

ASSESSMENT OF APPROPRIATENESS OF THE LIVELIHOOD VULNERABILITY METHODS FOR THE TRIBAL COMMUNITIES IN INDIA

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Abstract - Rural villages in low-income nations, including India with its large tribal population, face persistent challenges in addressing livelihood concerns. Policymakers struggle to develop comprehensive strategies for holistic human resource development in tribal areas. This study aims to assess the suitability of the livelihood vulnerability method for tribal communities in India. By evaluating vulnerability, it seeks to enhance livelihood opportunities for tribal farmers and inform future policymaking. The insights gained will aid in understanding tribal livelihood vulnerability, guiding resource allocation, and evaluating program effectiveness in remote tribal areas.

Key Words: Indigenous tribe, livelihood, vulnerability, assessment methods, tribal community

1. INTRODUCTION

Livelihood, including employment, income, and assets, is vital for sustaining a decent standard of living. Vulnerability to livelihood refers to the susceptibility to risks that can disrupt earning opportunities. Tribal communities, characterized by diverse traditions and interactions with their environment, are among the most vulnerable globally. They rely heavily on subsistence farming and natural resources for income. India, with a significant tribal population, faces unique development challenges. Addressing these requires a comprehensive strategy considering cultural, economic, and environmental factors. Assessing and mitigating livelihood vulnerability is crucial for formulating effective policies and interventions to improve tribal livelihoods.

1.1 Need of the study

The need for this study to inform evidence-based policies and programs tailored to the specific needs of tribal communities in India, addressing key determinants of vulnerability and promoting sustainable development while respecting cultural integrity.

1.2 Research question

How effective is the Livelihood Vulnerability Methods in assessing the unique challenges and resilience factors of tribal communities in India?

1.3 Aim

To assess the appropriateness livelihood vulnerability method for the tribal communities in India.

1.4 Objectives

- To understand the theory of vulnerability and existing livelihood issues of tribal communities in India
- To understand various approaches to assess livelihood vulnerability and to study existing livelihood development program.
- To identify appropriate method for assessing the livelihood vulnerability of tribal community in India by analysing suitable literature case study.
- To identify the parameters and indices/ sub-components for livelihood vulnerability assessment.

1.5 Methodology

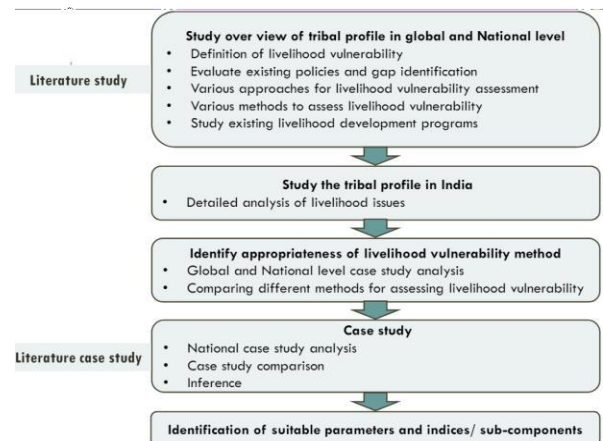


Figure 1.1 Methodology

1.6 Scope

To evaluate the extent of vulnerability in tribal communities and to promote future researches on tribal contributions on socio- economic sector. Formulation of this method shall help in the identification of tribal group, highly vulnerable to their livelihood

1.7 Limitation

The study is only limited to livelihood issues of tribal community.

2. LITERATURE REVIEW

2.1 Definition and theories of vulnerability

Vulnerability, originating from the Latin word "vulnerare," denotes a state of susceptibility to harm, encompassing

emotional, physical, economic, environmental, or social risks. It can arise from intrinsic traits or external circumstances, requiring courage to confront uncertainties. Vulnerability assessment, particularly in climate change, examines exposure, sensitivity, and adaptive capability. Vulnerability theory emphasizes the need to prioritize legal institutions and relationships to address shared human vulnerability and dependence, advocating for a synergistic approach to social justice. Fineman's theory posits that all humans are inherently vulnerable, necessitating state intervention to mitigate dependency. Disaster vulnerability theory elucidates how certain individuals, groups, and communities face heightened losses in natural disasters.

2.2 Factors affecting vulnerability

Physiological vulnerability includes exposure to climate change like sea-level rise and temperature shifts, worsening rural livelihood vulnerability due to limited assets for adaptation. Social vulnerability factors encompass relative inequality, culture, urbanization, and economic growth rate. Economic vulnerability involves the potential impacts of hazards on economic assets and processes, such as business interruption and increased poverty. Environmental vulnerability pertains to the potential impacts of events on the environment, including flora, fauna, ecosystems, and biodiversity.

2.3 Global and national scenario

Globally, inadequate data exists on indigenous populations, while strain on their lands and resources shows the unsustainability of traditional subsistence. Limited investment, employment opportunities, and quality education contribute to indigenous disadvantage. In India, over 700 tribes designated as Scheduled Tribes reside mostly in hilly and forest areas, facing challenges in education, income, and gender disparity. Land acquisition and displacement are significant factors contributing to tribal poverty.

2.4 National level Development programs

- Tribal sub plan – 1974
- Integrated Tribal Development Project (ITDP) - 1996
- Tribal housing schemes
- The Integrated Child Developed Scheme (ICDS) - 1975
- Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS). -2006
- National Rural Livelihood Mission (NRLM) -2010.

2.5 Gaps in existing policy and programs

Improper management of self-empowered job opportunities and capacity building for sustainable means of livelihood. Need a proper evaluation of livelihood vulnerability with technical solutions' bottom-up, holistic approach is required to improve their circumstances by coordinating the initiatives

2.6 Various approaches to examine vulnerability

- Risk/hazard approach (RHA): Utilized across various academic fields such as engineering, economics, epidemiology, and disaster literature.
- Integrated assessment approach (IAA): Recognizes the inseparable relationship between biophysical and social determinants in human systems research.
- Political economy/ecology approach (PEA): Considers poverty, inequality, marginalization, access to insurance, and housing quality as key determinants of social vulnerability.

2.7 Existing livelihood development frame works

- Sustainable livelihood framework by Robert Chambers: Identifies five capitals for sustainable livelihoods.
- Human development index (HDI) by UNDP: Assesses global human development.

3 TRIBAL PROFILES IN INDIA

Demography:

- STs are 8.2% of India's population, comprising 577 tribes.
- Gonds, with 8 million, are the largest tribe, mostly in Madhya Pradesh.

Occupation:

- Tribal livelihoods: hunting, gathering, herding, and agriculture.
- Dependency on traditional jobs creates economic vulnerabilities.

Poverty:

- Traditional occupations hinder diversification, leading to poverty.
- Poor implementation of welfare schemes worsens economic hardships.

Health:

- Tribal areas face high malnutrition and limited healthcare.
- Limited healthcare access heightens vulnerability.

Land Alienation:

- Many tribes lack cultivable land, leading to economic instability.

Education:

- Limited education access leads to high dropout rates.
- Despite literacy rate improvements, challenges persist.

Analysis:

- Tribal communities face challenges in demographics, occupation, education, health, land, and poverty.

- Solutions require tailored, comprehensive approaches.

4 DIFFERENT METHODS FOR ASSESSING LIVELIHOOD VULNERABILITY

4.1 Assessing and quantifying livelihood vulnerability of tribal farmers in water-stressed region of rural west Bengal, India.

Introduction:

Study assesses tribal farmers' livelihood vulnerability in Balarampur block, Purulia district, aligning with SDGs 1, 13, and 15. Aims to understand local challenges within the global sustainability framework.

Method:

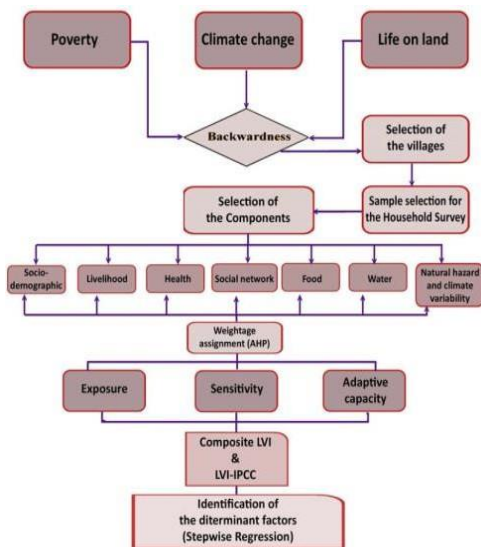


Figure 4.1 LVI-IPCC Framework

Uses quantitative and qualitative methods to address water scarcity and socio-economic issues. Introduces LVI-IPCC framework with seven components for the Livelihood Vulnerability Index (LVI). Applies standardization measures and Analytic Hierarchical Process (AHP) for data harmonization and weighting.

Inference:

Composite LVI and IPCC-LVI models assess vulnerability, showing lower vulnerability in Dumari due to higher adaptive capacity. Integrated approach enhances accuracy by including climate-related indicators. Provides policymakers with a tool for informed decision-making on climate resilience and sustainable development.

4.2 Livelihood assessment: a participatory tool for natural resource dependent communities

Introduction:

Introducing a participatory tool for assessing rural forest-dependent communities' livelihoods. Implemented in a

Northern Vietnam case study, collecting both quantitative and qualitative data. Assessment tool developed over three years evaluates conservation and development goals in GTZ - Tam Dao National Park and Buffer Zone Management Project.

Method:

Combines PRA methods with SLA for assessing local livelihoods in rural forest-dependent communities. Focuses on five livelihood capitals, ranking indicators on a scale of 1-3. Spider grams visually represent capital rankings, while frequency diagrams show proportional differences. Tool compares impacts on livelihood strategies, adapting to local conditions for repetitive assessments. Questionnaire gauges indicator importance and availability, providing insights for sustainable development approaches.

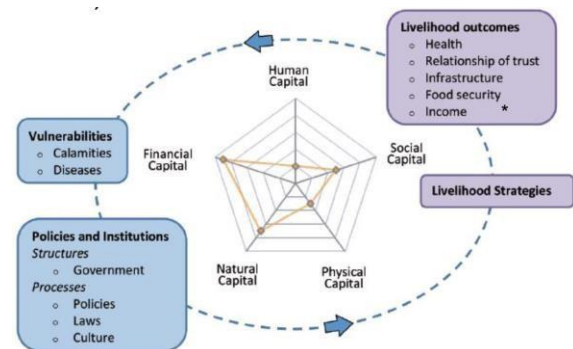


Figure 4.2 PRA-SLF Approach

Inference:

Ordinal scale simplifies assessment but may oversimplify complex livelihood dynamics. Spidergram aids visual analysis but may not capture interlinkages and causal relationships between capitals. Caution needed in drawing definitive conclusions solely based on spidergram results. Controversies persist about validity of quantitative/qualitative methods. Further research and repetitions over time essential for comprehensive understanding of livelihood dynamics.

4.3 Climate change on arid lands – a vulnerability assessment of tribal nations in the American west

Introduction:

Thesis explores water challenges for marginalized tribal communities in the American West through vulnerability assessments across 72 territories. Operationalizes an instrument to assist tribes in overcoming socioeconomic issues. Emphasizes historical root causes, current conditions, and proposes a comprehensive vulnerability framework. Advocates for nuanced strategies to address water challenges for tribal communities.

Methodology:

Utilizes Composite LVI and IPCC-LVI models, focusing on the Southwest. Data collection involves literature review,

secondary data analysis, GIS mapping, and comprehensive assessment using normalized indices.

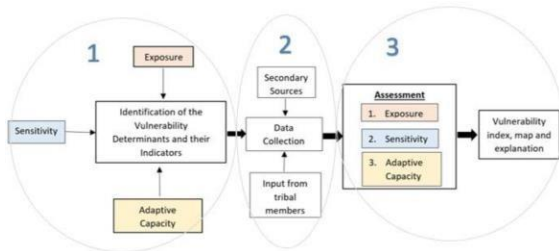


Figure 4.3 Methodology

Vulnerability Indicators:

Normalize 19 sub-indicators to calculate simple averages for EI, SI, ACI, and AVI. Connect composite index scores to geographic tribal entities using GIS. Develop GIS-based classifications for tribes into vulnerability levels.

Table 4.1 Vulnerability indicators

	Dimension	Component indicators			
EXPOSURE	Drought	Palmer Drought Severity Index (2001-2016) ^{3,4,8 (a)}	ADAPTIVE CAPACITY	Social	Level of Education (%) ⁷
	Extremes	FEMA disaster declarations (1990-2017) (#) ^{5,6 (a)}			Dependency Ratio ^{2,5}
	Variability	Rate of Precipitation Change (1901-2016) (%) ^{2,3,4 (a)}			Average Decadal Population Growth Rate (1996-2015) (%) ^{2,5 (a)}
		Temperature Change (2000-2015 vs long term average) (°F) ^{2,3 (a)}			Population Retention Ratio Ages 20-44 (2000 vs. 2010) ⁹
SENSITIVITY	Human	Population Density (population/mi ²) ^{2,3,4 (b)}	Economic	Institutional	Poverty (%) ³
	Livelihood	Primary Sector Employees (%) ^{1,2,5,7,8}			Older Employees (%) ^{2,5}
		Extent of Irrigation (%) ^{1,2,3,4, (a)}			Off-farm Income Sources (#)
	Physical Capital	Perennial Water Distribution Network (m) ^{9 (a)}			Casino (Y/N/IP)
			Climate Adaptation (score) ⁷		
					FEMA Hazard Mitigation Plan (status) ^{6 (a)}

Inference:

Composite LVI and IPCC-LVI models capture vulnerabilities of 72 tribes in the Southwest. Methodology, including sub-indices condensation, literature review, GIS mapping, and expert validation, contributes to understanding challenges faced by tribal communities in the context of climate change on arid lands.

4.4 An assessment of the livelihood vulnerability of the riverbank erosion hazard and its impact on food security for rural households in Bangladesh.

Introduction:

Examines riverbank erosion's impact on livelihood vulnerability and food security in Bangladesh. Highlights persistent food insecurity despite GDP growth. Offers insights for policymakers aligning with global food security and livelihood improvement goals.

Methodology:

Utilizes Livelihood Vulnerability Index (LVI), Climate Vulnerability Index (CVI), and Resilience Capacity Index

(RCI). Cross-sectional survey explores coping and adaptation strategies of riverine households.

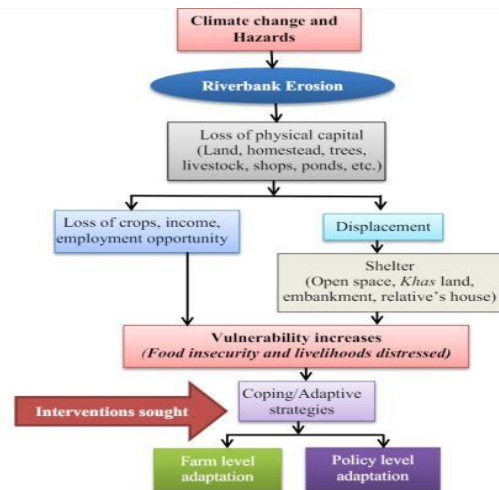


Figure 4.4 Indicators

Inference:

Study's analytical approaches provide insights into vulnerability, resilience, and household food security. Adaptation strategies can be replicated in similar contexts. Impact includes physical capital loss, reduced food production, and unemployment, influenced by economic, social, and political factors. Livelihood Vulnerability Index (LVI) provides a comprehensive assessment. Consider potential limitations of Climate Vulnerability Index (CVI) and Resilience Capacity Index (RCI) when used alongside LVI.

4.5 Comparison of methods

Table 4.2 Comparison of methods

Case Study Title	Method Used	Conclusion
Livelihood Assessment in Northern Vietnam	Participatory Tool combining PRA and SLA	1 to 3 ordinal scale may oversimplify dynamics Spidergram might not capture interlinkages effectively Caution required in drawing definitive conclusions Further research needed for a comprehensive understanding
Assessing Livelihood Vulnerability in West Bengal	LVI-IPCC Framework	Quantitative and comprehensive vulnerability assessment Incorporates climate-related indicators for accuracy Serves as a valuable tool for policymakers Aids informed decision-making for resilience and sustainable development
Climate Change on Arid Lands in American West	Composite LVI and IPCC-LVI Models	Quantitatively captures multifaceted vulnerabilities GIS mapping adds depth to the assessment Methodology contributes to a robust and holistic understanding of challenges faced by tribal communities
Riverbank Erosion Hazard Impact in Bangladesh	LVI, CVI, and RCI	LVI provides a comprehensive and precise assessment Adaptation strategies identified are replicable Valuable insights for policymakers and adaptable to similar contexts Consider potential limitations of CVI and RCI when used

Choosing LVI

LVI is selected for assessing livelihood vulnerability in India due to its comprehensiveness, prioritizing vulnerable areas and aiding resource allocation. Its multidimensionality, flexibility, and widespread usage in literature make it suitable for the region, serving as a scientific foundation for poverty reduction and sustainable development.

Livelihood Vulnerability Index (LVI)

Developed in 2009 by Hahn, Riederer, and Foster, the Livelihood Vulnerability Index (LVI) aligns with the IPCC's vulnerability framework. It assesses households' exposure to natural disasters and climate variability while considering social and economic factors influencing adaptive capacity. First applied in Mozambique, it serves as a tool for assessing climate vulnerability through household surveys, comprising seven major components: Socio-demographic profile, Livelihood, Health Concerns, Social Network, Food, Water, and Climate variability and natural hazard, each with several subcomponents.

5 CASE STUDIES

5.1 assessing and quantifying livelihood vulnerability of tribal farmers in water-stressed region of rural west Bengal, India

Introduction:

Study assesses tribal farmers' livelihood vulnerability in water-stressed rural West Bengal, India. Focuses on water scarcity's impact on socio-economic challenges faced by local tribal communities. Examines livelihood vulnerability in four selected villages of Balarampur block, Purulia district, to gauge SDGs 1, 13, and 15.

Methodology:

Uses structured questionnaire with statistically determined sample size for tribal population survey. Research framework comprises seven components: sociodemographic profile, livelihood, health, social network, food, water, and natural hazards. Constructs Livelihood Vulnerability Index (LVI) using selected indicators. Standardizes data for accuracy, determining component weights through Analytic Hierarchical Process (AHP). Introduces LVI-IPCC framework aligned with Intergovernmental Panel on Climate Change's vulnerability definition.

Table 5.1 Parameters

Category	Parameters / Indices
Socio-demographic (SD)	Population density, % female, % 0-6 years, Dependency ratio, % female-headed, % no formal schooling
Livelihood (L)	% households working elsewhere, % dependent on agriculture, Avg. livelihood diversification, % dependent on natural resources, % with own agricultural land
Health Concerns (H)	Avg. time to health facility, % with chronic illness, % missing work/school due to illness
Social Network (SN)	Avg. receive:give ratio, Avg. borrow:lend ratio, % not seeking govt. support in past 12 months
Food (F)	% depending on family land for food, Avg. months struggling, Avg. crop diversity, % not saving crops, % not saving seeds
Water (W)	% with water conflicts, % using natural source, Avg. time to water source, % without consistent supply, Inverse of avg. liters stored
Climate Variability (NC)	Avg. drought events past 10 years, % without disaster warning, % with illness/death due to disasters past 10 years, Mean SD of daily max temp, Mean SD of daily min temp, Mean SD of avg. precipitation

Inference:

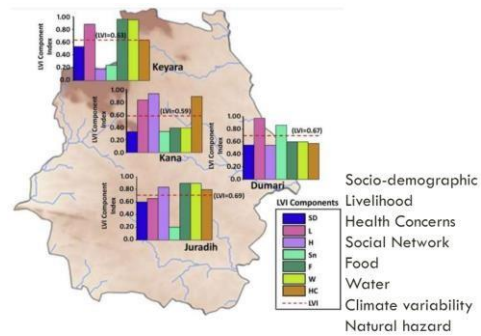


Figure 5.1 LVI Components

High vulnerability index values (>0.8) found in every hamlet. Purulia district vulnerability assessment highlights water security and livelihood disparities. Monocrop cultivation, lack of diversity, and inadequate storage exacerbate food insecurity. Climate change, groundwater over-extraction, and inefficient water management worsen water scarcity for tribal farmers. Recommendations include region-specific strategies, blending traditional and scientific knowledge, and promoting rainwater harvesting and MGNREGS-based water supply schemes, with civil society involvement.

5.2 participatory livelihood vulnerability assessment of the forest dwellers: a study of fifteen tribes and particularly vulnerable tribal groups in the eastern Indian region

Introduction:

Study examines livelihood vulnerability among 15 tribes in Jharkhand and Odisha across eight districts, surveying 598 households. 60% are PVTG households, 40% non-PVTG, selected randomly. Districts chosen based on poverty rates, forest density, tribal/PVTG population, MPI, HDI, with preference for those with mining/industrial activities.

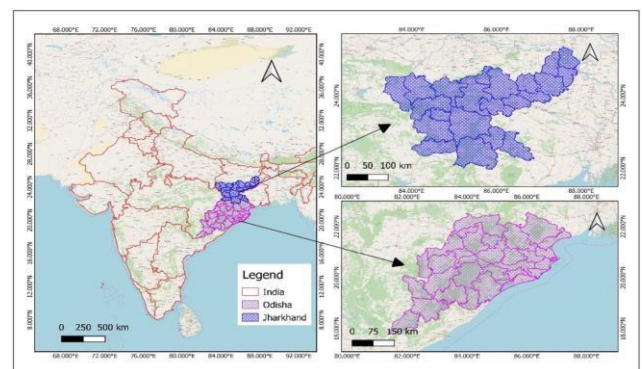


Figure 5.2 Map showing selected villages

Table 5.3 Selected Villages

District	Block	GPs	Villages
Keonjhar	Banspal	Gonasika	Guptaganga, Kadalibari and Sinkulapada
Kandhamal	Tumudibandha	Birmal	Domaska, Goranya and Mundimaska
Rayagada	Muniguda	Saibapadar	Batudi, Pajibali and Sarkapadi
Sundargarh	Lahunipara	Tal-Bahali	Badnuagaon, Sannugaon and Kardapadar

Methodology:

Utilizes mixed-methods approach with SPSS v20 for survey. Sampling minimizes errors for reliability. Data sources include questionnaire survey, Census data, and Participatory Rural Appraisal (PRA) tools. Validation through community verification and Correlation Coefficient Matrix for Livelihood Vulnerability Analysis (LVA).

Analysis:

Design inspired by NSSO's consumer expenditure survey. Monthly expenditure data collected, with 14 variables for vulnerability analysis. Livelihood Vulnerability Index (I) calculated based on total households for each indicator, with index values ranging from 0 to 100; higher values indicate lower vulnerability.

Inference:

Simple indexing assesses livelihood vulnerability for forest dwellers, notably effective with PRA tools. PVTGs, lacking means, face heightened vulnerability. Government food security schemes offer relief but mainly serve as quick fixes, not uplifting living standards.

Identified parameter and indices:

Table 5.4 Parameters and Indices

PARAMETER	INDICES
Livelihood	Household with concrete housetop of Form Bottom of Form
	Electrified households
	≥ 0.5-acre agricultural landholdings
	Availed central/state-sponsored livelihood scheme
Socio-demographic profile	Joint family type
	Two or more adult members
	Secondary education or above
	≥ Two livestock (cow, bullock, goat, sheep)
Food profile	Non-agricultural, non-forest-based primary occupation
	Year-round food availability
Finance	Expenditure ≥ Rs. 2000/month
	Availed banking service
Health profile	Members without chronic illness
Water profile	Year-round drinking water availability

5.3 Community level vulnerability to climate change: a comparative case study between selected naga tribes in India

Introduction:

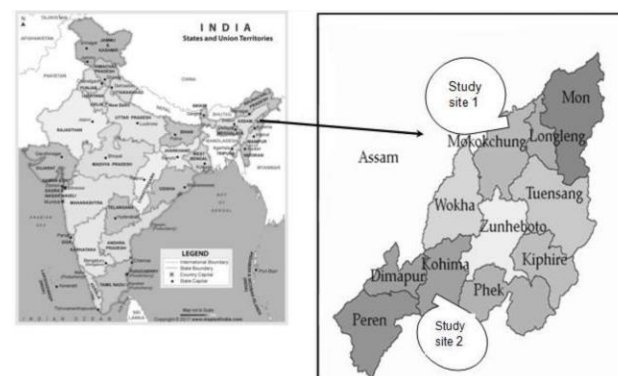


Figure 5.3 location of study area

8% of India's population is indigenous, occupying 15% of the land. Nagaland, in the North-East, is home to 14 Naga tribes facing historical challenges. Study focuses on Angami and Ao tribes, considering geographical challenges, insurgency, and infrastructure gaps. Both tribes face vulnerability in hilly terrains, impacted by climatic variations.

Methodology:

Uses Composite LVI and IPCC-LVI Models. Samples Khensa (Ao tribe) and Mima (Angami tribe) households. Conducts individual household interviews and collects climatic data from State Agricultural Research Stations (SARS).

Result:

Assesses climate vulnerability, highlighting landslide exposure. Sensitivity analysis shows Ao's vulnerability in food security and housing. Livelihood Vulnerability Index (LVI) suggests similar vulnerability, reflecting complex interplay of exposure, sensitivity, and adaptive capacity.

Inference:

Both tribes at subsistence level of vulnerability. Minor changes in exposure, sensitivity, or adaptive capacity significantly impact wellbeing. Efforts needed for safe housing, food security, and sanitation improvement. Development initiatives should address exposure, sensitivity, and adaptive capacity for both communities' well-being.

Sub components selected

Table 5.5 sub components

Factors	components
Exposure:	Landslide frequency and severity
	Cyclone exposure
	Drought frequency and severity
	Earthquake exposure
	Flood exposure
	Variability in average monthly minimum temperature
	Variability in average monthly maximum temperature
Sensitivity:	Variability in average monthly precipitation
	Sanitation status
	Food security status
	Drinking water facility
Adaptive Capacity:	Housing facility
	Education status
	Surplus income
	Stable occupation
	Organizational membership
	Skill training in disaster/climate risk management

5.4 Analysis

Table 5.6 analysis

Case Study	Methods	Parameters	Inference
Assessing Livelihood Vulnerability in Water-Stressed Rural Bengal	- Structured questionnaire - LVI creation - AHP for component weights	Socio- demographic Livelihood Health Social network Food Water Climate vulnerability	Similar vulnerability; Water stress and socio-economic factors play a role.
Participatory Livelihood Vulnerability Assessment of Forest Dwellers in Eastern India	- Mixed-methods approach - SPSS for quantitative analysis - PRA tools for insights - LVI and IPCC-LVI integration	Livelihood Socio- demographic Food Finance Health water	Diverse tribal vulnerability; LVI guides tailored solutions and strategies.
Community-Level Vulnerability to Climate Change in Nagaland	- Statistical survey with a structured questionnaire - LVI and IPCC-LVI integration	Natural disaster Water Shelter Education Occupation economy	Similar subsistence-level vulnerability; Focus needed on housing, food security.

5.5 Inference

Three case studies in Bangladesh, West Bengal, and Eastern India illuminate challenges faced by marginalized communities. Bangladesh emphasizes climate change impact via the Livelihood Vulnerability Index (LVI), advocating for local adaptation. West Bengal, aligning with Sustainable Development Goals, recommends interventions like rainwater harvesting. Eastern India, using a mixed-methods approach, identifies highly vulnerable tribal groups through Participatory Livelihood Vulnerability Assessment. Each study underscores the need for tailored methodologies and global frameworks to address specific livelihood challenges.

5.6 Parameters identified

- Socio-demographic profile
- Livelihood;
- Health Concerns;
- Food;
- Water;
- natural hazard

5.7 Selection of indices/ sub- components

Table 5.7 sub components

Parameters/Indices	Sub-components
Socio-Demographic Profile	(a) Population density
	(b) Dependency ratio
	(c) Percentage of female-headed households
Livelihood	(a) Percentage of landless households (less than 0.1 ha)
	(b) Percentage of households without other sources of income
	(c) Percentage of households not involved in saving and credit cooperatives/social groups
	(d) Percentage of households dependent on natural resources for livelihood
	(e) Livelihood diversification index (range: 0.25-1)
	(f) Number of reports of wild animal attacks
Health Profile	(a) Average time to the health facility (minutes)
	(b) Percentage of households with a family member with a chronic illness
	(c) Percentage of households where a family member had to miss work/school in the last 3 weeks due to illness
Water Profile	(a) Percentage of households that do not have a constant water supply
	(b) Percentage of households that utilize a natural water source
	(c) Average time to the water source (minutes)
Food Profile	(a) Average number of months households struggle to find food
	(b) Percentage of households that suffer from any kind of nutritional deficiency
Natural Hazards	(a) Percentage of reporting death of a person or family member by natural hazards
	(b) % of households that reported a reduction in Non-Timber Forest Products (NTFPs) resources due to climate variability
	(c) Percentage of reported destruction of farmland and properties by erosion Top of Form Bottom of Form

6 CONCLUSION

This study is dedicated to examining the susceptibility and livelihood vulnerability of tribal populations. Vulnerability, intricately linked to developmental stages, is shaped by factors such as physical exposure, economic fragility, and resilience. The imperative need for assessing the vulnerability of indigenous tribal communities arises to enhance their livelihood prospects. The study aims to pinpoint specific tribal groups with heightened vulnerability by establishing relevant parameters. The livelihood vulnerability assessment serves a dual purpose by providing a benchmark for evaluating development policy frameworks and supplying crucial data for the formulation of targeted adaptation and mitigation plans. This comprehensive approach seeks to pave the way for effective policies and interventions tailored to the unique challenges faced by these marginalized communities, fostering sustainable development and resilience.

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