



Evaluation of food-based recommendations to improve diet
quality for children 12-23 months of age in Kathmandu Valley,
Nepal

Final Report

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EXECUTIVE SUMMARY

Introduction: There has been significant improvement in the nutritional status of Nepali children in recent years, however high rates of stunting, anemia, and undernutrition still exist. Poor dietary practices are a major contributing factor for undernutrition among Nepalese children. A study by Helen Keller International's Assessment and Research in Child Feeding (ARCH) project conducted in 2017 in Kathmandu Valley revealed an association between high consumption of unhealthy snack foods and beverages and stunted growth, as well as risk of dietary inadequacy among children aged 12-23 months. As the first two years of life are crucial for a child's growth and development, it is important to identify strategies to improve children's diets with locally available foods which are also sources of multiple micronutrients.

Objective: This study aimed to evaluate food-based recommendations (FBR) to improve the diets of 12-23-month-old children in Kathmandu Valley, Nepal.

Methods and analysis: An observational study using a mixed methods approach was conducted in Kathmandu Valley, Nepal. Study tools were adapted from ProPAN guidelines and modified to the Nepalese context. The study included four steps: Step 1 (Food Attribute Exercise), Step 2 (Recipe Creation Exercise), Step 3 (Household Trial), and Step 4 (Focus Group Discussion). A total of 36 caregivers of at least one child 12-23 months of age were recruited for the Food Attribute Exercise (FAE); the same participants were included in the Recipe Creation Exercise. For Household (HH) Trials, 75 caregivers of at least one child 12-23 months of age participated. Those who participated in the final visit of the HH trial were included in Focus Group Discussions (FGD). A thematic analysis approach was used to conduct data analysis of the FAE, HH trial, and FGD. A recipe tool was prepared from FAE data analysis which was used in the Recipe Creation Exercise. In the Recipe Creation Exercise, an analysis of two prepared dishes was conducted. Minimum Dietary Diversity from the HH trial was calculated and feeding practices of children 12-23 months of age before and after the HH trial of the recommendation was assessed using Microsoft Excel.

Findings: The findings from the study are presented around the four exercises conducted consecutively.

1. Food attribute exercise

The first exercise was focused on food perceptions, current feeding practices, and availability of the food recommendations: milk, egg, lentils, vegetables. All the foods were considered nutritious and perceived as providing nutrition to children by most participants.

2. Recipe creation exercise

Based on the findings and discussion with participants, the new recommended jaulo and pancake recipes were selected. The new recommended jaulo recipe would be used to fulfil the lentils and vegetables recommendation; and pancake recipe would be used to fulfil the lentils and egg recommendation.

3. Household trial

The household trial assessed the compliance, acceptability, and feasibility of the four food-based recommendations. A recipe calendar used for introducing FBR in the initial household visit was found to be useful for participants to help them remember recommended foods and recipes. Compliance, acceptability, and feasibility of FBR were assessed from the second and third visit of HH trial. This trial found the percent of children achieving minimum dietary diversity (MDD) during initial and final household trials was 73.0% and 92.0% respectively and the increase in the proportion achieving MDD was found to be statistically significant. Statistically significant increase in the consumption of vitamin-A rich fruits and vegetables was also found.

a. Compliance

Most of the children were found to be consuming breastmilk, and among the non-breast-fed children, most were consuming milk. The majority of caregivers were feeding at least four eggs in a week. The consumption of lentils daily as recommended was also high, whereas cabbage, carrot and tomato were found to be fed in low amounts to young children. However, consumption of any vegetables daily in recommended amount was high. The new recommended jaulo recipe was used by most of the participants but full compliance was not achieved. Nearly half of participants did not feed pancake to their children.

b. Acceptability

Most participants reported their children liked to drink milk and eat eggs. The reason reported for the few children not consuming milk and egg was because they did not like them. Lentils were liked by the children either with new recommended jaulo or with rice. Adding vegetables enhanced the taste of new recommended jaulo, hence children liked it. Compared to carrot and tomato, children did not eat cabbage because it is not as soft as other vegetables, and green leafy vegetables were used instead. The acceptability of jaulo was good among participants and it was

found that cooking practices changed after the cooking demonstration. However, the pancake recipe was not liked by most of the children and they preferred eating lito or eggs.

c. Feasibility

Lentils were reported as a feasible recommendation in terms of cost. Most of the participants also reported milk and eggs were not costly. Vegetables were also not found to be costly by the participants in general. However, some participants perceived it as causing additional expense; buying different vegetables causes a slight increase in expenses. Time and effort was not reported to be a problem to prepare the new recommended jaulo and pancake for most of the participants.

4. Focus group discussion

Participants perceived the recommended foods and recipes to be healthy and nutritious for their children. They were happy to learn new information for feeding young children. They further learnt proportions and frequency of recommended foods and recipes to be fed to their children.

Conclusion: Findings from the study can be used to promote FBR at a larger scale and inform behavior change communication strategies for promotion of FBR in the future.

INTRODUCTION

Globally, 149 million children are stunted and 49.5 million are wasted (Development Initiatives, 2020), posing a significant threat to child health and survival (WHO, 2018). It is estimated that undernutrition contributes to almost half of global child deaths and can carry a lifelong impact, resulting in increased risk of infectious diseases in childhood and non-communicable diseases in adulthood (Black et al., 2013). Micronutrient deficiencies, a result of dietary inadequacy, have health consequences that are either direct, for example iron deficiency anemia and iodine deficiency disorder, or indirect, with such deficiencies increasing the risk of infectious diseases (Black et al., 2013). Even a minimal deficiency can lead to deficiency-related disorders and physical impairment (Nair, Augustine, & Konapur, 2015).

The foods consumed by older infants and young children are of paramount importance, as the first two years of life are a critical period of growth and development (Cusick & Georgieff, 2016). The relationship between optimal complementary feeding practices and nutritional status is well established, and achieving minimum dietary diversity has been positively associated with growth among young children (Bhutta et al., 2013; Arimond & Ruel, 2004; Khamis, Mwanri, Ntwenya, & Kreppel, 2019; Darapheak, Takano, Kizuki, Nakamura, & Seino, 2013). To meet the heightened nutrient requirements during the complementary feeding period, diets of older infants and young children should include diverse, nutrient-dense foods from sources such as fruits and vegetables, legumes, dairy products, meat, fish and eggs.

Though child nutritional status has dramatically improved in Nepal (Headey & Hoddinott, 2015; Cunningham, Headey, Singh, Karmacharya, & Rana, 2017), still more than one-third of children under-five are stunted, and more than half are anemic (Ministry of Health and Population (MOHP), New Era, & ICF International Inc., 2016). Poor dietary practices are a major contributing factor for undernutrition among Nepalese children (Bhandari & Banjara, 2015). While diets generally meet the recommended minimum meal frequency, they often fail to meet the recommendation for minimum dietary diversity (Ministry of Health and Population (MOHP), New Era, & ICF International Inc., 2016). A longitudinal study among young children in Bhaktapur found inadequate intakes for 8 of the 10 nutrients assessed, indicating poor nutrient-density of complementary foods (Morseth et al., 2018). Similar results were found by Pries et al. (2019) in their study of 12–23-month-old children living in Kathmandu Valley; half of children

were at risk of inadequate thiamin, niacin, and vitamin B-6 intakes, two-thirds were at risk of inadequate calcium intakes, and nearly all children were at risk of inadequate iron and folate intakes. Furthermore, a nutrition transition from traditional diets – based on grains, starchy staples, and fiber-rich foods - to commercially produced foods high in salt and sugar is characterizing Nepal (Subedi, Marais, & Newlands, 2017), including diets of young Nepalese children. A 2014 study among children 6-23 months old in Kathmandu Valley found that consumption of commercially produced food products was higher than the consumption of micronutrient-rich foods (Pries et al., 2016). Another study conducted in 2017 among children 12-23 months of age in Kathmandu Valley revealed that almost all children had consumed unhealthy snack foods and beverages (USFB) in the previous day, contributing 24.5% of their total energy intake (Pries et al., 2019). Among these children, high consumers of USFB had lower intakes of micronutrients and were at higher risk of micronutrient inadequacy than their counterparts who were low consumers of USFB (Pries, Sharma, et al., 2019). Regardless of USFB consumption, the study showed that overall diet quality was poor, with all children at risk of inadequate intakes for six vital nutrients: half at risk of inadequate intake of thiamin, niacin and Vitamin-B6; two-thirds at risk of inadequate intake of calcium; and most at risk of inadequate intake of iron and folate.

Nutrition-specific interventions during the critical window of nutritional opportunity of the complementary feeding period can help avert the likelihood of undernutrition and its consequences (UNICEF, 2019). Nepal has been striving to achieve optimal feeding practices for its young children through different interventions (Headey & Hoddinott, 2015). The WHO has recognized that maximizing the utilization of local, nutrient-dense foods is an effective intervention to improve infant and young child nutrition in any context (WHO, 2008). Food-based approaches that increase the uptake of micronutrient rich foods are critical to improving the quality of complementary feeding diet. Along with the benefits of improving diet quality of young children (Low et al., 2007; Lutter et al., 2013; Tontisirin, Nantel, & Bhattacharjee, 2009; Gibson et al., 2000), food-based approaches have the added advantage of cultural acceptability, long-term sustainability and reducing dependency on foreign aid (Lutter et al., 2013; Tontisirin, Nantel, & Bhattacharjee, 2009). Moreover, the context-specific food-based approach has been successfully tested in Asian and African settings to improve the intake of diverse nutritious foods among young children (Ayoya, Kodio, Iknane, & Sodjinou, 2010; Bekele & Turyashemererwa, 2019; Hlaing et al., 2016; Talavera & Narciso, 2014; Wu et al., 2013).

Optifood Analysis:

To identify Nepal-specific FBR that could be used to improve diets among children 12-23 months of age in Kathmandu Valley, analysis using Optifood was conducted. Optifood—developed by WHO in collaboration with London School of Hygiene and Tropical Medicine (LSHTM) and Food and Nutrition Technical Assistance (FANTA)—is a linear programming software that uses mathematical optimization to model locally available and consumed foods that contribute to achieving nutrient needs of specific target groups (Wessells et al., 2019; Daelmans et al., 2013). Dietary data, which are collected from the population of interest, define model parameters, ensuring the food-based recommendations are based on locally available foods and typical dietary patterns of the target group. The outputs from Optifood are used to compare individual recommendations (i.e. weekly number of servings of foods/food groups) and combinations of these recommendations. Through these comparisons, a user can identify the combination of individual FBR that will likely ensure population-level dietary adequacy for the highest number of nutrients, as well as identify ‘problem nutrients’ (nutrients where adequacy cannot be achieved given typical food consumption patterns). Optifood has been used in various countries to develop FBR for the complementary feeding period to improve dietary adequacy of older infants and young children (Santika, Fahmida, & Ferguson, 2009; Vossenaar et al., 2017; Bekele & Turyashemererwa, 2019; Hlaing et al., 2016; Samuel et al., 2019).

In Nepal, we defined the Optifood model parameters using a 2017 quantitative 24-hour recall dietary dataset collected from a representative sample of 745 children 12-23 months of age living in Kathmandu Valley. The FBR formulated using Optifood were developed to improve the adequacy of 11 key micronutrients (calcium, vitamin C, thiamin, riboflavin, niacin, vitamin B-6, folate, vitamin B12, vitamin A-RAE, iron and zinc) for children living in households of varying socio-economic status (SES). Among different sets of recommendations generated by Optifood, the best set of recommendations for all SES groups was selected by the project team based on nutritional adequacy, appropriateness for the context and anticipated feasibility and acceptability among caregivers. This set of recommendations included: 1) Milk once a day, 2) eggs once a day, 3) vegetables three times a day and 4) lentils three times a day (Table 1). This set of FBR was found to achieve adequacy of 8-9 of the 11 micronutrients assessed in Optifood across three levels of SES (vitamin C, riboflavin, vitamin B-12, vitamin A, zinc, thiamin, vitamin B-6, and calcium

or folate -- the last two nutrients being dependent on children’s SES status). Niacin and iron remained below 50% of the RNI, for the recommendations tested, indicating a high risk of inadequate intake for these nutrients, particularly iron (30% RNI). Niacin and iron were therefore identified as ‘problem nutrients.’

The vegetables recommended included vegetables that were the most commonly consumed by 12-23-month-old children in Kathmandu Valley: cabbage, carrots, and tomatoes. Additional vegetables could be included in this recommendation, depending on what was used by the household, including broad leaf mustard, spinach, and cauliflower. The study did not aim to introduce new or less commonly consumed vegetables but instead to increase the consumption of those that are commonly consumed and familiar. The average serving sizes for these recommendations are expressed as an equivalent serving size using local utensils for ease of participant understanding, detailed in Table 1. These serving sizes are based on the average serving sizes reported in the dietary survey of 12-23-month-old children in Kathmandu upon which the Optifood analysis was run. This set of FBR are intended to be included in the child’s general diet by caregivers, and not to be the sole foods consumed by the children.

Table 1: Four food-based recommendations

Recommendation		Serving sizes		Frequency
		Grams	Using local utensils	
1	Milk	140	1 tea glass	Daily
2	Lentils	6	1 heaping spoonful (raw)	Three times a day
3	Vegetables	Cabbage	8	1 heaping spoonful (cooked)
		Tomato	10	Half of 1 small tomato
		Carrot	12	1 thumb size (raw), 1 heaping spoonful (cooked)
4	Egg	37	Half an egg	Daily (or 4 eggs per week)

When modelled, this set of FBR derived from Optifood analysis would theoretically decrease dietary inadequacy among 12–23-month-old children in Kathmandu Valley. However, understanding the acceptability and feasibility of the FBR within the socio-cultural and economic context is important

before they are promoted at scale. Understanding of the facilitators and barriers to adopting FBR can also inform behavior change communication strategies to promote such recommendations among target populations. This study aimed to evaluate the FBR to improve the diets of 12-23-month-old children in Kathmandu Valley, Nepal.

The specific study objectives were to:

1. Assess caregivers' perceptions of foods recommended to them and current practices for these foods.
2. Develop recipes for caregivers to use for feeding their child 12-23 months of age that incorporate the FBR developed through Optifood.
3. Assess the acceptability, compliance, and feasibility of evidence-based FBR among caregivers through a HH trial.
4. Assess feeding practices of children 12-23 months of age before and after the HH trial of the recommendation.
5. Assess facilitators and barriers for using the FBR for young child feeding.

RESEARCH METHODOLOGY

Study design

This was a mixed methods observational study among primary caregivers of children 12-23 months of age in Kathmandu Valley, Nepal. The Process for the Promotion of Child Feeding (ProPAN) was applied, using selected, relevant steps to validate the FBR derived from Optifood analysis. We used the comprehensive ProPAN methods and tools, which is a step-by-step process to: 1) assess dietary practices, including barriers and facilitators; 2) develop and test recipes for the food-based recommendations; 3) develop interventions to promote them; and 4) monitor and evaluate the progress of the intervention (Pan American Health Organization & UNICEF, 2013).

A conceptual framework (Figure 1) from ProPAN (Pan American Health Organization & UNICEF, 2013) was adapted for this study, which reflects the facilitators and barriers that may influence the compliance, acceptability, and feasibility of FBR. This conceptual framework shows that along with the domains of feasibility, acceptability and compliance, other contexts - such as availability, dietary practices and supportive environment - might influence the adoption of the FBR and should be considered.

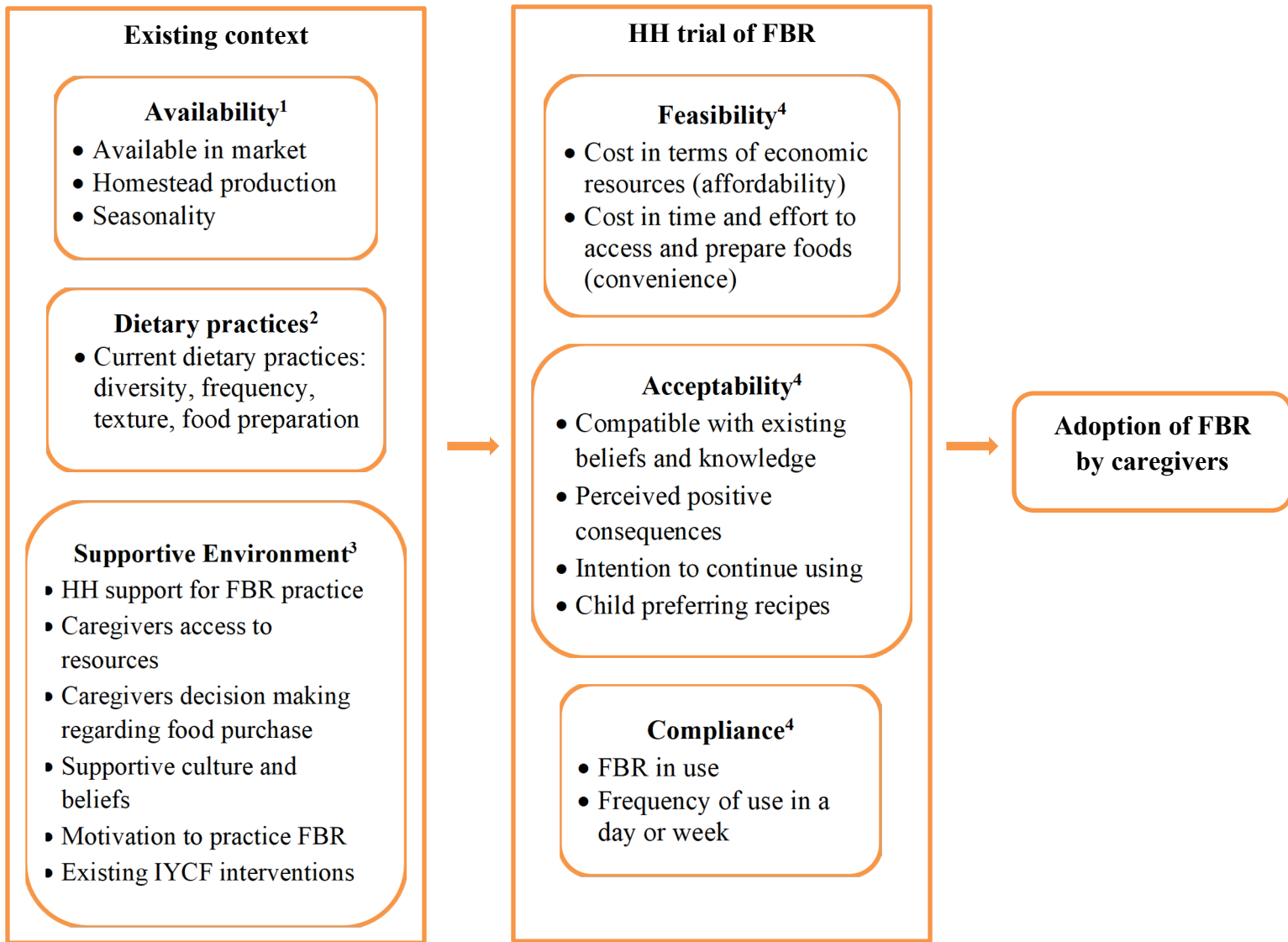


Figure 1: Conceptual Framework for the study

This study consisted of four, consecutive exercises to assess the domains outlined in the conceptual framework: 1) food attribute exercise (FAE), 2) recipe creation exercise, 3) household (HH) trial of FBR, and 4) focus group discussions (FGD). The domains captured by each exercise are outlined in Table 2 and details of the procedures for these exercises are noted below.

Table 2: Domains captured by the four steps of the exercises

Domains	Exercises/Steps
Availability¹ Available in market Homestead production Seasonality	FAE (Step 1) FGD (Step 4)
Dietary practices² Current dietary practices: diversity, frequency, texture, food preparation	FAE (Step 1) HH trial 1 st visit (Step 3)
Supportive environment³ HH support for FBR practice Caregiver's access to resources Caregiver's decision-making regarding food purchase Supportive culture and beliefs Motivation to practice FBR Existing IYCF interventions	FGD (Step 4)
Feasibility⁴ Cost in terms of economic resources (affordability) Cost in time and effort to access and prepare foods (convenience)	HH trial (1 st , 2 nd , 3 rd visits) (Step 3)
Acceptability⁴ Compatible with existing beliefs and knowledge Perceived positive consequences Intention to continue using Child preferring recipes	HH trial (1 st , 2 nd , 3 rd visits) (Step 3)
Compliance⁴ FBR in use Frequency of use in a day or week	HH trial (1 st , 2 nd , 3 rd visits) (Step 3)

Ethical approval for this study was sought from the Nepal Health Research Council (Registration no: 390/2020P). The interviewer obtained written informed consent from participants prior to interview.

Study population and sampling procedures

The FBR to be evaluated were developed based on dietary data from a survey conducted in Kathmandu Valley, covering all three districts: Kathmandu, Lalitpur and Bhaktapur. This study, therefore, was conducted in Kathmandu Valley, as the dietary practices and food availability was similar to those observed in the 2017 study. Six wards in Kathmandu Valley were selected for the study, chosen purposively from the wards where the 2017 study was conducted. These six wards were selected to be representative of three SES groups—two wards per low, middle and high SES group (Table 3). As Kathmandu is the most populous district in Kathmandu Valley, followed by Lalitpur and Bhaktapur, three wards of Kathmandu district, two of Lalitpur district, and one of Bhaktapur district were selected. The sample sizes for each exercise followed those recommended in the ProPAN guideline. The sample size for the HH trial allowed for performing subgroup analysis (SES group-wise), with a minimum of 20 participants per SES group.

Table 3: Number of participants by study location, district and SES group

SN	Location	District	SES group	No. of participants per exercise			
				FAE	Recipe creation	HH Trial	FGD
1	Madhyapur Thimi, ward - 7	Bhaktapur	Mid SES	4	4	12	12
2	Kathmandu Metropolitan City, ward - 2	Kathmandu	High SES	4	4	12	12
3	Jorpati, ward - 4	Kathmandu	Low SES	4	4	12	12
4	Kathmandu Metropolitan City, ward - 13	Kathmandu	Mid SES	4	4	12	12
5	Lalitpur Sub-Metropolitan City, ward - 8	Lalitpur	Low SES	4	4	12	12
6	Imadol, ward - 9	Lalitpur	High SES	4	4	12	12

FAE: Food Attribute Exercise; SES: Socioeconomic status; HH: Household; FGD: Focus Group

Discussion

As loss to follow-up was anticipated for this study, six participants from each ward were approached to participate in both the FAE and recipe creation exercise. Fifteen participants were recruited at each ward to participate in both the HH trial and FGD.

The participants for this study were primary caregivers of children 12-23 months of age residing in Kathmandu Valley. Female Community Health Volunteers (FCHVs) of the six wards were mobilized to identify HH with eligible participants. The inclusion and exclusion criteria for the participants were as follows:

Inclusion criteria:

- Primary caregiver-child pairs where child is 12-23 months of age
- Primary caregivers, who were primarily responsible for childcare, particularly child feeding
- Residence of at least 6 months within geographical limits of Kathmandu Valley

Exclusion criteria:

- Child was severely ill
- Non-residence within Kathmandu Valley
- Congenital/physical malformation that inhibited feeding
- Primary caregiver refused to participate
- Primary caregiver not available over the study period

Participant identification and recruitment

On the day of recruitment, the field researchers informed the caregivers the purpose of the study and the expected timeframe of their participation.

The EquityTool was used to assess SES status of caregivers participating in the study. The EquityTool for Nepal uses a simplified index of eight questions from the 2016 Nepal Demographic Health Survey (DHS), which allows comparison of the wealth profile of participants to the national population in the DHS 2016 survey (EquityTool, 2019a & 2019b). Participants in this study were compared to the urban national population wealth profile and those that fell into urban quintiles 1-2 were considered low SES, urban quintiles 3-4 were considered middle SES, and urban quintile 5 was considered high SES.

Study tools

Study tools were adapted from the ProPAN guidelines, modified to the Nepalese context. The tools were translated into Nepali by a professional translator and back-translated and pretested for finalization.

Study Procedures

Step 1. Food attribute exercise: This first step of the study was conducted to understand the positive and negative attributes held by caregivers for the foods to be included in the FBR. Through this exercise, it was determined whether caregivers fed or did not feed these foods to their children, and the reasons why certain foods were given and not others were explored. In addition, the exercise assessed caregivers' current practices of preparing these foods for their children and recipes already in use. This exercise was conducted to assist in the development of counselling messages for Steps 2 and 3. Additionally, with the knowledge of the current recipes in use, this exercise helped inform the recipe creation exercise.

Process and tools: The exercise involved 6 participants from each of the six study locations, resulting in a total of 36 participants. Each of the participants were visited individually at their home to conduct the exercise. They were shown pictures of commonly consumed foods that represented each of the FBR and questions were asked using a semi-structured guide: the reasons for feeding or not feeding the food items in the FBR, the preparation method for these food items and ingredients used, and their access to the foods, either from the market/retail stores/vendors or homestead production. An audio recorder was used during the exercise with the consent of the participants to record the conversation.

Step 2. Recipe creation exercise: This second step of the study was conducted to develop new recipes based on the FBR or to incorporate the FBR into existing recipes used by caregivers. The recipes were developed with the caregivers, using a participatory approach. This step included discussion around the existing recipes identified during Step 1 and coming to group consensus on recipes with necessary modifications to incorporate the FBR. The purpose of this exercise was to make FBR easy to follow and provide a range of options of preparing foods through familiar recipes,

ultimately improving the nutritional quality of the dishes that are commonly prepared and consumed in the Nepalese context.

Process and tools: In each of the six wards, caregivers were invited to convene as a group at a convenient time and location for the exercise. The study team organized the venue for the exercise and made the ingredients, cooking facilities and utensils readily available. A nutrition expert guided the participants during recipe preparation and the field researchers engaged the children of the participants while they were preparing the recipe. The investigator held the discussion, made observations, and recorded them. The exercise took place in the following sequence:

1. At the beginning of the exercise, the objective and participants' role during the exercise was explained.
2. A guided discussion was held to inform the participants on the nutritional benefits of the recommended food items for the young children. This information addressed their perceptions around the recommended food items that were documented during Step 1, helping to convince them to follow the FBR.
3. The discussion was followed by presenting the existing recipes captured during Step 1 and a discussion was conducted on how these recipes could be modified to make them more nutritious, appealing to children, convenient and less costly. A consensus on two recipes was made. The participants were instructed on the ingredients to include in the recipe, the feeding recommendations (texture, thickness, amount), hygiene practices, and responsive feeding.
4. All participants worked together to prepare the two chosen recipes, taking turns to either lead or help with recipe preparation. Facilitators guided the caregivers during the recipe preparation for inclusion of the FBR. They also observed and recorded information from the exercise. A paper form was used to document information for each of the recipes developed during the exercise.
5. Once the cooking was completed, the prepared dish was discussed with the participants. They were invited to taste the dishes, to feed their young child the prepared dish and give their feedback. Comments and observations made during the preparation and tasting/discussion of the recipes were also noted in the recipe form, including, participants' suggestions to improve or modify the recipes.

Step 3. HH trial of the recommendations: The purpose of this step was to assess the acceptability, compliance, and feasibility of FBR among caregivers of children 12-23 months of age. Specifically, the following aspects of each of these three realms were measured:

Acceptability was defined as including the following four areas (i) compatibility: assessing if the set of FBR is well-suited to the beliefs and knowledge of the caregivers and/or community, and is not a taboo for them; (ii) positive perception: assessing if the caregivers relate each FBR to having a positive health or nutrition outcome for their children; (iii) intention to continue using: assessing if the caregivers intend to use the set of FBR after the study is over; and (iv) child preference: identifying which individual FBR within the set their child readily accepted or refused.

Compliance was defined as the implementation/practice/use of the FBR by the caregivers. Frequency of use for each FBR in a day and a week was assessed to measure the full or partial compliance with the FBR. If the caregivers followed the FBR as suggested, it was considered full compliance, otherwise partial.

Feasibility was defined as the practicality of implementing the FBR in terms of two areas: (i) affordability, assessing if the caregivers were able to afford the recommended food item to feed their children, and (ii) convenience, assessing if the caregivers were able to commit their time and effort to prepare the FBR.

Process and tools: This trial involved three visits to each caregivers' place of residence: an initial visit, follow-up-visit and a final visit. A qualitative 24-hour recall of the foods given to children was conducted with the caregivers during the initial and final visit to measure changes in consumption of foods by the children before and after the introduction of the FBR.

During the **initial visit (first HH visit, day 1)**, the study team introduced themselves and explained the procedures of the trial to participants. First, the 24-hour dietary recall for the child was conducted with the participant. The team then introduced the FBR and recipes to the participants. A recipe calendar was used for this purpose, which was provided to participants to help them remember the FBR and recipes throughout the trial. The recipe calendar contained information about the frequencies and amounts of the FBR and the recipes to follow. Field researchers also provided counselling on the benefits for their children of following the FBR. During this initial visit, socio-

economic and demographic characteristics of the participants were captured, as well as data on the perceived feasibility and acceptability towards the FBR.

During the **follow-up visit (second HH visit, day 8)**, conducted at the midpoint of the trial period, participants' adherence to the FBR was documented. The field researchers assessed if participants remembered the FBR and had practiced them. The tool assessed compliance with the FBR, acceptance of the FBR by participants and feasibility to practice the FBR. In addition, the tool explored barriers and facilitators for participants to practice the FBR and participants' intention to continue using the recipes.

During the **final visit (third HH visit, day 15)**, at the end of the trial period, the study team performed the second 24-hour dietary recall and documented participants' impressions, experiences, and comments on the FBR they practiced. This was manually recorded using a paper form. A tape recorder was also used so as not to miss any information provided by the participants. The purpose of this visit was to determine compliance with the FBR, frequency of practicing the FBR, feasibility of the FBR, any modifications made, difficulties encountered, and motivating factors for compliance.

Step 4: Focus Group Discussion: The objective of this final step was to explore household and community contextual factors that supported or inhibited the adoption of the FBR. It also provided an opportunity to expand on the findings from the HH trial, for example, perception of other family members towards the FBR, their intention to continue following the FBR and their experiences with the recipes. The focus group discussion also assessed the likelihood that the target population would adhere to the FBR that incorporated modifications after the HH trial.

Process and Tools

Six FGD were conducted, one each at six study locations. The same participants from the HH trial were invited to participate in the FGD. A central location was identified prior to the discussion day and the caregivers were invited to the location at a convenient time. A moderator led the discussion and a note-taker recorded details of the FGD. An audio recorder was used to record the discussion with the consent of the participants. Each FGD was conducted in a comfortable and private site with minimal risk of interruption. The discussion captured the participants' overall experience with the FBR and the recipes. Common influencing factors for the adoption of the FBR were captured, as well

as social or physical characteristics in the environment that supported or inhibited the participants' ability to follow the FBR. At the end of each discussion and exercise, a summary was restated back to the participants to ensure the information truly reflected what they intended to say.

DATA MANAGEMENT AND ANALYSIS

Characteristics of the participants were analyzed using MS Excel. The results of the national wealth quintile of participants were automatically calculated by Equity Tool.

All interviews were transcribed verbatim by the research assistants in Nepali and translated into English. Translations were done immediately after each of the four steps and analyzed before moving onto the next step. Verification of the transcribed and translated documents was done by a co-investigator. The translated transcripts were imported to NVivo 12 for coding. Initial coding of several transcripts was done by two investigators, who developed a list of codes based on the conceptual framework of the study and other emerging codes were also noted on mutual consensus. Once agreement on coding was reached, transcripts were coded by the two investigators independently. Coded data were analyzed using techniques from thematic analysis (Braun & Clarke, 2006). Both investigators discussed the analysis and wrote the findings. This process of analysis was conducted for Step 1 (Food Attribute Exercise), Step 3 (HH trial), and Step 4 (FGD). For Step 2 (Recipe Creation Exercise), analysis of each dish was made at the end of the exercise to identify if the recipes were easy for the caregivers to follow, and if participants and their children liked the dish. After then, a recipe calendar was prepared.

The 24-hour dietary recall data collected in the initial and final visits of the HH trial were entered in Microsoft Excel. Dietary diversity scores and minimum dietary diversity (MDD) were calculated at each visit (WHO & UNICEF, 2021). Prevalence of consumption of food items before and after the HH trial of FBR were calculated and compared.

FINDINGS

A. SAMPLE CHARACTERISTICS

The total number of participants for the FAE and Recipe Creation Exercise was 36. The majority of these caregivers were the mother of the child (80.5%) and 52.8% of the children 12-23 months of age were male (Table 4).

Table 4: Percentage distribution of participants of FAE by background characteristics

Characteristics	Frequency (n=36)	Percentage (%)
Gender of child		
Female	17	47.2
Male	19	52.8
Participant relation with child		
Mother	29	80.5
Grandmother	4	11.1
Aunt	1	2.8
Father	1	2.8
Caretaker (House helper)	1	2.8

A total of 89 participants were recruited for the HH trial. Ten and fourteen participants were lost to follow up before the second and third, respectively. Similar to the FAE, the majority of caregivers for the HH trial were the mothers of the children. Compared to national urban populations, the majority of participants in the HH trial were of mid/high SES, with less than 4% of participants in low SES. The reasons participants dropped out of the trial included that their child was sick, they needed to work, or they were out of town on the day scheduled for data collection. The same participants (n=75) from the final visit of HH trial participated in FGD.

Table 5: Percentage distribution of participants of HH trial during the first HH visit by background characteristics.

Characteristics	Frequency (n=89)	Percentage (%)
Gender of child		
Female	45	50.6
Male	44	49.4
Participant relation with child		
Mother	75	84.3
Grandmother	12	13.5
Aunt	1	1.1
Father	1	1.1
Socioeconomic status		

Low	3	3.4
Mid	62	69.7
High	24	26.9

B. FOOD ATTRIBUTE EXERCISE

Participants' perceptions and their reports of family and community perceptions of the recommended food items and their current feeding practices for these foods are presented below.

Recommendation 1: Milk

1. Perception towards milk

Participants' perception

All participants considered milk nutritious for children, as they perceived that it provided strength to children and made them healthy. They further mentioned that milk contains calcium, which makes the bones stronger, and reported that the nutrients contained in milk prevent diseases. Due to the numerous benefits of milk, participants reported that milk should be fed and bought from the market if the mother's milk is not enough. One of the participants reported that children should not be fed milk when a child has a cold as it contains fat and can aggravate the cold.

Family and community perception

Most participants reported their family members had positive attitudes towards milk and encouraged feeding milk to young children because it is good for the child's health, is nutritious and makes children stronger. Some participants further reported that their family members suggested they either breastfeed or feed fresh cow's milk, as they perceive milk powder is added in the packaged milk sold in the dairy shop.

2. Current practice feeding milk

Nine of the 36 participants were still breastfeeding their children, and reported their breast milk was enough for their children. Other participants fed milk, either alone (boiled) or mixed with other food items such as kheer (6), lito (3), biscuits (2), oats (1), and porridge (1). While most participants fed milk without adding anything, nine mixed sugar to enhance the taste and one participant reported adding Horlicks as well.

3. Perceived need to change the current practice

Participants were asked if they should alter their current practice, and if so, how. Only six participants thought that they should change the current practice of feeding milk to their children. They reported that feeding in other ways or making different recipes of milk would be good to change the taste for their children. These participants reported that milk can be fed together with oats, lito, rice and *haluwa*, and that milk products such as kheer and yoghurt can be fed to young children.

4. Availability of milk

Participants did not report any issues with availability of milk. All participants reported purchasing milk year-round, either from corner shops/dairy shops or directly from a farm.

Recommendation 2: Egg

1. Perception towards eggs

Participants' perception

Most participants had positive perceptions of eggs, reporting that eggs provide nutrition and energy to children. Specifically, they mentioned that eggs contain protein, provide strength, and increase the height of children.

However, there was misconception among some participants that eggs should not be fed when a child is ill. Several participants mentioned that eggs from broiler breeds of chicken are not as nutritious as those of local breeds. One participant shared that egg yolk is difficult for children to swallow and might get stuck in the throat.

“We should not feed when child is sick because they don't eat at that time, and it is not good as well.” (Mother of 23-month-old)

“I have heard that the yellowish part shouldn't be fed during fever and cold/coughs as it contains fat.” (Mother of 23-month-old)

Family and community perception

Participants reported that family members and other mothers in the community discuss that eggs are good for children, providing nutrition and energy to the children and so should be fed regularly. However, there were some negative perceptions of the family and neighbors as reported by the participants. These included a mother-in-law asking one of the participants to not feed egg until the child is one year old, others suggesting not to feed eggs at an early age as children might get ill and have difficulty swallowing the yolk, and not giving eggs before children begin to speak. Participants reported willingness to feed their children eggs daily, however, other old-aged members suggested not to feed egg yolk daily as it may cause breathing problems for children.

2. Current practice feeding eggs

Thirty-three participants reported feeding eggs to their children. Among those, most fed boiled eggs and plain omelet. A few reported preparing dishes of eggs such as pancake (2) and cake (1). Only one participant mixed egg in jaulo.

3. Perceived need to change the current practice

The different recipes of egg to feed the children are egg curry and omelet. The eggs can be fried by adding little bit of salt and chili. Several participants mentioned pancake to feed children. Some of

them mentioned that eggs can be boiled and served with little amount of salt. One participant said that egg can be eaten with bread also.

We can also cook it as a pancake with egg in it, and feed that way. (Mother of 18-month-old)

4. Availability of eggs

All participants reported that eggs are bought from the market and are available all year round.

Recommendation 3: Lentils

1. Perception towards lentils

Participants' perception

All participants reported lentils as nutritious and good for their children's health, particularly as they are a source of protein. Different benefits of lentils were mentioned by the participants, including protection from diseases, being tasty, keeping the stomach full, helping children gain weight, and helping to increase the amount of water in the body. Participants discussed that lentils should be fed to children even if a child does not like them. One of the participants believed watery lentils to be healthy for children and several others mentioned that a young child should be given only the liquid part of lentils or watery lentils as they cannot digest whole lentils.

"I feed her not only because my child likes it, but also because it contains nutrition." (Mother of 18-month-old)

"Lentils are good for child health as they give energy. All types of lentils are good for health." (Mother of 17-month-old)

Participants considered all lentil varieties good for a child's health. However, a few perceived red lentils as not good during illness and that they negatively affect eyesight if fed frequently.

"I have heard that if musuro dal is given for four consecutive days then it affects the eyesight." (Grandmother of 13-month-old)

"We should not feed musuro dal when child is sick as it makes the body hot." (Mother of 15-month-old)

Family and community perception

Participants reported mostly discussing feeding lentils to children with family members, rather than community members. These discussions echoed their own perceptions, with family members noting lentils contain protein, are good for children and should be fed daily to children. Some participants reported that their family members suggested making lentils tasty so that their child prefers eating them and suggested mixing lentils with rice or including them in a jaulo recipe.

“My husband says that feeding lentils will form habit, give vitamins, and also provide strength to the child.” (Mother of 23-month-old)

“My mother says that in a week we must feed jaulo at least 1 time by combining it with lentils.” (Mother of 22-month-old)

2. Current practice feeding lentil

All participants reported feeding lentils to their children. Most fed their children lentils cooked for family (28) and/or added lentils into a jaulo recipe (24). A few participants reported mixing potato, green leafy vegetables, and lito in the lentils.

3. Perceived need to change the current practice

Some of the participants who reported needing to diversify how they prepare lentils because different types of recipes are needed for growing children. They mentioned different ways of feeding lentils, including mixing with rice, jaulo, or green leafy vegetables.

4. Availability of lentils

All participants reported buying lentils from the grocery shop. Two participants mentioned that they sometimes bring lentils back from the village when they visit. Almost all participants reported that all varieties of lentils are available the whole year. One participant said that although lentils are available all months, they are cheap during the winter season and become slightly expensive during off season. A few participants said that lentils are mostly available during the winter season only.

“I bring from the nearby shop. It is available the whole year.” (Mother of 17-month-old)

“The cost of musuro dal is sometimes expensive, sometimes cheap but it is available all the time.” (Mother of 14-month-old)

Recommendation 4: Vegetables

1. Perception towards recommended vegetables

Participants’ perceptions towards cabbage, carrot, and tomato

Cabbage: Participants considered cabbage good for the health of their children. They reported it to be nutritious, providing energy and vitamins, protecting children from

disease and helping to prevent constipation. However, cabbage was considered a cold food by some participants, so they reported not feeding it to their children. Furthermore, some said that feeding cabbage during sickness might aggravate cold in children. Others reported that cabbage might be difficult for small children to chew as their teeth have not developed. A few participants who thought that cabbage is difficult for a child to digest reported that it should not be fed to small children.

“Cabbage cannot be digested by young children, so it should not be given to them. The child will also catch cold.” (Grandmother of 13-month-old)

“A young child can’t digest cabbage properly.” (Mother of 19-month-old)

Carrot: Most participants were aware that carrot contains vitamins and mentioned that it should be mixed in with lentils and jaulo in small pieces. Further, they reported that carrots are good for health and eyesight and provide energy. A few reported that carrots help to increase water in the body and are good for digestion. They further noted that good nutrition is essential for a growing child, so carrots should be included in children’s diets from 6-7 months of age.

“Carrot gives energy to the child. It is good for health.” (Mother of 23-month-old)

“I don’t think there are any bad aspects of carrot, it is beneficial. I haven’t heard anything bad.” (Mother of 23-month-old)

However, a few participants reported carrots should not be fed if a child has a cold, as they may suffer from cough and sneezing. One participant said that she feared feeding carrots to her child as it might get stuck in the child’s throat.

“I don’t give it when she is ill because it causes cold, otherwise I give it.” (Mother of 18-month-old)

“It is better not to give carrot during winter because it causes colds.” (Mother of 23-month-old)

Tomato: Participants reported that tomatoes enhance the taste of vegetables and mentioned that tomatoes are nutritious and good for health as they contain vitamins. Some participants said that tomatoes are required for growing children and so should be fed to young children.

“Tomato should be fed to children. It is for taste and good for health as well.” (Mother of 21-month-old)

However, many participants thought tomatoes cause colds among children and that they should not be fed during fever as they are sour in taste. Further, participants perceived that

tomatoes should be avoided during sore throat or cough because sour taste can aggravate the sickness. Two of the participants reported that tomatoes should be consumed by adults only.

“We don’t feed it when they are ill, have a fever, cold or cough. Otherwise, when they are fine, we feed it.” (Mother of 18-month-old)

“We shouldn’t feed tomatoes in the cold season, so we must feed in summer only.”
(Mother of 17-month-old)

Family and community perception

Cabbage: There were mixed responses from participants regarding the perceptions of family members and community people towards feeding cabbage to children. Some participants said that their family members suggested feeding cabbage regularly to their children as it is nutritious. Others reported their family members said that cabbage should not be fed as it causes colds. Two of the participants said that their family members ask them not to feed cabbage because children cannot chew it since their teeth have not developed properly. In contrast, some participants reported that their family members told them if cabbage is cooked soft then it can be fed.

Carrot: Participants reported that their family members suggested feeding carrots frequently because they knew that carrots are nutritious and contains vitamins.

“They told us that carrots contain vitamins, so we should feed to the children.” (Mother of 18month-old)

One participant mentioned that the FCHV from her village suggested adding vitamin-rich foods in a child’s diet, which helps in the growth and development of the children. She was also told that carrots can be mixed in jaulo as well.

Tomato: Several participants shared that their family members suggested feeding tomatoes to form dietary habits among children. Some participants reported that family members suggested not feeding tomatoes to their children when they were sick, and that their children had greater chance of suffering from common colds if fed too many tomatoes. One of the participants was told not to feed tomatoes early in childhood by her neighbor. However, another participant shared that her friend suggested mixing tomato into jaulo to make her child strong. Several participants said that there was not any discussion about feeding tomatoes to their children with family members or community people.

2. Current practice feeding the recommended vegetables

Cabbage: Thirteen participants reported feeding cabbage to their children. Only three participants reported adding cabbage in jaulo and one reported adding cabbage into lentils for their child. Nine participants said that they cooked cabbage mixed with other vegetables for family dishes.

Carrot: Thirty participants fed carrots to their children and the majority (21) of them fed raw carrots. Twelve participants mixed carrot in jaulo, three fed boiled carrots, and two reported making *haluwa* with carrots for their children. Only one participant reported mixing mashed carrot in lito.

Tomato: Twenty-eight participants reported feeding tomatoes to their children. Among them, most participants mixed tomato in vegetables to enhance the taste of the vegetables. Only five participants reported mixing tomato in jaulo. A few participants reported mixing tomato in lentils and meat and one participant reported feeding tomato soup to her child.

3. Perceived need to change the current practice

Cabbage: Fifteen participants reported that cabbage can be prepared in other ways to make it softer for children. Specifically, it could be cooked in a pressure cooker, mashed in a grinder, or more water could be added while cooking. A few participants mentioned that cabbage can be added in jaulo and mixed with other vegetables to feed children.

Carrot: Participants mentioned different recipes that can be prepared with carrots, such as *haluwa*, carrot juice, and jaulo. Some perceived that carrots can be cut into small pieces and mixed in rice or fed raw.

Tomato: Participants reported tomatoes can be fed to children by adding them in with other vegetables, jaulo, and meat. One participant said that tomatoes can be fed to a child as a salad. Some participants reported wanting to try different recipes but did not have ideas for what recipes to try.

4. Availability of recommended vegetables

Cabbage: Participants reported buying cabbage from the market. The majority of participants said that cabbage is mainly available during the winter season, and less available during summer. Participants also reported that cabbage is cheaper during the winter season and more expensive during its off season. Only a few participants said that it is available round the year.

“I bring cabbage from the vegetable market. It is available round the year but is expensive during off season and cheaper during season.” (Grandmother of 13-month-old)

“Cabbage is not available round the year.” (Mother of 22-month-old)

Carrot: All participants reported buying carrots from the vegetable market. Many participants said that carrots are only available during certain seasons, mainly between the months of February to April. Very few said that it is available throughout the year and reported that it is found in less quantity during the off season. Participants reported that carrots are cheaper and tastier during their season, and more expensive during the off season.

Tomatoes: All participants reported buying tomatoes from the market. They reported that tomatoes are cheaper during their season, and more expensive during the off season. Only a few participants reported that tomatoes are available round the year.

“Tomatoes are available round the year but cheap in the season.” (Grandmother of 13-month-old)

C. RECIPE CREATION EXERCISE

Recipe creation exercises were conducted in all six study locations with the same participants from the FAE. The purpose of the recipe creation exercise was to make FBR easy to follow for the caregivers by developing different options of preparing foods in the FBR based on dishes that are already commonly consumed. The findings from the FAE were used to inform the recipes for this exercise.

Based on the findings and discussion with participants during the FAE, two different dishes were selected for recipe preparation: jaulo and pancake. Jaulo - (a Nepalese term) is usually a mixture of rice and lentils with mushy texture, generally fed to children. Here, in this study we added recommended vegetables to enrich jaulo. This would aid caregivers in meeting two of the FBR (lentils and vegetables). Pancake would aid in meeting two of the FBR (lentils and egg). As it will be difficult for caregivers to feed the foods in the FBR separately, if mixed in jaulo, it was anticipated that it would be easier for caregivers to prepare. Based on the findings from the FAE, boiled eggs were usually fed to children, but to provide a recipe of a different taste, a pancake made up of *sarbottam pitho* (lentil flour) and egg was suggested.

No different recipe was required for feeding milk to the children and caregivers were advised to follow their current practice (usually boiling), and feed at least one glass of milk every day. The breastfeeding mothers were asked to continue to breastfeed and advised to feed other milk if only giving minimal amounts of breastmilk.

1. Recipe for new recommended jaulo

New recommended jaulo was prepared using rice, lentil, cabbage, carrot, and tomato. One spoonful of any type of lentil, one spoonful of rice, two spoonfuls of raw cabbage, half a raw tomato, and one thumb- size raw carrot were used. A half spoonful of ghee was used to fry the ingredients, and a pinch of salt and turmeric were added to enhance the taste. Water was added as required, usually one glass of water, and was cooked in a pressure cooker.

Observation

Participants were actively engaged and enthusiastic in learning the new recommended jaulo recipe. There was often confusion among participants regarding

amount/measurement of the food; measurement at home was usually done by hand, so they were not sure whether the amount they were feeding to their children was enough or not. The misconception mentioned during FAE around avoiding certain types of lentils was also mentioned during the recipe creation exercise, and caregivers were counselled that all types of lentils are appropriate for young children.

Time

On average, the preparation and cooking of the new recommended jaulo recipe was 30 minutes. Because counseling was done while the jaulo was cooking, it took more time than usual and was estimated to require only 15 minutes for preparation and cooking at home.

Consistency

According to caregivers and the session facilitator, its consistency was semi-solid.

Acceptability of the food by the children

All children present during the recipe creation exercise tasted the jaulo and liked the dish.

Caregivers' impressions/opinions

Prior to the recipe creation exercise, participants reported preparing jaulo by mixing lentil, rice, and water only, and so were happy to learn a different way of cooking jaulo with the inclusion of vegetables. Participants reported that the recipe could be easily prepared at home and that they would start adding vegetables in jaulo.

2. Recipe for pancake

Pancake was prepared using egg and *sarbottam pitho* (a lentil-based flour) - one whole egg and two spoonfuls of *sarbottam pitho* were used to prepare pancake. Half a teaspoon of ghee was used, and a pinch of salt was added to enhance the taste.

Observation

Participants were observed to be excited during pancake recipe creation as it was a new recipe for most of the participants. However, several participants were already preparing and feeding pancakes to their children. The participants who were already familiar with cooking pancakes suggested mixing honey or sugar in the recipe, and one participant said that she used flour instead of *sarbottam pitho*. There was some confusion over the amount of ingredients which needed to be clarified.

Time

On average, the preparation and cooking of pancake was 10 minutes.

Consistency

According to caregivers and the session facilitator, its consistency was solid.

Acceptability of the food by the children

Most children present during the recipe creation exercise ate the pancake and found it tasty.

Caregivers' impression/opinions towards pancake

Pancake was a new dish for most of the participants and they said they would cook it onwards, as it can be easily prepared at home. They were happy to learn a new recipe and said that the pancake tasted good. One participant said that she will prepare it at home but was not sure whether her child will eat it or not. Some participants asked whether it can be cooked in oil, as their children do not like the taste of ghee.

D. HOUSEHOLD TRIAL

24-hour dietary recall: Dietary diversity scores and the proportion of children achieving minimum dietary diversity (MDD) was calculated based on a 24-hr dietary recall conducted during first and third HH visit (Table 6). As breastfeeding was not assessed during the 24-hr dietary recall, MDD was calculated based on seven food groups and the food dietary score was set for the consumption of four or more food groups. The seven food groups are:

1. grains, roots, tubers, and plantains
2. pulses (beans, peas, lentils), nuts and seeds
3. dairy products (milk, infant formula, yogurt, cheese)
4. flesh foods (meat, fish, poultry, organ meats)
5. eggs
6. vitamin-A rich fruits and vegetables; and
7. other fruits and vegetables.

Table 6: Food dietary score and minimum dietary diversity for first and third HH visit

	First HH visit (n=89)	Third HH visit (n=75)	p-value
Mean dietary diversity score	4.3	4.7	0.005*
Minimum dietary diversity	73.0% (65)	92.0% (69)	0.002**

**Increase in mean dietary diversity score is statistically significant (p-value<0.05)*

***Increase in proportion achieving MDD is statistically significant (p-value<0.05)*

Table 6 shows that the mean dietary diversity score increased, and the increment was found to be statistically significant. Similarly, minimum dietary diversity increased from 73% in the first HH visit to 92.0% in third HH visit and is statistically significant. Further, Figure 1 shows a considerable increase in the consumption of vitamin-A rich fruits and vegetables, other vegetables, and eggs. However, increase in the consumption of Vitamin-A rich fruits and vegetables was only found to be statistically significant with p-value=0.002

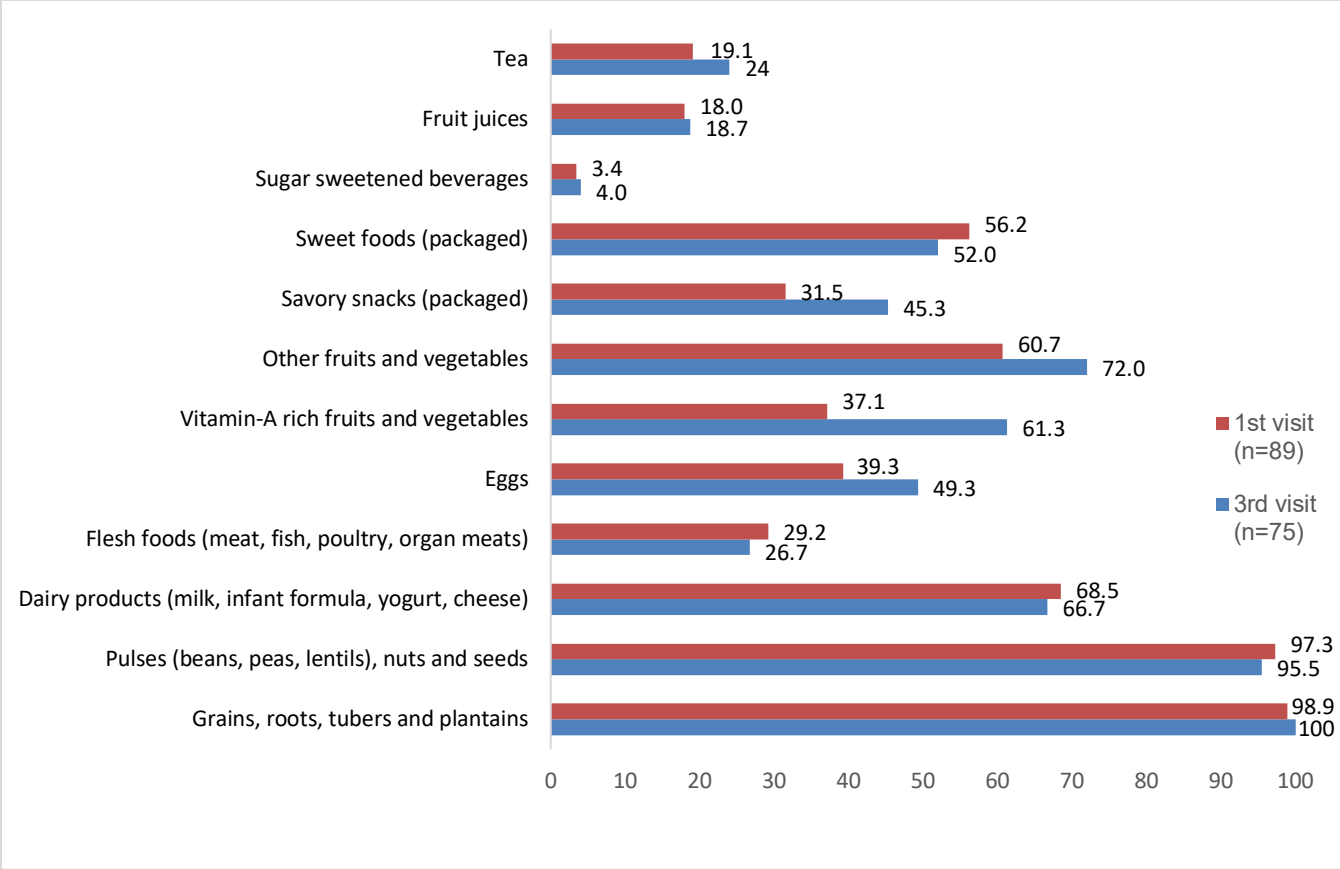


Figure 1: Percentage of children aged 12-23 months consuming foods during first and third HH visits

Use and usefulness of recipe calendar: Participants were provided a calendar which included a pictorial aid summarizing the recipes during their first HH visit. They were asked about their use of the recipe calendar and its usefulness in preparing the FBR in the follow-up visits. Almost all participants reported using the recipe calendar, with most hanging the calendar in their kitchen for easy reference while preparing food for their children. They further reported that the calendar was useful for them to remind them of the FBR in the correct amount. Moreover, participants who could not read reported that the pictures in the calendar helped them easily follow the FBR. Three participants who did not use the calendar reported that they remembered the FBR and recipes from the demonstration and did not have to use the calendar for recall.

“When we did not have it (calendar), I used to feed eggs daily, sometimes I used to forget to feed him, now I remember it due to calendar. I am hanging it there.” (Mother of 17-month-old, mid SES, second HH visit)

“My daughter-in-law is not like me; she is more educated. I look at the pictures in the chart, but she can read the text. It has been easier for me, because even with less eye vision I can look at the

picture and remember what ma'am had said, and I am doing it accordingly. (Grandmother of 21-month-old, mid SES, second HH visit)

"I hung it like a normal calendar, and at the beginning I used to look at it. But now I normally remember it in my mind." (Mother of 21-month-old, mid SES, third HH visit)

Recommendations and Recipes

Recommendation 1: Milk

Table 7. Recommendation to feed milk during HH trial

Quantity	Frequency	Serving size	Recommendation
140 ml	daily	1 tea glass	Feed one glass of milk daily to the child

1. Prior practice

During the first HH visit, most participants reported that their children drank milk daily, but several reported that their children did not like to drink milk. There were some mothers who were breastfeeding their children and therefore did not feed their children milk.

2. Compliance

Table 8: Number of participants feeding milk during HH trial visits in a week

No. of times in a week	2 nd HH visit	3 rd HH visit
Daily	30	34
4 days or less	3	2
Breast fed	43	37
Not Fed	3	2
Total	79	75

More than half of the children were still breastfed during the HH trial. Among non-breast-fed children, most of the caregivers fed milk to their children as recommended.

3. Acceptability

Child preference: Several caregivers reported not feeding milk to their children because their children did not like it.

“It (breastmilk) is enough till date. I tried feeding her packaged milk as well, but she did not like it.” (Mother of 21-month-old, mid-SES, second HH visit)

“Yes she doesn’t like milk or ghee. I tried but multiple times, but she didn’t like it.” (Mother of 22-month-old, mid SES, second HH visit)

4. Feasibility

Cost: While most participants did not consider milk expensive or an extra expense to feed their children, cost was an issue for four participants; they reported financial constraints to feeding milk to their children as recommended.

“My financial status is weak, so I feed milk 2 times a week. You have recommended us to feed one glass of milk in a day, but I can’t feed because I don’t have enough money to buy.” (Father of 21-month-old, mid SES, third HH visit)

“I should feed another grandchild also. There are more children in my home so I can’t feed all of them (milk) due to my financial situation. There are 10 members in my family.” (Grandmother of 21-month-old, mid SES, third HH visit)

Recommendation 2: Egg

Table 9. Recommendation to feed egg during HH trial

Quantity	Frequency	Recommendation
37 gm	4 times in a week	Feed at least 4 whole eggs in a week or half an egg every day.

1. Prior practice

Participants fed eggs to their children by boiling or frying them. Eggs were fed once a day by some participants, while others were irregular in feeding eggs, and for some it was only one egg per week. A few participants reported that their children liked to eat the white part of eggs only.

2. Compliance:

Table 10: Number of participants feeding egg during HH trial visits in a week

Number of times in a week	2nd HH visit	3rd HH visit
at least 4	58	53
less than 4	14	10
Not Fed	3	3
Data Not Available	4	9
Total	79	75

At the second and third visits, it was found that most participants fed eggs in the recommended frequency to their children. They mostly fed eggs boiled or fried and several participants fed eggs

with the pancake recipe. One participant considered eggs as a ‘hot’ food and reported not giving it regularly to her child because of this.

3. Acceptability

Childrens’ preference: Participants reported that their children liked consuming the eggs, either boiled or fried. Only a few participants reported not feeding eggs to their children or were not feeding eggs frequently because their children did not like them.

Perceived consequences: Only two participants did not feed eggs to their children and several others fed eggs infrequently because of the fear that it would cause vomiting.

“I started to feed him egg since he reached 1 year, but while he ate the egg, he vomited everything. Then again, I tried to feed him 2- 3 times, but he vomited everything that he had eaten. So, I stopped feeding him then after.” (Mother of 16-month-old, mid SES, second HH visit)

4. Feasibility

Cost: Most participants did not consider eggs costly for their children. They reported that eggs are bought for the family and do not require an extra purchase.

“No, I don’t think so (expensive). We always have eggs and other vegetables at home.”
(Grandmother of 12-month-old, mid SES, third HH visit)

However, cost was an issue to feeding eggs regularly to children for several participants, either because they were financially poor or/and had more children to feed.

“I am financially struggling. It is expensive and I can’t afford it every day.” (Mother of 23-month-old, mid SES, second HH visit)

“It sometime does. I don’t always have money to buy eggs.” (Mother of 14-month-old, mid SES, third HH visit)

Recommendation 3: Lentils

Table 11. Recommendation to feed lentils during HH trial

Quantity	Frequency	Serving size	Recommendation
18 gm	daily	3 spoons	Include at least 3 spoons of raw lentils daily in a child’s diet.

Though 77 participants reported remembering lentils as one of the recommended food items for their children, more than half of the participants did not report feeding the recommended amount of lentils for a day. Only 32 participants did report the recommended amount of 3 spoons in a day and 45 participants confused the daily recommended amount with the amount recommended for the new recommended jaulo recipe and reported 2 spoons as a daily recommendation, even after further probing.

1. Prior practice

During the first HH visit, participants reported feeding lentils mostly mixed in a jaulo or as a ‘dal’. Some reported feeding lentils as one of the ingredients used to prepare lito powder.

2. Compliance

Table 12: Number of participants feeding lentil during HH trial visits in a week

No. of times in a week	2 nd HH visit (n=79)		3 rd HH visit (n= 75)	
	Full*	Partial**	Full	Partial
Daily	63	11	62	9
5 days and less	4	1	1	0
Total	67	12	63	9

*Full: participants feeding lentil as recommended, 3 spoons (raw lentil)

* *Partial: participants feeding less than 3 spoons of lentil

The majority of participants complied fully with the recommendation for lentils. Most participants fed their children lentils daily and followed the daily recommended amount of lentils to be fed to the children. Participants fed lentils to their children either following the new recommended jaulo recipe or in a family food ‘rice and dal’.

“We have to feed 3 spoons of lentils; she gets one spoon from lito and I add 2 spoons of lentil in new recommended jaulo recipe compulsorily.” (Mother of 15-month-old, mid SES, second HH visit)

3. Acceptability

Participants reported that their children preferred new recommended jaulo recipe with lentils added or rice and lentils fed together.

4. Feasibility

Cost: Participants always reported lentils as a feasible recommendation in terms of cost. They mentioned that rice and lentils are always available in their household, so there is no extra purchase needed for rice and lentil to feed their children.

“We have to buy tomatoes, cabbage, and carrots. We do have rice and lentils at home.”
(Grandmother of 12-month-old, mid SES, third HH visit)

“The lentils and rice are always available in the house; we just need to buy vegetables.” (Mother of 23-month-old, mid SES, third HH visit)

Recommendation 4: Vegetables

Table 13. Recommendation for vegetables during HH trial

Vegetables	Quantity	Frequency	Serving size	Recommendation
Cabbage	16 gm	Any combination, three times a day	2 spoons	Feed cabbage, carrot, tomato, or other vegetables as available daily in recommended amount
Carrot	12 gm		1 thumb	
Tomato	10 gm		Half tomato	

1. Prior practice

Although the vegetables included in the FBR were not previously used, other vegetables were fed to the children. Participants reported feeding seasonal vegetables usually.

“I mix vegetables according to the season. Sometimes I mix pumpkin.” (Grandmother of 21-month-old, mid SES, first HH visit)

2. Compliance

Except for three participants during the second HH visit and eleven participants during the third HH visit, participants fed their children vegetables. Twenty participants complied with the daily recommendation for vegetables in a recommended amount during both the second and third HH visits; others were infrequent in feeding vegetables. Among the three recommended vegetables – cabbage, carrot, and tomato – tomato was the most commonly fed vegetable, followed by carrot and cabbage.

Table 14: Number of participants feeding vegetables during HH trial visits in a week

	Vegetable group#
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No. of times in a week	2 nd visit			3 rd visit		
	Full*	Partial**	Total	Full*	Partial**	Total
7	34	8	42	36	6	42
4-6	7	4	11	11	2	13
1-3	17	6	23	8	1	9
Not Fed			3			11
Total	58	18	79	55	9	75

*Full: participants feeding in the recommended amount

* *Partial: participants feeding less than recommended amount

Vegetable group summarizes consumption of any vegetables (at least three) including the recommended ones in the recommended amount for daily consumption.

Table 15: Number of participants feeding recommended vegetables during HH trial visits in a week

No. of times in a week	Cabbage		Carrot		Tomato	
	2 nd visit	3 rd visit	2 nd visit	3 rd visit	2 nd visit	3 rd visit
7	15	15	22	21	33	28
4-6	7	11	8	10	7	14
1-3	16	10	22	11	23	8
Not Fed	41	37	27	30	16	24
Data Not Available	1	2	0	3	0	1
Total	79	75	79	75	79	75

Participants reported not only feeding the recommended vegetables every day but using alternatives, as available in their household. They reported that recommended vegetables might not be available every day. Among other vegetables, green leafy vegetables (GLVs) were the most commonly fed vegetables by the participants; fifty participants reported feeding GLVs to their children on a regular basis. Other vegetables used as an alternative and fed to children included pumpkin (9), okra (9), beans (7), bottle gourd (5), cauliflower (4), sponge gourd (3), eggplant (2), pointed gourd (2), and peas (1).

“When I don’t make new recommended jauulo recipe, I mash some saag with his rice. He also eats vegetables except the ones mixed in new recommended jauulo recipe.” (Mother of 12-month-old, high SES, second HH visit)

“Sometimes I change vegetables, I mix taro leaves, beans, eggplant.” (Mother of 15-month-old, high SES, third HH visit)

“If there is no cabbage at home I mix other vegetables, but I mix 3 different types of vegetables. I mix seasonal vegetables like green beans, brinjal and greens.” (Mother of 17-month-old, high SES, third HH visit)

3. Acceptability

Childrens’ preference: Participants did report that adding vegetables enhanced the taste of the new recommended jaulo recipe and their children liked it.

“I didn’t use to add tomato and carrot before, but I used to add other vegetables like lady’s finger, because they are slippery and my baby use to eat. I also used to add one leaf of saag, I used to feed that way. But when we add carrot, jaulo becomes tastier, my daughter liked it and ate easily. She ate so well that day as well.” (Mother of 21-month-old, mid SES, second HH visit)

Many participants reported not feeding cabbage to their children. The reported reasons included: cabbage is not as soft as other vegetables and children don’t like it. GLVs were mostly used as an alternative to cabbage by the caregivers.

“I mix 4 spoons of lentils, rice and carrot. Cabbage is hard to feed for the child, so I mix spinach which I grow in my home.” (Mother of 23-month-old, mid SES, third HH visit)

“She does not like cabbage so sometimes I add potato, some days I add peas.” (Mother of 14-month-old, high SES, third HH visit)

Perceived consequences: Some participants reported feeding the recommended vegetables to their children only after attending the food demonstration and learning the benefits of vegetables.

“I hadn’t given him tomato before because I didn’t know we could feed tomato to the children. But after you said, I came to know that we can give it, so I started giving it because he likes sour taste. Even if I add one or two whole tomatoes then he eats it because of sour taste.” (Mother of 15-month-old, mid SES, second HH visit)

“I didn’t know that we could add carrot in jaulo, but I learned it in the program, and you told us that it benefits the kids, so I am going to continue using it.” (Mother of 14-month-old, mid SES, second HH visit)

“We didn’t feed our baby cabbage as a risk of catching cold. But you told us that frying all the ingredients in ghee for the right amount of time, would help prevent the cold. So now we have

started adding little cabbage, half a tomato, and carrot to her meal.” (Grandmother of 15-month-old, high SES, third HH visit)

4. Feasibility

Cost: In general, participants did not consider vegetables costly. As they already have vegetables for household consumption, they reported it was easy to feed them to the children as well.

“We have to bring it for ourselves, so do not have to separately spend money on vegetables.”
(Mother of 17-month-old, mid SES, second HH visit)

“All the vegetables are always used in the family, so I don’t think there is any change in the expenses for me.” (Mother of 22-month-old, mid SES, second HH visit)

However, some participants reported the recommended vegetables to be costly and perceived it causing additional expenditure.

“We have to buy tomatoes, cabbage, and carrots. We do have rice and lentils at home. Yes, we have to buy it and it causes more expense.” (Grandmother of 12-month-old, mid SES, third HH visit)

Furthermore, they mentioned that they will need different vegetables in a day rather than the ones they typically use, which slightly increases their expenses.

“Yes, in that sense it has increased. Like we need different vegetables every day like cabbage, carrot, and all.” (Grandmother of 15-month-old, mid SES, third HH visit)

Recipe 1: New recommended jaulo recipe

Table 16. Recipe for new recommended jaulo

Ingredient	Quantity	
	Grams	Local utensil
Lentil	12 gm	2 spoons
Rice	12 gm	2 spoons
Cabbage	16 gm	2 spoons
Tomato	10 gm	half
Carrot	12 gm	1 thumb
Other vegetables	As available, in addition or replacement of carrot, tomato and cabbage in respective amount	

1. Prior practice

Jaulo was being prepared by the participants prior to the food demonstration, however most participants were not preparing jaulo with the recommended quantities of rice, lentil, and vegetables. Participants reported adding rice and lentils in a greater amount than vegetables. While some participants reported adding vegetables to jaulo, others reported making plain jaulo of rice and lentil only. Participants reported not adding cabbage and tomatoes usually.

“Sometimes I used to prepare jaulo by adding lentil like the one we learnt today. I used to add lentil and rice sometimes.” (Mother of 21-month-old, mid SES, first HH visit)

“I don’t measure the quantity, and the vegetable mixed in jaulo were also different.” (Mother of 15-month-old, mid SES, first HH visit)

However, a few participants reported preparing jaulo using the recommended amount.

“I mix 3 spoons rice, 3 spoons lentils, 3-4 pumpkin leaves, greens, yellow part of boiled eggs, and half tomato in jaulo.” (Mother of 12-month-old, low SES, first HH visit)

“I have used maximum of the vegetables which are mentioned here today, lentil, cabbage, and tomato as well. I add half tomato, if the tomato is small then I use whole of it otherwise I use half. And then I mix onion in it.” (Mother of 16-month-old, mid SES, first HH visit)

The feeding frequency of jaulo differed among the participants. Some participants prepared jaulo daily, or more than one time in a day, whereas others prepared it four to six times a week. When jaulo was not fed, children were fed rice and lentils. *Jaulo* and *lito* were also fed alternatively.

2. Compliance:

Table 17: Number of participants who prepared new recommended jaulo recipe to feed their children in a week

No. of days in a week	2 nd HH visit		Total	3 rd HH visit		Total
	Full	Partial		Full	Partial	
7	29	5	34	28	7	35
4-6	10	5	15	17	1	18
1-3	19	8	27	10	3	13
Not Fed			3			9
Total	58	18	79	55	11	75

The new recommended jaulo recipe was prepared and fed to their children by most participants; more than a third of participants prepared jaulo as recommended throughout the week during the second and third HH visits. The participants reported using at least three vegetables; even when the recommended vegetables were not available, they reported using other similar vegetables.

“I mix 2 spoons of rice, 3 spoons of lentils, 2 spoons of cabbage, 2 spoons of carrot, if the tomato is small, I mix one and if it is big, I mix half.” (Grandmother of 12-month-old, high SES, second HH visit)

“I mix 3 spoons of lentils, 3 spoons of rice. If there is no cabbage at home I mix other vegetables, but I mix 3 different types of vegetables. I mix seasonal vegetables like beans, brinjal and greens.” (Mother of 17-month-old, high SES, third HH visit)

More than half and more than a third of participants did not feed new recommended jaulo regularly during second and third HH visit respectively. There were various reasons reported by the participants, including: children were sick, and children did not prefer eating the same dish every day.

“Sometimes, he doesn’t eat every day, so I give it in alternate days. We have a plate in which he eats, when we haven’t cooked new recommended jaulo, we add lentil to the rice.” (Grandmother of 15-month-old, mid SES, third HH visit)

“No, he doesn’t like the same food every day. So, I have fed him the recommended food items at least 4 times in a week. He eats something else for next 3 days. He eats new recommended jaulo and pancakes for 3-4 days and on rest of the days, he eats whatever I cook for him.” (Mother of 15-month-old, mid SES, third HH visit)

3. Acceptability:

Recipe practiced as recommended: Generally, acceptance of the new recommended jaulo recipe was good among participants, and many reported changing their prior cooking practices for jaulo after the food demonstration. Most participants, who made jaulo of rice and lentils only began adding vegetables. Prior to the food demonstration, potatoes were mostly used as a vegetable in the jaulo recipe, but now participants reported using other vegetables. Participants said that they were not previously aware of adding other vegetables in a jaulo recipe.

“I used to make jaulo but I didn’t know we could add vegetables in it as well. I just used to fry some minced ginger and garlic with the rice and pressure cook it.” (Mother of 23-month-old, mid SES, second HH visit)

“I used to (add vegetables) but I didn’t use that variety of vegetables. I used to add legumes and sometimes potato only.” (Mother of 12-month-old, low SES, second HH visit)

“Yes, rice lentils and a little ghee. I am from the Terai and that’s what we do there. But now I have been making it the way you taught us and add vegetables also.” (Mother of 18-month-old, mid SES, second HH visit)

Participants reported cooking new recommended jaulo using the ingredients in a proportionate amount as recommended, as well as feeding their children in a correct amount without the food getting wasted.

“I used to add more rice because seeing only a small amount would not satisfy me as I didn’t know the right amount. That way I used to cook more, and it used to get wasted. But now since I cook in a small amount, it cooks fast and it’s not even wasted. It has become much better now.”
(Mother of 15-month-old, high SES, second HH visit)

“We all have made jaulo before, but we didn’t know about the required quantity for children’s proper growth. Also, I have never heard of using cabbage in the jaulo and no one ever taught me before. But now we have learned new things which are beneficial for the children so I would say I really liked the new recommended jaulo recipe.” (Mother of 23-month-old, high SES, third HH visit)

Children’s preference towards the recipe: Participants reported that their children liked the new recommended jaulo recipe with added vegetables.

“When I prepared jaulo before I only mixed lentils, rice, and ghee, but now different vegetables are included and it is tastier than before, so she likes to eat more.” (Mother of 12-month-old, mid SES, third HH visit)

“I did not know what should be fed in what amounts. I used to mix only rice, ghee, and potato before. I now mix all the recommended foods and some extra foods also. My child didn't like to have jaulo, now he eats new recommended jaulo a lot.” (Mother of 12-month-old, low SES, third HH visit)

Eighteen and eleven participants did prepare new recommended jaulo but not as recommended according to the second and third visits. Several of them prepared plain jaulo because their children preferred it. Others did not use the ingredients as recommended, used more rice compared to lentil, or did not add vegetables in the recommended amounts to accommodate their children's preference.

“I added the vegetables every time so that she would get used to the taste, but all my attempts failed. So, I made plain jaulo after that using rice, lentil, and potato only..... she does like plain jaulo. She had jaulo with vegetables for 4 times, but she didn't like it maybe because of the vegetables.” (Mother of 22-month-old, mid SES, second HH visit)

“She didn't use to eat much before as well, that's why (I added less than recommended amount of carrot), you had asked to add 1 thumb of carrot, but I add less than that.” (Mother of 14-month-old, high SES, second HH visit)

However, three and nine participants did not feed new recommended jaulo according to their reports at the second and third visits. These participants, along with few others who did not feed their children new recommended jaulo regularly, mentioned that their children did not like it.

“Nowadays, my child doesn't like to have new recommended jaulo. I used to prepare it by mixing ladies-fingers but now I don't prepare it.” (Mother of 20-month-old, mid SES, second HH visit)

“My child does not like new recommended jaulo. I have been feeding him lito, lentils, milk, and egg daily instead of new recommended jaulo.” (Mother of 18-month-old, high SES, third HH visit)

Some participants reported increasing the recommended amount of ingredients because their children ate more. During the food demonstration, the participants were suggested to increase the amount of ingredients proportionately if their child ate more as this was the minimum recommendation to meet micronutrient requirements.

“Ma’am had recommended 2 spoons of chopped saag. My baby eats more because she is big, so the recommended amount won’t be enough for her. That’s why I prepare with more rice. I add all other ingredients according to rice amount, I add more lentils, carrot, and green vegetables also.” (Mother of 23-month-old, mid SES, second HH visit)

Perceived advantage of the recipe: One of the main perceived advantages of the new recommended jaulo recipe was that it enabled feeding vegetables to children. During the household visits, participants mentioned that their children would not eat vegetables alone, but they ate jaulo with vegetables added. Furthermore, several participants reported that with new recommended jaulo their children receive more vegetables than with family food.

“If I cook a vegetable for food then we’ll only have one vegetable, like if I cooked fried potato, then it will be potato only, if I cooked spinach then it’s spinach only and similar for meat. I add everything in new recommended jaulo.” (Mother of 15 months old, High SES, second HH visit)

“She does not eat vegetables (other than mixed in new recommended jaulo). She just has it (vegetables) in new recommended jaulo.” (Mother of 21-month-old, mid SES, third HH visit)

“When we add it (vegetables) in new recommended jaulo then she can’t separate it, and she has to eat it anyway.” (Mother of 18-month-old, high SES, third HH visit)

Perceived positive consequences: Participants reported that they perceived the new recommended jaulo recipe to have health and nutrition benefits.

“It helps for the growth of a child. Before this program, I mixed only lentils and rice, but she doesn’t like to eat when I mix vegetables she likes to eat.” (Grandmother of 22-month-old, high SES, second HH visit)

“Because it is good, and my son also liked it. It contains all the nutrition that is required for growth and development.” (Mother of 15-month-old, high SES, third HH visit)

Intention to continue using: Except for eight, all participants reported a strong intention to continue the new recommended jaulo recipe for their children. The reported reasons for their willingness to continue the recipe was that they perceived the recipe to be beneficial for the health and nutrition of their children, the recipe was easy to follow and not costly.

“These foods are good for the child so, I must continue. If I feed lentils, rice, and vegetables separately, the child may not finish all food items, but the child finishes when new recommended jaulo is fed.” (Mother of 15-month-old, high SES, second HH visit)

“It is better to feed him home made food than the junk food from the market. It is healthy and nutritious at low price. You have taught us what is good for our kids so I’m going to continue in the future.” (Mother of 23-month-old, high SES, second HH visit)

“Because the baby also likes it, and it is good for the health of baby as well. And it is neither difficult nor costly to prepare.” (Mother of 21-month-old, mid SES, third HH visit)

Beyond the perceived health and nutrition benefit of the recipe, child preference was one of the strong motivations for participants’ willingness to continue the recipe in future. As some participants reported that had their children not liked the recipe, they would not have intended to continue it.

“That is (new recommended jaulo) what she likes the most. She eats it well. So, I’m willing to make it for her.” (Mother of 18-month-old, high SES, second HH visit)

“Yes. He is eating well. If he hadn’t eaten it so well, I would have stopped but now I don’t see any reason to stop.” (Mother of 21-month-old, mid SES, third HH visit)

Out of eight participants, four were not sure they would continue with the recipe given their child preferences. Others reported cost and time for not being able to continue the recipe to their children.

“I did but she did not like it. However, I will try again.” (Mother of 22-month-old, mid SES, second HH visit)

“If I had money I would continue.” (Mother of 14-month-old, high SES, second HH visit)

4. Feasibility

Cost: Most participants were not worried about the cost of the new recommended jaulo recipe for their children, even though, for some, it increased some expenses.

“I think my expenses have been reduced now. Previously, I was not sure what and how much I should be feeding him. But now I have learned his minimum requirement. So, I don’t think that it is expensive.” (Mother of 15-month-old, high SES, third HH visit)

“Obviously, as I told you that I used to make plain jaulo, but now you need to buy all the ingredients so, it is expensive, but I don’t mind the expenses as I am spending it for my child.”
(Mother of 16-month-old, mid SES, third HH visit)

“Most of the ingredients are the basic household requirements so it didn’t add any more expenses.” (Mother of 18-month-child, high SES, third HH visit)

Interestingly, one participant reported a reduction in their daily expenditure on unhealthy foods because of the new recommended jaulo recipe.

“I used to feed her junk food from the market, and it was more expensive than it is now. Two of my kids used to have junk of about Rs.1000 in a day, but now the expenses have reduced.”
(Mother of 18-month-old, mid SES, third HH visit)

However, some participants did show their concern for the cost of new recommended jaulo recipe.

“If I have to cook new recommended jaulo, I have to cook twice because my daughter doesn’t eat it and I don’t like it too. And if I cook rice and lentil, it will be for everyone. Cooking new recommended jaulo also takes extra effort and extra gas. Gas is also very expensive nowadays, while cooking new recommended jaulo we have to cook it for a long time as well.” (Mother of 18-month-old, high SES, second HH visit)

“Yes, it is a little expensive as we need to add many ingredients like cabbage, tomato, and carrot. Previously I used to add some potatoes, okra, which is brought for the family, but now I need to buy separate ingredients just for her. So, I think it is a little expensive.” (Mother of 23-month-old, mid SES, second HH visit)

Time and Effort: Most participants reported that time and effort was not a problem for them to prepare the new recommended jaulo recipe. Further, it was not an issue to spend a little more time and effort cooking foods for their children. As many of the participants were staying home and not working outside, they mentioned they have enough time to cook for their babies; besides preparation, the new recommended jaulo would be cooked when they finished other household chores.

“No, it will be ready in a blink of time while you are busy doing other chores. (Mother of 21-month-old, mid SES, third HH visit)

“Yes, it is a little time-consuming, but it is not considerable. Cleaning all the vegetables and chopping it takes 5-10 minutes more than my usual time.” (Mother of 19-month-old, mid SES, third HH visit)

“No, it does not take much time. I am not working right now as my baby is small. So, all I do is stay home and take care of my child. So, I don’t have any problems regarding time management.” (Mother of 16-month-old, mid SES, second HH visit)

Two participants reported that it takes less time to cook new recommended jaulo recipe than the recipe they were using before.

“No. I found that this takes even less time, I used to add more water before and sometimes it used to be too soft and sometimes hard, and sometimes it used to get burned. Now, I know how much water should be added, so it has been easy for me, and it takes less time to cook.” (Mother of 17-month-old, high SES, second HH visit)

Even two working mothers did not find it difficult to prepare new recommended jaulo for their children.

“I make it in the morning and whoever is staying home looking after the child reheats it to feed him in the afternoon.” (Mother of 23-month-old, mid SES, second HH visit)

However, two other working mothers found it difficult to manage time to prepare the new recommended jaulo for their children.

“I’m mostly busy with my work at the bakery and I don’t get enough time, so I feed her what’s cooked for the other family members.” (Mother of 17-month-old, mid SES, third HH visit)

Recipe 2: Pancake

Table 18: Recommended recipe for pancake

Ingredient	Serving size
Ghee	1/2 spoon
Super flour	2 spoons
Egg	1 egg

1. Prior practice

Pancake was not usually prepared prior to participants' participation in the HH trial; participants fed eggs separately, either by boiling or frying. Several participants who prepared pancakes used other flour instead of *sarbottam pitho*. One participant reported preparing pancakes sometimes and one other reported preparing pancakes daily.

"I prepared pancake in flour but not in sarbottam pitho because my child doesn't like to have sarbottam pitho." (Mother of 18-month-old, high SES, first HH visit)

"If the ingredient is not available, I don't feed. Otherwise, I prepare pancake regularly." (Mother of 12-month-old, mid SES, first HH visit)

2. Compliance

Table 19: Number of participants who prepared pancake recipe as recommended to feed their children in a week

No. of days in a week	2 nd HH visit			3 rd HH visit		
	Super flour	Other flour	Total	Super flour	Other flour	Total
7	3	3	6	2	3	5
4-6	5	2	7	4	2	6
1-3	10	20	30	15	12	27
Not Fed			36			37
Total	18	25	79	21	17	75

Nearly half of participants did not feed pancake to their children according to reports at the second and third household visits. Others who fed were very infrequent in feeding pancakes to their children.

"I had prepared 2 times only. When madam taught us in the program, that day my child had to eat pancakes. But when I prepared it at home, she didn't like to eat it. I think I made pancakes hard so my child can't eat." (Mother of 21-month-old, mid SES, third HH visit)

“I’ve prepared it 2 times till now, but my child doesn’t like to have it. She eats lito and boiled eggs.” (Mother of 15-month-old, mid SES, third HH visit)

Like new recommended jaulo, participants mentioned not feeding it regularly because their children preferred a change in taste rather than eating the same food item every day in a week.

“I prepared it in an alternate day, sometimes I give boiled egg and sometimes pancake.” (Mother of 20-month-old, mid SES, third HH visit)

“I prepare it (pancakes) on days when I don’t cook new recommended jaulo, I prepare it as snack.” (Mother of 23-month-old, high SES, third HH visit)

3. Acceptability

Children’s preference towards the recipe: Most participants reported that their children did not like pancakes. Instead, children would prefer to eat lito (super flour porridge) or eggs.

“I prepared pancakes, but my child didn’t eat them. When I prepared in sarbottam pitho it becomes hard, so my child couldn’t eat. I tried wheat flour, but my child doesn’t like to have pancakes.” (Mother of 23-month-old, high SES, second HH visit)

“My son likes lito rather than pancakes, so I didn’t make it. The recommendation was to feed 3 spoons lentil, and it was being met so I thought, meeting the requirement is enough.” (Mother of 18-month-old, high SES, second HH visit)

“I did make (pancake), but she didn’t like the pancake. She just eats eggs.” (Grandmother of 17-month-old, mid SES, third HH visit)

However, some participants had a positive experience feeding pancakes to their children. Their children liked pancakes.

“Yes, she eats it. She likes dry foods like this rather than other foods.” (Mother of 14-month-old, high SES, second HH visit)

“I had the Sarbottam Pitho at home, so I tried making it for him and he liked it. I made it 4 times (in a week).” (Mother of 23-month-old, high SES, second HH visit)

“I make pancake daily as well. I use 2 spoons of Sarbottam Pitho, half an egg and half cup milk and make 2-3 small pancakes and he eats all of it.” (Grandmother of 20-month-old, mid SES, third HH visit)

Perceived advantage of the recipe: A few participants found the recipe easy to feed egg to their children, as their children did not eat eggs alone.

“He doesn’t eat the boiled one (eggs), so I give him the pancake of this size (gesture), and it’s also easy to eat for him.” (Mother of 15-month-old, high SES, second HH visit)

“No, she does not eat boiled or fried eggs. She just likes it in pancake.” (Mother of 21-month-old, mid SES, third HH visit)

Intention to continue using the recipe: Except for a few participants whose children liked pancakes, others did not intend to continue using the pancake recipe. Two participants reported that the pancake is hard for their children whose teeth are still growing.

“After she grows more, her teeth will be filled and then she might like pancakes, because it’s tasty. Right now, she might not have eaten it because she doesn’t have many teeth. She bites it and throws it, but she doesn’t eat it because it is hard as well.” (Mother of 21-month-old, mid SES, second HH visit)

“The teeth of my baby haven’t grown properly as he is only 17, 18 months old. I feed him lito and eggs.” (Mother of 16-month-old, mid SES, second HH visit)

4. Feasibility

Cost: Except for three participants, participants did not state that it was a financial problem to purchase the ingredients used to make pancakes regularly.

Time and effort: A few participants considered time and effort as a problem to prepare pancakes for their children.

“I did not have the ingredients, and I haven’t made the powder (sarbottam pitho) as the mill is very far.” (Mother of 20-month-old, mid SES, second HH visit)

“I have to go to work as well, that’s why (I did not prepare pancake).” (Mother of 21-month-old, mid SES, second HH visit)

Supportive Environment to Practice Recommendations and Recipes

1. Motivation to practice recommendations and recipes

During the first HH visit and FGD, participants’ motivation to practice the FBR and recipes demonstrated were discussed. These included:

Perceived health and nutrition benefits of recommendations and recipes:

All participants reported that following the FBR is good for children’s health since they are nutritious. They added that these foods help in the physical and mental development of children, so they should be fed these foods regularly. Given the health and nutrition benefits, almost all participants were willing to follow the recommendations.

“These foods are good to feed, these contain vitamins. Bones will be stronger.” (Mother of 12-month-old, low SES, first HH visit)

“Feeding these foods to children is good. Their minds will be active, and the child will get nutrition.” (Mother of 17-month-old, mid SES, first HH visit)

New learning around feeding young children:

During the first HH visit, participants reported being happy to learn about the foods and the feeding practices for young children and were willing to follow the FBR. Moreover, they reported being aware of the amount of food to be fed and adding vegetables in appropriate amount to the jaulo recipe. They added that children will form the habit of eating vegetables when they grow older if they start eating vegetables at the current age. Some participants did feed tomatoes and cabbage to their children and were happy to learn the importance of these vegetables.

“I didn’t know how to prepare the food for the baby, and what amount should be fed. We used to add food on our own estimated guess, however the quantity of food used to be more when I tried to cook a little bit. Now the amount is perfect.” (Mother of 23-month-old, high SES, FGD)

“Foods which I have not cooked till now include cabbage, but cabbage is also good to feed. I like all the recommended foods.” (Mother of 15-month-old, mid SES, first HH visit)

“I used to mix only greens and potatoes in jaulo. Now, I know carrots and cabbage are also important for the health of children.” (Grandmother of 18-month-old, high SES, first HH visit)

The focus group discussion participants shared the same happiness on learning new information about the different foods to be fed to children. They reported liking the foods recommended to their children.

“We are happy. We got the information about adding different foods to provide adequate vitamins for child.” (Mother of 22-month-old, high SES, FGD)

Some of the participants had already been feeding recommended foods to their children but were unaware about the right amount and frequency. Learning about the proportion of the recommended foods made them happy. They mentioned that their children have started to eat more and have become healthier compared to before.

“These are the foods that must be fed to children even though you had recommended it or not. But what’s different is, after you recommended it, we fed more of it. We have been adding 1-2 types of foods in jaulo, after you said we add 2-3 more type of things.” (Grandmother of 21-month-old, mid SES, FGD)

During the first HH visit, some participants were happy to learn the recipe of pancake because it was a good idea to feed egg to their children. A similar finding was reported during FGD.

One participant said that as there wouldn’t be many options to feed baby and due to her busy schedule, pancakes have been a best option. The other reported that pancakes were easier to carry when they are outside with the child.

“If we have to prepare something quickly then pancake is easy. It does take some time to prepare ingredients for new recommended jaulo recipe, but pancake is quick.” (Mother of 12-month-old, high SES, FGD)

2. Compatible with existing beliefs and culture

The findings from FGD revealed that none of the participants mentioned any belief which caused not feeding of the six recommended foods to their children.

3. Decision making

During the FGD, participants reported that the decisions of buying foods from the market, of cooking, and of child feeding are made primarily by the participants themselves. Further, there are not any restrictions from anybody in their household or community when it comes to preparing certain foods for their children.

“I take the decision myself about feeding the baby at home. My husband doesn’t even know what I am cooking and feeding the baby.” (Mother of 12-month-child, high SES, FGD)

However, some reported that decisions are also taken by mothers-in-law and husbands, with husbands and mothers-in-law playing a particular role in decision-making for food purchases. In addition, mothers-in-law also decide regarding feeding the children. Two participants said that they ask their husband to bring the food whereas the other two participants said that her husband brings food on his own.

“My husband brings foods on his own, and I cook for my child.” (Mother of 23-month-old, mid SES, FGD)

4. Existing IYCF interventions or programs

Participants of the FGD did not know of any existing interventions or programs related to child nutrition in their community. They reported that this was the first ever child nutrition related activity in their community where they participated; and almost all participants liked it. They mentioned being concerned about child feeding as they were unaware about which foods are nutritious. One participant shared that interventions around child feeding are more focused on rural municipalities than urban. Hence, the participants appreciated the study as being a great help to them in regard to child feeding. One participant shared that she knew about different health programs from FCHV when she lived in village but did not know anything about child nutrition programs in the community where she lives now.

“In villages, FCHVs would go to distribute medicines after a woman becomes pregnant, and they follow up until the baby is born and they also used to give some pregnancy expenses. But this is the first program for us (on child feeding).” (Grandmother of 21 months old, mid SES, FGD)

“When my first daughter was born, we were here only, but we didn’t know anything. We used to feed her what I had learned in my village, and I used to feed the family food. Now I’m feeding differently to my younger child, like you taught.” (Mother of 18-month-old, mid SES, FGD)

Participants suggestions with recommendations and recipes

Participants suggested adding any vegetables available at home, besides the recommended ones, to the new recommended jaulo recipe. They further added that other green leafy vegetables such as spinach, other *saag*, and green vegetables such as okra should also be fed as these are good for children. Participants also suggested giving fruits to the children in addition to the recommended food items.

Participants asked for and suggested more recipes for their children. They reported that though new recommended jaulo was liked by the children, they do not eat it every day and want change in the taste.

“My child eats new recommended jaulo but not every day. Children don’t eat food of same taste daily, we don’t even like the same taste either.” (Mother of 16-month-old, mid SES, FGD)

Participants had suggestions on further recipes which included vegetables and fruits puree, lito with fruits added to enhance the taste, and adding milk to pancake to make it soft.

“If any mother is tense that their baby is not eating lito then they can mix the paste of apple, banana, if the children like fruits.” (Mother of 15-month-old, high SES, FGD)

DISCUSSION

There is a critical need to improve the diets of young children in Nepal to reduce malnutrition. Nutrition-specific interventions are essential to provide strategies to families that they can utilize to improve the diets of their young children. To evaluate proposed FBR to improve the diets of children 12-23 months of age, (developed previously using the Optifoods and ProPAN tools), a mixed-methods observational study was conducted in Kathmandu Valley.

The FBR tested were: milk once a day, egg four times a week, and lentils and vegetables three times per day. Caregiver compliance with the FBR was recorded, with compliance varying depending on the FBR. Most of the caregivers did not provide milk, as their children were breastfeeding and thought breast milk was enough. This finding was similar to that of a study done in China where yogurt was not given to the children because caregivers thought breast milk was enough (Wu et al., 2013). Encouragement of breastfeeding is vital but at the same time it is necessary to ensure that enough breast milk is fed to help meet recommended intake.

A similar multi-method study conducted in China showed that suggested recipes were nutritious, useful, and easy to cook (Wu et al., 2013). However, unlike this study, mothers did not report that it was inconvenient to cook with the many ingredients required in the new recipes (Wu et al., 2013). Other reasons for non-compliance were similar to those given by mothers in this study, such as children having difficulty chewing, seasonality of foods, and children not liking a particular vegetable (Wu et al., 2013).

Local availability and seasonality were identified as key determinants for feasibility and acceptability of recommended foods in a study conducted in Uganda (Bekele & Turyashemererwa, 2019); these were also identified as key determinants in this study in Nepal, in which the feasibility of providing the recommended foods was assessed in terms of cost, and time and effort. Milk, egg and vegetables were found to be costly compared to lentils because lentils are consumed by all members of the family and therefore are available in the home most of the time. But other foods required for the recipe needed to be bought and thus were considered a bit expensive.

This study found that the acceptability of the recommended foods was generally based upon child preferences. Milk was mostly not preferred by children and thus not commonly provided. Given this, it is important to rethink the manner or recipe to feed milk to children. For lentils and vegetables, it was easier to feed as it was included in the new recommended jaulo recipe and children generally accepted it. The factors cited for acceptability of the recipes were availability of food, ease of cooking and the cooking time, and child preferences for some mothers, which is similar to findings of Bekele & Turyashemererwa (2019).

Bekele & Turyashemererwa found mothers easily accept working with familiar foods and preparation methods. In this study also, the new recommended jaulo, a familiar recipe, was more successful compared to the less familiar pancake. However, full compliance for the new recommended jaulo was not achieved. Caregivers felt that children would prefer more variety and did not like to eat the same. This shows there is a need to consider developing additional recipes to increase the overall compliance with the recommended food intake. The other recipe, pancake was not as successful. Compliance was low because caregivers said children eat *lito* and egg separately and there was no need to prepare pancakes. Based on this, a separate recipe may not be required to feed egg and lentils. The remaining amount of lentil as recommended can be added in the new recommended jaulo itself or *lito* can be recommended to fulfil the requirement.

Decision making regarding purchase of food and feeding were usually done by caregivers. This is different from the study done in Uganda where the main decision makers for purchase of foods in the households were husbands (Bekele & Turyashemererwa, 2019). Mothers-in-law and husbands' significant influence on controlling mothers' access to money for purchasing the recommended foods and determining which foods were purchased for family consumption and how they were used (FANTA III Project, 2015a) were not noted in this study.

Based on the findings, the recommended foods were considered acceptable, however the ability and desire of putting the FBR into practice with the recommended frequency and quantity should be considered. Challenges such as financial limitations and seasonal price variations to implement recommended foods mentioned in FANTA studies (FANTA III Project, 2015a; FANTA III Project, 2015b) were observed in this study as well. However, several other limitations noted in the FANTA studies, such as inability to store perishable foods, cost of traveling to the market, and inability to access markets often enough to buy fresh foods were challenges (FANTA III Project, 2015a) that were not reported as significant barriers in this study. Despite challenges, caregivers demonstrated a strong willingness to try the recommended FBR, and families were supportive of efforts to improve children's nutrition.

There is an urgent need to conduct IYCF related interventions and programs in urban areas. These interventions should include encouraging substitute foods to meet the same nutrient requirements which consider seasonal variation (Bekele & Turyashemererwa, 2019). Recipes that are easy to prepare at home; use of simple and familiar cooking methods; and use of easy-to-add foods/ingredients (Talavera & Narciso, 2014) should be highlighted.

LIMITATIONS

Several limitations of the study should be noted. The 24-hour dietary recall was recorded only once in initial and final visits of HH trial. Therefore, this single 24-hour recall is unable to account for day-to-day variation and fails to identify irregularly consumed foods, and intake of some foods/nutrients can be underestimated. Most participants belonged to mid socio-economic

status and the study was conducted in Kathmandu only using non-probability sampling technique, therefore the findings of this study cannot be generalized to the whole population. This type of study should be replicated in other regions within Nepal.

CONCLUSION

This investigation tested recipes which incorporate several foods recommended to fulfill nutrient requirements for children 12-23 months of age. The insights gained through this study about acceptability, feasibility, and compliance with the four FBR can aid promotion of FBR at a larger scale. Further understanding of the facilitators and barriers to adopting FBR can inform behavior change communication strategies to promote such recommendations among target populations.

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