the overall index (Venu *et al*., 2018) The indicators are grouped into different domains representing the security areas such as economic, nutrition, health, education, habitat and social-participation.

In this paper, we have considered the Maxwell and Frankenberger model has been considered to access the household livelihood security. The major component of livelihood security include (Sakamma, 2013).
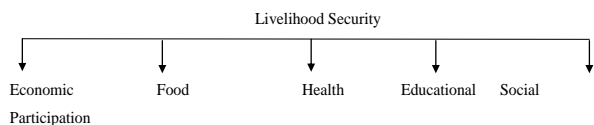
Economic security: includes total annual income earned by the farmers, value of farm land, value of livestock, value of non land farm assets and household savings.

Food security: includes quantity of food consumption and its expenditure.

Education security: consists of accessibility and availability of educational institutions in the study area.

Health security: consists of expenditure on health problems, accessibility and availability of health centers.

Habitat security: includes type of house (Pakka, Semi pakka, and Kaccha house), accessibility and availability of drinking water, toilet facility and cooking gas connection.

Social–participation security: consists of number of members participating in SHG, Milk cooperatives, Gram panchayath, Taluk panchayath and ownership of TV and Mobile phones.

Since each indicator is measured on a different scale, indicators are standardized following the approach adopted in measuring 'Life Expectancy' in Human Development

Reports (Akter and Rahman, 2012).

For example, a standardised indicator *j* is given by:

$$Zind_j = \frac{indicator_j - \min j}{\max j - \min j}$$

Where minimum and maximum values of the indicators are from the same components to which the j is considered. Once each indicator representing a particular livelihood security domain is standardised, then the relevant household livelihood security index for the particular domain is constructed by averaging the standardized indicators:

$$HLS_j = \sum_{I=1}^{j} zind_j / j$$

Where: *j* is the number of indicators used to construct the index.

The Composite overall Livelihood Security (CLS) index for the household is constructed by using the formula.

$$CLS = \sum_{i=1}^{n} wiHLSi / \sum_{i=1}^{n} wi$$

Where,

w - Indicates the weights determined by the number of indicators used to construct each HLS index. A weight varies among households, because of the variation in the number of indicators at the household level.

Results and Discussion

Economic security

Table 1 indicates the land holding pattern of the farm households in Kolar district. The average land holding was found to be higher in C + D + S farming system followed by C + D + H farming system. Average land holding

of rainfed farming of all the farming systems were more than irrigated farming systems. Kolar district comes under the Eastern dry zone of Karnataka where water supplementation from upper catchment is not available so farmers are highly reliable on ground water and rainfall for agriculture production.

Table 2 indicates the ownership of fixed assets under major farming systems in Kolar district. The value of land per farm was found to be highest in C + D + S farming system followed by C + D + H farming system. This is due to location of the farm land is very near to the city centers and average size of the farm (1.69 and 1.5 ha) and interestingly contribution of value of non land farm asset (14 %) was found to be highest in C + D + H farming system in Kolar district.

In the Table 3 Indicate the net income of farm households from various sources in Kolar district. C + D + S farmers used to get a maximum net annual income of Rs. 376453 of which 57.72 per cent was sourced from sericulture and 36.19 per cent from livestock and only four per cent from crop due the lower income crops grown by the farmers. Here it is notice that livestock contribution to the total income is more than 30 per cent in all the farming systems and has become source of sustainable income for the farmers (Sachin, 2012, and Zainab, 2010).

Food Security

Quantity of food consumption and expenditure pattern of farm households of different farming systems in the study area is presented in Table 3. It clearly shows that dietary pattern of households in all groups was mainly cereal based. Average consumption of cereals was estimated higher in C + D + S (86 kg/family/month) and lower in C + D (54 kg/family/month). Average

consumption of pulses was low in all the farming systems Compared with the ICMR recommendation (80 gm /day) in the districts. Average consumption of vegetables, fruits, milk, edible oil and sugar was higher in C + D + H based farm households and lower in C + Sh farm households which has to be correlated to level of farm income and average family size in both the district.

Average monthly expenditure on meat and egg was found higher in C + D +S based farming system in Kolar district and Monthly consumption expenditure was found higher in C + D + S (Rs.5164) followed by C + Sh (Rs. 4885) based farming system it is due average

number of family member per farm, consumption pattern and net annual income of sample respondent. This result is contradictory with the findings of Harishkunmar (2012).

Health Security

Health is one of the important factors in livelihood security of households. Security of farm households in terms of health is defined by way of availability and accessibility of health services like primary health center, 24 hours facility, Specialty hospital, and Yashaswini card.

Table.1 Land holding pattern of farm households in Kolar District (Hectare per farm)

Type of Land holding	C + Sh (n=30)	C + D + S (n=30)	C + D (n=30)	C + D + H (n=30)	F value
Irrigated	0.12 (10.25)	0.57 (33.72)	0.22 (16.66)	0.38 (25.33)	11.38[***]
Rainfed	0.82 (70.08)	1.00 (59.17)	0.92 (69.69)	0.98 (65.33)	1.11 [NS]
Present Fallow land*	0.23 (19.65)	0.12 (7.10)	0.18 (13.63)	0.14 (9.33)	39.58[***]
Total	1.17 (100)	1.69 (100)	1.32 (100)	1.5 (100)	113.73[***]

Note: *Present fallow land: land that is not seeded for one or 2 growing season. Figures in parentheses represent Percentage to total. ***significant at 1 % level, **significant at 5 % level, NS – non significant

Table.2 Ownership of fixed assets under major farming systems in Kolar district

Sl. No.	Particulars	C + Sh (n=30)	C + D + S (n=30)	C + D (n=30)	C + D + H (n=30)	F value
	Average size of the farm (Ha)	1.17	1.69	1.32	1.50	
1.	Value of the land per farm (Rs.)	2197500 (99.58)	24175000 (98.41)	2750000 (94.02)	3660000 (85.66)	137.87[***]
2.	Value of the non land farm asset (Rs.)	9186 (0.41)	389715 (1.58)	174752 (5.97)	612456 (14.33)	286.96[***]
3.	Total asset per farm (Rs.)	2206686 (100)	24564715 (100)	2924752 (100)	4272456 (100)	140.23[***]
4.	Total Asset per hectare (Rs.)	1298050	14535334	2215721	2848304	233.89[***]

Note: Figures in parentheses represent Percentages to total. ***significant at 1 % level, **significant at 5 % level

Table.3 Net income of farm households from various sources in Kolar district (Rupees/ annum)

Farming systems	Crop	Livestock	Sericulture	Non –farm income*	Total
C + Sh (n=30)	13256 (12.07)	74549 (67.92)	-	21950 (19.99)	109755 (100)
C + D + S (n=30)	18332 (4.86)	136245 (36.19)	217316 (57.72)	4560 (1.21)	376453 (100)
C + D (n=30)	16032 (7.74)	152184 (73.55)	-	38690 (18.69)	206906 (100)
C + D + H[1] (n=30)	108953 (45.19)	113152 (46.93)	-	18984 (7.87)	241089 (100)
F value	34.25***	631.50***	29.67***	208.30***	

Note: Figures in parentheses represent Percentages to total*Non-farm income includes income earned by working in others field for wages, working in Governmental organizations, working in private organizations or through own enterprises like kirani shops etc. ***significant at 1 % level, **significant at 5 % level. NS – Non Significant. 1 – crop income include crop + horticulture income

Table.4 Quantity of food consumption and expenditure pattern of sample farm household per month in Kolar district

Food Item	C+Sh (n=30)		C+D+S (n=30)		C+D (n=30)		C+D+H (n=30)	
	Kg	Rs.	Kg	Rs	Kg	Rs	Kg	Rs
Avg. family size (No)	6		6		5		5	
Cereals (Kg)	84 (54.80)	895	86 (49)	915	54(41)	450	58(40)	480
Pulses (Kg)	4.28 (2.80)	234	5.13 (2.93)	330	4.6 (3.49)	248	5.10 (3.55)	310
Edible Oil (kg)	3.56 (2.30)	221	4.5 (2.57)	290	4.1 (3.11)	230	4.2 (2.92)	270
VegeTables (Kg)	29.4 (19.20)	553	38 (21.67)	650	34.2 (25.95)	590	38 (26.43)	580
Fruits and Nut (Kg)	5.00 (3.30)	304	6.12 (3.49)	450	5.0 (3.79)	304	6.14 (4.27)	460
Egg and meat (kg)	5.6 (3.70)	1360	4.5 (2.57)	1485	3.8 (2.88)	1254	4.12 (2.87)	1359
Milk and Milk Products (kg)	17 (11.10)	374	26 (14.83)	528	21 (15.93)	462	23 (16)	483
Sugar & Jaggery (kg)	4.51 (2.90)	224	5.12 (2.92)	256	5.1 (3.87)	255	5.2 (3.62)	265
Others		120		250		200		200
Total	153 (100)	4885	175 (100)	5164	132 (100)	3993	144 (100)	4407

(Note: 1 egg = 44 gm, Figures in parentheses represent Percentage to total)

Table.4 Availability and accessibility to health services to farm households in Kolar district

Particular	Health center	C + Sh (n=30)	C + D + S (n=30)	C + D (n=30)	C + D + H (n=30)
Availability (Per cent)	Primary	25.12	33.33	65.12	42.25
	24 Hours facility	12.52	15.25	32.15	56.84
Accessibility (Distance in km)	Primary	3.20	1.00	0.80	2.25
	24 Hours facility	4.50	2.90	1.50	5.60
	Specialty hospital	11.12	8.20	7.00	8.50
Accessibility (Time in min)	Primary	15.12	8.50	10.15	12.41
	24 Hours facility	18.20	15.50	15.12	16.42
	Specialty hospital	25.10	25.45	30.24	20.18
No. of farmers owning Yashaswini card		12	22	24	25

Table.5 Household assets of farm household in Kolar district

Particular	C + Sh (n= 30)		C + D + S (n=30)		C + D (n=30)		C + D + H (n=30)	
	No.	Value (Rs.)	No.	Value (Rs.)	No.	Value (Rs.)	No.	Value (Rs.)
Type of House 1. Kaccha	7	47210 (12.51)	3	55486 (6.56)	5	55789 (8.17)	4	56789 (7.26)
2. Semi Pakka	22	96412 (25.55)	17	194285 (22.99)	20	187590 (27.48)	15	210457 (26.94)
3. Pakka	1	184756 (48.90)	10	478953 (56.68)	5	365897 (53.60)	11	398745 (51.04)
Toilet facility	24	11320 (3.00)	29	13475 (1.59)	25	11457 (1.67)	30	12987 (1.66)
Coocking gas	18	5120 (1.35)	28	5240 (0.62)	28	5187 (0.75)	30	5421 (0.69)
Value of the durable (Rs.)		32410 (8.59)		97425 (11.53)		56714 (8.30)		96784 (12.38)
Total value (Rs.)		377228 (100)		844864 (100)		682634 (100)		781183 (100)

(Note: Figures in parentheses represent Percentage to total)

Table.6 Availability and accessibility to drinking water by the farm households in Mandya district

Particular	Source	C + Sh (n=30)	C + D + S (n=30)	C + D (n=30)	C + D + H (n=30)
Availability (Per cent)	Public source	53.33	56.66	26.66	46.66
	Own bore well	10	13.33	10	10
	Filter water	36.66	30.00	63.33	43.33
Accessibility (Distance in Mt.)	Public source	64.33	57.89	80.76	65.75
	Own bore well	1.50	1.45	1.10	0.55
	Filter water	957	1142	1245	1124
Accessibility (Time in min)	Public source	2.15	1.43	3.25	2.23
	Own bore well	0.30	0.41	0.25	0.15
	Filter water	11.20	12.40	13.42	12.48

Table.7 Availability and accessibility to drinking water by the farm households in Kolar district

Particular	Source	C + Sh (n=30)	C + D + S (n=30)	C + D (n=30)	C + D + H (n=30)
Availability (Per cent)	Public source	30.00	6.66	13.33	6.66
	Own bore well	-	23.33	-	26.66
	Filter water	70.00	70.00	86.66	66.66
Accessibility (Distance in Mt.)	Public source	221	248	252	124
	Own bore well	-	1.12	-	2.12
	Filter water	1300	1750	1325	2145
Accessibility (Time in min)	Public source	4.20	4.56	5.13	2.19
	Own bore well	-	0.50	-	2.10
	Filter water	12.13	13.45	13.4	15.42

Table.8 Availability and accessibility of education institutes in Kolar district

Particular	Source	C + Sh (n=30)	C + D + S (n=30)	C + D (n=30)	C + D + H (n=30)
Availability (Per cent)	Primary School	80	95	83.33	93.33
	High School	36.66	64.53	58.45	60.00
Accessibility (Distance in Km.)	Primary School	0.90	0.45	0.82	0.60
	High School	3.12	1.98	3.2	1.84
	College and Degree	12	10.40	13.45	9.00
Accessibility (Time in min)	Primary School	6.2	3	6	4.2
	High School	14.2	8	12	6.3
	College and Degree	28	23.4	26	16

Table.9 Social participation status of the farm households in Kolar district (in number)

Sl No.	Particulars	C + Sh (n=30)	C + D + S (n=30)	C + D (n=30)	C + D + H (n=30)
1.	Member in Gram Panchayath	1.00 (3.33)	3 (10.00)	1 (3.33)	3 (10.00)
2.	Member in Taluk Panchayath	-	-	-	1 (3.33)
3.	Member in Milk Producers Co-operative Society	2 (6.66)	29 (96.66)	30 (100.00)	30 (100.00)
4.	Member in SH Group	27 (90.00)	22 (73.33)	26 (86.66)	22 (73.33)
5.	Television (No)	23 (76.66)	28 (93.33)	27 (90.00)	28 (93.33)
6.	Phone (No.)	38 (126.66)	55 (183.33)	42 (140.00)	52 (173.33)

(Note: Figures in parentheses represent Percentage to total number of sample)

Table.10 Composite livelihood security index of sample farm households of Kolar district

Particulars (Index)	C + Sh (n=30)	C + D + S (n=30)	C + D (n=30)	C + D + H (n=30)	F value
Economic security	0.23	0.48	0.38	0.42	24.50***
Food security	0.38	0.42	0.37	0.47	4.56***
Health security	0.24	0.28	0.40	0.45	14.51***
Habitat security	0.34	0.51	0.45	0.49	21.53***
Educational security	0.42	0.50	0.49	0.57	3.46***
Social participation security	0.32	0.55	0.48	0.59	39.41***
Over all livelihood security	0.322	0.44	0.42	0.49	14.23***

Note: *** significant at 1 % level,   ** significant at 5 % level

Table 4 reveals that Percentage of availability of primary health center was highest in C + D (65.12 per cent) farming system households with in the radius of 0.8 km and it takes average of ten minutes to reach followed by C + D + H farming system. There is no specialty Hospital facility within the radius of 20km in any one of the farm households in both districts. Highest number of Yashaswini card holders found in C + D + H farm households than the other farming systems in the districts

Habitat Security

Habitat of the household is another factor which influences the livelihood of household. Type of house, toilet facility, availability of cooking gas, drinking water and value of the durables (television, phone, fans, almirahs, motor cycle, fridge etc.) are the parameters which influences habitat security. Table 5, 6 and 7 indicate that, total value of household assets found higher in C + D + S (Rs. 844864) farm households followed by C + D + H farming system. Government programs like MGNAREGA and Ujjwala Yojana have benefited more than 60 percent of farm households by providing toilet facility and cooking gas facility in both the districts. With respect to the availability and accessibility of the drinking water more than 66 per cent of the farm households use filtered water as public source of drinking water as the ground

water extracted from deeper layer has higher salt load. Only 20 percent of the farm households depend on their own bore well for drinking water in C + D + S and C + D+ H farming system.

Education Security

Education is the most important aspect of life. Availability and accessibility of education institutes to farm households were taken for calculation of education security. Table 8 reveals that more than 80 Per cent of respondents have primary schools available within a radius of 1 km. However, none of the households in any of the farming systems have college and degree in the vicinity of 10km in the districts. That means students from these farming system households have to travel more than 20 minutes, which accounts for expenditure on education.

Social participation Security

Social network is nothing but the level of participation by the households in organizations like Panchayats, Milk co-operatives and Self Help Groups, access to elements like phone and television is another factor which determines social network status of households. The Table 9 reveals that participation in organizations like Panchayath (3) and co-operatives (30) was found higher

in C + D + H farming system in Kolar district and also 93.33 per cent of households had access to television in C + D + H farming system followed by C + D + S farming system with assessment of 86.66 Per cent and 93.33 respectively. Interestingly participation in SHGs was found to be highest (90 Per cent) among C + Sh farming system households in the district due to small savings and need of credit to the farm households and usage of phone in all the farming systems in the district is more than 100 Per cent.

Composite livelihood security index for farm households in the study area

Livelihood security index includes subcomponents of food security, economic security, education security, health security, habitat security and social participation securities. From the Table 10 indicate that the composite livelihood security index was found to be lowest (0.35) in C+ Sh farming system households. It is due to less landholding, less annual income, least participation in social activities and availability and accessibility of the education institution. The composite livelihood security index was found to be higher (0.49) in C+ D + H farming system households as they have good land holdings i.e., 1.85 and 1.50 ha, good irrigation facilities, labour force annual net income, accessibility and availability of education, health institution and also good social participation. F value indicates, a significant difference in all the subcomponents included in calculation. Composite livelihood security revealed that C + Sh farm households were less secured than the C +D +S, C +D and C + D + H farming system households in the district.

In conclusion the understanding the livelihood security of the farm households gives a holistic picture of economics, food, health, habitat, education and social participation

security of the households. In this motive, present research work is done to understand the overall livelihood security of farmers who practice the various farming systems like Crop + Sheep, Crop +Dairy, Crop + Dairy + Sericulture and Crop + Dairy + Horticulture in Eastern Dry Zone of Karnataka. Based on the result of the study, dietary pattern of households in all the groups was mainly cereal based which needs to be reported to Government and encourage it to take initiation to distribute pulses through Public distribution system and there is a need for providing the basic facilities like education institution, hospitals, drinking water facility in the vicinity to increase the overall livelihood security of the farming households. Dairy and sericulture enterprises are complementary to each other and provide stability to sustain farm income. Subject to technical feasibility, promotion of these enterprises to strengthen livelihood security

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