



Livelihood security assessment of dairy farmers in Nadia district of West Bengal: A microlevel analysis

SANCHITA GARAI¹✉, SANJIT MAITI¹, MANOJ GHOSH², CHAMPAK BHAKAT²,
SUMAN GARAI² and K S KADIAN¹

Eastern Regional Station, National Dairy Research Institute, Kalyani, West Bengal 741 235 India

Received: 6 January 2020; Accepted: 30 December 2020

Keywords: Dairy farmers, Health security, Livelihood security, Nadia

During the pre-independence era, agriculture was the main source of livelihood for majority of the rural households in India. With the rising population, declining land-man ratio and increasing mechanization in farm operations, agriculture alone is not able to provide adequate income and employment to meet the needs of these households (Singh 2008, Sène-Harper 2019). Dairy farming is an important sub-sector of agriculture all over the world. According to estimates of the Central Statistics Office (CSO), the value of output livestock sector was about ₹ 917,910 crore at current prices during 2016–17 which is about 31.25% of the value of output from agricultural and allied sector. Dairying plays a vital role in the country's agricultural economy, which being the second largest contributor to the gross agricultural produce and leading milk producer with 18.5% of world production (Anon 2016). In our milk sheds, marginal and small farmers (those operating less than 2 ha of land) account for some 57% of all household. India possesses one of the largest livestock wealth in the world. As the majority of dairy farming household adopted integrated crop and livestock farming system, they derived income from both dairy and crop which enhances the level of economic development (Khan *et al.* 2010). Being the most important sector in agriculture as far as employment is concerned, dairy farming represents over 30% of rural income and for those without land more than 55%. About 80% of the poor live in rural areas and depend on agriculture for their livelihood. Most of them are small farmers and landless people who are engaged in dairy farming as their primary or secondary livelihood option. Hence, the present study was designed to trace out the livelihood security of the farming community engaged in dairy farming in Nadia district of West Bengal, India.

The present study was conducted in the purposively selected Nadia district of West Bengal. Nadia district is the home of Eastern Regional Station of National Dairy

Research Institute, West Bengal University of Animal and Fisheries Sciences, Bidhan Chandra Krishi Viswa Vidyalaya. These institutes are disseminating their innovations to the rural masses of Nadia district since their inception. Therefore, it is assumed that livelihood of dairy farmers of Nadia district is more secure and sustainable like the other farmers than the other districts of West Bengal. Therefore, present study was conducted in Nadia district with 17 community development blocks and six blocks were randomly selected. From each selected block, a cluster of three villages were selected, randomly. Hence, a total of 18 villages were covered under this study. From each village, 20 dairy farmers having main income through dairy farming were selected randomly. So, a total sample size for the present study was 360.

Measurement of livelihood security: The livelihood security was operationalized as the adequate access to income and other resources to meet basic needs including food and nutrition, health facilities, clean environment, habitat facilities, educational opportunities and community participation and social integration. In order to measure the livelihood security of rural people, a Livelihood Security Measurement Index (LSMI) was developed for the present study by using the following methodology.

Step 1: An exhaustive list of 6 components of Livelihood Security were prepared from Twigg (2001), Baby (2004) and Jeil *et al.* (2020). These are Food and nutritional security; Economic security; Health security; Social security; Educational security; Infrastructural security.

Step 2: Principal Component Analysis (PCA) was used to identify the appropriate statements and their weightage by following the methodology of Maiti *et al.* (2017). Raw score was multiplied by weightage to get actual score of each statement.

Step 3: The raw scores of all the components were converted into unit scores by using simple range and variance as given below:

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

Present address: ¹ICAR-National Dairy Research Institute, Kamal, Haryana 132 001; ²ERS of ICAR-National Dairy Research Institute, Kalyani, Nadia, West Bengal 741 235. ✉Corresponding author e-mail: sanchita.bckv@gmail.com

where, U_{ij} , Unit score of the i^{th} respondent on j^{th} component; Y_{ij} , Value of the i^{th} respondent on j^{th} component; $\text{Max } Y_j$, Maximum score of the j^{th} component; $\text{Min } Y_j$, Minimum score of the j^{th} component (The unit scores of each respondent ranged from 0 to 1, i.e. when Y_{ij} is minimum, the score is 0 and when Y_{ij} is maximum the score is 1).

Step 4: The unit score of each component of individual respondents was summed up and it was treated as Livelihood security score of each respondent. So, it ranged from 0 to 1. Values towards one indicated high level of livelihood security.

Distribution of food and nutritional security index score which varies towards higher 0.79 to lower value of 0.48 in Table 1. All selected blocks were having higher food and nutritional security index value in Nadia district except Haringhata block. Average index value was 0.70. The higher food and nutritional security score in the sample blocks could be explained in terms of the fact that the blocks in the Nadia district were dairy based and had a well-functioning food distribution system for the poor families. Inter-blocks comparisons through Duncan Multiple Range test expressed that dairy farmers of Ranaghat I and Ranaghat II blocks had significantly higher food and nutritional security than the other studied blocks. Whereas, dairy farmers of the Haringhata block had significantly lower level of food and nutritional security.

The study revealed that on scale of 0 to 1, index values of the economic security showed wide inter-blocks variations, ranging from low level of 0.18 in Krishnanagar-II blocks to as high 0.63 in Chakdah block in Nadia districts with a mean value of 0.34 (Table 1). This result depicts economic security of dairy farmers was very low. Less fodder availability, small herd size, very less annual income, small scale of dairy farming may be the reason for very lower economic security through dairy farming in the study area. Dairy farming is much popular amongst the landless, small marginal farmers of Nadia district of West Bengal (Tudu and Roy 2015). Rathod *et al.* (2011) observed in his study that most of the farm families were marginal (33.33%) with low annual family income (60.83%) having agriculture (52.5%) as the major occupation. This was the least performing component among all the components of the

livelihood security. It was also found that economic security of the dairy farmers of the Chakdah block were significantly higher, whereas, their counter parts from Shantipur and Krishnanagar-II were significantly lower in comparison to the other studied blocks of Nadia district.

Health security score of the dairy farmers ranged between 0.57 of Chakdah block to 0.20 of Haringhata block with an average score of 0.39. It indicated a very lower level of health security status of the dairy farmers of Nadia district. Inter-block comparisons showed that health security among the dairy farmers of Chakdah block were significantly higher and Haringhata block were significantly lower in comparison to the other blocks of Nadia district. It was also found that there was no significant differentiation was observed among the dairy farmers of Shantipur, Krishnanagar-II and Ranaghat-I block.

It was found the average score of the social security index was 0.39 across the district, i.e. lower than the mid-value in the overall scale of 0–1 points for Nadia districts and indicated lower level of social security. Index values of the health security also showed wide inter-blocks variations, ranging from significantly lower level of 0.23 in Ranaghat-II blocks to as significantly higher of 0.59 in Chakdah block.

Table 1 shows that the index score of the educational security was lowest for Haringhata block (0.20) in comparison to that of the other blocks of Nadia districts. Overall educational security score in Nadia district was below the mid value of 0 to 1 scale. These findings expressed the show educational security of the dairy farmers of the Nadia district of West Bengal. Inter-blocks comparisons in terms of their educational security were assessed based on the Duncan Multiple Range Test and it was found that dairy farmers of Chakdah and Ranaghat-I had significantly higher educational security than the other blocks of Nadia district.

Block wise index values of the Infrastructural security showed a wide inter-blocks variation, ranging from low level of 0.39 in Krishnanagar-II blocks to as high 0.81 in Chakdah block in Nadia district with a mean value of 0.56 (Table 1). This result shows medium level availability of the infrastructural facility in Nadia district and inter-block comparisons showed that dairy farmers of the Chakdah and

Table 1. Average index value of livelihood security and its sub-component of dairy based livelihood strategies

Block	Food and nutritional security	Economic security	Health security	Social security	Educational security	Infrastructural security	Overall livelihood security
Santipur (1)	0.78 ^{ab}	0.19 ^d	0.43 ^b	0.29 ^c	0.41 ^b	0.41 ^d	0.34 ^c
Krishnanagar-II (2)	0.72 ^{bc}	0.18 ^d	0.42 ^b	0.29 ^{cd}	0.44 ^b	0.39 ^d	0.32 ^c
Chakdah (3)	0.67 ^c	0.63 ^a	0.57 ^a	0.59 ^a	0.64 ^a	0.81 ^a	0.71 ^a
Haringhata (4)	0.48 ^d	0.28 ^c	0.20 ^d	0.49 ^b	0.20 ^c	0.53 ^b	0.22 ^d
Ranaghat-I (5)	0.73 ^{abc}	0.37 ^b	0.44 ^b	0.45 ^b	0.60 ^a	0.76 ^a	0.55 ^b
Ranaghat-II(6)	0.79 ^a	0.41 ^b	0.30 ^c	0.23 ^d	0.46 ^b	0.46 ^c	0.36 ^c
Mean	0.70	0.34	0.39	0.39	0.46	0.56	0.42

^{abcd}Means at block level with different superscript in a column differ significantly at 5% level of significance, in a 2 tail test. Multiple comparisons are based on DMRT post-hoc test.

Table 2. Correlation coefficients among the livelihood security and its components

Block	Food and nutritional security	Economic security	Health security	Social security	Educational security	Infrastructural security	Overall livelihood security
Food and nutrition	1	0.086	0.299**	0.053	0.350**	-0.116*	0.416**
Economic security		1	0.393**	0.374**	0.317**	0.382**	0.656**
Health security			1	0.342**	0.488**	0.299**	0.740**
Social security				1	0.325**	0.492**	0.662**
Education security					1	0.320**	0.763**
Infrastructure security						1	0.605**
Overall livelihood security							1

** , Correlation coefficients is significant at the 0.01 level (2-Tailed); * , Correlation is significant at the 0.05 level (2-Tailed).

Ranghat-I block were having significantly higher level of infrastructural security than the other blocks in Nadia district

It was found that the mean value of the overall livelihood security index score was 0.42 which indicated the lower level Livelihood security among the dairy farmers of Nadia district. Inter-block variation ranged from lower level of 0.22 in Haringhata to high value of 0.71 in Chakdah block (Fig. 1). Duncun Multiple Range test was applied to understand inter-block comparison towards livelihood status and it was found that livelihood of the dairy farmers of the Chakdah block had significantly higher level of security than the other studied blocks of Nadia district at $P > 0.05$. But, no significant differentiation was observed in the livelihood security of the dairy farmers of Shantipur, Krishnanagar-II, Ranaghat-II block. Whereas, livelihood of the dairy farmers of the Haringhata block were significantly least secure in comparison to the other studied blocks of Nadia district. Among all the six components, dairy farmers of Haringhata had comparatively least score in food and nutritional security, health and educational security. But, dairy farmers of Chakdah were having comparatively highest score in five components of livelihood security index. Therefore, livelihood of the dairy farmers of the Haringhata and Chakdah were comparatively least and highly secured, respectively.

A matrix of correlation coefficients among the components of the livelihood security as well as overall

livelihood security is presented in Table 2 to express relationship amongst themselves. The same table clearly depicts the significant relationship of all the components with the overall livelihood security and amongst themselves without two incidences, i.e. food and nutritional security with economic security and social security. Hence, it may be concluded that a livelihood would be secure when all the components of the livelihood security had significant effort to achieve it. Therefore, policy makers must emphasize sustainable development in all spheres of livelihood to transform livelihood of the dairy farmers of Nadia district into a comfortable and secure zone.

SUMMARY

Dairying is considered as the most important secondary source of income and employment in India. Therefore, the present study was designed to appraise the livelihood security of the farming community of the Nadia district of West Bengal engaged in dairy farming. Livelihood security index is a composite index which was standardized by considering multi-criterion parameters responsible for livelihood of the dairy farmers, i.e. food and nutrition, economy, health, societal aspect, education and infrastructural resources. In overall, livelihood of the dairy farmers of Nadia district was poor with mean value of 0.42 on a scale of 0 to 1, ranging from 0.22 (Haringhata blocks) to 0.71 (Chakdah block). Comparatively, dairy farmers of Chakdah blocks had higher score in all six components of the livelihood security index than the other studied blocks. Livelihood security index (LSI) is not only highlighting livelihood security generated through dairy farming in Nadia district, but, also emphasizing the necessary policy matters to be intervened for improvement of the livelihood of the millions of resource poor dairy farmers.

REFERENCES

- Anon. 2016. Economic survey: India ranks first in milk production, accounting for 18.5% of world production, 2015–16. <http://www.news18.com/news/business/economic-survey-2015-16-india-ranks-first-in-milk-productionaccounting-for-18-5-per-cent-of-world-production1208209.html>.
- Baby S. 2004. 'Livelihood security in rural community: a critical analysis'. Unpublished PhD thesis. Indian Agricultural

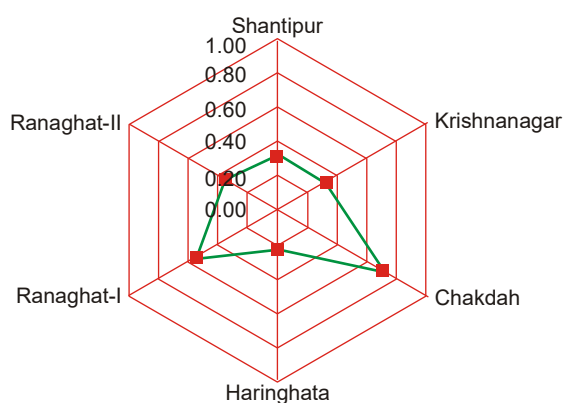


Fig. 1. Livelihood security index score across the Nadia district of West Bengal.

- Research Institute, New Delhi.
- Khan N, Rehman M A I A, Rehman A and Salman S M. 2010. Livestock Husbandry in India: A Blessing for Poor. *Proceeding of International Seminar on Tropical Livestock Production, The 5th International Seminar on Tropical Animal Production*, Yogyakarta, Indonesia, Oct. 19–22, 2010.
- Maiti S, Jha S K, Garai S, Nag A, Bera A K, Paul V, Upadhaya R C and Deb S M. 2017. An assessment of social vulnerability to climate change among the districts of Arunachal Pradesh, India. *Ecological Indicators* 77: 105–13.
- Rathod P K, Nikam T R, Landge S, Vajreshwari S and Hatey A. 2011. Participation of rural women in dairy farming in Karnataka. *Indian Research Journal of Extension Education* 11: 31–36.
- Singh B. 2008. Livelihood security: Need for cohesive strategy, paper published in the Compendium of Abstracts/Papers, prepared on the occasion of International seminar on “strategies for improving livelihood security of rural poor” held at ICAR research complex, Elu, Goa, India during September 24–27, 2008.
- Tudu N K and Roy D C. 2015. Socio-economic profile of women goat keepers and goat rearing challenges in goat in Nadia district of West Bengal. *Journal of Environmental Science and Technology* 4(2): 331–6.
- Twigg J. 2003. Social vulnerability, sustainable livelihoods and disaster. Report to DFID conflict and Humanitarian Assistance Department Sustainable Livelihoods Support office. <http://www.researchgate.net/publication/254398816>

