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Improved complementary feeding

A trainers manual for rural nutrition and health care givers

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The Enhancing partnership among Africa RISING, NAFKA, and TUBORESHE CHAKULA Programs for fast tracking delivery and scaling of agricultural technologies in Tanzania is an interdisciplinary and inter-institutional project that aims to address smallholder farmers' needs in the semi-arid and sub-humid zones of Tanzania. The 3-year project is funded by the USAID Mission in Tanzania as part of the U.S. Government's Feed the Future initiative.

Through participatory and on-farm approaches, candidate technologies are being identified and evaluated for scaling by the project team. This is being achieved through the already established networks by Tanzania Staples Value Chain (NAFAKA), Tuboreshe Chakula (TUBOCHA), and other institutional grassroots organizations, creating an opportunity for mainstreaming into wider rural development programs, beyond Africa RISING's current zones of influence.

The project is led by the International Institute of Tropical Agriculture (IITA) and the USAID Tanzania mission-funded 'Feed the Future' programs NAFKA and TUBOCHA. Developmental activities addressing the project objectives are being implemented in Manyara, Dodoma, Morogoro, Iringa, and Mbeya Regions in Tanzania.

The Project partners appreciate support from the American people delivered through the USAID Feed the Future initiative. We also thank farmers and local partners at all sites for their contributions to the project and the CGIAR system.

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Citation: Ngonyani, H., Okoruwa, A., Kyungu, L., Gaspar, A., Mutungi, C. and Abass, A. 2020. *Improved complementary feeding: A trainer's manual for rural nutrition and health care givers. Ibadan, Nigeria: IITA*



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Editing and layout: Total Solution Printing

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List of acronyms

ACDI/VOCA	Agricultural Cooperative Development International / Volunteers in Overseas Cooperative Assistance
Africa RISING	Africa Research in Sustainable Intensification for the Next Generation
CGIAR	Consortium of International Agricultural Research Centers
FTF	Feed the Future
GDP	Gross Domestic Product
IITA	International Institute of Tropical Agriculture
USAID	United States Agency for International Development

Introduction

Importance of nutrition

Optimal feeding significantly contributes to a child's growth, development and health. Malnutrition is one of the most serious health problems affecting infants and children in the country. Malnutrition contributes to the deaths of children under five years and is closely associated with poor health status, inadequate care and unhealthy environment. Adequate caring practices which also include preventing a child from infectious diseases and optimal feeding practices contribute to reducing malnutrition and promoting good health and nutritional status, which in turn promotes growth, and physical and mental development.

In the first six months of a child's life, breast milk is the best child's food because it provides all the nutrients needed for their growth and development. During this period, exclusive breast feeding is important, since it provides all the required nutrients as well as immunity against diseases hence enabling the child's physical and mental development. For a child born to a mother who has health problems and cannot breastfeed, a special infant formula is prescribed for the child by a medical practitioner while observing hygiene and sanitation during preparation (utensils, water and surroundings) which is extremely important at all times.

As the child continues to grow, breast milk alone is not enough to meet the child's nutritional needs; hence complementary foods are needed to fill the gap. During this time, breast milk continues to be a very important part of the baby's food until the age of 2 years and beyond. After 2 years of age the baby should be introduced to the family's food which should be diversified and balanced, while hygiene and sanitation for water, food and environment are observed.

Complementary feeding

Complementary feeding means giving other foods in addition to breastmilk when the baby is 6 months of age. During this period breastmilk continues to be an important part of baby's food up to 2 years or beyond. It is therefore recommended that, along with complementary feeding, breastfeeding should be continued until at least two years of age. The first two years of age is a critical period of growth during which there is a higher prevalence of malnutrition if appropriate feeding practices and optimal WASH practices are not followed. It is important that complementary foods be adequate and of good quality for proper growth and development of the child. Breastfeeding continues to be important because it provides substantial amounts of micronutrients. However, if a child cannot be breastfed then it is important to provide other types of milk until the age of 2 years or beyond. It is very difficult to meet a baby's nutritional requirements without giving milk or any other food of animal origin.

The importance of timely introduction of complementary foods

Effects of early introduction of complementary foods

Introducing complementary food before six months can result in the following effects:

- The mother will produce less milk because the child will be filled up on food and will not be able to suckle as much from the breast. The less the frequency of breastfeeding the less the production of breast milk .
- Foods will replace breastmilk which is a highly concentrated source of nutrients that are vital for the growth of a child.
- The baby's digestive system is not fully developed and therefore the food cannot be digested properly. The child's stomach may be filled up but the food cannot be digested properly and therefore they may not receive enough nutrients.
- The child may get frequent infections when complementary food replaces breast milk, with the child receiving less of the protective factor in breastmilk. In addition, the child may get diarrhoea because the food cannot be digested properly as its digestive system is not fully developed.

The effects of late introduction of complementary foods

- The baby will not get all the nutrients needed which may affect its growth and development.
- The child may be at risk of getting malnutrition because breastmilk alone is not enough to meet the nutritional needs for optimal growth and development.
- The child may have difficulties in learning to eat complementary foods when they are introduced later; which may put the child at a risk of getting nutritional deficiencies.

Recommended complementary feeding

Complementary foods should be appropriate to ensure that a child's nutritional needs are met for proper health, growth and development. It is important to use foods that are locally available because they are easily accessible, fresh and affordable. The child's food should be diversified and balanced by choosing at least one food item from each of the five food groups to prepare their meal. The food groups are:

Cereals, roots and tubers

Foods under this group form the largest part of a meal in terms of volume and are usually staple foods (See Figure 1). The foods in this group include: maize, rice, sorghum, millet, wheat, yams, taro, sweet potato, cassava, Irish potatoes and plantains. These foods are often used for complementary foods and when cooked they become bulky, thick and increase in volume with little nutrient content, therefore cannot meet the child's nutrients needs. These foods should therefore be mixed with other nutrient dense foods such as milk, groundnuts and oil to provide the child with enough nutrients.

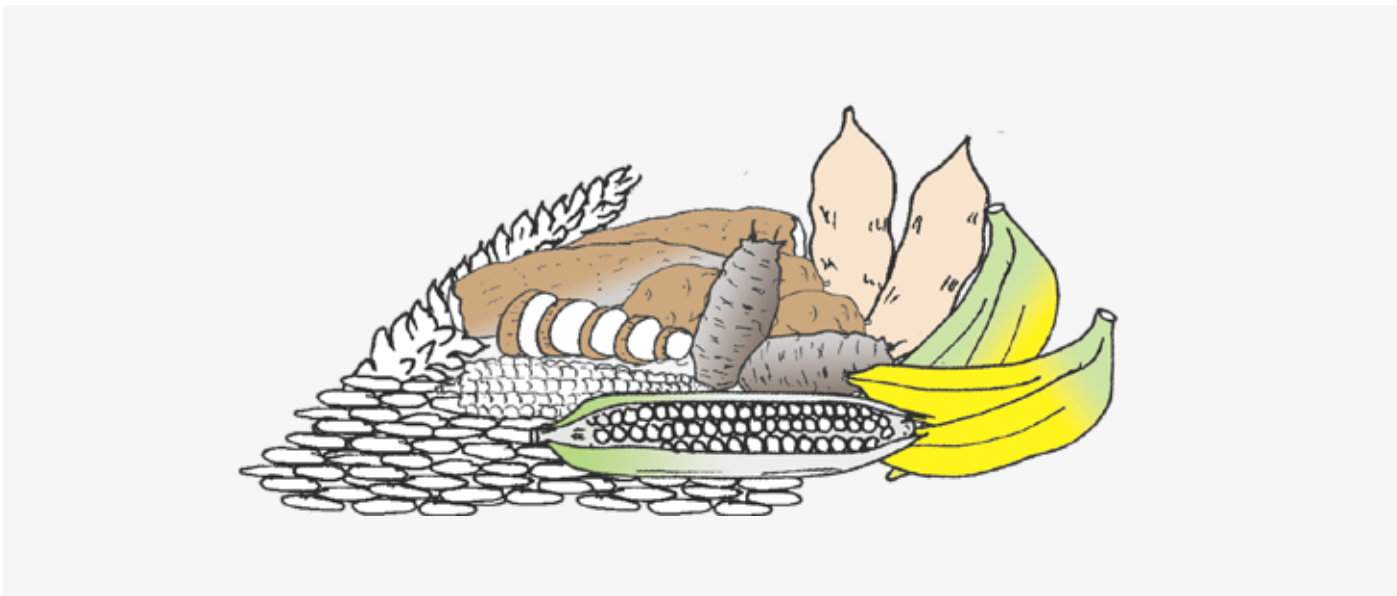


Figure 1. Cereals, roots and tubers.

Legumes and foods of animal origin

The foods in this group (Figure 2) include beans, peas, cow peas, ground nuts, soya beans, bambara nuts, chick peas, lentils, green grams and lima beans. Foods of animal origin include beef, fish, sardines, milk, eggs, chicken, duck, pigeon, guinea pigs, liver, kidneys, green grasshopper, locust, termites and other edible insects. The foods in this group provide nutrients responsible for growth and development as well as good health.

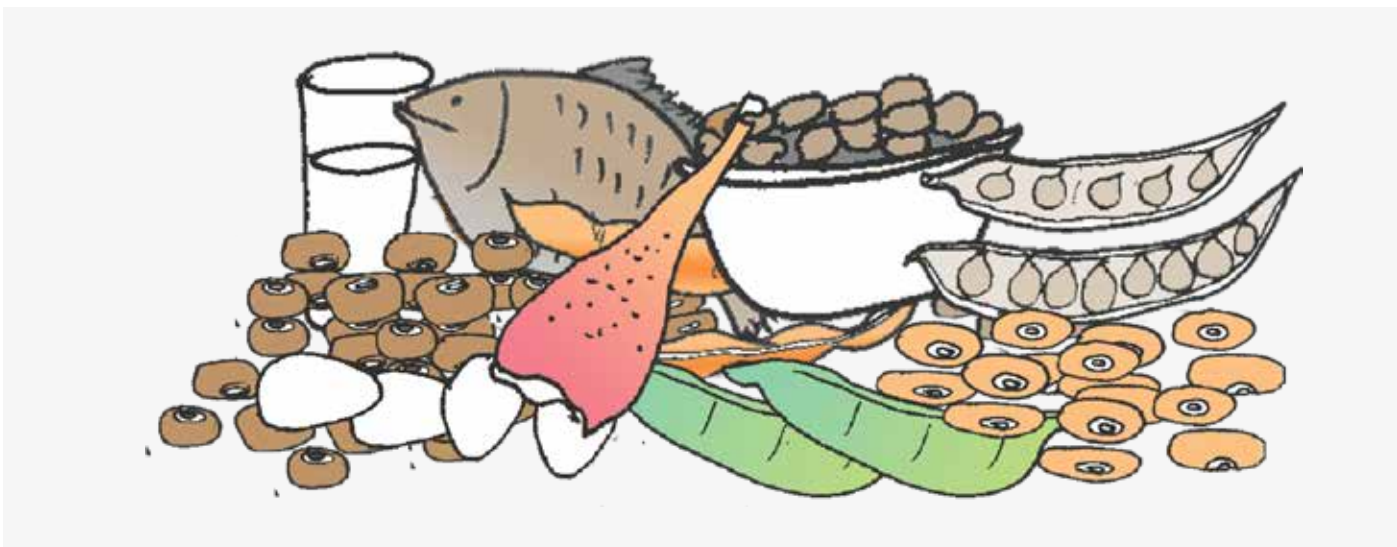


Figure 2. Legumes and foods of animal origin.

Vegetables

This group includes both exotic and indigenous vegetables (See Figure 3). These include amaranth, pumpkin leaves, cassava leaves, cow pea leaves, sweet potato leaves, spinach, nightshade, hare lettuce. Others include carrots, green pepper, tomatoes, egg plants, cucumbers, pumpkin, African eggplant, okra, beetroot, cabbage, kales and radish. It is important to mix vegetables in a child's food for proper body functioning and protection against diseases.



Figure 3. Vegetables.

Fruits

They include both indigenous and exotic ones (See Figure 4). Indigenous fruits include baobab fruit, tamarind, ambarella fruit African medler fruit, and dwarf palm. Exotic fruits include pawpaw, mango guava, lemon, passion fruit, pineapple, pear, oranges, tangerine, dragon fruit/black plum, avocado, banana, jack fruit, soursop, rubber vine, grapes fruit, peaches, and custard apple. It is important to include fruits in a child's meal for protection against diseases, and for proper body functioning.

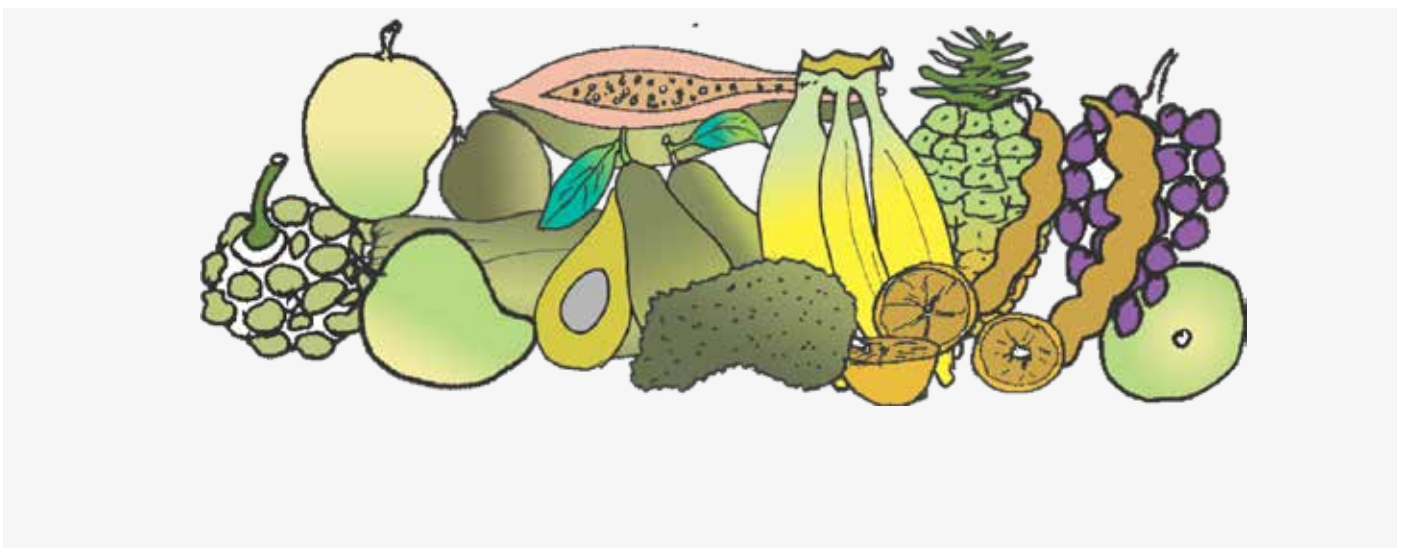


Figure 4. Fruits.

Fats, oils and sugars

Oils are available from plant sources such as sunflower seeds, sesame seeds, cotton seeds, cashew nuts, groundnuts and palms. Fats are from animal sources. Good sources of fats include butter, ghee, fatty meat and fish. Sugar is available as table sugar, sugar cane

and honey. Small amounts of oil should be added to a child's meal to assist in the absorption of some nutrients, to make the food tasty and increase the energy content of the meal. Adding a little sugar, is a useful way of increasing the energy content of a meal and make it tasty.

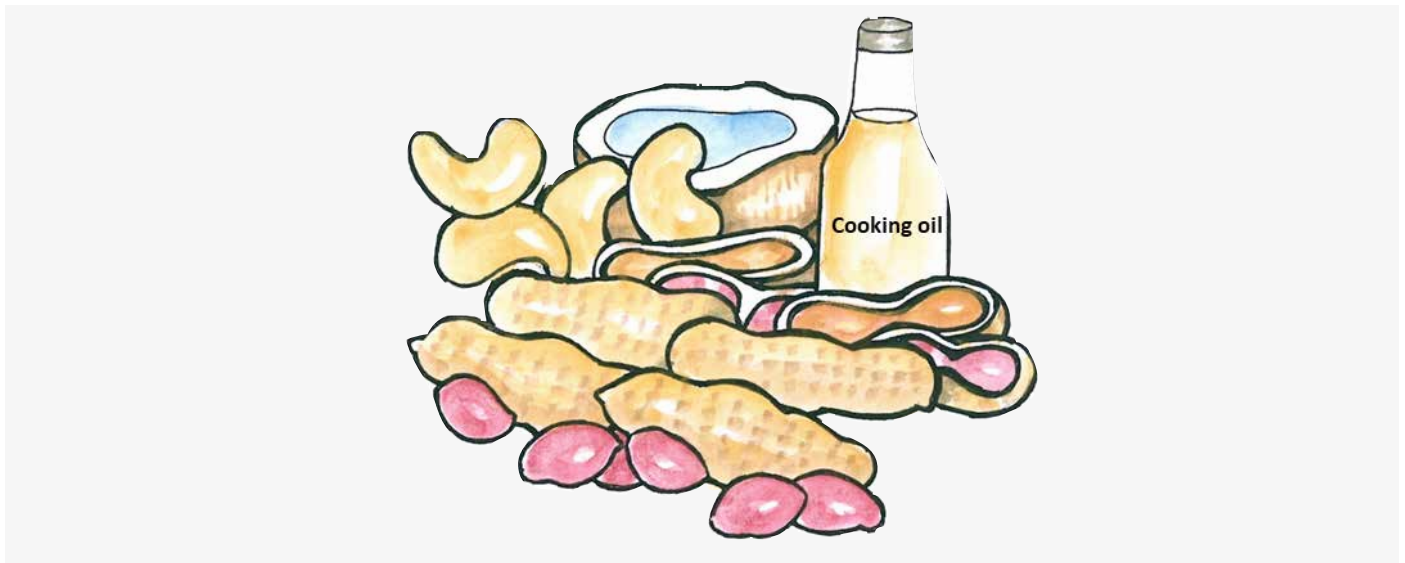


Figure 5. Oil sources.

Drinks

Water is not part of food groups but is important for the human nutrition and health. In addition, a child can be given other drinks which are nutritious, such as soup and pure fruit juices. Give a child clean and safe water or other drinks after the meal so as to avoid filling up the child's stomach with too much fluid before or during the meal.

Feeding a child

It is important to observe proper hygiene and sanitation in food handling as well as the utensils and the surroundings (See Figure 6). It is also important to ensure the recommended feeding frequency, amount, and the quality of food is given to a child.

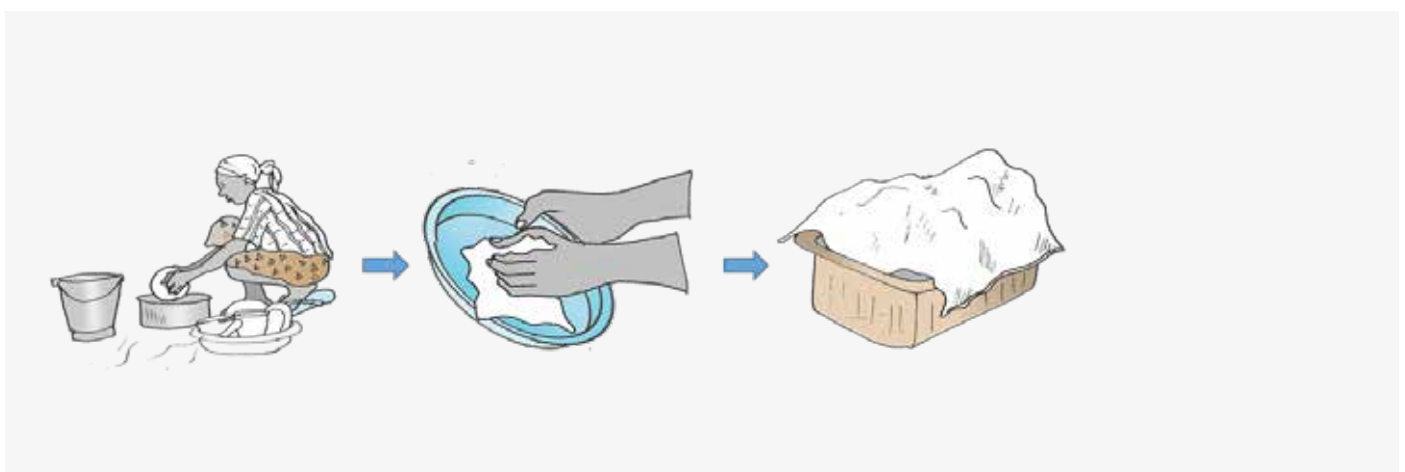


Figure 6. Some actions to ensure good hygiene.

Feeding a child aged 6-12 months

- When starting to give a child complementary food, the child needs time to get used to the taste and food mixture because they are just learning to consume other foods in addition to breastmilk.
- Give food to a child, starting with 2-3 tablespoons twice a day.
- Breastfeed the child before giving complementary food.
- Increase food quantity gradually as the child gets older; by 12 months of age the child should be able to consume one cup (250 mL) per meal.
- As the child gets older the food consistency gradually changes from soft foods/ puree to mashed food, then to foods cut into small pieces and eventually to family foods.

Feeding a child age 12 to 24 months

- Feed the child foods from the family diet. If necessary, the food should be mashed or cut into small pieces.
- Give the child three main meals, plus two snacks per day.
- Feed the child a full bowl/cup of 250 mL per meal.

A child should not be fed on sauce seeped from food; it is important to blend and grind the food together with the sauce to get the nutrients contained in the food.

REMEMBER:

A child should not be fed on sauce seeped from food; it is important to blend and grind the food together with the sauce to get the nutrients contained in the food.



Sauce seeped from food
(NOT RECOMMENDED)



Grind the food together with the sauce
(RECOMMENDED)

Figure 7. Recommendation for complementary feeding.

Responsive feeding

- Optimal child caring practices collectively entail appropriate feeding, receiving health care services, as well as psycho social support which are important for good health, growth and development of the child. All these depend very much on the behavior and practices of the care giver and other family members. Feeding time is an opportunity to demonstrate how well the care giver has an ability to care for the child. Responsive feeding is a recommended way of feeding a child.
- Responsive feeding is a type of feeding whereby a care giver helps and encourages the child to eat willingly and warmly.
- The care giver must be attentive during the feeding.
- The child must not be forced to eat when it signals satiety.



Figure 8. Responsive feeding.

Techniques/ approaches for responsive feeding

- Feed the child in a cheerful mood while encouraging it to eat (See Figure 8).
- feed the child slowly and patiently;
- experiment with different food combinations, tastes and textures;
- assist the child to feed itself;
- during meals minimize distractions that will make the child lose interest in food;
- always be closer to the child, interactive and attentive.

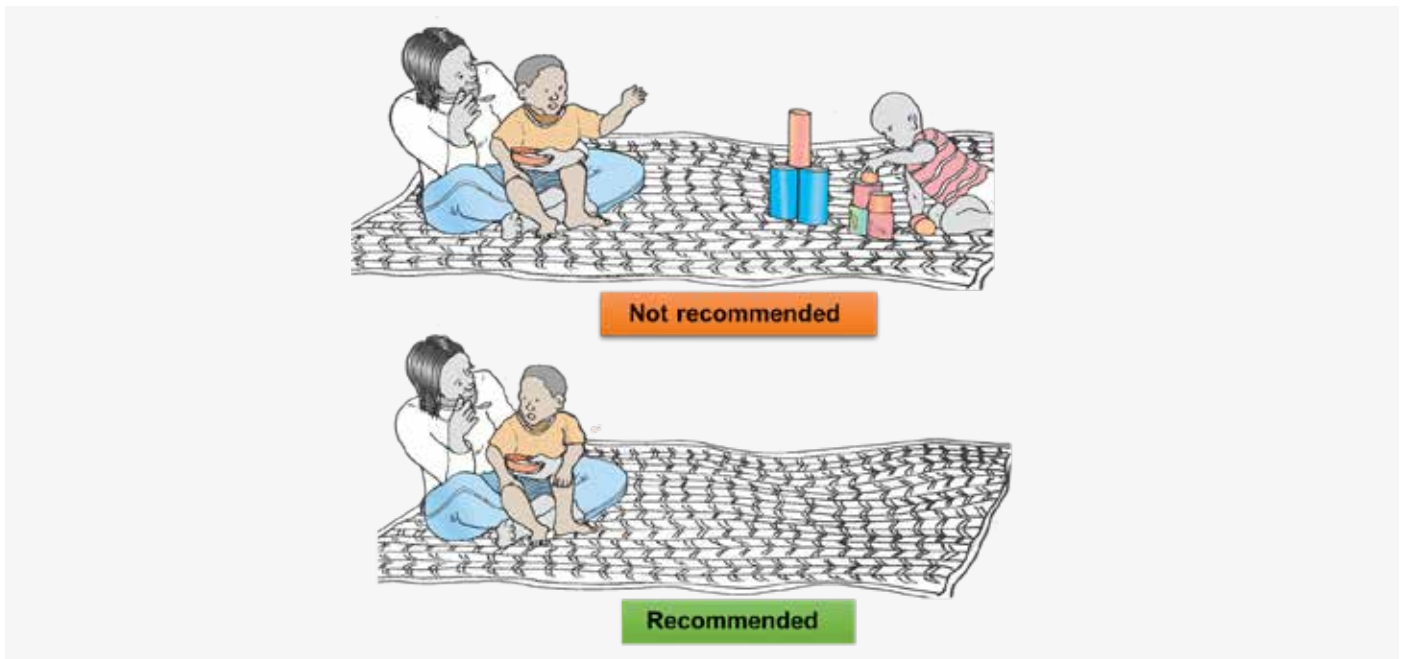


Figure 9. Minimize distractions during meal times.

Guiding principles to appropriate complementary feeding

- Complementary food should have the right consistence.

The food should be thick enough to stay easily on the spoon (Figure 9) and should provide adequate energy and nutrients.



Figure 10. The right food consistency.

How to feed

- Breastfeed the child first before feeding it complementary food;
- give soft food starting with one table spoon twice a day; gradually increase food quantity and frequency. as infants grow, the consistency of complementary foods should change from semi-solid to solid foods and the variety of foods offered should be increased;
- as the child gets older gradually introduce it to family foods;
- it is important to use locally available foods for complementary foods;
- it is important to observe the variety of foods, amount, frequency, consistency and feeding methods;
- put the child's food on a separate plate to ensure the child gets its share, and to know how much food the baby has eaten;
- practice responsive feeding where a care giver assists the child to eat and encourages the child to eat warmly without forcing;
- observe proper hygiene of food and water, environmental sanitation and cleanliness of the utensils .





Types of food to feed

- Improve the child's meal by adding nutrients and energy dense foods such as grounded peanuts, oil or grounded oil seeds, oyster nuts, coconut milk or milk. Add these foods gradually as the child grows.
- Include vegetables, legumes and foods of animal origin. The child should also be given a fruit in every meal.
- Give the child a variety of foods and try to change foods within food groups. The meal should be balanced by including at least one food item from each of the food groups.
- Feed the child often, at least five times a day, depending on its age.
- Older children should be given healthy snacks between meals such as buns, chapatti, rice fritter, milk, cooked cassava, sweet potatoes, bananas; and fruits such as ripe banana, pawpaw, mango, orange, avocado etc.

Amount of food to feed a child

- As the child gets older increase the quantity of food and the frequency of meals. It is important to continue breastfeeding the child. Table 1 below summarizes how complementary feeding should be done, in terms of frequency, and the amount of food at different ages.

Table 1. Provision of complementary food based on age, frequency and amount.

Child's Age	Feeding frequency	Amount of food
<ul style="list-style-type: none"> 6 months 	<ul style="list-style-type: none"> Two meals per day 	<ul style="list-style-type: none"> 2 to 3 table spoons per meal.
<ul style="list-style-type: none"> 7-8 months 	<ul style="list-style-type: none"> 3 times a day Provide 1 to 2 snacks between meals 	<ul style="list-style-type: none"> Increase the amount of food gradually up to half a cup (125 mL) per meal
<ul style="list-style-type: none"> 9 – 12 months 	<ul style="list-style-type: none"> 3 meals a day Provide 1 to 2 snacks between meals 	<ul style="list-style-type: none"> $\frac{3}{4}$ of a cup to 1 cup of 250 mL per meal
<ul style="list-style-type: none"> 13 -24 months 	<ul style="list-style-type: none"> 3 meals a day Provide 1 to 2 snacks between meals 	<ul style="list-style-type: none"> 1 cup of 250 mL per meal

Reasons that could make a child refuse to eat

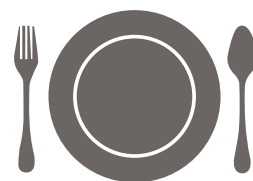
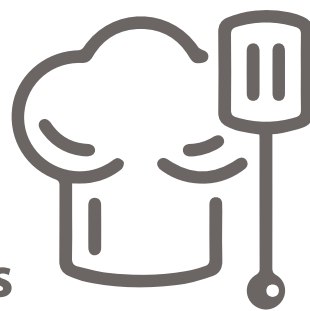
- The child may be too tired to eat.
- Forcing a child to eat.
- Feeding child foods with hard texture when it is not ready for solids.
- Giving the child drinks, especially sugary drinks that will fill up the belly and interrupt the child's appetite.
- The child not given attention, encouragement and support during meals.
- Punishing, shouting, and threatening a child during meals.
- The child eating together with other children or family members.
- The child not hungry. Preparation of different supplementary foods.



Things to remember

- Milk is an important food for a child since birth up to 2 years. Breastfeeding should be continued while giving complementary foods; if it is not possible to breastfeed then other types of milk should be part of a child's diet; give the child half a litre or two cups per day.
- The child should be given vitamin A supplements as recommended by health practitioners and according to national guidelines.
- The child should receive routine child health examinations (clinic) every month in order to monitor health, growth and development, as well as the recommended immunization. Mothers should be taught how to interpret the growth curves and the development stages in the growth card in order to monitor their children's growth and take necessary measures when need arises.
- During sickness increase meals frequency. Feed the child small frequent meals while continuing breastfeeding.
- Seek medical advice as soon as the child shows any signs of being unwell.
- Use iodized salt when preparing the child's meals.
- Observe hygiene, safety and sanitation of food, water and environment. Always wash hands with clean flowing water and soap before preparing food, after attending the child and after using a toilet and before feeding the child.

Preparation of different supplementary foods



Utensils needed for food preparation and cooking include cooker, cooking pots, wooden spoons, table spoons, tea spoons, forks, plates, big bowls, small bowls, a cup (250 mL), jugs, knife, basin, and soap for washing hands and utensils.



Recipes for children aged 6 to 9 months

Milk porridge

Ingredients	Methods
<p>1 heaped table spoon of maize or millet flour</p> <p>1 cup of (250 mL) milk</p> <p>1 teaspoon of sugar</p> <p>1 orange or lemon</p>	<ol style="list-style-type: none">1. Mix the flour with milk; and ensure there are no lumps2. Bring to boil and continue stirring until it starts to simmer3. Simmer for 5 minutes, then add sugar, stir and then remove from heat4. Wash, cut and squeeze the lemon to get juice; then add it to the porridge and stir5. Pour the porridge into a cup and feed the child while the porridge is warm

Maize flour porridge enriched with groundnut, sugar and lemon

Ingredients	Methods
<p>½ cup maize flour</p> <p>1 cup cold water for mixing the flour</p> <p>2 cups (500 mL) cold water for cooking the porridge</p> <p>1 tablespoon of roasted and pounded into groundnut paste</p> <p>1 tablespoon of sugar</p> <p>1 lemon or orange (you can also use baobab fruit powder)</p>	<ol style="list-style-type: none">1. Boil the water for cooking the porridge2. Mix the flour with cold water; making sure that there are no lumps3. Pour the mixture into the boiling water while stirring to avoid formation of lumps until it starts to simmer4. Cover the pot with porridge while it continues to simmer until it is well cooked5. Add in peanut butter/groundnut paste and sugar while stirring until the mixture boils; for 2 minutes, then remove from fire and let it cool until it is warm6. Wash, cut and squeeze the lemon or orange to get juice; then add to the porridge and stir. You can also add in baobab fruit powder7. Pour the porridge into a cup and feed the child while the porridge is warm

Flour made from dried germinated cereal grains (germinated flour) porridge enriched with yoghurt and oil

Ingredients	Method
<p>1 cup of maize flour \½ cup of cold water for mixing the flour</p> <p>2 cups (500 mL) of cold water for cooking the porridge</p> <p>1 heaped tablespoon of germinated flour (refer to page 28for how to prepare germinated flour)</p> <p>1 heaped tablespoon sugar</p> <p>1 tablespoon of cooking oil or margarine or butter</p> <p>1 cup of yoghurt or milk</p>	<ol style="list-style-type: none">1. Mix the maize flour with cold water; and ensure there are no lumps2. Boil the water for cooking the porridge3. Pour the mixture into boiling water while stirring to avoid formation of lumps until the mixture starts to simmer. Cover the porridge while it continues to simmer until it is well cooked. The porridge must be very thick. If it is not very thick pour in more mixture of the maize flour and water.4. Remove thick porridge from fire, pour it in a big bowl to cool until warm5. Return the porridge to the cooking pot, add the germinated flour6. Stir slowly until the porridge becomes thin7. Heat the porridge until the mixture boils8. Add oil/margarine/butter and sugar9. Remove the porridge from the fire; cool until it is warm and then add yoghurt/ boiled milk10. Feed the child immediately

Maize flour porridge enriched with egg, sugar, margarine and lemon

Ingredients	Method
<p>½ cup of maize flour;</p> <p>1 cup of cold water for mixing the flour;</p> <p>2 cups (500 mL) of cold water for cooking the porridge;</p> <p>1 egg;</p> <p>1½ tablespoon of sugar;</p> <p>1 teaspoon of margarine;</p> <p>1 lemon</p>	<ol style="list-style-type: none">1. Boil the water for cooking the porridge2. Mix the flour with cold water; making sure that there are no lumps3. Pour the mixture into the boiling water while stirring to avoid formation of lumps until it starts to simmer. Cover the porridge while it continues to simmer until it is well cooked4. Remove it from heat and cool it until warm5. Beat the egg then add it to the porridge stirring it well6. Heat the porridge until the egg is cooked7. Add sugar then remove it from the fire8. Add margarine and squeezed lemon juice and stir. You can also add orange juice or baobab fruit powder instead of lemon juice9. Pour the porridge into a cup and feed the child while the porridge is warm

Sweet potatoes enriched with milk and peanut butter

Ingredients	Method
<p>2 cups of cold water for cooking</p> <p>1 cup of orange flesh sweet potatoes peeled and cut into small pieces</p> <p>½ cup of boiled milk</p> <p>1 tablespoon of groundnut paste</p> <p>A pinch of salt</p>	<ol style="list-style-type: none">1. Put the sweet potatoes in a cooking pot and add water and salt and boil until soft2. Add groundnut paste, mix and let the mixture simmer for a few minutes3. Remove from heat and pour into a bowl4. Add milk and mix well to get a smooth mixture5. Feed the child while the food is warm

Note: You can add a half teaspoon margarine to make it smooth, to increase palatability and enriching it.

Pumpkin, yam, carrot with milk

Ingredients	Method
<p>1 cup of pumpkin peeled and cut into small pieces</p> <p>½ cup of yam peeled and cut into small pieces (if yam is not available you can use sweet potatoes)</p> <p>2 small carrots</p> <p>1 cup of boiled milk or yoghurt</p> <p>1 cup of water</p> <p>A pinch of salt</p> <p>1 teaspoon of margarine/butter</p>	<ol style="list-style-type: none">1. Wash the pieces of pumpkin, yams and carrots and put them into cooking pot; add water and salt2. Boil until soft, remove the mixture from heat and mash it3. Add in milk/yoghurt and mix to get a smooth mixture which is not too thin or too thick4. Pour it into a cup/bowl and feed the child while still warm



Recipes for children aged between 10 and 12 months

Irish potatoes enriched with chicken meat and carrots

Ingredients	Methods
<p>2 teaspoons of margarine or butter or cooking oil</p> <p>1 medium size onion</p> <p>2 small carrots</p> <p>1 medium size tomato</p> <p>4 medium size Irish potatoes</p> <p>1 cup of boiled milk</p> <p>1 cup of boiled chicken meat cut into small pieces (without skin or bones); instead of chicken you can use boneless fish or fresh boneless meat (pounded/ minced), dried boneless meat (grounded into powder) or dried sardines grounded into powder</p> <p>1 cup of water for cooking</p> <p>A pinch of salt</p>	<p>Peel the potatoes, onion, carrots and tomatoes and cut them into small pieces</p> <p>Put the cooking pot on fire and then add margarine/ butter/ cooking oil, tomatoes, carrots and a bit of water while steering for 5 minutes</p> <p>Add potatoes, meat, salt and some water</p> <p>Cover the pot and simmer until cooked</p> <p>Take the pot from the fire, and mash the food.</p> <p>When the food is warm add milk, and mix well</p> <p>Feed the child while the food is warm</p>

Plantains enriched with meat and carrots

Ingredients	Methods
<p>2 plantains/ cooking banana of any type available</p> <p>4 small carrots</p> <p>1 tablespoon of margarine or butter or cooking oil</p> <p>1 onion</p> <p>1 cup of fresh boneless lean meat cut into small pieces (instead of meat you can use boneless, lean chicken without skin, fish or dried boneless meat (grounded into powder) or dried sardines grounded into flour</p> <p>1 cup of boiled milk</p> <p>1 tomato</p> <p>3 cloves of garlic</p> <p>Water for cooking</p> <p>A pinch of salt</p>	<ol style="list-style-type: none">1. Pound the meat using a clean mortar or a board; or if you have a machine you can mince it2. Peel the garlic cloves and crush/pound it3. In a cooking pot put meat and add salt, boil until tender. Make sure that there is some soup left4. Peel the bananas, onion, carrots and tomatoes and cut them into small pieces, put them in another cooking pot and add salt and water.5. Put the cooking pot on fire and then add margarine/ butter/ cooking oil, garlic and the cooked meat with soup;6. Boil the mixture until the bananas are tender and the soup has dried up.7. Take the pot from the fire and mash the food.8. Add milk and mix well and continue to simmer in low heat for few minutes9. Take the pot from the fire, and mash the food if necessary10. Feed the child while the food is warm.

Rice enriched with vegetables and egg

Ingredients	Method
<p>1 egg</p> <p>½ cup of rice</p> <p>1 medium size carrot</p> <p>1 tablespoon of cooking oil</p> <p>1 cup of any shredded vegetables available, such as amaranth, Chinese spinach or other indigenous leafy vegetables.</p> <p>2 cups of water for cooking</p> <p>Small amounts of salt</p>	<ol style="list-style-type: none">1. Sort and clean the rice2. Bring water to boil then add salt, cooking oil and rice; boil until cooked but still hard3. Wash the vegetables and sieve them4. Peel the carrots and cut them into small pieces5. Add all the vegetables (including carrot) in the rice, cover and continue to cook on a low heat until cooked6. Beat the egg in a bowl and add it to the rice, stir and avoid formation of lumps while continuing to cook in a very low heat until the egg is well cooked and tender.7. Remove from the fire and mash (if necessary)8. Feed the child while the food is warm

Irish potatoes enriched with sardines and vegetables

Ingredients	Method
<p>3 large Irish potatoes (you can substitute potatoes with 2 cooking bananas, 3 medium pieces of cassava or ½ cup rice)</p> <p>1 handful of dried sardines</p> <p>1 medium size carrot</p> <p>1 tablespoon of cooking oil</p> <p>1 cup of any shredded vegetables available such as amaranth, spinach or other indigenous leafy vegetables</p> <p>2 cups of water for cooking</p> <p>Small amount of salt</p>	<ol style="list-style-type: none">1. Remove the heads from sardines and wash thoroughly to remove dirt and sand.2. Heat the cooking pot until is hot, then add the sardines and stir without adding water or oil until very dry3. Remove from the heat and pound in a mortar to a powdered form4. Peel the potatoes and carrots, wash and cut them into small pieces5. Put the cooking pot on the fire and then add potatoes, water and salt; and boil for 5 minutes6. Add carrots, pounded sardines and oil and let the mixture continue to boil for 3 minutes.7. Add shredded vegetables and cook for 5 minutes8. Remove from the fire, and mix (mash the food if necessary)9. Feed the child while the food is warm

Sweet potatoes enriched with beans and vegetables

Ingredients	Method
<p>1 cup of orange flesh sweet potatoes (or any other type) peeled cut into small pieces</p> <p>1 handful of any type of beans</p> <p>1 medium size carrot</p> <p>1 cup of any shredded vegetables available, such as amaranth, Chinese spinach or other indigenous leafy vegetables</p> <p>1 tablespoon of cooking oil</p> <p>Small amount of salt</p> <p>Plenty of water for cooking</p>	<ol style="list-style-type: none">1. Boil the beans until well cooked2. Peel the sweet potatoes, wash and cut them into small pieces and add them into the pot with the beans, cover and continue to cook3. While the sweet potatoes are being cooked; sort out the vegetables, wash, shred and add to the cooking pot4. Add salt and water and cook until soft5. Remove from the fire and mash to get a smooth mixture6. If the food is too dry/ thick you can add a little water or milk to get the desired consistency7. Feed the child while the food is warm

Plantains enriched with fish and green leafy vegetables

Ingredients	Method
<p>2 plantains/ cooking banana of any type available</p> <p>1 medium size fresh or dried fish</p> <p>1 cup of any shredded vegetables available, such as amaranth, Chinese spinach or indigenous leafy vegetables</p> <p>1 carrot</p> <p>1 onion</p> <p>1 tablespoon of cooking oil</p> <p>Water for cooking</p> <p>A little salt</p>	<ol style="list-style-type: none">1. Wash the fish, remove bones and cut into small pieces. If you are using dried fish wash and soak in hot water until soft, remove, sieve and remove bones2. Put the fish in a cooking pot, squeeze in lime/lemon, add a little water and cook3. Peel the bananas, onion, carrots and cut them into small pieces, then add them into the cooking pot, add salt4. While the food is being cooked; sort out the vegetables, wash, shred and add to the cooking pot5. Add oil and cook until the bananas are tender6. Remove from the fire, and mash the food7. If the food is too dry/ thick you can add a little water or milk to get the desired consistency8. Feed the child while the food is warm

Rice enriched with pumpkin and carrots

Ingredients	Method
<p>½ cup of rice</p> <p>1 cup of pumpkin (peeled and chopped)</p> <p>1 tablespoon of margarine or butter or cooking oil</p> <p>1 small carrot (peeled and chopped)</p> <p>½ cup of fresh milk or yoghurt</p> <p>1 teaspoon of sugar or a pinch of salt</p> <p>2 cups water</p>	<ol style="list-style-type: none">1. Wash the rice, put into the cooking pot, add water and salt2. Cook the rice until half done then add chopped pumpkins, carrots and oil3. Cover and cook until tender4. Remove from the fire and add milk to bring it to a desired but soft consistency5. Serve warm but not hot

Note: You can add ripe bananas (mashed) to the food to enrich and make it tasty.

Recipes for children aged between 1 and 2 years

Stiff porridge with meat and vegetables

Ingredients	Method
<p>2 cups of any flour available/ used by the family to make stiff porridge</p> <p>1½ cup of water for cooking</p> <p>1 cup of meat or liver cut into small pieces (minced meat can be used)</p> <p>1 cup of cold water for mixing the flour</p> <p>1 carrot</p> <p>1 sweet pepper</p> <p>1 onion</p> <p>1 tomato</p> <p>1 tablespoon of cooking oil (if you are using lean meat)</p> <p>½ cup of any shredded vegetables available, such as amaranth, Chinese spinach or other indigenous leafy vegetables.</p> <p>Small amount of salt</p>	<ol style="list-style-type: none">1. Cut the meat/ liver into small pieces, and put in a cooking pot, add salt and cook the meat until well done.2. Cut the carrot, sweet pepper, onion and tomatoes into small pieces and add them in the meat3. While the meat is being cooked, sort out the vegetables, wash, shred and add them to the cooking pot together with oil (if you prefer). Remove the pot from heat when vegetables are done4. Mash the cooked meat till soft and set aside5. In a separate pot, boil one cup of water6. In a small bowl mix ½ cup of cold water with one table spoon of flour; making sure that there are no lumps7. Pour the mixture into boiling water while stirring to avoid formation of lumps until the mixture starts to simmer.8. Slowly add flour to the cooking pot little by little, while stirring/ mixing until you get a very soft stiff porridge9. Cook for 5 minutes and then remove from heat and pour into a bowl10. Add the mashed meat and mix thoroughly11. Serve warm but not hot

Rice with milk, peas and carrots

Ingredients	Method
<p>½ cup of rice</p> <p>1 cup of peas (removed from pods)</p> <p>1 tablespoon of margarine or butter or cooking oil</p> <p>2 small carrots</p> <p>1 cup of fresh milk</p> <p>2 cups of water for cooking</p> <p>Small amount of salt</p>	<ol style="list-style-type: none">1. Sort and clean the rice2. Bring water to boil and then add a small amount of salt, cooking oil and the rice; cook until soft3. Wash the peas and boil them in another pot and when cooked add the carrots, little oil and a bit of salt4. Continue to cook until soft and mash the peas5. Add the cooked rice and mix thoroughly; and then add milk while stirring6. When the mixture boils, remove from the heat and pour into a bowl7. Serve warm but not hot

Plantains with beans and vegetables

Ingredients	Method
<p>2 plantains/ cooking banana of any type available</p> <p>1 handful of any type of beans</p> <p>1 medium size carrot</p> <p>1 cup of any shredded vegetables available, such as amaranth, Chinese, spinach or other indigenous leafy vegetables.</p> <p>1 tablespoon of cooking oil</p> <p>1 onion</p> <p>Small amount of salt</p> <p>Plenty of water for cooking</p>	<ol style="list-style-type: none">1. Boil the beans until well cooked2. Peel the bananas, onion, carrots and cut them into small pieces, and then add them into the cooking pot with beans. Add salt, and cover the pot and continue to cook.3. While the bananas are being cooked sort out vegetables, wash, shred and add them into the cooking pot4. Add salt and oil and cook until soft5. Remove from heat and mash to get a smooth mixture6. If the food is too dry / not moist enough you can add a little water or milk to get the desired consistency7. Feed the child while the food is warm

Irish potatoes with meat and vegetables

Ingredients	Method
<p>2 large Irish potatoes</p> <p>½ cup of lean meat</p> <p>1 tablespoon of margarine or butter or cooking oil</p> <p>½ cup of any shredded vegetables available, such as amaranth, Chinese spinach or other indigenous leafy vegetables.</p> <p>1 tomato</p> <p>1 carrot</p> <p>1 onion</p> <p>Water for cooking</p> <p>Small amount of salt</p>	<ol style="list-style-type: none">1. Cut the meat into small pieces, put them in a cooking pot, add salt and cook the meat until well done. Remove from heat.2. Cut the carrot, sweet pepper, onion and tomato into small pieces3. Peel the potatoes, wash, cut them into small pieces and put them in a cooking pot.4. Add the carrots, sweet pepper, onion and tomatoes; the cooked meat and cook until soft5. While the meat is being cooked; sort out the vegetables, wash,shred and add them into the cooking pot together with oil6. Remove the pot from heat when vegetables are done and mash7. Feed the child while the food is warm

Rice porridge with groundnut

Ingredients	Method
<p>4 table spoons of rice</p> <p>2½ tablespoons of groundnut paste</p> <p>1 tablespoon of sugar</p> <p>1 cup of yoghurt</p> <p>2 cups of water for cooking</p> <p>1 tablespoon of tamarind juice or baobab fruit juice</p>	<ol style="list-style-type: none">1. Sort and clean the rice and boil it until soft.2. Add groundnut paste (if dry add a bit of water)3. Continue to cook in a low heat for 5 minutes then remove from heat4. Add sugar, tamarind /baobab juice5. Add yoghurt and mix well6. Serve warm but not hot

Sweet potatoes with groundnut and vegetables

Ingredients	Method
<p>2 small orange flesh sweet potatoes (or any other type)</p> <p>2½ tablespoons of groundnut paste</p> <p>1 cup any shredded vegetables available, such as amaranth, Chinese spinach or other indigenous leafy vegetables.</p> <p>Small amount of salt</p> <p>Plenty of water for cooking</p>	<ol style="list-style-type: none">1. Peel the sweet potatoes, wash and cut them into small pieces2. Put the sweet potatoes in the cooking pot, add water and salt, cover and cook3. While the sweet potatoes are being cooked sort out vegetables, wash, shred and add to the sweet potatoes4. Add groundnut paste and continue to cook in a low heat until soft.5. Remove from heat and mash to get a smooth mixture6. Feed the child while the food is warm

Stiff porridge with sardines and vegetables

Ingredients	Method
<p>2 cups of any flour available/ used by family to make stiff porridge</p> <p>1½ cup of water for cooking</p> <p>1 handful dried sardines</p> <p>1 carrot</p>	<ol style="list-style-type: none">1. Remove heads from the sardines and wash thoroughly to remove dirt and sand2. Heat the cooking pot until hot, then add the sardines and stir without putting water or oil until very dry3. Remove them from heat and pound in a mortar until you get a soft mixture (powdered form)4. Peel and cut the carrot, sweet pepper, onion and tomato into small pieces5. Shred the vegetables6. Heat the cooking oil in a cooking pot for 4 minutes and then add the tomatoes

Stiff porridge with sardines and vegetables (continues)

Ingredients	Method
<p>1 sweet pepper</p> <p>1 onion</p> <p>1 tomato</p> <p>1 tablespoon of cooking oil</p> <p>½ lemon or lime</p> <p>½ cup of any shredded vegetables available, such as amaranth, Chinese spinach or other indigenous leafy vegetables</p> <p>Small amount of salt</p>	<ol style="list-style-type: none">1. After 5 minutes add the pounded sardine (powder), carrots, sweet peppers and salt. Cover and cook until the sardine powder is well cooked2. Add shredded vegetables and continue to cook for 5 minutes and then remove from heat.3. In a separate pot, boil one cup of water4. In a small bowl mix ½ cup of cold water with one table spoon of flour; make sure there are no lumps5. Pour the mixture into boiling water while stirring to avoid formation of lumps until it starts to simmer6. Slowly add the flour to the cooking pot little by little, while stirring/ mixing until you get a very soft stiff porridge7. Cook for 5 minutes and then remove from the heat and pour the porridge into a bowl8. Add the cooked sardine sauce into the stiff porridge and mix thoroughly9. Feed the child while the food is warm.

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Annex

Annex 1. Processing and preservation of different types of cereals and legumes for preparation of complementary foods

A. Germination and Fermentation

Among different communities, there are different local technologies of fermenting and germinating foods. The germinated / fermented foods are used for different purposes such as making different types of drinks, including non-alcoholic drinks. Evidence shows that these technologies can be used to improve the quality of food, especially complementary foods or foods for the sick.

Germination

Cereals and legumes such as maize, sorghum, millet, beans, peas and cowpeas can be germinated. Germination allows better digestion and absorption of nutrients in the body. If a germinated food is added to a thick porridge it will make it soft and easier for the child to eat and get more nutrients as more flour will be used to make the porridge as compared to an ordinary one.

Preparation of germinated flour

1. Sort and clean the cereal grains/ legumes
2. Soak in water; Soaking time differs from grain to grain/legume (refer to the table 2 below).
3. Drain and place the imbibed seeds in a container and then cover it.
4. Store in dark, warm place for a number of days until the grains sprout. The number of days differ from grain to grain. The table below shows the number of days it takes for each grain to sprout.
5. Sprouted legumes can be cooked immediately after sprouting and eaten as relish or side dish; or can be mixed with other foods such as potatoes, cassava or plantains.
6. Sprouted cereal grains need to be dried in the sun.
7. It is recommended to prepare a small amount of flour from germinated grains so that it does not lose its quality.

Table 2. Soaking time and number of days for sprouting for some of grains

	Grain	Amount (cups/250 mL)	Soaking (hours)	time	Sprouting (days)	time
1.	Beans	1	12		4 – 7	
2.	Green grams	1	12		2 – 5	
3.	Cow peas, peas	1	12		2 – 5	
4.	Sorghum, millet, bulrush millet	1	8		2 – 3	
5.	Maize	1	12		3 – 4	
6.	Groundnuts	1	12		1 – 2	

How to use flour prepared from dried germinated cereal grains (germinated flour)

Use the germinated flour to prepare porridge

The porridge is made by using germinated flour only. For the porridge to thicken more flour will be used hence more energy and nutrients in a small volume of porridge as compared to a porridge which is made using ordinary flour.

Use the germinated flour to make thick porridge thin

A thick porridge is prepared using ordinary maize flour as usual, and then germinated flour is added to make it thin. The following is an example of a porridge made by adding germinated flour:

Ingredients	Method
3 tablespoons maize flour 1 heaped tablespoon of germinated flour 1 heaped teaspoon of sugar 1 orange or lemon or lime 1 cup of cold water	<ol style="list-style-type: none">1. Mix the maize flour with cold water; making sure that there are no lumps.2. Boil the mixture while steering it to avoid formation of lumps.3. Continue to boil for 5 minutes, then remove from fire and cool until warm.4. Add the germinated flour slowly while stirring until the porridge becomes thin (preferred consistency).5. Heat the porridge until the mixture boils.6. Squeeze lemon/ or lime and add to the porridge together with sugar and stir it7. Remove it from the fire and pour it in a bowl and cool it until it is warm8. Feed the child immediately

NB: The porridge can be enriched further by adding milk, groundnut paste, margarine or butter.

Note

- Germinated flour is inactive in a hot porridge; therefore, the porridge must cool a little before adding the flour.
- The porridge should be boiled again for a few minutes after adding the germinated flour.
- Porridge made with germinated cereal flour uses much flour hence contains more energy and nutrients.

1. Fermented foods include malt drink (Togwa). In many Tanzania communities, malt drink is used as refreshment. This drink has a sweet-sour flavour and does not contain alcohol. It can therefore be consumed by children.
2. Fermented foods facilitate absorption of nutrients in the body and aid indigestion. In addition, these foods prevent germs from multiplying; therefore, they prevent diseases like diarrhoea and can stay for a long time without getting bad. Fermented foods can be given to children as snacks.

Preparation of malt drinks (Togwa)

Ingredients	Method
1 cup of maize flour ½ cup of germinated flour 9 cups (2½ litres) of cold water	<ol style="list-style-type: none">1. Mix the maize flour with cold water making sure that there are no lumps.2. Boil the mixture while steering it to avoid formation of lumps.3. Continue to boil the mixture for 5 minutes and then remove it from the fire and cool it until warm.4. Add the germinated flour slowly while stirring until the porridge becomes thin.5. Cover the porridge and store in a clean place for 12 hours.6. Malt drink is ready and can stay for a day before it is spoiled or turn alcoholic.

Note:

- Togwa will become alcoholic if it is stored for more than 24 hours. The alcoholic beverage should not be given to children.
- Malt drink aids in the management of diarrhoea in children.

B. Preparation of other types of flour for complementary foods

Ingredients	Method
8 cups of maize 1 cup of groundnut 1 cup of any type of beans or other legumes such as chickpeas, cowpeas, pigeon pea, lentils and green grams.a	<ol style="list-style-type: none"> 1. Sort the maize, groundnuts and beans, remove dirt, rotten and diseased ones and those with mould. Wash with water and dry in the sun 2. Soak the beans for 3 hours in cold water and then seep the water 3. Roast the beans till they turn brown (about 45 minutes). As alternative to roasting, the beans could be baked by putting them in a cooking pot, covering and putting hot charcoal on top of the covered cooking pot 4. Remove and dry the beans 5. Mix the beans with maize and groundnuts and grind them to obtain the mixed flour 6. Store the composite flour in an air tight container

Composite flour made from maize and soy beans

Ingredients	Method
4 cups of maize 1 cup of soy beans 3 cups of water for boiling the beans	<ol style="list-style-type: none"> 1. Sort the maize, remove dirt and spoiled ones, wash them with water; dry in sunlight to remove the moisture 2. Sort the soy beans, remove dirt and the spoiled seeds (rotten, diseased, mouldy etc, 3. Boil clean water in a pot 4. Slowly add soy beans into the boiling water (without interrupting the boiling process) and leave them to boil for 30 minutes 5. Remove the pot from the heat, decant the hot water from the pot and fill in with cold water 6. Gently roll the beans between the hands to remove the skin, while washing them in cold water 7. Decant the water and dry the dehulled beans in the sun 8. Mix the dried beans and maize and grind them to obtain a mixed flour. 9. Store the composite flour in an air tight container

Soy bean flour

Soy beans can be mixed with maize flour to make complementary food.

Ingredients	Method
3 cups of soy beans 9 cups of water for boiling the soy beans	<ol style="list-style-type: none">1. Sort the soy beans, remove dirt and spoiled (rotten, diseased, damaged) seeds2. Boil clean water in a pot3. Slowly add the soy beans into the boiling water (without interrupting the boiling process) and leave them to boil for 30 minutes.4. Remove the pot from the heat, decant the hot water from the pot and fill in with cold water5. Gently rub the beans between the hands to remove the skin, while washing them in cold water6. Decant the water and dry the dehulled beans in the sun. If the beans are well dried, they can be stored for up to 3-4 months7. Grind the beans to obtain flour8. Store the composite flour in an air tight container. Use the flour within one

This manual was made possible with support from the American people delivered through the United States Agency for International Development (USAID) as part of the US Government's Feed the Future Initiative. The contents are the responsibility of the International Institute of Tropical Agriculture (IITA) and do not necessarily reflect the opinion of USAID or the U.S. Government.