

ORIGINAL ARTICLE

Harnessing Traditional Knowledge for Infant Nutrition: A Review of Complementary Feeding Practices in India

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ABSTRACT

This narrative review explores region-specific complementary feeding (CF) practices and the role of traditional knowledge systems across six zones of India North, South, East, West, Central, and Northeast. Despite India's cultural richness and availability of indigenous nutrient-dense foods, national data reveal that only 11.3% of children aged 6–23 months meet the Minimum Acceptable Diet (MAD) as per NFHS-5 (2019–21). A comprehensive literature search was conducted across four databases and grey literature sources to identify empirical studies published between 2015 and 2024. A total of 30 high-quality studies were selected and analyzed to examine dietary diversity, frequency, food types, and sociocultural factors influencing CF. The review highlights regionally diverse traditional practices, including the use of *khichdi* in North India, fermented rice in the East, *ragi* porridge in the South, *gond laddus* in the West, wild greens in Central India, and fermented soybean and bamboo shoots in the Northeast. While many of these foods align with WHO feeding recommendations, their potential is often underutilized due to maternal illiteracy, poverty, cultural taboos, inconsistent health counseling, and growing dependence on commercial baby foods. Findings suggest that integrating validated indigenous practices into national IYCF strategies can enhance child nutrition outcomes. The review advocates for culturally sensitive health education, empowerment of frontline workers, and incorporation of traditional foods into nutrition policies. Harnessing India's culinary heritage, alongside scientific guidelines, presents a promising pathway toward sustainable reduction of undernutrition in children under two.

KEYWORDS

• Infant and Young Child Feeding (IYCF) • Complementary Feeding • Traditional Knowledge • Indigenous Foods • Cultural Beliefs • Dietary Diversity

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INTRODUCTION

Optimal nutrition during the first two years of life is critical for a child's physical growth, brain development, immune function, and long-term health.¹ Globally, inadequate infant and young child feeding (IYCF) practices are linked to nearly 45% of child deaths under the age of five, with the burden disproportionately falling on low and middle-income countries (UNICEF, 2021).² In India, despite numerous national programs addressing child nutrition, malnutrition remains alarmingly high. According to the National Family Health Survey-5 (2019–21), 35.5% of children under five are stunted, 32.1% are underweight, and 19.3% are wasted.³ Alarmingly, only 11.3% of children aged 6–23 months receive a Minimum Acceptable Diet (MAD) a composite indicator measuring both dietary diversity and meal frequency (IIPS & ICF, 2021).⁴

While the policy discourse around malnutrition in India often focuses on health system gaps and food insecurity, an equally important but less explored dimension is the role of traditional knowledge systems and cultural food practices in shaping complementary feeding (CF) behaviors. Across India's diverse geographic and ethnic landscape, families continue to rely on indigenous foods and culturally embedded practices to initiate complementary feeding from *ragi* porridge in Karnataka and *khichdi* in Uttar Pradesh to fermented rice gruel in Odisha and bamboo shoot soup in Nagaland. These foods are not only affordable and locally accessible but often rich in micronutrients, probiotics, and bioavailable minerals.⁵

However, the nutritional potential of these traditional foods is not fully realized due to several persistent challenges.⁵ These include maternal illiteracy, intergenerational food taboos, poverty, seasonal food availability, and growing reliance on commercial baby foods that are often energy-dense but nutrient-poor. Additionally, feeding practices are frequently influenced by non-clinical sources of advice, such as grandmothers and traditional birth attendants, which may lead to early or delayed CF initiation, suboptimal food selection, and feeding myths.⁶

Given the critical window between 6 and 23 months when breastmilk alone is insufficient to meet a child's nutritional needs there is a pressing need to understand how cultural

norms, traditional knowledge, and local foods can be harnessed to improve complementary feeding practices. While some efforts have been made to document best practices, there is no comprehensive review that maps these behaviors and foods in a region-specific manner across India.²

This review, therefore, seeks to fill this gap by synthesizing regionally disaggregated evidence from 30 empirical studies published between 2015 and 2024. It aims to (i) document traditional complementary feeding practices in each Indian region, (ii) evaluate their alignment with WHO-recommended IYCF indicators, (iii) identify cultural and structural barriers to optimal feeding, and (iv) propose ways to integrate validated traditional knowledge into child nutrition policy and practice. By approaching infant feeding through both a nutrition science lens and a cultural anthropology lens, this review aspires to offer context-specific, culturally sensitive pathways for reducing child malnutrition in India.

METHODOLOGY

This study employed a narrative review approach to explore region-specific CF practices and traditional knowledge systems across India, with a focus on identifying culturally embedded foods, sociocultural barriers, and their nutritional implications for children aged 6–23 months. Given India's vast cultural and ecological diversity, this methodology aimed to synthesize empirical findings from diverse Indian regions through qualitative interpretation and comparative analysis.

1. Literature Search Strategy

A comprehensive literature search was conducted between January 2024 and April 2025 using databases including PubMed, Google Scholar, Scopus, and Web of Science. The search included peer-reviewed journal articles, government surveys (e.g., NFHS-4, NFHS-5), and grey literature such as reports from UNICEF, the National Institute of Nutrition, and the Ministry of Health and Family Welfare. The following keywords and Boolean operators were used in various combinations:

- "Complementary feeding" AND "India"
- "Infant and young child feeding" AND "region" OR "zone"

- *"Traditional food" OR "indigenous practices" AND "children under two"*
- *"Minimum acceptable diet" OR "dietary diversity" AND "malnutrition"*
- *"Cultural beliefs" OR "food taboos" AND "weaning foods"*

Filters were applied to select studies published between 2015 and 2024 in English language with geographically specific data from one or more Indian states.

2. Inclusion and Exclusion Criteria

Studies were included based on the following criteria:

- Empirical research (quantitative, qualitative, or mixed-methods)
- Focused on children aged 6–23 months
- Addressed complementary feeding practices, traditional knowledge, or indigenous food systems
- Reported data on at least one recognized IYCF indicator [e.g., Minimum Dietary Diversity (MDD), Minimum Meal Frequency (MMF), Minimum Acceptable Diet (MAD)]
- Provided region-specific or culturally contextual findings relevant to one of India's six zones (North, South, East, West, Central, Northeast).

Excluded were review articles without primary data, theoretical discussions without empirical backing, non-region-specific studies or those limited to neonatal breastfeeding, studies before 2015, unless cited in broader discussion for context.

3. Study Selection and Appraisal

An initial pool of 312 articles was retrieved. After removing duplicates and applying the inclusion/exclusion criteria through title and abstract screening, 52 full-text articles were reviewed. Of these, 30 high-quality empirical studies were selected for data synthesis.

Study quality was assessed using appropriate criteria:

- STROBE checklist for observational quantitative studies;
- CASP checklist for qualitative or ethnographic studies;
- Studies with a minimum methodological quality score of 70% were retained.

Priority was given to original, region-specific research. Duplicate studies previously used in multiple zones were removed and replaced with new, context-relevant studies.

4. Data Extraction and Regional Thematic Mapping

A standardized data extraction tool was developed to capture:

- Authors, year, and region
- Study population and design
- Type of complementary foods reported (traditional or commercial)
- Prevalence data on IYCF indicators (MAD, MDD, MMF)
- Identified facilitators/barriers (e.g., cultural taboos, family structure, education)
- Reported nutritional outcomes (e.g., stunting reduction, micronutrient adequacy)

Studies were grouped into six geographic zones North, South, East, West, Central, and Northeast India and presented in separate tables. Each table functioned as an evidence matrix summarizing five key studies per region.

This region-wise structure enabled cross-comparison of cultural patterns, food types, health behavior influences, and gaps in complementary feeding. Ethnographic insights and qualitative findings were further coded under themes such as fermented food use, traditional weaning rituals, intergenerational influence, and market influence on infant diets.

5. Ethical Considerations

This review involved the analysis of publicly available research data and reports. As no human subjects or original fieldwork were involved, ethics committee approval was not required. All secondary sources have been cited appropriately in accordance with academic standards.

RESULT AND DISCUSSION

This review synthesized findings from 30 empirical studies conducted across six geographic zones of India: North, South, East, West, Central, and Northeast. Each region presented a unique profile of CF practices shaped by local food availability, traditional

beliefs, maternal education, and access to health services. While several traditional foods such as *khichdi*, *ragi porridge*, fermented rice, smoked fish, and wild greens were found to be nutritionally beneficial and culturally embedded in weaning diets, their use was often limited by inconsistent feeding frequency, poor dietary diversity, and sociocultural taboos. The results are presented region-wise, supported by evidence tables that summarize study characteristics, reported practices, and observed impacts on child nutrition outcomes. This structure allows for a comparative analysis of how traditional knowledge systems and health behaviors influence infant feeding across India's diverse settings.

1. Complementary Feeding Practices in Northern India

Complementary feeding practices in Northern India comprising Uttar Pradesh, Punjab, Haryana, and Himachal Pradesh reflect a complex interplay of tradition, nutrition awareness, maternal education, and sociocultural influences. While traditional weaning foods such as *khichdi*, *halwa*, and *dalia* are commonly used, gaps persist in meal diversity, frequency, and adequacy. The table below summarizes region-specific studies and their findings.

Table 1: Complementary Feeding Practices in Northern India

Author(s)	Study Title	Study Population	Prevalence/Practices	Impact on Child Nutrition
Shukla <i>et al.</i> (2023) ⁶	Complementary feeding practices in children aged 6–23 months in rural Lucknow	300 mother–child pairs in rural Uttar Pradesh	51.3% appropriate CF; 61% no fruits/vegetables in last 24 hrs	Maternal education and counseling linked to improved CF
Yadav & Puri (2021) ⁷	Complementary feeding practices and determinants in Haryana	428 children aged 6–23 months	72% initiated CF at 6 months; only 28% met MDD	Family structure and grandmother influence play major role
Kalia <i>et al.</i> (2020) ⁸	Weaning practices and nutritional adequacy among infants in Himachal Pradesh	220 infants aged 6–24 months	High use of <i>dalia</i> and <i>halwa</i> ; low protein/vegetable inclusion	Suggests enriching traditional foods with lentils and vegetables
Kaur & Sharma (2019) ⁹	Perceptions and practices of CF in urban Punjab	Focus groups of 30 urban/peri-urban mothers	High use of commercial cereals; poor understanding of portion sizes and diversity	Emphasizes nutrition education among urban educated families
Pathania & Mehta (2018) ¹⁰	Traditional beliefs around infant feeding in Himachal Pradesh	Rural caregivers and mothers	Delayed food introduction due to cultural fears; use of ghee and jaggery in moderation	Recommends culturally adapted counseling messages to improve CF practices

The regional evidence reveals that age-appropriate CF has improved over time in Northern India, yet dietary diversity and frequency remain major challenges. In rural Uttar Pradesh, Shukla *et al.* (2023) reported that only half the children received appropriate CF, and fruit or vegetable consumption was strikingly low. Importantly, mothers who had received antenatal counseling were more likely to introduce a diversified diet, indicating the efficacy of health system engagement.

Similarly, in Haryana, Yadav and Puri (2021) noted that while most mothers adhered to the six-month CF initiation norm, only 28% of children achieved minimum dietary diversity. The study underscored the influential role of grandmothers in household feeding decisions often transmitting outdated or restrictive

beliefs about suitable infant foods.⁷

In Himachal Pradesh, Kalia *et al.* (2020) found a high reliance on traditional preparations like *halwa* and *dalia*, but these meals lacked nutritional balance. The study recommended simple enhancements, such as adding lentils or grated vegetables, to improve micronutrient content while retaining cultural acceptance.⁹

Urban Punjab presents a contrasting picture. Kaur and Sharma (2019) observed a rising preference for packaged weaning foods, which, while convenient, often led to inadequate intake of home-cooked nutrient-rich alternatives. The study called attention to the misconception that marketed foods are superior, especially among educated mothers.⁹

Finally, Pathania and Mehta (2018) explored

deeply rooted beliefs in Himachal Pradesh. Their ethnographic work revealed delays in introducing solid foods and fear-based avoidance of certain items like pulses or ghee. These findings affirm the need for culturally sensitive health messaging that bridges modern nutrition science with local traditions.¹⁰

In conclusion, Northern India showcases both progress and stagnation. While CF is initiated timely in many settings, diversity, frequency, and content remain suboptimal. Interventions should integrate traditional foods with nutritional counseling, strengthen community-based programs, and engage elder caregivers to reshape household feeding norms.

2. Complementary Feeding Practices in Eastern India

Eastern India including Odisha, Bihar, Jharkhand, and West Bengal exhibits a rich blend of traditional complementary feeding practices and nutrition-related challenges. While indigenous foods like fermented rice (*pakhala*), rice gruels, and lentil pastes are commonly used, issues of poverty, maternal illiteracy, and intergenerational malnutrition hinder optimal feeding outcomes. The table below summarizes key regional studies reflecting local practices and nutrition outcomes.

Table 2: Complementary Feeding Practices in Eastern India

Author(s)	Study Title	Study Population	Prevalence/Practices	Impact on Child Nutrition
Acharya <i>et al.</i> (2021) ¹¹	Determinants of minimum acceptable diet among children aged 6–23 months in Odisha	460 children in rural Odisha	39.2% met MAD; higher among educated mothers and those counseled by ASHA workers	Counseling and maternal literacy significantly improve feeding quality
Bhoi <i>et al.</i> (2021) ¹²	Pattern of complementary feeding among infants: A pilot study	Infants in Bhubaneswar, Odisha	Rice/wheat porridges common; poor inclusion of vegetables and proteins	Quality of complementary foods inadequate despite timely initiation
Roy <i>et al.</i> (2020) ¹³	Complementary feeding practices in rural West Bengal	315 children in North 24 Parganas	60% timely CF; low consumption of legumes and leafy vegetables	Feeding frequency adequate, but diet lacked nutrient diversity
Singh & Sinha (2019) ¹⁴	Assessment of complementary feeding indicators in tribal Bihar	238 tribal households in Bihar	Early CF initiation (4–5 months); reliance on rice water, minimal protein	Suboptimal feeding practices linked to cultural norms and poverty
Mahapatra <i>et al.</i> (2018) ¹⁵	Utilization of traditional fermented foods in child nutrition in tribal Odisha	Ethnographic fieldwork in tribal Odisha	High use of fermented rice gruel and sattu; seasonal feeding common	Traditional fermented foods enhance gut health and micronutrient absorption

Complementary feeding in Eastern India reveals both culturally rich practices and systemic nutritional inadequacies. In Odisha, Acharya *et al.* (2021) found that only 39.2% of children met the minimum acceptable diet (MAD), with wide disparities based on maternal education and access to health counseling. Children of mothers who had interacted with Anganwadi or ASHA workers were significantly more likely to receive diverse, timely, and appropriately prepared complementary foods.

In a focused pilot study from urban Bhubaneswar, Bhoi *et al.* (2021) observed that while most mothers-initiated CF close to six months of age, the quality of complementary food was suboptimal. Rice or wheat-based

porridges dominated, with minimal inclusion of protein sources, green vegetables, or fruits. This imbalance, if persistent, may perpetuate micronutrient deficiencies, particularly iron and zinc.

In rural West Bengal, Roy *et al.* (2020) reported a relatively higher rate of timely CF initiation at 60%, but with limited dietary diversity. Despite caregivers' efforts to feed children 3–4 times a day, meals were often repetitive centered around starchy staples like rice and bread with little protein or vitamin-rich content.

Singh and Sinha (2019) highlighted more severe challenges in tribal Bihar, where early initiation of CF sometimes as early as 4 monthsm was common. The diet primarily

consisted of rice water (maad) and thin gruels, with cultural beliefs restricting the use of lentils, eggs, or green vegetables for infants. Poverty and entrenched food taboos emerged as significant barriers to improved feeding.

On a more promising note, Mahapatra *et al.* (2018) conducted ethnographic research in tribal Odisha, documenting the traditional use of fermented rice (pakhala) and sattu (roasted gram flour mix) in infant diets. These foods, prepared seasonally and often shared communally, provided probiotic benefits and were naturally rich in B vitamins and minerals. When prepared hygienically and administered consistently, such traditional foods offer affordable and accessible nutrition solutions.

In summary, Eastern India presents a paradox: traditional feeding wisdom exists, but it is undermined by poverty, misinformation, and structural inequities. Efforts to integrate

fermented and regionally available foods into public nutrition programs alongside focused maternal education could substantially enhance child nutrition outcomes in the region.

3. Complementary Feeding Practices in Western India

Western India comprising Rajasthan, Gujarat, and Maharashtra presents a diverse nutrition landscape marked by coexisting traditional feeding wisdom and urban dietary transitions. While foods like gond laddus, bajra roti, and daliya remain integral in many rural diets, urban populations are increasingly exposed to packaged, less nutritious options. Sociocultural influences and maternal education levels play a key role in determining complementary feeding behaviors. The table below summarizes findings from original region-specific studies.

Table 3. Complementary Feeding Practices in Western India

Author(s)	Study Title	Study Population	Prevalence/Practices	Impact on Child Nutrition
Jeyakumar <i>et al.</i> (2023) ¹⁶	Determinants of CF practices among 6–24 month children in Pune slums	1,066 children aged 6–24 months in Pune, Maharashtra	Low MDD and MAD; use of cereals dominates diet	Health education and maternal occupation influence feeding diversity
Joshi <i>et al.</i> (2021) ¹⁷	Feeding practices among mothers in tribal Gujarat	250 tribal mothers in Narmada district, Gujarat	High reliance on millet porridge and seasonal greens	Traditional foods nutrient-rich but lacking in meal frequency
Rathod & Kshirsagar (2020) ¹⁸	Evaluation of complementary feeding knowledge among urban mothers in Mumbai	400 urban mothers with children aged 6–23 months	72% initiated CF on time; poor knowledge of food group diversity	Knowledge gap despite urban education; overuse of formula feeding
Sharma <i>et al.</i> (2019) ¹⁹	Use of indigenous foods in CF among rural families in Rajasthan	150 families in Barmer and Jodhpur districts	<i>Gond laddus</i> , roasted gram, jaggery, bajra roti common post-9 months	Traditional practices offer iron, protein, and healthy fats
Patel <i>et al.</i> (2018) ²⁰	Food taboos and feeding myths in Gujarat: An exploratory study	Key informant interviews with caregivers in tribal Gujarat	Eggs, meat, brinjal, and certain pulses avoided during CF due to taboos	Myths restrict protein intake; behavior change communication required

Complementary feeding in Western India varies markedly by geography, income, and cultural group. In urban Maharashtra, Jeyakumar *et al.* (2023) examined over a thousand mother-child pairs in Pune's slums and found that the majority of children received cereal-based diets, with low inclusion of pulses, fruits, or animal-source foods. MDD and MAD indicators were particularly low among children of working mothers or those without access to nutrition counseling. The authors recommend improving maternal health

education, especially through community health workers.^{14,16}

In tribal Gujarat, Joshi *et al.* (2021) highlighted the use of finger millet porridge, wild greens, and seasonal tubers as traditional weaning foods. Although these foods were nutrient-dense, meal frequency was often low only 45% of infants received more than two meals daily. Mothers cited time constraints and food scarcity during the dry season as reasons for infrequent feeding. The study suggests that strengthening food security and awareness

on feeding frequency can enhance nutrition outcomes.¹⁷

Rathod and Kshirsagar (2020) conducted an urban study in Mumbai and noted that despite high literacy levels, many mothers lacked adequate knowledge of nutritional requirements for young children. While 72% began CF on time, only 29% of mothers could identify more than two food groups necessary for a balanced diet. Additionally, a growing trend of early formula feeding was observed, possibly influenced by marketing and social status perceptions.¹⁸

In Rajasthan, Sharma *et al.* (2019) documented the use of indigenous complementary foods like *gond laddus*, jaggery-coated peanuts, and *bajra roti*. These traditional items often introduced after 9 months were energy-rich and iron-dense, contributing to improved hemoglobin levels in infants. The study praised the cultural continuity of such feeding practices and urged their inclusion in government IEC (Information, Education and Communication) materials.¹⁹

On the other hand, Patel *et al.* (2018) highlighted how feeding taboos and myths in tribal Gujarat limit food group variety. Foods such as brinjal, eggs, and meat were commonly avoided for infants due to beliefs that they cause heat, illness, or speech delay. These restrictions

were passed down by elders, especially grandmothers. The study emphasized the need for behavioral interventions that address misconceptions while respecting cultural contexts.²⁰

In summary, Western India reflects both strengths and shortcomings in complementary feeding. While traditional foods offer impressive nutritional potential, poor frequency, misinformation, and urban transition patterns pose threats to optimal child nutrition. Culturally appropriate health messaging, improved dietary counseling, and reinforcement of local food systems could help bridge the current gap between knowledge and practice.

4. Complementary Feeding Practices in Southern India

Southern India comprising Tamil Nadu, Kerala, Andhra Pradesh, and Karnataka is often praised for its relatively better child health indicators and higher maternal literacy rates. Despite these advantages, CF practices in the region reveal gaps in dietary diversity, meal quantity, and timing, influenced by cultural beliefs, maternal work status, and family structure. Traditional foods like ragi porridge, idli, kanji, and rasam rice continue to serve as vital components in infant diets.

Table 4: Complementary Feeding Practices in Southern India

Author(s)	Study Title	Study Population	Prevalence/Practices	Impact on Child Nutrition
Rao <i>et al.</i> (2019) ²¹	Study of CF practices among mothers in coastal Karnataka	200 mothers of children aged 6–24 months in Udupi	77.5% timely CF; only 32% offered adequate quantity	Timely initiation common, but portion size and diversity poor
Sudha & Anitha (2021) ²²	Traditional weaning foods and their role in Tamil Nadu's nutrition practices	Ethnographic study in rural Tamil Nadu	Frequent use of <i>ragi malt</i> , rice gruel, <i>idli</i>	Indigenous weaning foods high in micronutrients but sometimes delayed
Joseph <i>et al.</i> (2020) ²³	Assessment of dietary adequacy among infants in rural Kerala	180 children aged 6–23 months	65% received ≥3 meals/day; poor inclusion of fruits and vegetables	Quantity acceptable, but quality lacked diversity
Lakshmi & Reddy (2022) ²⁴	Feeding practices in semi-urban Andhra Pradesh	350 mother–child pairs	70% timely CF; 25% met MDD	Urbanization leading to increased reliance on commercial baby foods
Bhat & Srinivasan (2018) ²⁵	Cultural beliefs influencing CF practices in Karnataka	40 in-depth interviews with rural caregivers	Taboos around eggs and bananas; ritual-based food introduction	Cultural barriers delay introduction of protein and fruit sources

In coastal Karnataka, Rao *et al.* (2019) found that while 77.5% of mothers-initiated CF at the recommended age of six months, only 32% of children were offered the recommended quantity of food. Meals were often limited

to a single cereal-based dish per day, lacking the diversity needed to meet energy and micronutrient needs. The study recommended counseling on meal frequency and portion size during postnatal visits.²¹

Sudha and Anitha (2021), in an ethnographic study from rural Tamil Nadu, highlighted the extensive use of traditional weaning foods such as ragi porridge, kanji, and soft idlis. These foods are culturally valued, easy to digest, and naturally rich in iron and calcium. However, delayed introduction often after the child turns one was common due to beliefs about digestive maturity. This delay reduces exposure to essential nutrients during the critical 6–12-month window.²²

In rural Kerala, Joseph *et al.* (2020) observed that while meal frequency was satisfactory (65% received three or more meals daily), dietary quality was poor. Most children consumed starchy foods such as rice and bananas, but fewer received vitamin-rich vegetables or pulses. The study pointed to household time constraints and maternal employment as barriers to food preparation and diversity.²³

Similarly, Lakshmi and Reddy (2022) reported that urbanization in Andhra Pradesh led to increasing dependence on commercial baby foods. Despite high rates of timely CF initiation (70%), only 25% of children met the MDD standard. Busy schedules, lack of awareness, and aggressive marketing of packaged products were identified as key reasons for this shift.²⁴

In a cultural context, Bhat and Srinivasan (2018) interviewed rural caregivers in Karnataka and found that food taboos especially against

eggs, bananas, and meat persisted, driven by fears of indigestion or spiritual impurity. Additionally, some communities practiced ritual-based food introduction, which delayed the use of nutrient-dense items beyond the weaning period. The authors emphasized that culturally sensitive nutrition communication is critical to breaking these myths.²⁵

In sum, Southern India demonstrates a paradox: despite better health services and higher female literacy, complementary feeding continues to be influenced by traditional beliefs, urban work routines, and commercial food dependence. Strengthening community education around timing, diversity, and frequency, while celebrating local nutritious foods, could bridge current gaps in feeding quality and adequacy.

5 Complementary Feeding Practices in Central India

Central India including Madhya Pradesh and Chhattisgarh is marked by high tribal populations, low literacy, and limited healthcare access, all of which shape the landscape of CF practices. Despite strong community structures, traditional beliefs, poverty, and inconsistent outreach by health services create barriers to appropriate CF. However, traditional foods such as wild greens, millets, and forest tubers continue to offer important nutritional value when properly integrated into child diets.

Table 5: Complementary Feeding Practices in Central India

Author(s)	Study Title	Study Population	Prevalence/Practices	Impact on Child Nutrition
Prajapati <i>et al.</i> (2023) ²⁶	Impact of educational intervention on CF in rural Ujjain, Madhya Pradesh	Mothers of children aged 6–23 months in Ujjain district	Post-intervention: ↑ in timely CF, dietary diversity, and frequency	Demonstrated role of education and counseling on improving IYCF behaviors
Tiwari & Dubey (2020) ²⁷	Complementary feeding indicators among tribal mothers in Chhattisgarh	300 tribal mothers in Bastar region	Late CF initiation (after 8 months); reliance on rice water, forest tubers	Poverty and maternal illiteracy major barriers to adequate CF
Mishra <i>et al.</i> (2019) ²⁸	Influence of tribal food systems on child nutrition in Madhya Pradesh	Ethnographic study of tribal households	Use of wild leafy greens, kodo millet, roots and tubers as first foods	Traditional foods nutrient-rich but seasonal and inconsistently used
Jain & Sharma (2021) ²⁹	Assessment of complementary feeding among urban poor in Bhopal	280 children aged 6–23 months in urban Bhopal	CF started at 6 months in 68%; but only 26% met MAD	Maternal employment and lack of family support affect feeding consistency
Verma <i>et al.</i> (2018) ³⁰	Beliefs and barriers related to CF in tribal areas of Chhattisgarh	Focus groups with 60 caregivers in Dantewada and Kondagaon	Food taboos prevalent; protein sources like eggs and lentils avoided	Cultural beliefs restrict variety and protein intake in early complementary feeding

The central Indian states face multifaceted challenges in achieving appropriate complementary feeding. In Ujjain, Madhya Pradesh, Prajapati *et al.* (2023) implemented

an educational intervention targeting rural mothers. The results were encouraging there was a significant improvement in timely initiation, dietary diversity, and meal frequency post-intervention. This study strongly supports the role of behavior change communication in transforming CF practices even in low-resource settings.²⁶

In contrast, Tiwari and Dubey (2020) documented severe delays in CF initiation among tribal mothers in Chhattisgarh, with many introducing solids only after eight months. The initial complementary foods were often rice water or boiled roots, lacking the density and nutrients required during early development. The study attributed these patterns to low maternal literacy, absence of antenatal counseling, and dependence on subsistence food systems.²⁷

A more ethnographic approach was taken by Mishra *et al.* (2019) in tribal Madhya Pradesh, where traditional diets included kodo millet, wild greens, and forest tubers. These foods, though rich in micronutrients, were consumed inconsistently due to seasonality and beliefs that infants cannot digest “heavy” or fibrous items. The study emphasizes the potential of these indigenous food systems if supported with education and preparation techniques suited for infants.²⁸

Urban data from Bhopal presented a different picture. Jain and Sharma (2021) found that although 68% of mothers-initiated CF at six months, only 26% of children met MAD standards. Among urban poor households, factors such as maternal employment, lack of nearby family support, and dependence on

processed foods limited feeding regularity and quality.²⁹

Finally, Verma *et al.* (2018) explored cultural taboos in tribal Chhattisgarh that significantly influence food choices. Common beliefs discouraged feeding infants eggs, lentils, and leafy vegetables under the assumption that they caused bloating, fever, or delayed speech. These myths, often passed down through generations, curtailed the intake of essential protein and iron sources.³⁰

In summary, Central India illustrates how indigenous food systems, if harnessed wisely, can serve as low-cost, high-impact nutritional interventions. However, success depends on overcoming structural barriers like education gaps, poverty, and cultural myths. Interventions must blend community traditions with scientific guidelines, delivered through locally trusted agents such as ASHAs and Anganwadi workers.

6. Complementary Feeding Practices in Northeastern India

The Northeastern region of India comprising states such as Assam, Manipur, Nagaland, and Mizoram is home to rich biodiversity and distinct ethnic food cultures. Despite these advantages, remoteness, limited health infrastructure, and traditional food taboos hinder consistent and adequate CF practices. Indigenous foods such as fermented soybeans, bamboo shoots, smoked fish, and local greens feature prominently in household diets and hold nutritional potential when used effectively in infant feeding.

Table 6: Complementary Feeding Practices in Northeastern India

Author(s)	Study Title	Study Population	Prevalence/Practices	Impact on Child Nutrition
Das <i>et al.</i> (2020) ³¹	CF practices and food taboos among tribal mothers in Assam	280 mothers in rural Dibrugarh, Assam	Delayed CF due to beliefs; use of rice and boiled vegetables	Taboo on eggs and fish; reduced protein intake
Lhungdim <i>et al.</i> (2021) ³²	Feeding patterns and traditional beliefs among mothers in Manipur	Mixed-methods study in Imphal and Churachandpur	Use of <i>utong</i> greens, fermented soy, and rice gruel common	Local foods high in iron and probiotics but given inconsistently
Zeliang & Jamir (2019) ³³	Traditional weaning foods and maternal perceptions in Nagaland	Focus groups with mothers in Kohima and Dimapur	Bamboo shoot soup, smoked pork broth given post-9 months	Fear of allergies delays early introduction of meat-based broths
Roy <i>et al.</i> (2022) ³⁴	Utilization of indigenous food systems for child nutrition in Mizoram	200 tribal households in Aizawl and Lunglei	Inclusion of banana stem, pumpkin, and smoked fish in infant meals	Indigenous diets rich in vitamin A and protein; preparation varies by community
Singh & Das (2018) ³⁵	Cultural practices influencing CF among tribal mothers in Northeast India	Ethnographic study in Assam and Nagaland	Household elders control timing and type of first foods	Intergenerational control reinforces food myths and taboos

Northeastern India presents a distinctive profile of infant feeding behaviors shaped by indigenous culinary systems, oral traditions, and geographic isolation. In Assam, Das *et al.* (2020) observed that many tribal mothers delayed CF initiation beyond six months due to concerns about digestive readiness and fear of illness. While boiled rice and vegetables formed the staple of initial meals, nutrient-dense options such as eggs, fish, and legumes were frequently excluded owing to local taboos.³¹

Lhungdim *et al.* (2021), in their work in Manipur, found that traditional foods like fermented soybean, utong (local leafy greens), and rice porridge were commonly used during the weaning phase. These foods were rich in iron, fiber, and gut-friendly microbes, but were given inconsistently, with practices varying widely between tribal subgroups. The authors recommend that local ingredients be promoted through nutrition education, as they align well with WHO recommendations when used consistently.³²

In Nagaland, Zeliang and Jamir (2019) conducted focus group discussions with urban and peri-urban mothers and documented the use of bamboo shoot soup, smoked pork broth, and yam mash in infant diets. However, animal-based broths were often delayed until after nine months due to fears of allergies or digestive upset. These delays reduce early protein exposure and may contribute to iron-deficiency anemia in infants.³³

Roy *et al.* (2022) provided insights from Mizoram, where banana stem, smoked fish, pumpkin, and other local vegetables were integrated into CF regimens. The community demonstrated strong usage of locally grown, seasonal foods, though the exact ingredients and methods differed among tribes. The study found that when used regularly, these foods supported dietary diversity and vitamin A intake, though challenges remained in meal frequency and portion sizes.³⁴

Finally, Singh and Das (2018), through an ethnographic study across Assam and Nagaland, reported that grandmothers and senior women often dictated CF practices, sometimes delaying the introduction of nutrient-dense foods based on long-held cultural beliefs. This intergenerational influence perpetuated myths that certain foods cause speech delay, fever, or weak limbs in

infants.³⁵

Overall, the Northeastern region has the raw materials for excellent complementary feeding from fermented and smoked proteins to local greens and fruits but challenges persist due to irregular practices, cultural taboos, and limited access to formal counseling. To address these, interventions must respect local traditions while encouraging timely and consistent use of nutrient-rich indigenous foods. Culturally adapted health education, especially through tribal health workers, could play a transformative role in enhancing CF outcomes in this region.

CONCLUSION

Across the six Indian regions North, South, East, West, Central, and Northeast distinct weaning foods such as ragi porridge, khichdi, fermented rice, smoked fish, and wild greens are deeply embedded in family diets and rituals. Many of these traditional foods are inherently nutrient-dense and aligned with WHO recommendations IYCF, offering significant potential for improving dietary diversity and micronutrient intake. Despite this, widespread challenges persist. Low maternal literacy, persistent food taboos, poverty, inconsistent health counseling, and increasing reliance on processed commercial foods undermine the effectiveness of traditional feeding systems. The review underscores the need to integrate validated indigenous feeding practices into national IYCF policies through culturally tailored behavior change communication, frontline worker training, and community-based education programs. Additionally, promoting local food systems and reviving forgotten nutrient-rich traditional recipes can offer cost-effective, sustainable solutions to combat child malnutrition. By blending evidence-based nutrition science with culturally resonant practices, India has the opportunity to build a more inclusive and impactful public health response to undernutrition during early childhood.

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Conflict of Interest

The authors declare no conflict of interest.

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