Feeding indicators for children 6-23 months lessons from Chinyunyu Community Rufunsa District Lusaka Zambia- A formative study.

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Abstract

Background: The purpose of this study was to generate evidence that will be used to create behavioral change project materials tools and approaches promoting optimum feeding practices for children 6-23 months of age that are culturally appropriate within the local context of Rufunsa district while promoting consumption of nutritious resilient legumes namely; Cow peas and soybean.

Methods: This was a case study which used the grounded theory approach which brought out individual and social processes related to feeding of children aged 6-23 months. There was a mixed purposive sampling of 53 participants; which included 24 women of reproductive age with one or more living children under-two years of age who have lived in the community for one year and have a living mother-in-law within the same community. Others were three husbands as well as seven mother-in-laws of some of the women. In addition community and religious leaders as well as a volunteer working in the health sector participated. Data was collected using Photo-voice Focus Group Discussions and In-depth Interviews. It was then transcribed verbatim and organized into codes using NVIVO software (QSR10, Melbourne Australia) analyzed thematically.

Results: Children aged 6-23 months are not fed according WHO recommendations in Chinyunyu. This may apply to the whole Rufunsa district. Minimum Dietary diversity emerges as an indicator of choice for a project following this study. This approach will also incorporate nutritious and resilient food legumes in promoting dietary diversity in the District

Conclusion: In order to improve on the feeding practices in the district dietary diversity will be promoted in the project following this study while treating other indicators as covariates.

Keywords: Feeding indicators Children 6 to 23 months Complementary feeding.

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Introduction

Most children aged 6-23 months are not fed according to global recommendations [1]. This may be explaining why global malnutrition levels are still high with approximately 45% of deaths among children under five linked to under nutrition. These deaths often occur in low- and middle-income countries where childhood obesity levels are rising at the same time [2]. In Sub-Saharan Africa children are highly affected by stunting with an average prevalence of 41% [3]. In Zambia average stunting levels are at 35% [4]. This is an improvement from 40% previously and a contribution towards the 2030 Agenda for Sustainable Development which is focused on ending all forms of malnutrition by 2030 [5,6]. The levels are however still higher than the WHO threshold of less than 20% [7]. Stunting is significantly higher in children above one year in boys in low birth weight in shorter inter-pregnancy interval in mothers with lower education and in poor and food insecure households [3].

The best-targeted age for addressing malnutrition is the first 1000 days of life as this window period is ideal for intervention implementation and tracking for the improvement of child growth and development [8]. WHO recommends timely introduction of complementary foods at six months of age sufficient meal frequency and portion sizes, diversity of diet appropriate food texture, safe food preparation, storage, as well as hygiene behaviors and responsiveness to feeding cues [9]. Complementary foods are other foods given to children aged six to 23 months in addition to breast milk [10]. To assess the feeding practices for children 6-23 months old WHO and UNICEF came up with 10 indicators (Table 1)

There are various rates for feeding indicators across the globe. These have been discussion in the sections that follow. Associated factors are also diverse as shown under each section. Table two summaries these factors using the food systems approach [11].

Introduction of Solid Semi-Solid or Soft Foods (ISSF) to children aged 6-8 months

Introduction of Solid, Semi-Solid or Soft Foods (ISSF) to children aged 6-8 months is at 50% in Indonesia 54.7% in Jordan and higher in the developed world being at 78.6% among Dutch Infants [12-14]. Factors include maternal age, child birth weight, maternal education, occupation and breastfeeding presence or duration. Others are type of delivery, parental conviction, attending antennal visits, child history of illness and father's occupation [13-15]

Minimum dietary diversity

The proportion of children aged 6-23 months that are fed according to the Minimum Dietary Diversity (MDD) criteria is low with the lowest reported in India (19.4%) followed by Ethiopia (44.6%), Nepal (46.5%) and Indonesia (50%). Lower maternal education and occupation, mother's knowledge of dietary diversity, father's education status and employment as well as poorer quintile age of the child and antenatal visits are the associated factors. Others are mother's education, age of a child as well as birth order of index child. In addition; living in urban area, having a home garden and media exposure are other factors [12,16-19].

Minimum Meal Frequency (MMF)

Separate studies in India reported a range of 41.9% to 94.4% of the children aged 6-23 months who met the Minimum Meal Frequency (MMF) while a 63.80% pooled prevalence was reported in a meta-analysis in Ethiopia [17,20,21]. Lower maternal age and occupation media exposure age of the child as well as antenatal visits are associated factors. Family income adolescent mothers as well as number of sons in the family who are more than two are other factors [22]. Furthermore age of the child, birth order of index child together with mother's involvement in decision making have been reported. Lastly

Table 1. *Feeding Indicators for children aged six to 23 months.*

Indicator name	Definition
Introduction of solid, semi-solid or soft foods	Infants 6–8 months of age who consumed solid, semi-solid and soft foods during the previous day
Minimum dietary diversity	Children 6–23 months of age who received foods from ≥ 5 out of 8 food groups during the previous day; 1. Breast milk; 2. Grains, roots, tubers and plantains; 3. Pulses nuts and seeds; 4. Dairy products; 5. Flesh foods 6. Eggs; 7. Vitamin-A rich fruits and vegetables; and 8. Other fruits and vegetables.
Minimum meal frequency	Breastfed children 6–23 months of age who received solid, semi-solid and soft foods the minimum number of times or more during the previous day
	Non-breastfed children 6–23 months of age who received solid, semi-solid and soft foods or milk feeds the minimum number of times or more during the previous day
Minimum milk feeding frequency for non-breastfed children	Non-breastfed children 6–23 months of age who consumed at least two milk feeds during the previous day
Minimum acceptable diet	Breastfed children 6–23 months of age who had at least the minimum dietary diversity and the minimum meal frequency during the previous day
	Non-breastfed children 6–23 months of age who received at least two milk feedings and had at least the minimum dietary diversity not including milk feeds and the minimum meal frequency during the previous day
Egg and/or flesh food consumption	Children 6–23 months of age who consumed egg and/or flesh food during the previous day
Sweet beverage consumption	Children 6–23 months of age who consumed a sweet beverage during the previous day
Unhealthy food consumption	Children 6–23 months of age who consumed selected sentinel unhealthy foods during the previous day
Zero vegetable or fruit consumption	Children 6–23 months of age who did not consume any vegetables or fruits during the previous day
Bottle feeding	Children 0–23 months of age who were fed from a bottle with a nipple during the previous day

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many interacting factors such as Food group diversification in farm-systems and overall social behavior and support as well as women's empowerment, reducing women's workload and multi-sectoral interventions have equally been documented [23,24].

Minimum Acceptable Diet (MAD)

Minimum Acceptable Diet (MAD) an indicator which combines MDD and MMF is very low. Up to 8.4% children aged 6-23 months in India and 35.1% in China were fed according the MAD criteria [25,26]. Associated factors here include; age of child, diarrhea at two weeks, mothers who listen to the radio, maternal education, maternal occupation, antenatal visits, father's education status and employment [25-27].

Consumption of eggs and or flesh foods

Consumption of eggs and or flesh foods reports from China alone vary from 21.9% to 75.3% [21,26]. Lack of nutrition knowledge, high cost of animal source foods, poor linkages between health and agricultural sectors as well as mothers' work load to head livestock, social norms and beliefs and house hold income are some of the associated factors. Others factors include; availability of nutrition experts, cooking demonstrations, in kind credit programs, livestock ownership together with government led stunting reduction programme and seasonality [19,28-30].

Zero vegetable unhealthy foods and sweet beverage consumption

Reports from one study in India showed that up to 33.8% of children aged 6-23 months received no vegetable or fruit, 85.8% consumed ultra-processed foods high in trans-fats, sugar and salt and 4.8% consumed sweet beverage the previous day [21].

Consumption of empty calories (25%) reported elsewhere is of concern. There is also limited availability of diverse foods throughout the year inadequate caregiver knowledge and cultural food preferences and taboos [31].

There is limited evidence on the approach to take for intervention programme on feeding of children aged 6-23 months in Rufunsa District. The purpose of this study therefore was to generate evidence that will be used to create behavioral change project materials tools and approaches promoting optimum feeding practices for children 6-23 months of age that are culturally appropriate within the local context of Rufunsa district while promoting consumption of nutritious resilient food legumes namely; Cow peas and soybean (Table 2).

Material and Methods

Research setting and population

The research was conducted in Chinyunyu community in Rufunsa district Lusaka Province [32-34]. Rufunsa district used to be part of Chongwe District. It was declared a district by late President Michael Sata in 2012 (Figure 1). The district is estimated to have a population of about 45,000 people [33]. The indigenous people are the remnants of the Soli people with the main economic stay being subsistence farming [35]. Chinyunyu is just 50 kilometers away from the metropolitan capital city of Zambia Lusaka. It also has one of the water attractions known as Chinyunyu hot spring off the Great East Road [36].

Research design

In this research an inductive approach known as grounded theory was employed to investigate the individual and social processes related to feeding of children aged six to 23 months in Chinyunyu community. Grounded theory involves construction of theory through data analysis to feed into upcoming research agenda [37].

Sampling process

A mixed purposeful sampling of 53 participants was employed. This sampling technique was flexible met multiple interests and allowed for triangulation [38]. The sample was broken down into 24 women of reproductive age who have one or more living children under the age of two years who participated in the Photo-voice/Focus Group Discussions (FGDs). These women had also lived in the community for at least one year. In addition they had a living mother-in-law in the community. Others included three husbands seven mother-in-laws of some of these same women who participated in Separate FGDs. Four other participants were community religious leaders as well as a community health volunteer who participated in In-depth Interviews in order to understand opportunities barriers and constraints of mainstreaming gender in their work.

Data collection methods

A preliminary investigation (pilot study) was carried out in Chinyunyu. One session each of the Photo-voice FGD and In-depth interview were conducted. The findings were used to develop interview guides. Semi-structured interview guides

Table 2. *Summary of factors influencing feeding indicators for children 6 to 23 months.*

Major factor	Sub-factors
Individual	Age of mother and child, type of delivery, attending antennal visits, place of delivery, parental conviction, media exposure, order of index child, illness of child, birthweight, breastfeeding presence and duration
Socioeconomic	Government led stunting program, Linkages between agriculture and health, livestock ownership, Number of sons in family, parental educational level, parental occupation, wealth quintile, family income, living in urban areas, social behavior, social norms and beliefs, high cost of animal source foods, in kind credit programs, gendered intra house food distribution disparities, women involvement in decision making, women empowerment, women's work load
Enabling environment	Food production: Having a home garden, food group diversity in farm systems
	Food processing, preservation and utilization: Availability of nutrition experts, cooking demonstrations, nutrition knowledge, postharvest management to mitigate seasonality
General Environment	Climate change affecting water availability for gardening and livestock

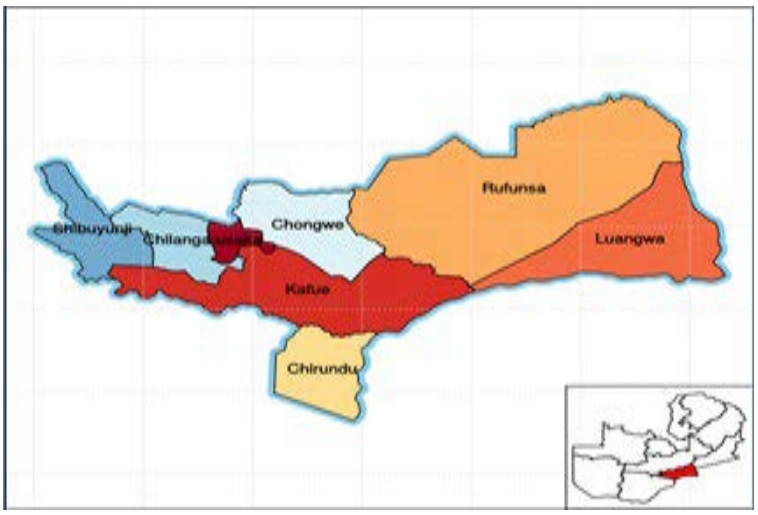

Figure 1*. Lusaka province of Zambia showing Rufunsa district.*

which allowed flexibility within the discussion were used in the main study. The semi-structured interview guides also allowed for additional questions on the emerging themes to be incorporated using continuous validation process [39]. The methods are discussed below.

Photo-voice

This was employed to provide a means for involving people in both sharing and defining issues, problems and concerns. It is a means to which participants can reflect both individually and together on their own concerns made visible in photographs and given voice through discussions and accounts [40]. Participants were asked to identify a concern or interest of the community. They were then asked to take photographs that depicted their community's concern or interest. The participants were told that they would need to meet separately to discuss their photographs and share their meanings. The participants exhibited their photographs on the floor. The facilitators ensured that some narratives had been included with the photographs. The initial meeting was held to familiarize the group with the underlying issues about the use of cameras power and ethics; potential risks to participants and how to minimize these risks; and the practice of giving photographs back to community members to express appreciation and respect. Shared discussion questions included; 1) what is an acceptable way to approach someone to take his or her picture? 2) Should someone take pictures of other people without their knowledge? 3) To whom might you wish to give photographs and what might be the implications? 4) When would you not want to have your picture taken? [41].

Participants were assisted to brainstorm about what themes they could focus on to enhance feeding of children aged 6-23 months in the community and then come to a consensus about which theme they would envision for each roll of film. Facilitators minimized technical advice during the initial workshops to avoid inhibiting people's creativity. Participants were advised to turn in their film to a facilitator for developing after capturing. They were also advised to gather back again to discuss their photographs four days after. During the meeting to discuss photographs there was a selection of photographs, contextualizing or storytelling and codifying issues, themes or theories occurring during group discussion. Firstly each participant was asked to select and talk about one or two photographs they felt were most significant or that they liked best. Secondly participants framed stories about and took a critical stance on their photographs in terms of questions spelling the acronym Showed. What do you see here? What is really happening here? How does this relate to our lives? Why does this situation, concern or strength exist?; What can we do about it? Participants codified the issues themes or stories that arose from their photographs. They particularly focused on issues, because photo-voice is well suited to action oriented analysis that creates practical guidelines. Discussions of photographs were digitally recorded transcribed verbatim and later translated (Table 3).

Focus group discussion'

Focus Group Discussions (FGDs) reveal collectively shaped social processes [42]. An FGD question guide was used to collect data. The discussions were digitally recorded transcribed verbatim and translated. Each FGD was conducted by four facilitators. Two facilitators led the discussion and ensured that all the topics were covered in the interview guide. Another facilitator was taking notes while the fourth facilitator assisted with recording digitally. Each FGD lasted for an average of an hour. The most conducive place at the time was used to ensure participants' confidentiality. An enclosure without a door was used at Chinyunyu health facility for husbands and mothers' FGDs. This was an isolated enclosure. On the other hand an isolated open area under a tree but near a community hall was used for mother in-laws. The level of participation was handled by constantly reminding the participants that the information they would be providing is of utmost importance to the nation. Education to the participants where there was ignorance was ensured.

In-depth interviews

In-depth interviews are a useful qualitative data collection technique that can be used for a variety of purposes including needs assessment, program refinement, issue identification and strategic planning. In-depth interviews are most appropriate

Table 3. *Socio-Demographic Characteristics n (%).*

	Husbands	Mothers	M-in laws	Key informants	Infants & Young Children	Total
N (%)	3(5.66)	24(45.28)	7(13.21)	4(7.55)	15(28.30)	53(100)
Age						
0 to 6	0(0.00)	0(0.00)	0(0.00)	0(0.00)	5(33.33)	5(9.62)
7 to 11	0(0.00)	0(0.00)	0(0.00)	0(0.00)	4(26.70)	4(7.69)
12 to 23	0(0.00)	0(0.00)	0(0.00)	0(0.00)	6(40.00)	6(11.60)
15 to 20	0(0.00)	5(20.80)	0(0.00)	1(25.00)	0(0.00)	6(11.60)
21 to25	1(33.30)	11(45.80)	0(0.00)	0(0.00)	0(0.00)	12(23.10)
26 to 30	1(33.30)	5(20.80)	0(0.00)	0(0.00)	0(0.00)	6(11.60)
31 to 35	0(0.00)	1(4.17)	0(0.00)	0(0.00)	0(0.00)	1(1.90)
36 to 40	0(0.00)	1(4.17)	0(0.00)	1(25.00)	0(0.00)	2(3.80)
41 to 45	0(0.00)	1(4.17)	0(0.00)	1(25.00)	0(0.00)	2(3.80)
46 to 50	1(33.30)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	1(1.90)
51 to 55	0(0.00)	0(0.00)	1(14.30)	0(0.00)	0(0.00)	1(1.90)
56 to 60	0(0.00)	0(0.00)	4(57.14)	1(25.00)	0(0.00)	5(9.60)
60 plus	0(0.00)	0(0.00)	2(28.60)	0(0.00)	0(0.00)	2(3.80)
Gender						
Males	3(100.00)	0(0.00)	0(0.00)	3(75.00)	13(86.70)	19(36.50)
Females	0(0.00)	24(100.00)	7(100.00)	1(25.00)	2(13.30)	34(65.40)
Employment						
Businessman	2(66.70)	2(8.33)	1(14.30)	2(50.00)	0(0.00)	7(13.50)
Farmer	1(33.30)	15(62.50)	6(85.70)	1(25.00)	0(0.00)	23(44.20)
Clergy	0(0.00)	0(0.00)	0(0.00)	1(25.00)	0(0.00)	1(1.90)
Project coordinator	0(0.00)	0(0.00)	0(0.00)	1(25.00)	0(0.00)	1(1.90)
Piece work	0(0.00)	6(25.00)	0(0.00)	0(0.00)	0(0.00)	6(11.60)
Schooling	0(0.00)	1(4.17)	0(0.00)	0(0.00)	0(0.00)	1(1.90)
Income						
less than 1000	0(0.00)	21(87.50)	6(85.70)	0(0.00)	0(0.00)	27(51.90)
1000 to 2000	1(33.30)	3(12.50)	0(0.00)	1(25.00)	0(0.00)	5(9.60)
More than 4000	2(66.70)	0(0.00)	0(0.00)	3(75.00)	0(0.00)	5(9.60)
Educational level						
Never went to school	0(0.00)	1(4.17)	0(0.00)	0(0.00)	0(0.00)	1(1.90)
Primary	1(33.30)	8(33.30)	4(57.14)	2(50.00)	0(0.00)	15(28.80)
Secondary	2(66.70)	15(62.50)	3(42.90)	2(50.00)	0(0.00)	22(42.30)
Tribe						
Bemba	1(33.30)	1(4.17)	0(0.00)	2(50.00)	0(0.00)	4(7.70)
Ndebele	1(33.30)	1(4.17)	0(0.00)	0(0.00)	0(0.00)	2(3.80)
Nsenga	1(33.30)	5(20.80)	0(0.00)	0(0.00)	0(0.00)	6(11.50)
Chewa	0(0.00)	3(12.50)	1(14.30)	1(25.00)	0(0.00)	5(9.60)
Lamba	0(0.00)	0(0.00)	0(0.00)	1(25.00)	0(0.00)	1(1.90)
Chikunda	0(0.00)	0(0.00)	1(14.30)	0(0.00)	0(0.00)	1(1.90)
Soli	0(0.00)	6(25.00)	1(14.30)	0(0.00)	0(0.00)	7(13.50)
Tonga	0(0.00)	2(8.33)	4(57.14)	0(0.00)	0(0.00)	6(11.50)
Lozi	0(0.00)	2(8.33)	0(0.00)	0(0.00)	0(0.00)	2(3.80)
Mambwe	0(0.00)	1(4.17)	0(0.00)	0(0.00)	0(0.00)	1(1.90)
Ngoni	0(0.00)	2(8.33)	0(0.00)	0(0.00)	0(0.00)	2(3.80)
Zezulu	0(0.00)	1(4.17)	0(0.00)	0(0.00)	0(0.00)	1(1.90)

for situations in which you want to ask open-ended questions that elicit depth of information from relatively few people. They are a tool for collecting rich information that can inform program development and evaluation [43]. An In-depth interview guide with open ended non-leading questions was used to bring out personal experience while in infant and young child feeding building rapport with the interviewees. Interviewees had explicit right to withdraw at any time with no further consequences for them. Interviewers tried to minimize any power imbalance between the parties by reducing on physical barriers. High level of confidentiality and anonymity was ensured [44]. Each interview was recorded digitally transcribed verbatim and later translated.

Data Processing and analysis: All Photo voice/FGDs FGD data and data for interviews were recorded digitally transcribed verbatim and later translated. Gaining an overview of collected data was done in order to familiarize with the data. This was done by reading and re-reading transcripts thereby ensuring deeper insight of the data the data was then coded. Coding was carried out using NVIVO software (QSR10, Melbourne Australia). A code is a word or sentence or phrase that represents aspects of a data or captures the

essence or features of a data [45]. During coding codes were matched with segments of text/informant statements selected as representative of the code [46]. The original meaning of what was communicated by participants was maintained.

Searching for themes among codes was the next level. Firstly categorization was done. This involved grouping the Code segments into subthemes based on similarity of content. This was done in order to reduce the number of different pieces of data in the analysis. Therefore similar codes were grouped together to form categories. Major themes were developed by interpreting the categories for their underlying meaning. Themes were the higher level of categorization that were used to identify a major element of the entire analysis of the data. A theme therefore is an outcome of the coding categorization and analytic reflection [46].

This was done in preparation for organization (coding).

Findings and discussion

Characteristics of participants: Up to 53 participants were enrolled in this study. There were Mothers (24) Husbands of some of the mothers (3) mother in-laws of some of the mothers (7) as well as children of some of the others below the age of 2 years (15) and key informants (4). The biggest group of participants were mothers. These mothers were mostly aged between 21 to 25 years. This study has shown that Chinyunyu community is composed of a number of ethnic groups. Participants were however mainly from the indigenous tribe (Soli) as well as Nsengas and Chewas originating from the Eastern Province and Tongas from Southern Province of Zambia. Others found in substantial numbers were Bembas. Most of the participants had secondary school education. Their economic mainstay was small scale farming with annual income less than K1000 (Table 1).

Introduction of solid, semi-solid or soft foods at 6 months: Infants 6-8 months of age should receive solid, semi-solid or soft foods daily [47]. In chinyunyu despite having an idea about the right age for introduction of complementary foods, mothers were reported to start giving other foods as early as three or four months. Unmarried girls were reported to be some of the mothers that introduced children to complementary foods early.

"Some women like leaving the children as they go moving up and down. They don't have time for their children. It happened where we live within two weeks after delivery a young girl used to pass through our place with the child at the back returning home late. Within three weeks she started leaving the baby with the mother. The unmarried girls are the ones moving up and down and they are the ones that are producing many children".

(FGD 001 56 years old mother in-law).

Likewise elsewhere complementary feeding is generally commenced before six months [15,48-50]. In Australia for instance the median age of introduction of solid foods was 17.6 weeks which is about four months four weeks [51]. When solid, semi-solid or soft foods are introduced below six months they replace breast milk in part or in whole. In such a case they are known as breast milk substitutes (BMS) [52]. Use of BMS may also be influenced by promotion and marketing strategies commonly spreading through culturally designated advisors [53-56]. The strongest independent predictors of the early introduction of solids were young maternal age, mother smoking prior to pregnancy and not fully breastfeeding at 4 weeks postpartum. Other significant factors include infants who: were born in second to fourth position whose mothers did not attend any antenatal clinics were male lived in an urban areas or were delivered by traditional birth attendants [57]. In addition mothers introduced solids earlier than recommended because they perceived their baby to either need them or be ready for them [51]. Infants who suffered illnesses such as diarrhea and acute respiratory infection were significantly more likely to be introduced to solid semi-solid or soft foods between the age of three and five months [57]. Complementary foods offered too early in child's life substitute breastmilk and may be not as nutritious as breast milk [15,53]. WHO recommends introduction of complementary foods at six completed months of life with continuation of breastfeeding up to two year or longer as mutually desired by mother and infant [58,59]. On the contrary however introduction of complementary food in the diet of healthy term infants in the EU between the ages of four and six months is deemed to be safe and does not pose a risk for adverse health effects [60]. In this study it was also noted that some children in Chinyunyu were reported to refuse to eat other foods beyond six months of age when breast milk alone is no longer adequate. One mother narrated; "…My baby is seven months old and he refuses to eat he just wants to breastfeed". Too late introduction of complementary foods deprive the infant of iron rich food sources a situation which might increase anemia risk and adversely affect child development [61].

Dietary diversity 6-23 months

Children 6-23 months of age should receive foods from five or more food groups. Food groups recommended include; 1. Breast milk; 2. Grains roots tubers and plantains; 3. Pulses nuts and seeds; 4. Dairy products; 5. Flesh foods 6. Eggs; 7. Vitamin-A rich fruits and vegetables; and 8. other fruits and vegetables [47]. Children in Chinyunyu were not fed according to the minimum dietary diversity criteria. Porridge was observed to be frequently offered to children. The porridge mostly contained groundnuts, sugar and salt. On other occasions porridge contained groundnuts, sugar salt and cooking oil or simply salt and water. Feeding vegetable soup and meat soup with nshima as well as pumpkins were also reported. Nshima is a thick porridge made out of staple cereals and cassava in Zambia. In addition a number of artificial commercial foods were reported to be offered to children. These are discussed later. While ensuring dietary diversity the food should be of a thick consistency to make sure that it is energy dense. Expressing ignorance a respondent said

"…When you start giving others foods at six completed months…you prepare light porridge... You need to give light porridge". "So what I have seen with my wives is that they sieve the porridge for the child starting to eat to make it very light porridge. As the child grows it becomes thicker."

In agreement with our study optimal complementary feeding elsewhere is lower than expected [50,62-65]. It is low in energy and protein dense foods as well as low in dietary diversity [48,49,66]. Reports from North Africa, West Africa and Asia particularly show that dietary diversity is lower than expected [63,64,66-68]. For example in Benini the proportion of children who met minimum dietary diversity was 12.6% [16]. Cereals roots and tubers are the most widespread food groups used to feed children. Specific foods such as potatoes vegetables tea fruits porridge soups and other home-made foods are offered to children [58,69]. Juice and water are equally offered [70]. Except for eggs and dairy products highest consumption rates for all food groups have been observed among children aged between 18 and 23 months [16] (Figure 2 & Figure 3).

Meal frequency 6-23 months

Children 6-23 months of age should receive solid, semi-solid and soft foods the minimum number of times or more daily. The minimum number of times is defined as: two feedings of solid, semi-solid or soft foods for breastfed infants aged 6-8 months; three feedings of solid, semi-solid or soft foods for breastfed children aged 9-23 months; and four feedings of solid, semi-solid or soft foods or milk feeds for non-breastfed children aged 6-23 months whereby at least one of the four feeds must be a solid, semi-solid or soft feed. "Feedings" include both meals and snacks other than trivial amounts [47]. Mothers in Chinyunyu reported offering the first meal of the day as late as 12 hours. Similarly in an Ethiopian study the proportion of children who met the minimum meal frequency was 50.4 % [16]. This may be explaining why there are still a lot of undernutrition cases in the world.

Egg and/or flesh food consumption 6-23 months

Children 6-23 months of age should consume egg and/or flesh food daily. These are also known as Animal Source Foods (ASF). ASF are the best source of high-quality nutrient-rich food for children aged 6-23 months. ASF are necessary and missing in the diets of nearly 800 million individuals [71]. In Chinyunyu only meat soup or meat liver were reported to be offered to children. There were also reports of reserving the ASF for the man of the house in some ethnic groups thereby depriving the rest of the family members of the ASF. One mother simply stated "Meat or fish are reserved for baba mukulu". This means that meat or fish are reserved for the husband. Elsewhere ASF among 6-23 months old children is very low with misperceptions about the benefits of animal-based protein leading to the delay in their introduction to children [72,73]. In Ethiopia for instance only 2% of the children were reported to consume eggs [74]. In addition home-reared livestock and their products are mainly used for market purposes [19]. Animal products are also consumed during special societal occasions since they are considered as luxury food rather than an essential part of daily children's diet [19].

Sweet beverage and unhealthy food consumption 6-23 months

Caregivers of children 6-23 months of age should avoid giving them sweet beverages. In Chinyunyu caregivers were reported to give commercial milk beverages. Artificial foods were also reported to be offered to children. These included artificial sweetener locally known as sweeted which is added

Figure 2. *Types of foods commonly given to children in Chinyunyu.*

Figure 3. *Light porridge.*

to porridge. Puffed corn brand known as jiggis and sweets branded as lolly pop are equally offered. Mothers were also reported to offer a commercial corn based and milk beverages as well as commercial cereal porridges. Elsewhere almost half (46%) of 7-8 month-olds consumed some type of dessert, sweet or sweetened beverage and this percentage increased as age increased. By 19 to 24 months 62% of toddlers consumed a baked dessert, 20% consumed candy and 44% consumed a sweetened beverage [75]. Parents should offer desserts, sweets sweetened beverages and salty snacks only occasionally while offering nutrient-dense age-appropriate foods as alternatives (eg fruit cheese yogurt and cereals). Water milk and 100% fruit juices should be offered as alternative beverages. Family food choices influence what foods are offered to children therefore family-based approaches to developing healthy eating habits may be helpful [75].

Zero vegetable or fruit consumption 6-23 months

Children 6-23 months of age should consume vegetables or fruits daily. There were no reports of vegetable offered to Infants and Young Children. The closest form they were offered to eat was vegetable soup with nshima. Elsewhere from 18% to 33% of infants and toddlers between ages 7-24 months consumed no discrete servings of vegetables and 23% to 33% consumed no fruits. French fries were one of the three most common vegetables consumed by infants 9-11 months of age. By 15 to 18 months French fries were the most common vegetable. Parents and caregivers should be encouraged to offer a wide variety of vegetables and fruits daily with emphasis on dark green leafy and deep yellow vegetables and colorful fruits [75]

What this study adds: This study has looked at feeding children 6-23 months holistically in order to arrive at a high impact approach in improving the nutrition status of this age group. With the factors in table two commonly distributed among all feeding indicators MDD emerges as an indicator of focus for the project following this study. MDD also include 5 other indicators namely; Minimum acceptable diet, Egg and/or flesh food consumption, Sweet beverage consumption, Unhealthy food consumption and Zero vegetable or fruit consumption. The remaining indicators can be treated as covariates.

Limitations

The findings of this study provide insights into the prevailing situation with regard to feeding of children aged 6-23 months. The findings will be used to develop an intervention programme in Rufunsa district. Generalizability of the results to chninyunyu community or Rufunsa district however is not applicable in this case as this was a qualitative inquiry.

Conclusion

Children aged 6-23 months are not fed according WHO recommendations in Chinyunyu. Emerging themes suggest that mothers especially young unmarried girls introduce semi solid foods as early as three to four months; the food is not frequently offered to children lack diversity mainly starchy and sugary foods but devoid of animal protein vegetables and fruits. The carbohydrate reliant diet may lead to protein and vitamin deficiencies among children aged 6-23 months old in such rural poor communities such as Chinyunyu in Rufunsa district. In addition there are intra-house gendered disparities in distribution of animal source foods in some ethnic groups.

Recommendations

Poor feeding practices seen in Chinyunyu may prevail in Rufunsa District. In order to improve on the feeding practices in the whole district the following recommendations are outlined.

A holistic approach based on the Socioecological model as a theory of change should be applied in the intervention following this study to take care of individual socioeconomic enabling environment and general environmental factors influencing feeding indicators for children aged 6-23 months.

At individual level young mothers and infants aged 6-11 months and poor wealth quintiles will be targeted. The messages will include; feeding of children aged 6-23 months irrespective of mode of delivery, importance of antenatal visits, age appropriate feeding during illness and continued breastfeeding feeding during pregnancy and feeding of children of any birth order. The programme should aim at changing the feeding behavior of mothers while utilizing the social media platforms that are accessible to mothers.

In the enabling environment home gardens as well as farm food group diversity should be encouraged. This includes ownership of livestock. In addition food processing, preservation and utilization should be encouraged through cooking demonstrations, nutrition education and postharvest management and mitigation of seasonality to improve dietary diversity. In addition savings groups providing locally accessible finances to stimulate agricultural diversity and provide disposable income for a diverse diet should be encouraged. The project should have a socio behavior change approach.

Socioeconomic factors should be influenced by the project activities through the district and ward multi-sectoral committees. During such committees the project should ensure strengthened linkages between agriculture and health. The intervention should be gender sensitive encouraging women participation but also friendly to men.

In the general environment the project should be climate smart by trying and ultimately promoting nutritious food legumes that are resilient to climate shocks.

Conflict of Interest

All authors do not have any possible conflicts of interest.

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