Research Report

Understanding Food Systems and Livelihoods of Indigenous Peoples in Pursat, Mondul Kiri, and Ratanakiri Provinces, Cambodia

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Disclaimer

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Abbreviation

Abbreviation	Full Form
CDHS	Cambodia Demographic and Health Survey
CISA	Coalition for Integrity and Social Accountability Organization
CSES	Cambodia Socio-Economic Survey
FAO	Food and Agriculture Organization of the United Nations
FGD / FGDs	Focus Group Discussion(s)
GAIN	Global Alliance for Improved Nutrition
HDDS	Household Dietary Diversity Score
HH / HHs	Household / Households
IADC	Indigenous Peoples for Agriculture Development in Cambodia Organization
I-CAN	Integrated Climate Action and Nutrition (Policy Brief)
ICF	ICF (international research organization supporting DHS surveys)
IDPoor	Identification of Poor Households Programme (Royal Government of Cambodia)
IFAD	International Fund for Agricultural Development
ILO	International Labour Organization
IWGIA	International Work Group for Indigenous Affairs
JASP	Jeffreys's Amazing Statistics Program (statistical analysis software)
KHR	Cambodian Riel
KII / KIIs	Key Informant Interview(s)
MAFF	Ministry of Agriculture, Forestry and Fisheries (Cambodia)
NIS	National Institute of Statistics
RECOFTC	Regional Community Forestry Training Center for Asia and the Pacific
REDD+	Reducing Emissions from Deforestation and Forest Degradation, plus conservation, sustainable forest management, and enhancement of forest carbon stocks
UNICEF	United Nations Children's Fund
WFP	World Food Programme
WUG	Water User Group
WVI/WVI-C	World Vision International (or World Vision Cambodia)

Executive Summary

Indigenous Peoples play a vital role in conserving biodiversity, sustaining traditional food systems, and protecting natural resources. In Cambodia, however, Indigenous communities face increasing pressures from climate change, land-use change, market integration, and socioeconomic inequality that threaten their food security, livelihoods, and cultural heritage. To better understand these challenges and identify opportunities for strengthening resilience, this study assessed the food systems, livelihoods, nutrition, and climate resilience of Indigenous households in Keo Seima District (Mondulkiri Province), Ou Chum District (Ratanakiri Province), and Phnom Kravanh District (Pursat Province).

This study employed a convergent mixed-mehtods research design involving 329 Indigenous households across three district. Quantitative household survey were complemented by 9 group discussions (FGDs), 9 key informant interviews (KIIs), and a stakeholder validation workshops. The primary objective of the research was to generate evidence to inform relevant stakeholders in designing culturally appropriate and climate-resilient programmes that strengthen Indigenous food systems and livelihoods.

The findings demonstrate that Indigenous livelihoods remain predominantly agriculture-based with crop production (71.1%), wage labour (46.8%), and livestock raising (35.0%) are the principal livelihood activities. Forests continue to serve as an important safety net by providing food and supplementary income. However, Indigenous food systems are gradually transitioning from traditional subsistence production towards greater market dependence. While this transition creates new economic opportunities, it also exposes households to greater market volatility, fluctuating commodity prices, and climate-related production risks. Household incomes remain generally low, with almost half of surveyed households earning less than KHR 5 million (approximately USD 1250) annually, and more than one-third classified as poor or vulnerable according to classification of Cambodia government.

Food security remains fragile despite moderate level of dietary diversity. Nearly 70% of households reported only moderate food security, while approximately 28% experienced weak or very weak food security. Seasonal food shortages were common, particularly during the pre-harvest period (July–September). During these month, households frequently coped by borrowing food or money, reducing meal sizes, collecting wild foods, and selling productive assets. Although most households reported consume three meals per day, dietary diversity among children under five remains inadequate, indicating persistent risks of child undernutrition and micronutrient deficiencies.

Climate change emerged as the most significant threat to Indigenous food systems. More than 70% of respondents reported noticeable changes in weather patterns over the past decade, including prolonged droughts, erratic rainfall, floods, and increasing pest outbreaks. These changes have reduced agricultural productivity , limited water availability, degraded forest resources, affected household health, and reduced household incomes. Climate-related shocks have also intensified livelihood insecurity and increased household indebtedness, particularly among poorer households with limited productive assets and limited alternative income sources.

The study also highlights the continued central role of women in sustaining indigenous food systems. Women contribute substantially to agricultural production, food preparation, livestock management, household nutrition, and financial decision-making. However, their participation continue to be constrained by considerable barriers, including heavy unpaid care responsibilities, limited access to agricultural training, unfavorable financial services, markets, productive resources and leadership opportunity. The study also highlights important evidence gaps on Indigenous food systems, nutrition, climate vulnerability, and livelihoods. At the same time, Community participation in formal organizations and social capital remain relatively limited, particularly among poorer households, reducing opportunities for collective action, knowledge exchange, and access to development services.

Despite these challenges, Indigenous communities identified clear priorities for strengthening resilience. Theseinclude improving crop and livestock production, climate-smart agriculture, increasing access to quality seeds, expanding irrigation system, strengthening agricultural extension service, Improving market access, diversifying livelihoods, and reinforcing community institutions. The findings underscore the need for integrated interventions that combine Indigenous ecological knowledge with climate adaptation, nutrition-sensitive agriculture, natural

resource conservation, women's empowerment, and inclusive local governance to build resilient Indigenous food systems. The findings also indicate that strengthening Indigenous food systems requires greater recognition of Indigenous knowledge and meaningful participation in programme and policy processes to ensure interventions are culturally appropriate and locally led.

Overall, the study concludes that strengthening Indigenous food systems requires integrated approaches that combine climate adaptation, nutrition-sensitive agriculture, sustainable natural resource management, women's economic empowerment, livelihoods diversification, and stronger Indigenous institutions. Equally important is ensuring that Indigenous knowledge, cultural values, and community priorities are fully integrated into programme design, implementation, and policy development. The evidence generated through this study provides a strong foundation for informing future investments, policy dialogue, and locally led development initiatives that enhance food security, nutrition, climate resilience, and sustainable livelihoods among Indigenous communities in Cambodia.

Recommendations in brief based on the findings:

- Strengthen climate-resilient Indigenous food production systems by integrating Indigenous knowledge with climate-smart agriculture, diversified cropping systems, agroforestry, community seed banks, and improved water management.
- Promote diversified and nutrition-sensitive food systems through home gardens, traditional vegetables, legumes, fruits, small livestock, fish production, and sustainable use of forest foods to improve dietary diversity.
- Improve culturally appropriate agricultural and market services by expanding Indigenous extension services, strengthening producer and savings groups, improving market linkages, and supporting value addition.
- Recognize and strengthen Indigenous knowledge systems through documentation, participatory research, and integration of traditional ecological knowledge into programme design and policy.
- Strengthen evidence for policy and programming by establishing regular, disaggregated monitoring of Indigenous food systems, nutrition, climate vulnerability, and livelihoods with community participation.
- Protect forests and strengthen community natural resource governance by supporting community forestry, sustainable harvesting, forest restoration, and Indigenous resource management systems.
- Expand resilient livelihoods and financial opportunities through vocational skills development, youth entrepreneurship, non-farm enterprises, savings groups, climate-risk financing, and value-chain development.
- Increase women's leadership and reduce barriers to participation by improving access to training, finance, leadership opportunities, gender-responsive extension services, and reducing unpaid care burdens.
- Strengthen Indigenous institutions and community leadership by investing in Indigenous organizations, customary governance systems, women, and youth to lead local food system planning and resource management.
- Promote integrated multi-stakeholder partnerships among government agencies, Indigenous organizations, civil society, research institutions, the private sector, and development partners to deliver coordinated interventions in food systems, nutrition, climate, and livelihoods.
- Mainstream Indigenous food systems into national and sub-national planning by incorporating Indigenous knowledge, food sovereignty principles, and meaningful Indigenous participation into agriculture, nutrition, climate adaptation, biodiversity, and rural development policies.

1. Introduction

1.1. Global and Local Context

Indigenous food systems are increasingly recognised as essential to achieving global food security, environmental sustainability, and cultural preservation. According to the Food and Agriculture Organization (FAO, 2025), Indigenous Peoples manage and protect a substantial proportion of the world's remaining biodiversity through traditional knowledge and sustainable resource management practices. These food systems have evolved over generations and provide diverse, nutritious, and culturally appropriate foods while maintaining ecological balance.

Recent discussions from the Indigenous Peoples' Forum highlighted that Indigenous self-determination is fundamental to food security and food sovereignty, as Indigenous communities possess unique knowledge systems, governance structures, and resource management practices that support sustainable food production (IFAD, 2025). Therefore, strengthening Indigenous food systems is increasingly viewed as a strategic approach to addressing global challenges related to hunger, climate change, and biodiversity loss.

Indigenous food systems contribute significantly to biodiversity conservation because they rely on diverse crop varieties, wild foods, forests, fisheries, and traditional land management practices. FAO (2025) notes that Indigenous Peoples are custodians of many globally important ecosystems and biodiversity hotspots. Their traditional practices help conserve genetic diversity in plants and animals while reducing environmental degradation.

In terms of nutrition, Indigenous food systems provide a wide range of nutrient-rich foods that support healthy diets and cultural food preferences. Research presented by IFAD (2025) indicates that traditional Indigenous diets often contain diverse sources of vitamins, minerals, and proteins, contributing to household food security and nutritional well-being.

Furthermore, Indigenous food systems strengthen resilience to environmental and economic shocks. Traditional ecological knowledge enables communities to adapt agricultural practices to changing climatic conditions, manage natural resources sustainably, and maintain food production during periods of crisis (FAO, 2025). Consequently, Indigenous food systems play an important role in enhancing community resilience and sustainable development.

Cambodia is home to 22 recognized Indigenous groups, representing approximately 1.1% of the national population (IWGIA, 2026). Indigenous communities are predominantly located in the north-eastern provinces of Mondulkiri, Ratanakiri, Kratie, Stung Treng, and parts of Pursat Province. These communities maintain distinct languages, cultures, customary institutions, and livelihoods systems that are closely linked to forests and natural resources. Despite legal recognition of Indigenous rights, many communities continue to face challenges in securing communal land titles and protecting their traditional territories. According to IWGIA (2026), only 48 of 488 Indigenous communities had obtained communal land titles by the end of 2025, leaving many communities vulnerable to land encroachment and resource loss.

Indigenous communities in Cambodia face multiple development challenges, including land insecurity, environmental degradation, poverty, limited access to services, and food insecurity. IWGIA (2026) reports that expansion of agribusiness, mining operations, hydropower projects, and illegal logging continues to affect Indigenous lands and livelihoods. Nutrition also remains a significant concern. UNICEF Cambodia (2025) reported that although national child stunting declined to 22%, vulnerable populations in remote and Indigenous areas continue to experience disproportionately higher levels of malnutrition and limited access to health and nutrition services. Access to quality education, healthcare, water, sanitation, and market infrastructure also remains limited in many Indigenous communities (UNICEF, 2025). Geographic isolation, limited infrastructure, and restricted access to productive resources further constrain opportunities for sustainable livelihoods development and inclusive economic growth.

Despite increasing policy attention to Indigenous rights and sustainable development, important evidence gaps remain regarding how Indigenous food systems are evolving in Cambodia. Existing studies have largely focused on land tenure, natural resource governance, or Indigenous rights, while comparatively little evidence exists on the

interrelationships between food production, livelihoods, nutrition, climate resilience, gender, and market integration within Indigenous communities. This lack of integrated evidence limits the ability of government institutions, Indigenous organizations, and development partners to design context-specific interventions that effectively strengthen Indigenous food systems and livelihoods.

This study provides an integrated assessment of the food systems and livelihoods conditions of Indigenous households in Keo Seima District (Mondulkiri Province), Ou Chum District (Ratanakiri Province), and Phnom Kravanh District (Pursat) Province**.** The study aims to generate robust evidence needed by government institutions, Indigenous Organizations, and development partners to design more effective interventions and policies for indigenous communities. The findings will strengthen programme design, support advocacy on child nutrition and food security, advance localization through partnerships with indigenous organizations, and contribute to policy dialogue on indigenous peoples' rights and sustainable livelihoods. The study will also provide a credible evidence base for future investments and funding opportunities in climate-resilient agriculture, nutrition, and livelihoods development while supporting Cambodia's broader sustainable and inclusive development agenda. Accordingly, the study addresses the following research questions:

1. *What are the current food systems and livelihoods strategies of Indigenous households in Pursat, Ratanakiri, and Mondulkiri provinces?*
2. *What are the major challenges and vulnerabilities affecting food security, nutrition, and livelihoods resilience among Indigenous households?*
3. *What opportunities and support mechanisms can strengthen sustainable food systems, nutrition, and livelihoods for indigenous communities?*

1.2. Research Objectives

To generate a rigorous, evidence-based understanding of the food systems and livelihoods conditions of indigenous communities in the target provinces and to identify actionable opportunities for strengthening sustainable food security, nutrition and economic resilience through context-responsive programming.

Specific Objectives

1. To assess the current food systems and livelihood conditions of indigenous communities in the target provinces, including food production, consumption patterns, income sources, market access, and natural resource management practices.
2. To identify key challenges, vulnerabilities, and opportunities affecting sustainable food security, nutrition, and economic resilience among indigenous households, with attention to climate change, gender, youth, and social inclusion dimensions.
3. To generate evidence-based recommendations to support advocacy, policy influence, and program design aimed at strengthening sustainable livelihoods, resilient food systems, and inclusive development for indigenous communities.

2. Methodology

2.1. Study Design

This study employed a convergent mixed-methods research design, integrating quantitative and qualitative approaches to provide a comprehensive understanding of Indigenous food systems and livelihoods in the selected study areas. The mixed-methods approach enabled quantitative findings from household surveys to be complemented and validated through qualitative evidence gathered from Focus Group Discussions (FGDs), Key Informant Interviews (KIIs), and a stakeholder validation workshop. This approach strengthened the depth, credibility, and contextual interpretation of the study findings by triangulating multiple sources of evidence.

A desk review of relevant literature, national policies, programme documents, and published study was conducted at the outset of the research. The review covered Indigenous livelihoods, food systems, agriculture, nutrition, natural resource management, climate change, and Indigenous rights in Cambodia. The findings informed the conceptual framework, research questions, study design, development of data collection instruments, and identification of key evidence gaps.

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2.2. Sampling Method and Study Area

The study was conducted in three districts representing Indigenous communities across three provinces of Cambodia: Keo Seima District (Mondulkiri Province), Ou Chum District (Ratanakiri Province), and Phnom Kravanh District (Pursat Province) (Figure 1). These areas were purposively selected because of their high concentration of Indigenous populations, dependence on agriculture and forest-based livelihoods, and exposure to environmental and climate-related challenges affecting food systems and livelihood resilience.

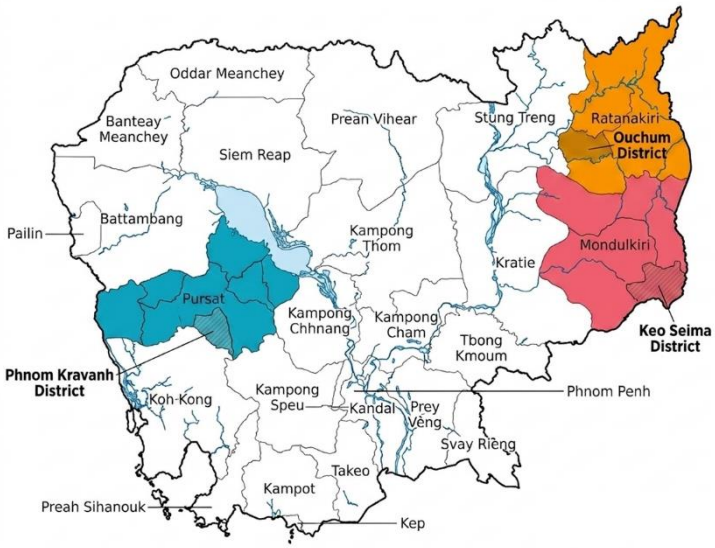
A total sample of 329 Indigenous households was included in the household survey. The initial sample allocation was conducted using proportional allocation, based on the total number of Indigenous households in each study area using the formula: **nh = (Nh × n) / N**

where:

- **nh** = sample size for each study area
- **Nh** = total number of households in each study area
- **n** = total study sample
- **N** = total population of households across all study areas

The proportional allocation initially resulted in a relatively small sample for Phnom Kravanh District. To ensure sufficient observations for meaningful district-level analysis, the sample size for Phnom Kravanh was increased to **42 households**, consistent with guidance for minimum analytical sample sizes in survey research (Lohr, 2022). The additional households were proportionally reallocated from Keo Seima and Ou Chum while maintaining the overall sample size of **329 households** (Table 1).

Fig. 01: Cambodia and District Map



The target of province and district of the study, Phnom Kranvanh district in Pursat province, Ouchum district in Ratanakiri and Keo Seima in Mondul Kiri province.

Table 01: Sample Size Proportionally Allocated

Province	Proposed District	Total Families	Sample Size By Province nh= (Nh*n/N)	Allocated Sample Size	Change	Revise Allocate
Mondulkiri	Keo Seima	3,290	108	11	-11	97
Pursat	Phnom Kravanh	211	7*	42	33	42
Ratanakiri	Ou Chum	6,465	212	22	-22	190
N=		9,966	327			329

**Note: The household survey sample was initially allocated proportionally based on the number of families in each province. As proportional allocation resulted in a small sample size for Pursat Province, the sample for Pursat was increased to 42 households to ensure adequate analytical validity (Lohr, 2022). The additional households were reallocated proportionally from Mondulkiri and Ratanakiri, while maintaining the overall sample size. The sample is proportionally allocated using the formula nh = (Nh × n/N).*

2.3. Data Collection and In-depth Interview

- Household Survey: *(Table 1):* A structured quantitative survey with 329 indigenous households across Pursat, Ratanak Kiri, and Mondulkiri to collect data on food systems, market access, income, consumption, and livelihoods strategy.
- Focus Group Discussions (FGDs): Nine FGDs which one FGD (10-15 people) will deliberately disaggregated groups, including with indigenous women (including elderly, disability people), men, and youth to explore food systems, livelihoods, traditional knowledge, gender roles, and challenges.
- Key Informant Interviews (KIIs): Nine KIIs with indigenous leaders (including elderly women), traders, and local authorities to explore food systems, markets, governance, and livelihood challenges from three district difference province.
- Consultative and Validation Workshop: Following the preliminary analysis of the household survey, Focus Group Discussions (FGDs), and Key Informant Interviews (KIIs), a consultative and validation workshop was conducted with key stakeholders, including representatives of indigenous communities, local authorities, Indigenous Affairs Development Committee (IADC), World Vision Cambodia, CASI community leaders, and relevant development partners in total 40 participants. The workshop served as a platform to present preliminary findings, validate the accuracy and relevance of the results, and gather additional insights and recommendations from stakeholders.

2.4. Data Analysis

The study employed a convergent mixed-methods approach, integrating quantitative and qualitative data to generate a comprehensive understanding of indigenous food systems and livelihoods. Quantitative data collected from 329 household surveys were cleaned, coded, and analysed using JASP statistical software. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarise household demographic characteristics, livelihood activities, food production systems, food security status, dietary diversity, market access, gender roles, and climate change impacts. Cross-tabulations and comparative analyses were conducted where appropriate to examine variations across provinces and population groups. Composite indicators, such as the Household Dietary Diversity Score (HDDS), were calculated using the FAO (2010) guidelines based on 24-hour food consumption recall.

Qualitative data from Focus Group Discussions (FGDs) and Key Informant Interviews (KIIs) were transcribed, translated into English where necessary, and analyzed using thematic analysis. Responses were coded and organized into key themes related to indigenous food systems, livelihoods strategies, food security challenges,

climate change impacts, gender and social inclusion, and community priorities. Findings from the quantitative and qualitative analyses were then triangulated to identify areas of convergence and divergence, providing deeper insights and strengthening the validity of the study's conclusions.

2.5 Ethical Considerations

The study was conducted in accordance with internationally recognised ethical principles for social research. Participation was voluntary, and informed consent was obtained from all participants before data collection. Participants were informed of the purpose of the study, their right to decline participation or withdraw at any stage, and the measures taken to ensure confidentiality and anonymity. Personal identifiers were removed during data analysis and reporting to protect participants' privacy.

Particular attention was given to conducting interviews and group discussions in a culturally appropriate and respectful manner. The research team recognised and respected the customs, traditions, values, and knowledge systems of Indigenous Peoples throughout the study. Community leaders were consulted during the planning and implementation of field activities to ensure culturally sensitive engagement and to promote meaningful participation.

3. Study Strengths and Limitations

3.1. Study Strengths

This study has several methodological and operational strengths that enhance the credibility and reliability of its findings.

- Indigenous data collectors enhanced trust, communication, and culturally appropriate data collection.
- Local language adaptation improved participant understanding and reduced response misunderstandings significantly.
- Community leaders facilitated access, participation, and smooth field data collection processes.
- Flexible supervision addressed challenges, ensuring efficient, timely, and coordinated field implementation.
- Mixed-methods design strengthened triangulation, validity, and credibility of study findings through integration of quantitative and qualitative methods.

3.2. Study Limitations

- Delays in project start due to approval and coordination with implementing partners and local authorities.
- Short data collection period limited revisits and seasonal variation assessment opportunities.
- Heavy rainfall delayed interviews, extending fieldwork duration and reducing daily productivity.
- Remote farm households required extensive travel, increasing time and operational costs.
- Poor internet connectivity delayed data synchronization and communication with field supervisors.
- Language adaptations may have introduced minor variations in respondents' interpretation.
- Coordinating stakeholders across three provinces required additional time and logistical planning.

4. Finding

4.1 Household Socioeconomic Characteristics

Understanding the socioeconomic characteristics of participating households provides essential context for interpreting Indigenous food systems, livelihoods strategies, and household resilience. A total of 329 Indigenous households were surveyed across Keo Seima District (Mondulkiri Province), Ou Chum District (Ratanakiri Province), and Phnom Kravanh District (Pursat Province).

Respondent Demographic Characteristics

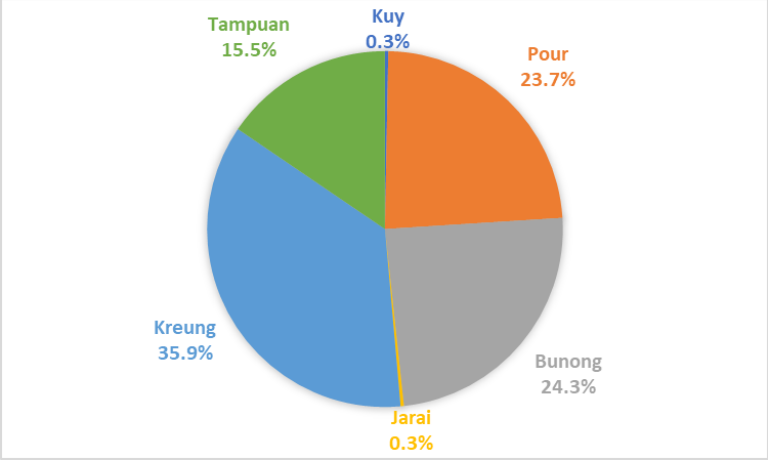
A total of 329 households were surveyed across three districts. Female respondents represented 69.3% of the sample, while males accounted for 30.7%. Nearly three-fifths of respondents (55.6%) were aged between 25 and 44 years, with the largest age group being 25–34 years (29.5%), followed by 35–44 years (26.1%) (Table 2). This indicates that most households were represented by working-age adults who are likely to be responsible for household decision-making.

Table 02: Respondent Demographic Characteristics (N = 329)

Indicator	Category	Frequency	%
Sex	Female	228	69.3
	Male	101	30.7
Age Group	15–24 years	36	10.9
	25–34 years	97	29.5
	35–44 years	86	26.1
	45–54 years	43	13.1
	55–64 years	35	10.6
	65+ years	32	9.7

The Fig.2 illustrates the distribution of respondents by ethnic group. Kreung represents the largest share at 35.9%, followed by Bunong (24.3%) and Pour (23.7%), indicating that these three groups make up the majority of the sample. Tampuan accounts for 15.5%, contributing a smaller but still significant proportion. In contrast, Jarai and Kuy each represent only 0.3%, showing minimal participation. Overall, the sample is dominated by Kreung, Bunong, and Pour respondents, while Jarai and Kuy are substantially underrepresented in comparison.

Fig. 02: Ethnic Composition



Educational attainment among household heads was generally low. More than one-third (36.47%) reported having no formal education, while 21.58% had attended some primary education without completion. Only a small proportion had completed secondary education (6.99%) or attained higher education (0.91%).

Table 03: Educational Attainment of Household Heads

Education Level	Keo Seima	Ou Chum	Phnom Kravanh	Total
Higher	0.00 %	1.58 %	0.00 %	0.91 %
Completed Primary School	28.87 %	12.63 %	9.52 %	17.02 %
Completed Secondary School	5.15 %	6.84 %	11.90 %	6.99 %
Some Primary	29.90 %	14.21 %	35.71 %	21.58 %
Some Secondary	6.19 %	13.16 %	16.67 %	11.55 %
None	29.90 %	43.16 %	21.43 %	36.47 %
Other	0.00 %	8.42 %	4.76 %	5.47 %

Chi-square test: $\chi^2(12, N = 329) = 45.68, p < .001$ (statistically significant).

Households consisted of an average of 5.2 members, reflecting relatively large family structures. The survey also identified 224 children under five were recorded across 329 households, with an average of 0.68 children per household (SD = 0.82)*. This finding indicates that most households have either no or one young child, while fewer households have multiple children under five.

Table 04: Household Composition

Variable	Value
Average household size	5.2
Median household size	5
Average number of women per household	2.9
Total children under five	224

Mean-0.681, Std. Deviation-0.822, Sum-224

Socioeconomic status remains a significant concern. More than one-third of households (34.0%) possessed an IDPoor card (10.9% IDPoor 1 and 23.1% IDPoor 2), while only 36.5% were classified as Normal (Table 5). The remaining households either had not been classified through the national IDPoor Programme or fell outside existing poverty identification systems.

Table 05: Household Vulnerability and Socioeconomic Status

Variable	Category	n	%
Disability	Yes	55	16.7
	No	274	83.3
Migration	Yes	26	7.9
	No	303	92.1
Socioeconomic Status	IDPoor 1	36	10.9
	IDPoor 2	76	23.1
	Poor without ID	97	29.5
	Normal	120	36.5

4.2 Livelihood Systems and Income Sources

Livelihoods among Indigenous households remain predominantly agriculture-based, with farming continuing to serve as the primary source of food, income, and household resilience. However, increasing climate variability, declining agricultural productivity, and limited economic opportunities have encouraged many households to diversify their livelihoods through wage labour, livestock production, forest-product collection, and other supplementary income-generating activities. The findings indicate that livelihood diversification is occurring primarily as a coping strategy rather than as a pathway towards sustained economic improvement.

A. Primary Livelihoods Strategies

As shown in Table 6, crop production was the dominant livelihood activity among indigenous households, reported by 71.1% of respondents, followed by wage labour (46.8%) and livestock raising (35.0%). A smaller proportion of households engaged in forest-product collection (15.8%), while only (8.8%) engaged in small business activities and less than 1% reported remittances as a livelihood source. Livelihood patterns varied across three study districts. Crop production was similarly important in Keo Seima (72.2%) and Ou Chum (72.1%) but slightly lower in Phnom Kravanh (64.3%). Wage labour was most common in Keo Seima (57.7%) and least common in Phnom Kravanh (23.8%), while livestock raising was particularly important in Phnom Kravanh (78.6%) compared to Keo Seima (25.8%) and Ou Chum (30.0%).

Across KIIs and FGDs, participants consistently identified cassava, cashew, rice, and soybean cultivation as the main livelihood activities, while also highlighting growing dependence on casual labour and plantation work. In Keo Seima, one community leader explained that "*Many households now supplement agricultural income through employment in nearby banana and rubber plantations because farming alone no longer provides sufficient returns*". Similarly, FGD participants in Ou Chum reported that households engage in wage labour, small-scale trading, livestock rearing, and forest-product collection to compensate for declining agricultural productivity.

Gender differences in livelihoods participation were relatively modest. Female respondents reported slightly higher engagement in wage labour (48.3% versus 43.6%) and forest product collection (17.1% versus 12.9%), whereas male respondents reported somewhat greater involvement in livestock production (38.6% versus 33.3%).

Similarly, FGD participants emphasized that poor households often have limited productive assets and depend primarily on selling their labour. Elderly people, widows, people with disabilities, and households with many dependents were repeatedly identified as the most economically vulnerable groups.

Table 06: Primary Livelihoods Activities of Indigenous Households

Variable (%)	Total	Keo Siema	Oh Chum	Phnom Kravanh	Female	Male	ID Poor 1	ID Poor 2	Poor without ID	Normal
Crop production	71.1	72.2	72.1	64.3	71.1	71.3	52.8	69.7	70.1	78.3
Wage labour	46.8	57.7	46.3	23.8	48.3	43.6	61.1	61.8	51.6	29.2
Livestock raising	35.0	25.8	30.0	78.6	33.3	38.6	30.6	22.4	36.1	43.3
Forest products	15.8	18.6	17.4	2.4	17.1	12.9	22.2	14.5	25.8	6.7
Small business	8.8	0.0	13.7	7.1	8.8	8.9	--	--	--	--
Remittances	0.9	0.0	1.6	0.0	1.3	0.0	--	--	--	--

B. Livelihoods Diversification and Income Levels

Although the survey did not collect income data by specific livelihood source, household income distributions provide important insights into economic conditions across the study areas. Overall, 46.6% of households reported annual income below 5 million KHR (approximately USD 1,250), while only 11.6% reported incomes above 10 million KHR, indicating that most households remain concentrated in lower-income categories. Poverty status further reinforces

these patterns: IDPoor 1 households are predominantly represented in the lowest income category (below 1 million KHR), whereas Normal households are more commonly found in higher income brackets, including 5–20 million KHR and above 20 million KHR (Table 07).

Income patterns varied considerably across districts. (Fig.03) Phnom Kravanh recorded the highest proportion of households earning less than 1 million KHR annually (45.2%), while Ou Chum had the largest share of households earning between 2.5 and 10 million KHR. Higher-income households (above 20 million KHR) were primarily concentrated in Keo Seima and Ou Chum, although lower-income households remained common in these districts as well. Overall, income distribution differs substantially by geographic location, reflecting varying economic opportunities and livelihood conditions.

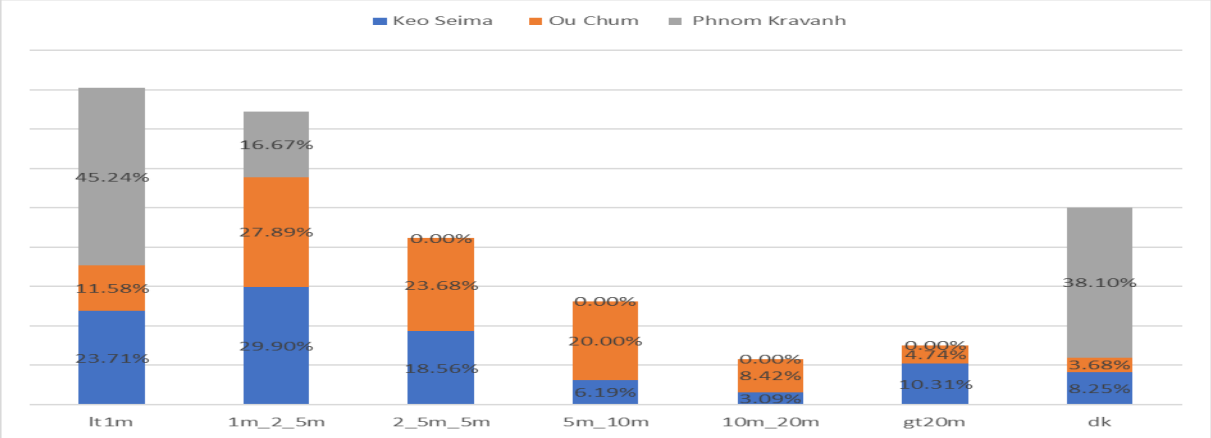
Gender-based differences in income were relatively modest. However, male-headed households were slightly more represented in higher income brackets (10–20 million KHR and above 20 million KHR), whereas female-headed households were more concentrated in lower income categories. Key informants identified households headed by widows, elderly people, people with disabilities, and families with large numbers of dependents as among the most economically vulnerable. These households often rely on casual labour, livestock sales, and borrowing to meet basic needs.

The quality finding showed that livelihood diversification remains limited for many households. While wage labour, forest-product collection, and small-scale business activities provide supplementary income, these activities often function as coping mechanisms rather than sustainable pathways out of poverty. Several respondents reported that households seek employment on plantations or migrate temporarily for work when agricultural production is insufficient, highlighting both the necessity and limitations of current diversification strategies.

Table 07: Annual Household Income Categories

Variable	Overall	ID Poor 1	ID Poor 2	Poor without ID Poor	Normal
lt1m	9.40%	22.22%	23.68%	26.80%	10.00%
1m_2_5m	27.10%	41.67%	25.00%	30.93%	20.83%
2_5m_5m	19.10%	25.00%	19.74%	15.46%	20.00%
5m_10m	13.40%	5.56%	11.84%	11.34%	18.33%
10m_20m	19.50%	2.78%	3.95%	2.06%	10.83%
gt20m	5.80%	0.00%	3.95%	5.15%	9.17%
dk	5.80%	2.78%	11.84%	8.25%	10.83%

Fig. 03: Income Categories by District



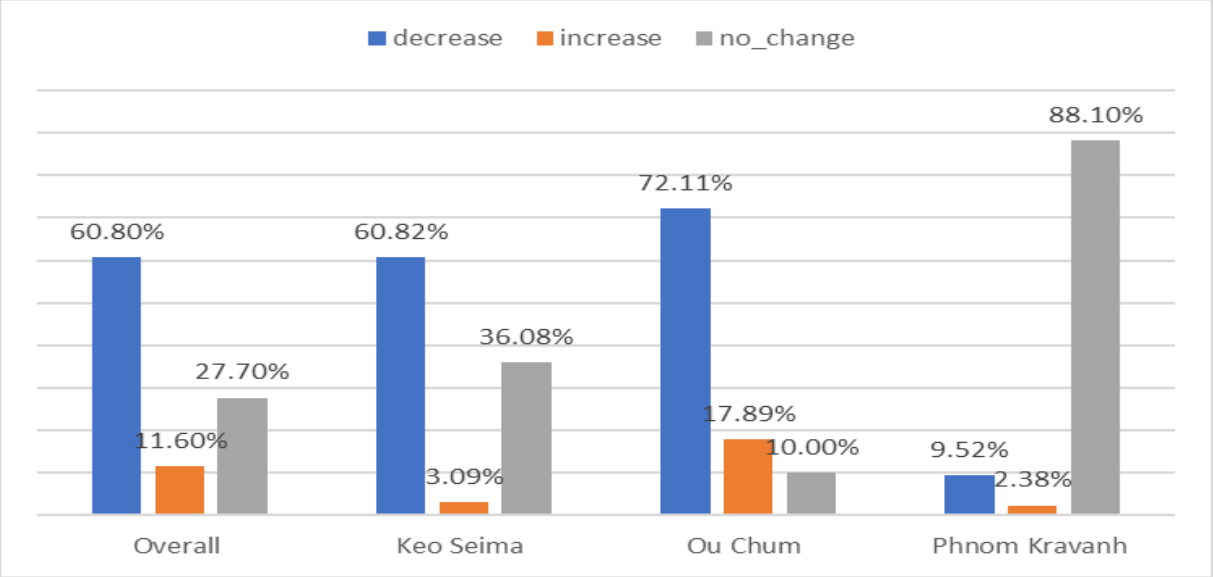
Chi-square test: *χ^2 (12, N = 329) = 104.60, p < .001. indicating that household income distribution differed significantly by district. For the Cambodia exchange rate 1$ = 4000 KHR*

C. Economic Vulnerability

Migration appears to play a supplementary role within indigenous livelihood systems. Although migration was reported by some households 7.9%, remittances were identified as a livelihood source by only 0.9% of respondents. This indicates that migration is not currently a major contributor to household income in most communities.

As shown in (Fig.4), during the previous 12 months, indigenous households experienced considerable economic challenges, with a majority (60.8%) reporting a decline in household income, while 27.7% reported no change and only 11.6% experienced income growth. The analysis revealed significant differences across districts ($\chi^2 = 117.2$, $df = 4$, $p < 0.001$), indicating that economic conditions varied substantially by location. Households in Ou Chum were the most economically affected, with 72.1% reporting declining incomes, suggesting high exposure to livelihoods shocks and limited income-generating opportunities. Similarly, 60.8% of households in Kaev Seima experienced income reductions, although more than one-third (36.1%) reported stable incomes. In contrast, households in Phnom Kravanh demonstrated greater economic stability, with 88.1% reporting no change in income and only 9.5% experiencing income decline.

Fig. 04: Household Income Changes During the Previous 12 Months



Chi-Squared Tests	Value	Df	p
X^2	117.2	4	< .001
N	329		

The overwhelming majority (88.1%) reported having no savings. Significant geographic disparities were observed. Savings ownership was highest in Keo Seima, where 16.5% of households reported having savings, followed by Ou Chum (12.1%). No households in Phnom Kravanh reported having savings (Fig.05). Formal borrowing was most prevalent in Keo Seima (50.5%), compared with Ou Chum (41.6%) and Phnom Kravanh (35.7%). Informal borrowing was relatively higher in Phnom Kravanh (21.4%) and Ou Chum (19.5%) than in Keo Seima (11.3%). However, differences in borrowing patterns across districts were not statistically significant ($\chi^2 = 4.94$, $p = 0.294$). The primary purpose of borrowing was household consumption and basic needs (73.0%), followed by agricultural production (30.0%) (Fig.06), other purposes (19.0%), education and health expenditures (18.0%), and business investment (13.0%). Through the KII, “About 90% of households have debt. When crops fail, or yields are low, families borrow money, sell livestock, or even sell land to cope with their difficulties.”

Fig. 05: Access to Savings

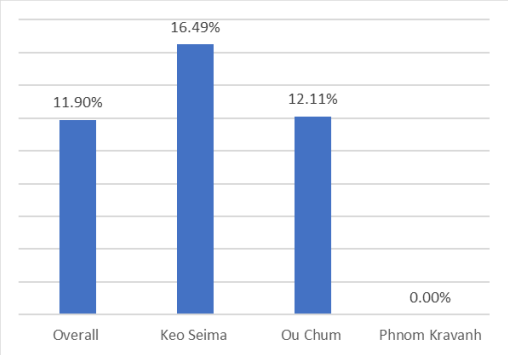
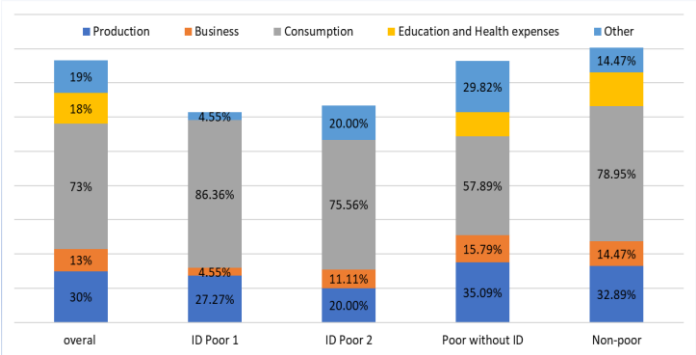


Fig. 06: Purpose of Borrowing



4.3 Indigenous Food Production Systems

A. Food Production

The results show that indigenous farming systems are increasingly oriented toward commercial crop production. Cassava production was the most widely cultivated crop, grown by 55.6% of households, followed by cash crops (28.6%) cashew (26.7%), and vegetables (23.4%) (Table 8.). in contrast, only 12.2% of households cultivated rice, while fruit trees (8.8%) and spices (8.8%) were grown by relatively few households. These findings suggest that household agriculture is increasingly oriented toward cash-generating crops rather than traditional staple food production. The relatively low prevalence of rice cultivation may indicate growing dependence on market purchases for staple foods, particularly among households with limited land suitable for paddy cultivation.

District-level analysis suggests important differences in agricultural production systems. Cassava and cash crops were more common in Keo Seima and Ou Chum, while households in Phnom Kravanh tended to maintain smaller and less diversified crop portfolios. Further disaggregation by poverty status indicates that Normal households were more likely to cultivate multiple crop types than poor households, reflecting differences in access to land, labour, and agricultural inputs.

Livestock production represents an important complementary livelihood activity among indigenous households. Chickens were the most commonly raised livestock species, owned by 61.1% of households, followed by cattle (35.9%) and pigs (18.2%). Livestock serves both as a source of food and as a productive asset that can be sold during periods of financial hardship or crop failure, . However, 17.0% of households reported owning no livestock, indicating a lack of productive assets among a significant proportion of households to cope with economic or climate shocks.

Table 08: Crops Cultivated and Livestock Raised by Indigenous Households

Crop Type	Households (N=329)	%	Livestock Type	Households (N=329)	%
Cassava	183	55.6	Chickens	201	61.1
Cash crops	94	28.6	Cattle	118	35.9
Cashew Nut	88	26.7	Pigs	60	18.2
Vegetables	77	23.4	No livestock	56	17.0
Legumes	55	16.7	Other livestock	33	10.0
Rice	40	12.2	Ducks	15	4.6

Fruits	29	8.8	Buffalo	7	2.1
Spices	29	8.8	Fish	3	0.9

B. Food Sources and Food Dependency

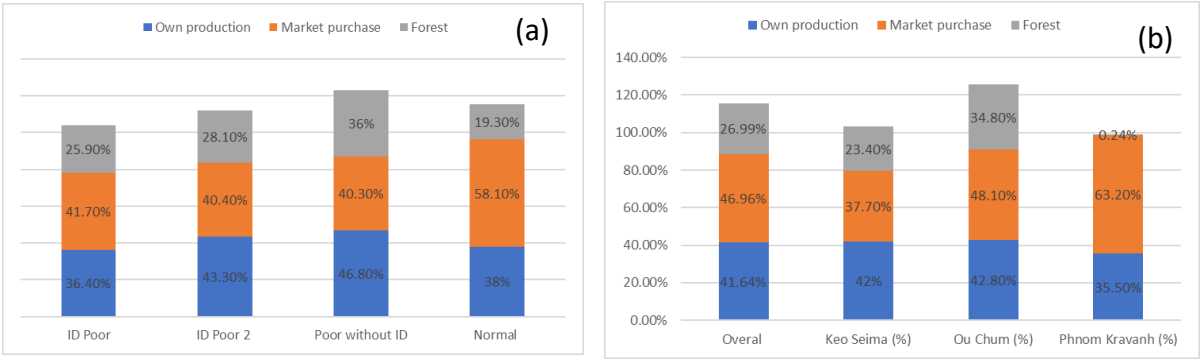
Food access among indigenous households is derived from a combination of own production, market purchases, and forest resources. On average, 41.6% of household food originated from own production, 47.0% from market purchases, and 27.0% from forest resources. Market dependence was highest among Normal households (58.1%), whereas poorer households relied more heavily on their own production and forest resources. Forest foods contributed substantially to household consumption among households without IDPoor cards (36.0%) and IDPoor 2 households (28.1%), highlighting the continued importance of natural resources in local food systems (Fig. 07a).

District-level differences were significant ($\chi^2 = 21.59$, $p < 0.001$). Households in Ou Chum reported the highest dependence on market purchases, while Keo Seima households maintained greater reliance on their own production. These findings suggest varying food acquisition strategies across locations, shaped by access to agricultural land, forest resources, and local markets. In Ou Chum, participants explained that most households obtain food from their rice fields, crop farms, and household vegetable gardens, while supplementing these sources through market purchases when production is insufficient (Fig. 07b).

"*Most of our food comes from farms and home gardens. During the dry season, some food is purchased from the market*."

Similarly, another FGD group reported: "Food mainly comes from rice fields, farms, and vegetables grown around the house. Some households also buy food from the market." The qualitative evidence also confirms the continuing importance of forests within indigenous food systems. Participants described collecting mushrooms, bamboo shoots, wild vegetables, resin, honey, and other forest products for both consumption and income generation. In Keo Seima, community members estimated that approximately 30% of household food comes from forest resources, particularly during periods of food shortage or limited agricultural production. One FGD participant explained: "The community obtains about 50% of its food from its own production, 30% from forest products, and 20% from markets and village shops."

Fig. 07: Food Source



Forest foods continue to play an important role in indigenous food systems, although dependence varies substantially across districts. Overall, one-third of households (33.1%) reported collecting food from forests or communal lands. Forest-food collection was most common in Ou Chum, where 40.5% of households reported collecting forest foods, followed by Keo Seima (30.9%). In contrast, only 4.8% of households in Phnom Kravanh reported collecting forest foods.

The differences across districts were statistically significant ($\chi^2 = 20.16$, $p < 0.001$), indicating that access to forests and natural resources remains highly location-specific. These findings suggest that forest resources continue to provide an important supplementary source of food, particularly in areas where indigenous communities maintain stronger connections to forest ecosystems (Fig.08).

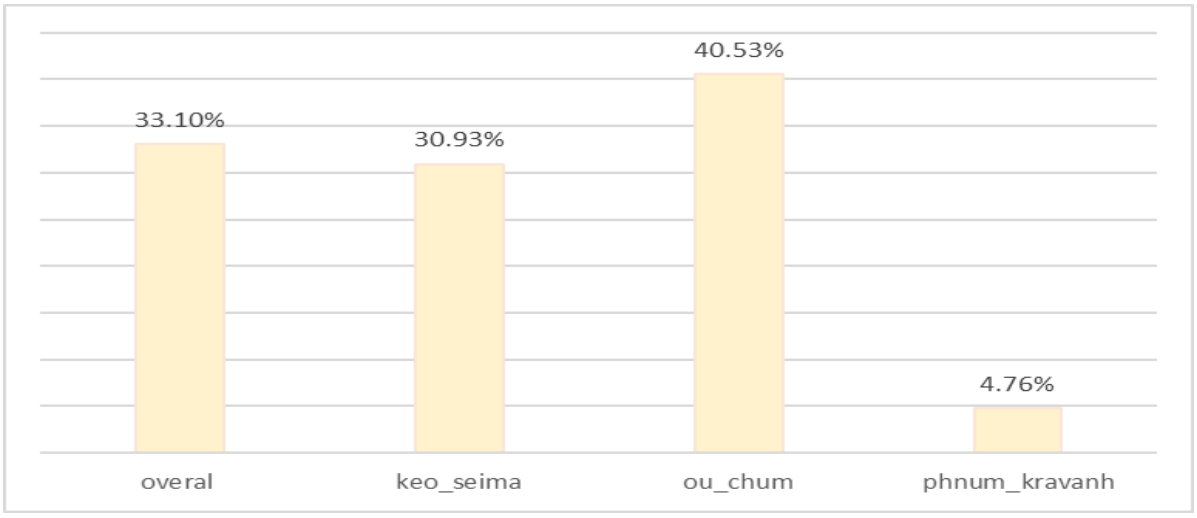
Forest-food collection was particularly common among Bunong, Kreung, and Tampuan households, suggesting strong links between indigenous food systems and traditional ecological knowledge. By contrast, households with limited access to forests or those living in more market-oriented environments reported lower reliance on natural resources. 66.9% of households reported not collecting food from forests, indicating that agriculture, livestock, and market purchases remain the primary sources of food for most households.

The qualitative findings confirm that forests remain an important component of indigenous food systems despite increasing market integration. Participants described collecting mushrooms, bamboo shoots, wild vegetables, honey, resin, and other forest products both for household consumption and income generation. In Keo Seima, FGD participants explained that forest foods become especially important during periods of food shortage, when households rely on wild foods to supplement their diets. "When families face difficulties, they go to the forest to collect vegetables, mushrooms, and other products both for food and for sale."

KIIs further highlighted concerns about declining access to forest resources. Community leaders reported that environmental degradation and changing climatic conditions have reduced the availability of some traditional forest foods and income-generating products. This finding helps explain why market dependence is increasing, particularly among younger households and communities with greater road access.

The convergence between quantitative and qualitative findings demonstrates that indigenous food systems are currently in transition. While traditional reliance on forests remains important, increasing commercialization and environmental pressures are shifting households toward greater market dependence. This creates both opportunities and risks. Greater market integration can improve access to food and income, but it also increases household exposure to food-price volatility and market shocks. Future interventions should therefore strengthen both sustainable natural resource management and market-based livelihoods opportunities, ensuring that traditional food sources continue to contribute to food security and resilience.

Fig. 08: Collection of Forest Foods by District



Chi-square test: ($\chi^2 = 20.16$, $p < 0.001$)

4.4 Food Security and Dietary Diversity

Food security among Indigenous households in the three study areas is characterised by seasonal adequacy but persistent vulnerability. Although most households reported a moderate food security situation at the time of the survey, many continue to experience predictable seasonal food shortages, limited dietary diversity among vulnerable household members, declining agricultural productivity, and constrained livelihood opportunities. These challenges are closely interconnected and reflect the dependence of Indigenous communities on rain-fed agriculture, natural resources, and fluctuating local markets.

A. Current Food Security Status of the Indigenous group

The overall food security picture is mixed but clearly fragile. At the aggregate level, nearly seven in ten households (69.9%) described their food security and food system as moderate, while 25.8% considered it weak and 1.8% classified their food security as very weak; only 2.4% reported a good situation.

Significant differences were observed across districts ($\chi^2 = 28.37$, $p < 0.001$). Keo Seima had the weakest profile, with 43.3% of households reporting a weak situation and only 49.5% reporting moderate food security. Ou Chum and Phnom Kravanh looked somewhat better, with 77.4% and 83.3%, respectively, reporting moderate food security, although weakness still remained visible in both areas. The poverty pattern was also strong: IDPoor 1 households had the highest share of weak/very weak status (52.7% combined), while Normal households were much more likely to report moderate or good food security. In contrast, the difference by respondent sex was small and not statistically meaningful. “About 30-40% of poor households experience food shortages and do not have enough food throughout the year (Table 09). This is because their food production is affected by natural disasters, they lack technical knowledge, and they do not have adequate means or resources for farming.” These were recorded by qualitative data collection, which comes from Community leaders who reported that many households can meet their food needs during and immediately after harvest periods, but struggle during the pre-harvest months.

Table 09: Current food security status by subgroup

%	Overall	Female	Male	Keo Seima	Ou Chum	Phnom Kravanh	IDPoor 1	IDPoor 2	Poor without ID	Normal
Good	2.4	2.2	3.0	4.1	1.6	2.4	0.0	1.3	0.0	5.8
Moderate	69.9	72.4	64.4	49.5	77.4	83.3	47.2	57.9	68.0	85.8
Weak	25.8	24.1	29.7	43.3	19.5	14.3	44.4	39.5	29.9	8.3
Very weak	1.8	1.3	3.0	3.1	1.6	0.0	8.3	1.3	2.1	0.0

B. Seasonal Food Availability and Food Shortages

The production calendar is highly seasonal. About 70.5% of households reported that their main production occurs in the wet season, compared with 21.0% in the dry season and 8.2% in both seasons equally (Fig. 09b). The harvest calendar is concentrated in November, December, and October, which explains why the lean period emerges before the main harvest and why households remain vulnerable in the middle and late rainy season.

Food shortages follow a predictable seasonal pattern. The highest prevalence of food shortages occurred between July and September, affecting 39.5% to 45.9% of households. Shortages peaked in August (45.9%) and September (45.6%), immediately preceding the main harvest season (Fig.09a). District-level analysis shows that shortages were particularly pronounced in Keo Seima during September (59.8%) and August (54.6%), while Phnom Kravanh recorded particularly high shortages during June (47.6%) and July (52.4%). In general, Keo Seima and Ou Chum reported stronger shortage pressure during the peak months. while Phnom Kravanh experienced elevated shortages during June and July (Fig.10). The qualitative findings strongly reinforce this pattern. Across all FGDs and KIIs, participants consistently identified August, September, and October as the most difficult months of the year. During this period, food stocks from the previous harvest are depleted, agricultural employment opportunities decline, and heavy rains often restrict transportation and access to markets.

A village leader in Keo Seima explained:

"The most difficult months are August, September, and October because families have already exhausted their rice stocks, the harvest has not yet arrived, and flooding often damages roads and fields."

FGD participants in Ou Chum shared similar experiences:

"Food shortages occur mainly during the rainy season because people cannot find work, and household rice stocks are depleted before the next harvest."

Fig. 09: Seasonal Food Production and Food Availability

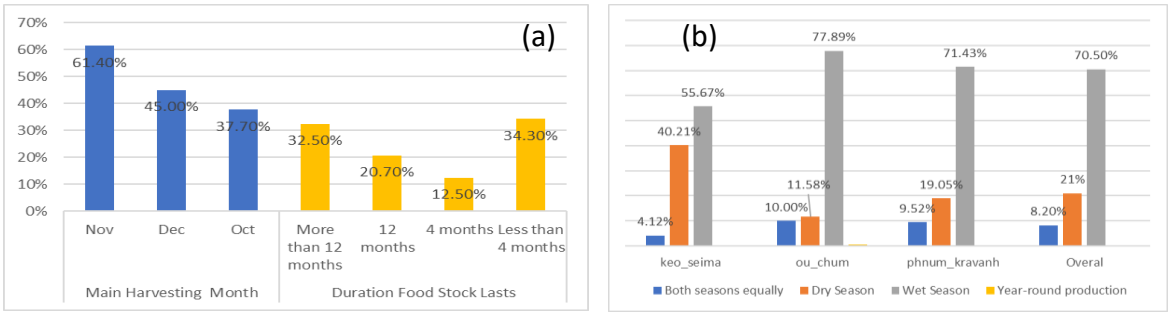
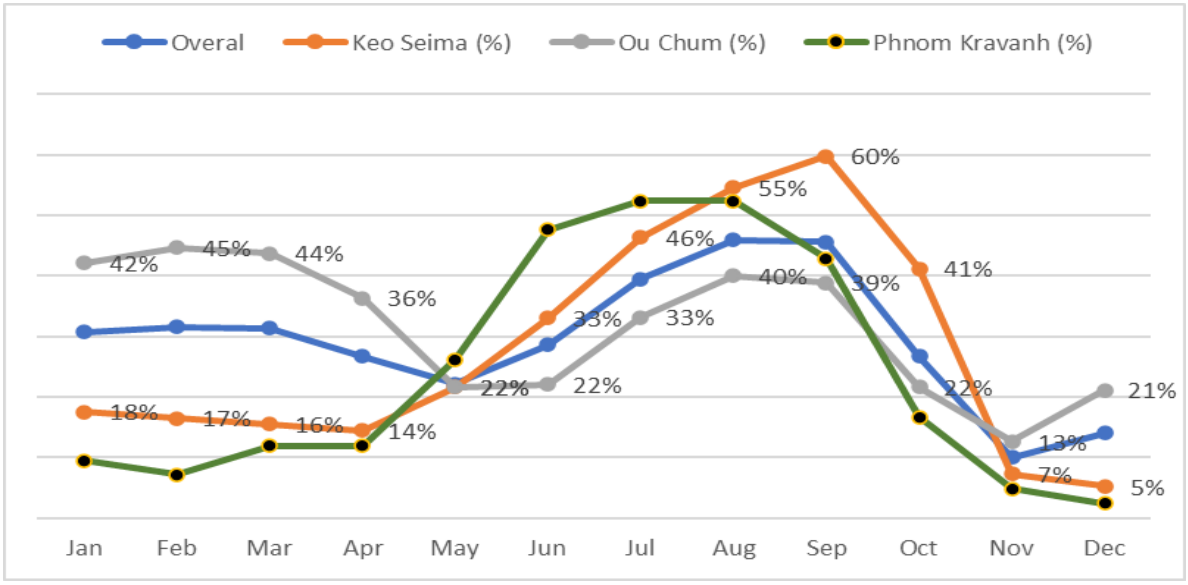


Fig. 10: Months Associated with Seasonal Food Shortages



C. Food Shortage Coping Strategy

Borrowing food or money was the most commonly reported coping strategy among households (60.5%), followed by reducing meal size (40.1%), eating less (31.9%), collecting wild foods (26.4%), and selling assets or livestock (19.5%). Significant differences were observed across districts. Households in Phnom Kravanh were substantially more likely to adopt severe coping strategies, including reducing meal size (54.8%), selling assets or livestock (54.8%), and collecting wild foods (76.2%), while borrowing food or money was less common (40.5%) than in Keo Seima (63.9%) and Ou Chum (63.2%) ($p<0.05$) (Fig.11). By poverty status (Fig. 13), borrowing food or money remained common across all groups and was highest among IDPoor 1 households (72.2%), whereas reducing meal size was reported more frequently among non-poor households (50.8%). (Fig.12) Households with children under five were more likely to borrow food or money (64.7% vs. 56.0%), while those without young children more frequently reduced meal size (45.3% vs. 35.3%) and ate less (36.5% vs. 27.7%).

Fig.11: food shortage coped by district level

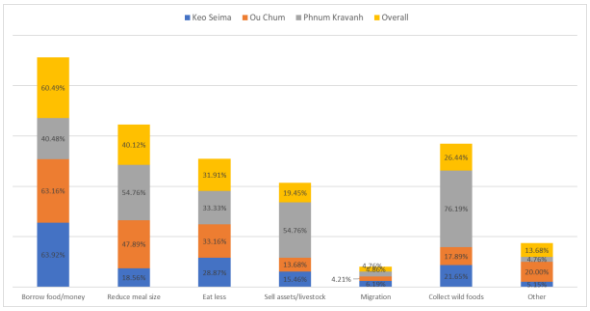


Fig. 12: Food Shortage Coped by HHs with Child under 5

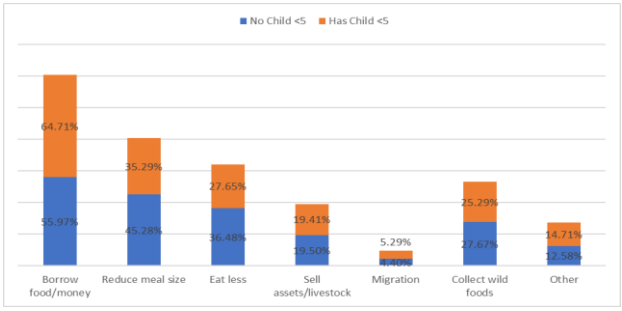
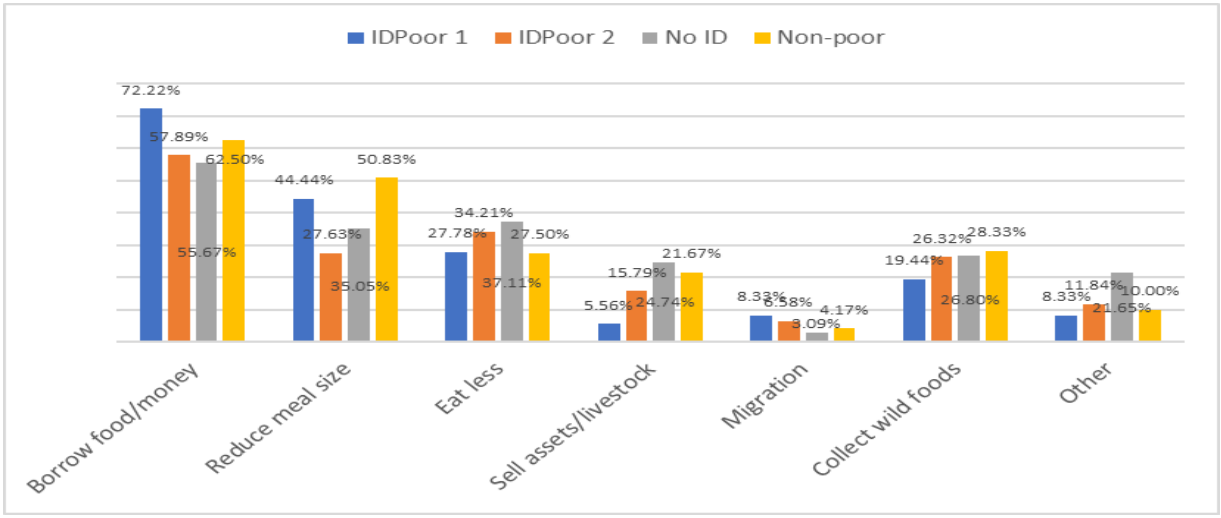


Fig. 13. Food Shortage Coped with by HHs Level

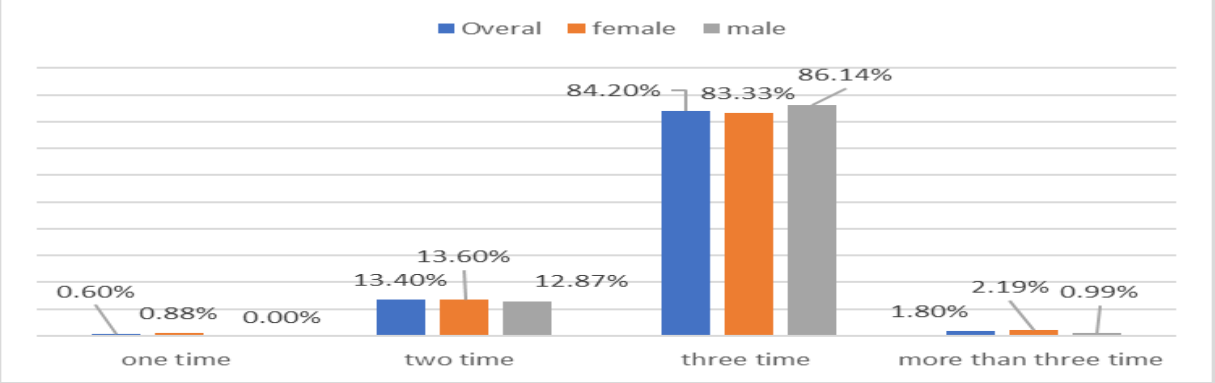


D. Food Consumption Patterns and Intra-Household Food Distribution

(Fig.10)The survey findings show that most households maintained a relatively adequate meal frequency during the day preceding the survey. Out of 329 respondents, 84.2% reported consuming three meals per day, which is generally considered a normal meal pattern. Another 13.4% reported eating only two meals, while very small proportions consumed one meal (0.6%) or more than three meals (1.8%).

These results suggest that the majority of households had access to sufficient food to sustain regular daily meals. However, the 14.0% of respondents who consumed one or two meals may indicate the presence of food access constraints, seasonal food shortages, limited household resources, or coping strategies related to food insecurity. When analysed by sex, meal frequency patterns were very similar between female and male respondents. Among female respondents, 83.3% consumed three meals per day compared with 86.1% of male respondents(Fig. 14). The Chi-square test confirmed that there was no statistically significant relationship between respondent sex and meal frequency ($\chi^2 = 1.534$, df = 3, $p = 0.674$). This indicates that men and women experienced comparable food consumption patterns, with no evidence of gender-based disparities in the number of meals consumed during the previous day. Anyways, through the FGD, participants (women group) highlighted that women, particularly pregnant and lactating women, and young children may still face nutritional challenges despite consuming the same number of meals as other household members. Participants reported cases of undernourished children and poor maternal nutrition linked to poverty, limited dietary diversity, and inadequate nutrition knowledge. "One out of ten women was reported to have poor health, and her child was born underweight because of inadequate food consumption."

Fig. 14: Number of Meals Consumed Yesterday

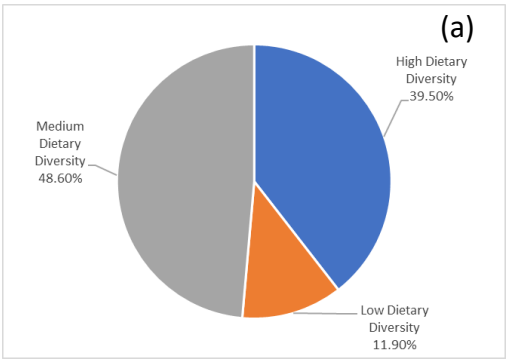


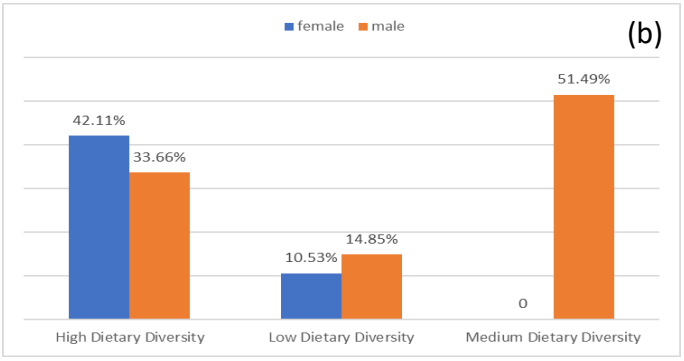
E. Dietary Diversity and Nutritional Quality

The Household Dietary Diversity Score (HDDS) analysis indicates that dietary diversity among surveyed households was generally moderate. Nearly half of households (48.6%) fell into the moderate dietary diversity category, while 39.5% achieved high dietary diversity, suggesting that many households consumed a relatively diverse range of food groups during the reference period (Fig.15a). However, 11.9% of households had low dietary diversity, indicating limited access to a variety of nutritious foods. Analysis by sex showed no statistically significant differences in dietary diversity outcomes between female and male respondents ($\chi^2 = 2.611$, df = 2, $p = 0.271$). Although female respondents reported a slightly higher proportion of high dietary diversity (42.1%) than male respondents (33.7%), moderate dietary diversity remained the most common category for both groups, indicating broadly similar dietary patterns across genders (Fig.15b).

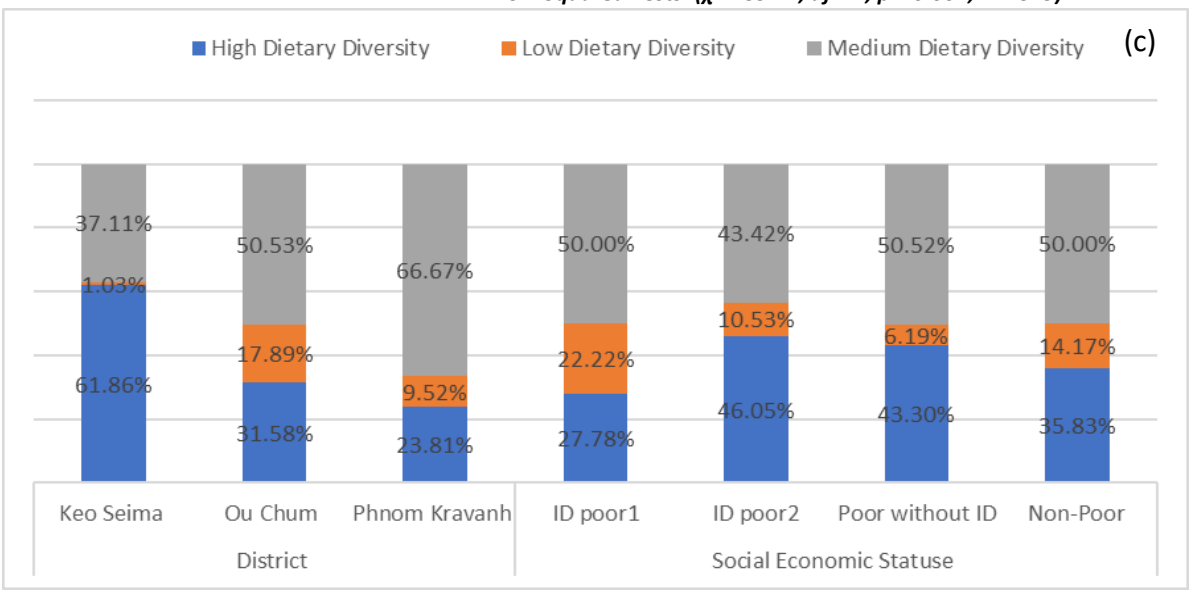
In contrast, dietary diversity varied significantly across geographic areas ($\chi^2 = 39.12$, df = 4, $p < 0.001$). Households in Keo Seima recorded the highest proportion of high dietary diversity (61.9%), compared with 31.6% in Ou Chum and 23.8% in Phnom Kravanh, highlighting important differences in food access and consumption patterns between locations. While differences by household poverty status were not statistically significant ($\chi^2 = 9.944$, df = 6, $p = 0.127$), ID Poor 1 households showed the highest proportion of low dietary diversity (22.2%), compared with 10.5% among ID Poor 2 households and 6.2% among households without an ID Poor classification (Fig.15c). These findings suggest that geographic location plays a stronger role in shaping dietary diversity than gender or poverty status, although poorer households may still face greater challenges in accessing diverse and nutritious foods.

Fig. 15: Dietary Diversity and Nutritional Quality





Chi-Squared Tests: (χ^2 = 39.12, df = 4, p < 0.001; N = 329).



Chi-Squared Tests: (χ^2 = 28.37, df = 6, p < 0.001; N = 329). ***Chi-Squared Tests: (χ^2 = 9.944, df = 6, p < 0.127; N = 329).***

Table 10 showed the dietary diversity among children under five was generally low to moderate. Out of 329 households, 22.2% reported that children consumed 3 or more food groups in the previous 24 hours, while 38.6% reported consumption of fewer than 3 food groups (Table 10). A substantial proportion (39.2%) responded "don't know," indicating either a lack of awareness or households without children under five. Overall, the findings suggest that only a minority of young children received adequately diverse diets, highlighting a continued nutrition gap in early childhood feeding practices.

FGDs help explain this discrepancy. Participants reported that daily meals typically consist of rice, vegetables, and small amounts of fish or meat. While households may consume several food groups overall, children often receive less diverse diets due to poverty, seasonal food shortages, and limited nutrition knowledge.

One FGD participant noted:

"There are still some children who are thin and not growing well because families cannot always provide nutritious foods."

Statistical analysis shows significant variation in child dietary diversity by geographic area ($\chi^2 = 75.39$, df = 4, $p < 0.001$), ethnicity ($\chi^2 = 107.9$, df = 12, $p < 0.001$), household poverty status ($\chi^2 = 15.93$, df = 6, $p = 0.014$), and education level ($\chi^2 = 32.59$, df = 12, $p = 0.001$). In contrast, no significant difference was observed by sex of respondent ($\chi^2 = 0.212$, df = 2, $p = 0.899$). These results indicate that child dietary diversity is primarily influenced by socioeconomic, cultural, and geographic factors.

Table 10: Child Dietary Diversity

(Children under 5, 24-hour recall)	Overall	Gender		District			Socioeconomic			
		female	male	Keo Seima	Ou Chum	Phnom kravanh	ID poor1	ID poor2	Poor without ID	Normal
Yes – 3 or more food groups	22.2	49	24	8	64	1	4	15	27	27
No – fewer than 3 food groups	38.6	89	38	61	60	6	22	35	34	36
Don't know	39.2	90	39	28	66	35	10	26	36	57

F. Main Drivers of Food Insecurity

The dominant driver of food insecurity was low crop production (Table 11), reported by 79.0% of households. This was followed by low income (61.4%), high food prices (37.1%), disaster shocks (34.3%), and livestock loss (27.7%). Several drivers varied significantly across districts. Across KIIs and FGDs, participants consistently identified declining agricultural productivity as the primary cause of food shortages and livelihood stress. Community members reported that crop yields have become increasingly unpredictable due to erratic rainfall, droughts, floods, pest outbreaks, and limited access to improved farming techniques. In Mondulkiri, one community leader explained that many households experience food shortages because agricultural production is frequently affected by natural disasters and because farmers lack the technical knowledge and equipment needed to improve yields.

Strong district-level differences were observed. Low income ($\chi^2 = 45.61$, $p < 0.001$) affected 88.1% of households in Phnom Kravanh compared with 68.9% in Ou Chum and 35.1% in Keo Seima. High food prices ($\chi^2 = 26.64$, $p < 0.001$) were also much more frequently reported in Phnom Kravanh (61.9%) than in Keo Seima (18.6%), with minor variation in high food prices. Poverty status also showed mixed results, with significant differences mainly in high food prices ($\chi^2 = 12.45$, $p = 0.006$). FGD participants noted that farmers are often forced to sell crops at low prices while purchasing food and agricultural inputs at increasingly high prices, reducing household purchasing power and limiting their ability to maintain adequate diets. Disaster-related shocks were especially prominent in Phnom Kravanh (71.4%), suggesting greater exposure to climatic and environmental risks. Livestock loss was more frequently reported in Ou Chum (35.3%) than in Phnom Kravanh (7.1%). “The most vulnerable households are elderly people and widows because they lack labour and have fewer opportunities to earn income.”

Table 11: Drivers of food insecurity

Variable	Overall	Keo Seima	Ou Chum	Phnom Kravanh	χ^2	df	p-value	Sig.
Low crop production	79.0%	77.3%	80.5%	76.2%	0.632	2	0.729	ns
Livestock loss	27.7%	21.7%	35.3%	7.1%	16.08	2	<0.001	***
High food price	37.1%	18.6%	41.1%	61.9%	26.64	2	<0.001	***
Low income	61.4%	35.1%	69.0%	88.1%	45.61	2	<0.001	***

Disaster	34.3%	30.9%	27.9%	71.4%	29.62	2	<0.001	***
Other	13.1%	8.3%	17.4%	4.8%	7.627	2	0.022	*

4.5. Indigenous Food Resilience

Indigenous food systems are increasingly challenged by climate change, environmental degradation, and socioeconomic pressures. Despite these challenges, Indigenous communities continue to demonstrate considerable resilience by combining traditional knowledge with a range of coping and adaptation strategies. However, the findings indicate that many households remain constrained by limited productive assets, inadequate technical support, and insufficient investment in climate-resilient agriculture. Strengthening Indigenous food system resilience will therefore require integrated interventions that address both immediate livelihood risks and longer-term adaptive capacity.

A. Climate Change Perception and Impacts

The findings indicate that climate change is widely recognised by indigenous communities. Nearly three-quarters of respondents (72.6%) reported observing noticeable changes in climate and weather patterns during the previous 5–10 years, while only 4.0% reported no noticeable changes (Fig.15). A further 23.4% were uncertain or unable to assess climate trends. Across all study locations, participants described increasingly erratic rainfall, prolonged droughts, stronger storms, floods, pest outbreaks, and declining agricultural yields.

Through FGD participants explained: “In recent years, the rains have become irregular, droughts are longer, and heavy rains often come at the wrong time. Crops are damaged, incomes fall, and families become indebted.”

Climate change has had widespread impacts on indigenous food systems and livelihoods. The most frequently reported impact was reduced crop production, affecting 85.8% of households that observed climate change. This confirms that agriculture remains highly vulnerable to changing weather conditions and climatic variability. The effect was particularly severe in Phnom Kravanh, where all respondents (100.0%) reported impacts on crop production, followed by Ou Chum (90.8%) and Keo Seima (71.8%). Statistical analysis shows significant differences by gender ($\chi^2 = 13.86$, $p < 0.001$), indicating that female respondents were more likely to report observed climate changes than males. Differences by wealth or identification groups were also statistically significant ($\chi^2 = 12.57$, $p = 0.05$), suggesting that socio-economic status influences climate awareness, while district-level variation was less statistically strong (Table 12).

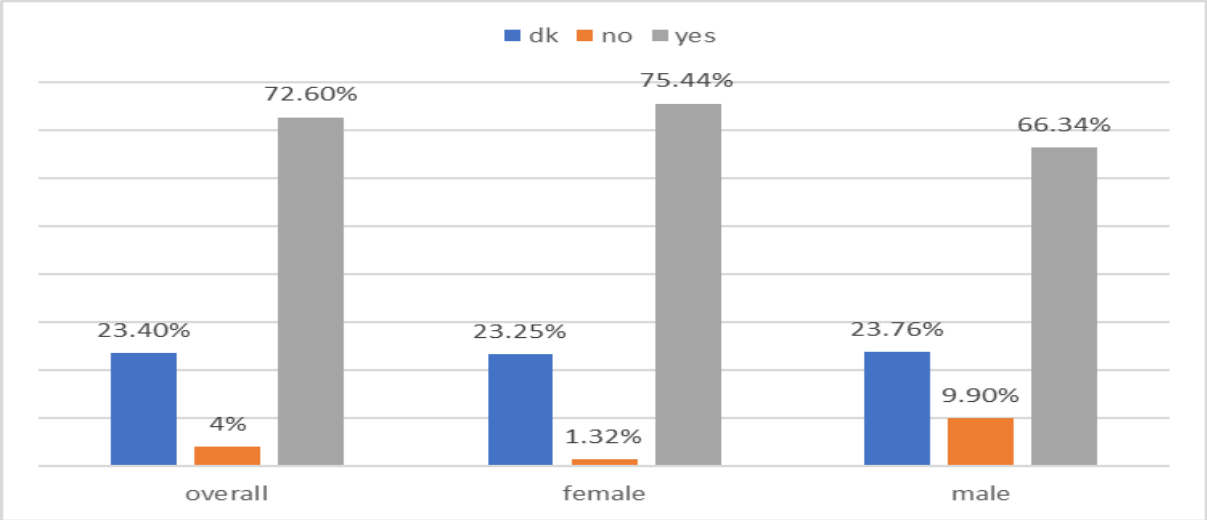
(Table 12) Forest resources were also heavily affected, with 71.5% of households reporting declines in the availability of forest products and natural resources. Dependence on forests remains important in indigenous communities; therefore, degradation of forest ecosystems directly affects food availability, dietary diversity, and livelihood opportunities. The strongest impacts were reported in Phnom Kravanh (96.8%) and Ou Chum (70.8%).

Water scarcity emerged as another major concern. More than two-thirds of households (70.7%) reported impacts on water availability, with the highest prevalence in Phnom Kravanh (87.1%). Reduced access to water affects crop production, livestock management, household consumption, and overall livelihood resilience.

Climate change also affected household health (72.4%), reflecting increased exposure to heat stress, disease outbreaks, and reduced access to safe water. Economic impacts were substantial, with 42.7% of households reporting reduced household income. Income losses were especially severe in Phnom Kravanh (71.0%) and Ou Chum (54.6%), suggesting that climate-related shocks are increasingly undermining economic security.

Livestock production was affected among 44.8% of households, although impacts varied considerably across districts. Ou Chum reported the highest prevalence of livestock-related impacts (65.4%), while livestock losses were less common in Phnom Kravanh (3.2%). Finally, only 12.1% of households reported increased migration, indicating that migration remains a secondary response compared with local adaptation strategies (Table 12).

Fig. 16: Perception of Climate and Weather Changes During the Last 5–10 Years



Chi-Squared Tests: ($\chi^2 = 13.86$, $df = 2$, $p < 0.01$; $N = 329$

Table 12: Impact Food Systems and Livelihoods by District

Variable	Keo Seima (%)	Ou Chum (%)	Phnom Kravanh (%)	Total (%)
Crop production affected	71.8	90.8	100.0	85.8
Livestock production affected	26.9	65.4	3.2	44.8
Forest resources affected	62.8	70.8	96.8	71.5
Household income affected	11.5	54.6	71.0	42.7
Water availability affected	57.7	74.6	87.1	70.7
Household health affected	75.6	67.7	83.9	72.4
Migration increased	6.4	16.2	9.7	12.1

B. Main adaptation and coping strategies

Households use a mix of short-term coping actions and longer-term adaptation strategies. The most common response was selling assets (37.7%), followed by diversifying livelihoods (34.7%) and borrowing money (32.6%) (Fig. 17). These are important because they show that climate stress is pushing households into financial and livelihood adjustment rather than allowing them to remain stable. KIIs and FGDs, participants consistently reported that climate-related crop failures, declining yields, food shortages, and income losses force households to borrow money, sell livestock, seek wage labour, and collect forest products to survive. In Keo Seima, a community leader explained that when harvests fail, families often have no option but to borrow money or liquidate productive assets: "Households facing difficulties borrow money from credit institutions, sell livestock, and some even sell land to cope with their problems." Similarly, FGD participants reported that households commonly seek wage labour in plantations, collect forest foods, or sell livestock when food shortages occur. Participants in Ou Chum explained that during periods of crop loss and declining income, families increasingly depend on casual labour and natural resources to meet their basic needs.

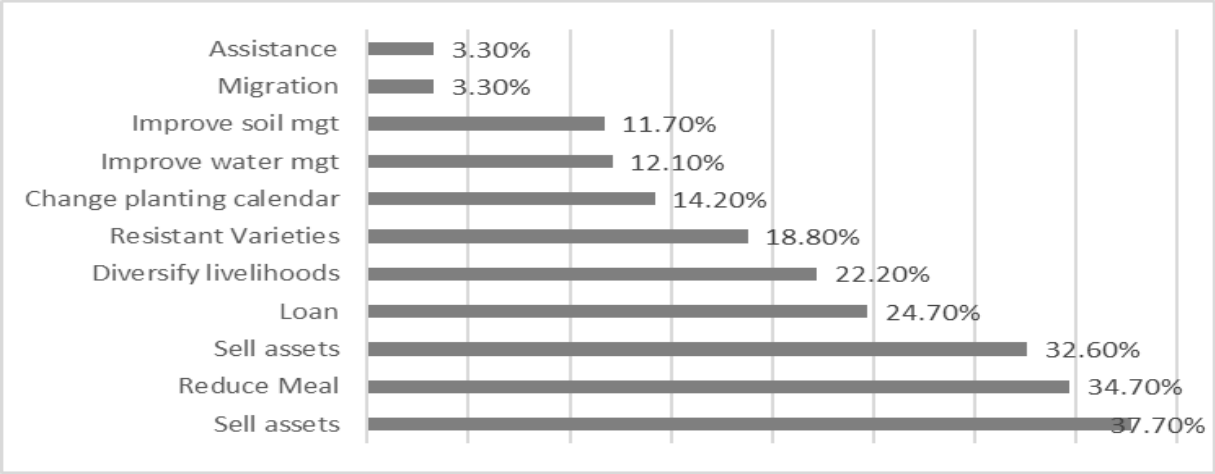
However, not all strategies are equally positive. Selling assets and reducing meals are distress coping mechanisms. They help households survive in the short term but can weaken future resilience by reducing savings, productive assets, and nutrition. In contrast, livelihood diversification, resistant varieties/practices, water management, soil management, and changing the planting calendar are more resilient responses because they directly improve production stability.

District differences are very revealing. In Phnom Kravanh, households reported extremely high reliance on distress responses: 77.4% reduced meals, 100.0% sold assets, and 96.8% diversified livelihoods. They also reported strong use of water management (67.7%) and soil management (58.1%), which suggests that severe stress is forcing both coping and adaptation at the same time (Table.13). In Keo Seima, borrowing money was the most common response (47.4%), while in Ou Chum, diversification and borrowing were both important. Women were slightly more likely than men to reduce meals and sell assets, while men were slightly more likely to report water management and resistant practices. Women were often described as playing a central role in managing household food security during crises, including reducing household consumption, caring for livestock, managing home gardens, and seeking alternative food sources. Men were more frequently involved in wage labour migration, and forest resource collection.

Table 13: Adaptation and Coping Strategy

Variable	Keo Seima	Ou Chum	Phnum Kravanh	Total	χ^2	p-value
Reduce Meal	8.97%	10.77%	77.42%	18.83%	80.11	<0.001
Sell assets	37.18%	23.08%	100.00%	37.66%	63.1	<0.001
Loan	47.44%	25.38%	25.81%	32.64%	11.54	0.003
Diversify livelihoods	24.36%	26.15%	96.77%	34.73%	60.56	<0.001
Resistant Varieties	28.21%	24.62%	16.13%	24.69%	1.74	0.419
Change planting calendar	15.38%	10.00%	12.90%	12.13%	1.35	0.51
Improve water mgt	2.56%	8.46%	67.74%	14.23%	84.99	<0.001
Improve soil mgt	1.28%	6.92%	58.06%	11.72%	75.48	<0.001
Migration	5.13%	2.31%	3.23%	3.35%	1.2	0.549
Assistance	8.97%	16.92%	77.42%	22.18%	64.77	<0.001
Other strategies	2.56%*	4.62%	0.00%	3.35%	1.87	0.393

Fig. 17: Main adaptation and coping strategies used by households



C. Future priorities for making food systems more sustainable

The findings indicate that indigenous households priorities practical strategies to strengthen food security and build resilience against climate-related shocks. The most commonly identified future action was increasing crop and livestock production (76.0%), followed by growing more crops for household consumption (42.2%), increasing non-farm income opportunities (23.7%), and adopting climate-resilient agricultural practices (19.5%). Women were slightly more likely than men to prioritise climate-resilient farming (21.1% vs. 15.8%) and non-farm income generation (26.8% vs. 16.8%), while men placed slightly greater emphasis on water and irrigation systems (20.8% vs. 17.5%). Geographically, households in Keo Seima showed the strongest demand for increased agricultural production (92.8%), whereas Phnom Kravanh respondents more frequently emphasised household food production (59.5%) and participation in agricultural groups (47.6%). Across socio-economic groups, priorities were broadly similar, although Normal households were more likely to emphasise water and irrigation systems (22.5%) and production expansion (79.2%). Across FGDs and KIIs, participants consistently emphasised the need for improved agricultural knowledge, climate-resilient farming techniques, quality seeds, livestock support, and reliable water systems. In Ou Chum, participants explained that climate variability has made traditional farming practices less effective, creating a strong demand for improved production techniques and drought-resilient crops. One participant stated:

Similarly, community leaders in Mondulkiri highlighted the need for improved cashew and cassava production technologies, noting that many farmers continue to rely on traditional practices with limited technical knowledge. A commune representative observed:

"Most farmers growing cassava do not know the proper production techniques, crop management, or appropriate harvesting periods. They simply follow what others are doing."

At the same time, more than half of households (54.1%) reported that they had not yet implemented any measures to improve the sustainability of their food systems. Climate change was identified as the primary constraint (37.4%), particularly in Phnom Kravanh (83.3%), followed by lack of agricultural land (20.7%), inadequate institutional support (17.0%), lack of capital (15.2%), and limited technical knowledge (13.7%). Female respondents reported slightly higher constraints related to budget and institutional support than males. Among wealth groups, climate change was reported most frequently by Normal households (50.8%), while poorer households more commonly highlighted lack of knowledge, land, and access to resources. These findings suggest that future interventions should combine climate adaptation, improved access to productive assets and services, and targeted support that responds to the differing needs of women, men, districts, and socio-economic groups.

Lack of knowledge and access to services also emerged consistently across qualitative discussions. Community leaders noted that many indigenous farmers have never received formal agricultural training and often lack access to extension services, improved inputs, or technical advice.

A KII respondent explained that households face difficulties because they lack agricultural equipment, technical skills, and opportunities to learn improved farming methods. In addition, several FGD participants reported that inadequate irrigation systems and declining water availability limit their ability to diversify crops or maintain production during dry periods. As one participant noted:

Table 14: Future priorities for making food systems more sustainable

Variable	Keo Seima	Ou Chum	Phnom Kravanh	Total
Increase crop and livestock production	90 (92.78)	135 (71.05)	25 (59.52)	250 (75.99)
Use climate-resilient agricultural practices	29 (29.90)	34 (17.89)	1 (2.38)	64 (19.45)
Have adequate water supply and irrigation systems	16 (16.49)	33 (17.37)	12 (28.57)	61 (18.54)
Grow crops for household consumption	51 (52.58)	63 (33.16)	25 (59.52)	139 (42.25)
Increase non-farm income	21 (21.65)	50 (26.32)	7 (16.67)	78 (23.71)
Join agricultural groups/communities	5 (5.15)	16 (8.42)	20 (47.62)	41 (12.46)
Save money	17 (17.53)	36 (18.95)	7 (16.67)	60 (18.24)
Seek training on agricultural techniques	2 (2.06)	14 (7.37)	4 (9.52)	20 (6.08)
Increase the sale of agricultural products	1 (1.03)	13 (6.84)	2 (4.76)	16 (4.86)
Improve nutrition and food consumption	0 (0.00)	6 (3.16)	1 (2.38)	7 (2.13)
Conserve natural resources (land, water, and forests)	0 (0.00)	4 (2.11)	0 (0.00)	4 (1.22)
Others (Please specify)	2 (2.06)	26 (13.68)	6 (14.29)	34 (10.33)

D. Barriers to sustainable food systems

The workbook shows that more than half of households (54.1%) reported that they had not implemented anything at all to make food systems more sustainable. This is a key resilience signal. It means many households are aware of the problem but are not yet able to translate that awareness into action. The main reason reported was climate change itself (37.4%), followed by lack of land (20.7%), lack of institutional support (17.0%), lack of budget/capital (15.2%), and lack of technical knowledge (13.7%).

The biggest barrier is climate change itself (37.4%). This is especially severe in Phnom Kravanh, where 83.3% cited climate change as a barrier. The next major constraints are lack of land (20.7%), lack of institutional support (17.0%), lack of capital (15.2%), and lack of technique/knowledge (13.7%). These are classic structural barriers: households know what they need, but many lack land, money, water, and technical support.

District differences are important. Keo Seima stands out for higher reported gaps in institutional support and capital, while Ou Chum shows a stronger combination of land, knowledge, and climate barriers. Phnom Kravanh is different again: it shows the strongest climate pressure, the strongest market barrier, and the weakest ability to act, which helps explain why the district often appears more vulnerable in the rest of the analysis.

This section also captures the closest available proxy for traditional knowledge in the workbook households' desire to use climate-resilient practices, better seeds, water management, and resource conservation. The workbook does not have a direct "traditional knowledge" variable, but these results show that local knowledge is being expressed through practical agricultural adaptation.

Table 15: Current Practice to deal with Food Insecurity

Variable	Overall	Keo Seima	Ou Chum	Phnom Kravanh
No, did not implement anything at all.	54.10%	57 (58.8%)	105 (55.3%)	16 (38.1%)
Lack of budget or capital	15.20%	20 (20.6%)	30 (15.8%)	0 (0.0%)
Lack of water for agriculture	9.12%	14 (14.4%)	14 (7.4%)	2 (4.8%)
Climate change	37.39%	21 (21.7%)	67 (35.3%)	35 (83.3%)
Lack of agricultural land	20.67%	6 (6.2%)	50 (26.3%)	12 (28.6%)
Lack of good crop seeds/animal breeds	7.60%	2 (2.1%)	21 (11.1%)	2 (4.8%)
Lack of technique and knowledge	13.68%	11 (11.3%)	32 (16.8%)	2 (4.8%)
Lack of labour	4.26%	1 (1.0%)	13 (6.8%)	0 (0.0%)
No market to sell products	3.65%	1 (1.0%)	7 (3.7%)	4 (9.5%)
Unstable product prices	2.43%	1 (1.0%)	7 (3.7%)	0 (0.0%)
Animal or crop diseases	3.34%	3 (3.1%)	8 (4.2%)	0 (0.0%)
Lack of support from relevant institutions	54.10%	27 (27.8%)	24 (12.6%)	5 (11.9%)

E. Priority support needs and leverage points

When households were asked what kind of support they most needed, the strongest answer was crop seeds and livestock breeds (66.3%). This is the clearest leverage point in the workbook. It means households are not asking first for abstract policy change; they are asking for the basic productive inputs that allow them to farm and rear livestock more effectively. The strongest demand for seed/breed support was in Keo Seima (89.7%), followed by Phnom Kravanh (73.8%) and Ou Chum (52.6%).

The second major support need is agricultural technical training (37.1%), followed closely by livestock support (34.0%), equipment/materials (25.5%), market support (24.9%), and water/irrigation systems (20.1%). These results show a clear pattern: households want practical support that strengthens production, improves resilience, and connects them to markets.

District differences point to different leverage points. Ou Chum shows the strongest demand for technical training, while Phnom Kravanh shows the strongest demand for market support and water/irrigation. Keo Seima places particularly strong value on livestock support and seed/breed support. Poverty differences also matter: poorer households are more likely to prioritise seed/breed support, water, and production inputs, while Normal households are somewhat more likely to prioritise market and value-chain support.

Table 16: Types of support needed

Variable	Overall	Sex		Social economic			District		
		Female	Male	ID Poor 1	ID Poor 2	Poor without ID	Keo Seima	Ou Chum	Phnom Kravanh
Support for crop seeds/livestock breeds	66.30 %	66.67 %	65.35 %	75.00 %	61.84 %	54.64 %	89.69 %	52.63 %	73.81 %
Agricultural technical training	37.10 %	38.16 %	34.65 %	41.00 %	30.26 %	43.30 %	28.87 %	46.84 %	11.90 %
Water and irrigation systems	20.10 %	18.42 %	23.76 %	19.00 %	19.74 %	8.25%	5.15%	24.21 %	35.71 %

Equipment/materials	25.50%	25.00%	26.73%	27.00%	22.37%	34.02%	15.46%	31.58%	21.43%
Livestock raising support	34%	31.14%	40.59%	30.00%	39.47%	32.99%	43.30%	34.74%	9.52%
Market support	24.90%	28.07%	17.82%	19.00%	21.05%	28.87%	26.80%	12.63%	76.19%
Financial support or credit	8.50%	7.89%	9.90%	13.00%	13.16%	7.22%	9.28%	8.95%	4.76%
Nutrition and health training	7.90%	9.21%	4.95%	5.00%	7.89%	13.40%	5.15%	10.53%	2.38%
Business/vocational skills training	5.20%	6.14%	2.97%	2.00%	2.63%	8.25%	2.06%	7.37%	2.38%
Climate change-related support	1.80%	2.19%	0.99%	0.00%	2.63%	3.09%	0.00%	2.63%	2.38%
Social protection/safety net systems	0%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Other	10.90%	11.84%	8.91%	2.00%	9.21%	14.43%	4.12%	12.11%	21.43%

4.6 Social and Gender Dimensions of Food Systems

A. Community Participation and Social Capital

Social and gender dynamics play a critical role in shaping the resilience and sustainability of Indigenous food systems. Beyond agricultural production, household food security depends on community participation, access to social networks, equitable decision-making, women's contributions to food production, and the ability of vulnerable groups to access resources, knowledge, and services. This section examines how social capital, gender roles, and household decision-making influence Indigenous livelihoods and identifies opportunities for strengthening more inclusive and resilient food systems.

Social capital is limited but still meaningful. Only 26.1% of households reported membership in a group or Organization, while 73.9% reported no membership (Fig. 18a). Savings group participation (Fig. 18c) is highest in Keo Seima (59.09%), labourin Ou Chum (27.87%), and absent in Phnom Kravanh (0%) ($p = 0.014$). Similarly, agricultural cooperatives are concentrated in Ou Chum (37.7%), while Keo Seima is very low (4.55%), and Phnom Kravanh has no participation ($p = 0.007$). The most pronounced difference is in youth group membership, which is entirely concentrated in Phnom Kravanh (100%), compared to 21.31% in Ou Chum and 0% in Keo Seima ($p < 0.001$). Cultural group participation is highest in Ou Chum (24.59%), while environmental (5.81%) and WUG 10.47%) memberships remain low across all districts. By poverty status, most differences are not statistically significant, except for savings groups ($p = 0.044$), where Poor without ID households show the highest participation (53.13%), followed by ID Poor 1 (33.33%), ID Poor 2 (20%), and Normal households (22.73%).

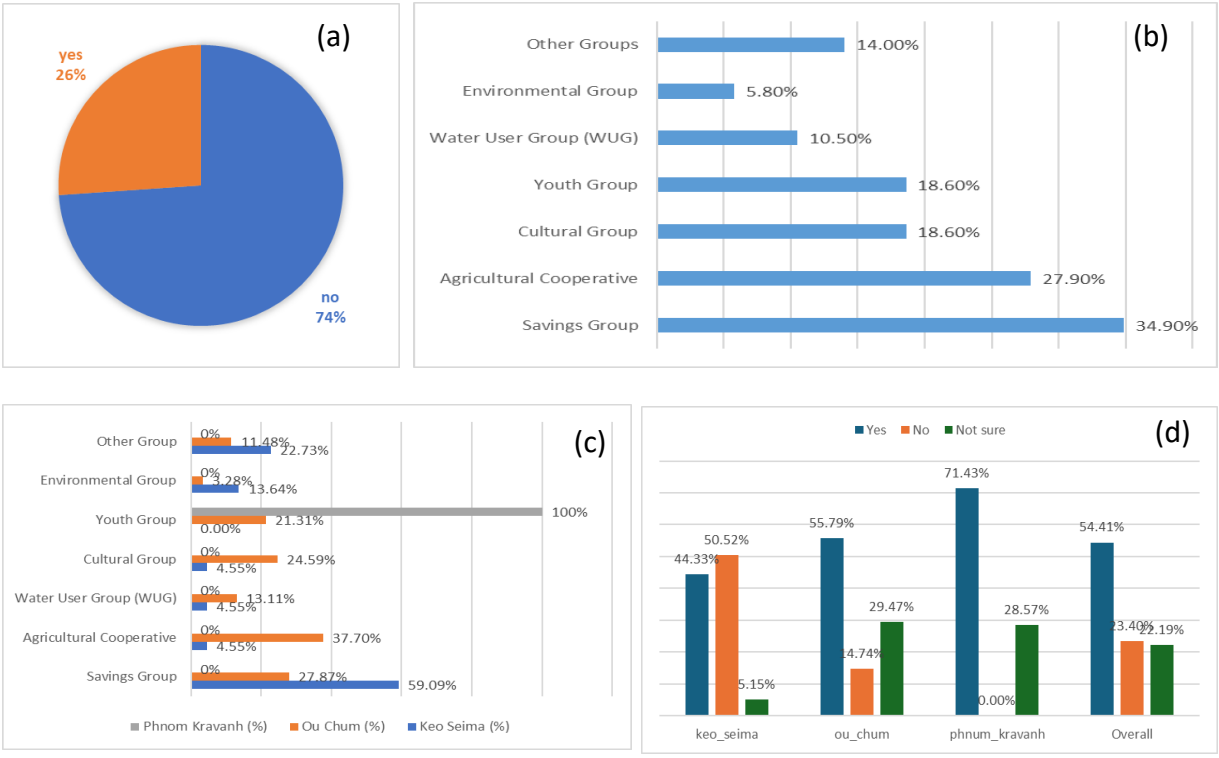
Savings groups are the most common organizational membership (34.9%), followed by agricultural cooperatives (27.9%), while cultural groups and youth groups each account for 18.6%, and water user groups (10.5%) and environmental groups (5.8%) remain the least common forms of participation (Fig. 18b).

Gender-disaggregated results indicate important differences; females are more likely to participate in savings groups (42.11%) compared to males (20.69%, p = 0.049), highlighting the role of savings groups in promoting women's financial inclusion. In contrast, males show higher participation in agricultural cooperatives (37.93%) than females (22.81%), although this is not statistically significant (p = 0.139). A strong gender gap is observed in youth groups, where females account for 28.07% and males 0%, with a significant difference (p = 0.002). Participation in WUG, cultural, environmental, and other groups show relatively small and non-significant gender variation, suggesting more balanced access across these categories (Fig. 18c).

When asked whether they would participate in activities to promote food security and sustainable food systems, 54.4% said yes (Fig. 18d). Participation willingness was highest in Phnom Kravanh (71.43%), followed by Ou Chum (55.79%), and lowest in Keo Seima (44.39%). Willingness also increased with better socioeconomic status, suggesting that poorer households may face more constraints to participation even when they are interested.

The participation barriers table shows that several coded barriers were common, especially Barrier 2 (56.0%) and Barrier 4 (54.0%), followed by Barrier 1 (34.7%). Even though the barrier labels are coded in the workbook, the overall pattern is clear: participation is constrained by time, access, resources, and possibly social or logistical barriers.

Fig. 18: Social Cohesion



B. Decision-Making in Food Production, Income, Food, and Financial Services

The findings suggest that decision-making within indigenous households is characterised primarily by joint decision-making, particularly in matters related to production, income management, and financial services. Approximately 62.0% of households reported making decisions jointly regarding crop and livestock production, while 59.0% reported joint decision-making over household income, and 66.0% jointly managed savings and credit decisions. These results indicate relatively high levels of cooperation between women and men in key livelihoods and food system decisions.

However, women appear to exercise greater influence over food-related decisions than in other domains. Nearly half of households (46.2%) reported that women were the primary decision-makers regarding food purchases and allocation, compared with only 4.9% where men made these decisions alone. Women also played important roles in income decisions (33.4%) and agricultural production decisions (24.3%). Male-only decision-making was relatively uncommon across all domains, ranging from 3.0% for savings decisions to 11.2% for production decisions.

Table 17: Household Decision-Making Patterns

Variable	Female (%)	Male (%)	Joint (%)	Other (%)
Crop & livestock production	24.3	11.2	62.0	2.4
Use of household income	33.4	6.7	59.0	0.9
Food purchase and allocation	46.2	4.9	48.3	0.6
Savings and credit decisions	19.8	3.0	66.0	11.2

C. Women's Participation in Livelihoods and Food Production

Women play a central role in indigenous food systems. Overall, 74.2% of households reported that women actively participate in livelihoods and food production activities, while only 25.8% reported that women do not participate. Participation levels varied significantly across districts ($\chi^2 = 10.03$, $p = 0.007$). Women's participation was highest in Phnom Kravanh (88.1%), followed by Ou Chum (76.3%) and Keo Seima (63.9%).

Significant differences were also observed across ethnic groups ($\chi^2 = 77.72$, $p < 0.001$). Participation was particularly high among Phnong households (95.5%), Bunong households (87.7%), and Tampuan households (83.3%), while lower levels were observed among Kreung households (73.6%). These findings suggest that cultural norms and local livelihood systems shape women's involvement in food production activities.

In contrast, no statistically significant differences were observed across poverty categories ($\chi^2 = 0.874$, $p = 0.832$). Women's participation remained consistently high among IDPoor and Normal households alike, indicating that women contribute substantially to food production regardless of household economic status.

Table 29. Women's Participation in Food Production Activities by District and Poverty Status

Labour Division within Indigenous Food Systems

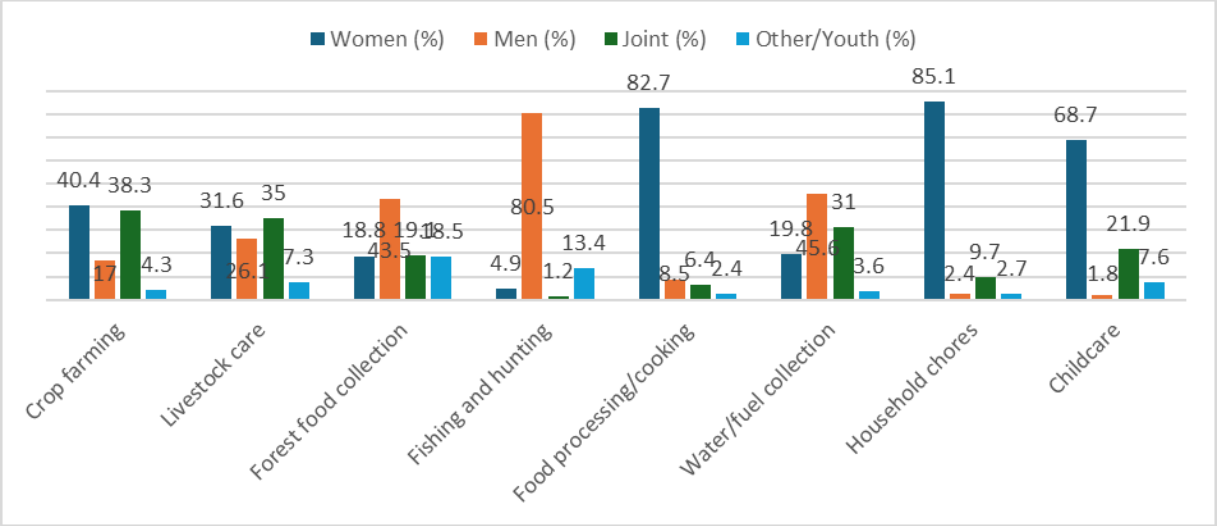
The labour division findings reveal a strongly gendered structure within indigenous food systems. Women dominate food preparation, household care, and childcare responsibilities. More than four-fifths of households (82.7%) reported that women are primarily responsible for food processing and cooking, while 85.1% reported that women carry primary responsibility for household chores. Childcare responsibilities were also predominantly performed by women (68.7%).

In contrast, men dominate physically demanding and resource-extraction activities. Forest-food collection was primarily undertaken by men in 43.5% of households, while fishing and hunting were overwhelmingly male activities (80.5%). Men were also more involved in water and fuel collection (45.6%).

Crop farming and livestock care showed the highest levels of shared labour. Joint responsibility was reported by 38.3% of households for crop farming and 35.0% for livestock management. Women also played major roles in crop production (40.4%) and livestock care (31.6%), indicating that agricultural production depends heavily on female labour.

Youth participation was relatively limited across most activities, ranging from 0.6% in crop production to 2.7% in water collection. This suggests that although young people contribute to household labour, they are not the primary actors in most food-system activities.

Fig. 19: Household Labour Division



D. Barriers Limiting Women's Participation

Women face multiple constraints that limit their participation in livelihood activities and food-system development. The most commonly reported barrier was heavy household workload and family responsibilities, affecting 54.4% of respondents. This was followed closely by lack of technical skills or training (50.2%), suggesting that many women face both time constraints and capacity limitations.

Childcare responsibilities (36.5%) and limited access to markets (36.5%) were also major barriers. Poor health conditions affected 27.7% of women, while transportation and mobility constraints were reported by 22.2%. These findings suggest that practical and economic barriers are more important than discriminatory barriers.

Interestingly, direct reports of gender discrimination were relatively low (2.4%), and cultural restrictions were almost absent (0.3%). This suggests that the main challenge for women is not exclusion from participation but rather the heavy burden of domestic responsibilities combined with limited access to skills, services, and markets.

Important differences emerged across ethnic groups. Household workload was particularly high among Phnong households (90.9%) and Bunong households (83.1%). Lack of technical skills was especially pronounced among Phnong households (95.5%) and Tampuan households (66.7%). Market access constraints were most common among poor households (69.1%), indicating that economic disadvantage compounds participation barriers.

The labour division analysis indicates that youth participation is generally below 3% across most food-system activities, suggesting that food production and household management continue to be dominated by adults. This may reflect increasing migration, changing livelihood aspirations, and reduced youth engagement in agriculture.

Fig. 20: Barriers to Women

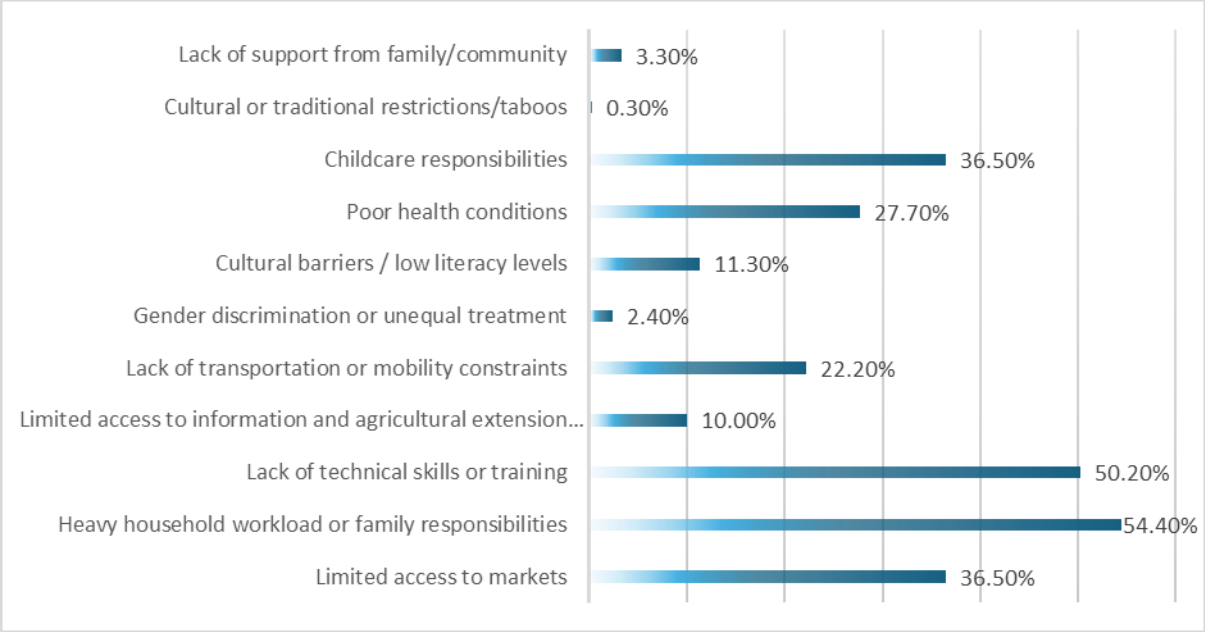
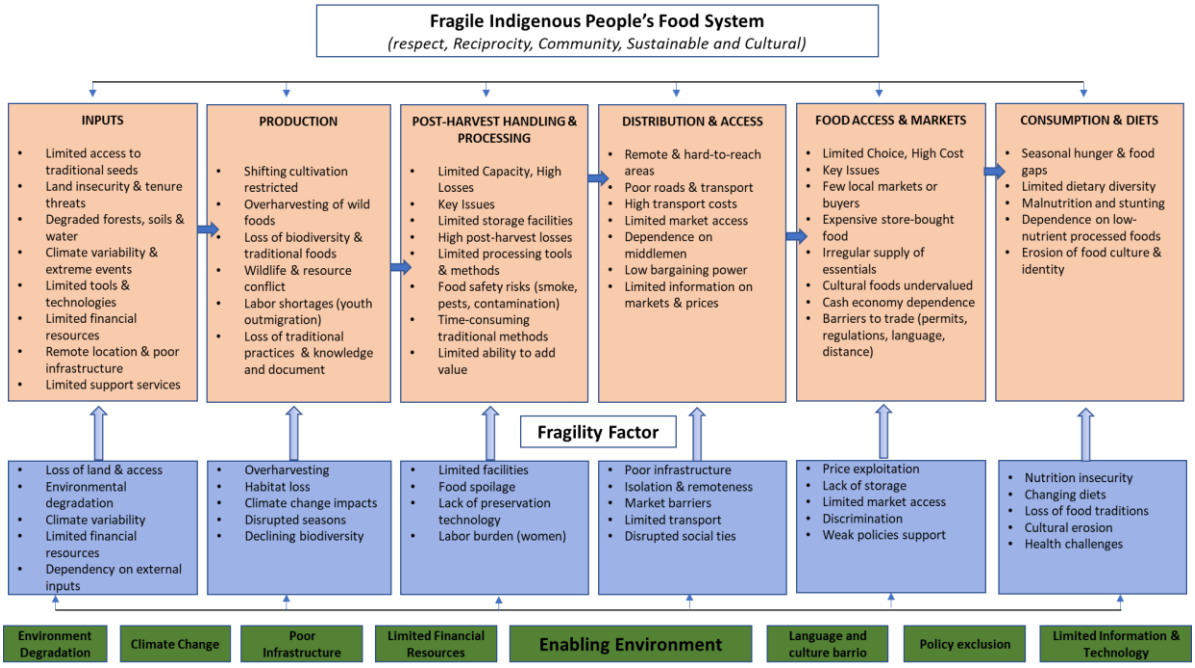


Fig. 21: Fragility of Food System of Indigenous Peoples Map



4. Discussion

This study provides robust quantitative and qualitative evidence on the current state of Indigenous food systems and livelihoods in Keo Seima (Mondulkiri), Ou Chum (Ratanakiri), and Phnom Kravanh (Pursat). By integrating household survey data with insights from focus group discussions (FGDs), key informant interviews (KIIs), and stakeholder consultations, the study offers a comprehensive understanding of Indigenous food systems, the drivers of vulnerability, and opportunities for strengthening resilience. The discussion is organised around the three research objectives and situates the findings within the broader national and international evidence.

4.1. Current Food Systems and Livelihoods Strategies of Indigenous Households in Pursat, Ratanakiri, and Mondulkiri

The findings show that indigenous households rely primarily on agriculture, with crop production (71.1%), wage labour (46.8%), and livestock raising (35.0%) as their main livelihood strategies. As the science journal highlighted, smallholder farmers across Cambodia commonly combine crop cultivation with wage labour and livestock production as complementary livelihood strategies that strengthen household resilience. These findings align with recent evidence indicating that Cambodian smallholder farmers increasingly combine agricultural production with wage employment and livestock rearing as complementary livelihood strategies to manage income uncertainty and seasonal risks. (ScienceDirect 2025).

Indigenous food systems remain highly diversified, drawing upon four interconnected food sources: household agricultural production, forest resources, local markets, and, to a lesser extent, livestock products. However, the relative contribution of each source varies across provinces according to ecological conditions, market access, and livelihood opportunities. While own-production continues to provide the foundation of household food consumption, market purchases are becoming increasingly important, which indicates a gradual shift from traditional subsistence food systems toward market-oriented consumption. (Recoft 2014), and forest resources, which in Mondulkiri and Ratanakiri, forest resources function as a safety net during crop failure and lean agricultural seasons (Recoft 2024), demonstrating that indigenous food systems remain diversified but are becoming increasingly market-oriented.

Forests continue to provide important foods and income, particularly during periods of food shortage, while dietary diversity is generally labourbut varies across districts. These findings illustrate the continued importance of traditional food systems alongside increasing commercialization, while the coexistence of traditional food gathering practices with market-oriented agriculture reflects an ongoing livelihoods transition. Similar trends have been documented in recent studies emphasising that Indigenous knowledge, agroforestry, and community forest management continue to support household food security despite growing pressures from land-use change, commercialisation, and climate change.

The coexistence of traditional food procurement practices with commercial agriculture illustrates an ongoing livelihood transition. Similar trends have been documented in recent regional studies, which emphasise that Indigenous ecological knowledge, agroforestry systems, and community-based natural resource management continue to underpin household food security despite increasing pressures from agricultural commercialisation, climate change, and landscape transformation. (Redaa 2025).

4.2. Major Challenges and Vulnerabilities Affecting Food Security, Nutrition, and Livelihood Resilience Among Indigenous Households

The study identified multiple, interconnected vulnerabilities that undermine food security and livelihood resilience among Indigenous households. Climate change emerged as the most significant challenge, affecting agricultural production, forest resources, water availability, household health, and income. Low agricultural productivity, driven by poor soil fertility, unpredictable rainfall, limited irrigation infrastructure, inadequate access to agricultural technologies (NIS, 2022), limited market access, and low investment in climate-resilient agricultural practices (IFAD, 2023), further constrains household livelihoods. These challenges, combined with declining household incomes, rising food prices, seasonal food shortages, and limited livelihood diversification, exacerbate food insecurity. These findings are consistent with the World Food Programme (WFP, 2023), which reported that increasing food prices

have significantly reduced the purchasing power of vulnerable households in Cambodia, forcing many families to reduce food consumption, shift to less nutritious foods, borrow money, or rely on informal credit during lean seasons. Similarly, (FAO, 2021) found that seasonal food insecurity remains widespread among Indigenous communities, particularly during the pre-harvest period when household food stocks are depleted, and employment opportunities are scarce.

The study also found inadequate dietary diversity among children, reflecting broader national trends. The Cambodia Demographic and Health Survey (CDHS, 2021–22) reported that minimum dietary diversity among children remains below recommended levels in many rural provinces, contributing to persistent undernutrition and micronutrient deficiencies. Furthermore, households frequently rely on borrowing to cope with food shortages, while structural barriers—including limited technical knowledge, inadequate access to capital, weak institutional support, and restricted access to productive resources continue to constrain livelihood development, consistent with findings from ILO (2022) and IWGIA (2024).

Gender inequalities further compound these challenges. Women shoulder substantial domestic and agricultural responsibilities while having limited access to agricultural training, markets, financial services, and productive resources. Studies by UN Women, 2022) similarly found that Indigenous women in Cambodia bear a disproportionate share of unpaid household and agricultural labour but have fewer opportunities to access extension services, productive assets, financial resources, and leadership positions. These inequalities reduce women's ability to improve household food security, diversify livelihoods, and strengthen resilience to climate and economic shocks.

4.3. Strategic Opportunities to Strengthen Indigenous Food Systems and Livelihoods

The findings identify several priority areas for future programming to strengthen food security and livelihood resilience among Indigenous communities. Households consistently emphasized the need for improved crop varieties and livestock breeds, enhanced agricultural technical training, context-specific climate-resilient farming practices, improved irrigation and water management, better market access, and livelihood diversification (World Vision, 2025) and as key priorities for improving rural livelihoods while reducing vulnerability to climate change (MAFF, 2022). Diversifying income sources beyond traditional crop production was identified as a critical strategy for reducing vulnerability to climate and market shocks while improving household food security (Zero Hunger Coalition, 2024). The study also highlights the need to strengthen agricultural extension services, promote nutrition-sensitive agriculture, and improve coordination among climate, agriculture, and nutrition policies to achieve better food and nutrition outcomes for vulnerable rural populations, including Indigenous communities (GAIN, 2026). In addition, increasing women's participation in agricultural decision-making and improving access to financial and institutional services are essential for achieving equitable and sustainable livelihood development (Zero Hunger Coalition, 2024).

The study further underscores the importance of conserving forest resources alongside agricultural development. Forests remain vital to Indigenous livelihoods by providing wild foods, medicinal plants, fuelwood, and supplementary income, while also serving as ecological buffers against climate change. Recent investment priorities of the Food and Agriculture Organization (FAO) and the Royal Government of Cambodia recognise forest restoration and sustainable landscape management as integral components of climate-resilient agricultural development, particularly in eastern Cambodia, where many Indigenous communities depend on forest ecosystems. Furthermore, FAO reports that integrating climate information with agricultural advisory services has enabled hundreds of thousands of Cambodian farmers, including Indigenous communities, to make more informed production decisions and strengthen their resilience to climate-related risks (FAO, 2025).

5. Conclusion

This study provides a comprehensive assessment of indigenous food systems and livelihoods in Keo Seima (Mondulkiri), Ou Chum (Ratanakiri), and Phnom Kravanh (Pursat), highlighting both the resilience and the growing vulnerabilities of indigenous communities. The findings show that agriculture remains the foundation of household

livelihoods, with cassava, cashew, rice, livestock, and forest resources continuing to play critical roles in food production, income generation, and cultural identity. However, indigenous food systems are undergoing a significant transition as increasing dependence on markets, declining forest resources, climate change, and limited livelihood diversification reduce traditional resilience.

Food security remains fragile. Although most households reported labourfood security and dietary diversity, many continue to experience seasonal food shortages, particularly during the pre-harvest months, and rely on coping strategies such as borrowing food or money, reducing meal sizes, selling productive assets, and collecting wild foods. Climate change has further intensified these challenges through declining crop yields, water scarcity, forest degradation, and income losses, disproportionately affecting poorer and more remote households. Women play a central role in food production, household nutrition, and decision-making, yet continue to face significant barriers related to heavy workloads, limited technical skills, and inadequate access to markets and agricultural services.

Despite these constraints, indigenous communities demonstrate strong potential for building more resilient and sustainable food systems. Households identified improved crop and livestock production, climate-smart agriculture, quality seeds, water management, technical training, market access, and livelihood diversification as priority interventions. Strengthening indigenous knowledge, empowering women and youth, conserving natural resources, and improving access to productive assets and services will be essential for enhancing food security, nutrition, climate resilience, and sustainable livelihoods.

Overall, these findings provide a robust evidence base to inform World Vision Cambodia, government agencies, and development partners in designing culturally appropriate and inclusive programmes that strengthen indigenous food systems and long-term community resilience.

6. Recommendations

Based on the study findings, eleven strategic recommendations are proposed to strengthen Indigenous food systems, improve nutrition, enhance livelihood resilience, and inform future policy and programme development.

1. Strengthen climate-resilient indigenous food production systems	Support indigenous communities to strengthen climate resilience by combining indigenous ecological knowledge with climate-smart agriculture. Promote locally adapted farming practices, diversified cropping systems, indigenous crop varieties, agroforestry, community seed banks, and water management solutions such as small-scale irrigation, rainwater harvesting, and community ponds that respond to local ecological conditions.
2. Promote diversified and nutrition-sensitive food systems	Shift programming beyond commercial crop production by supporting diversified farming systems that improve household food security and nutrition. This includes home gardens, traditional vegetables, legumes, fruits, small livestock, fish production, and sustainable harvesting of forest foods to increase dietary diversity while conserving indigenous food cultures.
3. Improve culturally appropriate agricultural and market services	Expand access to agricultural advisory services, financial inclusion, and markets through approaches that are culturally and linguistically appropriate. Strengthen the capacity of indigenous extension workers, community facilitators, producer groups, and savings groups while improving local market linkages, post-harvest handling, and value addition for indigenous products.
4. Recognise and strengthen indigenous knowledge systems	Systematically document, preserve, and promote indigenous knowledge related to agriculture, forest management, biodiversity conservation, climate adaptation, and traditional foods. Encourage participatory research and knowledge exchange between indigenous communities, research

	institutions, and development Organizations to ensure local knowledge informs innovation and programming.
5. Strengthen evidence for policy and programming	Improve the availability and use of disaggregated data on indigenous food systems, nutrition, livelihoods, climate vulnerability, and natural resource management. Regular monitoring and community-based assessments should inform planning, resource allocation, and adaptive programming while ensuring indigenous communities participate in data generation and validation.
6. Protect forests and strengthen community natural resource governance	Support indigenous communities to sustainably manage forests, community-protected areas, and communal natural resources that remain essential sources of food, nutrition, income, and cultural identity. Strengthen community-based forest governance, sustainable harvesting practices, restoration of degraded forests, and protection of customary resource management systems.
7. Expand resilient livelihood and financial opportunities	Reduce household vulnerability by promoting diversified livelihoods beyond agriculture through vocational skills, youth entrepreneurship, community enterprises, ecotourism, non-timber forest products, value-added processing, and locally appropriate financial services, including savings groups, producer Organizations, and climate-risk financing.
8. Increase women's leadership and reduce barriers to participation	Strengthen women's participation in food systems by addressing practical barriers such as heavy unpaid care responsibilities, limited access to training, financial services, and leadership opportunities. Promote women-led producer groups, savings groups, indigenous enterprises, and gender-responsive extension services while engaging men and community leaders to support more equitable household responsibilities.
9. Strengthen indigenous institutions and community leadership	Invest in the capacity of indigenous community Organizations, customary leaders, women, and youth to lead local food system planning, natural resource management, and community development. Development interventions should build upon existing indigenous governance structures and strengthen community ownership rather than creating parallel systems.
10. Foster integrated and coordinated food system partnerships	Promote stronger colration among indigenous Organizations, local authorities, civil society Organizations, academia, research institutions, private sector actors, and development partners to deliver integrated solutions that connect agriculture, nutrition, forestry, climate adaptation, livelihoods, education, and land governance. Joint planning, shared learning, and coordinated investment can improve efficiency and long-term sustainability.
11. Mainstream indigenous food systems in national and sub-national planning	Support the integration of indigenous food systems, traditional knowledge, and food sovereignty principles into food systems transformation, climate adaptation, biodiversity conservation, nutrition, and rural development planning at national and sub-national levels. Planning processes should ensure meaningful participation of indigenous communities throughout design, implementation, monitoring, and evaluation.

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