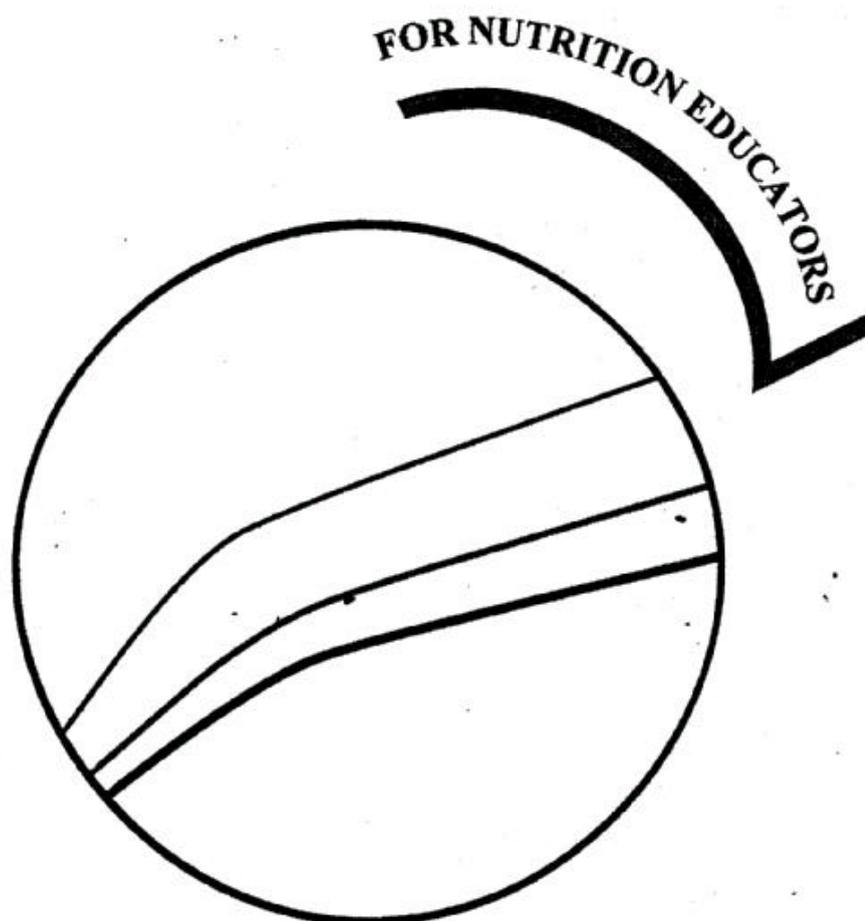


NUTRITION REFERENCE MANUAL



HELEN KELLER INTERNATIONAL/CAMBODIA
1999

Nutrition Reference Manual

For Nutrition Educators

Helen Keller International/Cambodia 1999

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Organization of the Training Manual

This manual has two main sections:

- ✍ Section one which provides detailed contents for basic knowledge of nutrition- *'Nutrition Reference Manual'*, and
- ✍ section two which contains a curriculum and lesson plans- *'Nutrition Curriculum and Lesson Plans'*

Nutrition Reference Manual: This section is organized into main topics with each main topic divided into subheadings. The topics move in sequence from the more general to the more specific and from what should come first (prerequisite) to what needs to follow. This section provides general knowledge from reference documents and knowledge of the nutritional situation in Cambodia. Some parts, such as common problems/difficulties and misconceptions found in Cambodia, are primarily from studies conducted by HKW and other agencies. There are some limitations to locally available information. Therefore, parts of the reference manual should be modified by users as necessary and are NOT an exhaustive compilation.

Nutrition Curriculum and Lesson Plans: This section provides a detailed guide on training for each of the lessons. It must be used with the first section- Nutrition Reference Manual. While each lesson plan provides enough detail and information for trainers to train others, the Nutrition Reference Manual section will provide broader information and knowledge to trainers to increase their understanding of each topic beyond the information contained in the lessons.

The curriculum outlines the course description, which includes brief components on:

- ✍ Overall objective
- ✍ Specific objectives for each lesson
- ✍ Contents
- ✍ Learning Experience/Training Methods
- ✍ Materials
- ✍ Time
- ✍ Evaluation

The lesson plans explain in detail what will happen in each session/lesson. There are four main components in each lesson plan:

- ✍ Objective(s) of the lesson
- ✍ Time
- ✍ Materials
- ✍ Steps In training (Learning Experience)

Most of the lesson plans are appropriate for a small group of participants (5-10 people). It is necessary for the trainer to adapt these lesson plans for larger groups of participants, especially for training activities and time needed to complete the lessons.

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ABBREVIATIONS/ACRONYMS

ARI	Acute Respiratory Infections
BMI	Body Mass Index
HAZ	Height-for-Age Z-score (stunting)
HIV	Human Immuno-deficiency Virus
HKW	Helen Keller Worldwide
HW	Health Worker
IDA	Iron Deficiency Anemia
IDD	Iodine Deficiency Disorders
MUAC	Mid-upper Arm Circumference
NGO	Non-Governmental Organization
ORT	Oral Rehydration Therapy
PEM	Protein Energy Malnutrition
TBA	Traditional Birth Attendant
UNAIDS	United Nations Program on HIV/AIDS
UNICEF	United Nations Children Fund
VAC	Vitamin A Capsule
VAD	Vitamin A Deficiency
WAZ	Weight-for-Age Z-score (underweight)
WHO	World Health Organization
WHZ	Weight-for-Height Z-score (wasting)

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INTRODUCTION

Background to the Nutrition Training Manual

In Cambodia, all forms of major nutritional deficiencies are prevalent. Protein-energy malnutrition (PEM) is a problem as are micronutrient deficiencies including vitamin A deficiency (VAD), iron deficiency anemia (IDA) and iodine deficiency disorders (IDD). With increasing information made available as to the nutritional problems in Cambodia, there has been a demand for training of staff of local and international organizations and staff of health centers in the areas of nutrition and home gardening. Helen Keller Worldwide (HKW) has, and continues to play an important role in providing technical assistance to these agencies for this purpose.

HKW focuses on the training of the trainers of agencies (including local and international NGOs, government staff and UN agencies) requesting technical assistance. Because only limited amounts of material on nutrition are available in Khmer, HKW developed this training manual to meet the demand for nutrition training materials. The training manual includes basic nutrition and lesson plans that trainers can adapt and apply to their own training programs. HKW developed this nutrition training manual using information from external reference documents and from the results of research conducted in Cambodia by HKW and other agencies.

Purpose and overview of the Nutrition Training Manual

This training manual is a complete package of basic nutrition education. Section one covers the contents of basic nutrition and section two includes detailed lesson plans on how to teach each of the topics. The main purpose of this training manual is to serve as a reference for nutrition educators; it should be used primarily as a guide for trainers and adapted to fit specific program needs.

Who should use the HKW Training Manual?

This manual is designed for those involved in nutrition programs, and particularly those who are involved in nutrition education. It provides basic knowledge on nutrition and ideas of how to use the knowledge to train others. The people mainly in mind when this manual was being developed are:

- ⚡ HKW staff for use in providing training to staff of agencies requesting technical assistance in nutrition;
- ⚡ staff of other agencies who have received the training from HKW, to be used as reference document and to be modified to meet program needs and the needs of the target population.

Other persons who could use this include staff from key government line ministries and UN agencies.

I. INTRODUCTION TO NUTRITION

A) What is nutrition?

Nutrition is the study of how the body uses food. Food is what people eat and drink to stay alive and healthy, for growth, development, work, and other physical activities. Food habits are defined by the quantity, quality of food consumed and the methods of obtaining, consuming and utilizing food. Most food habits are learned and passed on from one generation to the next. As individuals mature and develop, experiences influence changes in some of these habits. Nutrition education can also help to change food habits.

B) Importance of good nutrition

Individuals need food to provide energy for work and to regulate body temperature. Food is needed to build, maintain, and repair the body. It is also required to control body processes and to protect against disease and infections. In this way, food not only maintains life but also influences the quality of life in people.

Malnutrition is the body's physical response to limited intake of food, in both quantity and quality. It can also be the cause or result of chronic illness, such as diarrhea.

C) Malnutrition and its effects

Under-nutrition is a lack of intake of macronutrients (protein, carbohydrates, fats) and is often found among people living in developing countries like Cambodia. This means that the body is not receiving the nourishment it needs to grow and function properly. Poor nutrition in early life often leads to:

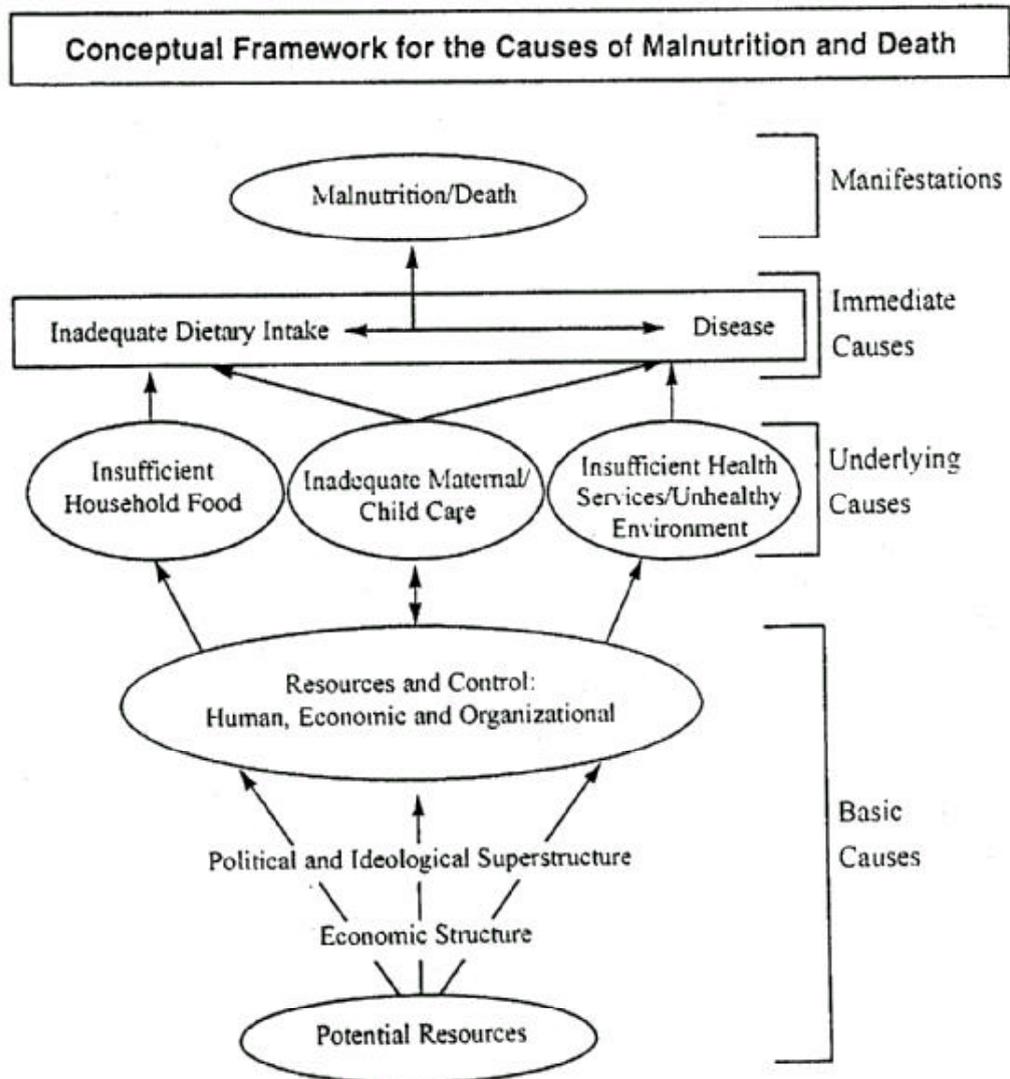
- preventable deaths
- permanent psychomotor disability
- permanent mental disability
- permanent physical disability
- life-long susceptibility to illness
- lower reducibility of school-aged children
- lower productivity of adults
- shorter life span.

Malnutrition weakens the body's ability to resist many types of disease and infections.

- The incidence and severity of diarrhea is greater in malnourished children
- Measles is especially dangerous where many children are malnourished
- Tuberculosis is more common and progresses more rapidly in those who are malnourished.
- Even minor problems like the common cold are usually worse, last longer, or lead to pneumonia more often in persons who are suffering from malnutrition.

Not only does good quality food help prevent disease, it helps the body fight disease and recover more quickly. So, when a person is sick, it is important to maintain or even increase the intake of quality food.

It is important to note that the immediate causes of malnutrition and death are primarily inadequate dietary intake and disease. However, dietary inadequacies are caused by and inadequate supply of food, or by too little time to prepare food or to feed children. Similarly, deaths may result from any one or a combination of causes such as lack of health services, poor water supplies and sanitary facilities, poor food hygiene, inadequate child care. Causes at this level are underlying causes. They are numerous and usually interrelated. Underlying causes include insufficient basic health services and unhealthy environmental conditions, inadequate household food security and inadequate maternal and child care. The diagram below shows the relationship between malnutrition and death and factors that could contribute to it.



II. FOOD GROUPS

A) Introduction

Foods provide energy for movement (physical activity) and for normal body functions (breathing, mental activity, regulation of body temperature, and blood circulation). Foods provide materials for building, maintenance and repair of body tissues and are necessary for the prevention of and recovery from diseases and infections. The various macro- and micro-nutrients in foods make these different functions possible. All foods contain one or more nutrients in varying amounts. No one food provides all of the nutrients needed for normal functions. Each type of nutrient has a specific function and the nutrients work together as a team. Therefore, it is important for individuals to consume a wide variety of foods on a daily basis for growth and to maintain optimal health.

As different foods provide different nutrients, the nutritional needs of people vary. Nutritional needs are influenced by age, sex, health status pregnancy, and physical activity. Knowledge of food groups is useful in selecting a combination of foods to meet physiological nutritional needs in addition to satisfying individual tastes and cultural habits. Foods that provide the same or similar nutrients are grouped together and can replace each other to provide the same nutrients. This knowledge also helps to make the best use of local foods by providing choices based on the availability (seasonal) or price.

Foods can be classified into three main groups according to the nutrients contained in the foods.

B) Three basic food groups

1. Body-building foods

These foods contain protein which is used by the body for growth, maintenance and repair of body tissues. Foods in this group include breastmilk, tofu, soybeans, mung beans, peanuts, fresh milk, eggs, fish, chicken, duck, pork, beef, crab, shrimp, squid, eel, frog and other animal meats.

2. Energy Foods

Foods in this group are good sources of carbohydrates or fats, which are used by the body to provide fuel for physical activity. Foods high in carbohydrates are rice, noodles, potato, sweet potato, taro, yam, corn, bread, sugar, honey, and sugar cane, while those high in fat are coconut milk, cooking oil, animal fat.

3. Protective foods

These foods contain essential vitamins and minerals which work with body-building and energy foods in preventing and fighting disease and illness. They contain substances called micro-nutrients which include vitamin A, iodine and iron and are necessary for good health. Foods in this group are mainly vegetables and fruits, but there are some very important animal sources as well.

- ? Dark green leafy vegetables: kang kong, ivy gourd, amaranth, pak wan, mustard greens, pumpkin leaf.
- ? Yellow/orange vegetables: pumpkin, orange sweet potato, and carrot.
- ? Yellow/orange fruits: ripe mango and ripe papaya.
- ? Eggs, chicken meat, fish such as sergeant fish, pra and chlaing fish, animal blood, liver, and other animal organs.

As mentioned above, many foods have more than one type of nutrient. For example, duck and chicken eggs can be in both the body-building and in the protective groups.

III. ANTHROPOMETRY

A) What is Anthropometry

Anthropometry is the practice of taking body measurements to give an indication of nutritional status. Common measurements taken in developing countries are height, weight and mid-upper arm circumference (MUAC). Relationships between height, weight, age and MUAC are made and compared against international reference standards. From this, the nutritional status of individuals and populations can be determined.

B) Growth Monitoring

Growth monitoring is an activity where children under 5 years of age are measured (weight and/or height) at repeated intervals over time and changes in weight and/or height are documented. This activity is useful in early detection of growth faltering and also in documenting improvements in child growth in relation to program activities and interventions. Growth faltering is the failure of children to increase their weight and/or height appropriately for age and is usually related to poor nutritional intake and/or illness. Malnutrition can be detected at an early stage if growth monitoring is done regularly and used well.

1. The weight chart (weight for age)

Weight chart or 'yellow card' is a document that records a child's weight for age. It is a simple and common tool to watch a child's growth. A child's weight is a good indication of his/her nutritional status, especially if the child is under five years of age. If the weight chart is used regularly and with care, malnutrition can be detected at an early stage and treatment can be started before it is too late. Each month a child under five years old should be weighed. Another dot should be put on the chart every time the child is weighed. If the child is healthy, each month the new dot will be higher on the chart than the last. To see how well the child is growing, join the dots with lines.

a. How to read the child weight chart

- An upward line means the baby is growing well and gaining weight.



- A flat line is a cause for concern because the baby is not gaining weight.



- A downward line is a sure sign of danger.



The main disadvantage of weight for age method is that it is often difficult to assess accurately. Few people in Cambodia have accurate birth dates. It is important for the health worker to determine age by probing and using an events calendar.

	April Cheth	May Pisak	June Ches	July Asath	Aug. Srap	Sep. Pho- trabat	Oct. Asoch	Nov. Kadek	Dec. Mikas	Jan. Bos	Feb. Meak	March Phal kun
1999 Rabbit										2	00	0
1998 Tiger										1	99	9
1997 Cow										1	99	8
1996 Rat										1	99	7
1995 Pig										1	99	6
1994 Dog										1	99	5

b. How to weigh

Portable hanging scales are strong and reliable and can be hung from the tree or a hook in the ceiling. Care must be taken not to hang them too high to avoid scaring the children. Also scale should be at reader's eye level. The scales must be secured and allowed to hang free with the sling or basket attached before each child is weighed. Check that the scales read zero before weighing. Test for accuracy daily by using an object of known weight that is about as heavy as the children to be weighed. Weigh the child with a minimum of clothing. Ensure that the child is not touching any thing beyond the scale pan/basket. Read the scale at eye level. Record the child's weight to the nearest decimal. If possible, weigh newborns within a few hours of birth on a beam scale (see diagram below).

2. Height for age

Height-for-age z-scores (haz) are a measure of linear growth (length or height) in comparison to an international standard by age and gender of a child. A child with a height-for-age z-score less than -2.00 is classified as being at least moderately stunted. Stunting is an indication of long-term or chronic malnutrition. In Cambodia, more than 55% of all children 6-59 months of age are stunted, with the percentage being higher in older children and in rural areas.

a. How to measure children < 24 months of age

Length of all children younger than two, as well as of any other children that are unable to stand, should be measured with a measuring board. The child should be placed on the board with the head firmly against a vertical board and the child's eyes looking straight upwards. The child's knees should be pressed down and the sliding foot-board moved firmly against the heel. The length is recorded on the tape to the nearest decimal.

b. How to measure the height of children aged 24 months or older

The child's height can be measured with a centimeter tape fixed to wall or straight stick. The floor should be at exactly at 0 centimeters. The child is placed with bare feet flat on the floor, heels together, back straight and eyes looking straight ahead. A horizontal headboard is pressed firmly against the child's head and the marker is read on the tape to the nearest decimal.

3. Weight for height

Weight for height is the index used to measure acute malnutrition, which results in thinness. A child with a w for height (why) z score less than -2.00 is classified as being wasted. A high rate of wasting in children is often found in places where there is a sudden shortage of food, usually caused by natural disasters (flood, drought), civil conflict, or other emergency. In Cambodia, the national rate of wasting in children 6-59 months is around 13%, with rural seasonal rates as high as 20 percent.

An advantage of using weight for height is that the age of the child is not necessary for assessment. In Cambodia, this is important since age calculation of children is difficult due to lack of birth reporting. Also, the weight is related to the height so that a short, plump child which might be underweight for its age is not registered as malnourished, e.g. weight for height allows for stunting.

For monitoring purposes, it is not practical unless assessing an emergency situation. Also, weight for height can be time consuming. It requires two measurements (weight and height) which increases the risk of error and requires the ability to read tables and keep records.

Standard weight for height tables are attached at the end of this section.

4. Arm circumference

The mid-upper arm circumference can be a useful screening method for detecting malnourished children in the 1-5 year age group, especially if ages are not accurately known or weighing scales are not available. It is appropriate for children between the ages of 1 and 5 years because the normal arm circumference of children in this age group doesn't vary much, so that standard cut-off points can be used. If the arm circumference is between 12.5 and 13.5 cm, the child can be considered moderately malnourished. Below 12.5 cm indicates severe malnutrition.

The MUAC is best used in emergency situations such as in refugee camp for screening purposes. It is easy, and an inexpensive way to assess malnutrition in adults and children. It is also useful in validating the other measures of malnutrition such as waz and whiz scores.

a. How to measure arm circumference:

The left arm of the child should hang in a relaxed position. The arm circumference is measured mid-way between the elbow and the shoulder. The tape should be wrapped closely around the arm but must not be twisted or pulled tight.

5. Body Mass Index (BMI)

For adults, the body mass index (BMI) is used to measure thinness, especially in women of childbearing age. The body mass index is calculated by dividing the weight (W) in kilograms by the height (H) in meters squared.

$$\text{BMI} = W/H^2$$

So if a woman weighs 40.4 kilograms and is 1.54 meters tall the following equation is used to calculate her BMI: $40.4/(1.54)^2 = 17.0 \text{ kg/m}^2$. A woman with a BMI below 18.5 kg/m² is classified as being moderately malnourished.

C) What action should be taken if the child is not gaining weight?

if a child under of 5 years old is not gaining weight, the mother should do as follows:

- Feed children 3 to 5 times a day.
- Continue breastfeeding up to at least two years of age.
- Use Oral Dehydration Therapy (ORT) to prevent dehydration.
- Add a small amount of coconut milk, oil or fat to foods for the child.
- Seek medical attention from the nearest health center if the child is frequently sick.
- Give the child additional foods more frequently both during illness and the recovery period.
- Give vitamin A rich foods daily, such as dark green leafy and yellow/orange vegetables and yellow/orange fruits, as well as animal sources of vitamin A. Vegetables should be cooked in oil to help the body absorb vitamin A better.
- Give boiled water to children. Sugar drinks should not be used instead of milk.
- Build and use latrines to improve sanitation and hygiene.
- Give de-worming medicine from a health center to the child.
- Make sure the child has received BCG, DPT, measles, and polio immunizations immunize the child if this has not already been done.
- Make sure the child has received vitamin A supplements- give supplement of child has not received within the past three months.

Always check the age of the child before counseling so that appropriate information is given.

IV. PROTEIN ENERGY MALNUTRITION (PEM)

A) What is malnutrition?

A person, who is weak or sick because he/she does not eat enough, or does not eat the foods his/her body needs, is said to be poorly nourished or malnourished. The person suffers from malnutrition. The two main causes of malnutrition are:

- Inadequate dietary intake. Where food is insufficient. Insufficient of foods produced, no extra budget for purchasing foods, foods are expensive, or some foods are not available in some seasons. Food may be available but incorrectly used. May also cause disease through lowered immune system function.
- Disease: May affect dietary intake by loss of appetite. This will in turn have an effect on malnutrition through insufficient food intake.

As described previously, underlying causes of malnutrition include insufficient household food security, inadequate maternal and child care and insufficient health services and unhealthy environmental conditions.

B) What is Protein Energy Malnutrition (PEM)?

PEM is caused by a deficient intake of energy and usually protein. It is almost always aggravated by repeated episodes of diarrhea and other infections. Poverty (shortage of food) and poor living conditions are the most important underlying causes of PEM.

PEM most commonly affects children between the ages of six months and 5 years (especially around 12-24 months). Children in this age group are most vulnerable to common infectious diseases such as measles. This is the time that they are introduced to complementary foods. In many cases, it is the time that their mothers stop breast feeding.

Chronic PEM has many short and long term physical and mental effects, including growth retardation-being lighter and shorter than a normal child.

C) What is mild malnutrition?

The first sign of all forms of PEM is growth failure. The child is thinner and shorter than normal. Growth failure can be seen most clearly on a child's growth chart. Weeks or months before a child looks like a case of malnutrition, the child will have stopped growing. Because the child is poorly nourish, he/she may lack the strength to fight infections. So, the malnourished child becomes more seriously ill and takes longer to get well than a well-nourished child.

Children with this form of malnutrition suffer more from diarrhea and colds. Their colds usually last longer and are more likely to turn into pneumonia. Measles, tuberculosis, and many other infectious diseases are more dangerous for these malnourished children. More of them die. It is important that these children get special care and enough food before they become seriously ill.

D) What is severe malnutrition?

This occurs most often in babies who stopped breastfeeding early or suddenly, and who are not given sufficient high-energy and protein foods often enough. Severe malnutrition often starts when a child has diarrhea or another infection. The severe forms of PEM are:

- Marasmus
- Kwashiorkor
- Marasmic kwashiorkor

1) Marasmus: This child is just skin and bones.

a. Causes

The child with marasmus does not eat enough food of any kind. In other words this child is starved. Many children get marasmus between the ages of 6-14 months during the weaning period.

b. Signs and symptoms

Children with marasmus:

- Have no fat, so the skin is loose and seems to be too big for their body
- Are very underweight ('all skin and bones'). The child has severely retarded growth and low weight for age
- The infant looks like an 'old man' or has a 'monkey face'
- Are always hungry

c. Treatment

This child needs more food, especially energy foods. Because the child with marasmus is very sick, it is best to urgently seek medical care.

2. Kwashiorkor: This child is skin, bones, and water.

a. Causes

The child with kwashiorkor does not eat enough body building' foods. More often it happens when the child does not get enough energy foods, and his/her body burns up whatever proteins he/she eats for energy. Kwashiorkor occurs most often in children aged from one to three years. It is a serious sickness, especially when there are the added complications of infections.

b. Signs and symptoms:

Children with kwashiorkor

- show body swelling (edema), especially on the legs and feet, and sometimes on the face ('moon faced'),
- have soft, flabby muscles
- have thin upper arms
- have cracked, peeling skin

- have thin, reddish hair.
- have stopped growing (growth retardation)
- are unhappy and may not want to eat

c. Treatment:

This child needs more foods more often- a lot of foods rich in energy, and some foods rich in protein. Because the child with kwashiorkor is a very sick child, it is best to urgently seek medical care.

3. Marasmic Kwashiorkor

This is a mixed form with edema occurring in children who are otherwise Marasmic and who may or may not have other associated signs of kwashiorkor.

E) Children who are at risk of malnutrition

- When children are between 6 months and 5 years old they are growing fast. They get malnourished easily if they do not get enough of the right (nutritious) foods for their needs.
- When there are many children in a family, there may be less food for each person. Because the mother has so much work to do, she may not pay enough attention to feeding the smaller children.
- If a mother has pregnancies too close together, the health of both babies and the mother will suffer. She may produce poor quality breastmilk (insufficient vitamins and minerals) to feed the baby and the older child will get less time and care and may become malnourished.
- Babies who are born small (less than 2.5 kilograms) are more likely to become malnourished.
- Babies who do not get enough breastmilk may become malnourished.
- Breastmilk is the only food babies need for the first six months of life. At 6 months of age, children need other foods. If they do not get enough of these other foods at the right time, they will not grow properly. They may become malnourished.
- If a child catches an infection such as diarrhea, whooping cough, or measles, the child is likely to become malnourished.
- By the time a baby is three months old, he/she should be about 1.5 kilograms heavier than when he/she was born. If the child gains less weight, he/she may become malnourished. Stopping breast feeding too early can cause the baby to stop growing.
- Poor families often cannot afford to buy or grow food for everyone in the family. The younger children are usually the ones who do not have enough to eat and may become malnourished.
- If a family does not know how to feed children properly, children often do not get enough of the right kinds of foods, and they are likely to become malnourished.

F) How to prevent malnutrition

- Exclusively breastfed up to around six months
- At six months begin introducing complementary foods and continue to breastfeed up to two years of age
From seven months give the child a mixed diet which includes rice, vegetables, fruits, and egg, meat or fish. This will help a malnourished child get better quickly
- Give more meals per day. This is a good way of giving more food. A child with malnutrition needs six meals per day. He/she should get good portions of food, not just snacks
- Add fat to the meals. Use cooking oil to add more energy to the meal and to make the food taste better so that the child eats more

V. MICRONUTRIENT MALNUTRITION

Micronutrient malnutrition is often referred to as "hidden hunger" and results from the inadequate intake of micronutrients like vitamin A, iodine and iron. Micronutrient malnutrition reduces resistance to infections, affects children's learning capacity, creates disabilities and decreases adults' work capacity. Micronutrient malnutrition is an important problem for Cambodians as it affects not only their health but also their economic status and quality of life.

The next sections will go into more detail on the deficiency causes by insufficient vitamin A, iodine and iron.

VI. VITAMIN A DEFICIENCY (VAD)

A) Vitamin A

Vitamin A is a micro-nutrient found in dark green leafy vegetables, orange and yellow fruits and vegetables, and in animal products such as eggs, some fish, chicken and liver. It is an essential nutrient needed by the body for normal growth, development, and also sight. Vitamin A also helps the body fight diseases and infections.

B) Vitamin A Deficiency (VAD)

Vitamin A deficiency occurs when children do not consume enough natural sources of vitamin A from foods or do not receive vitamin A supplements on a regular basis. The first and most easily detected sign of VAD is night blindness, which is called 'kwak moin' in Khmer. In 1993, the prevalence of night blindness in four rural provinces and in the urban slums of Phnom Penh was 5.6%, almost six times the WHO cut-off rate for it to be a problem of public health significance.

The people most at risk of vitamin A deficiency are infants and children from 6 months to 6 years of age, infants who are not breastfed properly, and pregnant or lactating women.

C) Causes of vitamin A deficiency:

1. Lack of vitamin A in diet:

- Vitamin A rich foods may be available only in certain seasons, or may be too expensive at other times.
- Not enough vitamin A rich foods are customarily given to children or are only given in small amounts.
- Lactating mothers suffer from VAD and therefore produce breastmilk which is low in vitamin A.

2. Poor dietary diversity

- Low dietary intake of fat or oil, protein, zinc, or nutrients that the body needs to be able to absorb and utilize vitamin A.

3. Illness

- Prolonged diarrhea (usually 10-14 days) prevents absorption and use of vitamin A and fats/oils.
- Severe malnutrition prevents absorption and use of vitamin A, especially during episodes of diarrhea.
- Measles increases the body's need for vitamin A reduces the ability to absorb and use vitamin A.
- Roundworm infections also prevent absorption and use of vitamin A as well as fats and oils.

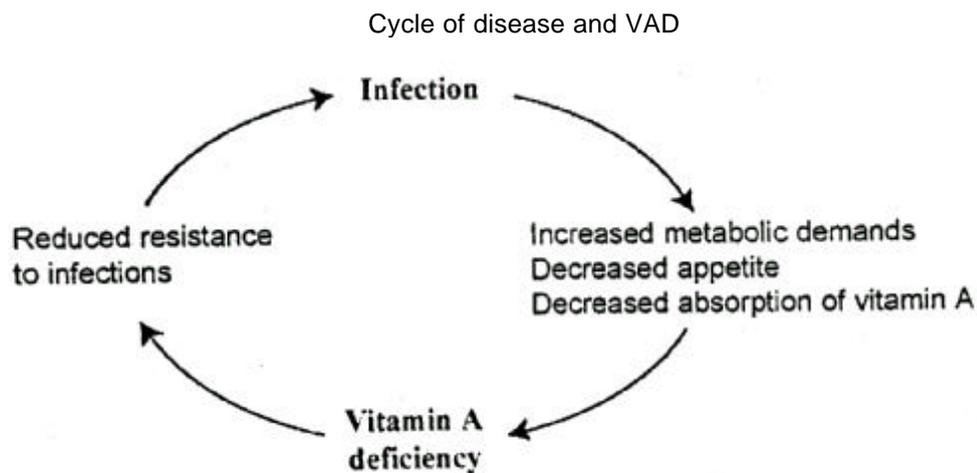
D) Effects of VAD

1. Growth and development

- Can result in poor appetite.
- Can slow child growth, especially that of the fetus if the mother is suffering from VAD.

2. Immune system

- Weakens the barriers that protect against infection, for example in the digestive tract.
- Reduces the ability of cells in the body to fight diseases.
- Increases the likelihood that children who are sick from measles or severe prolonged diarrhea will progress to more serious forms of the disease, suffer complications and possibly die.



3. Survival

- Can have negative effects on child survival, especially with severe diarrhea and measles.

4. Vision

- Impairs vision by damage to the cornea.
- Can cause night blindness and, in severe cases, can lead to permanent blindness.

E) Clinical signs of VAD

- Night blindness or 'kwak moin' is detected when a child or pregnant woman has difficulty seeing things in dim light or at night. Some signs of night blindness are when a person bumps into things, or when the person, especially the child, sits still and does not want to do anything at night. Night blindness is an early sign of vitamin A deficiency, although not all children with vitamin A deficiency have this symptom. If the deficiency is not treated, the condition may get worse which could lead to corneal scarring, more severe sight problems and eventually blindness.
- Another sign is 'dry eye' in which the white part of the eye loses its shine and begins to wrinkle. Also, foamy white patches or little gray bubbles appear in the white part of the eye.
- Corneal scarring- the result of more severe and prolonged vitamin A deficiency which leads to permanent blindness.

F) How to prevent and treat VAD

- Feed colostrum to the newborn baby; colostrum is very rich in vitamin A and helps the baby fight infections early in life. Only give babies breastmilk, not any other milk, foods, or liquids for the first 6 months of life.
- Continue breastfeeding up to two years of age.
- Around 6 months of age begin feeding the child other foods besides breastmilk. Vegetables should be fried in fat or oil so that the child's body can better absorb and use vitamin A, and to add extra energy which the child needs for play and growth.
- Children 6-59 months of age should receive high dose vitamin A supplements 2 to 3 times per year.
- Provide direct health interventions such as measles immunization and ORT.
- Pregnant women and lactating mothers should increase their vitamin A intake by consuming vitamin A rich foods. Up to eight weeks after delivery, mothers should receive a vitamin A capsule from the nearest health center.
- Increase production and consumption of vitamin A rich foods through home gardening.
- If the child already has measles, night blindness, or symptoms of vitamin A deficiency, take him/her to the nearest health center for treatment with vitamin A capsules.

G) Vitamin A Capsules- Prevention Protocol for Preschool Children and Lactating Mothers

Screen all children and mothers coming for any reason to health centers or referral hospitals and give vitamin A to those who are eligible.

All children (6-59 months) coming to health facilities that have not received a dose in the previous one month	Children 6 - 11 months	100,000 ILJ orally
	Children 12 months - 59 months	200,000 IU orally
All mothers, irrespective of their mode of infant feeding, up to 8 weeks after delivery - if they did not received vitamin A post-partum.		200,000 N orally

Universal distribution of vitamin A capsules during outreach services around the months of March and November

Give vitamin A to the child if he / she has not received a vitamin A dose in the previous one month.	Children 6 - 11 months	100,000 IL' orally
	Children 12 months - 59 months	200,000 IU orally

Give vitamin A to mothers - irrespective of their mode of infant feeding - coming with their child for immunization up to 8 weeks after delivery if they did not receive vitamin A post-partum

200,000 IU orally

Always record on the child's Yellow Card and on the Mother's Card the dose and the date VAC was given

Remind the mother/caretaker to keep the health card in a safe place and to always bring it when going to the health center or hospital.

H) Vitamin A Capsules-Treatment Protocols

Treatment of xerophthalmia

All age groups except women of reproductive age	Children < 6 months of age	Immediately on diagnosis:	50,000IU
		Next day:	50,000IU
		At least two weeks later:	50,000IU
	Children 6-11 months	Immediately on diagnosis:	100,000 IU
		Next day:	100,000 IU
		At least two weeks later:	100,000 IU
	Individuals > 1 year	Immediately on diagnosis:	200,000 IU
		Next day:	200,000 IU
		At least two weeks later:	200,000 IU

Women of reproductive age	With night-blindness or Bitot's spots	Daily for 30 days	10,000 IU
	With severe signs of active xerophthalmia (acute corneal lesion), whether or not pregnant	Immediately on diagnosis: Next day: At least two weeks later:	200,000 N 200,000 IU 200,000 IU

1. This protocol applies to all stages of active xerophthalmia, including night blindness, conjunctiva Xeroxes with Bitot's spots, corneal xerosis, keratomalacia and corneal scars.
2. Individuals with acute corneal lesions should be referred to a specialized unit as an emergency. Corneal xerophthalmia is an emergency.

Treatment of measles

Give vitamin A treatment to all children with active measles or with measles within the past three months.	Children 6-11 months	100,000 IC on Day 1 100,000 IU on Day 2
	Children 1 - 12 years	200,000 IU on Day 1 200,000 IU: on Day 2

Treatment of persistent diarrhea and severe malnutrition

Give one vitamin A dose to all children with acute lower respiratory tract infection, chronic diarrhea and severe malnutrition, if the child has not received vitamin A in the previous one month.	Children 6-11 months	100,000 IU' on Day 1
	Children 1 - 12 years	200,000 IU: on Day 1

I) Foods rich in vitamin A

- Colostrum/ breastmilk
- Dark green leafy vegetables such as kang kong, ivy gourd leaves, amaranth, mustard greens, and pumpkin leaves, pak wan
- Yellow/orange vegetables such as pumpkin, orange sweet potato, and carrots
- Yellow/orange fruits such as ripe mango and ripe papaya
- Chicken and duck eggs with yolk
- Chicken meat
- Animal liver
- Small fish with liver intact, sergeant fish, chlaing, and pra fish.

J) Recipes for vitamin A rich foods

The following are some recipes for vitamin A rich foods that Cambodian families can afford and are easy to prepare. They are good for all family members, especially for young children:

Fried pumpkin with egg: Ingredients include:

- ? pumpkin
- ? egg
- ? one table spoon of oil
- ? garlic
- ? fish sauce

Fried kang kong with minced pork or other kinds of meat:

- ? kang kong with leaves
- ? minced pork
- ? garlic
- ? Oil
- ? fish sauce or soy bean paste

Samlor karkor with chicken or pork or fish (small fish):

- ? pumpkin
- ? papaya
- ? pumpkin leaves and flower
- ? ivy gourd leaves
- ? amaranth
- ? hummingbird tree leaves
- ? chicken or pork or fish
- ? lemon grass
- ? garlic
- ? oil
- ? fermented fish
- ? ground roasted rice

Fried mustard greens with egg:

- ? mustard green (leaves and stems)
- ? egg
- ? garlic
- ? Oil
- ? fish sauce

Vitamin A Deficiency (VAM)

Samlor Brohor with small fish:

- ? small fish
- ? ivy gourd leaves
- ? amaranth
- ? pumpkin
- ? pumpkin leaves
- ? lemon grass
- ? garlic
- ? galangal

Pumpkin sweet soup:

- ? pumpkin
- ? coconut milk
- ? sugar

VII. IODINE DEFICIENCY DISORDERS (IDD)

A) Iodine

Iodine is an essential Micronutrient (mineral) found primarily in shellfish and other sea foods and is most commonly consumed through iodized salt. It is a component of the thyroid hormone (Thyroxin) whose main function is to control normal functioning of the brain and body. Lack of thyroxin makes a person slow, apathetic (unemotional), easily tired and can stunt child growth.

B) Iodine Deficiency Disorders (IDD)

Failure to consume adequate iodine can result in Iodine Deficiency Disorders (IDD). Consequences of IDD include: irreversible mental retardation, other defects in development of the nervous system, goiter, physical sluggishness, growth retardation, reproductive failure, increased childhood mortality, and socioeconomic compromise. The most devastating of these consequences are on the developing human brain. Iodine deficiency is the world's major cause of preventable mental retardation.

In Cambodia, IDD is considered a serious public health problem. The goiter rate from a 1997 national goiter prevalence survey in the 8-12 year age group, was found to be 12%. It is estimated that there are nearly 1.3 million individuals at risk of iodine deficiency disorders in Cambodia. Those at greatest risk are pregnant women and school-aged children.

C) Causes of IDD

- IDD is caused by a lack of iodine in the diet.
- Goiter and cretinism are most common in mountain areas where there is little natural iodine in the soil, water, or foods (crops and domestic animals). Is also common in areas with high amounts of rainfall which can leach the natural iodine from the soil and in river basin areas where there is high erosion.
- Consumption of goitrogens, which are foods that inhibit the absorption of iodine (reduce the amount of iodine the thyroid gland can absorb from the blood) can also cause goiters. Iodine requirements are higher in the case of high consumption of goitrogens. However, goitrogens do not cause Iodine Deficiency Disorders if people consume enough iodine. It is only when people are already iodine deficient that goitrogens make iodine deficiency disorders worse. Goitrogens are found in foods such as cassava and cabbage.

D) Effects of IDD

Iodine deficiency affects human health in several ways. It may cause a variety of problems including mental retardation, reproductive failure; miscarriage, and stillbirth. The most noticeable physical sign of IDD is an enlarged thyroid gland which results in what is known as a goiter. People of both sexes and all age groups can be affected by IDD. Pregnant women and their fetuses and school age children are the most vulnerable.

1. Pregnant women and fetuses
in severe cases of IDD problems include increased risk of: miscarriages, stillbirths, birth defects, prenatal and infant mortality, and cretinism.
 2. Neonatal (newborns)
IDD in newborn babies is a well-recognized cause of mental retardation. Signs include: neonatal goiter and neonatal hypothyroidism (inactive thyroid gland).
 3. Children and Adolescents
 - Goiter
 - Juvenile hypothyroidism - children with this problem are less energetic, find it hard to study, and have poorer school performance than normal children
 - Impaired mental function
 - Retarded physical development
 4. Adults
 - Nodular Goiter - the result of a long term enlarged thyroid gland and can be felt as a small lump or nodule and earl also be seen. Nodular goiter is common in older women.
 - Hypothyroidism - caused by a lack of thyroid hormone and results in impaired mental function.
 - Iodine induced hyperthyroidism - occurs primarily in older people when severely iodine deficient people increase their iodine intake. People with hyperthyroidism may lose weight, sweat a lot, have a fast beating heart (palpitations), be irritable, have bulging eyes and a small shaking (tremor) of the fingers.
 5. Effects of IDD on the community
In places where there are long-term severe problems with IDD, iodine deficiency disorders may delay social and economic development in an area because:
 - Many people in the community are mentally slower and less energetic than they should be. It is hard to motivate them to take part in development activities.
 - IDD can be found in livestock as well, so cattle, chickens, and other animals are also likely to be less productive.
 - Children and adults with cretinism may be a burden on their families and community.
 - Iodine deficient children are difficult to educate. These school children are likely to have lower intelligence and poorer school performance than those not suffering from IDD.
- E) Prevention of IDD
- The most practical way of improving dietary intake of iodine is through the use of iodized salt both as table salt and in cooking.
 - Encourage people to increase their intake of iodine rich foods such as shellfish, seafood, seaweed, and iodized salt.
 - Promote the following behaviors:

1. Exclusive breast feeding of infants from birth to 6 months. Breastmilk contains enough iodine if the mother is not suffering from IDD.
2. Use iodized salt instead of non-iodized salt.
3. Consumption of iodine rich foods such as shellfish, shrimp, crab, squid, and seaweed.
4. In goiter endemic areas, limit the intake of food known to contain goitrogens, such as cassava and cabbage

F) Sources of iodine

Rich sources of iodine are:

- Shellfish
- Seafood such as shrimp, crab, squid, and fish
- Seaweed
- Iodized salt
- Iodine fortified foods such as instant noodles (imported from Thailand); in some parts of Cambodia well water is iodized

G) Iodized salt

Iodized salt is the salt that is fortified (or mixed) with iodine. Iodized salt should contain at least of 20ppm. (20 mg iodine per one kilogram of salt), by the time it reaches the home. Some iodine added to salt is lost during transportation and storage.

Sea salt is not a good source of iodine because crystals of salt are pure sodium chloride; the iodine remains in solution in the water. The small amount of iodine that may dry onto the surface of the salt crystals is lost during storage.

Salt is chosen for iodination because:

- Salt is one of the foods that is universally consumed by almost all people in all countries.
- People consume salt at approximately the same level throughout the year.
- The mixing of the iodine compound with salt is a simple operation and produces no adverse chemical reaction. The equipment required is uncomplicated, and easy to operate and maintain.
- The addition of iodine to salt does not change the color or taste of the salt. Iodized salt should not appear different from non-iodized salt.
- The cost of iodination is low.

In Cambodia, iodized salt is being produced in Kampot and in some places in Phnom Penh through the support of the Ministry of Health, UNICEF, the World Health Organization, and Helen Keller Worldwide. There is a nationally recognized logo for iodized salt. People should be educated to look for salt with logo depicting that salt is iodized. This is shown diagrammatically below.

VIII: IRON DEFICIENCY ANEMIA (IDA)

A) Iron

Iron is a mineral essential to the body. It is found mainly in the green color matter of plants and in hemoglobin and myoglobin (muscle component) of animals. Iron helps form the red cells in the blood. Sixty percent of iron is found in the red cells in the blood, 10% in muscles and enzymes, and 30-35% stored in the liver.

B) Iron Deficiency Anemia

Iron deficiency anemia (IDA) is the most severe degree of iron deficiency. The body, at this stage, has too few red blood cells. A person with anemia has "thin" or "weak" blood. This happens when blood is lost or destroyed faster than the body can replace.

C) Causes of IDA:

Some of the causes are:

- Lack of foods rich in iron
- Low quantity of absorbable iron in the diet (from animal sources it is more easily absorbed than from plant sources)
- Low absorption of iron due to:
 - presence of iron inhibitors such as tea and coffee
 - lack of essential substances (vitamin C) in diet that enhance iron absorption
- Children are not given appropriate complementary foods during the weaning period
- Children are given complementary foods too early
- Inadequate iron stores from birth because the mother was anemic or the birth was premature (born too early)
- Increased requirements such as during pregnancy and during rapid early childhood and adolescent growth
- Blood loss due to both menstruation and childbirth among women
- Repeated infections such as worms (hookworm and whipworm), malaria, chronic diarrhea, and dysentery

D) What are the effects of IDA?

Women

- Major contributory cause of postpartum maternal mortality
- Fetal growth retardation and prenatal and prenatal mortality Risk for preterm delivery
- Inadequate weight gain of fetus
- Increased prenatal mortality
- Risk of low birth weight baby (and subsequent higher risk of child dying in infancy and early childhood)

Children

- Impaired infant psychomotor and mental development
- Decreased learning achievement and impaired language development
- Behavioral effects such as apathy, inattention, irritability, and insecurity
- Lowered physical activity
- Lowered body immune responses, therefore reduced resistance to infection

E) Signs and symptoms of IDA:

- ✍ The person may be less active than normal, get tired fast, and feel dizzy and fatigued
- ✍ The person may have infections often
- ✍ The person may have poor appetite, sleep, and difficulty concentrating
- ✍ Pale (light pink or whitish) insides of eyelids and finger tips
- ✍ Pale gums and lips

F) How IDA can be prevented:

- ✍ Pregnant women should eat different kinds of foods (mixture of foods), especially those rich in iron, such as red meat, liver, green leafy vegetables, and beans.
- ✍ In areas where anemia is prevalent, that is in all developing countries and even in many Western countries, pregnant women should also take iron tablets. In Cambodia, the Safe Motherhood Policy states that pregnant women should receive 90 iron/ float tablets. This will build up iron in their blood so that they can pass on a full amount to their fetuses before birth. It is very important to tell pregnant women about side effects of iron tablets such as heartburn, nausea, vomiting, diarrhea, and sometimes constipation. These effects seriously affect compliance of iron supplementation. Advise pregnant women to take iron tablets after meals.
- ✍ Mothers should exclusively breastfeed their children for six months then introduce complementary foods. The iron stores of the normal newborn infant are usually sufficient for the first six months of life. However, in Cambodia, infants are rarely exclusively breastfed and infants as young as six months are already anemic.
- ✍ Around about 6 months, babies should have a mixed diet, which contains good food sources of iron.
- ✍ Children should not drink tea because it partly inhibits the absorption of iron.
- ✍ Fruits or juices, which taste sour, like orange, pineapple, etc., and animal foods help the body absorb the iron in foods. They should be taken with meals, which contain plenty of iron. This will help iron absorption.
- ✍ Children should live in clean surroundings, use the toilet and wear shoes where possible to prevent hookworm and whipworm infections.
- ✍ Infectious diseases such malaria should be controlled and treated.
- ✍ Hookworms and schistosomiasis should be controlled and treated.

G) Foods rich in iron

Foods rich in iron are liver, animal internal organs (e.g. kidney and heart), meat, shellfish, beans, and green leafy vegetables such as kang kong, ivy gourd, mustard greens, Chinese kale, etc.

H) Iron enhances and inhibitors

Enhances

papaya, guava, banana, orange, lemon, lime, and pineapple, pumpkin, tomato, beef, pork, liver, chicken, fish, and soy sauce

Enhances should be consumed with meals.

Inhibitors

tea and coffee

Avoid inhibitors during meals but not necessary to avoid exclusively.

IX. FEEDING CHILDREN FROM BIRTH TO 6 MONTHS OF AGE

A) Colostrum

1. What is colostrum?

Colostrum is the first milk that comes out of a mother's breasts during the first three to four days after birth. It is yellow in color and relatively thick. Colostrum comes out only in a small amount but is enough for a newborn baby. It is highly nutritious. Colostrum is what a baby needs for the first few days of his or her life until the mother's regular milk comes out. However, the practice of feeding colostrum to newborns is not a popular practice in Cambodia.

2. Importance of colostrum for a newborn baby:

- Colostrum contains more antibodies (substances that protect our body against diseases and infections) than later milk (regular milk). It gives a baby the first "immunization" to protect him/her against most of the bacteria and viruses, which surround the baby at the time of birth.
- When a baby is born, his/her intestine is not yet completely developed. Colostrum helps a newborn baby's intestine to complete this development so that it can digest and absorb milk. If a baby drinks cow milk or eats other foods before having colostrum, these certain foods can harm the intestine leading to the development of allergies.
- Colostrum is a laxative (helps a baby pass stool) and helps a baby to pass meconium (the first, very dark stools). This helps to prevent jaundice (yellowing of the skin and white of the eyes). It cleans the baby's stomach and forms a protective coat in the digestive tract.
- It contains vitamin A.
- It contains enough nutrients for the baby until mother's regular milk comes out.
There is no need for other foods or fluids.

3. Misconceptions about colostrum:

Many Cambodian people believe that colostrum is bad for newborn babies because:

- They believe that colostrum causes diarrhea and illness and that it is sour and dirty. Thus, many mothers squeeze this first milk (colostrum) away.
- It is believed that when a mother has a fire burning under her bed after delivery, her breastmilk is hot, which makes her baby sick. Therefore, many mothers do not breastfeed during this time.
- Many mothers believe that during the first two to three days their breasts will not produce any breastmilk. They usually feed water mixed with sugar to their newborn babies when their babies start to cry. They believe that babies cry because they are hungry, thus mothers have to give something to satisfy babies' hunger.

4. How and when to start giving colostrum:

- Baby should start to suck the mother's breasts as soon as half an hour after birth. This will help mother's body to make breastmilk faster. When baby starts to suck mother's breast soon after birth, mother's breast will not grow too big and will not be so tender and painful. The sooner the mother breastfeeds her baby, the faster the breastmilk will come out. Babies will not cry of hunger because they will get breastmilk soon after birth. There is no need to give newborn babies other foods or liquids besides breastmilk, because these other foods may cause babies to be sick if they are contaminated. Sugar mixed with water is not nutritious. If babies drink the solution of sugar with water, they will take less breastmilk because they are already full, which in turn will reduce breastmilk production.
- Health workers or Traditional Birth Attendants (TBAs) should explain to mothers of newborn babies that colostrum is the first milk that comes out after mothers give birth. It gives babies protection from sickness. Mothers who already gave colostrum to their babies found that their babies did not get sick often and that their babies are very healthy. Health workers should also explain that colostrum does not cause diarrhea or fever; instead it helps babies fight these sicknesses and it helps defeat diseases. Colostrum is clean and important for babies, it helps babies grow strong and healthy, helps prevent sickness and disease in children, and provides vitamins to children. Mother should not squeeze colostrum (first milk) away. Even when mothers have a fire burning under their bed after delivery, their milk is still good and will not cause their babies to be sick or have diarrhea.

B) Breastfeeding

1. Breastmilk is best

Breastmilk is the best and most appropriate food for babies. For the first six months of life breastmilk alone is enough for babies. Breastmilk gives the baby all the nutrients and the water they need (provides sufficient liquid to keep babies properly hydrated). Mothers should continue breastfeeding for at least two years.

2. Exclusive breastfeeding for six months

Exclusive breastfeeding means no other food or liquid is given to babies besides breastmilk and means babies are breastfed frequently day and night (on demand feeding). Exclusive breastfeeding can reduce infant morbidity and mortality, in particular from diarrhea. Giving complementary foods and fluids too early will increase the risk of diarrhea and death. This is often the case as other foods and fluids are contaminated and the baby's immune system cannot fight microbes as an older child or adult can. In addition, introduction of other foods and fluids will decrease breastmilk intake, as the baby is already full from these foods or liquids. When the baby takes less breastmilk, mother's body makes less milk. Therefore, the amount of breastmilk supply decreases, thus decreasing nutritional intake; complementary foods also decrease the absorption of iron contained in breastmilk. Complementary foods rarely compensate for the nutrients in the breastmilk displaced. Health workers need to be careful not to counsel mothers to introduce other foods too early.

3. Advantages of breastfeeding

- Breastmilk has all the nutrients babies need. It helps babies grow and become healthy and smart.
- Breastfeeding is the cleanest/most hygienic and least expensive food for babies.
- Breastmilk is rich in vitamin A which helps protect babies from illness.
- When breastfeeding, babies receive love and care from their mothers, this encourages a bond between mothers and babies.
- Breastfeeding helps babies avoid hard stools and constipation. Breastmilk is easy to digest.
- Breastfeeding helps mother's uterus to contract and return to normal faster.
- Breastmilk is always ready and at the correct temperature for babies.
- Exclusive and frequent breastfeeding can help protect against the next pregnancy.

4. Disadvantages of bottle-feeding

Bottle-feeding is dangerous for babies, especially using sweetened condensed milk. Sweetened condensed milk does not have enough nutrients for baby's growth and development. Mothers should not bottle feed their children or use cow's milk as a supplemental food.

- Cows milk (especially sweetened condensed milk) has very little nutritional value for babies (especially when diluted). Babies will not receive nutrients their bodies need for their growth and development. Babies will not grow or develop properly.
- Bottle-feeding is not clean and not safe and can lead to serious illness, especially diarrhea and poor growth and development.
- Bottle-feeding is expensive and difficult to prepare.
- Bottle-feeding discourages the bond between the mothers and their babies.
- Cow's milk is difficult to digest.

5. Common problems and difficulties in breastfeeding and ways to overcome or prevent them

1. Sore or cracked nipples

Sore nipples can occur if:

- The baby is not sucking properly;
- The baby sucks too long in a bad position;
- Excessive cleaning of the nipple;
- The nipples are flat and hard for the baby to grasp; or
- The nipples are not used to the baby's sucking

If a mother has sore or crack nipples, she should:

- Expose the nipples to air as much as possible between feedings
- Leave a drop of milk on the nipples after feeding because it helps the crack to heal
- Not use soap for washing the breasts and nipples because it will cause dryness and the nipples will crack more. Use clean water to wash nipples once a day
- Feed the baby more often. Feeding the baby often can prevent sore nipples. The mother has to make sure that the nipple and the brown part of the breast are all the way in the mouth of the baby when the baby sucks
- Wear loose cotton clothes and should not wear a bra
- Express breastmilk manually if she cannot breastfeed.

2. Breast enlarged and painful

This may be caused by:

- The baby did not begin to breastfeed immediately after birth;
- The baby is not suckling well because of some problems such as flat or inverted nipple;
- The baby sleeps a lot;
- There are large intervals between nursing; and
- There is a time limit to the breastfeeding.

However, engorgement is common 3-4 days after giving birth.

If the breasts are engorged and painful mothers should:

- Have the newborn baby suck mother' s breasts as soon as half an hour after birth to prevent enlarged breasts
- Breastfeed without setting a time limit
- Let the baby continue sucking if possible
- Express breastmilk manually if baby cannot suck
- Feed the baby often. The milk that fills the breasts and makes them swollen causes engorgement. It can occur if the baby is not breastfed often enough. Swollen breasts can be very painful and may cause fever in the mother
- Express breastmilk if it is too painful to have the baby suck

3. Inverted or flat nipples

If the nipples are inverted or flat mothers should:

- Pull out their nipples in case they are flat. This should be done during pregnancy
- Breastfeed immediately after delivery when the breasts are still soft; do not wait until the milk comes in because it is difficult for the baby to grasp the nipple of an engorged breast even when the nipple protrudes
- Continue breastfeeding even if the nipples are flat.

4. Not enough breastmilk

Some mothers think they cannot produce enough breastmilk for their babies. Health workers need to explain that almost all mothers can produce enough milk for their babies if they:

- Let the baby suck as often as he/she likes (when the baby demands) during day and night
- Use both breasts at each feeding because both breasts contain the same quality of milk
- Give only breastmilk (during the first six months of the baby's life). Do not give other solutions like water or other milk. This reduces the amount of milk the baby takes from the breast and makes the breast produce less milk
- Increase their own intake of foods for extra calories and nutrients (iron, iodine, and calcium). Eat as much as possible, especially dark green leafy vegetables, yellow/orange vegetables, yellow/orange fruits, eggs, chicken, red meat and fish. Drink a lot of liquid (water and juices)
- Encourage mothers to eat foods that help produce more breastmilk, such as "Ponlei"(Zingiber cassumbr), "Chi"(Basil, *Ocimum basilicum L.*), "Chi pahorm "(Mint, *Mentha avernis L.*), "Romdeng Srok"(Galangal, *Alpinia galanga L. Sw*) "Sleukk Ngop"(Sourpuss *androgynous L. Merr.*)
- Get good rest and sleep, and try to avoid getting tired or upset.

6. Misconceptions about breastfeeding

a. Use of other foods or liquids to supplement breastmilk

Some mothers give sugar water, condensed milk, or other solutions to their babies early in their lives, sometimes as the first food given to newborn babies. This can be very harmful to a baby's health. Reasons may include:

- They are worried that they do not have enough breastmilk. This worry occurs when babies cry or appear irritated after breastfeeding, or if the mother does not have confidence that she has enough milk. Crying after breastfeeding is not a sign that a baby needs other foods. It normally means that the baby needs to be held and cuddled more. Some babies need to suck the breast simply for comfort.
- They are afraid that their milk is too diluted and thin, because they themselves are not eating nutritious foods or they feel weak.
- They want their children to experience other tastes and become less dependent on their breasts.
- They leave the baby and are unable to return immediately.
- They are afraid to breast feed if they feel tired, weak, or sick.

Health workers should find out the main misconceptions mothers have, then help them overcome their problems accordingly (to the specific reason each mother has). Explain the importance of exclusive breastfeeding, dangers of providing complementary feeding too early, and dangers of bottle-feeding.

b. Breastmilk of a pregnant mother is bad

Some mothers believe that when they are pregnant again during their lactating period, they cannot breastfeed their babies. They believe that breastmilk of pregnant women is sour and will cause the child to be ill- diarrhea and fever. Please refer to the section on problems and difficulties faced by lactating mothers for more details.

c. Stop breastfeeding when the baby is sick or the mother is sick

A very common malpractice is that mothers stop breastfeeding when their babies have diarrhea. They believe that breastmilk will make the diarrhea worse. Some mothers also stop breastfeeding when they themselves are sick.

Health workers need to explain to mothers that breastmilk is the best food for sick children, including children with diarrhea. Mothers should continue breast feeding frequently to re-hydrate babies with diarrhea. For children up to six months of age, breastmilk should be the main source of food. Around six months of age, breastmilk alone is not sufficient to meet the needs of the infant and other foods must be used as supplemental foods.

Mothers should continue breast- feeding even when they are sick. Breastfeeding will not transfer the mother's sickness or tiredness to their babies. However, the mother should continue to eat nutritious foods.

HIV (Human Immune-deficiency Virus) and infant feeding: The latest recommendation from WHO (World Health organization), UNICEF (United Nations Children's Fund), and UNAIDS (United Nations program on HIV/AIDS) suggests that there is a firm evidence that HIV can be transmitted through breastmilk. Health workers should educate, support, and counsel women and their families so that they can decide how best to feed infants when their mothers are HIV positive. Health workers should try to prevent HIV transmission from breastfeeding, for women known to be HIV positive by counseling them to replace breastmilk with other foods. However, mothers should make their own decision on whether they will breastfeed or not, and if they choose not to breastfeed, it is their choice of which breastmilk substitutes to use. The health worker should counsel accordingly.

If not breastfed, an infant needs about 150ml of milk per kg of body weight day. Breastmilk substitutes include commercial infant formula, home prepared formula (from animal milks, with dried milk powder or with evaporated milk), modified animal milks and dried milk powder and evaporated milk. Skimmed and sweetened condensed milk are NOT recommended for feeding infants aged six months. Special care must be taken to ensure that containers and feeding utensils are clean and that any water used is boiled. Instructions on formula or milk powder containers must be followed correctly to prevent malnutrition.

d. Milk of mothers who work outdoors is hot

Some mothers believe that when they work outdoors, their milk is hot and will cause the baby to become sick- have diarrhea and fever.

Health workers need to explain to mothers that when they work outdoors their breastmilk is still good and will not cause their baby to become sick. Therefore, mothers should resume breastfeeding as soon as possible when they return home from working outside. They should drink plenty of liquids (water or fruit juices) to cool down their body's temperature and stimulate circulation.

e. Breastmilk does not provide enough water for the baby

Many mothers believe that their breastmilk does not have enough water for their babies. They think their babies are thirsty. Therefore, mothers give water to their babies to satisfy their thirst. The use of water and sugar water is one of the most common practices that prevents exclusive breastfeeding.

Health workers need to explain to mothers that breastmilk provides enough water to their babies. Mothers do not need to give any water or other liquids for their babies. When a mother feels that her baby is thirsty, she should breastfeed the baby and drink the water herself. Water is often not clean and can give the baby diarrhea.

X. FEEDING CHILDREN FROM 6 TO 36 MONTHS OF AGE

A) What is complementary feeding?

Complementary feeding is giving appropriate foods in addition to breastmilk to children from the age of six months onwards. Babies should be introduced to complementary foods at the age of six months, because by this age, breastmilk alone does not provide enough nutrients for babies' growth and development.

B) Importance of complementary feeding

Babies need complementary foods to keep growing, to give them enough energy and other nutrients, and to protect their health. If babies are given other foods or liquids before six months of age, they have a greater chance of getting sick with diarrhea and of growing slower because of insufficient breastmilk intake. If babies are not given other foods when they are older than six months, they will become malnourished because they do not receive enough of the nutrients their bodies need. Breastmilk is the perfect food for babies, but it alone does not contain enough nutrients for babies' growth and development from six months of age onwards.

C) When to start giving complementary food

Babies at around the age of six months are ready to taste other foods. They usually show signs of being ready to eat such as reaching out for food or grabbing food. Their bodies are also mature enough to digest a wider variety of foods.

D) Common malpractices regarding complementary feeding in Cambodia

- ✘ Complementary foods are often introduced either too early or too late.
- ✘ The foods that are given have little nutritional value for children, such as plain rice soup with salt or rice mixed only with broth or juices from fried dishes.
- ✘ Foods for children are prepared the same way as food for other members of the family. These cooking methods are not appropriate for young children because young children need foods that are softer and easier to digest than older people do.
- ✘ Some kinds of foods, including those rich in vitamin A, are not given to children because the belief that those foods are bad for children. Foods considered bad include watermelon, fish, mango, pineapple, amaranth, jack-fruit, and others.

E) Desired practices

- ✘ Start complementary feeding when children are around six months old
- ✘ Introduce complementary foods gradually according to the age of the child
- ✘ Prepare complementary foods properly and appropriately for the age of the child
- ✘ Use various foods from different food groups to prepare complementary foods for children
- ✘ Feed children different food groups every day, 3-5 times a day
- ✘ Change food preparation for families with young children by including smaller size pieces of meat and vegetables to ensure they are fed to the child

F) How to give complementary foods

1. Babies should be introduced to new foods one at a time. This is necessary because it enables babies to get used to new textures and tastes. The new food needs to be soft and easy to digest. Mothers should mash or strain the food so that it is easy to feed the baby, and easy for the baby to eat and to digest.
2. Give the same food for about a week until the baby is used to it. Then slowly start giving more of the same food and start offering other foods. If the baby spits out the food, don't worry. Keep trying every day. The baby has to get used to swallowing and to the new textures of food.
3. Babies need to eat foods that are dense in energy and nutrients. Rice soup should be mixed with some oil, fish or egg, and vegetables (green leafy or yellow orange). Foods made for the babies should not be too watery because babies may not receive enough nutrients from the food and they may get full quicker from water or liquid in foods.
4. Babies need to be fed more often than adults because their stomachs are smaller. Babies can be fed at the same time as adults - breakfast, lunch, and dinner - and then given snacks between meals. Babies under one year of age should be fed complementary foods 3-5 times each day in addition to breastmilk (the baby should breast feed first and eat complementary foods afterwards).
5. Different kinds of foods have different types of nutritional value. The best diet for the baby is a mixture of foods from the three different groups- body-building, energy and protective. Babies can be given all of these foods. However, the foods need to be well cooked, soft, and mashed or finely chopped.
6. No particular food, such as watermelon, mango, amaranth, jack-fruit or ripe papaya, will cause sickness in children if it is properly prepared and stored. Similarly, fish will not give worms to children if it is well cooked. Germs and worms are found on dirty hands, uncooked food, unclean utensils, insects and in unfiltered water. If food is not properly prepared, stored, or fed in a clean way, babies can get sick and have diarrhea.
7. Mothers should wash their hands with soap and water before they prepare food and before they feed their children.
8. Food and utensils should be washed before use.
9. Food should be kept covered to protect it from insects that carry germs.
10. Babies should be kept clean and prevented from putting dirty things in their mouths. Before eating, the child's hands should be washed with water and soap, as they will grab for the food to put in their mouth.

G) Suggested complementary feeding of children in different age groups**At 0-6 months:**

Babies should be breast-fed exclusively and frequently for the first six months of life. No other foods are necessary at this time and no other foods should be given. Giving liquids such as water or sugar mixed with warm water to babies will increase the chance of babies getting sick, especially with diarrhea. Liquids will also reduce breastmilk intake by the baby, which in turn reduces milk production by the mother's body.

At 6-7 months:

The first foods introduced to babies should be given to complement breastmilk. The foods need to be soft and tender. Breastmilk may be used to soften and liquids the foods, so that babies can swallow them easily. Breastmilk must remain the main source of food. Babies should be breastfed prior to being given complementary foods. The main purposes of offering foods to babies at this age are:

1. For babies to adapt to different tastes of foods, food textures, and ways of being fed,
2. For babies' stomachs to adapt to digesting new foods other than breastmilk. Babies should be fed small amounts (two spoons) at first and foods should be introduced one by one,
3. To test if a baby shows a tendency to food sensitivities or allergies, and
4. Breastmilk alone is not sufficient at this age.

Examples of foods for this age group:

- Mashed cooked banana,
- Mashed rice soup, Mashed
- sweet potato,
- Mashed egg yolk

At this point, foods mothers consider 'bad' should not be suggested, since mothers are less likely to introduce these foods. Foods suggested above are widely available in Cambodia and not expensive.

a. First week and second week: Give one food at a time, two spoons each time and three times a day. The baby should be given the same food for about a week or three to four days before adding a new food. For example:

- Mashed cooked banana,
- Mashed rice soup,
- Mashed sweet potato,
- Mashed egg yolk

b. Third week: Mothers can feed their babies the same foods as the first and second week but increase the amount of foods to three, four, or five spoons, as babies are able to take it in. Mothers can now give different foods that have already been introduced alternately during one day, so that babies can taste different foods and are not bored of having the same foods all the time (all day). For example:

Morning	-	give mashed banana
Noon	-	give mashed egg yolk
Evening	-	give mashed rice soup

c. Fourth week: Mothers can give complementary foods the same way as during third week. At this time if mothers do not notice their children have any allergies they can introduce other new foods to babies one by one. For example:

- Mashed pumpkin
- Mashed fish
- Mashed ripe papaya

They do not need to try each food for many days (three to seven days); one or two days is sufficient.

At 7-8 months:

At this age the foods still need to be soft and tender. Mothers can start to feed a combination of two different kinds of foods. Babies should continue to be breastfed before being given other foods. Mothers should feed babies complementary foods three times a day plus one to two snacks. Fruits such as a small piece of ripe papaya or mashed banana can be used as snacks. Mashed rice soup at this time can be used as a base, and other foods can be added into it. The amount of food given should depend on what babies want. Mothers can feed the following foods alternately so babies are not bored by the same foods every day. It is suggested that mothers feed different foods every meal, if possible, but this depends on mothers' resources and time.

Examples of foods for babies 7-8 months:

- Mashed rice soup mixed with egg yolk
- Mashed rice soup mixed with sweet potato
- Mashed rice soup mixed with pumpkin
- Mashed rice soup mixed with fish

At 8-9 months:

When babies are eight to nine months of age, mothers can add other fruits, vegetables, and meat to the babies' foods. The food still needs to be cut in small pieces and well cooked. Foods for babies still need to be mashed but they can be rougher; so that babies can adapt to the new food texture. Most babies have their first teeth come through at this age. Mothers can mix a wider variety of foods together in preparing babies' food. Babies should be fed three times a day plus snacks between meals. Breastfeeding should still be done first, then complementary foods.

Examples of foods for babies in this age group:

- Mashed rice soup mixed with egg yolk, and a piece of cooked mashed pumpkin or sweet potato
- Mashed rice soup mixed with fish, and finely chopped and well cooked kang kong leaf
- Mashed sweet potato sweet soup or mashed pumpkin sweet soup (sweet soup made of pumpkin or sweet potato mixed with sugar and coconut milk)
- Bananas, pieces of ripe papaya, or other fruits can be use as snacks.

At 9-12 months:

Mothers can give all three food groups but the foods still need to be mashed (rougher), finely chopped, or cooked until soft. Mothers can now give a whole egg. Other kinds of meat can be given, such as chicken, pork, and liver. Omen vegetables, especially green leafy vegetables and yellow/orange vegetables, and other fruits can be given at this time. Foods should be cooked in some fat or oil; or, oil can be added to the foods, so that babies get extra energy for their active lives and to help their bodies absorb vitamin A better.

Mothers do not need to buy expensive foods for their babies. They can use foods that are available in their villages, such as fish, eggs, and local vegetables (for example, kang kong, pumpkin, and ivy gourd).

Babies should be fed five times a day - three meals and two snacks between meals. Mothers should continue to breast feed their babies prior to giving other food to their babies. However, once or twice a day, their babies may eat a meal or a snack without being breast- fed.

Example of foods for babies in this age group:

- Mashed rice soup can be used as a base then other foods added, such as mashed egg, fish, liver, and vegetables
- Fruits such as ripe papaya, banana, and orange can be used as snacks

At this age mothers have more choices of the kinds of foods to prepare for their babies and also more choices on how to prepare those foods. For example, a whole egg can be cooked as omelet then mashed and mixed with mashed rice soup. This way their babies will experience new food tastes and get more energy from oil. Mothers should prepare more fried dishes far their babies to increase their consumption of oil. For example, mothers can fry pumpkin with egg or fish then mash and mix with rice soup. Mothers can mix various kinds of foods to prepare dishes for their babies.

At 12-36 months:

Health workers (HWs) can give advice about the importance of foods mothers mistakenly consider 'bad' for their children such as amaranth and ripe mango, and how to prepare these foods. Mothers now may feel more confident to try them. Children can now start to eat the same foods as other family members. However, mothers need to ensure that the textures and size of the foods are appropriate for the child, and that meat and vegetables are not all eaten by other family members. Mothers should give their children vegetables and meat from the soup (Samlor) and fried dishes. Fruits that are available in the village can be used as snacks. Sweet soup such as pumpkin sweet soup and other desserts should be used as snacks as well.

Mothers should continue breastfeeding, but at this time they should offer complementary foods first and breastfeed afterwards. The child can be fed complementary foods at the same time as family meals- breakfast, lunch, and dinner plus two snack times in mid - morning and mid -afternoon.

XI. FEEDING YOUNG CHILDREN AGE 3 TO 5 YEARS

The preschool age is not a fast growing period; therefore, it is not a time when the child has a big appetite. Many children may refuse to eat, or are picky and choosy (only eat what they like), and may not eat enough. Mothers may need to prepare food in a way that encourages their children to eat.

Children in this age group are very active; they may be busy playing and may not think about eating. Therefore, it is difficult for mothers to ensure that they eat every meal and eat properly.

A) Nutrition of preschool children

- ✍ Good nutrition during preschool age is important to a child's future. This is the time when a child needs adequate food to grow and build his/her body, to give the child plenty of energy for play and to help fight common infections.
- ✍ Preschool children use a lot of energy for their activities. The kind and amount of food they eat affects their physical and mental well-being. Give them the right kinds of foods every day - prepare the meal for them by using mixture of foods from the three basic food groups. Give them more energy foods to meet their energy needs for their activities.
- ✍ Give them vitamin A rich foods to prevent night blindness, increase resistance against infections and diseases, and help in their growth and development. Include vitamin A rich foods in dishes prepared for preschool children every day.
- ✍ Give them foods rich in iron to prevent anemia.
- ✍ Give them foods rich in iodine and use iodized salt to prevent iodine deficiency disorders.

B) Food preparation for preschool children

Children in this age group are choosy; if they do not like the food, they will not eat it. They may turn to sweets or other unhealthy foods. Mothers need to prepare food in different ways to make children more interested in the food and want to eat it.

Mothers should make family meals attractive with different colors, size, and shape of different foods such as vegetables, meat, fruits, etc. If the child does not like to eat fruits, the mother may serve them in different forms such as, as juice or shaped into cubes, balls, and rings.

XII. FEEDING SICK CHILDREN

A) Breastfeeding sick children

When a child is sick or has an infection, he/she needs more food than usual. Breastmilk is the best food for sick children. A mother should never stop breastfeeding when her baby is sick. If the baby cannot suck, the mother can squeeze her breastmilk out of her breasts into a clean cup and feed it to the baby with a clean spoon. If the baby does not suckle the breast regularly and the milk is not squeezed out, the milk may dry up.

B) Importance of continuing breastfeeding sick children

- ✍ Breastmilk is the most nutritious, easily digested food for a sick child and it helps the sick child recover faster.
- ✍ Children with diarrhea may refuse to take solid foods but they may take breast milk in the same amount as when they are well. If they continue to be breastfed, they will recover more quickly.
- ✍ If a baby is frightened or in pain because of the illness, breast feeding can comfort him/her.

C) Reasons why a child is in danger when he/she is sick

- ✍ If the child vomits or has diarrhea, he/she is losing fluids and nourishment.
- ✍ If the child coughs or has a sore mouth, as in measles, the child may not want to eat.
- ✍ If the child has fever, his/her body uses more energy. Because little food is taken in, the child's body will use its' own tissue for energy. This makes the child grow thin, weak, and malnourished.

D) Importance of feeding sick children

- ✍ The child who gets sick becomes weak and begins to falter in growth. Extra foods and more frequent meals will help the child catch up with what he/she lost and resume normal health. If children are not given food during and after their illness, they will not grow well.
- ✍ Children recover from illnesses more quickly if they are fed.
- ✍ Sick children need nutritious foods to fight their illness. Breastmilk and other foods can help children recover fast.

E) Kinds of foods to give to sick children

Sick children should be breastfed more often than when they are well. Sick children should be fed extra foods more often than when they are well. Persuade the sick child to eat by offering foods he/she likes and which are softer, non-irritating and more attractive than the usual diet.

a. Foods for a sick baby less than 6 months old

For the baby less than 6 months old, breastmilk should be the only source of nourishment. The mother should not give any other foods or drinks.

b. Foods for a sick child of 6 months or more

- ? Breastmilk is an important food during a child's illness for their first and second years of life. A child who is ill and unwilling to eat much solid foods may be willing to breastfeed because the breast is an important source of comfort. With comfort, the child gets valuable nourishment. If the baby suckles more than before the illness, the breastmilk supply should increase.
- ? The child should continue to be breastfed as often as he/she wants.
- ? The child also needs some other foods:
 - Give small frequent meals, a mixture of soft foods that he/she will eat, for example rice soup with egg and vegetables;
 - Rice soup is good for sick children but mothers should add fish or egg to it. Green leafy vegetables such as kang kong, ivy gourd, and yellow vegetables/fruits such as pumpkin, yellow sweet potato, ripe papaya, and ripe mango give a lot of vitamins that help children get better faster. They also help to prevent malnutrition and severe under weight, and help children recover from chronic diarrhea or measles. Vegetables should be cut in small pieces and cooked until soft;
 - As soon as the child recovers, feed the child extra food to make up for lost growth.

F) How often should sick children be fed?

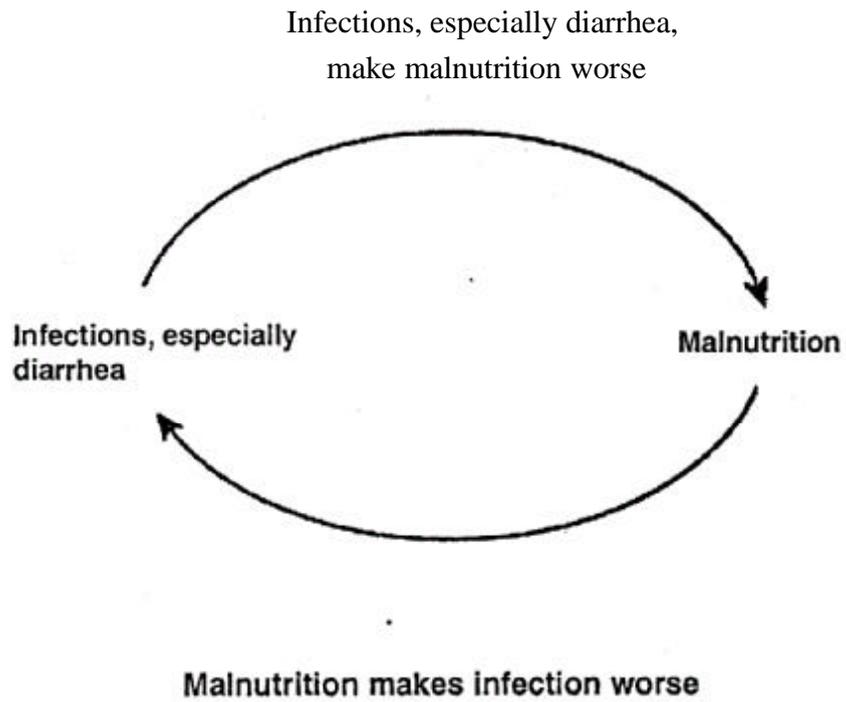
- ✍ The sick child should continue to be breast-fed as often as he/she wants.
- ✍ Give the child six meals every day for at least one week after the illness is over. The baby needs to catch up on the growth he/she lost. The baby is not fully recovered from an illness until the child has at least the same weight as when the illness began.

G) Misconceptions about feeding sick children

- ✍ Some mothers believe that breastmilk will make diarrhea worse. Thus, they stop breastfeeding when their children have diarrhea. Please refer to the section on breastfeeding for more information.
- ✍ Some mothers believe that a sick child with diarrhea or vomiting should not eat because foods will irritate the child's stomach and will cause worse diarrhea or vomiting.

H) How can we change misconceptions?

Mothers should know that children who are not fed when they have diarrhea, measles, or other infections will begin to lose weight. They will become weak, thin and malnourished. Weak, thin, and malnourished children will get infections more easily. So mothers can see there is an important relationship between nutrition and infection.



XIII. NUTRITION FOR FEMALE ADOLESCENTS

A) Why female adolescents need nutritious food

Adolescence is a period of rapid growth. The adolescent's appetite increases, and the child is always hungry. If he/she is not supervised, he/she tends to eat inappropriate foods or quick snack foods. Some adolescents may turn away from the three basic food groups to sweets, soft drinks, or high calorie snacks. Many adolescents therefore maybe poorly nourished, despite their large food intakes. Adolescent girls often consume insufficient vitamin A, iodine, iron, and calcium their bodies' require.

One of the most importance things a child must learn about diet at this time is that he/she must not just fill his/her stomach with food. He/she must fill it with foods that are nutritious and supply other requirements than calories.

1. Vitamin A

Adolescent girls need to eat more foods rich in vitamin A, such as eggs, animal liver, green leafy vegetables, yellow/orange vegetables and fruits than adult women because of menstruation and rapid growth. Vitamin A is also needed for clear eyes, smooth skin, and shiny hair. If a female adolescent does not consume enough vitamin A, she may be at risk when she becomes pregnant and her fetus may not develop well.

2. Iron

Iron needs increase dramatically during growth of adolescents. Both girls and boys are at risk of iron deficiency if their diet is low in iron. Adolescent girls need less iron for their growth than adolescent boys, but they need additional iron when they begin to menstruate. Foods rich in iron are red meat (for example beef), animal internal organs, beans, shellfish, and green leafy vegetables, such as kang kong, ivy leaves, gourd leaves, mustard greens, etc.

Anemia is highly prevalent among both adolescent boys and girls in developing countries. If an anemic female adolescent becomes pregnant, both she and her fetus are at high risk.

If female adolescents do not consume enough iron, she may be anemic which is particularly dangerous during pregnancy. Please refer to the section on prevention of IDA in pregnancy for more information.

3. Iodine

If female or male adolescents do not consume enough iodine, they may have or develop:

? Goiter,

- ? Impaired mental function, and
- ? Retarded physical development.

If an iodine deficient female adolescent becomes pregnant, she may be at high risk of miscarriage and her baby may die at birth or during the first month of his/her life. She may give birth to a baby with mental and physical retardation- this condition is called 'cretinism'. Please refer to the section on IDD for more information. Foods rich in iodine are shellfish, seafood, seaweed and iodized salt.

XIV. NUTRITION DURING PREGNANCY

A) Foods for pregnant women:

1. Why pregnant women need extra foods

Pregnancy is an important time in a woman's life. This is when a baby grows inside her body. To grow properly the unborn child needs a healthy and well-nourished mother. A pregnant woman needs more food than other times because she needs extra energy for the baby's growth and to maintain her good health. A pregnant woman can continue to work or exercise as before pregnancy but she should not get too tired. She will need more rest than usual. A pregnant woman who does not eat enough and who still has to work very hard is in danger. She may have a small baby who does not grow well and who is often sick; she may become sick herself.

2. What kinds of foods are good for pregnant women

A pregnant woman needs to eat good foods. She should eat meals at least 5 times a day, which includes 2 snacks that contain a mixture or variety of foods. She can get the extra food she needs by eating a little more of her usual meals if these meals are nutritious. A nutritious meal contains a mixture of 3 different basic food groups. It is easy to start with the foods that are commonly eaten in the community, are usually well liked, and are easy to grow. Pregnant women should increase their nutrient intake, especially of the following:

Vitamin A:

Vitamin A will increase resistance against infections and diseases, prevent night blindness, and help in the growth and development of the fetus. Foods rich in vitamin A are:

- Green leafy vegetables such as kang kong, ivy gourd leaves, pumpkin leaves, mustard greens, collard greens, amaranth, etc.
- Yellow fruits and vegetables such as ripe papaya, ripe mango, pumpkin, orange sweet potato, and carrot
- Egg, small fish with liver intact, and animal liver such as chicken liver, pig liver, fish liver

Iron:

Iron will prevent anemia and increase production of red blood cells. Sources of iron are red meat, liver, animal internal organs (e.g. heart and kidney), beans, shellfish, and green leafy vegetables, such as kang kong, ivy gourd leaves, mustard greens, Chinese kale, and collard greens.

Calcium:

Calcium will keep mother's gums and teeth healthy and help in the growth and development of bones and hair of the fetus. Rich sources of calcium are small fish with bones, milk, shrimp, shrimp paste, egg, fermented fish, canned fish, peanuts, and beans.

Iodine:

Iodine will prevent goiter, and promote proper mental and physical development of the growing fetus to ensure that the baby will be born alive without retardation. Rich sources of iodine are seafood such as shellfish, shrimp, crab, squid, seaweed and iodized salt.

Vitamin C:

Vitamin C **will** increase the body's resistance against common illness like cough and colds, keep gums healthy, and assist the absorption of iron. Sources of vitamin C are guava, orange, tamarind fruit, lemon, mango, tomato, pineapple, etc.

Protein:

Protein will make the mother and the fetus grow strong and healthy. Rich sources are fish, beef, pork, chicken, beans, eggs, tofu, etc.

Carbohydrates and Fat:

Carbohydrate and fat will provide energy needed by the mother for her daily activities and for the growth of the fetus. Sources of carbohydrates are rice, corn, cassava, taro, sugar, etc. Foods rich in fat are coconut milk, vegetable oil, and animal fat.

Fluids:

Pregnant women should drink plenty of fluids, either fruit drinks or clean water. Fluids will help prevent dehydration, promote circulation, and help prevent constipation.

B) What should a pregnant woman do to stay healthy?

- ✍ Eat well - eat more and eat a mixture or variety of foods
- ✍ Receive tetanus toxoid immunizations if not already up-to-date
- ✍ Have more rest
- ✍ Do not drink alcohol (may cause abnormal growth of the fetus and development or cause deformity, and brain damage) and do not smoke (may cause deformity and low birth weight baby; less than 2.50 kg)
- ✍ Keep clean - bathe regularly and brush teeth every day
- ✍ Avoid taking medicine, especially antibiotics. Medicines can harm a developing fetus. Only take those medicines recommended by a trained health worker
- ✍ Stay away from children with measles, especially German measles (will increase the risk of fetal malformations such as deaf-mutest, heart lesions, and birth defects)
- ✍ Continue to work and get exercise but do not get too tired
- ✍ Wear shoes to prevent worms from entering the body through the feet

C) Prevention of vitamin A deficiency in pregnancy

Pregnant women are vulnerable to vitamin A deficiency because they need extra vitamin A to meet the needs of fetal growth and development and to prepare for the lactation period. Vitamin A is transferred from the mother to her fetus through the placenta. Night blindness among pregnant women may be more common than among preschool children in areas where VAD is endemic. Recent evidence shows that maternal death may be dramatically reduced by increased intake of vitamin A.

VAD is associated with poor socioeconomic status and low intake of foods rich in vitamin A. A common symptom of VAD is night blindness. The best treatment and prevention of VAD during pregnancy is to consume vitamin A rich foods both from animal sources (liver, egg, and small fish with liver in tact) and vegetable and fruit sources (green leafy and yellow orange fruits and vegetables). High dose vitamin A capsules should never be taken during pregnancy because they may cause deformity and birth defects.

D) Prevention of iron deficiency anemia in pregnancy

Iron is an essential component of hemoglobin- the oxygen-transporting molecule in blood. A shortage of iron results in a shortage of hemoglobin, which in turns leads to a "short age of blood". This is called anemia. Iron deficiency anemia is the world's most common nutritional deficiency. Pregnant women are particularly vulnerable to iron deficiency anemia.

a. Signs of IDA in pregnancy

- Pale insides of eyelids and gums
- Pale or transparent skin and white fingernails
- Weakness, fatigue, dizziness, and low energy
- If severe, the person may have swollen face and feet, rapid heartbeat, and shortness of breath
- Desire to eat dirt

If untreated a pregnant woman with anemia may die from losing too much blood during delivery.

b. Causes of IDA in pregnancy

- Do not eat enough foods rich in iron
- Low quality of absorption of iron due to presence of iron inhibitors, such as tea and coffee
- Have too many children and too close to each other or get pregnant too soon after delivery
- Blood loss caused by parasites such as hook worm, and schistosomiasis
- Have an injury that causes blood loss
- Have diseases, such as TB, malaria, and others

c. Effects of IDA on pregnant women and their fetus

if pregnant women are anemic, they may have difficulties in pregnancy and childbirth. An anemic pregnant woman will give birth to a newborn baby with low iron levels and will produce breastmilk that is also low in iron. IDA will increase maternal and fetal morbidity and mortality (the chance that either mother or baby will be sick and die) and will increase likelihood of low birth weight newborn (less than 2.50kg). Anemia during pregnancy increases the chance of stillbirths, neonatal mortality, and low birth weight in children. Anemic mothers usually have less energy for routine childcare tasks or for any activities that require energy.

d. How to prevent IDA

- A pregnant woman should have enough iron in her blood to keep herself and her baby healthy. Every day pregnant women should eat foods that contain plenty of iron. Foods that are rich in iron are liver, animal internal organs, egg, meat, shellfish, beans, and green leafy vegetables such as kang kong, ivy gourd leaves, mustard greens, Chinese kale, collard greens, etc.
- To help pregnant women's body absorb and use iron better, they should eat foods rich in vitamin C such as orange, guava, tamarind fruit, lemon, mango, tomato, pineapple, or fruit drink with their meals. Avoid drinking tea or coffee during meals, as they can prohibit the absorption of iron.
- A pregnant woman should visit the antenatal clinic as early in her pregnancy as possible. She should receive iron tablets from the health worker; advise her to take iron tablets during a main meal, and that she should not take the tablet with tea or coffee because these drinks inhibit the body from using the iron properly. She should take tablets with a sour drink like lemon juice for better absorption. The health worker should explain to the pregnant woman about some side effects of taking iron tablets, such as black stool, constipation, diarrhea, or dizziness. Explain that these side effects will not harm her or the fetus health. She should continue to take the tablets. If she take the tablets with a main meal, it will ease some of the side effects.
- Birth spacing (at least 2 years to build up stores).

E) Weight gain in pregnancy**a. Why is it important to gain weight during pregnancy?**

A woman should gain weight during pregnancy. A pregnant woman needs to gain weight during pregnancy because the extra weight is for:

- The growth and development of the fetus
- The mother's body changes: her body needs to increase blood, muscle, tissues, and fluids in preparation for the growth and development of the fetus, for breast feeding, for the placenta, and for protection of the uterus

Women who do not gain enough weight often have underweight newborn babies. Babies who weigh less than 2.50 kg may not grow well, and may suffer more from infections and malnutrition than babies of normal weight.

b. How much weight should a pregnant woman gain during her pregnancy?

A woman should gain at least 11 to 13 kg during pregnancy. The baby accounts for only part of the gain. Her body must add blood, muscle, fluids, and tissues, which are needed for baby's growth and development and for preparation of breastfeeding. If she gains less than 11 kg, the baby's chances for health and survival decrease. A pregnant woman should gain weight smoothly and steadily. If her weight increases suddenly, she should see a midwife.

c. What kinds of foods will help pregnant women gain weight?

Carbohydrates and fat will provide energy needed by a mother for her daily activities and for the growth and development of her fetus. Some foods rich in carbohydrates are rice, corn, cassava, taro, and sugar. Foods rich in fat are coconut milk, vegetable oil, and animal fat. However, the best diet for pregnant women is a diet that includes a variety and a mixture of foods from the three different food groups.

F) Common problems and difficulties faced by pregnant women and suggestions on how to overcome them**a. Iron Deficiency Anemia**

During pregnancy, some women feel dizzy, tired, fatigue, a desire to eat dirt or charcoal, nauseous and some may also vomit. If a pregnant woman feels dizzy, tired, fatigue, or nausea, she may be anemic. She should eat more food, especially foods rich in iron such as liver, animal internal organs; meat, shellfish, beans, and green leafy vegetables such as kang kong, ivy gourd leaves, mustard greens, Chinese kale, etc. If the problem is severe she should go to the health center for iron tablets.

b. Morning sickness

If a pregnant woman feels nauseous and/or vomits, she should eat a light sweet meal before going to bed at nighttime such as a small bowl of sweet mung bean soup or have a dried crispy food e.g. biscuit before getting out of bed in the morning. She should eat small amounts of foods at frequent intervals: eat 5 or 6 meals a day, and should drink fluids between, rather than with meals. She should avoid greasy and fried foods.

c. Heart burn

Often caused by eating too much heavy, greasy food, or drinking too much alcohol or coffee. These make the stomach produce extra acid, which causes discomfort or a 'burning' feeling in the stomach or mid-chest.

Prevention:

- Do not eat too much. Eat small meals and eat frequent snacks between meals.
- Avoid food known to cause discomfort, such as spicy foods, fermented foods, alcoholic beverages, coffee, greasy foods, and carbonated drinks (Coke, 7up, Pepsi).
- Drink a lot of water.
- Avoid smoking or chewing tobacco.
- Try to sleep with the chest and head lifted up with pillows or blankets.

d. Constipation

Pregnant women should drink plenty of fluids. Take liquids early morning before eating anything because it often causes bowels to move. Eat fruits, vegetables, and foods with high fiber content, such as sweet potato, taro, beans, orange, Kang Kong, etc. Exercise regularly or do house work or home gardening work.

e. Swelling of the feet

Pregnant women with this problem should eat less salt and avoid salty foods. They should rest with their feet up.

G) Misconceptions on nutrition during pregnancy and suggestions on ways to help people change those misconceptions

Following are some taboos that pregnant women believe:

- ✍ Eating less food will cause them to have an easier delivery because the fetus will be smaller
- ✍ Eating snails during pregnancy will make baby's saliva come out all time
- ✍ Sugarcane causes a lot of amniotic fluid
- ✍ White rice porridge causes the cervix to be sticky
- ✍ Banana flower causes delivery to be difficult
- ✍ Kwet (a kind of fruit) causes delayed rupture of the amniotic sac
- ✍ Drinking traditional alcohol medicine is considered good

Pregnant women can eat the same kinds of foods they used to eat before they become pregnant. But, they should eat more food than normal as they are also "feeding" the fetus.

XV NUTRITION DURING LACTATION

A) Foods for lactating mothers:

1. Why lactating mothers need extra foods

The nutritional needs of lactating mothers are greater than non-lactating mothers. As a result, her food intake should be abundant and varied. A lactating mother should continue to eat foods she has eaten during pregnancy but should increase the amount consumed. A lactating mother needs extra foods to recover from her delivery and to produce sufficient quality and quantity of breastmilk for her newborn baby. If she does not eat enough, foods reserved in her body will be taken to provide energy and to produce breastmilk, which will make her weak and unhealthy. A lactating mother needs to eat more food to:

- Maintain her health and prevent malnutrition;
- Produce enough breastmilk without using her body reserves;
- Maintain and replace nutrients.

2. What kinds of foods are good for lactating mothers

A lactating mother should try to eat more foods from the 3 basic food groups - Body Building Foods, Energy Foods, and Protective Foods. She should eat rice, fish, eggs, green leafy vegetables and yellow/orange vegetables and yellow/orange fruits every day, so that she becomes healthy and strong and does not feel tired or weak. A lactating mother should try to drink plenty of liquids to satisfy her thirst. These liquids include clean water, soup, soy- bean milk, or fruit juices.

B) What should a lactating mother do to stay healthy?

During the first 40 days postpartum, the mother needs to recoup her physical as well as emotional strength after pregnancy and childbirth. She does this by doing the following:

- Resting during the day;
- Going to the health center for a postpartum check up;
- Eating a variety of quality foods;
- Drinking plenty of water even when not thirsty; and
- Bathing daily.

C) Prevention of vitamin A deficiency during lactation

Lactating mothers are vulnerable to vitamin A deficiency because they need more vitamin A for their breastmilk. Consumption of foods rich in vitamin A should improve vitamin A stores of the mother and the vitamin A content of her breastmilk. Lactating mothers need to be well nourished in order to produce breastmilk rich in vitamin A, as well as to protect their own health.

Causes, prevention, and treatment of VAD are similar to those of pregnant women. Women, up to 8 weeks postpartum, irrespective of their mode of infant feeding, should receive a high dose vitamin A capsule (200,000 IU).

D) Prevention of iron deficiency anemia during lactation

During the first six months of breastfeeding, women who are not already iron deficient are generally not at risk of developing iron deficiency. If they breast feed frequently and exclusively, they are unlikely to menstruate and so are protected from this blood loss. However, many women are anemic after delivery because of losses during pregnancy and delivery. They may need extra iron to recover and meet additional needs for breast feeding. After six months of lactation, women are at increased risk of developing iron deficiency. When lactating mothers start to menstruate again, they need extra iron to replace both the losses during menstruation and the iron that is transferred to breastmilk.

a. Causes of IDA during lactation

- Blood loss during pregnancy and delivery
- Blood loss from menstruation, for those lactating mothers who start to menstruate
- Have parasites and illnesses such as malaria, worms, TB, or schistosomes that deplete their iron stores
- Inadequate intake of iron rich foods due to wrong beliefs (food taboos) or lack of foods (foods rich in iron are not available)
- Poor nutrition in general (e.g. do not eat variety of foods), mother's own reserves are used to produce breastmilk
- Mother's heavy workload and not enough rest

b. Effects of anemia on lactating women and their babies

If a lactating woman is anemic, she may have difficulties in breastfeeding and her baby may not grow well. The following may happen:

- Does not produce enough breastmilk for her baby
- Produces breastmilk with low iron content
- Has lower resistance to infections for both mother and her child
- Has high maternal and infant mortality
- Reduces work capacity
- Decreases mental performance

c. How to prevent IDA during lactation

A lactating woman should have enough iron in her blood to keep herself and her baby healthy. Iron will prevent anemia and increase production of red blood cells. Every day lactating women should eat foods that contain plenty of iron. Foods that are rich in iron are liver, animal internal organs, meat, eggs, shellfish, and green leafy vegetables.

To help her body absorb and use iron better she should eat food rich in vitamin C such as orange, pineapple, guava, tamarind fruit, lemon, mango, tomato, or fruit drink with the meal. A postpartum woman should visit the health center for iron tablets. Advise the woman to take the iron tablets during a main meal. She should not take the tablet with tea or with coffee because these drinks stop the body from using the iron properly.

E) Common problems and difficulties faced by lactating mothers and suggestions on how to overcome them

✍ **Many mothers complain that when their babies are sick they bother mothers (babies liked to suck mothers' breast all the time).**

Health workers should explain to mothers that sick children need nutritious foods to fight their illness. Breastmilk and other foods can help children recover fast. It is a good thing that sick babies like to suck their mothers' breast. Sick babies should be breast-fed more frequently. Mothers should also feed soft food to their sick children who are over six months of age. If children are not given food during and after illness, they will not grow well. Sick children should be fed extra food more often than when they are well. Breastmilk should be the main source of food; other foods should be used as supplemental foods.

✍ **Mothers do not sleep enough, are tired, thin, dizzy, and sick.**

Mothers with these problems may be anemic. Health workers should explain the importance of good nutrition during lactation. Lactating mothers who are easily tired, or are weak, feel dizzy, and get sick often should eat an extra amount of a mixture of all different food groups. They should eat foods rich in iron and vitamin A. They should visit their health center for vitamin A (two months postpartum) and, if their problems are severe, for iron supplements.

✍ **Mothers do not produce enough breastmilk.**

Health workers have to explain to mothers that every mother can produce enough milk for her baby but she needs to breast feed her baby often. The more the baby sucks her breast, the more breastmilk she will produce. If the mother does not breastfeed often, she will produce less breastmilk. Encourage the mother to eat fish, egg, green leafy vegetables and yellow/orange vegetables, and yellow/orange fruits every day.

✍ **Lactating mothers became pregnant again soon after delivery.**

It is believed that breastmilk of a pregnant woman is sour and will cause sicknesses (fever and diarrhea) in her baby. Therefore, many mothers stop breastfeeding their babies when they become pregnant again. This practice is very dangerous for young babies whose mothers stop breastfeeding them early in their lives.

Health workers need to explain to mothers that breastmilk is still good even when a lactating mother is pregnant. Breastmilk of pregnant mothers is not sour and will not cause any illnesses in babies. Pregnant mothers should not stop breastfeeding their babies. They should eat enough nutritious foods such as eggs, fish, juice, vegetables, fruits, etc. to maintain and improve their health. When babies are six months old, mothers can introduce complementary foods.

Nutrition During Lactation

Exclusive breastfeeding for six months and child spacing will reduce the chance of mothers becoming pregnant soon after delivery, so that mothers' bodies will have enough time to recover before becoming pregnant again.

F) Misconceptions about nutrition during lactation and suggestions on ways to help people change those misconceptions:

Postpartum Diet:

Some of the following are special diets Cambodian people think are good for postpartum mothers and that they should and can eat, while some are considered taboo for postpartum mothers:

Foods/diets considered good for postpartum mothers:

- Rice soup with salt and pepper, rice with pepper, pork, beef or fish kaw (fish sweet stew) with salt and pepper, dried salty beef with a lot of salt, pepper and MSG. The reason why postpartum mothers should eat salty foods or drink salty boiled water is to make them feel thirsty so that they can drink more traditional medicine.

Some foods women consider good for the postpartum period are actually good, such as meat and fish. However, what is lacking is variety; there is no mention of fruits and vegetables or other highly nutritious foods. In addition, rice soup alone will not provide the nutrients a woman needs.

Foods/diets (mistakenly) considered bad or taboo for postpartum mothers:

- Vegetables, both cooked and uncooked were felt by some to be dangerous because they will cause abdominal pain, vein swelling, cramping, and heartburn. Old women forbid postpartum women to eat vegetables to avoid swollen abdomen and swollen vein
- Some fruits such as jack-fruit, pineapple, and banana and some vegetables such as string beans and field cucumber are considered bad.
- Eating buffalo meat, pig's head, some fish such as Trey Kreye, Dieb, Cdor and red tailed fish are also prohibited.

Lactating mothers should be educated about the importance of good nutrition during lactation. They should eat more nutritious foods than normal in order to recover from hemorrhage during delivery and also to produce good quality breast-milk to feed their babies. Lactating mothers should eat those nutritious diets that contain a mixture of foods from the three food groups. They should drink a lot of water or fruit juices. They should use the water that vegetables were boiled in. They should also have plenty of rest. They can then feel confident that what they eat will keep them and their babies healthy.

XVI. FOOD PREPARATION AND STORAGE

The nutritional value of any meal depends on the individual foods used and how they are prepared and cooked. A variety of foods are used in Cambodia. These foods are prepared, stored, or cooked in many different ways.

A) Parts of vegetables that are rich in vitamins and minerals

Leaves of green leafy vegetables contain more vitamins and minerals than the stem. Kang kong leaves are richer in vitamin A and iron than their stems. However, Cambodian people prefer to eat the stems rather than the leaves. They need to be educated about this nutritional issue, so that they do not throw the leaves away but instead use them more in cooking.

Ripe papaya is rich in vitamin A; green papaya is not so rich. Cambodian people like to eat green papaya as a vegetable. They should be encouraged to keep the papaya fruits until they are ripe.

Orange sweet potato is richer in vitamin A than the white one. People should be educated about this and be encouraged to grow orange sweet potato instead of the white ones. Leaves of the sweet potato are rich in vitamin A and iron. People should be encouraged to use sweet potato leaves in cooking more.

B) Food preparation

Food preparation includes washing, soaking, peeling, and cutting. The process affects the nutrients in foods such as rice, tubers; fruits, vegetables, and legumes.

Some nutrients will be lost during washing, soaking, peeling, and cutting, especially those vitamins that are dissolved in water (e.g. vitamin B and C). However, the extent of the loss will depend on the number of washings, the amount of water used, and the length of time a food is soaked.

Vegetables should be washed before peeling or cutting. This is important for avoiding contamination with germs or worms. Washing vegetables and fruits after cutting will increase the loss of nutrients, especially vitamins that dissolve in water.

Vegetables and fruits that do not need to be peeled should not be peeled. A lot of nutrients are in the skin; peeling will take away those nutrients. If it is necessary to peel, only a thin layer should be peeled off. It is especially important to wash fruits and vegetables if they are not going to be peeled.

To preserve vitamins, rice should be washed in a small amount of water and should not be soaked for a long time. Rice should be washed in cool water as quickly as possible and only washed once.

C) How to cook to preserve vitamins and minerals

Rice is often cooked alone. Other foods are cooked in combination to prepare a variety of dishes, e.g. soups and fried dishes. Some foods are eaten raw. Some basic cooking methods are: fast or slow boiling, steaming, frying, grilling, roasting, and baking. These different cooking methods affect the nutrients in foods to a different degree.

The effect of cooking on the food's nutrient value depends on a number of factors. These include the amount of fat or water used, the cooking temperature, and the length of time the food is cooked. The following guidelines help reduce nutrient loss during cooking:

- Cook rice with the lid on. Only use enough water so that it is all absorbed and you do not need to pour extra water away
- Cook green leafy: vegetables in fat or oil (fried dishes) for a short time - fat or oil helps the body absorb vitamin A better
- Cook green leaves and vegetables in a small amount of water for a short time
- Do not use high temperature when cooking vegetables
- Do not over cook vegetables
- Eat fresh (raw) fruits as much as possible. Make sure fruits are cleaned properly. Avoid cooking fruits if not necessary

D) Food storage

To keep food safe we should:

- Keep storage area and cupboard clean, cool, and dry
- Do not store food in containers that have previously been used for chemicals
- Keep food covered while it is stored, and keep it away from chemicals such as insecticides and household cleaners
- Keep insects, pests, animals, birds, and dust away from food

Fish, meat, and poultry require special care as they always have germs (bacteria) on their surface. They can go bad very quickly in a warm climate. Fresh fish, meat, and poultry should be:

- ? Gutted as soon as possible
- ? Kept away from direct sun light and dry wind
- ? Kept as cold as possible
- ? Kept separately from cooked food or food that is to be eaten raw
- ? Salted and dried if to be kept for a long time at room temperature

E) Food hygiene

Fresh and clean foods are important for good nutrition. Contaminated foods can both reduce the food's nutrient value and cause disease. Diseases that are caused by contaminated foods and water are diarrhea, typhoid, cholera, and hepatitis. The following practices will prevent food-related illnesses and reduce the wastage of food:

- Throw away any food that smells bad, looks bad, or is spoiled
- Wash yours and your children's hands before handling food
- Cook and eat without delay
- Avoid coughing or sneezing near food or on food. Avoid touching hair, mouth, nose, or anything likely to be dirty while preparing food
- Food must be covered to protect it from flies, insects, and dust
- Do not eat foods from badly dented or very old cans. Cans with bump on top are especially bad, as the cans may rust. Once the can is opened, the food should be eaten straight away or put in a clean covered container and stored in cold place. Food should not be left in the can once the can is opened
- Cooked food should be kept separately from raw food
- Fruits and vegetables that are eaten raw should be washed properly with clean water. Fruits and vegetables that are eaten raw should be washed before others that need to be cooked
- Make sure that the water used for cooking and washing is fresh and from a safe source (hand pump, covered well, boiled, etc.)
- Meat and fish should be cooked thoroughly. Don't eat raw meat or fish. Fermented or preserved fish should be cooked to prevent worms.
- Re-cook all foods that have been sitting out more than 2 hours.
- Wash your hands with soap and water before cooking
- Cooking utensils should be washed and kept covered
- The kitchen should be kept clean to avoid insects and flies

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