

# Complementary Feeding

## *Family foods for breastfed children*



*Department of Nutrition for Health and Development*  
*World Health Organization*

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## Introduction

Breast milk alone is the ideal start to a child's life. This book deals with the period when a child continues to receive breast milk but also needs increasing amounts of additional foods, before eventually changing to family foods alone. The book shows that breast milk can continue to be an important source of nutrients until the child is at least two years old. It also shows how mixtures of family foods can meet the extra needs of young children during this vulnerable time. These foods, given *in addition* to breast milk, are called *complementary foods*. The process of feeding them is called *complementary feeding*.

To keep young children healthy during this period, complementary foods should be nutritious, clean and safe, and fed in adequate amounts. They may be specially prepared foods, or modified family meals. This book tells you when to start complementary feeding, what to give, how much, and how often. It also explains how to encourage young children to eat enough, how to keep their food clean and safe, and how to feed sick children. The book takes into account the results of recent studies on young child feeding, growth, and childhood illness including diarrhoea.

The information in this book will help you to understand more about the nutritional value of foods available in your area and will be useful when you advise and counsel families on child feeding. Space is provided for notes on your local situation so that you can adapt the feeding recommendations for the communities where you work. There is a section at the end (pages 46–47) to explain the meaning of words that may be unfamiliar. The book is for everyone responsible for the health and nutrition of young children, particularly health and nutrition workers, and their trainers. It will be of practical value for the in-service training of health workers, such as those taking the WHO/UNICEF courses on the Integrated Management of Childhood Illness,<sup>1</sup> and other counselling<sup>2</sup> or training courses<sup>3</sup> on breastfeeding.



*Breast milk can continue to be an important source of nutrients until the child is at least 2 years old.*



*'Complementary feeding' means giving other foods in addition to breast milk.*

<sup>1</sup> Integrated Management of Childhood Illnesses WHO/CHD/97.3.

<sup>2</sup> Breastfeeding Counselling: A Training Course WHO/CHD/93.3,4,5 & 6. UNICEF/NUT/93.1,2,3 & 4.

<sup>3</sup> HIV and Infant Feeding: A Training Course WHO/FCH/CAH/00.2,3,4 & 5.

### Key recommendations

Breast milk is the natural first food for babies and should be fed alone for at least 4 months and if possible 6 months. However, after this period additional foods (complementary foods) are needed. To make sure that young children grow well and stay healthy, it is important to know which foods to give, how much to give, and how often. Breast milk should be the main food throughout the baby's first year, and an important food during the second year. Breast milk continues to provide unique anti-infective factors that other foods cannot.

The list below is to remind you of the main messages to consider when discussing complementary feeding with parents and others caring for young children, or when training health workers. Why these recommendations are important is explained in the rest of the book.

- Give breast milk *alone* for at least 4 months, and until 6 months if possible. Breast milk contains all the energy and nutrients a baby needs for healthy growth as well as anti-infective factors, which protect against diarrhoea and other infections.
- Give a child complementary foods between 4 and 6 months only if he or she:
  - ⇒ is not gaining weight adequately, despite appropriate breastfeeding
  - ⇒ receives frequent breastfeeds but appears hungry soon after.
- Breastfeed for two years or longer.
- When starting complementary foods, continue breastfeeding as often as before — meaning as often as the child wants. Keep the length of each breastfeed the same as before.
- Give complementary foods that are:
  - ⇒ rich in energy and nutrients
  - ⇒ clean and safe
  - ⇒ easy to prepare from family foods
  - ⇒ locally available and affordable.
- Give complementary foods three times daily to breastfed babies aged 6–7 months, increasing to five times daily by 12 months. Start with a few teaspoons and gradually increase the amount and variety.
- Actively encourage a child to eat at mealtimes and when having snacks.
- Make sure all utensils are clean.
- Spoon-feed complementary foods from a cup or bowl. Do *not* give from a feeding bottle.
- If complementary foods are not kept in a refrigerator, feed them within 2 hours of preparation.
- During and after illness, breastfeed more frequently than usual, and give extra meals.
- After illness, encourage a child to eat as much as possible at each meal. Continue this until the child regains any lost weight and is growing well again.
- Keep a chart of a young child's weight. Monitoring growth is a useful way to know if a child is eating enough and is healthy.



## What is complementary feeding?

*Complementary feeding* means giving other foods *in addition* to breast milk.<sup>1</sup> These other foods are called *complementary foods*. During the period of complementary feeding, a baby *gradually* becomes accustomed to eating family foods. At the end of this period (usually at around the age of 2 years), breast milk is entirely replaced by family foods, although a child may still sometimes suckle for comfort.

There are two kinds of complementary foods:

- *specially prepared foods* and
- *usual family foods that are modified* to make them easy to eat and provide enough nutrients.

For example, a mother may *specially prepare* porridge for her baby while the rest of the family eat cassava and groundnut stew. When the child is a little older, the mother will give the cassava mashed in the stew. Mashing *modifies the consistency* of the family food, making it easier for the child to eat. Family meals can also be modified by adding something *extra*, for example adding a piece of mango to give extra vitamin A, or liver for extra iron, and oil or margarine for extra energy.



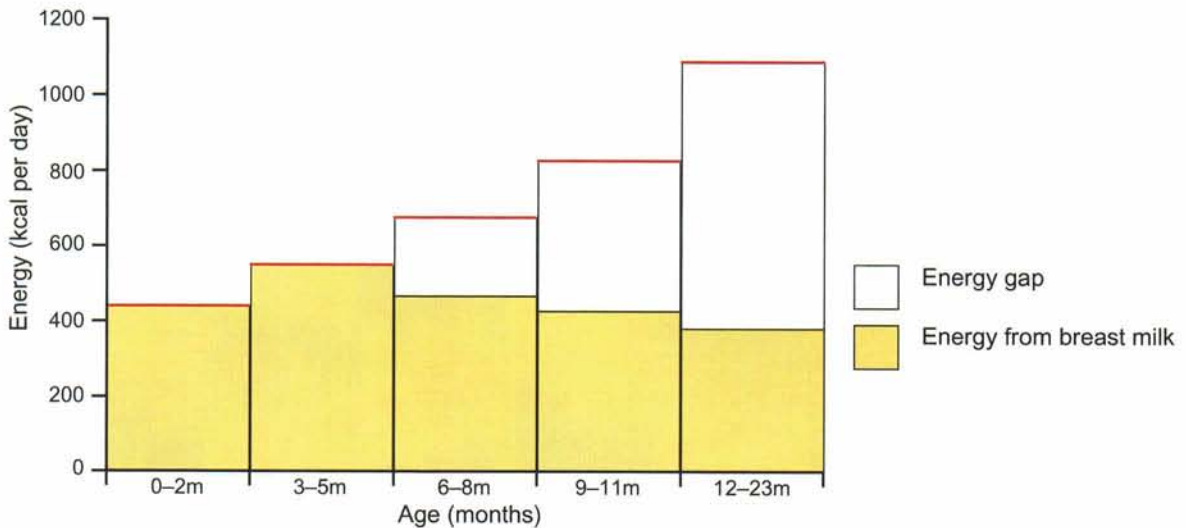
*Mashing a child's food makes it easier to eat.*

## Why are complementary foods needed?

As a baby grows and becomes more active, an age is reached when breast milk alone is not sufficient to meet the child's nutritional needs. So complementary foods are then needed to *fill the gap* between the total nutritional needs of the child and the amounts provided by breast milk.

<sup>1</sup> In this book we focus on the complementary feeding of children aged 6–24 months who are breastfed. Some children, for various reasons, receive little or no breast milk at this age. This means that their total energy and nutrient needs have to be provided by complementary foods and some other source of milk, or from family foods alone. The feeding recommendations in this book may need to be adapted for these children. For example, some children may need larger amounts of family foods or may need to be fed more frequently. Even so, much of the information in the book is relevant to those feeding and caring for children who receive little or no breast milk.

Figure 1 Energy required (top line) and the amount from breast milk.



**Figure 1** shows how the *energy* needed by a child (the red line) increases as the child becomes older, bigger and more active. It also shows how much of this energy is supplied by breast milk if a mother breastfeeds frequently (the area shaded yellow). Note that from 6 months onwards there is a *gap* between the total energy needs and the energy provided by breast milk. This gap gets bigger as the child gets older.

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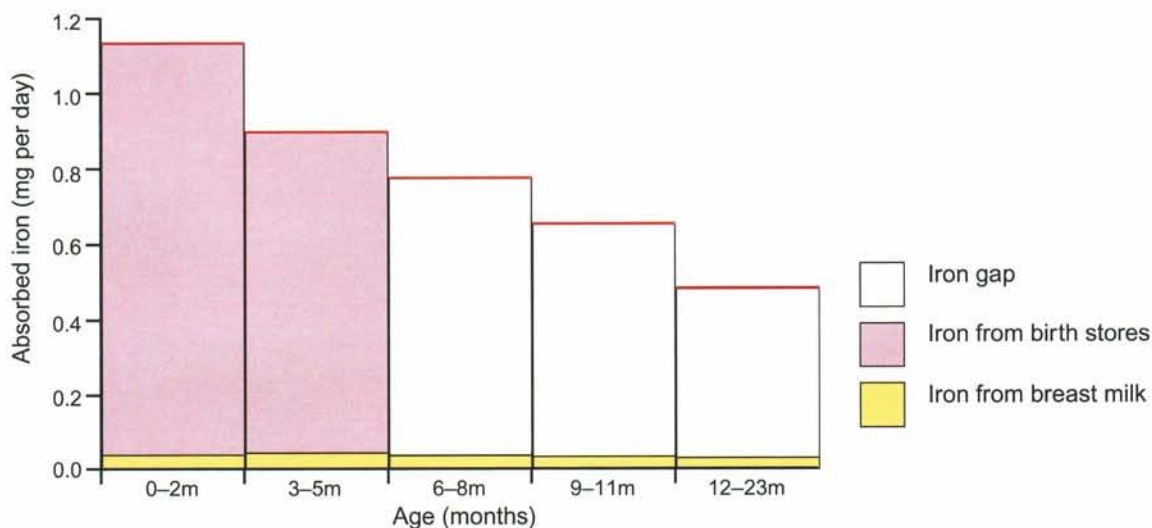
*The energy needed by a child increases as the child becomes older, bigger and more active*

---

This means:

- complementary foods are needed to fill the energy gap
- the quantity of food needed increases as the child becomes older
- if the gap is not filled, the child will stop growing, or grow slowly.

Figure 2 Absorbed iron needed (top line) and the amount from breast milk and body stores at birth.



Now look what happens if we consider iron instead of energy. The red line in **Figure 2** shows the daily amount of iron a child needs at different ages. You can see that this gradually becomes less. This is because the amount needed is related to how much new blood a child's body has to make. More new blood is made in the first year (when growth is faster) than in the second.

The gap between the iron needed and the amount provided by breast milk is the amount of iron a child needs to absorb from complementary foods. Notice that the amount of iron that a child receives from breast milk is small. So there is a large gap between what the child needs and what is provided by breast milk, especially in the first year.

Full-term babies are born with enough iron to cover their needs in the early months and they use their iron store (shaded pink in Figure 2) to fill the gap. But this store is used up by about 6 months.

This means:

- complementary foods that provide plenty of iron are needed to fill the iron gap from about 6 months of age
- if the iron gap is not filled, the child will become anaemic
- the iron gap is biggest from 6–12 months, so the risk of anaemia is highest in this age group
- preterm and low-birth-weight babies are at increased risk of anaemia because they are born with smaller body stores of



iron, so the iron gap starts earlier. Give iron drops from 2 months, if available.

We could draw similar diagrams for all the nutrients. These would show that:

- for most nutrients, the gap becomes larger as the child gets older
- for calcium, like iron, the gap is smaller in the second year, but it is still large.

In the diagrams, we show the needs of an 'average' child, and the nutrients supplied by breast milk from an 'average' mother. Other children of the same age may need slightly different amounts of energy and nutrients. A few children have higher needs and therefore larger gaps than shown; a few have smaller needs and smaller gaps. But for all children, the most difficult gaps to fill are usually for:

- energy
- iron
- zinc
- vitamin A.

### When should complementary foods be started?

Complementary foods should be started when the baby can no longer get enough energy and nutrients from breast milk alone. For most babies this is between 4 and 6 months of age. This is also the age when nerves and muscles in the mouth develop sufficiently to let the baby munch, bite and chew. Before 4 months, babies push food out of their mouths because they cannot fully control the movement of their tongues. At 4–6 months of age it becomes easier to feed thick porridges, purees and mashed foods because children:

- can control their tongues better
- start to make up-and-down 'munching' movements
- start to get teeth
- like to put things in their mouths
- are interested in new tastes.

This is also the age when their digestive system is mature enough to digest a range of foods.

Starting complementary feeding too early or starting it too late are both undesirable. Signs that a child is ready to start

*Knowing why mothers start complementary foods too early or too late helps you to decide how to counsel them. For example, mothers often start early because they think they do not have enough breast milk. This may be because the baby cries a lot. Once you understand their reasons, you can give appropriate advice. For example, let the baby suckle more often or for longer periods.*



*Listening to mothers and letting them know that you are interested in how they feed their babies and asking questions in a friendly way is an important part of understanding their opinion and the things that worry them, and the difficulties they face.*





complementary foods are that the child:

- is at least 4 months old *and*
- receives frequent breastfeeds but appears hungry soon after *or*
- is not gaining weight adequately.

A child should be fed only breast milk for at least 4 months, and until 6 months if possible. Breast milk provides all the energy and nutrients needed for healthy growth. It contains anti-infective substances which protect the child from diarrhoea and other illnesses.

Giving complementary foods *too soon* is dangerous because:

- a child *does not need* these foods yet, and they may displace breast milk. If foods are given, the child takes less breast milk, and the mother produces less, so later, it may be more difficult to meet the child's nutritional needs
- a child receives less of the protective factors in breast milk, so the risk of illness increases
- the risk of diarrhoea also increases because complementary foods may not be as clean as breast milk
- the foods given instead of breast milk are often thin, watery porridges or soups because these are easy for babies to eat. These foods fill the stomach but provide fewer nutrients than breast milk, and so the child's needs are not met
- mothers are at greater risk of becoming pregnant if they breastfeed less frequently.

Starting complementary feeding *too late* is also dangerous because:

- a child does not get the extra food needed to fill the energy and nutrient gaps
- a child stops growing, or grows slowly
- the risk of malnutrition and micronutrient deficiencies increases.

*Discussing issues and ideas with other health workers is helpful. It is a chance to share experiences, and make decisions together.*

*This reduces the risk of health workers giving conflicting advice to mothers. Working together can also lead to more effective action. For example, working together may mean that a radio slot could be organised which might be too ambitious for one person working alone.*

TIP

Here are some questions to help you record the situation in your area.

1. At what age do most children start complementary foods in your area?

.....months

2. Is this: too soon (before 4 months)? ☐ YES ☐ NO

between 4 & 6 months? ☐ YES ☐ NO

or: too late (after 6 months)? ☐ YES ☐ NO

If so, do you know why mothers start complementary foods too soon or too late?

.....  
 .....  
 .....

3. Do you need to discuss with families the best age to start complementary foods? ☐ YES ☐ NO

If so, when is the best time to do this? (e.g. at antenatal visits, at delivery, at clinic visits etc.)

.....  
 .....  
 .....

4. Do you need to discuss these questions with other health workers to hear their opinions? (They may have good ideas too) ☐ YES ☐ NO

## What are good complementary foods?

Good complementary foods are:

- rich in energy, protein and micronutrients (particularly iron, zinc, calcium, vitamin A, vitamin C and folate)
- clean and safe:
  - ⇒ no pathogens (i.e. no disease-causing bacteria or other harmful organisms)
  - ⇒ no harmful chemicals or toxins
  - ⇒ no bones or hard bits that may choke a child
  - ⇒ not boiling hot
- not too peppery or salty
- easy for the child to eat
- liked by the child
- locally available and affordable
- easy to prepare.

The following sections list the different kinds of family foods and show how giving a *mixture of these foods* provides young children with the energy and nutrients they need.

When discussing which mixtures of foods make good meals, it is helpful to start with the local staple and then decide which other foods to add.

## The staple

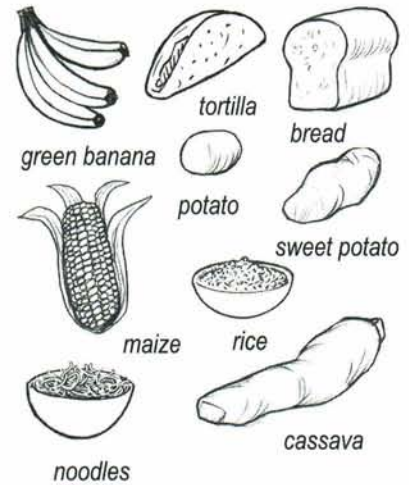
Every community has a staple food. It is the main food eaten. Examples are *cereals* (such as rice, wheat, maize, millet), *roots* (such as cassava, yam, potato) and *starchy fruits* (such as plantain and breadfruit). In rural areas, families often spend much of their time growing, harvesting, storing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

Staples provide *energy* (mostly from starch). Cereals also provide *protein*, but cassava, sweet potato, banana, plantain 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, potato) provide 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 eaten with other foods for a child to get enough nutrients.



Staple foods.

Listening to mothers' suggestions is a good way to know what is practical and culturally acceptable.

TIP

Involve the whole family in these discussions if you can. Grandmothers may know about good ideas that were used in the past. Listening to the opinion of husbands is good too. If they know you value their opinion and are prepared to listen to their point of view, they are more likely to accept your suggestions about complementary feeding.

TIP



**How can you help families make the local staple suitable for young children? Here are some questions to help you.**

*Look at the list below and circle the staple used by most families in your area. If there are other staples that are commonly used, circle them as well. If your staple food is not listed, add it under the correct heading.*

Cereals	Roots	Starchy fruits
rice	cassava (manioc/yucca)	cooking banana
maize (corn)	yam	breadfruit
wheat	taro (eddo/dasheen)	plantain
millet	tannia (cocoyam)	
sorghum	sweet potato	
quinoa	potato	

1. What is the staple food in your community?  
.....
2. Which type is it? ☐ cereal ☐ root ☐ starchy fruit
3. How is your staple food usually eaten (for example is it boiled, or cooked in soup, or made into tortilla, chapati, bread or porridge)?  
.....
4. Can young children eat the staple in the way it is usually eaten by the family?  
☐ YES ☐ NO

*If no, can mothers suggest ways to make the staple in the family meal easy for young children to eat, such as mashing and softening it with a little milk and margarine or oil?*

.....

.....

.....

.....



## Problems with porridges made from staples alone

Porridge can be made from any staple. When flour or a grated root or starchy fruit is mixed with water and cooked to make porridge, the starch absorbs water and swells up. This makes the porridge thicken. If it is too thick, it is difficult for a young child to eat. So large amounts of water are often added to keep the porridge thin. But this dilutes all the nutrients in the staple.

This means that thin porridges:

- are watery
- have a low energy concentration
- have a low nutrient concentration.

There is a similar problem with soups. Although they may contain nutritious foods, they are very watery and dilute. Even when a child eats as much thin porridge or soup as his/her stomach can hold, and eats five times each day, it is still not enough to meet the nutritional needs of the child.

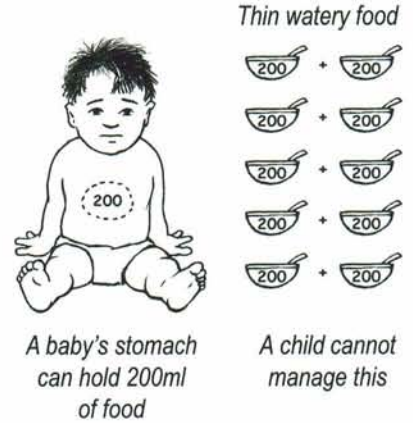
Do families in your area feed thin porridge? If so, you can suggest one or more of the following ways to make a more energy- and nutrient-rich porridge:

- cook with less water and make a thicker porridge. Porridge should be too thick to drink. So feed thick porridge with a spoon
- replace some (or all) of the water with milk
- add extra energy and nutrients to enrich thick porridge. For example add milk powder and sugar (or margarine or ghee); or add groundnut paste (peanut butter) or sesame seed paste
- adding fatty/oily foods makes thick porridge softer and easier to eat
- toast cereal grains before grinding them into flour. Toasted flour does not thicken much, so less water is needed to make porridge.

Do families in your area give soups? If so, you can advise them to:

- take out a mixture of the solid pieces (e.g. staple, beans, meat, vegetables) and mash to a thick puree. Soften with a little margarine or oil for extra energy
- feed this mixture to the child instead of the liquid (the best part of the soup is the solid ingredients in it).

In your area, if cereal grains are germinated (sprouted) before



*With thin porridge or soup, a child needs to eat 2 bowls at each meal. This is impossible, so his needs are not met.*



*Add extra energy and nutrients to enrich thick porridge.*

Give a soft, thick porridge made from the staple, or a cooked staple mashed until it is smooth. The food should be thick enough to stay easily on the spoon. Porridge that is so thin it can be fed from a feeding bottle, or poured from the hand and or drunk from a cup, does not provide enough energy or nutrients (unless it has been specially thinned using germinated flour).



being eaten, encourage families to dry and grind them into a flour. This type of flour does not thicken much during cooking, so less water can be used. Germination also reduces the phytates present in a cereal so more iron can be absorbed. Another way of using germinated flour is to add a large pinch to ready-cooked thick porridge. This will make it soft and easier for the child to eat. 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. Using this method, there is no reduction in phytates as only a pinch is added.

### Importance of feeding a mixture of complementary foods

Other foods must be eaten with the staple to fill the energy and nutrient gaps. The types of foods that fill the gaps best are:

- pulses (such as peas, beans, and groundnuts) and oil seeds (such as sesame seeds)
- foods from animals
- dark-green leaves and orange-coloured fruits and vegetables
- oils, fats and sugars.



Porridge should be thick enough to stay easily on the spoon.

### Pulses and oil seeds

Pulses and oil seeds are good sources of *protein*, but they lack vitamin A and, when dried, they lack vitamin C. Oil seeds and some pulses (groundnuts, bambarra, soybean) are rich in fat and so are high in *energy*. As with cereals, pulses and oil seeds contain phytates which interfere with the absorption of iron, zinc and calcium.

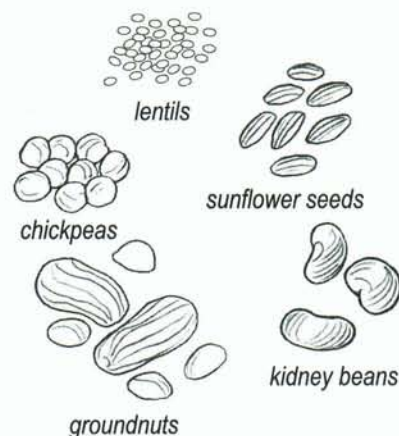
In addition to phytates, most raw peas and beans contain several other *anti-nutrients* that interfere with the way nutrients are used by the body. Thorough cooking destroys most of these substances, but does not destroy phytates. Soaking dry peas and beans and throwing away the water before cooking helps to remove anti-nutrients, and also reduces phytates.



**Can you think of ways to help families prepare these foods for young children?**

*Look at the list below and circle the foods that are available in your area. If there are others, add their names.*

Low fat pulses	High fat pulses and oil seeds
chick pea (dhal, bengal gram)	groundnut (peanut)
pigeon pea (dhal, red gram)	bambarra
lentils (split pea, adas)	soybean
lablab (bonavist bean)	pumpkin seed
cowpea	sunflower seeds
blackeye pea	melon seed
red bean (kidney bean)	sesame (sim-sim)
broad bean	shea butter-nut
mung bean (green gram)	cashew nut
navy bean	pine kernels
lima bean	
tarwi	



Now look at the foods you have circled.

1. Which pulses and oil seeds are commonly eaten in your area?  
.....
2. Are they fed to young children? ☐ YES ☐ NO  
If no, what are the reasons?  
.....  
.....
3. How are the circled foods prepared for the family?  
.....
4. Are these foods easy for young children to eat and digest? ☐ YES ☐ NO  
If no, discuss with families how they could be prepared in a more suitable way.  
For example:
  - boil peas or beans, then sieve to remove coarse skins
  - remove skins by soaking raw seeds and then rubbing the skins off before cooking
  - toast or roast nuts and seeds and pound to a paste.Which ways would most families prefer?  
.....  
.....
5. Have you circled any foods that are high in fat? ☐ YES ☐ NO  
These make good complementary foods because they are rich in both protein and energy.

### Foods from animals

Foods from animals, birds and fish (including shellfish) are rich sources of many nutrients but are often expensive. Their flesh (meat) and organs/offal (such as liver, heart, blood), as well as milk, yoghurt, cheese and eggs 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*. This is because iron and zinc in these foods are very well absorbed. The redder the flesh and organs when raw, the more iron they contain (see Box 1, p19).



*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 it is not well absorbed. Milk fat (cream) contains *vitamin A* so foods made from *whole* milk contain vitamin A.

Foods made from milk and any food containing bones that are eaten (e.g. small fish, canned fish, or pounded dried fish) are good sources of *calcium*.

### Questions

Look at the foods listed below and circle the ones that are available in your area. If there are others, add their names.

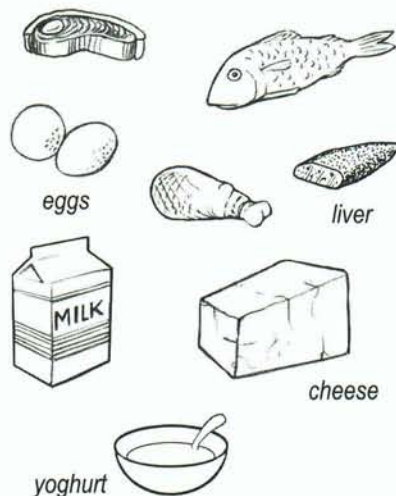
Animals, birds, fish	Foods from milk	Eggs
beef	fresh whole milk	hen's eggs
lamb/mutton/goat	fresh skimmed milk	
pork	dried whole milk	
liver/kidney/other offal	dried skimmed milk	
rabbit	evaporated whole milk	
wild animals, insects	condensed whole milk	
chicken	cheese	
duck/other birds	yoghurt	
fresh fish	curds	
dried fish eaten whole		
canned fish eaten whole		
shell fish/other fish		

Cooking some pulses takes a long time. To save fuel, soak pulses then boil them really well for at least 20 minutes to destroy anti-nutrients. Then put the pot in a big box filled with insulating materials (e.g. dry grass or soft cushions filled with straw or polystyrene granules). Leave the pot in the box for about 3 hours to finish cooking. Leaving overnight is even better. Note: do not use the box for keeping food warm. Any uneaten food must be boiled again before eating.

TIP

Learn about the resources families have. If your advice is unrealistic, people will not follow it. For example, mothers cannot sieve cooked pulses if they have no sieve.

TIP



## Complementary Feeding

Look at the ones you have circled.

1. Which dark-green leaves and orange-coloured vegetables and fruits grow in your area?

.....

.....

.....

(Note: oranges, despite their colour, are not a rich source of vitamin A)

2. Are any considered unsuitable for young children? ☐ YES ☐ NO  
If so, why?

.....

.....

3. Can families suggest ways to make these foods more suitable for children?

.....

.....

4. For the foods you have circled, write the months of the year when they are available

.....

.....

5. Are there any months when none of these foods is available? ☐ YES ☐ NO  
If so, which months are these?

.....

.....

6. And can you help families overcome this lack?

For example:

- ask an agricultural officer which dark-green leafy plants or orange-coloured vegetables and fruits grow best in different seasons
- suggest families fence a small area close to the house and plant fast-growing vegetables
- use waste water for watering.



## Box 1. Sources of iron and iron absorption

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

- the amount of iron in the food
- the type of iron (iron from meat and fish is better absorbed than iron from plants, milk and eggs)
- the types of other foods present in the same meal (some *promote* iron absorption and others *interfere*)
- whether the child is anaemic (more iron is absorbed if anaemic).

### Examples of foods high in iron

#### High iron, good absorption

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

#### High iron, poor absorption

Egg yolk  
Pulses  
Dark-green leaves

**The amount of iron absorbed from eggs, milk and plant foods (e.g. cereals, pulses, other seeds, vegetables and fruits) is:**

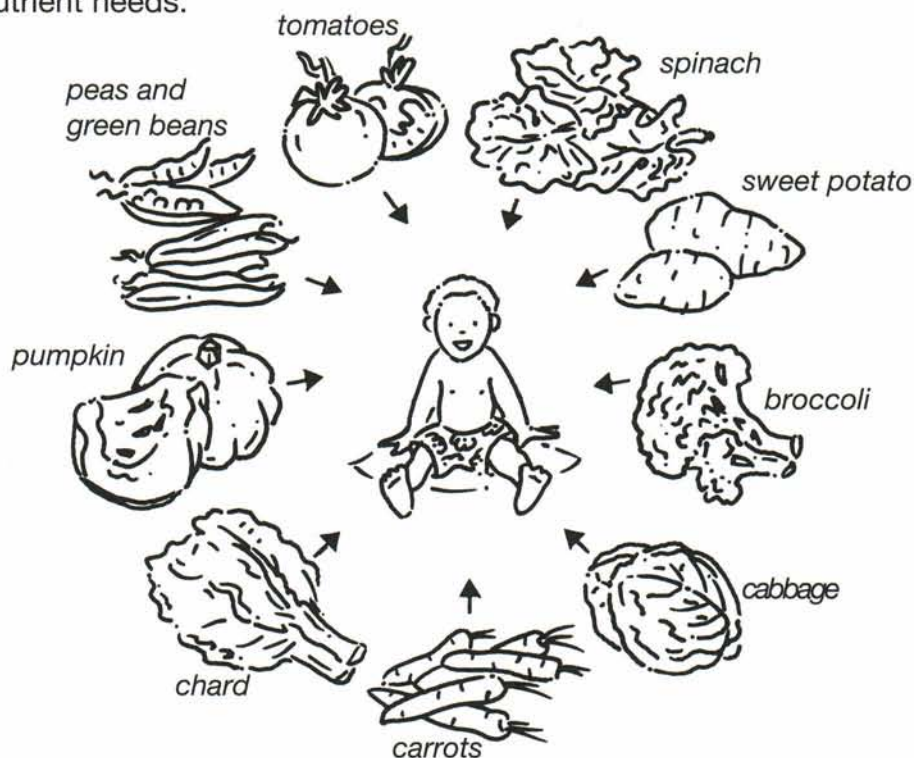
- **increased by eating at the same meal:**
  - foods rich in vitamin C
  - flesh and organs/offal of animals, birds
  - fish and other seafood
- **decreased by drinking:**
  - teas and coffee.

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 (see Annex 1).










Eating fermented cereals increases iron absorption.

## Complementary Feeding

Adding a variety of vegetables to the child's diet greatly contributes to meeting micronutrient needs.



For instance, a small amount of vegetables given as complementary food is enough to cover the child's vitamin A needs for one day.

	carrots	or	sweet potato	or	dark green vegetables
age group					
6 - 12 months	1 1/2 Tbs 		1 Tbs 		1/3 cup 
1 - 2 years	1 1/2 Tbs 		1 Tbs 		1/3 cup 
2 - 6 years	2 1/2 Tbs 		1 Tbs 		1/3 cup 



## Oils, fats and sugars

Oils (such as soy oil) and fats (such as margarine, butter, ghee) are concentrated sources of *energy*. So adding 1 teaspoon of oil or fat to a meal gives extra energy in a small volume. Red palm oil is very rich in *vitamin A*. Butter and ghee also provide *vitamin A*, and margarine usually has vitamins A and D added to it by the manufacturer.

Sugar, jaggery and honey are also energy-rich and can be added to porridge and other foods in small quantities.

**Which foods and oils should be added to complementary foods in your area? Here are some questions to help you decide.**

*Circle the fats and oils listed below that are available in your community. Add any not listed.*

Fats	Oils
margarine	soy oil
butter	coconut oil
fat from meat	sunflower oil
ghee	groundnut (peanut) oil
lard	olive oil
	coconut cream
	maize (corn) oil
	palm oil
	red palm oil
	sesame oil



butter/margarine/ghee



coconut

Of the ones you have circled:

1. *Are there any reasons why families may not give even small quantities of these foods to young children?*

.....  
.....

2. *Which can be added to complementary foods during cooking?*

.....  
.....

3. *Which can be added to food after cooking*

.....  
.....

### How complementary foods can fill the energy and nutrient gaps

#### What are the energy and nutrient gaps?

Earlier we explained that a young child needs the right amount of energy and nutrients to grow well and remain healthy. In Figure 1 we showed the amount of energy that children need at different ages. And we showed the amount of energy supplied by breast milk at each age. The difference between the amounts children need and the amounts from breast milk is called the *energy gap*. Figure 2 showed the *iron gap*. In the following figures we show the energy, protein, iron and vitamin A gaps for children aged 12–23 months. And we show how to fill the gaps by giving a mixture of complementary foods. The same mixtures of complementary foods also fill the gaps of the other nutrients that are not shown in the Figures, including zinc, calcium, folate and vitamin C.

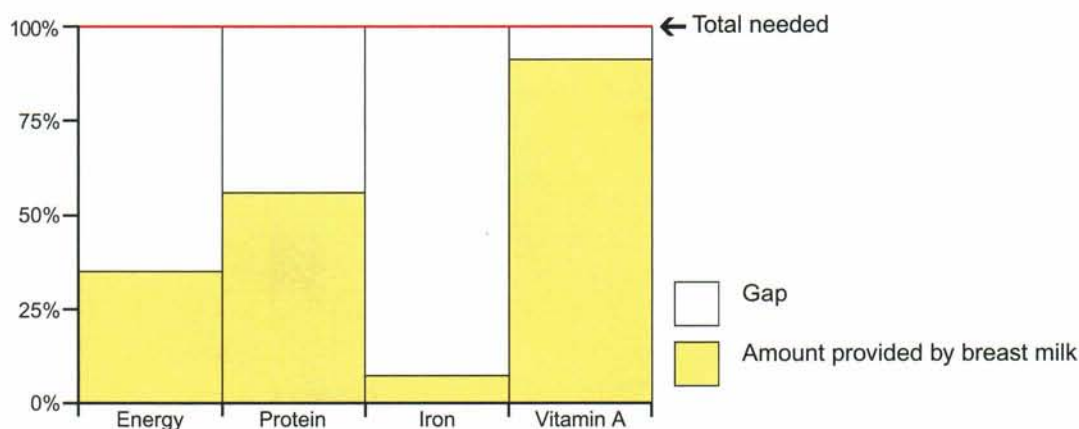


*Giving a mixture of foods will help fill the energy and nutrient gaps.*

In **Figure 3**, the red line at the top of each column represents how much energy, protein, iron and vitamin A are needed each day by an ‘average’ child aged 12–23 months. For simplicity we have not included other micronutrients. The lower (yellow) sections at the bottom of each column show how much energy and nutrients are supplied by breast milk if the child is breastfed frequently. Notice that:

- breast milk provides important amounts of energy and nutrients even in the second year of life
- none of the four columns is full, showing there are gaps to be filled for energy and all the nutrients
- the biggest gaps are for energy and iron, and the smallest is for vitamin A.

**Figure 3** Percentage of a day's needs at 12–23 months that can be met by breast milk.



Next we want to explain how giving a *mixture of complementary foods* is the best way to fill the gaps and make certain that children get enough energy, protein and micronutrients for healthy growth and development. During a day, a good mixture is a staple + pulse + an animal food + green leaves or an orange-coloured vegetable or fruit. Families can use all these foods to make a meal, or they can use for example:

- staple + pulse + green leaves/orange vegetable or fruit at one meal
- staple + animal food + green leaves/orange vegetable or fruit at another meal.

Add a small amount of fat or oil to give extra energy if none of the other foods in the meal is energy-rich.



In the next set of figures we will use these foods to show how a mixture of them can fill the gaps between what a child needs and the nutrients provided by breast milk. For illustration, let us see what happens when we give the following foods over a day:

- frequent breastfeeds
- 3 meals: a morning meal of cereal porridge  
a midday meal of rice + beans + orange  
an evening meal of rice + fish (or liver) + green leaves
- 2 snacks: banana; bread with margarine.

We start with the child's midday meal as we want to show you first what happens when a child eats a staple (rice) + pulse (beans). We also want to show that foods containing vitamin C (like oranges) improve iron absorption from this meal.

### **Midday meal (rice + beans + orange)**

First look at the top section of **Figure 4**. This shows how much of the gaps are filled when the child eats the staple in this meal. We have added a teaspoon of fat (e.g. margarine) for extra energy.

#### ***The staple cereal (3 rounded tablespoons cooked rice + 1 teaspoon fat)***

- helps fill the energy and protein gaps
- has only a very small effect on the iron gap
- has no effect on the vitamin A gap.

If we had used potato or yam instead of rice, they would have a smaller effect on the protein gap. Other roots (like cassava) and starchy fruits would have almost no effect on the protein gap.

The middle section of Figure 4 shows how much of the gaps are filled by the beans in this meal.

#### ***Adding a pulse (1 rounded tablespoon of beans)***

- has a small effect on the energy gap
- almost fills the protein gap
- has a small effect on the iron gap
- has no effect on the vitamin A gap.

If we had used a high-fat pulse or oil seeds, more of the energy gap would be filled.

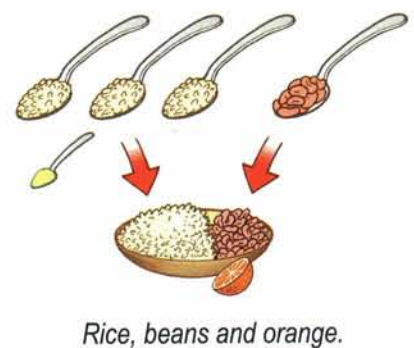
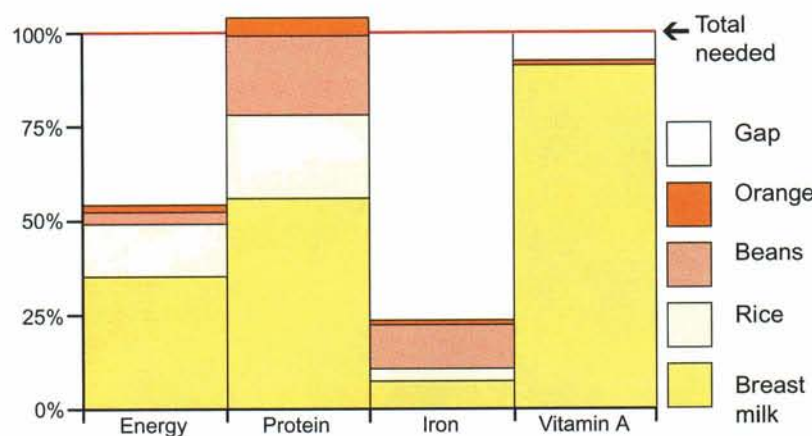
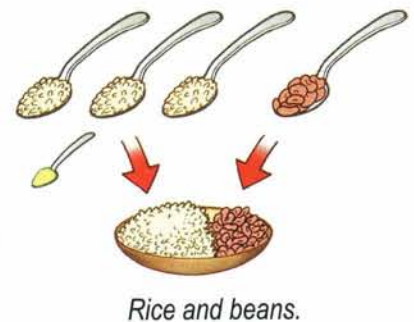
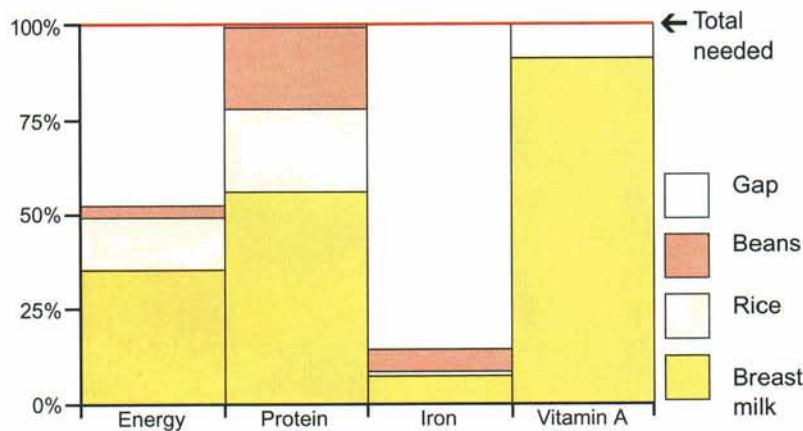
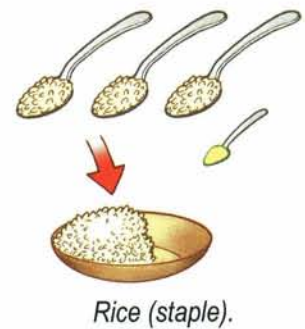
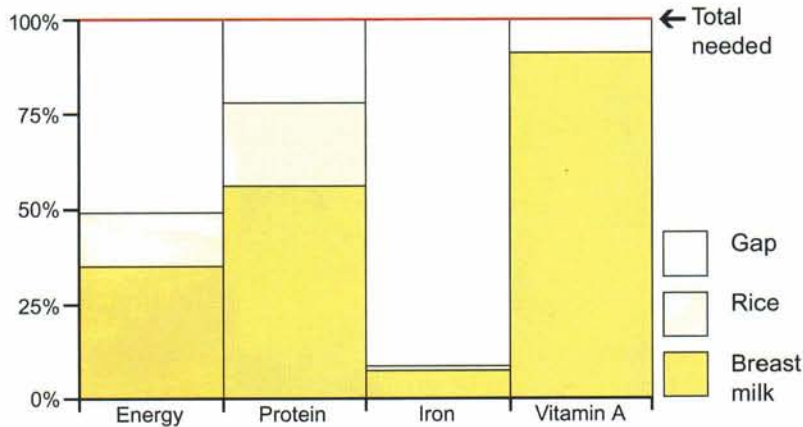
The lower section of Figure 4 shows that fruit with the meal improves the absorption of iron from the other foods in this meal (because the fruit contains vitamin C).

---

*Fruit with a meal  
improves the absorption  
of iron*

---

Figure 4 Percentage of a day's needs at 12–23 months that can be met by breast milk and a midday meal of rice + beans + orange.



### ***Adding fruit (half a small orange)***

- has a small effect on the energy and protein gaps
- improves the absorption of iron in the rice and beans
- has only a small effect on the vitamin A gap.

If we had used mango, paw-paw or passion fruit instead of orange, these would have provided lots of vitamin A, as well as vitamin C.

Next let us turn to the evening meal. **Figure 5** shows how much of the gaps are filled when we combine the staple + animal food + dark-green leafy vegetable.

### **Evening meal (rice + fish + green leaves)**

First look at the top section of Figure 5. This is the same as in the midday meal and shows how the gaps are filled by 3 tablespoons of rice and a teaspoon of fat.

The middle section of Figure 5 shows what happens to the gaps when fish is eaten with the rice.

### ***Adding fish (1 rounded tablespoon)***

- has a small effect on the energy gap
- fills the protein gap
- has a small effect on the iron gap
- has no effect on the vitamin A gap

If we had chosen small fish that are eaten *whole* with their livers, these would have filled some of the vitamin A gap. Adding fish improves the absorption of iron from the plant foods in this meal.

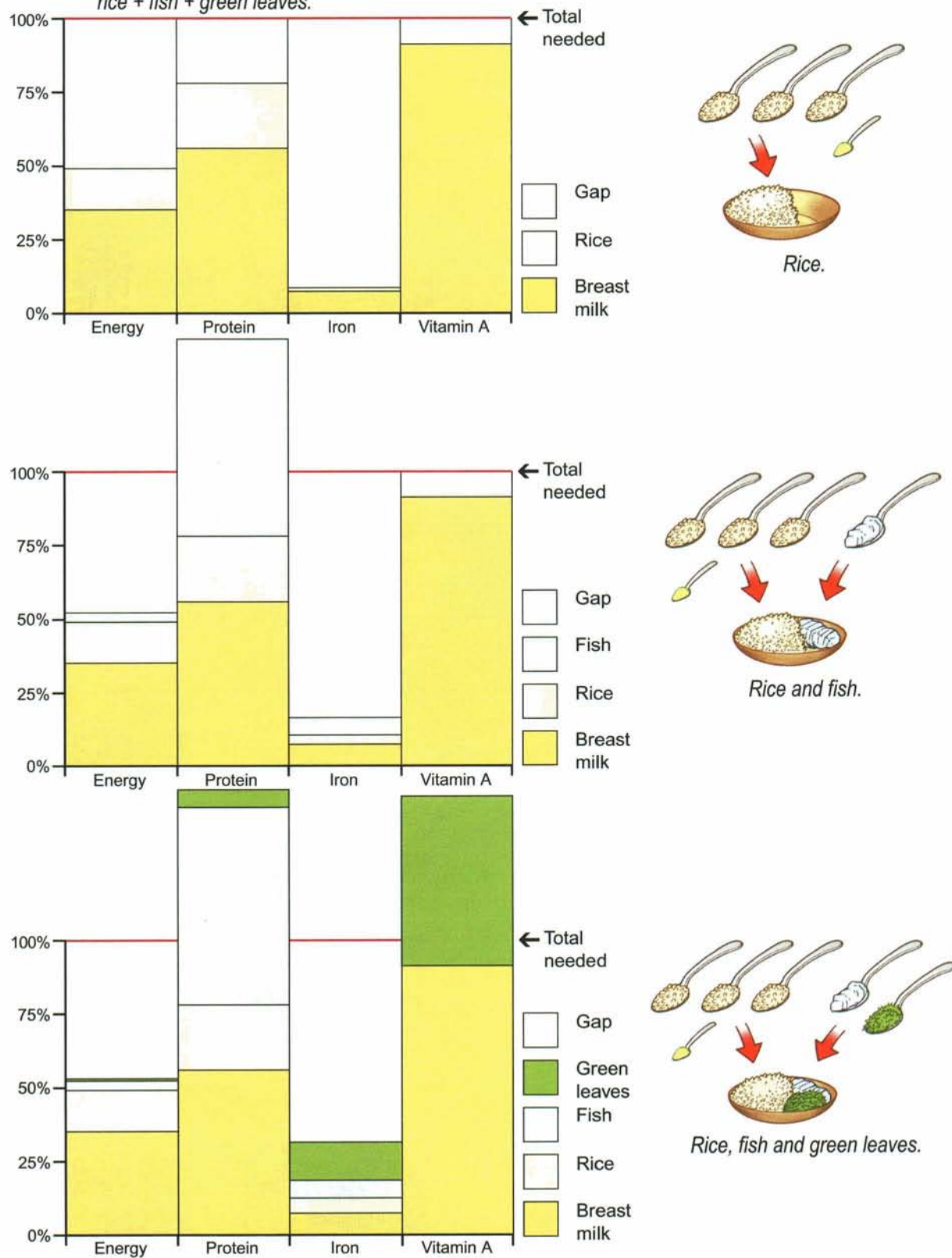
The lower section of Figure 5 shows what happens to the gaps with the dark-green leaves in this meal:

### ***Adding dark-green leaves (1 rounded tablespoon)***

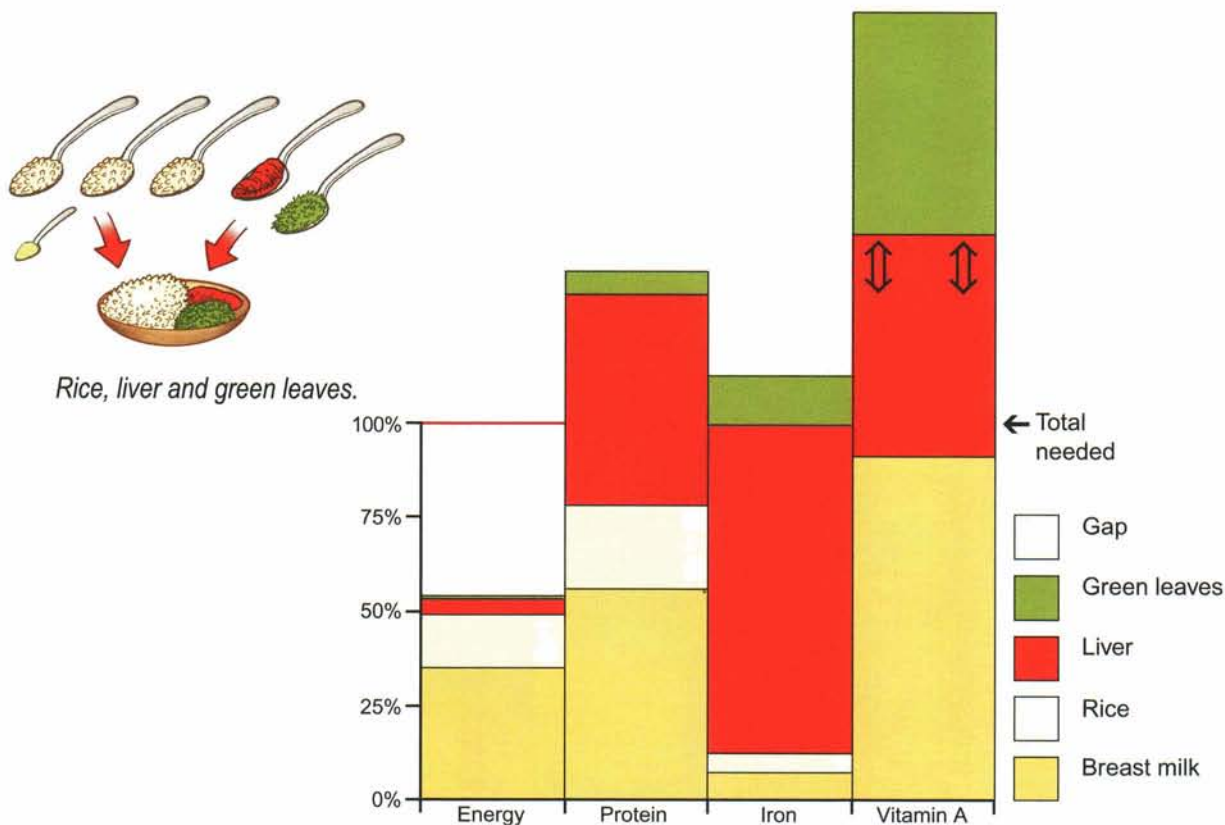
- has very little effect on the energy gap
- provides some protein
- provides some iron
- provides lots of vitamin A and completely fills the gap.



**Figure 5** Percentage of a day's needs at 12–23 months that can be met by breast milk and a evening meal of rice + fish + green leaves.



**Figure 6** Percentage of a day's needs at 12–23 months that can be met by breast milk and an evening meal of rice + liver + green leaves.

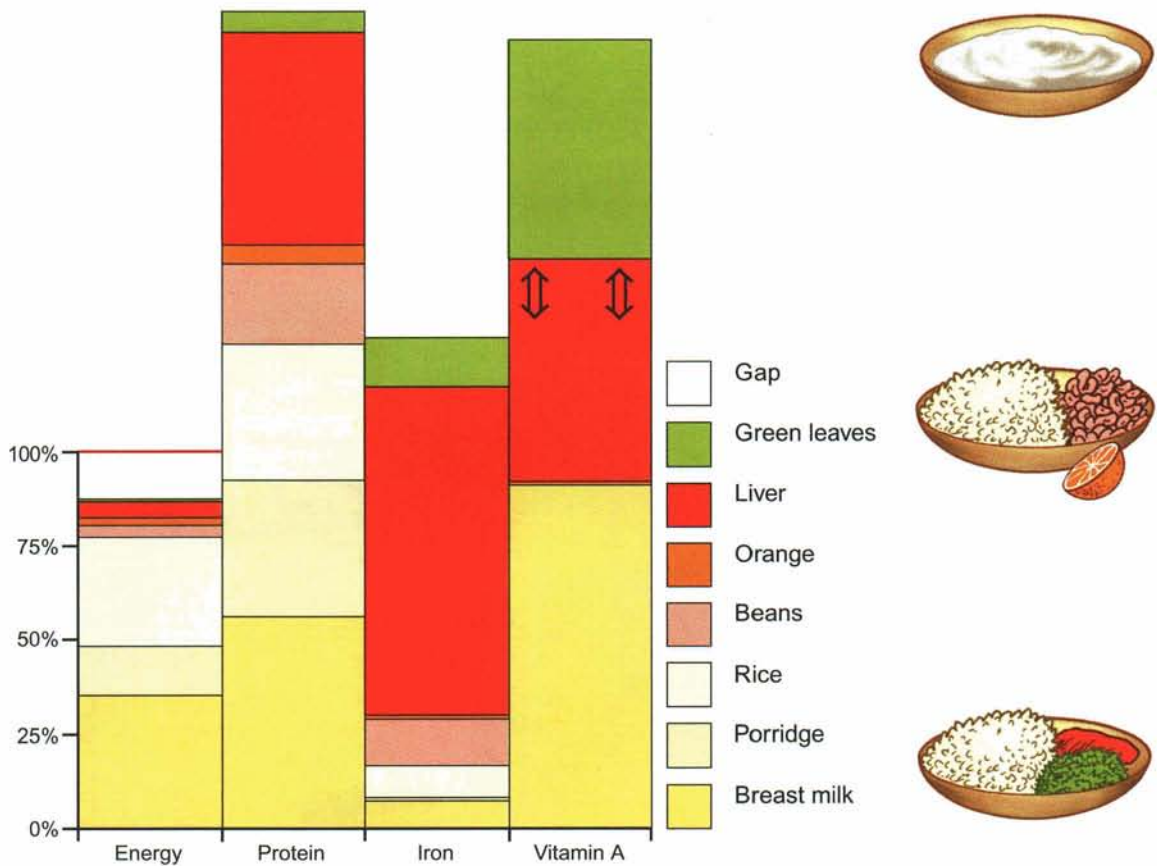


**Figure 6** shows what happens to the gaps if a child eats chicken liver instead of fish:

### ***Adding liver (1 rounded tablespoon)***

- has a small effect on the energy gap
- fills the protein gap
- fills the iron gap
- fills the vitamin A gap. In fact, there is so much vitamin A that the page is too small to show it properly. It provides 20 times more than is shown here.

Figure 7 The morning meal + the midday meal + the evening meal containing liver.



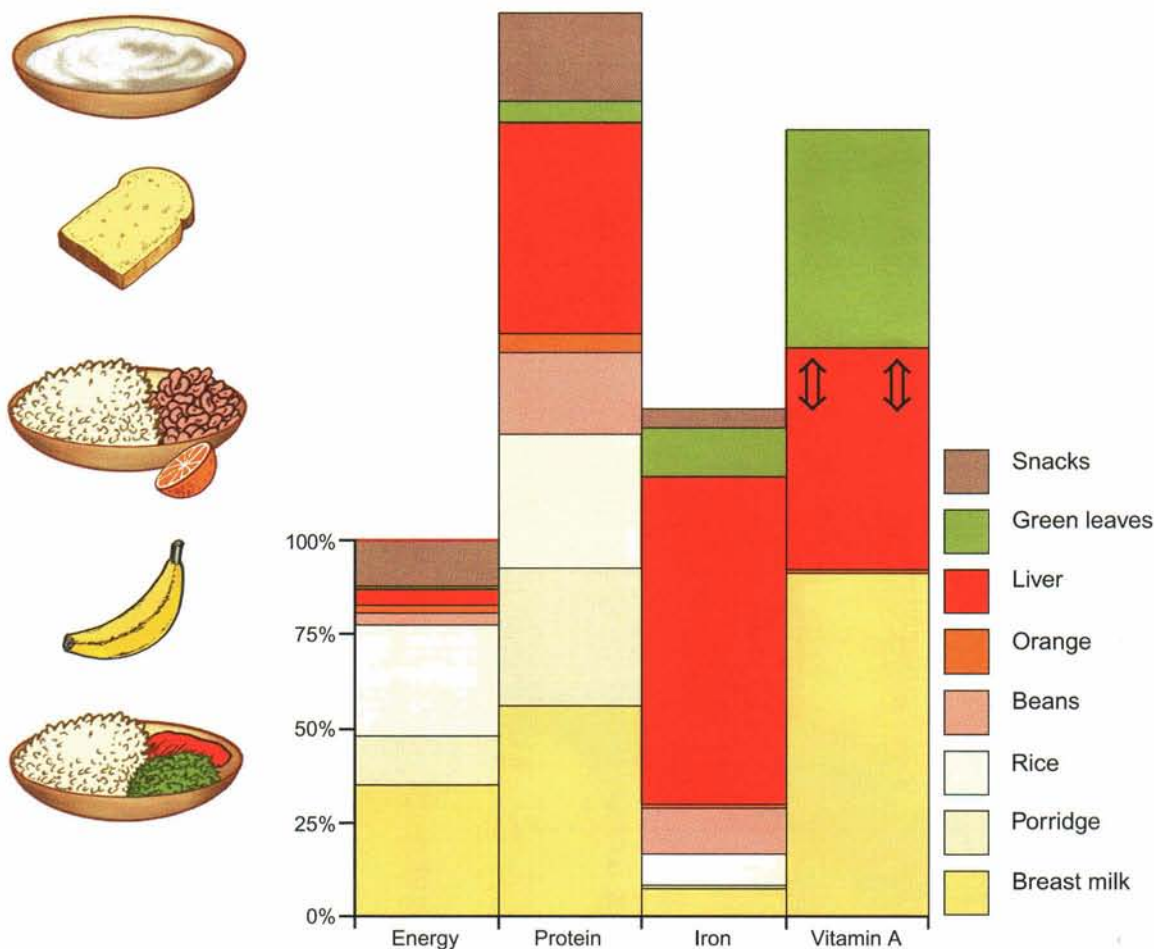
Now, let us look at Figure 7 to see what happens when a child eats the morning meal, this midday meal, and the evening meal containing liver.

**Figure 7** shows that with 3 meals:

- there is still a small energy gap
- the protein gap is filled
- the iron gap is filled
- the vitamin A gap is filled.



Figure 8 The morning meal + the midday meal + the evening meal containing liver + snacks, fill all the gaps.



So let us give the child 2 snacks to fill the energy gap. **Figure 8** shows that all the gaps are filled.

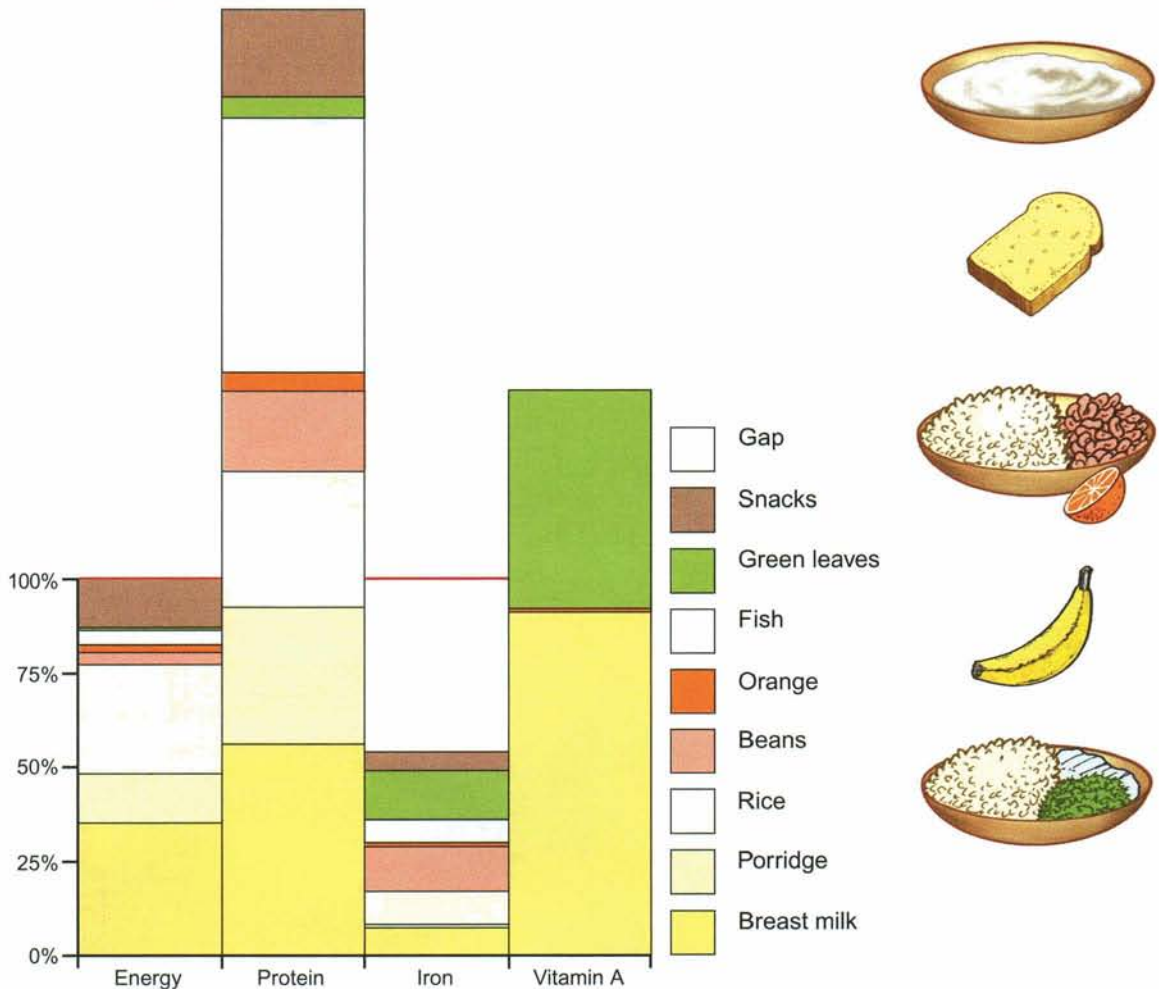
Did you notice that:

- the gap most easily filled is the protein gap
- many foods have no vitamin A at all (like rice and beans)
- a few foods provide lots of vitamin A.

**Figure 8a** shows what happens if the child eats fish instead of liver. The iron gap is still not filled. Iron is the most difficult gap to fill. The flesh and organs of animals and birds are the best sources of iron but are often expensive.<sup>1</sup>

<sup>1</sup> Because the iron gap is difficult to fill, some health programmes recommend giving children iron supplements, either as a tablet or liquid preparation.

Figure 8a The morning meal + the midday meal + the evening meal containing fish + snacks, still leaves an iron gap.



One way to provide more iron is to give food *fortified* with iron. Examples are some cereals (rice) and cereal products (e.g. flour, bread) that have iron added to them by the manufacturer. In a few countries, milk powder, soy sauce, fish sauce, curry powder, and sugar and salt are fortified with iron.

*Are iron-fortified foods available and affordable in your area? If so, encourage families to buy and use them.*

Iodised salt is an important fortified food. This is salt fortified with the micronutrient iodine. Encourage families to use this if available.

Now you have seen how adding a *mixture* of complementary foods to breast milk can make a complete diet for a young child.

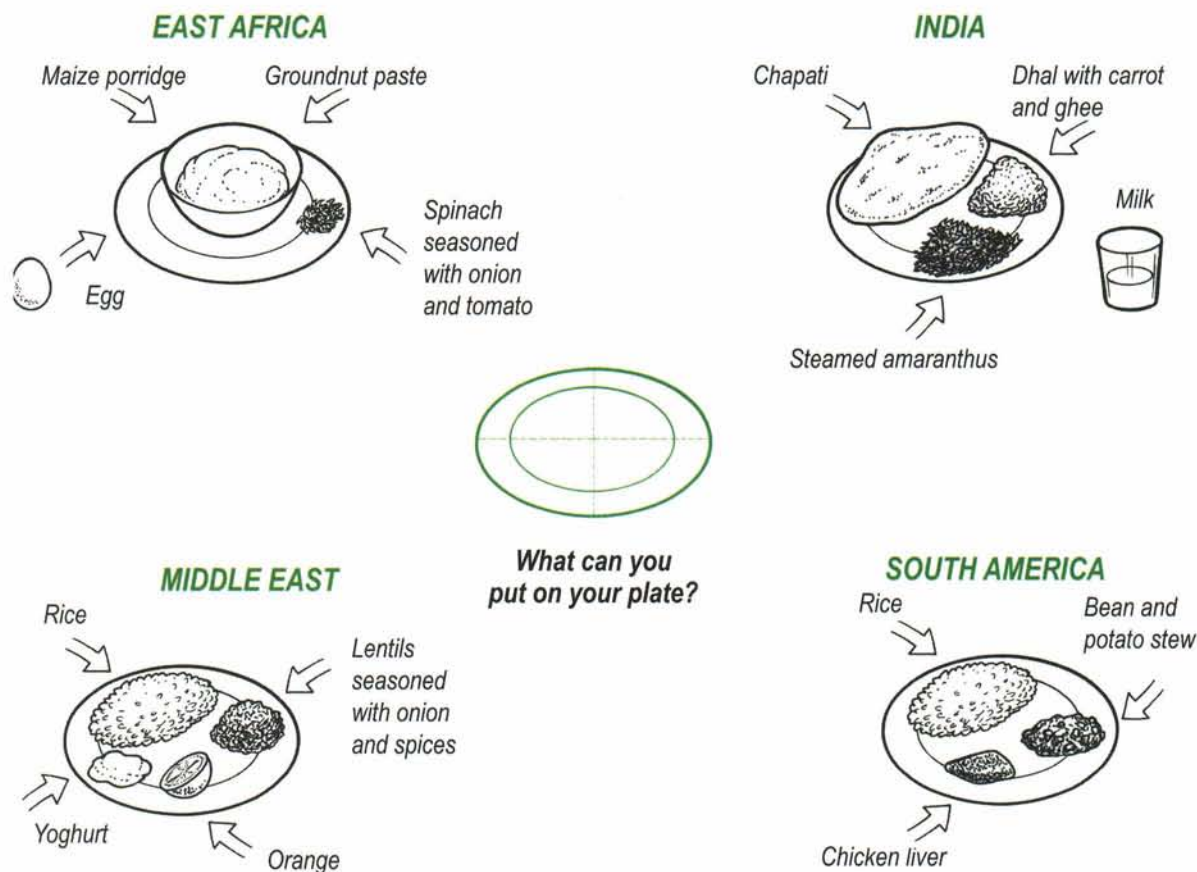
## Can you help families in your area to make mixtures like these?

To help you decide, look at the foods you circled earlier and your answers to the previous questions.

1. What mixtures of local foods would children in your area like that will fill the gaps?  
.....  
.....
2. Which other foods do mothers usually add to meals? For example, flavouring foods such as onions and spices. We all know it is no use planning a good diet unless it is tasty and children like to eat it.....  
.....

The foods used to feed children vary from place to place. In **Figure 9** below we show other mixtures of family foods that make good meals. Perhaps these will give you ideas about good mixtures of local foods. The recipes are given in Annex 2.

Figure 9 Other examples of good meals.





When you counsel a family about a child's food, you will need to suggest some options for them to consider. They will have to decide what is possible in their circumstances. So first find out if the child is being breastfed and what other foods the child is being given. Then consider if these make a good mixture that will fill the nutrient gaps. If you think there are gaps, suggest suitable foods that families might be able to give. In many places, foods from animals are difficult to obtain and expensive. For many families, it is possible to give these occasionally. Help families to think through what is really possible. Then let them decide what is best for their situation.

The meals in Figures 4–9 are enough for children aged 12–23 months. A child who is big for her age may need more. Children aged 6–11 months need less complementary food because their energy gap is smaller. But remember their iron gap is bigger, so it is especially important to include iron-rich foods for younger children.

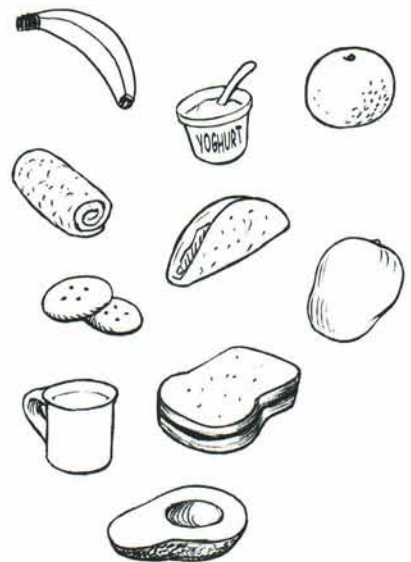
If children are not breastfed, or breastfed infrequently, they will need food of animal origin and if possible milk products to be certain to make up for the nutrients they miss from breast milk. Children less than one year old will need to be fed 5 times a day instead of only three times when they are breastfed.

## Which foods make good snacks?

In Figure 8 we saw that children needed *snacks* to fill the energy gap. Snacks are foods eaten between meals. They are a convenient way to give a young child extra food. Snacks should be easy to prepare. Children should be supervised and helped to make sure the snacks are completely eaten.

*Good snacks provide both energy and nutrients. Examples are:*

- mashed ripe banana, paw-paw, avocado, mango and other fruits
- yoghurt, milk, puddings made with milk
- bread or chapati with butter, margarine, groundnut paste (peanut butter) or honey
- biscuits, crackers
- beancakes
- cooked potatoes.



*Good snacks provide both energy and nutrients.*

'Poor value' snacks are ones that are high in sugar (which rots teeth) and low in nutrients. Examples are:

- fizzy drinks (sodas)
- ice lollies/lollipops
- sweets/candies.

### Questions

1. Which foods are used as snacks for young children in your area?

.....

.....

2. Which are of poor value?

.....

.....

3. Which are good?

.....

.....

4. Are there other foods that could make good snacks?

.....

.....

### Drinks

Families should know that:

- drinks for young children must be clean and safe. So, boil water (or make it safe some other way, for example using a special filter) and boil milk if not pasteurised. Wash the outside of fruit before juicing
- drinks should not replace solid food or breast milk. If drinks are given with a meal, it is best to leave most until the end, otherwise the child may not want to eat
- teas and coffee reduce iron absorption. Drinks should not be given with a meal, or during 2 hours before a meal, or 2 hours after it.

## How much food and how often?

The taste of a new food may surprise a child. Advise mothers to:

- start by giving one or two teaspoons twice a day
- gradually increase the amount and variety (by 9 months, a child should be eating a variety of family foods).

It takes time for a young child to learn how to use his/her lips to clear food off the spoon, and how to move the new food to the back of the mouth, ready for swallowing. Some food may run down the chin, or be spat out. Tell families to expect this – it does not mean that the child dislikes the food. With *encouragement* and *patience*, a child soon learns how to eat new foods and enjoy new tastes.



*Help and encourage a child to eat.*

As the child becomes older, suggest that families:

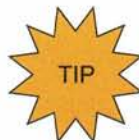
- continue to breastfeed often
- increase the amounts of food given at mealtimes and give as much as the child will eat with active encouragement<sup>1</sup>
- gradually increase the number of meals. Give complementary foods three times daily at 6–7 months, increasing to at least five times (3 meals and 2 snacks) by 12 months
- at first, make the food soft; later, mash it or cut into small pieces
- help and encourage the child to eat.

**Figure 10** gives an example in which health workers set out their feeding recommendations. Note they use words and pictures to:

- describe the changing pattern of feeding as children grow older
- recommend frequent breastfeeding for two years
- suggest what complementary foods to give, how much, and how often
- use locally available mixtures of foods
- show families actively encouraging their children to eat.

*Would something like this be helpful for families in your area?*

*When working out options to suggest, you will want other health workers to accept them too, so involve them when making plans. You will also want families to be able to select an appropriate option for their circumstances. So before finally deciding, discuss your ideas with families who have young children, and ask if they think families will want, and be able, to follow the suggestions.*



<sup>1</sup> By the age of 9 months, a child can eat several spoonful (or about half a cupful) at each meal. As shown in Figures 4–9 by the second year a child can eat several large spoonful, or a small bowl, at each meal.



Figure 10 Feeding recommendations during sickness and health on the mother's counselling card.

### Up to 4 months of age

- Breastfeed as often as the child wants day and night, at least 8 times in 24 hours.

### 4 months up to 6 months

- Breastfeed as often as the child wants day and night, at least 8 times in 24 hours.
- Only give other foods if the child:
  - appears hungry after breastfeeding or
  - is not gaining weight adequately.
 If so, add complementary foods (listed under 6 months up to 12 months). Give these foods 1 or 2 times per day after breastfeeding.



### 6 months up to 12 months

- Breastfeed as often as the child wants.
- Give adequate servings of:
  - thick porridge made out of either maize or cassava or millet or soya; add sugar and oil mixed with either milk or pounded ground nuts
  - mixtures of mashed foods made out of either matooke or potatoes or cassava or posho (maize or millet) or rice; mix with fish or beans or pounded ground nuts; add green vegetables.
 Give 3 meals per day if breastfed.  
 Give 5 meals per day if not breastfed.  
 Give nutritious snacks between meals like egg, banana or bread.



### 12 months up to 2 years

- Breastfeed as often as the child wants.
- Give adequate servings of:
  - mixtures of mashed foods made out of either matooke or potatoes or cassava or posho (maize or millet) or rice; mix with fish or beans or pounded ground nuts; add green vegetables
  - thick porridge made out of either maize or cassava or millet or soya; add sugar and oil mixed with either milk or pounded ground nuts.
 Give 3 meals per day and 2 snacks.



### 2 years and older

- Give family foods at 3 meals each day. Also, twice daily, give nutritious snacks between meals, such as: bananas, eggs or bread.



## Encouraging young children to eat

Appetite is a good guide to the amount of food a child needs *if* the child is healthy, is fed frequently and is encouraged to eat. If the appetite decreases, it is a sign that something is wrong. Perhaps the child is ill or unhappy, or jealous of a new baby. Perhaps the child is trying to get extra attention, or is going through a fussy stage. Perhaps the diet is the same every day and the child is getting tired of the same taste. If the appetite remains poor for some time, the child may become malnourished.

A mother or other responsible person should actively encourage and help a young child at mealtimes even when the child is well and has a good appetite. It is especially important to supervise mealtimes from the time a child starts other foods up to two years of age. A child left on her own may not eat enough. A child needs time to learn to use a spoon. A young child often eats slowly and is messy and easily distracted. It is important that the child has sufficient time to eat enough. So advise families:

- to put the child's food in a separate bowl to make sure the child gets a fair share and eats the correct amount
- to sit with the child at mealtimes, watch what the child is eating, and actively give help and encouragement when needed
- not to hurry the child. A child may eat a bit, play a bit, and then eat again; encouraging a child to eat needs patience and a good sense of humour!
- once a child has stopped eating, to wait a little and then offer more
- to give some foods that the child can hold or pick up. Young children often want to feed themselves; parents should encourage this but be ready to help to make sure that most of the food eventually gets into the mouth
- to mix foods together if the child picks out and eats only favourite foods
- to feed as soon as the child is beginning to get hungry. If children wait too long to eat and get upset, they may lose their appetites
- not to feed when the child is sleepy
- not to force-feed. This increases stress and decreases appetite even more; mealtimes should be relaxed, happy occasions



*It is good if someone sits and encourages a child at mealtimes.*



*Young children often like to feed themselves, but they may need helping.*



*Imaginative games can help children eat more.*



*The time spent with the child at meal-times can also be used to tell new words and concepts and so improve the child's mental development.*

*Suggest families use mealtimes to:*

- name the utensils, foods and colours
- show some things are small and some big
- talk about how the food tastes.

**TIP**

*Let a child touch and pick up food and feed herself. This helps develop co-ordination and motor development.*

**TIP**

*Mealtimes are opportunities to help a child feel good about herself and what she is able to do. Encourage families to give praise, to smile at the child, and say 'that is very good'.*

**TIP**

- to make sure the child is not thirsty. (But do not give so much liquid before or during a meal that the appetite is reduced)
- to play games to persuade reluctant children to eat more, for example pretending the spoon is a bird coming to feed its chick, or pretending the food is for a doll or another child or a toy animal
- to be prepared to do a little cleaning up afterwards!

A child may refuse food to gain attention. You can help families avoid this by advising them to pay attention to children when they eat well and praise them for eating well. If a child refuses food, take it away and offer it later. If the child continues to refuse it, the child may really dislike the food and should be offered something else.

Imaginative games can be created to help reluctant children to eat more.

### Question

1. *In your area, do families have games or other ways of encouraging children to eat?*

.....

.....

.....

.....

*If so, ask them to share these ideas with you, and with other families.*

2. *How do families recognise that a child is hungry?*

.....

.....

.....

.....



## Stopping breastfeeding

You have seen that breast milk provides important amounts of energy and nutrients even in the second year. By the third year, a child will be able to eat family foods easily and the risk of illness and malnutrition will be less. So breastfeeding can be stopped gradually. A child may still want to breastfeed occasionally, for example if tired, upset or sick.

Many mothers believe that if they become pregnant they should stop breastfeeding immediately. This is not necessary as their breast milk is still good and does not harm the new baby. Stopping suddenly can upset a child emotionally, so it is best to stop gradually.



Advise families to encourage a child to eat even if he is not hungry.

## Protecting young children from disease

Babies are protected from disease by:

- inheriting some immunity from their mothers. This *natural (passive) immunity* (for example immunity from measles) is present at birth and lasts a few months
- substances in *colostrum* (the mother's first milk)
- substances in breast milk.

Gradually, babies develop their own protective immunity.

Young children are most vulnerable to disease between 6 and 24 months of age because:

- their passive immunity from their mother has declined
- their own immunity is not yet fully developed
- they are increasingly exposed to pathogens.

Pathogens are organisms that cause disease. Examples are bacteria, viruses, moulds and the eggs and larvae of parasites (for example, roundworms). Diarrhoeal pathogens are present in the faeces of people and animals and are easily passed to young children. Unless faeces are disposed of properly, diarrhoeal pathogens get into soil, food and water and onto hands, containers and utensils. Animals, flies and other insects can carry pathogens and so spread disease.

Young children are more likely to get diarrhoea than older children and adults because:

- young children crawl and play on the floor
- they put dirty fingers and other dirty objects into their mouths
- they may be fed from feeding bottles which are difficult to keep clean, safe and free of pathogens

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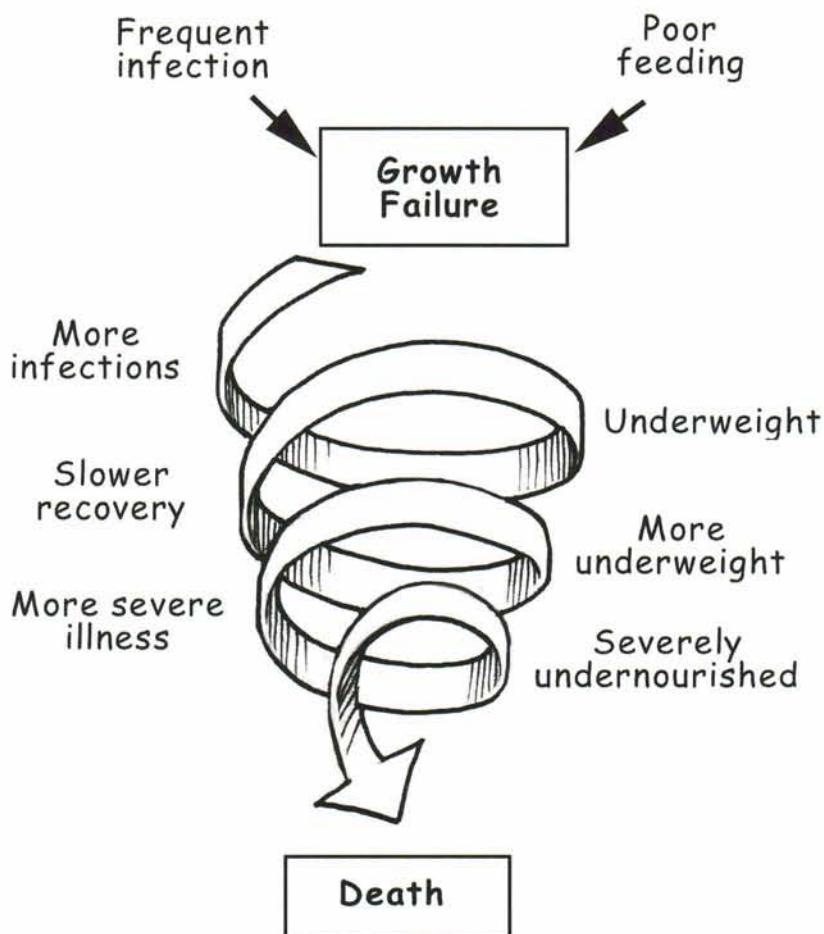
*Freshly-prepared food  
reduces the risk of  
diarrhoea*

---

- they may be given food that has been kept for a long time in a warm place. These conditions allow pathogens to multiply quickly
- their immunity is less developed.

A child who is ill usually does not want to eat. If the illness is severe or lasts a long time, the child may become malnourished. If the child is already malnourished, illness makes the malnutrition worse.

Figure 11 Infection and poor feeding produce ever-worsening undernutrition and illness.



When children are malnourished, they have less protection against pathogens because:

- barriers to pathogens (like skin) are less efficient. So it is easier for pathogens to invade the child's body
- malnourished children lack nutrients and so cannot make enough antibodies and other substances that fight disease. So pathogens multiply more easily inside the body.

This means that malnourished children are:

- ill for longer than well-nourished children
- more likely to become seriously ill
- more likely to die.

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

- feeding breast milk alone for at least 4 months, and 6 months if possible
- then feeding increasing amounts of appropriate complementary foods
- continuing to breastfeed during the first two 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 two 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 diarrhoea, 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 (meat, milk etc) and cooked food in a refrigerator if the family has one



*A clean home reduces the risk of illness.*



*Children who are well-nourished during the first two years are likely to stay well-nourished later.*





*Advise families to wash hands with soap before preparing food.*



*Keep food and utensils covered.*

- 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 faeces are not left exposed
- use potties for young children or remove their faeces from the ground and put in a covered pit or latrine
- wash dirty nappies straightaway 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 away from the house and water supply clothing worn while spraying.

*To keep food free of toxins, advise families:*

- to store food and crops in a dry, cool, airy place
- not to use mouldy food
- not to eat bitter cassava roots without proper treatment (for example, peeling, cutting, soaking and boiling, or grating and fermenting, or making into flour).

## Feeding during illness

*A child may eat less when ill because:*

- the child does not feel hungry
- the child is vomiting
- the mouth or throat is sore
- parents think food will harm a sick child and so give less food, or none at all
- parents give more watery food.

*To reduce the risk of malnutrition, advise parents to:*

- encourage the child to eat, even if not hungry
- feed *during* illness
- feed more *after* illness.

Sick children often need *extra* foods and drinks – for example if they have fever or diarrhoea. Sick children may prefer breast milk to other foods.

*So during illness, advise families to:*

- increase the number of breastfeeds
- offer small amounts of food frequently (perhaps every 2 hours)
- gently coax and encourage the child to eat even if not hungry
- give soft foods, especially if the mouth or throat is sore
- give extra fluids if the child has diarrhoea or fever
- give foods that the child likes
- feed when the child is alert, not sleepy
- make the child comfortable before feeding, for example by clearing a stuffy nose.

*Advise families to take a child to the clinic at once if the child:*

- is sick and refuses to drink
- has diarrhoea and drinks poorly
- has diarrhoea with blood
- has a cough and difficult breathing
- has a cough and fast breathing
- is breastfeeding poorly, especially if less than 2 months of age
- has a fever and lives where malaria is common
- is getting worse.



*All the family can help coax children to eat.*



*Advise families to give extra food during recovery from illness.*





*Regular weighing helps to check if a child is progressing well.*



*Discuss a child's progress and child feeding whenever you can.*

### Feeding during recovery

A child's appetite usually increases after illness. So this is a good time to give extra food so that lost weight is quickly regained.

Advise families to:

- continue to breastfeed frequently
- give complementary foods more frequently
- encourage the child to eat as much as possible at every meal
- continue to give extra food until the child has regained lost weight and is growing well again.

### Helping working mothers

It is an advantage to the child to stay with the mother for as long as possible so that she can breastfeed often. If a mother has to work away from home and leave her child, advise her that she can continue to provide good care if she:

- continues to breastfeed as often as possible, including at night
- chooses a responsible care-giver or nursery to look after the child
- expresses breast milk and shows the care-giver how to feed it by cup. If expressed breast milk is put into a clean covered container, it can be kept for 8 hours in a cool place even when there is no refrigerator
- tells the care-giver how to feed the child with complementary foods, how often and how much
- asks the care-giver to use a small cup or spoon to feed complementary foods to the child, never a feeding bottle
- teaches the care-giver how to keep food safe and clean
- tries to keep the same care-giver each time.

### Checking progress

Signs that a young child is healthy and well-nourished are that the child:

- is growing at a healthy rate<sup>1</sup>
- is eating well
- is active, happy and playful
- is not sick often
- recovers quickly from common childhood illnesses.

<sup>1</sup> The best way to check growth is to plot the child's weight on a growth chart. The child should be weighed regularly (preferably every month in the first year). Then the direction of the child's line on the chart can be seen and compared to the direction of the reference line.



So when you meet with mothers and care-givers of young children:

- advise them to take their children to the clinic or health post regularly for growth monitoring
- discuss child feeding and their children's progress, and give advice or counsel if needed, or if asked.

### Meaning of words

**Absorbed iron:** this is the iron that passes into the body after it has been released from food during digestion. Only a small proportion of the iron present in food is absorbed. The rest is excreted in the faeces.

**Active encouragement:** assistance given to encourage a child to eat. This includes praising, talking to the child, helping the child put food on the spoon, feeding the child, making up games.

**Antibodies:** substances produced by the body to attack bacteria and viruses that might get into the body. Antibodies are passed from a mother to her baby in breast milk and so breastfeeding helps protect babies from infection. Antibodies are also called immunoglobulins.

**Anti-infective factors:** substances that prevent infection. These include antibodies.

**Anti-nutrients:** substances that interfere with the absorption or utilisation of nutrients. Examples are phytates in cereals and tannins in tea which reduce the absorption of iron from eggs, milk and plant foods.

**Chapati:** a flat bread made by mixing whole wheat flour with water and then shaping pieces of the dough into flat circles and baking on a griddle (hot metal sheet). Traditionally eaten in India and Pakistan.

**Colostrum:** the 'first' milk that mothers produce before the main flow of breast milk becomes established.

**Deficiency:** shortage of a nutrient that the body needs.

**Family foods:** foods that are part of the family meals.

**Fermented foods:** foods that are soured. For example, yoghurt is fermented milk. Another example is fermented cereals made by mixing cereal flour with water and then leaving for 2 or 3 days. In this process, microorganisms change some of the starch into other substances. These substances can be beneficial and kill pathogens that may be contaminating the food. So food that has been fermented is often safer than other food. Fermenting cereals breaks down the phytates in the cereal and allows more iron, zinc and calcium to be absorbed.

**Filtered water:** water purified and made safe by passing it through a special filter to remove germs and dirt.

**Fortified foods:** these are foods that have certain nutrients added to improve their nutritional quality. An example is the addition of B vitamins and iron to milled flour so that the nutrients removed during milling are restored to their original content. Another example is the addition of vitamins A and D to margarine so that it has the same vitamin value as butter.

**Germinated seeds/flour:** seeds that have been soaked and allowed to sprout. Seeds may be soaked in water for 24h and then covered with a damp cloth for 48h. The sprouted seeds can be dried and milled to make germinated flour. If a little of this flour is added to warm thick porridge it makes the porridge soft and easy to eat.

**Ghee:** butter that has been heated so that the fat melts and the water evaporates. It looks clear. It can be made from cow or buffalo milk and is widely used in India. In the Middle East it is called *samna*.

**Gruel:** another name for thin porridge. Examples are *atole* in Central America, *uji* in Africa.

**Immunity:** a defence system that the body has to fight disease.

**Jaggery:** brown sugar made from the sap of the palm flower. It is widely used in the Indian subcontinent.

**Matooke:** green banana.

**Micronutrients:** essential nutrients required by the body in small quantities (like vitamins and some minerals).

**Natural (passive) immunity** is the protection a baby inherits from his/her mother.

**Nutrients:** substances the body needs that come from the diet. These are carbohydrates, proteins, fats, minerals and vitamins.

**Nutritional needs:** the amounts of nutrients needed by the body for normal function, growth and health.

**Offal/organs:** liver, heart, kidneys, brain, intestines, blood.

**Pasteurized:** food (usually milk) made safe by heating it to destroy disease-producing pathogens.

**Pathogen:** any organism that causes disease.

**Pesticides:** substances (usually sprays) used by farmers to prevent pests from attacking crops.

**Porridge:** is made by cooking cereal flour with water until it is smooth and soft. Grated cassava or other root, or grated starchy fruit can also be used to make porridge.

**Phytates:** substances present in cereals, especially in the outer layer (bran), and in peas, beans and nuts. Phytates combine with iron, zinc and calcium in food to form substances that the body cannot absorb. Eating foods containing vitamin C helps protect iron from the adverse effect of phytates.

**Pulses:** peas, lentils, beans and groundnuts.

**Puree:** food that has been made smooth by passing through a sieve or mashing with a fork, pestle or other utensil.

**Quinoa:** a cereal grown at high altitude in the Andes in South America.

**Safe water:** water that has had disease-causing pathogens removed, for example by boiling, adding chlorine, or passing through a filter specially made for this purpose.

**Tarwi:** a bean grown in the Andes in South America.

**Tortilla:** a flat bread made by mixing maize flour and water and then making the dough into a thin round shape. It is cooked on a hot metal griddle. Traditionally eaten in Central America. Wheat flour can also be used.

**Toxin:** a poisonous substance.



### Annex 1: Good sources of important nutrients

Young children, like everyone else, need many different nutrients for growth and development, to provide energy, and to keep healthy. We have shown that most young children have sufficient protein in their diets. The main problem nutrients are *iron*, *zinc* and *vitamin A*. Also important is *vitamin C* which helps iron absorption, and *calcium* for building bones and teeth. The following foods are good sources of these nutrients.

**Iron:** Good sources were listed in Box 1 on page 19.

**Zinc:**

- liver and offal of all kinds
- foods prepared with blood
- flesh of animals, birds and fish
- shellfish
- egg yolk.

**Vitamin A:**

- breast milk
- liver of all kinds
- red palm oil (unbleached)
- egg yolk
- orange-coloured fruits – mango, paw-paw, passion fruit (but not oranges). The darker the colour the more vitamin A
- orange-coloured vegetables – carrot, pumpkin, yellow sweet potato, red/orange peppers (but not tomatoes). The darker the colour the more vitamin A
- dark-green leaves – spinach, amaranthus, kale, cassava leaves, sweet potato leaves, pumpkin leaves, broccoli. The darker the green the more vitamin A.

**Vitamin C:** (cooking destroys some vitamin C)

- fresh fruit – guava, orange, lemon, mandarin, mango, paw-paw, berries, melon, banana, passion fruit, peach
- tomato, peppers
- green leaves and vegetables – spinach, amaranthus, kale, cassava leaves, sweet potato leaves, cabbage, broccoli, cauliflower
- baobab pulp
- fresh starchy roots and fruits are good sources if large amounts are eaten – potato, sweet potato, cassava, plantain.

**Calcium:**

- milk and milk products – cheese, yoghurt
- fish eaten with bones – small whole fish, pounded dried fish, canned fish.

## Annex 2: Recipes for good mixed meals from four countries (Figure 9, p 32)

(Each meal fills at least one-third of the gaps for energy, protein, iron and vitamin A)

### Example from East Africa (maize + groundnuts + egg + spinach meal)

Thick maize porridge	4½ tablespoons	(140g)
Groundnut paste	1 tablespoon, rounded	(15g)
Egg	one	(30g)
Spinach	handful of leaves	(20g)

Make a thick porridge with maize flour. Pound groundnuts and add to the porridge. Just before serving add the raw egg and cook for a few minutes. Fry onions and tomato for flavour, add spinach. Serve separately or mix with porridge.

### Example from India (chapati + dhal + carrot/amaranthus meal)

Chapati	half	(50g)
Dhal (cooked)	1 tablespoon, rounded	(30g)
Carrot	half a small one	(25g)
Amaranthus	handful of leaves	(30g)
Ghee	1 teaspoon	(5g)
Milk	½ cup	(50g)

Cook dhal (lentils) until soft with spices (for flavour). Add carrot and ghee when dhal are nearly ready. Serve with chapati and steamed amaranthus. (Alternatively add the leaves to the dhal/carrot mixture when these are cooked).

### Example from Peru, South America (rice + beans + liver)

Rice	3 tablespoons	(84g)
Bean and potato stew	1 tablespoon	(30g)
Liver	½ tablespoon, rounded	(15g)
Margarine	1 teaspoon	(5g)

Boil the beans with onions and spices for flavour until nearly soft. Add potato and continue cooking. (Alternatively add cooked potato). Cook a chicken's liver (e.g. in the stew or steamed with the rice). Mash the potato, beans and liver with well-cooked rice and a little margarine.

### Example from Syria, Middle East (rice + lentils + yoghurt)

Cooked rice	3 tablespoons, rounded	(84g)
Lentils	1½ tablespoons, rounded	(30g)
Oil	1 teaspoon	(5g)
Yoghurt	3 tablespoons	(50g)
Orange	half a small one	(50g)

Fry onions (for flavour) until brown and add spices. Boil lentils until soft. Cook rice and add the rice and lentils + liquid to the onions. Simmer gently. Serve with yoghurt.

## Annex 3: Composition (per 100g) of some foods

Food	Description	Energy (kcal)	Protein (g)	Iron (mg)	Vitamin A (µg RE)
Maize flour	White, refined	335	8	1.1	0
Wheat flour	White, fortified	341	9.4	2.0	0
Bread	White, fortified	235	8.4	1.6	0
Rice	Cooked	138	2.6	0.2	0
Potato	Cooked	75	1.5	0.3	0
Sweet potato yellow	Cooked	84	1.1	0.7	660
Cassava	Raw	153	0.7	1.0	0
Chapati	No fat	202	7.3	2.1	0
Kidney beans	Boiled	100	6.9	2.0	0
Mung beans	Raw, dried	279	23.9	6.0	0
Mung beans	Boiled	91	7.6	1.4	0
Soy beans	Raw, dried	370	35.9	9.7	0
Groundnuts	Raw	564	25.6	2.5	0
Sunflower seeds	Raw	581	19.8	6.4	0
Melon seed	Raw	595	26	7.4	0
Chicken liver	Raw	135	19.1	9.5	11325
Beef, lean	Raw	123	20.3	2.1	0
Lamb, lean	Raw	162	20.8	1.6	0
Pork, lean	Raw	147	20.7	0.9	0
Chicken (light meat)	Raw	116	21.8	0.5	0
Chicken (dark meat)	Raw	126	19.1	1.6	0
Fish	Raw	76	17.4	0.3	0
Fish	Steamed	98	22.8	0.2	0
Fish small	Dry whole	320	44	8.5	na
Milk	Fresh, whole	66	3.2	0.06	55
Cheddar cheese		412	25.5	0.3	362
Egg	Boiled	147	12.5	1.9	190
Carrot	Raw	35	0.6	0.3	1350
Carrot	Boiled	24	0.6	0.4	1260
Spinach	Boiled	19	2.2	1.6	640
Pumpkin	Boiled	13	0.6	0.4	160
Tomato	Raw	17	0.7	0.5	107
Mango		57	0.7	0.7	300
Orange		37	1.1	0.1	5
Paw-paw		36	0.5	0.5	135
Banana		95	1.2	0.3	3
Avocado		190	1.9	0.4	2
Sugar		394	0	0	0
Red palm oil	Unbleached	890	0	0	4000
Ghee		898	0	0	758
Margarine		739	0.2	0.3	780



## Annex 4: Technical Data

In Figs 1 and 2, the energy and iron needs of an *average* child have been taken as:

	<b>Energy (kcal/d)</b>	<b>Absorbed iron (mg/d)</b>
0–2m	404	1.14
3–5m	550	0.90
6–8m	682	0.78
9–11m	830	0.66
12–23m	1092	0.49

(References WHO 1998 Table 9, FAO/WHO 1988, adapted from Table 5.1)

In Figs 1 and 2, we have taken the energy and iron intakes from breast milk as:

	<b>Breast milk (g/d)</b>	<b>Energy (kcal/d)</b>	<b>Absorbed iron (mg/d)</b>
0–2m	714	493	0.043
3–5m	784	540	0.047
6–8m	674	465	0.040
9–11m	616	425	0.037
12–23m	549	379	0.033

In Figs 1–8, in calculating energy, protein, iron and vitamin A intakes from breast milk, we have used WHO 1998 Tables 7 and 22 and an energy content of 69 kcal /100ml. We have assumed that the absorption of iron from breast milk is 20%.

In Figs 3–8, the energy, protein, iron and vitamin A needs of an average child aged 12–23m have been taken as:

<b>Energy (kcal)</b>	<b>Protein (g)</b>	<b>Absorbed iron (mg)</b>	<b>Vitamin A (µgRE)</b>
1092	10.2	0.49	300

(References WHO 1998, Dewey et al 1996, FAO/WHO 1988, Department of Health 1991). For protein, we assumed a digestibility of 85% and that the amino acid needs are met.

### Portion sizes of cooked foods in Figures 3–8

1 rounded tablespoon rice	28g	(3 tablespoons 84g)
1 teaspoon fat	5g	
1 rounded tablespoon beans	30g	
1 rounded tablespoon fish	30g	
1 rounded tablespoon liver	30g	
1 rounded tablespoon green leaves	27g	
1/2 small orange	50g	
1 slice bread + margarine	20g + 5g	
1 small banana	60g	

We took 6µg carotene as equivalent to 1µg retinol.

We allowed for the enhancing effect of fish/meat and vitamin C on iron absorption from plant foods.

For this we assumed the absorption of iron to be:

iron in rice/porridge	5%
iron in rice/beans	5%
iron in rice/beans when eaten with fruit	10%
iron in rice when eaten with fish/liver	10%
iron in rice when eaten with fish/liver + leaves	15%

The energy and nutrient contents of the portions indicated in Figs 3–8 are thus:

	Amt. (g)	Energy (kcal)	Protein (g)	Absorbed iron (mg)	Vitamin A (µg)
staple	84	116	2.2	0.17 x 5% = 0.008 x 10% = 0.016* x 15% = 0.024**	–
fat	5	45	–	–	–
beans	30	30	2.1	0.60 x 5% = 0.030 x 10% = 0.060*	–
fish	30	29	6.8	0.21 x 15% = 0.031	–
liver	30	40	5.7	2.85 x 15% = 0.427	3397
leaves	27	5	0.6	0.43 x 15% = 0.064**	173
orange	50	19	0.5	0.05 x 10% = 0.005	3
banana	60	57	0.7	0.18 x 5% = 0.009	2
bread	20	47	1.7	0.30 x 5% = 0.015	–
porridge + milk/sugar	100	144	3.6	0.12 x 5% = 0.006	–
breast milk	549	379	5.8	0.16x20% = 0.033	274

\*Vitamin C at the same meal enhanced iron absorption to 10%

\*\* Fish/liver + vitamin C at the same meal enhanced iron absorption to 15%

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