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## Research Article

# Unveiling dietary patterns among children aged 6-23 months: A framework analysis for perspectives in Chinyunyu Community, Rufunsa District, Zambia



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### Highlights/Key Messages

- Complementary diets were dominated by cereal based porridges
- Poverty and heavy workloads limited recommended feeding practices
- Limited maternal decision-making power influenced child feeding
- Groundnuts were the main protein source, limiting dietary diversity
- Affordable, local diverse foods could improve complementary feeding

## Background

Appropriate complementary feeding from 6-23 months is essential for child growth and development, yet dietary diversity remains inadequate in many resource-constrained settings. Understanding contextual influences on feeding practices is important for improving child nutrition.

## Objective

This study examined qualitative evidence to identify dietary patterns and factors shaping complementary feeding among children aged 6-23 months in Chinyunyu, Rufunsa District, Zambia.

## Methods

This Framework Analysis applied Gale et al. (2013) and the WHO Infant and Young Child Feeding framework to interpret qualitative data. The study was conducted in drought-prone Chinyunyu Ward, Rufunsa District, Zambia. Participants included 24 women aged 18-49 years with a child under two years and seven mothers-in-law who participated in Photovoice and focus group discussions, alongside three husbands and four community leaders who participated in in-depth interviews.

## Results

Caregivers generally described awareness of recommended feeding practices; however, poverty, limited maternal decision-making power, and heavy workloads were perceived to constrain adherence. Diets cited were dominated by cereal-based porridges prepared with groundnuts, sugar, or salt. Groundnuts were reported as the main protein source, and reliance on them may have limited dietary diversity. Furthermore, increasing dependence on commercial foods was also perceived to undermine optimal complementary feeding.

## Conclusions

Despite awareness of recommended feeding practices, poverty, gendered resource control, and heavy workloads were reported to constrain adherence to WHO recommendations. Empowering women, improving livelihoods, and promoting affordable dietary diversity, including legumes beyond groundnuts, may strengthen complementary feeding and child nutrition.

**Keywords:** complementary feeding; dietary patterns; framework analysis; Rufunsa District Zambia

## Graphical Abstract



## Introduction

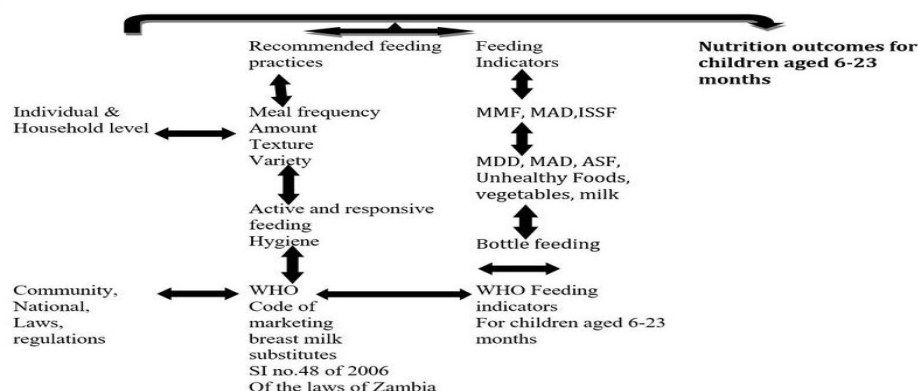
The period from 6–23 months, within the first 1,000 days of life, is a critical stage when children transition from exclusive breastfeeding to complementary feeding and require nutrient-dense foods to support rapid growth and development (Vyas, 2021). During this period, energy requirements increase substantially, and diets must provide adequate macro- and micronutrients, including iron, zinc, calcium, phosphorus, magnesium, and vitamin B6 (Lutter et al., 2021; Moreira et al., 2024). Appropriate complementary feeding reduces the risk of stunting, micronutrient deficiencies, and childhood obesity (Bergamini et al., 2022).

WHO and UNICEF have established key indicators to assess feeding practices among children aged 6–23 months (WHO and UNICEF, 2021). However, complementary feeding remains suboptimal in many low- and middle-income countries. Globally, only 29% of children achieve minimum dietary diversity, with lower coverage in sub-Saharan Africa (24%). Minimum meal frequency and minimum acceptable diet are also inadequate across many settings (Kassie et al., 2023). According to the Zambia Demographic and Health Survey, only 12% of children aged 6–23 months achieved the

minimum acceptable diet, while 22% met minimum dietary diversity and 45% received minimum meal frequency. These feeding practices may be explaining Zambia's high prevalence of anaemia (62%) and stunting (32%) among under-five children (ZSA, 2024).

Reported factors shaping feeding of children aged 6–23 months include parental factors such as maternal education, women's empowerment (Sarwar et al., 2024), and paternal support (Martin et al., 2021). Household factors such as food security, ownership of consumer goods, livestock, source of water and type of toilet (Amugsi et al., 2025) and reliance on cereal-based foods (Galani et al., 2022) often also influence child feeding. Furthermore, urbanisation and increased availability of processed, sugar-sweetened foods (Mukanu, 2022) influence from mothers-in-law (Kwah et al., 2025), and by community leaders (Moreno et al., 2023) are other factors reported.

The explanation above links to an interplay between recommended feeding practices, regulatory environments, and feeding indicators in shaping nutrition outcomes for children aged 6–23 months, as illustrated in Figure 1.



**Figure 1. Interplay between recommended feeding practices and feeding indicators in shaping nutrition outcomes for children aged 6–23 months**

SI: Statutory Instrument; MMF: Minimum Meal Frequency; MAD: Minimum Acceptable Diet; ISSF: Introduction of Soft & Semi-solid foods; ASF: Animal Source Food.

Source: WHO & UNICEF, 2021

The interlinked components in the conceptual framework show that household practices, measured by feeding indicators, and supportive policy frameworks influence nutrition outcomes during the critical complementary feeding window (Padhani et al., 2023).

Given the limited evidence on dietary patterns among children aged 6–23 months in Chinyunyu, interpreting qualitative datasets through the WHO Infant and Young Child Feeding framework (WHO and UNICEF, 2021) provided an opportunity to generate deeper insights into the social, cultural, and economic determinants of complementary feeding. Therefore, this study sought to identify dietary patterns and explore the factors shaping them among children aged 6–23 months in Chinyunyu.

## Methods

### Study Design

This was a Framework analysis study, utilising a systematic, theory-driven examination of data using pre-existing concepts (Gale et al., 2013). Dietary patterns were explored against WHO (2003) complementary feeding recommendations as well as WHO and UNICEF (2021) infant and young child feeding indicators.

### Study Setting

The qualitative study was conducted from 30th April to 4th May 2018 in Chinyunyu Ward, located in Rufunsa District of Lusaka Province, Zambia. Rufunsa District had a population of approximately 81,733 in 2022 (City Population, n.d.). Fig. 2 show details.



Source: [map of Lusaka province showing Rufunsa District - Search Images](#)

**Figure 2. Map of Lusaka Province, showing Rufunsa District**

The indigenous people in Chinyunyu are the remnants of the Soli people, with the main economic activity being subsistence farming (Chisala, 2023). The prevalence of stunting among children under five in Lusaka Province is estimated at 20%, in the medium prevalence range of WHO classification (ZSA, 2024). However, Rufunsa's vulnerability to climate shocks, erratic rainfall, and food insecurity (Ngoma et al., 2024) suggests a high risk of malnutrition in the district.

### Sampling Strategy

The target population included mothers, their mothers-in-law, husbands, and community leaders. A purposive, criterion-based sampling approach (Palinkas et al., 2015) was employed to recruit participants with direct experience of or influence on complementary feeding practices. Maximum variation across participant groups was sought to capture diverse perspectives, with recruitment continuing until sufficient thematic saturation was achieved (Malterud

et al., 2016).

### Data collection methods

The study employed photovoice (FV), focus group discussions (FGDs) and in-depth interviews (IDIs) with mothers, fathers, mothers-in-law, and community leaders to generate rich, contextual insights on complementary feeding. Digital recording, verbatim transcription, and later translation concluded the data collection.

### Photo-voice and focus group discussions

This technique is a means by which participants can reflect both individually and together on their own concerns made visible in photographs and given voice through discussions and accounts (Carpenter, 2022).

Participants were oriented on themes to focus on to enhance feeding of children aged 6 to 23 months in the community. Facilitators minimised technical advice during the orientation to avoid inhibiting people's creativity.

Captured films were later developed on site. Mothers gathered again to discuss their photographs through an FGD after four days. A separate FGD was also conducted among mothers-in-law.

FGDs were complemented with semi-structured question guides. These revealed collectively shaped social processes (Lazarus et al., 2025). Four facilitators conducted each FGD, with two leading the discussion while ensuring coverage of all selected photos and the topics in the interview guide. Another facilitator took notes, while the fourth assisted with digital recording after seeking participants' permission. FGDs lasted for an average of an hour. Where there was ignorance, participants were educated. Lastly, tapes were transcribed verbatim and translated. The FGD venue used was the most conducive place at the time that ensured participants' confidentiality. An enclosure without a door at Chinyunyu health facility provided privacy for mothers' FGDs and husbands as well as community leaders' IDIs. This was an isolated enclosure. Mothers-in-law gathered in an isolated open area under a tree near a community hall.

### ***In-depth interviews***

In-depth Interviews (IDIs) are most appropriate for situations in which you want to ask open-ended questions that elicit personal experiences from relatively few people (Osborne & Grant-Smith, 2021). In this study, IDI participants were husbands and community leaders.

### ***Data processing and analysis***

The Framework Analysis approach was employed following

the stages of familiarisation, identifying a thematic framework, indexing, charting, and mapping, as well as interpretation (Gale et al., 2013). Qualitative data were reviewed together and integrated at the thematic level to avoid duplication of findings. The research team coded the data manually, and a second reviewer cross-checked themes to enhance analytical rigour. The team then mapped existing codes and themes against the WHO Infant and Young Child Feeding framework and related indicators to identify dietary patterns and feeding practices while preserving the original meaning and context of participants' accounts.

### **Ethical considerations**

Ethical approval was obtained from the Levy Mwanawasa Medical University Research Ethics Committee (LMMU-REC 00010/20) and the National Health Research Authority (NHRA/0001/15/03/2021). Permission to conduct the study in Rufunsa District was received from the Lusaka Provincial and Rufunsa District Health Offices. All data were anonymised prior to analysis, and confidentiality and privacy were maintained throughout the study (Kang & Hwang, 2021).

## **Results**

### **Participant Characteristics**

A total of 38 participants were recruited, comprising 24 mothers, 7 mothers-in-law, 3 husbands, and 4 community leaders. Table 1 provides information on participant characteristics.

**Table 1. Characteristics of participants**

|                             | Category      | Husbands<br>n (%) | Mothers<br>n (%) | Mothers-in law<br>n (%) | Key informants<br>n (%) | Total<br>n (%) |
|-----------------------------|---------------|-------------------|------------------|-------------------------|-------------------------|----------------|
| <b>Age in years</b>         | <b>Total</b>  | <b>3(7.89)</b>    | <b>24(63.16)</b> | <b>7(18.42)</b>         | <b>4(10.53)</b>         | <b>38(100)</b> |
|                             | 18–20         | 0(0.00)           | 5(20.83)         | 0(0.00)                 | 1(25.00)                | 6(15.79)       |
|                             | 21–25         | 1(33.30)          | 16(66.67)        | 0(0.00)                 | 0(0.00)                 | 17(44.74)      |
|                             | 26–30         | 1(33.30)          | 2(8.33)          | 0(0.00)                 | 0(0.00)                 | 3(7.89)        |
| <b>Gender</b>               | 31+           | 1(33.30)          | 1(4.17)          | 7(100.0)                | 3(75.00)                | 12(31.58)      |
|                             | Males         | 3(100.00)         | 0(0.00)          | 0(0.00)                 | 3(75.00)                | 6(15.79)       |
|                             | Females       | 0(0.00)           | 24(100.00)       | 7(100.00)               | 1(25.00)                | 32(84.21)      |
| <b>Occupation</b>           | Farmer        | 1(33.33)          | 15(62.50)        | 6(85.71)                | 1(25.00)                | 23(60.53)      |
|                             | Other         | 2(66.67)          | 9(37.50)         | 1(14.29)                | 3(75.00)                | 15(39.47)      |
| <b>Monthly income (USD)</b> | <45           | 0(0.00)           | 21(87.50)        | 6(85.71)                | 0(0.00)                 | 27(71.05)      |
|                             | 45+           | 3(100.0)          | 3(12.50)         | 1(14.29)                | 4(100.0)                | 11(28.95)      |
| <b>Educational level</b>    | Up to primary | 1(33.33)          | 9(37.50)         | 4(57.14)                | 2(50.00)                | 16(42.11)      |
|                             | Secondary     | 2(66.67)          | 15(62.50)        | 3(42.86)                | 2(50.00)                | 22(57.89)      |
| <b>Tribe</b>                | Soli          | 0(0.00)           | 6(25.00)         | 1(14.29)                | 0(0.00)                 | 7(18.42)       |
|                             | Other         | 3(100.0)          | 18(75.00)        | 6(85.71)                | 4(100.0)                | 31(81.58)      |

USD: United States Dollar (based on exchange rate at the time of the original study)

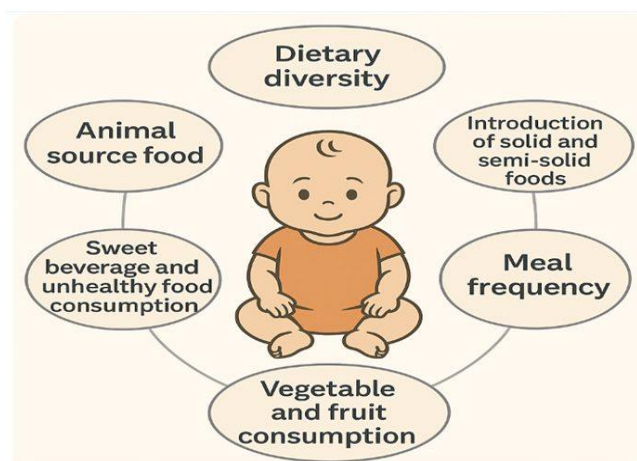
Participant perspectives on infant and young child feeding. The themes identified in this research related to the timing of food introduction, meal frequency, dietary diversity, feeding support, and hygiene practices among children aged 6–23 months (Table 2). These themes emerged consistently across participant narratives during data collection.

Six feeding domains for children aged 6–23 months were identified through thematic analysis (Fig. 3). These were:

dietary diversity, introduction of solid and semi-solid foods, meal frequency, consumption of animal-source foods, intake of fruits and vegetables, and exposure to sweetened beverages and unhealthy foods. These domains represent the core themes drawn from participants' narratives and form the basis for the feeding indicators discussed in the subsequent sections.

**Table 2. Summary of participant perspectives on dietary patterns for children aged 6 to 23 months**

| Recommended Feeding Practice  | Feeding Indicator                                                 | Key Findings                                                                                                                                                                 |
|-------------------------------|-------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Introduction of Other Foods   | Introduction of soft and semi-solid foods at six completed months | Some mothers were reported to introduce complementary foods too early, others too late                                                                                       |
| Frequency & amount            | Minimum meal frequency                                            | Reported meal frequency was irregular                                                                                                                                        |
| Variety                       | a) Minimum Dietary Diversity                                      | Porridge variations reported: With groundnuts, sugar, salt, salad, or plain.                                                                                                 |
|                               | b) Animal source food consumption                                 | Staple foods reported: Nshima, vegetable soup, pumpkin, goat meat soup, goat liver whenever available.                                                                       |
|                               | c) Fruit and vegetable consumption                                | There were reports of giving vegetable soup, usually accompanying nshima made for children                                                                                   |
|                               | d) Consumption of unhealthy foods                                 | Unhealthy foods reported: Drinks with a bit of alcohol, porridges with artificial sweetener, candies, puffed cereals.                                                        |
| Food Texture Preferences      |                                                                   | Food texture reported varied from thin to thick.                                                                                                                             |
| Active and Responsive Feeding |                                                                   | Some mothers were reported leaving the child unattended or did not actively support feeding.<br>Some children were reported to refuse to eat, and mothers did not encourage. |
| Hygiene Practices             |                                                                   | Poor hygiene practices reported: Babies made to drink their dirty bathwater to make them strong against diseases                                                             |

**Figure 3. Domains of feeding practices among children aged 6-23 months in Chinyunyu**

**Dietary diversity** Porridge was frequently identified as a staple complementary food and was commonly prepared with groundnuts, sugar, and salt, and occasionally enriched with cooking oil, although some participants reported preparing it using only salt and water. The participants further reported that porridge offered to children was often described as thin in texture and predominantly cereal-based. A 47-year-old husband in Chinyunyu (IDI 003) remarked, “...My wives sieve the porridge for the child starting to eat to make it very thin, making it thicker as the child grows” (Figure 4).

**Figure 4. Maize porridge; Left-prepared with maize meal, water, salt and sugar; Right-Similar porridge but very thin in texture.**

Vegetable and meat soups served with *nshima* were also widely mentioned as common complementary foods. As one 31-year-old husband explained during an in-depth interview (IDI 002), “When a child is still young, we give meat soup and vegetable soup with *nshima*.”. *Nshima*, a staple in Zambia, is a thick, smooth porridge made from ground maize, sorghum, millet or cassava flour. It closely resembles Kenya’s *ugali* and Zimbabwe’s *sadza* (Magogodi, 2022) and is typically

consumed with soups, sauces, or stews collectively known as *ndiyo* (relish) in Zambia (Magogodi, 2022).

#### Age of introduction of solid and semi-solid foods

Participants reported varying ages for the introduction of solid and semi-solid foods, with some mothers citing three to four months. Early introduction was frequently described as more common among younger and unmarried mothers. A

56-year-old mother-in-law observed: “...Where we live, within about three weeks after delivery, young girls start leaving the babies with their mothers and continue moving up and down...” Furthermore, some participants reported that children resisted foods offered to them after six months of age. One mother explained: “...My baby is seven months old, but he just wants to breastfeed.” Meanwhile, continued breastfeeding was widely reported among children aged 6–23 months and emerged as a common feeding practice across participant accounts.

### Meal frequency

Participants described varying feeding frequencies among children aged 6–23 months, with differences observed in the number of meals and snacks provided throughout the day. Notably, most mothers reported irregular feeding frequency, possibly resulting in fewer feeding occasions during the day.

### Animal source foods

Young children in Chinyunyu were typically provided with meat soup or whole liver whenever available. In addition, cultural norms within certain ethnic groups restricted the consumption of animal-source foods (ASF), reserving them for the household head. One mother underscored this

custom, stating, “Meat or fish are reserved for *bbabba mukulu*,” indicating that such foods were primarily designated for the husband.

### Sweet beverage and unhealthy food consumption

There appeared to be widespread consumption of sweet beverages and unhealthy foods among young children in Chinyunyu. Reported items included commercial products such as milk beverages, puffed cereals, candies, and products containing artificial sweeteners. The participants also reported frequent consumption of commercial corn-based drinks and ready-to-eat cereal porridges.

### Fruit and vegetable consumption

Most caregivers in Chinyunyu reported offering vegetable soup as the main source of vegetables for infants and young children. Participants indicated that this soup was extracted from any vegetable prepared for a household meal and was commonly served alongside *nshima*. Figure 6 shows frequently reported foods eaten in households in Chinyunyu, mainly vegetables with *nshima*. Accounts showed that foods were not usually prepared in such a way as to accommodate children aged 6–23 months.



Figure 6. Commonly eaten foods among households in Chinyunyu

### Perceived factors influencing infant and young child feeding

This study identified several factors perceived to influence dietary patterns among children aged 6–23 months in Chinyunyu, shown in Table 3. Participants frequently reported that men largely controlled access to land, livestock, and financial resources, while women were primarily responsible for managing subsistence crop

production. Women also described carrying a substantial workload related to household tasks and childcare, with men reportedly having limited involvement. However, some participants noted variations across ethnic groups, reporting that households originating from Northern and Eastern Zambia tended to have more shared household and caregiving responsibilities.

**Table 3. Factors perceived to shape infant and young child feeding in Chinyunyu**

| Major Theme                                       | Key Findings                                                                                                                                                                                                                                                                                                                                                                     |
|---------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Access to and control over resources              | Men mostly controlled land, cows and money. Women mostly controlled small animals and subsistence crops.                                                                                                                                                                                                                                                                         |
| Gender and leadership in decision-making          | Men mostly sought cash-earning roles, while women mostly took unpaid, community-centred leadership.                                                                                                                                                                                                                                                                              |
| Livelihood activities and household contributions | Men's activities: Farming, charcoal production, gardening, piece work, and building. Some engaged in beer drinking, informal jobs, or idle activities.<br>Women's activities: Household chores, farming, selling vegetables, running small businesses, working in lodges, charcoal production, commercial sex work, and looking after cows.                                      |
| Who does more work?                               | Women performed more household and caregiving tasks, including child feeding.                                                                                                                                                                                                                                                                                                    |
| Cultural and ethnic influences on household roles | Bemba: Men and women shared labour, finances, and household responsibilities.<br>Easterners: Both men and women owned land, animals, money, and did household chores.<br>Ndebeles, Shonas, Tongas, and Zezulu:<br>- Men controlled money and resources.<br>- Women provided labour, did household chores, and had limited decision-making power.<br>Soli: Soli women owned land. |
| Other reasons for feeding practices               | Poverty: Limited food availability.<br>Non-adherence to nutritional advice: Some mothers did not follow what they learned.                                                                                                                                                                                                                                                       |

Men: Husbands; Women: Mothers, caregivers

### Participants' perspectives on improving infant and young child feeding practices

Table 4. presents participant-generated suggestions for improving infant and young child feeding in Chinyunyu.

**Table 4. Perspectives on ways of improving infant and young child feeding**

| Major Themes                     | Key findings                                                                                                                                                                                                         |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Improving Water Supply           | Enhancing water supply systems to ensure clean and safe drinking water for preparing infant foods.<br>Water harvesting initiatives to store water for household use and food production                              |
| Health Education                 | Community-based health education programs to improve knowledge<br>Training on proper infant and young child feeding practices, including appropriate complementary feeding.                                          |
| Food Security and Nutrition      | Teaching families how to grow their own food to enhance household food security.<br>Promoting the use of locally available nutritious foods to improve dietary diversity.                                            |
| Community Engagement and Support | Establishing nutrition and health clubs to promote peer learning<br>Encouraging collective food preparation sessions, where mothers learn proper food preparation techniques to retain nutrients for young children. |

## Discussion

Our findings provide evidence on current practices and factors influencing optimal complementary feeding among children aged 6–23 months in Chinyunyu, Rufunsa District. Rufunsa, as a drought-prone rural district (Hadley et al., 2023), highlights the constraints caregivers face in accessing diverse and nutrient-rich complementary foods due to

environmental and economic limitations. Recurring droughts exacerbate food insecurity, often forcing households to rely on cheaper staple foods with lower nutrient density (Hadley et al., 2023), thereby increasing the risk of malnutrition among young children. The findings suggest that complementary feeding practices were characterised by limited dietary diversity, variations in the timing of introducing solid and semi-solid foods, suboptimal meal frequency, low consumption of animal-source foods, inadequate fruit and vegetable consumption, and the use of sweetened beverages and commercially processed foods.

Limited dietary diversity was a recurring pattern in caregivers' accounts of complementary feeding practices among children aged 6–23 months. Caregivers reported frequent reliance on staple foods such as porridge and nshima made out of maize meal dominating complementary feeding practices. Caregivers consistently reported preparing this food with ingredients such as groundnuts, sugar, or salt, while nshima was reported to be served with vegetable soup or meat soup to children aged 6–23 months. This is similar to patterns documented elsewhere (Oladiran & Emmambux, 2022). Groundnuts are a common source of protein and micronutrients used in infant feeding in many settings, including Zambia (Hamaimbo et al., 2023). Although aflatoxin exposure was not assessed or reported in the present study, the reliance on groundnut-based complementary foods may have implications where aflatoxin contamination occurs. Aflatoxin, a hepatotoxic and carcinogenic mycotoxin produced by *Aspergillus* species under warm and humid conditions, has been associated with impaired nutrient absorption, suppression of insulin-like growth factor pathways, and gut inflammation (Urugo et al., 2024). Consequently, exposure to aflatoxin-contaminated foods has been hypothesized to contribute to linear growth faltering and an increased risk of stunting among children during the critical 6–23-month period (Urugo et al., 2024). Mothers should also be encouraged to utilize other locally available legumes such as cowpeas, soybeans, and Bambara nuts, which offer comparable protein and micronutrient benefits to support dietary diversity and nutrient adequacy (Funduluka et al., 2023; Tura et al., 2025).

Participants stated that the introduction of solid, semi-solid, and soft foods (ISSF) was often initiated as early as three to four months, particularly among young unmarried mothers. This aligns with a recent study in Tanzania (Masuke et al., 2021). Such early introduction in Chinyunyu was reported to often be influenced by grandmothers assuming caregiving roles. This practice displaces breast milk intake and exposes infants to infection risks (Yakubu, 2023). Conversely, similar to a recent study in Ethiopia (Abate et al., 2023) some mothers reported delaying ISSF beyond six months due to infants' refusal to eat. This practice could increase the risk of nutrient deficiencies (Capra et al., 2024). Thin, low-energy-density foods emerged as a common feature of complementary feeding, reflecting cultural beliefs that young infants should initially be offered soft foods before progressing to thicker textures (Erasmus et al., 2023). This practice, if prolonged, could contribute to inadequate

energy intake (Oladiran & Emmambux, 2022). Nutritional adequacy among children aged 6–23 months in Chinyunyu was further compromised by irregular meal frequency, with caregivers citing poverty, time constraints, and limited knowledge. This feeding practice potentially affected adherence to age-appropriate meal frequency recommendations. Caregivers' narratives suggest that inadequate feeding support and poor hygiene practices may have contributed to increased vulnerability to infection and poor nutrition outcomes among young children. These challenges align with findings in Indonesia and Zambia (Moramarco et al., 2023; Rahayuwati et al., 2023).

The findings suggest that ASF were not routinely included in the diets of children aged 6–23 months, despite recommendations that young children consume foods such as eggs, meat, and fish to support growth and development. Consistent with an Ethiopian study (Zerfu et al., 2025), caregivers frequently reported offering only the soup derived from animal-source foods rather than the actual flesh (appropriately prepared for an infant in the case of meat), a practice that provides minimal nutritional benefit and does not constitute adequate ASF consumption. In some ethnic groups in this study, ASF was reported to be culturally reserved for the household head, a practice that could disproportionately affect child nutrition. A similar study in West Africa showed that a good portion of fish or meat was reserved for the father (Lokossou et al., 2021). Limited fruit and vegetables consumption (FVC) also emerged as a recurring feature of complementary feeding practices, with caregivers frequently reporting vegetable soups accompanying *nshima*, but only as toddlers transitioned to family diets. ASF and FVC among children aged 6–23 months provide micronutrients, including iron, zinc, vitamin A, and B12, which promote growth, cognitive development, and immune function (Engidaw et al., 2023; Haileselassie et al., 2022).

Sweetened beverage consumption and ultra-processed foods emerged as additional notable features of complementary feeding practices, with caregivers describing the use of commercially available products including sweetened drinks, puffed cereals, and candies. The frequent reliance on unhealthy food choices in low-income households can be attributed to both economic constraints and a lack of nutritional awareness (Anderson et al., 2021; Silva et al., 2023). This sets the stage for non-communicable diseases (NCDs) later in life (Fragkou et al., 2021).

Perspectives on factors shaping dietary patterns among children aged 6–23 months can be viewed at multiple levels. At the individual and household levels, resource distribution was reported to be male-dominated, with husbands managing most cash crops and therefore household income, while women were reported to primarily oversee subsistence crops, small animals as well as household chores, consistent with findings elsewhere (Firdissa et al., 2025). This structural dynamic limits women's ability to purchase nutritious foods, particularly in households where financial dependence on men restricts their decision-making power regarding child nutrition (Rietveld et al., 2023). Maternal workload was

further reported to impact timely meal preparation and meal frequency. Such time constraints are recognised as barriers to optimal infant feeding practices, as reported in a recent sub-Saharan study (Kulwa et al., 2023). Cultural norms also emerged as influencers for feeding practices and food distribution within households. In some ethnic groups, certain food taboos, such as reserving meat and fish for men, were reported to constrain children's access to nutrient-rich foods, similar to findings in Asia (Travasso et al., 2023). This reinforces existing nutritional disparities and perpetuates inequities in child dietary quality.

## Limitations

A major strength of this study was the use of rich qualitative data generated through Photovoice, Focus Group Discussions, and In-depth Interviews, which provided detailed insights into complementary feeding practices and the factors influencing them in Chinyunyu. Nevertheless, the findings reflect participants' experiences within a single rural community, may not represent the entire community, and may not be generalisable to other settings. As the study relied on self-reported practices, responses may have been influenced by recall or social desirability bias. The findings should therefore be interpreted as contextual insights rather than evidence of causal relationships.

## Conclusions

The findings suggest suboptimal complementary feeding practices among children aged 6–23 months in Chinyunyu, characterised by reliance on cereal-based porridges, inconsistent meal patterns, low consumption of animal-source foods, fruits and vegetables, and increasing use of commercially available unhealthy foods. Groundnuts were commonly reported as the main protein source, although food safety concerns were noted. Poor hygiene practices reported further suggest increased vulnerability to malnutrition among young children. These feeding practices appeared to be influenced by interconnected social, cultural, economic, and environmental factors. Despite caregivers generally demonstrating awareness of recommended feeding practices, poverty, male-controlled resources, maternal workload, drought, cultural beliefs, and limited social support appeared to constrain their ability to provide diverse and adequate diets. Overall, the findings suggest that context-specific interventions that strengthen women's decision-making, improve nutrition and food safety education, and enhance access to diverse, affordable foods, including locally available legumes, may improve complementary feeding practices in such resource-constrained settings.

## Author Contributions

PF: Conceptualisation, Methodology, Investigation, Data Curation, Funding Acquisition, Formal Analysis, Writing - Original Draft, and Project Administration. MM, RMK, PB, NMM, TH, and CK: Formal Analysis, Writing - Review & Editing. All authors have read and approved the final version of the paper and its submission and have given consent for publication.

### Declaration of Generative AI and AI-Assisted Technologies in Scientific Writing

ChatGPT (GPT-5.6, Open AI) was used to assist in designing the graphical abstract and Figure 3 illustrating the domains of complementary feeding practices. The authors reviewed and approved the final content and presentation.

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### Data Availability Statement

All relevant data are available within the manuscript

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### Conflict of Interest

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## REFERENCES

- Abate, A. D., Hassen, S. L., & Temesgen, M. M. (2023). Timely initiation of complementary feeding practices and associated factors among children aged 6–23 months in Dessie Zuria District, Northeast Ethiopia: a community-based cross-sectional study. *Frontiers in Pediatrics*, 11, 1062251. <https://doi.org/10.3389/fped.2023.1062251>
- Amugsi, D. A., Sidze, E., Thuita, F., Flax, V. L., Wilunda, C., Adair, L., Mwangi, B., ... Ekiro, S. (2025). Factors Influencing Wasting in Children Under 5 in Arid Regions of Kenya. *Maternal & Child Nutrition*, 22(1), e70036. <https://doi.org/10.1111/mcn.70036>
- Anderson, E., Wei, R., Liu, B., Plummer, R., Kelahan, H., Tamez, M., Marrero, A., ... Mattei, J. (2021). Improving healthy food choices in low-income settings in the United States using behavioral economic-based adaptations to choice architecture. *Frontiers in Nutrition*, 8, 734991. <https://doi.org/10.3389/fnut.2021.734991>
- Bergamini, M., Simeone, G., Verga, M. C., Doria, M., Cuomo, B., D'Antonio, G., Dello Iacono, I., ... Miniello, V. L. (2022). Complementary feeding caregivers' practices and growth, risk of overweight/obesity, and other non-communicable diseases: a systematic review and meta-analysis. *Nutrients*, 14(13), 2646. <https://doi.org/10.3390/nu14132646>
- Capra, M. E., Decarolis, N. M., Monopoli, D., Laudisio, S. R., Giudice, A., Stanyevic, B., Esposito, S., & Biasucci, G. (2024). Complementary feeding: tradition, innovation and pitfalls. *Nutrients*, 16(5), 737. <https://doi.org/10.3390/nu16050737>
- Carpenter, J. (2022). Picture this: Exploring photovoice as a method to understand lived experiences in marginal neighbourhoods. *Urban Planning*, 7(3), 351–362. <https://doi.org/10.17645/up.v7i3.5451>
- Chisala, C. (2023). optimising the economic weight of thermal springs for rural tourism development in Zambia. <https://doi.org/10.46222/ajhtl.19770720.415>
- City Population. (n.d.). Retrieved <https://www.citypopulation.de/en/zambia/wards/admin/>
- Engidaw, M. T., Gebremariam, A. D., Tiruneh, S. A., Tesfa, D., Fentaw, Y., Kefale, B., Tiruneh, M., & Wubie, A. T. (2023). Micronutrient intake status and associated factors in children aged 6–23 months in sub-Saharan Africa. *Scientific Reports*, 13(1), 10179. <https://doi.org/10.1038/s41598-023-36497-3>
- Erasmus, C. R., Pillay, T., & Siwela, M. (2023). Factors affecting the choices made by primary caregivers during the complementary feeding transition period, KwaZulu-Natal, South Africa. *South African Journal of Clinical Nutrition*, 36(1), 1–7.
- Firdissa, S., Alemayehu, S., Workeneh, S., Nchanji, E. B., Abdulhamid, N., Tesfaye, L., Tegegne, G., ... Terefe, T. (2025). Uncovering Gender Inequities: Bridging gender gaps in water access, control, and utilization among Borana Pastoralists in a changing climate. <https://hdl.handle.net/10568/178485>
- Fragkou, P. C., Karaviti, D., Zemlin, M., & Skevaki, C. (2021). Impact of early life nutrition on children's immune system and noncommunicable diseases through its effects on the bacterial microbiome, virome and mycobiome. *Frontiers in Immunology*, 12(2021), 644269. <https://doi.org/10.3389/fimmu.2021.644269>
- Funduluka, P., Hachibamba, T., Mukuma, M., Bwembya, P., Keith, R., Kumwenda, C., & Mwila, N. M. (2023). Enhancing household soybean processing and utilization in the Eastern Province of Zambia, a concurrent triangulation study design. *PLoS One*, 1–24. <https://doi.org/10.1371/journal.pone.0282762>
- Galani, H. Y. J., Orfila, C., Gong, & Y. Y. (2022). A review of micronutrient deficiencies and analysis of maize contribution to nutrient requirements of women and children in Eastern and Southern Africa. *Critical Reviews in Food Science and Nutrition*, 62(6), 1568–1591. <https://doi.org/10.1080/10408398.2020.1844636>
- Gale, N. K., Heath, G., Cameron, E., Rashid, S., & Redwood, S. (2013). Using the framework method for the analysis of qualitative data in multi-disciplinary health research. *BMC Medical Research Methodology*, 13(1), 117. <http://www.biomedcentral.com/1471-2288/13/117>
- Hadley, K., Wheat, S., Rogers, H. H., Balakumar, A., Gonzales-Pacheco, D., Davis, S. S., Linstadt, H., Cushing, T., Ziska, L. H., & Piper, C. (2023). Mechanisms underlying food insecurity in the aftermath of climate-related shocks: a systematic review. *The Lancet Planetary Health*, 7(3), e242–e250. [https://doi.org/10.1016/S2542-5196\(23\)00003-7](https://doi.org/10.1016/S2542-5196(23)00003-7)
- Haileselassie, M., Redae, G., Berhe, G., Henry, C. J., Nickerson, M. T., & Mulugeta, A. (2022). Educational intervention and livestock ownership successfully improved the intake of animal source foods in 6–23 months old children in rural communities of Northern Ethiopia: Quasi-experimental study. *Plos One*, 17(11), e0277240. [https://doi.org/10.1016/S2542-5196\(23\)00003-7](https://doi.org/10.1016/S2542-5196(23)00003-7)
- Hamaimbo, B. T., Marinda, P. A., Nyau, V., Chileshe, J., Khayeka-Wandabwa, C., & Schoustra, S. E. (2023). Adequate dietary intake and consumption of indigenous fermented products are associated with improved nutrition status among children aged 6–23 months in Zambia. *Dairy*, 4(1), 137–149. <https://doi.org/10.3390/dairy4010010>
- Kang, E., & Hwang, H.-J. (2021). Ethical conducts in qualitative research methodology: Participant observation and interview process. *Journal of Research and Publication Ethics*, 2(2), 5–10. doi: <http://dx.doi.org/10.15722/rpe.2.2.202109.5>
- Kassie, G. A., Gebrekidan, A. Y., Enaro, E. Y., & Asgedom, Y. S. (2023). Minimum acceptable dietary intake among children aged 6–23 months in Ethiopia: A systematic review and meta-analysis. *PLoS One*, 18(6), e0287247. <https://doi.org/10.1371/journal.pone.0287247>
- Kulwa, M. K. B., Mamiro, S. P., Kolsteren, & W. P. (2023). Nutrition education package focusing on infant and young child feeding in Tanzania. *Journal of Nutrition Education and Behavior*, 55(7), 493–508. <https://doi.org/10.1016/j.jneb.2023.04.002>
- Kwah, K., Bartle, N., Sharps, M., Choudhry, K., Blissett, J., & Brown, K. (2025). Application of the behaviour change wheel to optimise infant feeding in Bangladeshi and Pakistani Communities in the UK: Co-Development of the Learning About Infant Feeding Together (LIFT) Intervention. *Maternal & Child Nutrition*, 21(3), e70019. <https://doi.org/10.1111/mcn.70019>
- Lazarus, S., Hughes, M., Button, M., & Garba, K. H. (2025). Fraud as legitimate retribution for colonial injustice: neutralization techniques in interviews with police and online romance fraud offenders. *Deviant Behavior*, 47(3), 1–22. <https://doi.org/10.1080/01639625.2024.244632>
- Lokossou, Y. U. A., Tambe, A. B., Azandjè, C., & Mbhenyane, X. (2021). Socio-cultural beliefs influence feeding practices of mothers and their children in Grand Popo, Benin. *Journal of Health, Population and Nutrition*, 40(1), 1–12. <https://doi.org/10.1186/s41043-021-00258-7>
- Lutter, C., K., Grummer-Strawn, L., Rogers, & L. (2021). Complementary feeding of infants and young children 6 to 23 months of age. *Nutrition Reviews*, 79(8), 825–846. <https://doi.org/10.1093/nutrit/nuaa143>
- Magogodi, L. C. (2022). 11 Featured Example: Gastrotourism in Botswana, Zambia and Zimbabwe. Sustainable Tourism Dialogues in Africa, 7, 191. [Full text here](#)
- Malterud, K., Siersma, V. D., & Guassora, A. D. (2016). Sample size in qualitative interview studies: guided by information power. *Qualitative Health Research*, 26(13), 1753–1760. <https://doi.org/10.1177/1049732315617444>
- Martin, S. L., Matare, C. R., Kayanda, R. A., Owoputi, I., Kazoba, A., Bezner Kerr, R., Nnally, L., Khan, M., Locklear, K. H., & Dearden, K. A. (2021). Engaging fathers to improve complementary feeding is acceptable and feasible in the Lake Zone, Tanzania. *Maternal & Child Nutrition*, 17, e13144. <https://doi.org/10.1111/mcn.13144>
- Masuke, R., Msuya, S. E., Mahande, J. M., Diarz, E. J., Stray-Pedersen, B., Jahanpour, O., & Mgongo, M. (2021). Effect of inappropriate complementary feeding practices on the nutritional status of

- children aged 6–24 months in urban Moshi, Northern Tanzania: Cohort study. *PLoS One*, 16(5 May), 1–16. <https://doi.org/10.1371/journal.pone.0250562>
- Moramarc, S., Roster Mwaba, I., Chafula Muyaba, L., Palombi, L., & Buonomo, E. (2023). Improvement in dietary diversity and feeding habits of malnourished under-five children attending supplementary feeding programmes: a community-based cross-sectional study in Zambia. *International Journal of Food Sciences and Nutrition*, 74(1), 82–94. <https://doi.org/10.1080/09637486.2022.2144148>
- Moreira, P. R., Silveira, M. B., Neves, R. O., Nunes, L. M., & Bernardi, J. R. (2024). Estimated energy and nutrient intake in complementary feeding methods in Brazilian infants: randomized clinical trial. *Scientific Reports*, 14(1), 13. <https://doi.org/10.1038/s41598-023-50415-7>
- Moreno, J. M., Chapman, A. J., Ebido, C. C., Sougou, N. M., Diallo, A. H., Tening, R. N., Dial, F. B., Massonnié, J., Firoozmand, M., & Niang, C. E. H. A. (2023). Local contextual factors of child stunting found via shared values of stakeholder groups: an exploratory case study in Kaffrine, Senegal. *Public Health Nutrition*, 26(11), 2418–2432. <https://doi.org/10.1017/S1368980023001088>
- Mukanu, M. M. (2022). Development of evidence-based context appropriate public policy reform models that coherently promote healthy food environments and food consumption patterns in Zambia. [Full text here](#)
- Ngoma, H., Finn, A., & Kabisa, M. (2024). Climate shocks, vulnerability, resilience and livelihoods in rural Zambia. *Climate and Development*, 16(6), 490–501. <https://doi.org/10.1080/17565529.2023.2246031>
- Oladiran, D. A., & Emmambux, N. M. (2022). Locally available african complementary foods: nutritional limitations and processing technologies to improve nutritional quality—a review. *Food Reviews International*, 38(5), 1033–1063. <https://doi.org/10.1080/87559129.2020.1>
- Osborne, N., & Grant-Smith, D. (2021). In-depth interviewing. In *Methods in urban analysis* (pp. 105–125). Springer. [https://doi.org/10.1007/978-981-16-1677-8\\_7](https://doi.org/10.1007/978-981-16-1677-8_7)
- Padhani, Z. A., Das, J. K., Siddiqui, F. A., Salam, R. A., Lassi, Z. S., Khan, D. S. A., Abbasi, A. M. A., Keats, E. C., Soofi, S., & Black, R. E. (2023). Optimal timing of introduction of complementary feeding: a systematic review and meta-analysis. *Nutrition Reviews*, 81(12), 1501–1524. <https://doi.org/10.1093/nutrit/nuad019>
- Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N., & Hoagwood, K. (2015). Purposeful sampling for qualitative data collection and analysis in mixed method implementation research. *Administration and Policy in Mental Health and Mental Health Services Research*, 42(5), 533–544. <https://doi.org/doi:10.1007/s10488-013-0528-y>
- Rahayuwati, L., Komariah, M., Sari, C. W. M., Yani, D. I., Hermayanti, Y., Setiawan, A., Hastuti, H., ... Kohar, K. (2023). The influence of mother's employment, family income, and expenditure on stunting among children under five: A cross-sectional study in Indonesia. *Journal of Multidisciplinary Healthcare*, 2271–2278. <https://doi.org/10.2147/JMDH.S417749>
- Rietveld, A., Farnworth, C. R., Shijagurumayum, M., Meentzen, A., Voss, R. C., Morahan, R., & López, D. E. (2023). An evidence synthesis of gender norms in agrifood systems: Pathways towards improved women's economic resilience to climate change. [Full text here](#)
- Sarwar, A., Jadoon, A. K., Chaudhry, M. A., Latif, A., & Javaid, M. F. (2024). How important is parental education for child nutrition: analyzing the relative significance of mothers' and fathers' education. *International Journal of Social Economics*, 51(10), 1209–1225. <https://doi.org/10.1108/IJSE-06-2023-0483>
- Travasso, S. M., Thomas, T., Makkar, S., John, A. T., Webb, P., & Swaminathan, S. (2023). Contextual factors influencing production, distribution, and consumption of nutrient-rich foods in Bihar, India: a qualitative study of constraints and facilitators. *Food and Nutrition Bulletin*, 44(2), 100–115. <https://doi.org/10.1177/03795721231172251>
- Tura, D. C., Belachew, T., Tamiru, D., & Abate, K. H. (2025). Nutritional enrichment of traditional complementary foods using underutilized nutritious plant foods in sub-Saharan Africa: their nutritional potential and health benefits: A scoping review. *Applied Food Research*, 5(1), 100726. <https://doi.org/10.1016/j.afres.2025.100726>
- Urugo, M. M., Tekla, T. A., Lema, T. B., Lusweti, J. N., Djedjibegović, J., Lachat, C., Tesfamariam, K., ... Abdel-Wahhab, M. A. (2024). Dietary aflatoxins exposure, environmental enteropathy, and their relation with childhood stunting. *International Journal of Food Sciences and Nutrition*, 75(3), 241–254. <https://doi.org/10.1080/09637486.2024.231>
- Vyas, S. (2021). A systematic review on nutritional vulnerability and opportunity during the first 1000 days of life for ensuring better human capital. *Indian Journal of Science and Technology*, 14(30), 2511–2516. <https://doi.org/10.17485/IJST/v14i30.1253>
- WHO, & UNICEF. (2021). Indicators for assessing infant and young child feeding practices: definitions and measurement methods. <https://www.who.int/publications/i/item/9789240018389>
- Yakubu, N. (2023). Assessment of the Impact of Caregivers Complementary Feeding Knowledge on Undernutrition among Children 6 to 36 Months in Borno State, Nigeria. *Assessment*, 11(3). <https://doi.org/10.1177/1525822X05282260>
- Zerfu, T., Duncan, A., Baltenweck, I., & McNeill, G. (2025). Low awareness and affordability are major drivers of low consumption of animal-source foods among children in Northern Ethiopia: A mixed-methods study. *Maternal & Child Nutrition*, 21(1), e13720. <https://doi.org/10.1111/mcn.13720>
- ZSA. (2024). Zambia demographic and health survey key indicators report. The DHS Program ICF Rockville, Maryland, USA. [Full text here](#)