



A Cross-State Analysis of Livelihood Security Among Farm Women in Kerala and Manipur

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HIGHLIGHTS

- 51.11 per cent of the farm women in Kerala and 64.44 per cent in Manipur had a moderate level of livelihood security.
- Major constraints perceived by the farm women in Kerala and Manipur included insufficient funds and inadequate government supports respectively.
- The finding recommends a framework for assessing and progressing gender-inclusive rural development approaches.

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ABSTRACT

Farm women, having a pivotal role in agriculture, continue to face systemic barriers to livelihood security. This study was undertaken in 2022 to assess and compare the livelihood security, identify the constraints and formulate a sustainable livelihood security framework for the farm women in Kerala and Manipur state. Primary data were collected from 90 respondents using pre-tested interview schedule and validated with key local informants through focus group discussions. Descriptive statistics, frequency and Principal Component Analysis were used as statistical tools for data analysis. The findings revealed that 51.11 per cent of the respondents in Kerala and 64.44 per cent in Manipur had a moderate level of livelihood security. The first two components i.e. food and occupational security, could explain the total variance of 70.926 per cent for Kerala and 56.336 per cent for Manipur. The main constraints to livelihood security for farm women were insufficient funding and inadequate government support. Based on these findings, livelihood strategies were formulated for farm women and delivery system level to safeguard the livelihood outcomes. Designing interventions and policies aimed at ensuring farm women's sustainable livelihood security will be significantly impacted by these findings and recommendations.

INTRODUCTION

Agriculture serves not only as a means of food production but also as a pathway to mainstream nutrition into farming systems (Rukmani, 2019). Although livelihood security for farm women is essential to ensuring food security, strengthening rural resilience, advancing gender equity, and achieving sustainable development, a significant gap remains in their access to and control over key resources—such as land, training opportunities, financial services, and participation in decision-making processes. In many developing

nations, agriculture remains the backbone of the economy, with women comprising about 43 per cent of the agricultural labor force—reaching up to 70 per cent in some regions (FAO, 2018; Ugwu, 2019). Despite their central role, women's contributions are often underestimated. They face systemic barriers in accessing land, credit, education, and technology, which reduces productivity and increases vulnerability to poverty and food insecurity. Women farmers have historically been mislabeled as economically inactive, and gender disparities are reinforced through their exclusion from empowerment and participation in societal structures (Altenbuchner

et al., 2017; Santhi & Kalirajan, 2018). Understanding rural livelihoods requires exploring how gender affects access to and use of resources, ultimately influencing individuals' ability to make decisions and effect change in their lives. A gendered analysis of farmland access is crucial to understanding agricultural productivity and sustainable livelihood strategies (Tong et al., 2019; Gebre et al., 2021).

Women's empowerment must be addressed not only for equity but also to enhance agricultural output and rural well-being (Nain & Kumar, 2010; Mohapatra & Satpathy, 2018). As Pattnaik & Lahiri (2021) emphasize, recognizing the dissatisfaction of farm women is essential for Indian agriculture to thrive and for these women to lead fulfilling lives. While there are growing opportunities for women in agriculture, such as access to networking, education, and government programs the continued existence of separate initiatives for women highlights ongoing inequality (Ball, 2020). Agricultural innovations hold promise for improving the lives of disadvantaged populations, but these benefits will only be fully realized when women's empowerment becomes a core outcome of agricultural development (Asadullah & Kambhampati, 2021; Jannat et al., 2021).

To design effective technological and policy interventions, it is critical to document the specific needs and challenges of farm women. Women's perspectives must inform research and extension priorities which require committed action from research institutions and policymakers. The present study aims to develop a sustainable livelihood security framework that can guide stakeholders and policymakers in formulating efficient and inclusive action plans for the development of farm women. Enhancing the livelihoods of farm women is essential for broader goals such as gender equality, poverty alleviation, and sustainable agriculture. This study was carried out with three objectives: first, to assess and compare the sustainable livelihood security of farm women in Kerala and Manipur; second, to identify key constraints; and third, to formulate a sustainable livelihood security framework to address these constraints effectively.

METHODOLOGY

The study was conducted in Thiruvananthapuram district of Kerala and Ukhrul district of Manipur in 2022, representing two geographically and socio-culturally distinct regions of India. A multi-stage random sampling technique was adopted. One district from each state was purposively selected based on the significant participation of women in agriculture. Within each district, one block with the highest number of farm women was chosen, followed by the selection of three panchayats from each block using similar criteria. From each panchayat, 15 farm women were randomly selected, making a total sample size of 90 respondents. Data were collected through personal interviews using a structured and pre-tested interview schedule. Both quantitative and qualitative methods were employed. Quantitative data were analyzed using descriptive statistics such as frequency and percentage with the help of SPSS Version 16.0. Inferential statistics were applied where necessary. For qualitative insights, Participatory Rural Appraisal (PRA) and Rapid Rural Appraisal (RRA) techniques were employed to capture ground realities and community-level perspectives.

The six components of livelihood security viz. food, occupational, educational, habitat, health and social security were adopted (Rathod et al., 2023). Each component was represented by a different number of statements with distinct scoring ranges. To ensure comparability, the raw scores were standardized into unit scores using the formula:

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

U_{ij} = Unit score of the i^{th} respondent on j^{th} component, Y_{ij} = Value of i^{th} respondent on j^{th} component, Max_j = Maximum score on the j^{th} component, Min_j = Minimum score on the j^{th} component

The standardized scores (ranging from 0 to 1) were multiplied by the number of items under each component to assign appropriate weightage. Total livelihood security score for each respondent was computed by summing the weighted unit scores of all six components. Principal Component Analysis (PCA) was conducted using the GRAPES (General R-Shiny Based Analysis Platform Empowered by Statistics) web application to derive the underlying structure and weightage of livelihood components. The constraints faced by the farm women was ranked using Garrett's ranking. The ranks allotted by the respondents were converted into scores by using this technique as given:

$$\% \text{ position} = 100 (R_{ij} - 0.50) / N_j$$

Where, R_{ij} = Rank given for the i^{th} factor by j^{th} individual, N_j = Number of problems ranked by the j^{th} individual

Additionally, Garrett's ranking method was used to convert the percentage of positions produced into scores. After adding up the respondents' scores, mean values were determined.

RESULTS

Livelihood security of farm women

The distribution of livelihood security among farm women in Kerala and Manipur is presented in Table 1a and 1b. In Kerala, 60.00 per cent of the respondents exhibited medium livelihood

Table 1a. Distribution of respondents in Kerala based on livelihood security (n=45)

Status of Livelihood Security	Percentage
Low (< 18.24)	11.11
Medium (18.25 – 20.01)	60.00
High (> 20.02)	28.89
Mean	19.13
Standard deviation	0.89

Table 1b. Distribution of respondents in Manipur based on livelihood security (n=45)

Status of Livelihood Security	Percentage
Low (< 24.69)	13.33
Medium (24.70 – 25.70)	68.89
High (> 25.71)	17.78
Mean	25.2
Standard deviation	0.509

security, followed by 28.89 per cent with high and 11.11 per cent with low security. Similarly, in Manipur, 68.89 per cent of respondents reported medium security, while 17.78 per cent and 13.33 per cent had high and low levels of security, respectively.

Component-wise livelihood security

The result as shown in Table 2a and 2b indicated that in Kerala, 51.11 per cent of respondents exhibited medium food security, followed by 40.00 per cent high and 8.89 per cent low whereas in Manipur, 64.44 per cent had medium, 20.00 per cent high and 15.56 per cent low food security. Kerala had 77.78 per cent of respondents reporting medium occupational security, while 15.55 per cent and 6.67 per cent had high and low, respectively. In Manipur, 68.89 per cent had medium occupational security, 17.78 per cent low and 13.33 per cent high. In Kerala, 71.11 per cent of respondents showed medium educational security, with 15.56 per cent low and 13.33 per cent high. Manipur had 73.33 per cent medium, 22.22 per cent low, and 4.45 per cent high educational security. Medium habitat security was reported by 68.89 per cent in Kerala and 66.67 per cent in Manipur. High habitat security was reported by 20.00 per cent in Kerala and 15.55 per cent in Manipur. In Kerala, 55.55 per cent of respondents reported medium health security, 37.78 per cent high and 6.67 per cent low. In Manipur, 75.56 per cent reported medium, 15.55 per cent high and 8.89 per cent low. Kerala respondents showed 44.45 per cent medium, 31.11 per cent low, and 24.44 per cent high social security. In Manipur, 46.67 per cent had medium, 31.11 per cent high and 22.22 per cent low.

Table 2a. Distribution of farm women in Kerala based on different components of livelihood security (n=45)

Components	Category	Percentage
Food security	Low (< 3.24)	8.89
	Medium (3.25 – 5.21)	51.11
	High (> 5.22)	40.00
	Mean: 4.23, SD: 0.99	
Occupational security	Low (< 5.81)	6.67
	Medium (5.82 – 8.36)	77.78
	High (> 8.37)	15.55
	Mean: 7.09, SD: 1.28	
Educational security	Low (< 8.05)	15.56
	Medium (8.06 – 11.40)	71.11
	High (> 11.41)	13.33
	Mean: 9.73, SD: 1.68	
Habitat security	Low (< 8.32)	11.11
	Medium (8.33 – 10.2)	68.89
	High (> 10.3)	20.00
	Mean: 9.31, SD: 0.99	
Health security	Low (< 4.07)	6.67
	Medium (4.08 – 6.36)	55.55
	High (> 6.37)	37.78
	Mean: 5.22, SD: 1.15	
Social security	Low (< 3.72)	31.11
	Medium (3.73 – 7.6)	44.45
	High (> 7.7)	24.44
	Mean: 5.71, SD: 1.99	

Table 2b. Distribution of farm women in Manipur based on different components of livelihood security (n=45)

Components	Category	Percentage
Food security	Low (< 1.79)	15.56
	Medium (1.8 – 4.54)	64.44
	High (> 4.55)	20.00
	Mean: 3.17, SD: 1.38	
Occupational security	Low (< 7.32)	17.78
	Medium (7.33 – 9.25)	68.89
	High (> 9.26)	13.33
	Mean: 8.29, SD: 0.97	
Educational security	Low (< 6.96)	22.22
	Medium (6.97 – 10.31)	73.33
	High (> 10.32)	4.45
	Mean: 8.64, SD: 1.68	
Habitat security	Low (< 8.6)	17.78
	Medium (8.7 – 10.15)	66.67
	High (> 10.16)	15.55
	Mean: 9.38, SD: 0.78	
Health security	Low (< 0.94)	8.89
	Medium (0.95 – 4.2)	75.56
	High (> 4.3)	15.55
	Mean: 2.62, SD: 1.68	
Social security	Low (< 5.88)	22.22
	Medium (5.89 – 9.17)	46.67
	High (> 9.18)	31.11
	Mean: 7.53, SD: 1.65	

Principal Component Analysis (PCA)

Principal component analysis was conducted to evaluate the contribution of the principal components to the variance in livelihood security, with the results displayed in Table 3. Upon conducting the principal component analysis, it was determined that the first and second principal components were identified as the primary contributors to livelihood security, as indicated by their eigen values exceeding one. PCA results indicated that in Kerala, the first two principal components (PC1 = 2.974, PC2 = 1.282) accounted for 70.93 per cent of the total variance. In Manipur, PC1 and PC2 accounted for 34.63 and 21.71 per cent respectively, explaining 56.34 per cent cumulatively.

Constraints faced by farm women in achieving livelihood security

The study revealed that the major constraints perceived by the farm women in Kerala included insufficient funds (I), non-availability of good quality seeds (II), inadequate land for cultivation (III), inadequate training (IV), lack of marketing facilities (V), crop loss due to wild animals (VI), non-availability of fertilizers (VII), insufficient irrigation facilities (VIII) and lack of farm machinery (IX). In Manipur, the major constraint perceived by farm women were inadequate government support (I), inadequate marketing facilities (II), insufficient irrigation facilities (III), insufficient funds (IV), insufficient transportation facilities (V), inadequate extension services (VI), followed by non-availability of inputs in time (VII), inadequate storage facilities (VIII) and inadequate improved cultivation methods and technology (IX).

Table 3. Contribution of the principal components to the variance in livelihood security for Kerala and Manipur

Principal Component	Eigen value		Variability (%)		Cumulative per cent of variance	
	Kerala	Manipur	Kerala	Manipur	Kerala	Manipur
PC1	2.974	2.078	49.565	34.63	49.565	34.63
PC2	1.282	1.302	21.362	21.707	70.926	56.336
PC3	0.78	0.93	13.007	15.506	83.934	71.842
PC4	0.517	0.753	8.618	12.548	92.551	84.391
PC5	0.253	0.607	4.21	10.112	96.761	94.503
PC6	0.194	0.33	3.239	5.497	100	100

DISCUSSION

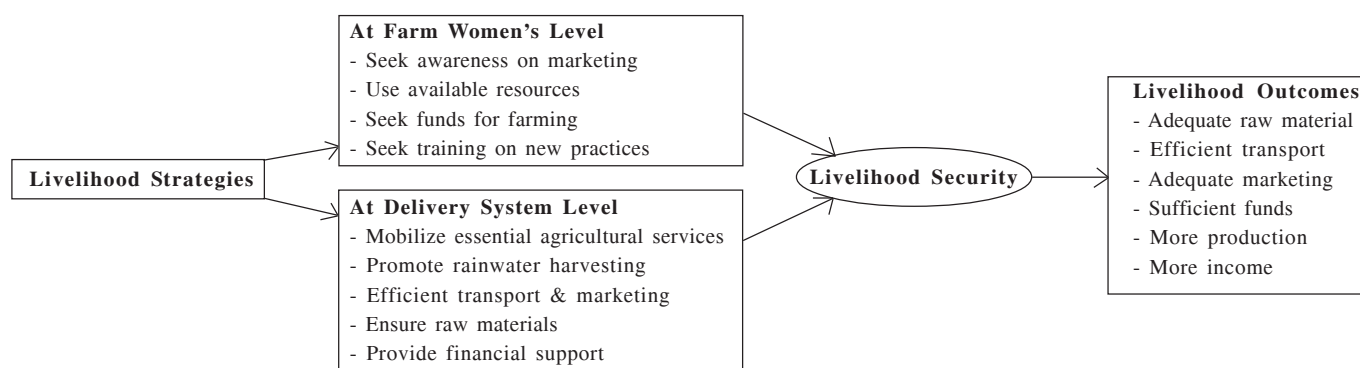
The findings illustrated that most farm women in both states experienced moderate livelihood security, which may be attributed to their medium scores across most livelihood dimensions. These findings are consistent with those of Pradhan et al., (2020); Gautam & Jha (2023); Mishra et al., (2023), who reported similar patterns of moderate security among rural populations. The higher food security in Kerala compared to Manipur is likely due to efficient public food distribution systems, availability of diverse agricultural produce, and better nutritional awareness, which aligns with the findings of Asha (2020); Manikanta & Satpathy (2023). Occupational security was also slightly better in Kerala, possibly due to more stable engagement in agricultural and allied sectors. These results were parallel to the results of Rejula et al., (2017) & Matouleibi et al., (2022). Kerala's strong educational infrastructure explains the higher percentage of respondents with medium and high educational security, aligning with findings from Sathwika (2019). Likewise, better access to sanitation, electricity, and housing facilities contributes to higher habitat security in Kerala. The outcome aligns with the results of Abhishek (2023). The health sector in Kerala is notably advanced and well-maintained, offering adequate medical facilities, contributing to higher health security. This outcome is consistent with Hridya (2018). Interestingly, Manipur was slightly ahead in the proportion of high social security. This may reflect stronger community participation and women's engagement in social activities in the North-East. The outcome is in agreement with the results of Chandana et al., (2023). PCA analysis revealed that food, education, and habitat security were key contributors to PC1 in Kerala, while occupational, health, and social security loaded more strongly on PC2. In Manipur, PC1 was driven by education, habitat, and social security, while PC2

reflected food and occupational security. Negative correlation of health security with PC2 in Manipur suggests differential access or variability in health perceptions.

In Kerala, financial constraints were the predominant issue, signifying restricted access to institutional credit and dependence on informal lending mechanisms. The significance of seed quality and land limitations indicates fundamental challenges in agricultural production and land ownership patterns. The prominent prioritization of concerns such as wildlife-related crop damage and insufficient mechanization indicates specific agricultural vulnerabilities and a lack of technology. In Manipur, the primary constraints were insufficient governmental support, signifying challenges related to policy and governance. This may indicate restricted extension outreach and inadequate utilization of agricultural programs in remote or tribal regions. Marketing and irrigation issues were prioritized, highlighting infrastructural deficiencies that hinder productivity and profitability. Financial limitations were noted, potentially attributable to perceived significance in relation to gaps in institutional support. Transport and storage constraints were highlighted, underscoring the necessity for logistical infrastructure to mitigate post-harvest losses. The prioritization of new technology adoption as a limitation stresses the necessity for targeted training and awareness initiatives for women farmers in the region.

Formulation of a sustainable livelihood security model

Strategies for livelihood were developed at the levels of farm women and delivery systems to ensure favorable outcomes, including the adequate availability of raw materials, efficient transportation, ample marketing facilities, and sufficient funding, resulting in increased production and higher income (Figure 1). It

**Figure 1.** Livelihood security framework

is expected that when farm women efficiently utilize traditional and modern agricultural practices, the yield will improve food security and create surplus income, thereby improving overall well-being (Amayo et al., 2021). Meshram (2024) highlights that technological interventions can enhance the sustainability of agricultural systems, environmental protection, satisfy educational and social needs, and ultimately improve livelihood security. In light of the constantly shifting climate, the results of the study are vital for developing strategies to increase the agricultural sector's resilience and flexibility in order to guarantee food security and the sustainability of livelihoods (Janani et al., 2024).

CONCLUSION

This study was carried out to assess and compare the livelihood security, constraints perceived and formulate a sustainable livelihood security framework for the farm women in Kerala and Manipur. The study indicated that most of the respondents in Kerala and Manipur indicated a moderate level of livelihood security. Insufficient funds and inadequate government support were the major constraints faced by farm women in Kerala and Manipur in achieving livelihood security. This result complements the framework of sustainable livelihoods, which was formulated at the farm women and delivery system level to safeguard livelihood outcomes. These findings aid the need for policies that provide women in agriculture more access to education, markets, credits and agricultural inputs.

DECLARATIONS

Ethics approval and informed consent: Informed consent was sought from the farmer respondents of the study during the course of the research.

Conflict of interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

The authors declare that during the preparation of this work, they thoroughly reviewed, revised, and edited the content as needed. The authors take full responsibility for the final content of this publication.

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