

Recipe Development Guide



A Participatory Approach
to Designing Recipes Using
Local Foods



Photo by Philip Laubner/CRS

ACKNOWLEDGEMENTS AND INTRODUCTION

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The purpose of this guide is to assist field colleagues who are implementing nutrition programs to improve feeding practices through the development of recipes utilizing locally available nutrient-rich foods. It was developed with the primary purpose of creating recipes for meals and snacks for infants and young children, and can be further adapted and used for pre-school age children, primary school children, adolescents, pregnant and lactating women, or whole household meal development. Field colleagues will become more familiar with the community context and be supported in developing recommendations aligning with global and country-specific nutritional guidelines. Our desire is that this guide will enhance an understanding of local practices, beliefs, barriers, and enablers to help improve nutrition practices through a participatory process with communities. The learning from this guide can be used to develop participatory nutrition education materials such as recipe books, cooking demonstrations approaches, peer support group activities, and household counseling materials, to name a few.

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COMPONENT 1

UPDATING YOUR KEY FOODS LIST

Objective:

The purpose of this section is to create or update a **Key Foods List** that is used in preparation of meals for the target population or group of interest.

To achieve this objective, follow the steps for organizing an existing list or inventory of foods commonly consumed in the community and combining it with a food calendar (a calendar with the months of the year in which certain fruits and vegetables can be found locally).

Your product will be a **Key Foods List** with 25-30 key foods (including foods growing in the wild and those produced in the home or commercial sector, particularly those that are enriched or fortified) which should include energy-rich foods, animal-source foods, sources of protein and/or micronutrients (iron, zinc, vitamin A, vitamin C, and calcium) and others that can be considered potentially important. If no current list of foods is available, use the [Market Survey](#) and [Community Focus Group first](#), followed by the steps below.

Overview:



Foods List

Steps:

1. You can start with a current list of foods commonly consumed in the community.
 - If this is unavailable, but you have a Food Composition Table (see *Appendix B for definition and description*) for your community or region, you can use the foods listed in the table.
 - If you also have a food calendar (foods grouped by seasonal availability), you will need this, too.
2. Start by filling out the [**food groups list**](#) with foods that fall under various food categories. To get started, review the example foods found on the food group tables listed on the following pages and circle those commonly found in your area. Carefully study each food group description to help to appreciate the diversity of foods within each food group.
3. Transfer these subgroups of foods to the [**Key Foods List**](#). List 1 food per line, labeling each one with the name of its food group and seasonal availability (use existing food list/calendar data or data from the [**Market Survey**](#) or [**Community Focus Group**](#)).
4. If possible, list 25–30 foods, with the most commonly-consumed foods appearing closer to the top of the list.

Food Groups

Objective: The purpose of this section is to describe food groups, which categorize foods generally by their source and the nutrients they provide.

These food groups and the associated exercises can be used to label Key Foods in the [**Key Foods List**](#). Later in the guide, food groups will help create and refine mixed meals and recipes for your target population (see *Appendix D: Food Groups and Nutrients for a more detailed description of food groups*).



If the Ministry of Health designates food groups to be used, use those instead of the food groups listed below.

Staple Food

Every community has a staple food, or foods. It is the main food eaten. Examples are cereals, roots, and starchy fruits. In rural areas, families often spend much of their time growing, harvesting, storing, and processing the staple food. In urban areas, the staple is often purchased, and the choice depends partly on cost. Cooked staples can usually be mashed or softened in a small amount of liquid; staples are often milled into flour and cooked to make a porridge or gruel.

CHECK THE FOODS USED BY MOST FAMILIES IN YOUR AREA.

ADD ANY NOT LISTED.

Cereals

- Rice
- Maize (corn)
- Wheat
- Millet
- Sorghum
- Quinoa

Roots

- Cassava (manioc/yucca)
- Yam
- Taro (eddo/dasheen)
- Tannia (cocoyam)
- Potato

Starchy Fruits

- Cooking banana
- Breadfruit
- Plantain

Pulses/Legumes, Nuts, and Seeds

This category includes pulses/legumes as well as nuts and seeds. These foods can provide protein in a meal, and nuts and seeds are higher in fat than staple foods and pulses/legumes.

CHECK THE FOODS AVAILABLE IN YOUR AREA. ADD ANY NOT LISTED.

Low-Fat Pulses

- Chick pea (dhal, Bengal gram)
- Pigeon pea (dhal, red gram)
- Lentil (split pea, adas)
- Lablab (bonavist bean)
- Cowpea
- Blackeye pea
- Red bean (kidney bean)
- Broad bean
- Mung bean (green gram)
- Navy bean
- Lima bean
- Tarwi

High-Fat Pulses/Oil Seeds

- Groundnut (peanut)
- Bambarra
- Soybean
- Pumpkin seed
- Sunflower seed
- Melon seed
- Sesame (sim-sim)
- Shea butter-nut
- Cashew nut
- Pine kernel

Animal Foods

This food group includes foods derived from animals and fish/shellfish, including flesh, eggs, and organs. It also includes dairy (milk, cheese, and yogurt). Animal foods can be eaten fresh (like milk), cooked, or preserved (like dried meat or fermented foods like yogurt). Animal foods are good sources of protein; some of them are concentrated sources of certain vitamins and minerals.

CHECK THE FOODS AVAILABLE IN YOUR AREA. ADD ANY NOT LISTED.

Animals, Birds, Fish

- Beef
- Lamb/mutton/goat
- Pork
- Liver/kidney/other offal
- Rabbit
- Wild animals, insects
- Chicken
- Duck/other birds
- Fresh fish
- Dried fish eaten whole
- Canned fish eaten whole
- Shell fish/other fish

Foods from Milk

- Fresh whole milk
- Fresh skimmed milk
- Dried whole milk
- Dried skimmed milk
- Evaporated whole milk
- Condensed whole milk
- Cheese
- Yogurt
- Curds

Eggs

- Hen's Eggs
- Duck Eggs

Flavoring Foods

Although foods like onion, garlic, salt, pepper, and spices do not contribute many nutrients to a meal, they flavor foods and make them palatable and enjoyable. The subgroup food listing exercise does not include a column for flavoring foods, but they may show up on the market survey or in the community focus group.

Fruits (Yellow/Orange and Other) and Vegetables (Dark Green, Yellow/Orange, and Other)

Fruits like mango, orange, or passion fruit can provide vitamin C in the diet and may help with iron absorption in a meal. Fruits in general provide vitamins and minerals and calories/energy. Vegetables that are dark green and yellow/orange are generally good sources of vitamin A. Vegetables in general provide vitamins and minerals.

The exercise will have you identify dark green and yellow/orange (orange-colored) vegetables and yellow/orange (orange-colored) fruits. Examples of other fruits and vegetables are provided as they may appear in the market survey or community focus group.

CHECK THE FOODS AVAILABLE IN YOUR AREA. ADD ANY NOT LISTED.

Dark Green Leaves

- Spinach
- Amaranthus
- Kale
- Pumpkin leaves
- Sweet potato leaves
- Cassava leaves
- Chard

Orange or Yellow Vegetables

- Pumpkin
- Carrot
- Sweet potato
- Squash/zucchini

Orange-Colored Fruits

- Mango
- Passion Fruit
- Paw-Paw (papaya)
- Orange

Other Fruits/Vegetables

- Eggplant
- Onions
- Tomatoes
- Okra
- Plantain

Oils, Fats, and Sugars

Oils and fats are concentrated sources of calories/energy. Adding a teaspoon of oil or fat to a meal gives extra calories/energy in a small volume. Red palm oil, butter, and ghee have vitamin A, and margarine sometimes has vitamins A and D added to it by the manufacturer.

Sugar, jaggery (palm sugar), and honey are also calorie/energy-rich and can be added to a staple porridge or other foods in small quantities.

CHECK THE FOODS AVAILABLE IN YOUR AREA. ADD ANY NOT LISTED.

Fats

- Margarine
- Butter
- Fat from meat
- Ghee
- Lard

Oils

- Soy oil
- Coconut oil
- Sunflower oil
- Groundnut (peanut) oil
- Olive oil
- Coconut cream
- Maize (corn) oil
- Palm oil
- Red palm oil
- Sesame oil

Market Survey

Objective: The purpose of the market survey is to identify the foods that provide the greatest amount of energy and nutrients for the least cost (nutrient/cost ratio) and generate a calendar with the months of the year in which certain fruits and vegetables can be found locally.

To achieve this objective, follow the steps below and use the [Market Survey Form](#) to record data.

Steps:

1. Include the name of the retail location from where the price and seasonality information will be obtained. Write the specific location and exact address, district, and area/city to which it corresponds.
 - Write the code the Supervisor assigned to each Field Worker.
 - Write the date of the visit to the retail location (dd/mm/yyyy).
 - The Supervisor should verify the information on the completed form and write the code and date when they reviewed the form.
2. First column: Food Codes/Item Codes/Item Number
 - The codes to be written in the first column correspond to the codes of the [Nutrient Analysis of Recipe](#) used for the calculation of nutrients. The Supervisor should fill in the code for each food while preparing the list of foods.
 - Alternatively, the codes could be written on the form after the visit to the retail locations. The food code may also be called item code or item number, depending on the Food Composition Table used in calculation of nutrients.
3. Second column: Food Name
 - Write the entire name of the food and its key characteristics, so it will be correctly identified at the retail locations. For example, “red delicious apple” means that only the food prices for this type of apple should be obtained. These key characteristics are determined by the team before the visits to the retail locations and are written down by the Supervisor on each form.
 - For industrialized foods, the brand names should be written down.
4. Third column: Retail Unit
 - For example, for foods sold by kilogram (kg), the retail unit will be “kilogram” and the prices will be obtained for 1 kilogram of this food. For those foods sold by units such as bags, bottles, cans, etc., it will be necessary to specify the size of the retail unit.
 - If there is more than 1 unit, list all of them, using 1 row for each retail unit. Food prices should be recorded according to the retail unit in order to reduce errors in data analysis and interpretation.
 - This column should be completed by the Supervisor.
5. Fourth column: Net Weight
 - The fourth column corresponds to the net weight of the food’s retail unit. As described earlier, this is the weight of the edible portion of the retail unit, that is, without peel, bone, seeds, or other non-edible portions.
 - This column should be completed by the Supervisor. If needed, see *Appendix H: Calculations and Conversion Factors* for calculation of edible portion of foods.
6. Sixth column: Price
 - Up to 3 prices in local currency per retail location should be recorded for each food item if the location is a market with several vending stalls. Otherwise, only 1 price should be collected per retail location for each food item.



Photo by Dooshima Tsee/CRS

- The price should be written in local currency. Decimal points should be clearly written. For example, if the cost of a kilogram of mangoes is three soles and 50 cents (Peruvian currency), the number 3.50 should be written in the price column. This information should be completed by the Field Worker during the visit to the selected retail locations.
7. Last columns: Months Available (Seasonality)
- This information should only be collected for foods such as fruits and vegetables that are not available in the retail locations all year long. Write an “x” under the months in which the food is available (even if only a small amount is available). If the food is available all year long, write an “x” under the “All Year” column.
 - Note that this section considers the months in which the foods are available in the retail locations, not the months in which foods are sold in greatest quantities.
8. Fill out the [Food Calendar Form](#) to acknowledge the seasonality of foods in the area. This will be useful for the recipe enhancement exercise when developing a variety of recipes and adjusting based on seasonal availability.

Community Focus Group Discussion

Objective: The objective of a community focus group discussion is to obtain names and characteristics (food group, seasonality) of foods—including wild or gathered foods and foods produced or grown at home—commonly eaten by community members.

Steps:

9. The [Key Foods List](#) table may be a helpful format for recording foods (listed by community members) and their respective food group.
10. Questioning community members may be done in a community setting (such as a health clinic or community center, or even a popular market). A variety of people (from any and all socio-demographic backgrounds, gender/age, race/ethnicity) should be asked about foods commonly eaten.
11. Here are some questions to use when talking with community members:
 - What do you grow or raise at home?
 - Of these, what do you consume?
 - What do you sell?
 - How are these affected by the time of the year?
12. Fill out the Key Foods List Form and ensure the additions from the focus group discussions have a food group descriptor. For questions about grouping foods, see *Appendix D: Food Groups and Nutrients*.

COMPONENT 2

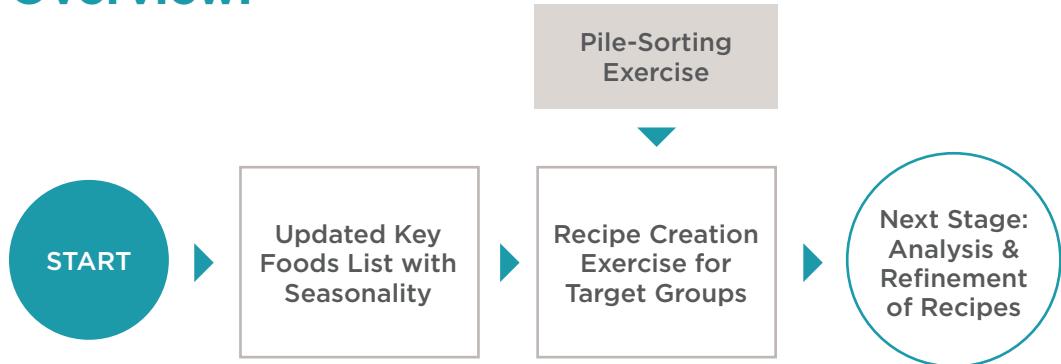
OBSERVING COMMON MEAL PREPARATION

Objective: The purpose of this section is to observe preparation of meals intended for the target population, and gather data for use in the analysis and refinement of these recipes.

To achieve this objective, follow the steps for conducting a recipe creation exercise and combining it with a pile-sorting exercise. You will need the [Key Foods List](#) and [food calendar](#) from Component 1 to set up the observation exercise and the pile-sorting exercise.

Your product will be recipes for the common meals eaten in households of the target population or group of interest. These recipes will be analyzed in Component 3, and refined according to facilitators and barriers indicated by the pile-sorting exercise to improve their nutrient density and content for the target population or group of interest.

Overview:



Recipe Creation Exercise

Caregivers of the target population or group of interest will use selected Key Foods and **household measures** and demonstrate the preparation of common meals or recipes usually fed to the target population. This exercise can be conducted either once, with 2-3 different sets or groups of Key Foods included to maximize the number of recipes obtained in 1 session (or more) to obtain multiple recipes. Team resources will determine the number of sessions held. Use the recipe creation exercise form to record data (you will need 1 form for each recipe recorded).

Steps:

1. For each session, 8-10 caregivers with similar characteristics (for example, from the same community or with similar economic conditions) should be identified. If it is likely that not all the caregivers invited will be able to participate, it is recommended to invite approximately twice the total number required for each session (such as, 20 caregivers invited for a session with 10 caregivers). The research team should try to form a group that is likely to work well together. To ensure that caregivers are able to participate fully in the session, it is recommended to have 2 or 3 people watching the children during the session, and to have toys on hand for them.
2. Gather materials, including copies of the [Recipe Creation Exercise Form](#), food scale, household measures used by caregivers for cooking, and ingredients (selected from the Key Foods list, fresh and/or cooked foods prepared from a raw state, in pre-weighed and recorded quantities appropriate for the number of participants). Also include materials for washing hands and sanitizing cooking utensils.
3. The sessions should be carried out in a relatively controlled atmosphere, where caregivers are provided with the ingredients, cooking utensils, and fuel—among other resources—for the recipe creation or modification. The place where the sessions are held should be a comfortable area in which all the participants feel at ease cooking and tasting the new dishes, feeding them to their children, and discussing their impressions.
4. At the beginning of each session, the objectives of the exercise should be clearly stated. You may want to follow the provided script:
 - “Today we are here to make recipes that are even more nutritious to feed [description of target population]. And, **you** will be preparing the recipes, not the study team.”
 - It is important to ask in the beginning—“How do you cook for your children? Prepare an individual meal? A pot for children only? Does it differ by age? Or a household pot for everyone?” This helps determine if you do 1 recipe preparation or 2, differing by age.
 - “Please create a typical recipe that you serve your child with the foods or ingredients provided [mention what is on the table]. We would like to know what is typically available to prepare.”
 - “Please point out what you would like to use if you had it available.” Any foods indicated should be noted on the **second page** of the [data recording form](#) by name and food group (such as, dark green vegetable, animal food, fat, etc.).
 - Depending on the response to question “b,” the caregivers of children of different ages might be split up. For example—“We will split into groups by age of your child. Those of you with children 6–11 months of age, please group together and prepare a recipe for children 6 months or older who are just learning to eat. Those with children 12–23 months please group together and prepare a recipe for children 12–23 months who are already eating table foods. It should be something typical that you would serve them.”
 - “You have up to 45 minutes to prepare a dish. After you prepare the recipe, we will weigh the food and record the ingredients, and then you will have a chance to feed it to your child.”
 - “Once you have fed your children we will ask you some questions in a large group format.”

5. All ingredients need to be weighed using the food scale before being used by participants for cooking. If ingredients are items pre-cooked from raw form (like rice or beans) for use in the exercise, raw amounts should be recorded as well as cooked amounts, and then also record amount used in any recipe.
6. Weigh the final products of the recipes used by the participants, and record ingredients used and amounts of each, before meals are eaten by children.

Pile-Sorting Exercise

Caregivers of the target population or group of interest will use selected Key Foods or visual representations (pictures or picture cards) of them to answer the following questions on the [Pile-Sorting Exercise Data Recording Form](#).

Steps:

1. The pile-sorting exercise can be conducted in tandem with the same participants as the recipe creation exercise.
 - Split the caregivers into similar groups as those used for the recipe creation exercise. For example, those with children 6–11 months of age should group together, and those with children 12–23 months should group together.
 - The materials needed are either actual foods or pictures of foods that are of interest (potential food taboos, beans, eggs) or the most nutrient-rich foods available (animal source foods or plant source foods that could fill a nutrient gap (iron, vitamin A)).
2. Arrange the Key Foods or the pictures by their [food group](#) to begin. The food groups might mirror the Ministry of Health's food groupings, or group by key nutrients. You can use [Pile-Sorting Exercise Data Recording Form](#) to go through items and record data.

NOTES

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COMPONENT 3

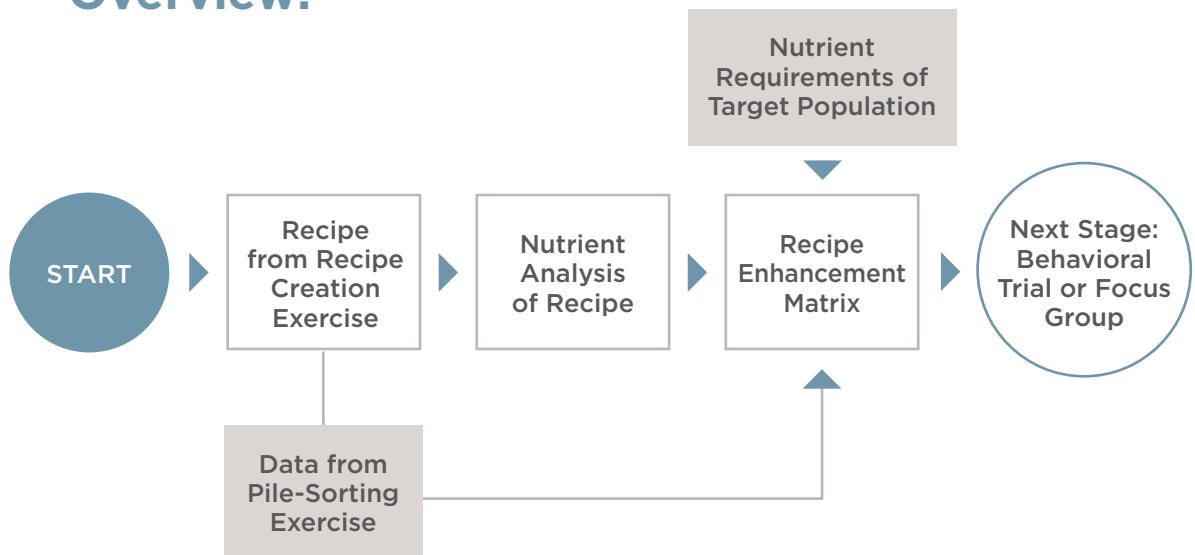
RECIPE ANALYSIS AND REFINEMENT

Objective: Enhance a recipe of a common meal using data from the pile-sorting exercise and a nutrient analysis to enhance it for the target population.

To achieve this objective, follow the steps for conducting a nutrient analysis of a recipe from the [Recipe Creation Exercise](#) and using the recipe enhancement [matrix](#). You will also need to use the nutrient requirements of your target population (Appendix E) and the data from the [pile-sorting exercise](#) in Component 2.

The outcome of these exercises will be the production of recipe nutrient analyses and enhanced recipes for use in Component 4.

Overview:



Nutrient Analysis of Recipe

Each recipe created and documented in Component 2 will need a separate [nutrient analysis](#). Note that how the meal was prepared will affect whether it needs to be modified before nutrient analysis. If the recipe is prepared exclusively for an individual (ex: young infant), minimal modification is needed. If the recipe was prepared for the whole family, then each of the ingredients will need to be scaled down to the portion consumed by the individual. In some cases a combination of the two methods will be used to prepare a meal, such as using the family pot for porridge and adding additional ingredients directly into the child's bowl. See [Appendix K](#) for an example.

If an internet connection is available, it is recommended to consult the [USDA website](#) or [NutVal](#) for nutrient analysis. Instructions for using the USDA website can be provided upon request. Of note, NutVal is most appropriate when designing meals or food baskets using food aid rations. It has a more limited database than the USDA database. For local foods that may not appear in the USDA database, manual calculations using country-specific or regional Food Composition Tables may be useful in order to determine the nutrient composition of the analyzed recipe.

The following steps will detail how to use a food composition table (FCT) to perform manual calculations to determine the nutrient composition of the analyzed recipe. A *food composition table* is a list of consumed foods and beverages, usually for a particular area or region, that displays the amounts of nutrients (like carbohydrates, fats, protein, vitamins, and minerals) found in a standard amount (usually 100 grams) of the food or beverage.

Steps:

1. Use the [Recipe Creation Exercise Form](#) from the recipe to be analyzed.
2. For each ingredient:
 - In the third column, find the amount used in grams (g). If this has not already been calculated, use the Amount Used in Household Measure and a list of equivalent standard measures ([see Household or Local Measurements](#)).
 - If this amount is NOT the edible portion, calculate the edible portion of the ingredient used by following [these instructions](#).
 - If the amount used in grams is NOT in the form of the ingredient listed in the FCT (cooked versus raw), do a conversion between cooked and raw using [these instructions](#). **List the food used in the state that it would be offered to the child and specify raw or cooked.** When developing the recipe to share with the caregiver, certain foods from the analysis may need to be converted to the form in which the caregiver will start the recipe (i.e. X g of uncooked rice) keeping in mind the context (some foods are eaten raw or some foods that are purchased already cooked). Nutrient analysis will be done using the final state of the food, as some foods retain or lose nutrients when prepared.
 - If the same pot is used for the whole family, then adjust the amount of each ingredient to reflect the portion intended for consumption by the youngest household member. For example, if the pot volume is 2000 mL and the child is only expected to eat 250 mL, then the pot holds 8 child-servings (2000 mL/250 mL). Therefore, the amount of every ingredient listed will be divided by 8.
 - Fill in [Nutrient Analysis of Recipe Form](#) with the ingredients used with the correct amount as calculated for the edible portion in the cooked or raw form. Use 1 line for each ingredient in the recipe.
3. Using a FCT (developed for the region of the target population, or taken from [INFOODS](#)), for each ingredient:
 - Identify each food in the database and edit/record the name of each ingredient/food as listed in the FCT along with its item code.
 - First calculate the percentage of the standard amount in the FCT (usually this is 100 g) used in the recipe to obtain a multiplier. For instance, if 60 g of groundnuts were used in a recipe, obtain the multiplier by dividing 60 into 100 g: $60 \text{ g} / 100 \text{ g} = 0.60$
 - Record the multiplier in the [form provided](#).

- Multiply each kcal and nutrient entry in the FCT by the multiplier for each ingredient. Record in the [form provided](#).
- Add up the columns in each chart to obtain the total amount of nutrients (kilocalories, protein, and other nutrients of interest) in the recipe.
 - Calculate and compare the recipe to the age-based recommendations for the youngest household member consuming this recipe:
 - Complementary feeding children (age 6–23 months)
 - Calculate the [energy density](#) and [nutrient densities](#) of the recipe
 - Compare the energy and nutrient densities of the recipe to the table of Nutrient Requirements in [Appendix E](#). Circle the values that are not meeting the recommendations in the table.
 - Older children and adults (age 24 months and older)
 - Calculate 1/3 of the total [Nutrient Requirements](#) based on age and gender. Record these values as the goal.
 - Compare the total amount of calories, protein, vitamins, and minerals in the recipe to the goal amount. Circle the values that are not meeting the recommendations; these are nutrients of interests for the purpose of recipe enhancement.

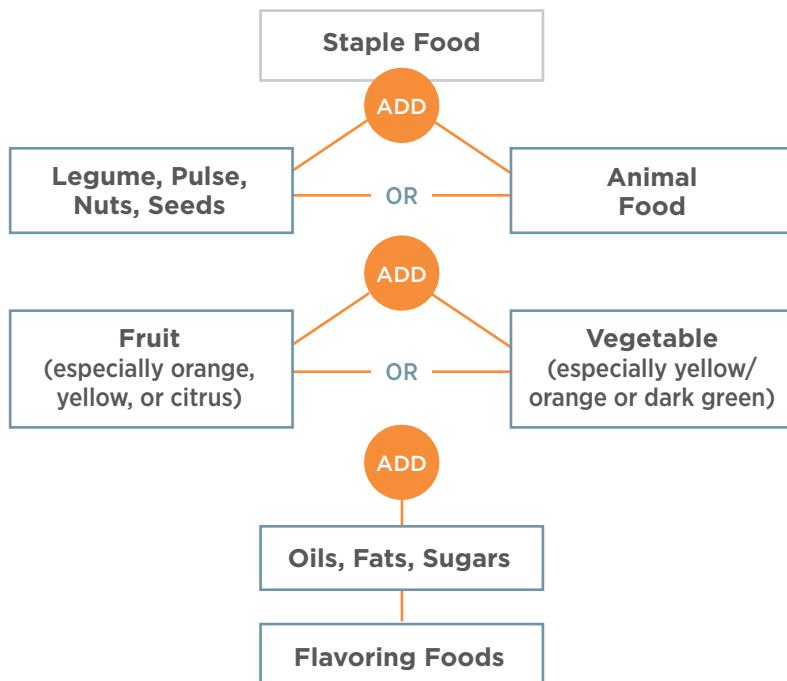
Recipe Enhancement Matrix

The Recipe Enhancement Matrix is a tool that will allow you to build a new recipe or enhance an existing recipe for a nutrient-rich meal for the whole family. It follows a basic formula that promotes dietary diversity by selecting nutrient-dense foods from recommended food groups. This process is informed by the Key Foods List as well as the nutrients of interest identified by the Nutrient Analysis of a Recipe.



Nutrients of interest may also be identified by nutrients in high biological demand (based on age, gender, or pregnancy/lactation), a long history of low reported intake, or high prevalence of regional nutritional deficiencies. Surveys done for the country or region of the target population will help you select the nutrient/s of interest, such as vitamin A, iron, zinc, etc.

Basic Formula for a Nutrient-Rich Meal



The Recipe Enhancement Matrix applies the illustrated formula and increases nutrient density by:

- Increasing the number of food groups included in the ingredients of recipes, OR
- Substituting 1 kind of food within a food group (like fruits or vegetables) for a different, more nutrient-dense food to include in the recipe.

Steps:

1. Select food groups using the [Recipe Enhancement Matrices](#) provided.

Building a new recipe:

- Starting with the staple food, in the first column, add 2 or more additions to the ingredients list for the enhanced recipe:
 - » Add 1 protein food from either of the next 2 columns.
 - » Aim for 1 or more additions from the following 3 columns.
 - » Additional items may be added as desired. Fruits listed in the last column make for a nutritious snack!
 - » Analyze the nutrient content of the recipe using instructions for the Nutrient Analysis of the Recipe above. The circled nutrients are the nutrients of interest.

Analyzing an existing recipe:

- Identify the staple food used as a foundation for the recipe. Write the staple in a blank cell of the first column of the Recipe Enhancement Matrices.
 - The next columns should be filled in with items from the recipe ingredients list, under the correct food group.
 - If the recipe has fewer than three columns filled, choose something from the updated Key Foods List to add another food group to the recipe (keep seasonality in mind).
 - Check the new ingredients lists: the enhanced recipe should have more food groups included than the original. For example, an addition of a vegetable to a staple mixed with an animal food, or an addition of a pulse/legume/nut/seed to a staple mixed with a vegetable.
2. Substitute foods from the Key Foods List within a column of the Recipe Enhancement Matrix to achieve a greater nutrient density for nutrients of interest.
 - Reference FCTs to identify foods from the Key Foods List that has a higher value per 100g weight of a nutrient of interest than a food in the original recipe.
 - For example, say the original recipe included cabbage as an ingredient and was low in vitamin A. If mustard greens are on the Key Foods List for locally available foods, these can be used as the dark leafy green instead of cabbage to enhance the recipe for vitamin A content (check the appropriate FCTs for exact vitamin A amounts).
 3. Up to 5 iterations of the Recipe Enhancement Matrix can be completed for each recipe that needs refinement. The number completed should be no less than 2, and preferably 3 or more. *The variety of combinations of food group columns in each matrix means that this can generate more than 1 refined recipe per original, promoting dietary diversity across meals and days.*
 - For example, if 1 recipe is enhanced by completing 3 of the blank matrices, there are 3 new recipe options, each providing greater nutrient density in the meal. If these 3 options are prepared on different days throughout a week, this will result in greater dietary diversity, which will usually help increase the variety of nutrients in the diet and make it more likely that an individual will meet their nutrient needs.

Data from Pile-Sorting Exercise

In the previous component, caregivers were asked a series of questions about foods, sorted by food group, in the Key Foods List.



These answers can be used to select Key Foods for filling in the Recipe Enhancement Matrices that are available, acceptable, and affordable for caregivers.

To find foods rich in a specific nutrient:

1. Go to <https://ndb.nal.usda.gov/ndb/search/list>, and click on the **NUTRIENT SEARCH** tab.
2. **SELECT** “Calcium, Ca (mg)” in the first nutrient drop-down list.
3. In the **FOOD GROUPS** drop-down list, **SELECT** “Legumes and Legume Products;” hit **GO**.
4. **SCROLL** and **SELECT** the food you are interested in; **CLICK** on the food item.
5. **SCROLL** down the list or hit **PRINT** (a PDF will come up on your screen) to see all the nutrient values of the food item.



Photo by Dooshima Tsee/CRS

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COMPONENT 4

TESTING OF RECOMMENDATIONS

Objective: Test a recommendation, such as a new recipe from the recipe creation exercise or a modified recipe (adding 1 or more ingredients to a common preparation). These recommendations have the potential to positively impact the nutritional status of infants and young children and require a change in behavior by the caregiver.

After the recipe enhancement exercise, the team will have potential recommendations for improving traditional recipes to enhance their nutritional quality or new recipes with commonly- used foods. The purpose of this step is to evaluate the acceptability and feasibility of the recommendations. Once barriers and/or facilitators to adopt the improved recipes are identified, modifications can be made before promoting the improved recipes through cooking demonstrations, or other project activities. The test of recommendations is necessary for observing how caregivers carry out proposed recommendations under typical conditions, and reduces risk of poor compliance during the project. The testing is carried out through a household behavior trial at the homes of the selected caregivers. Nothing is to be provided by the team as it is to be a trial in their natural environment. Results from the trial will be used in order to modify the recommended practices (recipes) to increase the likelihood of adoption.

To achieve this objective, the following steps will be carried out for the testing of the recipes:

1. Identify nutrient inadequacies in the population from the previous exercises. They may be diets deficient in common micronutrients such as iron, vitamin A, or iodine.
2. Develop a [matrix of concerns and solutions](#) from the pile-sorting exercise that was completed after the recipe creation exercise. Complete the template with factors such as concerns and potential solutions/motivations when preparing or using a specific food, using words expressed by the caregivers. Use this when introducing the new practices, if necessary.
3. Select the participants for the household behavioral trial. Select caregivers of children who are of the age for whom the practice or recipe is appropriate. Each practice or recipe should be tested in 6 households.
4. Develop messages for the presentation of the recommended practices of recipes during the first household visit. An example is “the recipes that I would recommend that you try now that your child is 6 months old is ... [present the recipes or practices for them to choose].”
5. Develop a drawing of the recipe or practice and leave it with the caregiver so they can remember.



Photo by Sam Phelps/CRS

6. Carry out the initial visit. For the initial visit, complete the [Initial Visit of the Test of Recommendations](#) form to analyze that specific visit.
7. Once all the information is gathered from the initial visits, organize it in [the form](#) to consolidate all the information.
8. 7 days later, carry out the final visit, completing the [Final Visit of the Test of Recommendations](#) form. This is necessary in order to document their impression, experiences, and challenges. It also identifies how many times they carried it out and what modifications they made. It also is useful for understanding what recommendations they have for communicating the recommendation to the other caregivers in the community.
9. Once all the information is gathered from the final visits, organize it on the [consolidation form](#).
10. Complete an [Analysis of the Test of the Recommendations](#) for each practice or recipe tested. This will be used to rank recommendations and identify final recommendations.
11. The selection of the recommendations that will be used in the project should be done according to the caregivers' compliance with the recommended practice, the feasibility of the recommended practice, and the positive impact the practice will likely have on the nutrition of young children. For this analysis, complete a [Compliance and Feasibility Matrix](#). Review the data and select 3-4 recommendations that have potential for adoption.

COMPONENT 5

COOKING DEMONSTRATION*

Planning Guide for a Group Demonstration of the Preparation of Young Children's Food

Review Objectives of the Demonstration:

- Teach mothers how to prepare simple and nutritious food for young children using local ingredients (learning through doing).
- Demonstrate the appropriate consistency (thickness) for these foods.
- Demonstrate the taste and acceptability of the food preparations for mothers and young children.

Decide the Key Messages

- Select 1–3 Key Messages to say to mothers.
- Follow each message with a checking question (a question that you cannot answer with a simple “yes” or “no”). For example:
 - » Foods that are thick enough to stay in the spoon give more energy to the child.
 - › *Checking question:* What should the consistency of foods be for a small child? (*Answer:* thick, so the food stays in the spoon).
 - » Animal-source foods are especially good for children, to help them grow strong and lively.
 - › *Checking question:* What animal-source food could you give your child in the next 2 days? (*Answer:* meats, fish, egg, milk, cheese—these are special foods for the child).
 - » A young child needs to learn to eat—encourage them to eat, and show lots of patience.
 - › *Checking question:* How should you feed a child learning to eat? (*Answer:* with patience and encouragement.)

Gather the Equipment and Materials

- Cooked food for the preparation
- Plates and utensils for the preparation
- Utensils for mothers and infants to taste the preparation
- Table on which to prepare the food
- Facilities for washing hands

Give the Participatory Demonstration

- Thank the mothers for coming.
- Present the recipe that will be prepared (from the recipe development exercise).
- Hold up each of the ingredients. Mention any ingredients that can be easily substituted, for example oil for butter, powdered milk or tinned milk (unsweetened) for fresh milk, or cooking water or boiled water if no milk is available.
- Invite at least 2 mothers to prepare the food. If possible, have enough ingredients to have 2 or 3 pairs of mothers to participate in the preparation, each pair working with their own plate of ingredients and utensils.
- Talk the mothers through each step of the preparation, for example:
 - » Washing their hands and hands of children
 - » Mashing a potato or _____
 - » Adding the correct quantity of fish or egg, etc.
 - » Adding correct quantity of milk or water
- Point out the consistency of the preparation as the mothers are making it, and demonstrate with a spoon when they are finished.
- Reinforce the use of local inexpensive and nutritious ingredients, especially using foods from the family pot.
- Ask the mothers if they would have difficulty obtaining any of the ingredients (suggest alternatives). Ask the mothers if they could prepare the food in their household.

Offer Food Preparations to Taste

- Invite the mothers who prepared the food to taste it in front of the rest and give their opinion (use clean spoons).
- Invite all the mothers to taste the preparation and give it to their small children (who are at least 6 months old). Use a clean spoon for each child.
- Use this time to stress the Key Messages you decided to use when planning the demonstration.

Ask Checking Questions

- What are the foods used in this recipe? What could be used instead of each ingredient? Wait for responses.
- The health worker reads out the list of the foods again.
- Get a commitment. Ask the mothers when they think they can prepare this food for their young child (for example, tomorrow).
- You may repeat the Key Messages and checking questions again.

Conclude Demonstration

- Thank the mothers for coming and participating.
- Get a verbal commitment from each mother that they will try a new practice between now and the next meeting.
- Ask the mothers to share their new knowledge of preparing this food with a neighbor who has small children.
- Invite mothers to visit the health facility for nutrition counseling and growth checks.

*Component 5 was copied in full from [WHO. Infant and Young Child Counseling: An Integrated Course. Geneva, Switzerland: WHO and UNICEF, 2006, pages 216-217.](#)

NOTES

NOTES

Appendix A

COMPONENT 1 TABLES AND MATRICES

Key Foods List Form

Food Groups Lists

Staples

Pulses/Legumes, Nuts, and Seeds

Animal Foods

Fruits (Yellow/Orange and Other) and Vegetables (Dark Green, Yellow/Orange, and Other)

Oils, Fats, Sugars

Food Calendar Form

Market Survey Form

Name of retail location:	
Address/location (street, avenue, kilometer, neighborhood, section):	
Name of field worker (and code #):	
Survey date (dd/mm/yyyy):	
Name of supervisor (and code #):	
Date of supervision (dd/mm/yyyy):	

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Appendix B

COMPONENT 2 FORMS



Recipe Creation Exercise Data Recording Form

Meeting date and place:

Ask: "How do you cook for your children? Prepare an individual meal? A pot for children only? Does it differ by age? Or a household pot for everyone?" This determines if you do 1 recipe preparation or 2, differing by age.

Recipe name:

Age of recipient of meal (in months or years, as appropriate):

Name of dish and weight of container used to hold it:

"ProPAN. Process for the Promotion of Child Feeding, 2nd Edition. Washington, DC: PAHO, 2013."

Appendix B

Cooking method (record all steps taken by caregiver to prepare the recipe):¹

Observations during cooking (reactions or comments, etc.):

Total preparation and cooking time:

Final amounts of dish:

Weight (g)	Weight of Container (g)	Net Weight (g)	Total volume of food (number and type of household measure)

¹. It is important to note if foods are offered to the child in raw form or cooked form for nutrient analysis. The recipe shared with the caregiver will list foods in the state from which they are to start the recipe preparation.

Amounts served and consumed:

Person Served	Amount Served (Weight of Container with Portion minus Weight of Container)	Leftover Amount (g) of Food Only	Amount Eaten (Amount Served minus Leftover Amount) (g)

Consistency of final dish (liquid, semi-liquid, thick, solid, other)?

- According to caregiver:
- According to staff/personnel:

Observations of acceptability of dish by target population (observations made of tasting):

Observations made by caregiver about the recipe/meal:

- Is this typically what you prepare at home?
- Always available (foods)?
- Sometimes available (foods)?
- What foods would you like to try adding to this recipe (something they didn't select)?



Pile-Sorting Exercise Data Recording Form

Meeting date and place:

Main infant and child nutrition and feeding problems:

Foods presented or food group addressed:

Ask: *How do you cook for your child? Prepare an individual meal? A pot for children only? Does it differ by age? Or a household pot for everyone?* This determines if you ask 1 FGD or divide by age groups.

Age of recipient of food (in months or years, as appropriate):

Show cards of the foods in the food groups (such as, energy giving, body building, protective food groups). **Ask the following questions per food group.**

For [insert food group], show the cards that you are *most likely* to feed your child. Why?

For [insert food group], show the cards that you are *least likely* to feed your child. Why?

Probe:

1. Sort the cards by most expensive to least expensive.
2. Sort the cards by available all year to rarely available.
3. Sort the cards by easiest to purchase in the market to hardest to purchase in the market.
4. Sort the cards by easiest to raise at home to hardest to raise at home.
5. Which of these foods could you feed your child every day? How much?
6. Which of these foods could you feed your child several times every week? How much?
7. Which of these foods could you feed your child only once a week? How much?
8. Which of these foods can you rarely ever feed your child? How much?
9. Which of these foods would you be willing to add a small addition to your child's own plate/bowl after ladling out food from the pot?

Appendix C

COMPONENT 3 FORMS



Nutrient Analysis of Recipe Form

Recipe name/code:

Net weight (g) of food prepared (final weight of food only):

Volume of food prepared—number and type of household measures:

Nutrient analyses of a meal for a child ages 6–23 months

Ingredient ²	Amount Used in Recipe (g)	Standard Amount in FCT (g)	Multiplier ³ (Ingredient Amount ÷ FCT Amount)	kcals in Ingredient	Protein (g) in Ingredient
Recipe Total:					
Energy Density: (100 g x total kcals ÷ total recipe grams)					

2. List the food used in the state that it would be offered to the child and specify raw or cooked. When developing the recipe to share with the caregiver, certain foods from the analysis may need to be converted to the form in which the caregiver will start the recipe preparation (such as, X g of uncooked rice), keeping in mind the context (some foods are eaten raw or some purchased foods are already cooked). Nutrient analysis will be done using the final state of the food, since some foods retain or lose nutrients when prepared. See appendix H for conversion factors.

3. An example would be 50 g of a food but the FCT would note values per 100 g, so the multiplier would be 0.5.

Nutrient analyses of a meal for a child ages 6–23 months

Ingredient	Multiplier (Ingredient Amount ÷ FCT Amount)	Vitamin A (µg RAE) in Ingredient	Vitamin C (mg) in Ingredient	Calcium (mg) in Ingredient	Iron (mg) in Ingredient	Zinc (mg) in Ingredient
Recipe Total:						
Nutrient Density: (100 kcals x total nutrient ÷ total recipe kcals)						

If the nutrient density for the recipe meets the requirements for the youngest member of the household (an infant), then it is likely to meet the nutrient requirements for older household members as well, if enough quantity is eaten.

Main infant and child nutrition and feeding problems to address:⁴

Nutrient analyses of a meal for children 24 months of age and older and adults

Ingredient ⁵	Amount Used (g)	Standard Amount in FCT (g)	Multiplier	kcals in Ingredient	Protein (g) in Ingredient
Total					
Goal (per meal)					

4. This may include feeding practices regarding breastfeeding (bottle feeding, cup feeding, or feeding only at the breast).

5. Ingredients are calculated based on cooked values.

Ingredient	Multiplier	Vitamin A (µg RAE) in Ingredient	Vitamin C (mg) in Ingredient	Calcium (mg) in Ingredient	Iron (mg) in Ingredient	Zinc (mg) in Ingredient
Total						
Goal (per meal)⁶						

Recipe Enhancement Matrices

For each recipe, sort the ingredients from the Recipe Creation Exercise (Component 2) into the food categories below. If fewer than 3 columns are used, enhance the nutrient content of the recipe by suggesting a food in one of the unused columns that is listed in Key Foods (Component 1). At least one protein food and one nutrient-rich vegetable or fruit should be used in each recipe.

	Select	Select At Least One		Select At Least One			Optional	Optional
	Staple Food	Animal Food	Pulses/ Legumes, Nuts And Seeds	Dark Green Veg.	Yellow/ Orange Veg.	Yellow/ Orange Fruit or Citrus	Other Fruit or Veg.	Oils, Fats, and Sugars
Food								
Measured Amount								
Local Amount								

6. Estimating 1/3 (33%) of daily requirements.

Appendix C

Create five recipes using the Recipe Enhancement Matrix Template above or using some simplified variations of the template below. More than three foods are allowed, and more than one food item within a category is allowed.

1.	Staple Food	Animal Food	Dark Green Vegetable
Food			
Measured amount			
Local amount			

2.	Staple Food	Pulses/Legumes, Nuts, and Seeds	Dark Green Vegetable	Yellow/Orange Vegetable
Food				
Measured amount				
Local amount				

3.	Staple Food	Pulses/Legumes, Nuts, and Seeds	Dark Green Vegetable	Yellow/Orange Fruit or Citrus	Oils, Fats, and Sugars
Food					
Measured amount					
Local amount					

4.	Staple Food	Animal Food	Pulses/Legumes, Nuts, and Seeds	Yellow/Orange Vegetable
Food				
Measured amount				
Local amount				

5.	Staple Food	Animal Food	Dark Green Vegetable	Other Fruit/Vegetable	Oils, Fats, and Sugars
Food					
Measured amount					
Local amount					

Appendix D

FOOD GROUPS AND NUTRIENTS

In this guide, the food groups used to categorize foods used in recipes for complementary feeding of children aged 6–23 months mirror those used in other materials and guides.

Staple Food

Every community has a staple food(s) which is the main food eaten. Examples are cereals (such as rice, millet, wheat, maize), roots (such as cassava, yam or potato), and starchy fruits (such as plantain and breadfruit). In rural areas, families often spend much of their time growing, harvesting, storing, and processing the staple food. In urban areas, the staple is often purchased, and the choice depends partly on cost. Cooked staples can usually be mashed or softened in a small amount of liquid; staples are often milled into flour and cooked to make porridge or gruel.

Nutrients: Staples provide energy/calories (mostly from starch). Cereals also provide protein, but cassava, plantain/banana, sweet potato, and breadfruit contain very little protein. Yam and potato have more protein than other roots, but not as much as cereals.

Staple foods are poor sources of iron, zinc, and calcium. Cereals contain phytates, which may interfere with the absorption of iron, zinc, and calcium contained in the cereal and in other foods in the meal. Fresh roots such as cassava and potato contain vitamin C, but flours made from staples have none. Only the yellow varieties of maize, sweet potato, and plantain are sources of vitamin A.

This means the staple must be combined with other foods for the complementary-fed child to get enough nutrients.

Pulses/Legumes, Nuts, and Seeds

This category includes pulses/legumes (like beans, peas, and lentils) as well as nuts (such as groundnut/peanuts and almonds), and seeds (like sesame/benniseed).

Nutrients: Pulses/legumes, nuts and seeds are good sources of protein, but they lack vitamin A and, when dried, they lack vitamin C. Nuts/seeds and some pulses (groundnuts/peanuts, bambarra, and soybean) are rich in fat and thus, high in energy/calories. As with cereals, pulses and nuts/seeds contain phytates, which interfere with the absorption of iron, zinc, and calcium. Soaking dry pulses/legumes, throwing away the soaking water, and then cooking in fresh water helps reduce phytates.

Animal Foods

This food group includes foods derived from animals and fish/shellfish: flesh, eggs, and organs. It also includes dairy (milk, cheese, and yogurt). Animal foods can be eaten fresh (like milk), cooked, or preserved (like dried meat or fermented foods like yogurt).

Nutrients: Animal foods are good sources of protein. The flesh and organs of animals, birds, and fish and foods prepared with blood are the best sources of iron and zinc. The redder the flesh, the more iron these foods contain. Iron, vitamin A, and folate are stored in liver, so even small servings of liver provide large amounts of these nutrients. Egg yolk has a store of nutrients and is another rich source of vitamin A (the iron content of egg yolk is high, but the iron is not well-absorbed). Foods made from whole milk contain vitamin A. Foods made from milk and any food containing bones that are eaten (like small or canned/tinned fish or pounded fish) are good sources of calcium.

Fruits (Yellow/Orange and Other) and Vegetables (Dark Green, Yellow/Orange, and Other)

These foods are grouped together because they are all rich sources of vitamin A.

Nutrients: Fruits that are yellow/orange (like mango, orange, or passion fruit) can provide vitamin C in the diet and may help with iron absorption in a meal. Fruits in general provide vitamins, minerals, and calories/energy. Vegetables that are dark green and yellow/orange are generally good sources of vitamin A. The darker the green color or the stronger the orange color, the more vitamin A the fruit or vegetable contains. Dark green vegetables are rich in folate and iron, but the iron is poorly absorbed. Vegetables in general provide vitamins, especially vitamin C and minerals.

Oils, Fats, and Sugars

Oils (like soy oil) and fats (like margarine, butter, or ghee) are concentrated sources of calories/energy. Sugar, jaggery (palm sugar), and honey are also calorie/energy-rich.

Nutrients: Adding a teaspoon of oil or fat to a meal gives extra calories/energy in a small volume. Red palm oil, butter, and ghee have vitamin A, and margarine sometimes has vitamins A and D added to it by the manufacturer. Sugar, jaggery (palm sugar), and honey are also calorie/energy-rich and can be added to a staple porridge or other foods in small quantities.

Nutrient of Concern: Iron

The amount of iron that a child absorbs from food depends on:

- Amount of iron in the food
- Type of iron (iron from meat/fish is better absorbed than iron from plants, milk, eggs)
- Types of other foods in the same meal (some promote iron absorption; others interfere)
- Whether the child is anemic (more iron is absorbed if anemic)

Examples of food high in iron:

High iron, good absorption

- Liver of all kinds
- Other organ/offal, especially red organs/ blood
- Flesh of animals, especially red meats
- Flesh of birds, especially dark meat
- Foods fortified with iron (such as infant cereals)

High iron, poor absorption

- Egg yolk
- Pulses
- Dark-green leaves

The amount of iron absorbed from eggs, milk, and plant goods—such as cereals, pulses, other seeds, vegetables, and fruit—is:

Increased by eating at the same meal

- Foods rich in vitamin C
- Flesh and organ/offal of animals, birds
- Fish and other seafood

Decreased by drinking

- Teas and coffee

Eating foods rich in vitamin C at the same meal is the best way to improve the absorption of iron from eggs, milk, and plant foods. Foods rich in vitamin C include guava, mango, orange and other citrus fruits, paw-paw, and pineapple. Eating fermented cereals also increases iron absorption.

Nutrient of Concern: Vitamin A

A small amount of vegetables given as complementary food is enough to cover the child's vitamin A needs for 1 day. 1 IU retinol = 0.3 µg RAE (RE)

Other Vitamin A Sources:

- Liver
- Red palm oil
- Egg yolk
- Mango, paw-paw, passion fruit
- Pumpkin and red or orange peppers

	Carrots	or	Sweet Potato	or	Dark Green Vegetables
<u>Age Group</u>					
6–12 Months	1 ½ Tbs 		1 Tbs 		1/3 Cup 
1–2 Years	1 ½ Tbs 		1 Tbs 		1/3 Cup 
2–6 Years	2 ½ Tbs 		1 Tbs 		1/3 Cup 

Nutrient of Concern: Vitamin C

Vitamin C (cooking destroys some of the vitamin):

- Fresh fruit, such as guava, orange, lemon, mandarin, mango, paw-paw, berries, melon, banana, passion fruit, peach
- Tomato, peppers
- Green leaves and vegetables, such as spinach, amaranthus, kale, cassava leaves, sweet potato leaves, cabbage, broccoli, cauliflower
- Baobab pulp
- Fresh starchy roots and fruits if eaten in large amounts, such as potato, sweet potato, cassava, plantain

Nutrients of Concern: Zinc and Calcium

Zinc:

- Liver and offal of all kinds
- Foods prepared with blood
- Flesh of animals, birds, and fish
- Shellfish
- Egg yolk

Calcium:

- Milk and milk products (cheese, yogurt)
- Fish eaten with bones (small whole fish, pounded dried fish, canned fish)

NOTES

Appendix E

NUTRIENT REQUIREMENTS

Complementary Feeding of Children 6–23 months

At 6 months of age, babies can no longer get enough energy and nutrients from breast milk alone. This is also the age when children can control their tongue better and begin making “munching”/up-and-down movements with their mouth, showing that they are ready to try thick porridges, purees, and mashed foods. Children this age should not be given tea, coffee, or sugary beverages.

- Before 6 months of age, a child should be fed only breast milk. When it is time to introduce food along with breast milk, remember:
- Start with 1 or 2 teaspoons of food twice per day. Increase both amount and variety gradually. Make food thin and soft at first; later, cut or mash it into small pieces. “Lumpy” or non-smooth foods should be introduced by 10 months.
- Around 10 months of age, children will have greater ability to self-feed by pinching small pieces of food between their fingers and thumb. When the child is 1-1½ years, the child will be able to begin feeding with a utensil such as a spoon.
- When first introducing foods, some food may run down the chin or be spat out. This does not mean the child dislikes the food. It takes time to learn how to use lips to clear the food off of a spoon, move it to the back of the mouth, and swallow. Signs that children dislike a food may include refusing to open the mouth, turning the head away, or pushing away the food with their hands.
- Give priority to young children when serving foods because their nutritional needs are high and a child needs to eat or be fed slowly, without rushing and with assistance, even if the child is beginning to practice self-feeding.
- Put the child’s food on a separate plate to ensure the child gets its share or make sure the child reaches all the food types in a prepared meal.
- Snacks may include nutrient-rich and colorful fruits (banana, avocado, mango, paw-paw), groundnut, nut paste, or butter with bread, cooked potatoes, or legume/bean cakes.

Approximate Amounts of Foods to Offer

The amount of food and nutrients required for each child may vary based on the amount of breast milk consumed, their growth rate, state of health, and energy expenditure rate. While there are guidelines for the amount of energy needed from complementary foods for children with average breast milk intake in developing countries⁷, and quantity of complementary foods to meet energy needs⁸, caregivers should be advised and supported in continuing to breastfeed a child the optimal number of times for that child’s age while offering a diverse and adequate diet following the principles of responsive feeding. The amount of breast milk consumed will influence the amount of energy required from complementary foods. Since most caregivers do not measure the amount of breast milk consumed nor the energy consumed from food, the amount of food to offer to the child should be based on the following principles:⁹

- **Responsive Feeding**
 - » Feed infants directly and assist older children, acknowledging hunger and satiety cues
 - » Feed slowly and patiently
 - » When children refuse food, try different combinations and textures of foods in an encouraging way
 - » Minimize distractions during a meal
 - » Talk to children and use eye-to-eye contact to show love
- **Meal Frequency and Energy Density**
 - » As a child gets older, increase the number of times a child is fed complementary foods
 - » The number of feedings depends on the energy density of the foods and amount consumed at the feedings

7. Guidelines for Complementary Feeding of the Breastfed Child, <http://www.fsnnetwork.org/sites/default/files/GuidingPrinciples%20CF%20Breastfed%20Child.pdf>.

8. Ibid. Approximate quantity of complementary foods that would meet energy requirements: 137–187 g/day (ages 6–8 months), 206–281 g/day (ages 9–11 months), 378–515 g/day (ages 12–23 months).

9. Ibid.

- » At ages 6–8 months, healthy breastfed infants should receive meals 2–3 times/day, and 3–4 times/day for children ages 9–23 months, with additional healthy snacks 1–2 times/day as desired.
- » Children ages 6–23 months should be breastfed freely as the child wants (~8 feeds each day/night at 6 months, will decrease gradually)

In the table below, average nutrient requirements are outlined for various household members. Users of this field guide should note that these are average nutrient requirements by sex and age. For designing the recipes for children to promote among caregivers, the nutrient requirements below can serve as a guide for estimating nutrient requirements. For a general recommendation, recipes should be developed to meet 1/3-1/2 of the child's daily nutrient requirements.¹⁰ Where nutrients gaps are high, adjustments should be made based on initial formative research. Sample recipes can further be found in annex I. Nutrient Requirements for All Household Members.¹¹

Gender/Age	Body Weight ¹²	Energy ⁹		Protein ¹³	Iron ¹⁴	Zinc ¹¹	Vit A ¹¹	Vit C ¹¹	Calcium ¹¹
Age	kg	kcal	MJ	g	mg	mg	µg RAE	mg	mg
Both Genders									
0–6 mos	7.9	640	2.7	10	0	2.5	400	40	200
7–11 mos	9.6	775	3.2	11	11	2.5	500	50	260
1–3 yrs	13.5	1,125	4.7	11	7	4.0	400	15	700
4–8 yrs	24.0	1,700	7.1	17	10	7.0	450	25	1000
Girls									
9–13 yrs	43.8	2,275	9.5	41	8	7.0	600	45	1300
14–17 yrs	56.4	2,500	10.5	47	15	7.3	700	65	1300
Boys									
9–13 yrs	42.3	2,550	10.7	40	8	8.5	600	45	1,300
14–17 yrs	64.4	3,325	13.9	58	11	9.4	900	75	1,300
Women									
18–59 years		2,250	9.5	41	18/8 c	6.8	500	75	1000/1200 ^d
Pregnant ¹⁵		285	1.5	10	27	9.5	770	85	1000
Breastfeeding		460	1.9	19	9	10.4	1300	120	1000
60+ years		2,050	8.5	41	8	6.8	700	75	1200
Men									
18–59 years		2,850	11.9	54	8	9.4	900	90	1000
60+ years		2,350	9.9	54	8	9.4	900	90	1200

10. Following guidance from the World Bank School Feeding guide that a school meal or snack should meet 1/3-1/2 of a child's energy and protein requirements. <http://siteresources.worldbank.org/NUTRITION/Resources/Tool10-FullReport.pdf>.

11. If other nutrients are of concern, the table can be expanded and additional nutrients can be recorded. Requirements for infants assume breastfeeding. Reported values for ages 0–6 months assume exclusive breastfeeding and values for ages 7–11 months assume a diet with breastmilk with complementary foods.

12. FAO 2004, using moderate physical activity level and oldest age in the grouping.

13. WHO/FAO/UNU 2007.

14. JOM 2011.

15. Values from second trimester reported.

Nutrient Density Requirement for Complementary Foods by Age 14¹⁶

Nutrient	Unit	6-8 months	9-11 months	12-23 months
Minimum Energy Density	kcal/g (3 meals/d)	0.59	0.77	0.98
Gastric Capacity	<i>g/kg BW</i>	249	285	345
Protein	<i>g/100kcals</i>	0.7	0.7	0.7
Iron	<i>mg/100kcals</i>	7.7	4.6	1.6
Zinc	<i>mg/100kcals</i>	1.6	1.0	0.8
Vitamin A	<i>µg RAE/100kcals</i>	5	9	17
Vitamin C	<i>mg/100kcals</i>	0	0	1.1
Calcium	<i>mg/100kcals</i>	125	78	26

Notes:

kcal = kilocalorie

MJ = megajoules (joules are the modern unit for measuring energy. 1,000 kcal=4.18 MJ)

RE = retinol equivalents

(See Iron column)

- a Full-term babies are born with sufficient iron stores for 6 months
- b Higher amount needed when menstruation starts
- c Lower amount needed after menopause
- d Higher amount needed after menopause
- e Needs are so high that iron supplements are usually recommended for pregnant women and pregnant adolescent girls

These values assume that:

- Children are breastfed for at least the first year
- Young children are eating small amounts of foods and have high nutrient requirements to support rapid growth.
- Older children and adults eat small amounts of iron-rich food (such as meat), other animal proteins, and vitamin C-rich foods, and large amounts of staple foods, such as maize; the bio-availability values used for iron are “10% bio-availability.”
- Adults have moderate physical activity

Sources: Energy—FAO. 2004. Human energy requirement. Report of a Joint FAO/WHO/UNU Expert Consultation, FAO Food and Nutrition Technical Paper Series, No.1. Rome; Protein—WHO. 2007. Protein and Amino Acid Requirements in Human Nutrition. Report of a Joint FAO/WHO/UNU Expert Consultation, WHO Technical Report Series, No.935. Geneva. Micronutrients—IOM. 2011. Dietary Reference Intakes: The Essential Guide to Nutrient Requirements. Washington, D.C.: The National Academies Press. Nutrient Density—WHO/UNICEF. Complementary Feeding of Young Children in Developing Countries: A Review of Current Scientific Knowledge. Geneva: World Health Organization; 1998.

16. WHO/UNICEF. Complementary Feeding of Young Children in Developing Countries: A Review of Current Scientific Knowledge. Geneva: World Health Organization, 1998.

NOTES

Appendix F

FEEDING A SICK CHILD

Diarrhea and respiratory conditions are major concerns in children worldwide.

Increase fluid intake during illness, including more frequent breastfeeding, and encourage the child to eat soft, varied, appetizing, favorite foods. After illness, give food more often than usual and encourage the child to eat more.

For children ages 6–11 months, specifically:

- Breastfeed child more often during and after illness
- Be patient and encourage child to eat more during illness
- Give 1 extra feeding of enriched/mixed porridge each day for 2 weeks after illness

If respiratory conditions or discomfort due to symptoms cause the child to reject soft solids, try a broth or rehydration mixture made with clean water.



It may be helpful to provide illustrations or visuals of the extra food and breast milk that sick or recovering children need daily, as well as a visual to demonstrate that sick children need a varied—not restricted—diet.



Photo by Georgina Goodwin/CRS

NOTES

Appendix G

FOOD SAFETY AND PERSONAL HYGIENE

Families can reduce the risks of illness (particularly diarrhea, respiratory infections, and malaria) and malnutrition by:

- Feeding breast milk alone for 6 months
- Then feeding increasing amounts of appropriate complementary foods
- Continuing to breastfeed during the first 2 years
- Keeping food and water clean and safe
- Keeping the home and surroundings clean
- Putting children to sleep under a net if there are mosquitoes
- Taking children for immunizations on time

Children who are well-nourished during the first 2 years of life are likely to stay well-nourished for the rest of their childhood.

How can food be kept clean and safe?

Food is unclean and unsafe if it:

- Contains pathogens that cause conditions like diarrhea, vomiting, worms, typhoid, cholera, hepatitis
- Contains pesticides and harmful chemicals
- Contains toxins
- Chokes or burns a child

To help keep food safe from pathogens, advise families to:

- Wash hands with soap before preparing food
- Use fresh food that looks and smells good
- Keep perishable food (meal, milk, etc.) and cooked food in a refrigerator if available
- Cover cooked food and eat within 2 hours if there is no refrigerator; if kept longer, reheat food thoroughly so that it is all boiling hot and any pathogens will be killed
- Wash children's hands before meals
- Feed the child with a clean spoon or cup, never a feeding bottle
- Use fermented (soured) foods if these are available (because pathogens grow less easily)
- Keep animals outside the house
- Keep the house and outside areas clean so that rats, mice, and insects do not breed
- Use toilets so that feces are not left exposed
- Use potties for young children or remove their feces from the ground and put in a covered pit or latrine
- Wash dirty diapers immediately or put them in a tightly-sealed plastic bag or bucket to keep flies off them
- Wash hands with soap after using the toilet and after cleaning the baby's bottom
- Protect food and utensils from rats, mice, cockroaches, flies, and dust by keeping them covered
- Protect stored drinking water from animals, dust, hands, dirty scoops, and dippers

To help keep food safe from pesticides and other harmful chemicals, advise farming families to:

- Keep pesticides and other dangerous chemicals—and the equipment and containers used for them—away from the house and water supply
- Follow the manufacturer's instructions before harvesting crops that have been sprayed
- Keep clothing worn while spraying away from the house and water supply

To keep food free of toxins, advise families to:

- Store food and crops in a dry, cool, airy place
- Not use moldy food
- Not eat bitter cassava roots without proper treatment, such as peeling, cutting, soaking, boiling, grating/fermenting, or making into flour

For the final nutrition education or counseling materials, it will be useful to have photos of steps to illustrate the tips listed above.

NOTES

Appendix H

CALCULATIONS AND CONVERSION FACTORS

Edible Portion of Foods Calculation

The edible portion of food refers to the portion of the food that can actually be eaten. This value is expressed as a decimal ranging from 0 (meaning no part of the food is edible) to 1.0 (meaning all parts of the food are edible), or a percentage ranging from 0% (no part of the food is edible) to 100% (all parts of the food are edible). For example, only 68% of a banana is edible (with the peel representing the remaining 32%), resulting in an edible factor of 68%.

It will be necessary to generate the edible factors for foods consumed by children for which this information is not available. **To generate the edible factor of a particular food, the food should be weighed with the inedible portion (such as pit, bone, or peel) included. Then, all of the inedible portions should be removed and the food reweighed, measuring only the edible portion.** The edible portion can then be calculated. An example is provided below.

- Raw goose drumstick with skin and bone, 1 medium piece = 112 g
- Raw goose drumstick without skin or bone, 1 medium piece = 73 g

If 112 gram of goose drumstick including the skin and bone is 100%, what is the percentage of the goose drumstick without skin or bones (without the inedible portion) that weighs 73 g?

- $(112 \text{ g goose drumstick with skin and bones}) / (73 \text{ g goose drumstick without skin or bones} \times \text{edible portion}) = 100\%$
- The edible portion (X) = 65%
- As 65% divided by 100 = 0.65, the edible portion of the raw goose drumstick is 0.65

To apply the factor to calculations, the edible portion must first be obtained from the edible portions of foods list generated by the country or the research team based on the information provided in the previous paragraphs and example. The served (or consumed) grams of the food or ingredient should then be multiplied by the edible portion. Examples are provided below.

- 75 g of pork with bone, with an edible portion of 0.66
- $75 \text{ g} \times 0.66 = 49.5 \text{ g pork without bones}$



Photo by Sam Phelps/CRS

Cooked-to-Raw Conversion Factors

The weight of cooked foods versus raw weights varies considerably because some foods retain water (such as rice) while others lose water (such as meat) during the cooking process. It is important to consider these changes and use the conversion factors to calculate the net gram amounts for the raw or cooked food, as needed.

To generate the conversion factor, the raw food must be weighed. The food is then cooked, using a common cooking method (such as boiling, frying, or grilling). The selected cooking method should be recorded.

The cooked food should be cooled for a short, pre-determined amount of time (such as 5 minutes) and then weighed. The conversion factor should be calculated as follows:

- Weight of raw rice—85 g
- Weight of cooked rice—189 g
- $85 \text{ g} / 189 \text{ g} = X$
- $X = 0.45$ (cooked-to-raw conversion factor)

Sample Cooked-to-Raw Conversion Factors

Food	Conversion Factor
Boiled Rice	0.45
Fried Rice	0.30
Boiled Beans	0.28
Refried Beans	0.20
Boiled Pasta	0.45
Fried Beef	1.25

The cooked-to-raw conversion factor can be used to convert a cooked food to its raw form, or vice versa. When converting from cooked-to-raw, the conversion factor is multiplied. When converting from raw-to-cooked, the amount should be divided by the conversion factor (or multiplied by the inverse of the conversion factor). Examples are provided below.

Cooked-to-raw: multiplying by the conversion factor

- $82 \text{ g boiled beans} \times 0.28$ (cooked-to-raw conversion factor) =
22.96 g raw beans, which can be rounded to 23.0 g
- $82 \text{ g fried beef} \times 1.25$ (cooked-to-raw conversion factor) = 102.5 g raw beef

Raw-to-cooked: multiplying by the inverse of the conversion factor

- $30 \text{ g raw beans} \times 1/0.28$ (inverse of the cooked-to-raw conversion factor)
= 107.14 g boiled beans, which can be rounded to 107.1 g
- $100 \text{ g raw beef} \times 1/1.25$ (inverse of the cooked-to-raw conversion factor) = 80 g fried beef

Raw-to-cooked—dividing by the factor

- $30 \text{ g raw beans} / 0.28$ (factor) = 107.14 g boiled beans (round to 107.1 g)
- $100 \text{ g raw beef} / 1.25$ (factor) = 80 g fried beef

Energy Density

Energy density is the amount of energy in 1 gram of food (expressed in kcal).

It is calculated using the following formula: $\frac{\text{total energy of food/recipe (kcal)}}{\text{total weight of food/recipe (g)}}$

Nutrient Density

Nutrient density is the amount of a nutrient (like protein, vitamin A, or iron) per 100 kcal of food. It is calculated using the following formula: $\frac{\text{total nutrient in food/recipe (usually mg)}}{\text{total energy in food/recipe (kcal)}} \times 100\text{kcal}$

Household or Local Measurements

Household/local measures are cups, spoons, bowls, tins, and any other containers (utensils) or ways of measuring volume of food, commonly used in the area or homes when purchasing, preparing, and eating food. The list of abbreviations of household measures helps to identify the utensils that caregivers use to offer foods to children in case the amounts served cannot be weighed in the home. All Field Workers must use the same abbreviations when referring to a specific utensil.

Before creating the list, a set of the most common utensils used in the area must be obtained. Ideally, Field Workers should decide on the best way to abbreviate and remember each utensil. The abbreviations should be created for optimum comprehension by the Field Workers and the Supervisor. **A table or chart of equivalencies (household/local measures to standard measures (spoons/cups or grams) can then be created.**

 **The most useful resource will combine visuals or pictures with text tables quantifying the standard measurements with the household/local equivalents for use in creating and making recipes.**

Weight or volume equivalent of household measure for various ingredients:

- 4, 2-finger pinches of salt = 1/8 of a teaspoon = 1 gram
- 1 of the common glass tea cups full to the brim = 250 mL = 17 tablespoons
- 250 mL cup = 120 gram of wheat = 180 gram of beans
- 1 heaped teaspoon of sugar = 5 grams sugar
- 1 cup = 200 ml
- 1 tablespoon of flour = 10 grams of flour
- 4 tablespoons of flour = 1/4 cup



Photo by Michael Stulman/CRS

NOTES

Appendix I

SAMPLE RECIPES

Recipes should be promoted based on the culture and with the aim of meeting approximate nutrient requirements for individuals in various age groups. For meals, recipes should be developed to meet 1/3-1/2 of the average daily nutrient requirements for that age group.¹⁷ When preparing meals for multiple individuals in this age range, multiply the recipe by the number of individuals. For snacks, a smaller amount can be estimated. When developing the recipe to share with the caregiver, certain foods from the analysis may need to be converted to the form in which the caregiver will start the recipe (such as, X g of uncooked rice) keeping in mind the context (some foods are eaten raw or some purchased foods are already cooked). Nutrient analysis will be done using the final state of the food, since some foods retain or lose nutrients when prepared.

Below are some sample analyses and recipes for a child 12–23 months of age,¹⁸ a primary school-aged child, and a pregnant woman. The analyses show foods in the state that it would be offered to the child (specified as raw or cooked). The recipe shows the type of food and amounts that a caregiver would follow in preparing the meal. The amounts in the recipe given to the caregiver would need to be stated using local measurements but for the purpose of these examples standard measurements (grams or cups) are used.

Example 1: Nutrient Analysis and Recipe for a Meal for a Child Aged 12–23 Months

Nutrient analyses of a meal for a child ages 12–23 months

Ingredient ¹⁹	Amount Used (g) ²⁰	Standard Amount in FCT (g) ²¹	Multiplier	kcal in Ingredient	Protein (g) in Ingredient
White rice ²²	40 g (0.2 cup)	100	0.4	52	0.9
Soybean ²³	38 g (0.2 cups)	100	0.38	65	6.9
Moringa leaves ²⁴	10.5 g (0.5 cup)	100	0.105	13	1.1
Pumpkin ²⁵	73.5 g (0.3 cup)	100	0.735	15	0.5
Vegetable Oil ²⁶	5 g (1 tsp)	100 mL	0.05	43	0.0
Total				188 kcal	6.55 g
Density per 100kcal					5.2
Nutrient Density Goal					

17. Guidance from the World Bank School Feeding guide states that a school meal or snack should meet 1/3-1/2 of a child's energy and protein requirements, <http://siteresources.worldbank.org/NUTRITION/Resources/Tool10-FullReport.pdf>.

18. Field work has shown that in many cultures, age defines what children receive to eat. Commonly, children under 2 years receive a certain type of meal, while older children and adults receive a different meal. For children who are just beginning to eat (ages 6–11 months), the porridge or meal may be cooked longer or prepared (mashed) so it is softer and easier to eat. Recipes should be promoted based on the culture and to meet nutrient requirements for children in that age group even if it is served to younger children. Therefore, for developing meals for a child anywhere in the 6–23 month range, the 1–3 year-old nutrient requirements were used to ensure meeting the older children's nutrient requirements. However, it is important to note that in the case of iron, nutrient needs are higher in the 7–11mo range than in the 12–23mo (or 1–3 yr) range. If meals are prepared exclusively for ages 6–11 months, develop the recipe using those nutrient requirements.

19. Ingredients are calculated based on uncooked values.

20. Recommendation is to offer 3/4-1 cup (250 ml capacity) cooked food per meal for ages 12–23 months.

21. USDA database automatically estimates values at 100 g—do not adjust this column; only adjust volume of food item.

22. Using Rice, white, short-grain, cooked, unenriched (#20453) in USDA database.

23. Using Soybeans, mature seeds, boiled, without salt (#16109) in USDA database.

24. Using Drumstick leaves, cooked, boiled, drained, without salt (#11223) in USDA database.

25. Using Pumpkin, cooked, boiled, drained, without salt (#11423) in USDA database.

26. Using Vegetable oil (#45287283) in USDA database.

Ingredient	Multiplier	Vitamin A (µg RAE) in Ingredient ²⁷	Vitamin C (mg) in Ingredient	Calcium (mg) in Ingredient	Iron (mg) in Ingredient	Zinc (mg) in Ingredient
White rice	0.4	0	0	0	0.1	0.2
Soybean	0.38	0	0.6	39	2.0	0.4
Moringa leaves ²⁸	0.105	37	6.5	32	0.5	0.1
Pumpkin	0.735	212	3.5	11	0.4	0.2
Vegetable Oil	0.05	0	0	0	0	0
Total		249	10.6	82.2	2.9	0.9
Density per 100kcal		137	5.8	45.1	1.6	0.5
Nutrient Density Goal²⁹		17	1.1	26.0	1.6	0.8

Recipe for this meal for a child aged 12–23 months given to the caregiver

Ingredient	Amount
White rice, raw	18 g (21 mL or 1 2/3 Tbsp) ³⁰
Soybean, dry	10.6 g (26 mL or 2 Tbsp) ³¹
Moringa leaves, raw/fresh	1 cup
Pumpkin, raw	1/3 cup
Vegetable Oil	5 g

27. If using IU of vitamin A, conversion is 1 IU = 0.3 µg RAE, <https://ods.od.nih.gov/factsheets/VitaminA-HealthProfessional/>; 400 µg RAE daily requirement = 1,333 IU.

28. 1 cup of raw green leaves cooks down to 1/2 cup.

29. Estimating 1/3 (33%) of daily requirements.

30. 40 g cooked *(85 g raw/189 cooked).

31. 38 g *0.28 conversion factor.

Example 2: Nutrient Analysis and Recipe for a Meal for a Child aged 7–9 years

Nutrient analyses of a meal for a primary school-aged child (aged 7–9 years)

Ingredient ³²	Amount Used (g)	Standard Amount in FCT (g)	Multiplier	kcal in Ingredient	Protein (g) in Ingredient
Sweet potato ³³	216 g (1 large; 2/3 c; 158 mL)	100	2.16	164	3.0
Peanut flour ³⁴	15 g (0.25 c)	100	0.15	64	5.1
Goat milk ³⁵	½ c; 120 mL	100	1.2	50	4.0
Carrot ³⁶	46 g (1 carrot)	100	0.46	16	0.3
Plantain ³⁷	135 g (1/2 plantain; 0.9 c; 220 mL)	100	1.35	165	1.8
Vegetable oil ³⁸	14.8 mL; 0.25 Tbsp (3.4g)	100	0.148	123	0.0
Total				582	14.1
Goal (per meal)				560	8.3

Ingredient	Multiplier	Vitamin A (µg RAE) in Ingredient	Vitamin C (mg) in Ingredient	Calcium (mg) in Ingredient	Iron (mg) in Ingredient	Zinc (mg) in Ingredient
Sweet potato	2.16	1700	27.6	58.3	1.6	0.43
Peanut flour	0.15	0	0.0	19.5	0.7	0.90
Goat milk	1.2	75	1.2	150.0	0.0	--
Carrot	0.46	392	1.7	13.8	0.2	0.09
Plantain	1.35	76	24.8	4.1	0.7	0.26
Vegetable oil	0.148	0	0.0	0.0	0.0	0.00
Total		2242	55.3	245.7	3.2	1.67
Goal (per meal)³⁹		165	11.6 ⁴⁰	231.0	3.0	1.85

32. Ingredients are calculated based on cooked values.

33. Using Sweet potato, cooked, boiled, without skin (11510) in USDA database.

34. Using Peanut flour, low fat (16100) in USDA database.

35. Using Goat milk, UPC: 855336004013 (45364284) in USDA database; FCT values reported per 100 mL.

36. Using Carrots, cooked, boiled, drained, without salt (11125) in USDA database.

37. Using Plantains, yellow, raw (09277) in USDA database.

38. Using Vegetable Oil, UPC: 820103495042; (45260550) in USDA database; FCT values reported per 100 mL.

39. Estimating 1/3 (33%) of daily requirements.

40. Daily requirement of vitamin A for a child 7–9 years is 500 µg RAE or (1,666 IU).

Recipe of this meal for a primary school-aged child (7–9 years)

Ingredient	Amount
Sweet potato, cooked	1 large or 2/3 cup
Peanut flour	1/4 cup or 60 mL
Goat milk	1/2 cup or 120 mL
Carrot, raw	1 carrot
Plantain, raw	1/2 plantain
Vegetable oil	3/4 tsp

Example 3: Nutrient Analysis and Recipe for a Pregnant Woman

Nutrient analyses of a meal for a pregnant woman

Ingredient ⁴¹	Amount Used (g)	Standard Amount in FCT (g)	Multiplier	kcal in Ingredient	Protein (g) in Ingredient
Whole-grain maize porridge ⁴²	325 g (300 mL)	100	1.2	433	8.3
Small fish ⁴³	80g (80mL)	100	0.8	169	18.9
Sweet potato leaves ⁴⁴	48g (180mL)	100	0.48	17	1.0
Tomato ⁴⁵	50g (120mL)	100	0.5	40	1.0
Mango ⁴⁶	125g (180mL)	100	1.25	75	1.0
Vegetable oil ⁴⁷	14g (14mL; 1 tbsp)	100	0.14	116	0.0
Total				849	30.3
Goal (per meal)⁴⁸				886	15.5

41. Ingredients are calculated based on cooked values.

42. Using Corn flour, whole-grain, yellow (20016) in USDA database; multiplier calculated with 120 g dry weight.

43. Using Sardines, UPC: 072728008460 (45197690) in USDA database.

44. Using Sweet potato leaves, cooked, steamed, without salt (11506) in USDA database.

45. Using Tomatoes, red, ripe, cooked, stewed (11660) in USDA database.

46. Using Mangos, raw (09176) in USDA database.

47. Using Vegetable Oil, UPC: 820103495042 (45260550) in USDA database.

48. Estimating 1/3 (33%) of daily requirements for woman (age 18+) plus additional kcal and protein for pregnancy.

Ingredient	Multiplier	Vitamin A (µg RAE) in Ingredient	Vitamin C (mg) in Ingredient	Calcium (mg) in Ingredient	Iron (mg) in Ingredient	Zinc (mg) in Ingredient
Whole-grain maize porridge	1.2	13.2	0.0	8.4	2.9	2.08
Small fish	0.8	48.0	0.0	348.8	3.7	--
Sweet potato leaves	0.48	70.6	0.7	15.8	0.3	0.12
Tomato	0.5	16.5	9.1	13.0	0.5	0.09
Mango	1.25	67.5	45.5	13.8	0.2	0.11
Vegetable oil	0.14	0.0	0.0	0.0	0.0	0.00
Total		215.8	55.3	399.8	7.6	2.40
Goal (per meal)⁴⁹		264.0 ⁵⁰	18.2	396.0	High	3.66

Recipe of this meal for a pregnant woman

Ingredient	Amount
Whole-grain maize flour	110 g flour
Small fish, raw	80 g (80 mL)
Sweet potato leaves, raw	96 g (240 mL; 1 c)
Tomato, raw	100 g (240 mL; 1 c)
Mango, raw	125 g (180 mL; $\frac{3}{4}$ c)
Vegetable oil	14 g (14 mL; 1 tbsp)

49. Estimating 1/3 (33%) of daily requirements.

50. Daily vitamin A requirement during pregnancy is 800 µg RAE (2,666 IU).

NOTES

Appendix J

TEST OF RECOMMENDATIONS

Matrix of Concerns and Solutions

Practices/Recipe	Concerns	Solutions
1		
2		
3		



Initial Household Visit of the Test of Recommendations

Before starting the questions, the Field Worker should introduce themselves to the caregiver and ask her consent to use the questionnaire. Share the prepared message about the purpose of the visit.

What is important to you about the health of your child?

Messages for the presentation of the recommended recipe during the first household visit

Question to determine the practice to be tested

Based on the household's availability and access to key foods, what 1 (or more) practice(s) was agreed upon with the caregiver?

Initial Household Visit Table

Date	Field Worker	Child's name/ Mother's name	Address	Recipe to be tested	What do you think about the recipe?	Would you like to change the practice in some way? How?	Do you think you could put the recommendation into practice? Why/why not?	Days/times available for the follow-up visit

In closing, thank the caregiver for answering the questions and explain that you will be back to hear her opinion regarding the recipe. Leave the recipe diagram for her to remember how to do it.

Follow-Up Household Visit

Introduce yourself to the caregiver and then let her know that you are interested in knowing “how practicing the recipe went”

Location of the home:

Follow-Up Household Visit Table

Date	Field Worker	Child's name/ Mother's name	Name of the recipe tested	Did you practice the recipe? How many times? If not, why?	What did you like about the recipe?	What did you dislike about the recipe?	Did your child like the recipe? How could you tell?	Did other people say something about the recipe? Who? What did they say?	Did you ever modify the recipe? What did you change? Why did you change it?	Are you willing to continue practicing the recipe? Why? Why not?

In closing, thank her for her willingness to cooperate and encourage her to continue using the recipe and swapping out with new foods as they are available.

Consolidation Form (Table to organize all the information gathered from the 2 household visits)

Analysis of the Test of the Recommendations

Actual Behavior Practiced	Executed	Modified	Facilitators	Obstacles	Intention to Continue
Recipe/Practice 1					
Recipe/Practice 2					
Recipe/Practice 3					

Compliance and Feasibility Matrix

	Criteria	Recipe/Practice 1	Recipe/Practice 2	Recipe/Practice 3
Compliance	% who put the recommendation into practice			
	# of times/week they put it into practice			
	# of times/day they fed it to the child			
	Child's acceptability			
Feasibility	Perceived positive consequences			
	Compatibility with beliefs and knowledge			
	Cost			
	Time and Effort			
	Complexity			

NOTES

Appendix K

TEACHING AIDE FOR COMPONENT 3

Scenario 1: Individual Pot of Rice Porridge for Complementary Feeding

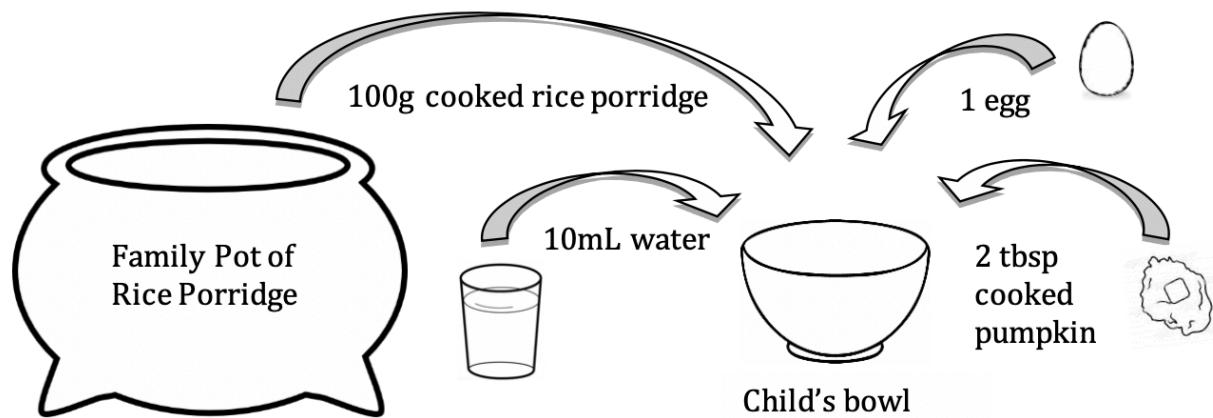
Problem: A basic porridge recipe prepared with rice and water meets the energy density requirements for a meal, but it has low dietary diversity and inadequate nutrient density for vitamin A. The recipe has one ingredient, and energy density of 1.1, and vitamin A density of 0.

Using the Key Foods List and simplified Recipe Enhancement matrix (below), we will enhance a basic rice porridge to increase the vitamin A content by adding an egg and some pumpkin.

Staple Food	Animal Food	Yellow/Orange Vegetable	Dark Green Vegetable	Yellow/Orange Or Citrus Fruit
millet	dried fish	carrot	amaranthus leaves	mango
plantain	egg	pumpkin	pumpkin leaves	papaya
potatoes	milk, cheese, or other dairy	tomato	spinach	guava
rice	meat		local greens	

The enhanced rice porridge recipe will now have three ingredients from three different food groups: rice (staple food); egg (animal food); and pumpkin (orange vegetable).

In this scenario, the family chooses to prepare rice porridge and boiled pumpkin for the whole family. A portion of the rice and pumpkin will be placed in the child's bowl, and lastly a raw egg will be stirred into the hot porridge for cooking. Each of these ingredients will be weighed before adding to the child's bowl.



Suppose the child's bowl contains 100g cooked rice porridge, one egg, and 2 tablespoons pumpkin. The porridge is a little thick, and so the mother adds 10mL water to the child's bowl. What is the energy density and vitamin-A density of the enhanced recipe? Do they meet the density requirements for a child aged 11 months? What recommendations would you make?



You may need to convert standard measurements used below (grams, tablespoons, cups) into commonly-used household or local measures; use Appendix H if needed.

Steps:

1. Calculate the weight (g) of each ingredient using nutrient density or a conversion factor from the FCT.
 - Rice = 100 g cooked
 - Egg = 1 whole egg = 50 g
 - Water = $10\text{mL} \times 1\text{g}/1\text{mL} = 10\text{ g}$
 - Pumpkin = $2\text{ tbsp} \times 30\text{g}/2\text{ Tbsp} = 30\text{ g}$

2. Calculate the amount of kcals and vitamin A of each ingredient using the ingredient weight and information from the FCT.

Rice

- FCT lists 100 g of cooked rice as having 110 kcals and **0 µg vitamin A**

*Since the amount of cooked rice used in the recipe is 100 g (the same amount listed in the FCT) the values can be copied directly from the FCT into the Nutrient Analysis chart.

Egg

- FCTs indicate that 100 g of “egg, boiled/cooked” is 147 kcal and **190 µg vitamin A**.
 - » One cooked egg weighs 50 g. We divide this number by 100 to get our multiplier of 0.5. So the kilocalories and vitamin A amounts from the FCT must be multiplied by 0.5 before we know how much the egg contributes to the enhanced meal.
 - » The egg contributes $147\text{ kcal} \times 0.5 = 74\text{ kcal}$ and $190\text{ µg} \times 0.5 = 95\text{ µg}$ vitamin A.

Pumpkin

- FCTs indicate that 100 g of “pumpkin, boiled/cooked” yields 13 kcal and 160 µg vitamin A.
 - » Two tablespoons or 30g of pumpkin is divided by the reference weight in the FCT of 100g to obtain a multiplier of 0.3. So we must multiply the amounts of kilocalories and vitamin A by 0.3 to see how much the pumpkin contributes to the enhanced meal.
 - » The pumpkin contributes $13\text{ kcal} \times 0.3 = 4\text{ kcal}$ and $160\text{ µg} \times 0.3 = 48\text{ µg vitamin A}$.

Water does not contribute calories or nutrients to the recipe.

3. Total the gram weights, kcals, and vitamin A in the recipe

- Total gram weight: 100 g of rice porridge + 50 g of egg + 30 g of pumpkin + 10 g water = ~190 g of food. This amount of food:
 - » Will be slightly more than an average child aged 6–11 months (who is also receiving breast milk) will eat at 1 sitting, with their own bowl/cup and assistance.
 - » Will be approximately 1 serving for an average child aged 12–23 months (who is also receiving breast milk) will eat at 1 sitting, with their own bowl/cup, with/without assistance (as needed).
- Total kcals: 110 kcals of rice porridge + 74 kcals of egg + 13 kcals of pumpkin = 197 kcals.
 - » The energy density of this serving of enhanced rice porridge is $197\text{ kcal} / 190\text{ g of food} = 1.04$.
 - » An energy density of 1.04 is > 0.77, and thus, an acceptable energy density.
- Total vitamin A: 0 µg of rice porridge + µg of egg + 48 µg of pumpkin = **143 µg vitamin A**.
 - » Nutrient density for vitamin A: $143\text{ µg} / 197\text{ kcals} \times 100\text{ kcals} = 0.73$
 - » The vitamin A density is 0.73, which is less than the recommendation of 9 for an infant aged 9–11 months

Summary:

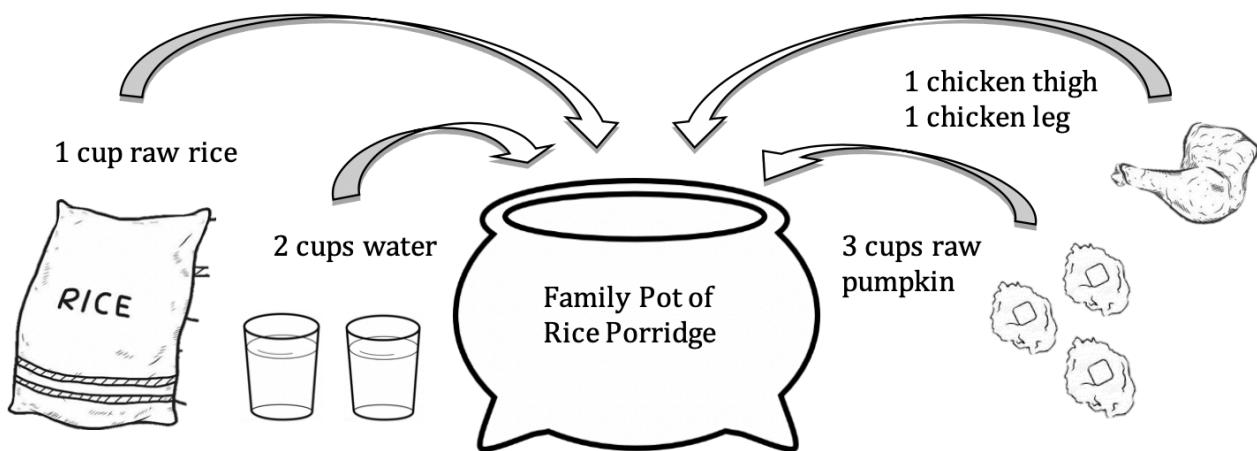
The overall volume of food is a little more than what a child aged 6–11 months will eat in one sitting, but it could be an adequate serving for a slightly older child. The recipe met the requirements for the energy density. It improved the vitamin A-density from 0 to 0.73; however, it does not meet the nutrient density requirement for a child aged 9–11 months.

Recommendations:

- The nutrient-density could be changed by reducing the amount of rice in the recipe.
- Additional vitamin A-rich foods like spinach or fortified oil could be added to the porridge.

Scenario 2: Cooking a Family Pot to Meeting Requirements for Complementary Foods

We begin with a basic staple porridge of rice (Staple Food column) and water. We will then add a protein food (chicken) and a vegetable (pumpkin) to make an energy-dense, diverse meal that can be served to every family member and will also meet needs of children who are complementary feeding. The recipe will be prepared for 5 people in one family pot as shown.



Will the energy density of the recipe meet the energy requirements for a child aged 16 months?

While cooking, 50 g of water evaporated from the cooking pot. The 16-month-old child ate a 125 g portion, and the rest was divided equally among the other four members of the household. Did the portion given to the 16-month-old meet the vitamin-A density requirement? Did the portion given to the 8-year-old boy meet his vitamin A meal requirement?

Steps:

1. Convert all ingredients from raw volume to cooked weight in grams

$$\text{Rice} = 1 \text{ c raw rice} = 195 \text{ g raw rice} \times 2.22 \text{ cooked/raw factor} = 433 \text{ g}$$

$$\text{Chicken} = 2 \text{ cooked pieces} = 6 \text{ oz edible portion (no bones)} \times 28.4 \text{ g/oz} = 170 \text{ g}$$

$$\text{Pumpkin} = 3 \text{ cups raw} \times (58 \text{ g}/0.5 \text{ cup}) = 1 \text{ cooked}/1 \text{ raw} = 348 \text{ g}$$

$$\text{Water} = 2 \text{ cups} \times (240 \text{ mL}/\text{cup}) \times (1 \text{ g/mL}) = 480 \text{ g}$$

2. Calculate the total pot weight and subtract water lost due to evaporation.

$$\text{Pot weight: } 433 \text{ g} + 170 \text{ g} + 348 \text{ g} + 480 \text{ g} = 1431 \text{ g}$$

$$\text{After cooking (subtract water loss)} = 1431 \text{ g} - 50 \text{ g} = 1381 \text{ g}$$

3. Calculate energy density

$$\text{Rice} = 433 \text{ g} \times 130 \text{ kcals}/100 \text{ g} = 563 \text{ kcals}$$

$$\text{Chicken} = 170 \text{ g} \times 233 \text{ kcals}/100 \text{ g} = 396 \text{ kcals}$$

$$\text{Pumpkin} = 348 \text{ g} \times 13 \text{ kcals}/100 \text{ g} = 45 \text{ kcals}$$

$$\text{Total kcals} = 563 + 396 + 45 = 1004 \text{ kcals}$$

$$\text{Energy density} = 1004 \text{ kcals}/1381 \text{ g} = 0.73 \text{ kcals/g}$$

The energy density of 0.73 is less than the recommendation for children ages 12-23 months.

4. Calculate the vitamin A density

$$\text{Rice} = 433 \text{ g} \times 0 \mu\text{g}/100 \text{ g} = 0 \mu\text{g}$$

$$\text{Chicken} = 170 \text{ g} \times 56 \mu\text{g}/100 \text{ g} = 95 \mu\text{g}$$

$$\text{Pumpkin} = 348 \text{ g} \times 160 \mu\text{g}/100 \text{ g} = 557 \mu\text{g}$$

$$\text{Total vitamin A} = 0 + 95 + 557 = 652 \mu\text{g}$$

$$\text{Vitamin A density} = 652 \mu\text{g} \div 1004 \text{ kcals} \times 100 \text{ kcals} = 64 \mu\text{g}/100 \text{ kcals}$$

The vitamin A density meets the requirement for children ages 12–23 months (17 μg/100 kcals).

5. Calculate the portion of each ingredient consumed by the 8-year-old.

Since the child ate 125 g of the 1381 g pot, this leaves 1256 g in the pot. This amount was divided equally among 4 members of the house, giving each a 314 g portion. A 314 g portion is 23% of the final pot weight for the recipe. Therefore, the amount of each ingredient for the recipe should be multiplied by 0.23 to get the amount the child ate.

$$\text{Rice} = 433 \text{ g} \times 0.23 = 100 \text{ g}$$

$$\text{Chicken} = 170 \text{ g} \times 0.23 = 39 \text{ g}$$

$$\text{Pumpkin} = 348 \text{ g} \times 0.23 = 80 \text{ g}$$

6. Calculate the vitamin A content provided by each ingredient.

$$\text{Rice} = 100 \text{ g} \times 0 \mu\text{g}/100 \text{ g} = 0 \mu\text{g}$$

$$\text{Chicken} = 39 \text{ g} \times 56 \mu\text{g}/100 \text{ g} = 21 \mu\text{g}$$

$$\text{Pumpkin} = 80 \text{ g} \times 160 \mu\text{g}/100 \text{ g} = 128 \mu\text{g}$$

$$\text{Total vitamin A} = 0 + 21 + 128 = 149 \mu\text{g}$$

(Note: steps 5 & 6 can be done in either order. Sometimes it makes more sense to calculate the nutrient content of the recipe first and then calculate the portion eaten by each family member.)

7. Compare the total vitamin A content to the recommendation for a boy aged 4–8 years.

The recommendation for a boy aged 4–8 years is 450 μg vitamin A per day. If he eats 3 meals a day, then each meal should have 150 μg vitamin A. This child's portion provided 149 μg, which can be considered adequate to meet the meal requirement.

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