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Indigenous Food and Nutrition Knowledge and Practice among Ethnocultural Groups in Nepal: A Narrative Review

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Abstract

Indigenous food and nutrition knowledge and practice (IFNKP) represent intergenerational learning, environmental stewardship, and cultural uniqueness. In Nepal, diverse ethnic groups such as the Tharu, Danuwar, Darai, Majhi, Rai, Limbu, Magar, Gurung, Chepang, Tamang, Newar, Sherpa, Thakali, and Loba possess distinct IFNKP linked to their local ecology. This narrative review aimed to explore indigenous foods as sources of nutritional requirements, traditional food and nutrition knowledge among ethnic groups, and indigenous food practices within these communities. Literature published between 2020 and 2025 was reviewed through Google Scholar, Scopus, and Web of Science, yielding 28 peer-reviewed studies that met the inclusion criteria. The information was analyzed under three themes, and the major finding shows that indigenous foods such as Dhido, Gundruk, Kinema, and Bhakka provide significant dietary fiber, protein, and antioxidant benefits while remaining culturally acceptable. Traditional technologies such as fermentation, sun-drying, and steaming help sustain food value and reduce food waste. However, these practices are gradually diminishing due to dietary shifts, urbanization, and insufficient policy recognition. The review highlights that IFNKP is not an antiquated tradition but a living practice that shapes dietary behavior and nutritional status among Nepali tribal groups. Integrating IFNKP into Nepal's nutrition and education policies, supporting local farming, promoting knowledge transfer, and addressing climate change can help preserve indigenous food culture and improve community health and food security.

Keywords: Food sovereignty, indigenous food, nutrition education, nutrition knowledge, tribal groups

Introduction

Nepal is home to 142 legally recognized ethnic and caste groups and 124 mother-tongue languages, each characterized by distinct cultural norms, dietary practices, and food-related customs that shape community life (National Statistics Office, 2021). Within this socio-cultural diversity, local food culture and nutrition practices function both as cultural markers and as foundations for health, environmental balance, and identity. These dimensions highlight the significance of understanding how indigenous food practices promote sustainable nutrition in rural Nepal (Contini et al., 2021; Bhusal et al., 2023).

However, traditional diets are increasingly being taken over by processed and imported foods, exposing communities to higher risks of diet-related illnesses (Jia et al., 2022; Al Mutairi et al., 2022). Poor nutritional status remains widespread in Nepal (Acharya et al., 2024), particularly among rural and indigenous groups, where many households lack nutrient-rich diets, leading to energy, protein, vitamin, and mineral deficiencies that result in child undernutrition, weakened immunity, and adult morbidity (Chhetri et al., 2024).

Indigenous Food and Nutrition Knowledge and Practice (IFNKP) denote the intergenerational learning, cultural beliefs, and ecological relationships that shape how communities plant, harvest, transform, and prepare food within their local biosphere (Swiderska et al., 2022). In Nepal, these knowledge systems function as central frameworks for cultural continuity, environmental management, and nutritional resilience among ethnic communities (Lama, 2021). Shukla et al. (2020) explain how such orally transmitted learning, embedded in daily life, enhances rural youths' food literacy by connecting them to local foods, seasonal cycles, and traditional cuisines. Similarly, Das et al. (2022) illustrate how Himalayan communities rely on local diets as climate-adaptive strategies, integrating food with ritual practices, cultural identity, and ecological awareness. In addition, the Rural Enterprises and Remittances Project (2023) documents how the Athpahariya, Danuwar, and Santhal communities preserve food cultures through forest-based collection, communal consumption, and seed-saving traditions.

Nepal also possesses a rich local food and agricultural heritage, as people have long utilized indigenous vegetables, herbs, and traditional foods that are both nutritious and well adapted to local ecological and socio-cultural conditions (Sherpa, 2023). This body of knowledge, passed down across generations, encompasses how food is produced, consumed, stored, and even used medicinally, forming a core part of indigenous knowledge systems (Lama, 2021). Foods such as Dhido, Gundruk, Kinema, and Bhakka exemplify this heritage, serving as nutrient-rich staples that continue to represent both health and cultural identity (Alvi et al., 2021; Dahal et al., 2022). The Newar community demonstrates remarkable diversity in indigenous food practices through dishes such as Yomari, Chatamari, Samaybaji, and Bara, each symbolizing nutritional variety and ritual significance (Magar et al., 2023; Manandhar, 2024). These traditions illustrate how indigenous foods strengthen social cohesion while meeting nutritional needs.

The majority of Nepal's indigenous communities maintain sustainable meal practices, which represent farming and living systems that safeguard the earth and remain viable across generations (Chhetri et al., 2024). Many farmers rely on natural compost rather than chemical fertilizers, preserve seeds annually, and cultivate low-water crops suited to local conditions (Feely, 2023; Sherpa, 2023). Although these practices support nutritional well-being and community self-sufficiency, they are increasingly threatened by declining rainfall, soil degradation, pest outbreaks, migration, and a shift toward unhealthy processed foods. Nevertheless, efforts to conserve traditional food knowledge continue;

for instance, digital technologies are being used to teach and document Newar cuisine (Manandhar, 2024). These insights demonstrate that IFNKP in Nepal are not remnants of the past but dynamic systems essential for sustaining health, culture, and environmental balance.

Although several case studies document the foodways and practices of specific ethnic groups, the collective contributions of these practices to nutritional requirements, traditional food and nutrition knowledge, and indigenous food systems across Nepal's diverse communities remain underexplored. This review addresses this gap by examining the following research questions: To what extent do indigenous foods consumed by ethnic cultural communities meet nutritional requirements? What traditional food and nutrition knowledge exists among these groups? And what indigenous food practices are common across Nepal's diverse ethnic communities? These questions delineate the scope and analytical direction of this study.

Methods

This study employed a narrative review approach to synthesize recent publications on Indigenous Food and Nutrition Knowledge and Practices (IFNKP) in Nepal. The review focused on research exploring the nutritional, cultural, and ecological dimensions of indigenous food systems. Relevant studies were identified through systematic searches in Google Scholar, Scopus, and Web of Science using combinations of keywords such as "Indigenous foods Nepal," "ethnic food culture Nepal," "traditional food preservation," "nutritional analysis of indigenous foods," "public health nutrition Nepal," and "sustainable agriculture and food systems."

Only peer-reviewed articles published in English between 2020 and 2025 were included. Studies were selected if they examined indigenous foods, dietary practices, or food-related knowledge among Nepal's ethnic communities, and if they provided empirical or conceptual analysis related to nutritional content, agricultural sustainability, or cultural significance. Publications were excluded if they were grey literature, non-academic reports, opinion editorials, or if they lacked methodological transparency.

From an initial pool of 54 articles, 28 met the inclusion criteria after duplicate removal and relevance screening. Key information from each study—such as author, year, objectives, design, site, participants, methods, findings, and limitations—was extracted into a structured matrix. The second author conducted the primary literature search, while the first and third authors reviewed duplicate entries, assessed the quality and relevance of the studies, and performed a risk-of-bias assessment to ensure alignment with the research questions.

The final set of studies was qualitatively analyzed and synthesized under three themes guided by the research questions. These studies represented diverse tribal and ethnic groups across Nepal, including the Tharu, Danuwar, Darai, and Majhi from the Terai; the

Rai, Limbu, Magar, and Gurung from the mid-hills; the Chepang and Tamang from the central hills; the Newar of the Kathmandu Valley; and the Sherpa, Thakali, and Loba from the trans-Himalayan region. As this study involved a review of previously published literature and did not include primary data collection, institutional ethical approval was not required.

Results and Discussion

This review included 28 studies encompassing diverse ethnic communities, food practices, and research approaches across Nepal and related contexts. As summarized in Table 1, the studies were organized under three thematic areas: indigenous foods as sources of nutritional requirements, indigenous food and nutrition knowledge among ethnic cultural groups, and indigenous food practices. Together, these themes illuminate how indigenous foods, knowledge systems, and practices contribute to nutrition, cultural identity, and sustainable food systems, while also revealing emerging threats.

Table 1: Thematic Area, Research Objectives, Study Design & Site, and Key Findings of the Review (n =28)

S. N	Authors and Date	Thematic Area	Objectives	Study Design & Site	Key findings
1	Adhikari et al. (2021)	Indigenous Food Knowledge	Document IK on seeds, pests, and food; assess cultural role; identify threats.	Mixed-methods (Survey + FGDs) Syangja District, Nepal	Preserved 20+ rice types; millet retained for rituals; limited pest strategies.
2	Adhikari et al. (2021)	Food Practice and Sustainability	To assess pandemic impacts on agriculture and food, evaluate responses, and recommend policy improvements.	Mixed-methods (virtual panels, surveys) Nationwide, esp. Karnali	42% food insecurity in Karnali; subsistence farming more resilient; remittance drop harmed income.
3	Al Mutairi et al. (2022)	Nutritional Value of Foods	To examine role of nutrition in preventing and managing chronic diseases.	Conceptual/Review-based article (Saudi Arabia, international context)	Balanced nutrient-rich diet reduces risks of heart disease, diabetes, cancer, obesity; Mediterranean diet exemplary. Processed foods and excess sugar linked to chronic illness. Holistic health requires nutrition, exercise, sleep, stress management.
4	Alvi et al. (2021)	Food Access	Assess lockdown impacts on	Panel phone surveys (CATI) Gujarat (India),	50%+ relied on informal networks;

		and Gender Role	women's extension access. And evaluate productivity effects.	Dang (Nepal)	formal access declined.
5	Bhandari (2023)	Ethnocultural Practices of Food	To find out medicinal plants used, analyze usage patterns, and assess conservation needs.	Mixed-methods (ethnobotany) Runtigadhi, Rolpa District	166 species documented; herbs/roots prevalent; Curcuma longa & Bergenia ciliata key.
6	Chaudhary et al (2022)	Ethno-practice of Foods	To investigate the adaptive strategies of the Tharu community and assess their role in sustaining food security and climate resilience.	Qualitative field study; Western Tarai, Nepal	Found that Tharu farmers use crop diversification, agroforestry, traditional irrigation, and ritual-based farming integrated with new techniques to address droughts and floods. Hybrid practices reduced vulnerability and improved household food security
7	Chhetri et al. (2024)	Traditional Food Practice among Ethnic Group	To identify key crops and traditional practices, assess farming knowledge levels, and recommend policy interventions.	Mixed-methods Bagmati Province (8 Chepang-majority LGs)	Millet, Kaguno, wild foods preserved; barriers: seed scarcity, wild animals, market inaccessibility.
8	Dahal et al. (2022)	Nutritional Value of Traditional Food (Bhakka)	Test milk powder ratios and find out sensory acceptance. To find out and analyze nutritional improvements	Experimental study Tribhuvan University labs	7.5% blend had best taste; protein increased from 5.18% to 6.7%.
9	Das et al. (2022)	Indigenous Food Practice	To analyze the dynamics of indigenous foods, their cultural significance, and adaptation practices in the	Qualitative ethnographic case study; Himalayan region (India, Nepal, Bhutan context mentioned).	Indigenous communities' associate food with rituals, local ecology, and climate adaptation; indigenous crops like barley, buckwheat, and millet

			Himalayas.		maintain resilience; traditional cuisines preserve identity.
10	Dawadi et al. (2022)	Traditional Food Practice	Profile macronutrients and micronutrients, analyze phytochemicals, and test bioactivity.	Experimental lab analysis Phulchoki (collection), NAST lab	Pulp rich in carbs/phenolics; seeds high in protein/fat; low antioxidant and no antibacterial effects.
11	Downs et al. (2022)	Traditional Foods Practices	Analyze value chains of millet and Koinar and identify points for intervention.	Qualitative, value chain analysis Jharkhand, India	Climate-resilient crops; barriers include processing labor, market access.
12	Feely (2023)	Urbanization and Its Impacts on Foods	Analysis the circular nutrient and knowledge practices, assess sustainability challenges, highlight hybrid successes.	Mixed-methods, case studies Kathmandu Valley & peri-urban farms	Composting, seed-saving common; youth migration and market reliance major threats.
13	Karmacharya (2024)	Nutritional Value of Foods	To discuss and analyze institutional meal practices and content, compare with other forces, and recommend improvements.	Mixed-methods (autoethnography, KII, FGD) Multiple APF sites	4,783 kcal/day rations; lacks altitude adjustment; cultural meals boost morale.
14	Katuwal et al. (2023)	Traditional Food Practice	To measure bioactive changes over time, find optimal fermentation duration, and compare with traditional Kinema.	Experimental RSM model Lab-based (Biratnagar)	Best bioactivity at 29.6h; DPPH, phenolics, and flavonoids peaked. Optimized Kinema scored higher.
15	Khakurel et al. (2021)	Traditional Food Practice and Food Security.	To document species and use, study gender and age knowledge gaps, and recommend conservation.	Ethnobotanical study Sikles region, Kaski District	72 WEP species; knowledge varies by age/gender; key threats: overharvesting, youth disinterest.

16	Khatiwada (2025)	Traditional Farming of Foods	To examine ongoing livelihood patterns and challenges of Chepang and Tamang in Makwanpur and Chitwan districts, with emphasis on farming practices and sustainability.	Cross-sectional mixed-method study conducted in Makwanpur and Chitwan districts (Dec 2024 – Jan 2025).	Both groups rely heavily on traditional farming and seasonal food stock; however, farming is low-return and insufficient. Climate change, lack of skills, and weak market connectivity reduce production and sustainability. Negative correlation between food sufficiency and farming capacity. Shift towards market dependency and wage labor observed.
17	Khattri and Pandey (2021)	Food and Ecology	To analyze climate impacts, document traditional adaptation, and provide sustainability insights.	Mixed-methods (fieldwork, meteorological data) Upper-manthang, Mustang	Temp ↑0.048°C/year; erosion, water scarcity high. Adaptations: greenhouses, spiritual rituals.
18	Lama (2021)	Indigenous Food Knowledge and Practice	To explore the uses of indigenous knowledge in conservation of environment and natural resources.	Qualitative, descriptive & interpretive; Nepal (multiple ethnic communities).	Found various practices: Mewahang Rai ethno-pest management; Sherpa "Singi Nawa" tree-cutting regulation; Newar "Si:thi Na:kha" festival for watershed management; Tamang use of Titepati for ritual/medicine; and other ecological rituals. These practices directly/indirectly conserve environment and resources.
19	Magar et al. (2023)	Nutritional Value of Foods	To analyze traditional dishes, and nutrition, and explore cultural roles and preservation challenges	Mixed-methods Newari communities, Kathmandu Valley	High carbs (e.g., Dhindo: 44.81%); dishes linked to festivals and kinship.
20	Manandhar	Globalization	Identify key dishes	Mixed-methods	Eight dishes identified;

	(2024)	and Traditional Food Knowledge	needing preservation as well as test AR effectiveness. Assess cultural dissemination potential.	(Expert interviews + User testing) Kathmandu Valley & Purdue University	SUS usability score 73.3; AR found engaging.
21	Mastran and Shrestha (2025)	Tourism and Food Sustainability.	To identify factors influencing food choices, including experiential variables, to guide tourism and preservation.	Quantitative survey (TPB model) Kathmandu Valley heritage sites	Aesthetics, attitude, and control linked to intention; behavior-intention gap exists.
22	Ojha et al. (2022)	Nutritional Value of Traditional Foods	To analyze diet diversity and medicinal food use, and assess nutrient adequacy.	Ethnographic study 24 villages in Bageshwar, India	Traditional diet meets 74–93% energy; 68 plant species used for dual purposes.
23	Shah et al. (2021)	Ayurveda-based Products	Gather information on product status, validate Ayurvedic concepts, and assess composition and trends.	Cross-sectional review + market scan Kathmandu Valley	Most products imported; multi-component supplements; lacking R&D and regulation.
24	Sherpa (2023)	Indigenous Food Knowledge and Practice	Assess adaptation using Protection Motivation Theory (PMT) with identify demographic influences. Recommend policy support.	Mixed-methods (Survey + FGDs) Khumbu region, Nepal	Organic manure & crop storage effective; age/experience improve efficacy.
25	Shukla et al. (2020)	Traditional Food Knowledge	Examine the extent of traditional food knowledge among youth and how this knowledge supports food literacy and sustainable food systems.	Qualitative study; rural villages in Kavre and Sindhupalchok districts, Nepal.	Youth identified 45 traditional foods (dhido, gundruk, sisnu, millet-based dishes); knowledge transfer mainly oral. Migration and modernization reduced youth interest. Traditional foods seen as “poor people’s food” but linked to cultural

					identity and resilience.
26	Swiderska et al. (2022)	Indigenous Food Practice	To examine how decolonial and interdisciplinary approaches can address indigenous peoples' priorities in sustaining food systems and cultural heritage.	Narrative review and comparative synthesis across multiple regions (global South, including Asia, Africa, Latin America).	Indigenous food systems are nutrient-dense, climate-resilient, and culturally embedded; yet marginalized in policy and markets. Biocultural heritage approaches strengthen rights, empower communities, and integrate traditional and scientific knowledge.
27	Thagunna et al. (2023)	Nutritional Value of Traditional Foods	To document and promote the cultural and nutritional importance of Tharu rice-based dishes (Dhikri, Bagiya, Bhakka).	Descriptive qualitative study; Tharu community, Terai Nepal	Found that Dhikri, Bagiya, and Bhakka are culturally central in Tharu festivals (e.g., Maghi, Deepawali). Nutritionally, Bhakka contains 5.18% protein and 57.59% carbohydrates, while Bagiya includes sesame, rich in antioxidants and omega-3. However, modernization is reducing intergenerational knowledge transfer.
28	Thapa and Hussain (2021)	Food and Ecology	Examine local climate perceptions, validate with climate data, and assess food security and strategies.	Mixed-methods Tatapani RM, Jumla (Ward 4)	Temp ↑, humidity ↓; 42% food insecure; cereals dominated diets; water scarcity harms food security.

Indigenous Foods and Nutritional Requirements

Across the reviewed literature, indigenous foods emerge as nutritionally rich, ecologically adaptive, and culturally meaningful staples that contribute substantially to household dietary needs. Studies consistently highlight the nutrient density of traditional foods and their potential role in supporting the livelihoods of rural and ethnic communities. For instance, Dahal et al. (2022) demonstrated that fortifying *Bhakka*, a steamed rice cake, with 7.5% milk powder increased its protein content from 5.18% to 6.7% without

reducing sensory acceptability. Similarly, Katuwal et al. (2023) found that fermented *Kinema*, a staple food among the Limbu (Yakthung) people, achieved peak antioxidant and phenolic levels at around 29.6 hours of fermentation, enhancing its immunity-supporting and gastrointestinal benefits. Wild fruits such as *Viburnum mullaha* (Bhalayo) were reported to contain high amounts of carbohydrates, proteins, and polyphenols, which are especially valuable in food-insecure and resource-poor settings (Dawadi et al., 2022).

Additionally, studies among the Tharu community show that *Dhikri*, *Bagiya*, and *Bhakka* provide not only nutritional energy but also cultural continuity through their central role in festivals such as Maghi and Deepawali (Thagunna et al., 2023). Bhandari (2023) further recorded 166 edible plant species used for maternal and child health, revealing a long-standing tradition of blending food and medicinal practices. Traditional foods such as *Dhindo* and *Gundruk* possess higher fibre and antioxidants than many urban processed foods, which are increasingly linked to lifestyle diseases (Alvi et al., 2021). Millet, Kaguno, and Koinar leaves—though nutrient-dense—remain underutilized due to labour-intensive processing and limited market linkages (Downs et al., 2022).

Taken together, these findings indicate that indigenous foods substantially contribute to the nutritional sufficiency of ethnic communities, providing energy, protein, micronutrients, and bioactive compounds. At the same time, threats from market dependency, declining traditional agriculture, and the rising consumption of processed foods indicate the need for supportive policies that strengthen production, processing, and market integration of indigenous foods, particularly in food-insecure regions.

Traditional Food and Nutrition Knowledge Among Ethnic Communities

Traditional knowledge systems across Nepal's ethnic groups play a pivotal role in sustaining nutrition, ecological balance, and cultural identity. This knowledge is typically transferred orally and embedded in daily routines, ritual practices, and communal customs. Sherpa (2023), using the Protection Motivation Theory, found that households in the Khumbu region apply indigenous risk-reduction strategies such as organic manure and traditional crop storage techniques, which enhance resilience to climate stress. Gurung farmers' practices of seed conservation, ritual-based pest control, and biodiversity preservation similarly illustrate how traditional knowledge maintains ecological cycles under market and climate pressures (Adhikari et al., 2021).

Ojha et al. (2022) reported that Himalayan households meet 74–93% of their daily energy needs through diets that include medicinal plants, demonstrating how food serves both nutritional and therapeutic functions. Gendered knowledge patterns also emerged in several studies: women in Kaski were found to possess extensive knowledge of herbs and leafy greens, while men specialized in forest fruits and wild edibles (Khakurel et al., 2021). Such distinctions broaden dietary diversity and community resilience.

Traditional food knowledge is also being reinterpreted and preserved through modern tools. Manandhar (2024) showed how augmented reality (AR) is used to document and teach Newar cuisine, making it accessible to younger generations. Meanwhile, the Rural Enterprises and Remittances Project (2023) documented how Athpahariya, Danuwar, and Santhal communities continue food heritage practices through forest foraging, seed saving, and communal food sharing.

These findings collectively reveal that traditional food knowledge forms a dynamic, adaptive system that integrates nutrition, culture, and ecology. Although modernization, migration, and processed food systems threaten this knowledge base, ongoing community practices and technological initiatives indicate strong potential for its preservation and revitalization.

Indigenous Food Practices Among Ethnic Cultural Groups

Indigenous food practices across Nepal demonstrate a deep interconnection between agriculture, ecology, and cultural identity. These practices often reflect sustainable and climate-resilient strategies that have been refined over generations. In the Kathmandu Valley, farmers engage in composting, seed preservation, and biological pest control to maintain soil fertility and minimize dependence on chemical inputs (Feely, 2023). In Upper Mustang, land rotation, greenhouse farming, and hardy crops such as barley and buckwheat enable Loba communities to sustain food production in harsh climatic conditions (Khattri & Pandey, 2021).

Food practices also hold cultural and ritual significance. Newar foods such as *Yomari*, *Kwati*, and *Samaybaji* remain tied to seasonal cycles and festivals, reinforcing social identity and ancestral heritage (Magar et al., 2023). Among the Tharu people, steamed rice-based foods such as *Dhikri* and *Bagiya* serve both everyday nutritional needs and ritual roles (Thagunna et al., 2023). Chepang and Tamang communities continue to rely on millet, Kaguno, and forest-based foods as climate-adaptive strategies, despite encountering seed shortages, market barriers, and environmental risks (Chhetri et al., 2024; Khatiwada, 2025).

These case examples illustrate that indigenous food practices are ecological and cultural systems rather than mere dietary habits. Their reliance on local biodiversity, minimal external inputs, and community-based labour not only enhances food security but also sustains cultural identity and ecological stewardship. However, the increasing pressures of climate change, market dependency, and youth migration threaten these centuries-old practices, emphasizing the urgency of integrated policy support, conservation strategies, and community-based innovations.

Conclusion

This narrative review synthesized 28 studies to examine the nutritional value of indigenous foods, the depth of traditional food and nutrition knowledge, and the diversity of indigenous food practices across Nepal's ethnic communities. The findings reveal that indigenous foods such as *Bhakka*, *Kinema*, *Dhindo*, *Gundruk*, and various wild fruits are nutrient-dense and culturally significant, contributing substantially to dietary energy, protein, fibre, antioxidants, and bioactive compounds. Traditional knowledge systems—expressed through seed preservation, medicinal plant use, crop storage, and gendered food know-how—remain central to maintaining ecological balance, food security, and cultural identity. Indigenous food practices, including composting, ritual food preparation, foraging, and climate-resilient farming, demonstrate how ethnic communities sustain nutrition and biodiversity through ecologically grounded methods.

Despite these strengths, indigenous foods and knowledge systems face growing threats from climate change, market dependency, youth migration, and the widespread adoption of processed foods. Yet, ongoing community practices and emerging technological efforts, such as digital documentation of traditional cuisine, show encouraging pathways for preservation. Overall, the review concludes that Indigenous Food and Nutrition Knowledge and Practices (IFNKP) in Nepal are living, adaptive systems that play a vital role in sustaining nutrition, cultural continuity, and ecological resilience. Strengthening these systems is crucial for promoting sustainable diets and food security in Nepal's diverse socio-cultural landscapes.

Implications

The findings of this review indicate strong implications for nutrition, agriculture, and public policy in Nepal. Indigenous foods offer nutrient-rich, culturally accepted, and affordable alternatives to increasingly prevalent processed foods. Their integration into school feeding programs, maternal and child nutrition initiatives, and community health campaigns can support healthier diets and help reduce diet-related illnesses. At the policy level, greater support is needed for seed conservation, the promotion of traditional and climate-resilient crops, and market incentives to process and commercialize millet, Kaguno, wild edibles, and other underutilized foods. Recognizing indigenous agricultural knowledge within local development and agricultural extension programs can strengthen food security and improve rural livelihoods.

There are also significant implications for cultural preservation, ecological sustainability, and future research. Indigenous foods serve as cultural symbols and identity markers, making the documentation of traditional recipes, rituals, and culinary practices crucial for safeguarding cultural heritage. Sustainable farming methods—such as composting, mixed cropping, and agroforestry—reflect climate-adaptive strategies that can enhance biodiversity and reduce reliance on chemical inputs. Community forest governance and

local institutions should acknowledge the value of forest-based foods and foraging practices in sustaining nutrition and ecology. Finally, more comparative research across ethnic groups is needed to fully understand Indigenous Food and Nutrition Knowledge and Practices (IFNKP), while digital tools such as augmented reality and cultural archives offer promising ways to preserve and transmit this knowledge to future generations.

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