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Vulnerable Employment among Rural Youth in Karnataka State: A Study of Sustainable Livelihood Capitals

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Agriculture in India sustains over half the population, faces a critical challenge as its youth disengage from this sector due to low incomes and high risks, which impedes agricultural reform and competitiveness in the global food market. In 2021, a study was conducted in Karnataka's

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Mandya and Ramanagara districts, focusing on assessing the vulnerable employment among 120 randomly selected rural youth in agriculture through constructing a vulnerable employment index. The study revealed that the overall composite vulnerable employment index was 0.63, with human capital being the highest contributor to vulnerable employment (0.80), followed by financial capital (0.78), physical capital (0.68), natural capital (0.63), and social capital (0.57). Notably, 67.50 per cent of surveyed youth face moderate to highly vulnerable employment, primarily due to deficiencies in human capital (72.50%), financial capital (72.50%), natural capital (79.16%), and social capital (77.50%). However, there is a glimmer of hope in the relatively lower vulnerability in physical capital (48.33%). This research highlighted the urgent need to address vulnerable employment among rural youth in agricultural endeavour by investing in relevant skills training and education, providing access to financial resources, ensuring sustainable management of natural capital, and fostering strong social capital through mentorship programs and community engagement.

Keywords: Livelihood capitals; skills; sustainable agriculture; rural youth; vulnerable employment.

1. INTRODUCTION

Around the world, youth engagement in agriculture is facing numerous challenges impacting global food security and sustainable development. In many developing countries, agriculture remains the backbone of the economy, and youth involvement is crucial for revitalizing this sector [1]. However, vulnerable employment—characterized by inadequate earnings, low productivity, and poor working conditions—poses a major threat to sustainable agricultural development. Globally, the International Labour Organization (ILO) reported that 1.4 billion workers were in poor-quality employment in 2017, with a significant proportion in agriculture. This trend is particularly acute in Asia, where millions of young agricultural workers face precarious employment conditions that hinder their economic prospects and contribute to social instability.

India, with its vast young population, exemplifies both the potential and the challenges of youth employment in agriculture. The country's young people, deeply rooted in generations of agricultural knowledge and tradition, have the potential to drive a resurgence in the agricultural sector. Properly nurturing and guiding the strengths and abilities of rural youth can lead to sustained agricultural growth and overall national prosperity [2]. However, widespread vulnerable employment among rural youth threatens to dim this promising future [3]. Former ILO Director-General Guy Ryder highlighted the “decent work deficits” that plague a significant portion of the workforce, particularly young people in rural India. Nearly 50 per cent of agricultural workers in India live below the national minimum wage, struggling to meet basic needs for food, shelter, and healthcare [4,5]. Additionally, low productivity due to limited access to training, modern equipment, or technological advancements perpetuates poverty among rural youth [6]. An estimated 75 per cent of India’s 535 million-strong workforce in 2019 was likely trapped in poor-quality jobs, reflecting a significant challenge for the country’s economic and social development [7]. The failure to address these issues in the agricultural sector poses a threat not only to India's economic stability but also to its social fabric [8]. These conditions contribute to increased migration, as youth seek better opportunities in urban areas, often ending up in vulnerable employment there as well [9].

In Karnataka, a state with approximately 12 million youth, the agricultural sector remains a significant employer but is marked by low income and poor working conditions [10]. There is, however, a glimmer of hope. Several initiatives are underway to address this issue. These include government programs promoting rural entrepreneurship, skill development schemes focusing on modern agricultural practices, and efforts to improve access to credit and markets for agricultural producers [11]. Fostering innovation in the agricultural sector through investments in technology and creating a supportive policy environment can also incentivize youth to stay engaged in agriculture [12].

Empowering India's rural youth with the tools and resources they need to secure decent employment in agricultural sector is not just about economic development; it's about building a stable, prosperous, and food-secure future for the nation and by nurturing their potential and fostering a vibrant rural economy [13]. This requires a concentrated effort from all

stakeholders, including the government, private sector, and civil society, to create an enabling environment where rural youth can thrive [14]. By addressing the root causes of vulnerable employment and providing targeted support, India can transform its rural youth from a vulnerable demographic into a dynamic force for national growth and development [8]. Therefore, the present study aims to explore the current status of vulnerable employment in the agricultural sector, identify the underlying causes of these conditions, and affirmative action for transition out of vulnerable employment in the agricultural domain.

2. METHODOLOGY

The Karnataka state was selected as the study's locale. Mandya and Ramanagara districts in Karnataka were purposively selected. Both districts have experienced negative rural population growth and are noted for high rural migration. Two blocks in each district and two villages from each block were selected using a simple random sampling technique. Thus, a total of four blocks and eight villages were chosen. From each selected village, 15 rural youth aged 15-29 years were randomly selected. These youth were permanent residents of the village, actively engaged in agricultural activities at the time of data collection, and able to express their views on vulnerable employment in agriculture with respect to their livelihood capitals. This sampling resulted in a total of 120 respondents. Ex post facto research design was followed. In this study, the vulnerable employment index was constructed to analyse vulnerable employment among rural youth in agricultural endeavour by using Sustainable Livelihood Framework [15,16]. The framework examines the availability and access to various livelihood capitals through the 'asset pentagon,' which includes human, physical, financial, natural, and social assets. The asset pentagon is central to the livelihood framework and lies within the vulnerability context, which is a complex array of influences that have a direct or indirect impact on an individual's employment or livelihood.

The construction of a vulnerable employment index for rural youth hinges on assigning weights (scale values) to the five livelihood capitals outlined in the Sustainable Livelihood Framework (SLF). These weights reflect the perceived importance of each capital in determining the vulnerability of young people in their employment. The Normalized Rank Order Method, developed by Guilford [17], provides a structured approach for this weighting process. The 120 judges were asked to rank the five livelihood capitals (human, physical, financial, natural, and social) based on their perceived importance in assessing the vulnerability of rural youth employment (1 being most important and 5 being least important). Out of the initial 120 judges, 48 responded. After a thorough evaluation, 16 responses were excluded due to inconsistencies or incomplete data. The remaining 32 responses were used for further analysis.

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

Where,

Ri = stands for the rank value of the dimension i in the reverse order as 5 to 1
n = indicates the number of dimensions ranked by the judges.

Above formula was used to calculate proportions (p-values) for each rank assigned by the judges. This formula considers the assigned rank and the total number of capitals being ranked (5). Additionally, based on the reverse rank order (5 to 1) and a reference Table provided by Guilford [17], specific "C-values" were assigned to each rank. The number of times each rank (1 to 5) was assigned by the judges (frequency distribution) was calculated for each livelihood capital. Finally, for each capital, a "scale value" (Sc) was obtained by multiplying the frequency of each rank by its corresponding C-value and then summing these products. The sum was then divided by the total number of judges (32). This process resulted in a unique scale value for each livelihood capital, reflecting its relative importance in the overall vulnerable employment index.

Ensuring the validity and reliability of the vulnerability index is crucial. To achieve this, a critical step called item analysis and relevance test was conducted. The judges were asked to evaluate the relevance of each indicator using a three-point scale: "Most Relevant" (3 points), "Relevant" (2 points), and "Least Relevant" (1 point). This process helped assess the importance of each indicator in the context of the index. Two key metrics were calculated for each indicator: Relevancy Weightage (RW) and Mean Relevancy Score (MRS). These metrics helped determine which indicators should be included in

the final index. The Relevancy Weightage (RW) was calculated using a formula that considers the number of judges who rated the indicator as "Most Relevant," "Relevant," and "Least Relevant," along with the total number of judges and the maximum possible score. Indicators with an RW greater than 0.80 were considered to have high relevance for the index. The Mean Relevancy Score (MRS) was also calculated using a formula that considers the same response categories from the judges. Indicators with an MRS greater than 2.40 were considered to have a strong average relevance score from the judges. By applying these two criteria (RW > 0.80 and MRS > 2.40), the research team was able to select the thirty-four most relevant indicators for each dimension of the vulnerable employment index.

The vulnerable employment index assigns a single score to each respondent, reflecting their overall vulnerability in rural youth employment. However, each dimension of the index might have a different number of indicators, leading to varying score ranges. To address this, the scores for each dimension are converted into a common "unit score" ranging from 0 to 1. Before this conversion, it's essential to identify the relationship between each indicator and vulnerable employment. In this study, all indicators were assumed to have a negative functional relationship. This means that as the indicator score increases (positive values), vulnerability to employment challenges decreases. Conversely, a decrease in the indicator score (negative values) indicates a rise in vulnerability. For indicators with a negative functional relationship, the following formula is used to calculate the unit score (Uij) for each respondent "i" on indicator "j":

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

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

Following this calculation, each respondent will have a unit score between 0 and 1 for each dimension. A score of 0 indicates the lowest vulnerability (highest indicator value), while a score of 1 indicates the highest vulnerability (lowest indicator value). Finally, to obtain the overall Vulnerable Employment Index (VEI) for each respondent, the unit scores (Uij) are multiplied by their corresponding scale values (Sj) obtained earlier through the Normalized Rank Order Method. These weighted scores are then summed up across all dimensions. The final step involves dividing this sum by the total sum of all scale values.

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

Where,

VEI_i = Vulnerable Employment 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

The status of vulnerable employment among rural youth was assessed using a total index score derived from all individual indicators. This score was then used to categorize the respondents into three levels: less, medium, and highly vulnerable. The categorization was achieved by applying the "Cumulative Square Root of Frequency Method" to the range of total index scores.

3. RESULTS AND DISCUSSION

The index values for all dimensions, along with the composite vulnerable employment index, were calculated to determine their level of influence in causing vulnerable employment among rural youth. The results presented in revealed that the overall composite vulnerable employment index of rural youth was 0.63. Further breakdown by dimension showed that 'Human Capital' emerged as the most critical factor, with an average index value of 0.80. This suggests that limitations in education, skills, and health significantly contribute to vulnerability in employment. 'Financial Capital' followed closely with an average of 0.78, highlighting the importance of access to financial resources for securing employment. 'Physical Capital' (0.68) and 'Natural Capital' (0.63) also played a significant role, indicating that inadequate infrastructure, essential services, and access to natural resources can hinder employment opportunities. Finally, 'Social Capital' had an average value of 0.57, suggesting that limited

social networks and support systems can contribute to vulnerability.

3.1 Distribution of Rural Youth, based on Different Dimensions of Vulnerable Employment Index

Human Capital: This study assessed human capital, a key dimension of the vulnerable employment index, using various indicators. These indicators included education levels (individual and family head), health status, training opportunities, skills, food intake, government program awareness, and decision-making involvement. By evaluating these aspects, researchers gained a comprehensive understanding of human capital's influence on employment vulnerability among rural youth.

An analysis of the data in Table 1 revealed that a significant portion (47.5%) of rural youth fell into the "moderately employment vulnerable" category concerning human capital. Additionally, 27.50 per cent were classified as "less employment vulnerable," while 25 per cent faced "high employment vulnerability" related to human capital. These findings underscore the critical role of education, health, and skills in reducing vulnerable employment, as 72.50 per cent of rural youth are moderate to highly vulnerable, highlighting urgent needs for targeted interventions. In previous years, the budget allocations by both state and central governments have revealed that spending on human capital development, specifically education and healthcare, remains insufficient compared to other developing and developed nations. India spends only 3 per cent of its GDP on education and 1.26 per cent on health [18]. It emphasized that a healthy, well-educated, and skilled population is fundamental to sustainable agricultural growth as well as strong nation.

Physical Capital: It is a crucial factor influencing employment opportunities, was assessed in this study. It encompassed various infrastructural facilities like communication networks, healthcare services, educational institutions, access to essential resources and markets, and electricity availability. These elements were analyzed to understand their role in vulnerable employment among rural youth.

Data from Table 1 indicates that 51.67 per cent of rural youth are categorized as "less employment vulnerable" concerning physical capital, reflecting the positive impact of infrastructure development initiatives, potentially driven by decentralized planning. However, there is still significant room for improvement, as 27.5 per cent of youth remain moderately vulnerable, and 20.83 per cent face high vulnerability due to inadequate physical capital. This underscores the urgent need for continued investment and strategic planning to address infrastructure gaps in rural areas. By fostering a more supportive environment with improved infrastructure, employment prospects for rural youth can be significantly enhanced, contributing to overall economic development and resilience in these communities [19].

Financial Capital: It encompassing access to formal financial resources, credit facilities, loan utilization patterns, government incentives, poverty levels, and employment availability, plays a critical role in shaping the vulnerable employment level of rural youth. Data analysis from Table 1 reveals that a significant portion (49.17%) of rural youth falls under the "moderately vulnerable employment" category regarding financial capital. Additionally, 27.50 per cent were classified as "less vulnerable," while 23.33 per cent faced "high employment vulnerability" related to financial capital.

The significant levels of vulnerable employment among rural youth, with 72.5 per cent categorized as moderately to highly vulnerable, underscore the need for continued efforts to improve access to financial services and address underlying socioeconomic challenges. While initiatives by the government, NABARD, and commercial banks to expand institutional credit have contributed to reducing vulnerability for a larger group, more targeted interventions are required to support the significant portion still facing high risks. Factors contributing to this vulnerability include limited educational opportunities, a focus on subsistence farming rather than market-led agriculture, lack of financial and functional literacy, limited awareness of government support programs, and unequal distribution of wealth or assets in rural communities. Addressing these issues through tailored policies and programs could significantly enhance the financial well-being and employment prospects of rural youth. Schemes like PM KISAN, offering financial aid to farmers with simplified procedures, have played a role in improving access to credit. However, the considerable presence of youth in the "highly vulnerable" category warrants further investigation and targeted interventions to bridge

the gap. Continued efforts to expand financial inclusion, through both brick-and-mortar branches and alternative banking methods, can help reach underserved populations and reduce vulnerability [20-22].

Natural Capital: It encompassing natural resources like water bodies, forests, pastures, and agricultural land, alongside irrigation facilities, climate change, and environmental degradation, plays a crucial role in shaping decent employment conditions for rural youth. These elements function within complex ecosystems that not only generate income but also contribute to long-term livelihood sustainability [23].

Data from Table 1 reveals that a majority (58.33%) of rural youth experience "moderate employment vulnerability" regarding natural capital. This is followed by 20.83 per cent facing "high vulnerability" and another 20.83 per cent classified as "less vulnerable." A possible explanation for this trend lies in the medium availability and accessibility of natural resources for most rural youth. While these findings suggest that a significant portion of youth have some access to natural resources, it's crucial to recognize the limitations. Ecosystem goods and services act as a safety net for vulnerable populations, providing essential resources for health, food security, and economic stability. However, the moderate availability and potential degradation of these resources highlight the need for sustainable practices. Initiatives like the World Bank-supported NABARD's Sustainable Livelihoods and Adaptation to Climate Change (SLACC) program offer promising solutions by prioritizing climate-resilient farm technologies [24]. These programs empower rural youth, improve yields and income, and generate decent employment opportunities, enhancing their current well-being and ensuring the long-term viability of natural capital for future generations [25,26].

Social Capital: It encompasses the community and broader social claims that individuals and households can draw upon by virtue of their belonging to various social groups. This includes social participation, the level of trust among members, mass media exposure, security in self-employment, and the level of social support from relatives, friends, local leaders, etc. All these aspects of social capital were studied to understand the vulnerable employment of rural youth in relation to social capital.

The data from Table 1 clearly reveals that 45.83 per cent of rural youth are moderately vulnerable in terms of employment related to social capital. This is followed by 31.67 per cent who are highly vulnerable and 22.50 per cent who are less vulnerable. Social capital plays a pivotal role in the development process of any individual or community. The findings indicate that over four-fifths (87.50%) of the youth experience moderate to high levels of vulnerability in terms of employment related to social capital. Therefore, there is a need for initiatives by government and non-government agencies to enhance social capital for the welfare of rural youth. Social capital can directly impact the efficiency of economic relations, increase youth income, and boost savings rates. It also helps reduce the 'free rider' problems associated with the management of common property resources and facilitates the development and sharing of knowledge.

3.2 Overall Vulnerable Employment of Rural Youth About all Five Components of Vulnerable Employment Index

This study investigated the vulnerable employment of rural youth in agricultural sector using the Vulnerability Employment Index. The index considers five dimensions: human capital, physical capital, financial capital, natural capital, and social capital. These dimensions act as resources that young people can leverage to overcome challenges and secure decent employment.

The analysis of Table 2 revealed that majority (67.50%) of youth falling under moderate to high vulnerability categories. Limited access to education, skills, healthcare, infrastructure, financial resources, and social support networks were identified as key contributors. Youth decent employment deficit rate in rural areas is significantly higher than those of adults [27]. However, a positive aspect emerged with 32.50 per cent classified as less vulnerable, indicating the potential impact of government interventions. To empower rural youth and create a more supportive environment, policymakers should focus on strengthening all livelihood capitals through investments in education, skill training, healthcare, infrastructure development, and financial inclusion programs [14,28]. Additionally, promoting sustainable agricultural practices and fostering strong social networks within rural communities can equip young people with the resources and connections needed to overcome

Table 1. Distribution of respondents according to different vulnerable employment index dimensions (n=120)

Dimensions	Categories based on VEI*	Respondents (Rural Youth)	
		Frequency	%
Human Capital	Less Vulnerable (<0.71)	33	27.50
	Moderately Vulnerable (0.71 to 0.85)	57	47.50
	Highly Vulnerable (>0.85)	30	25.00
Physical Capital	Less Vulnerable (<0.52)	62	51.67
	Moderately Vulnerable (0.52 to 0.72)	33	27.50
	Highly Vulnerable (0.72)	25	20.83
Financial Capital	Less Vulnerable (<0.72)	33	27.50
	Moderately Vulnerable (0.72 to 0.81)	59	49.17
	Highly Vulnerable (>0.81)	28	23.33
Natural Capital	Less Vulnerable (<0.49)	25	20.83
	Moderately Vulnerable (0.49 to 0.67)	70	58.33
	Highly Vulnerable (>0.67)	25	20.83
Social Capital	Less Vulnerable (<0.47)	27	22.50
	Moderately Vulnerable (0.47 to 0.62)	55	45.83
	Highly Vulnerable (>0.62)	38	31.67

**Vulnerable Employment Index*

Table 2. Distribution of respondents according to overall vulnerable employment index (n=120)

Categories based on overall VEI	Respondents (Rural Youth)	
	Frequency	%
Less Vulnerable (<0.51)	39	32.50
Moderately Vulnerable (0.54 to 0.67)	52	43.33
Highly Vulnerable (>0.67)	29	24.17

vulnerabilities and thrive in the agricultural sector [29,30]. By addressing these challenges, Karnataka could harness the potential of its rural youth in agricultural sector, contributing to economic stability and growth.

4. CONCLUSION

The study revealed a significant degree of vulnerable employment among rural youth in Karnataka across multiple dimensions. While some progress has been made in physical capital, deficit in human, financial, natural, and social capital pose substantial challenges. Two-thirds of the youth studied exhibited moderate to high vulnerability, emphasizing the urgent need for comprehensive interventions. By focusing on quality education and vocational training tailored to local needs, young people could acquire skills relevant to emerging sectors such as sustainable agriculture, renewable energy, and digital innovation. Promoting youth entrepreneurship through access to funding and mentorship can stimulate economic growth and reduce youth vulnerable employment in rural areas. Strengthening social networks and community engagement is also crucial, as these connections provide support and resources that could help rural youth navigate challenges. Addressing systemic barriers such as inadequate infrastructure and limited healthcare access is vital for creating an environment conducive to personal and professional development. Convergence and comprehensive approach by all the stakeholders would not only empower rural youth in agriculture but also foster sustainable development.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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