NUTRITION: A LIFE CYCLE APPROACH
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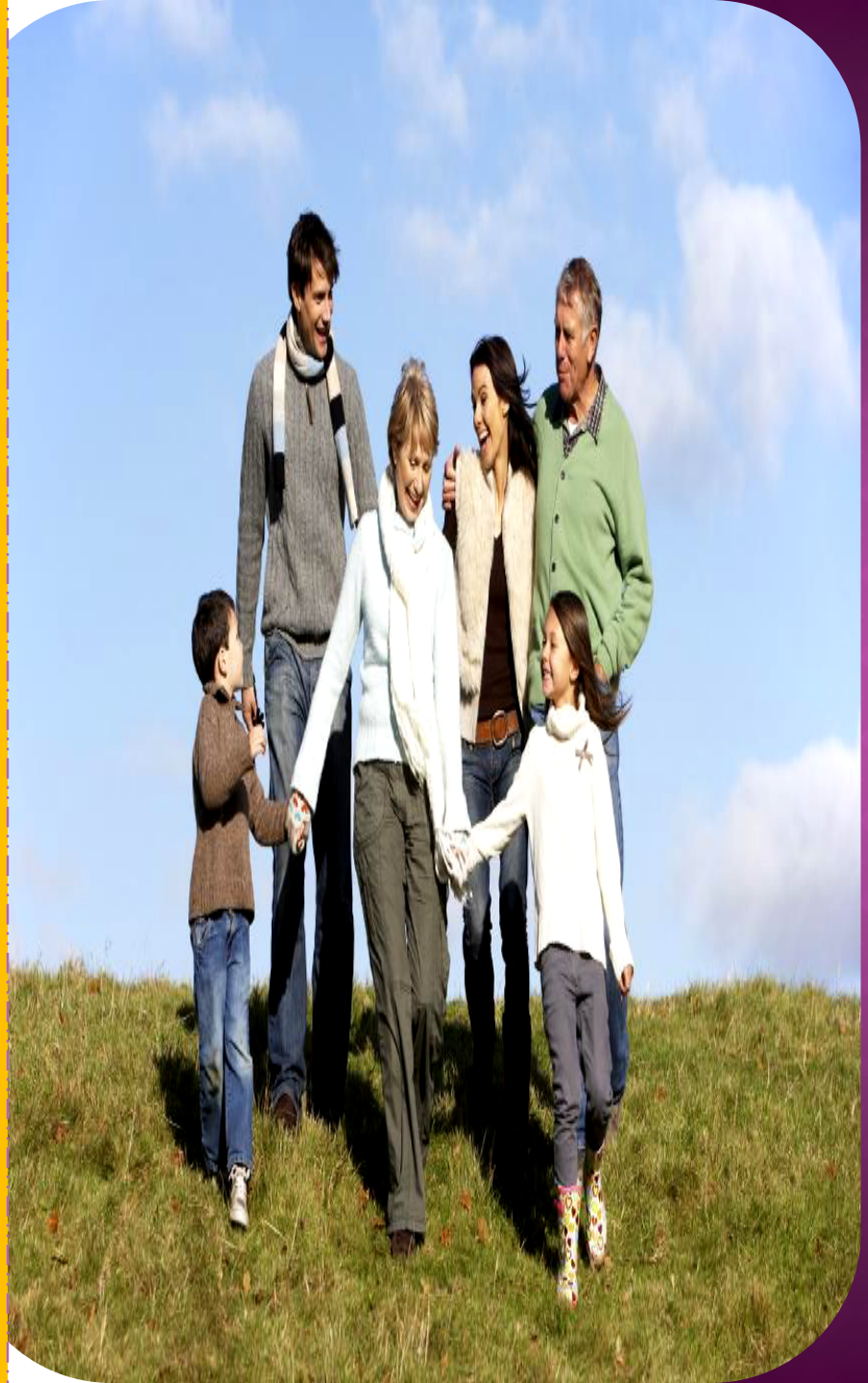
Nutritional requirements throughout the Lifecycle



INTRODUCTION

The nutrient requirements during the four main stages of the human lifecycle vary considerably. What infants and children require is different from what adults and the elderly need. In addition, there might be specific nutrients which a pregnant women and lactating mothers need in higher amounts than adult men.

WHY IT IS IMPORTANT TO KNOW NUTRITIONAL REQUIREMENTS?

Nutritional requirements of an individual or group for two major reasons:

- ***Prescriptive reasons:*** that is, to provide or dispense food supplies; for example:
  - to procure food for national consumption.
  - to secure food for institutional consumption.
  - to run nutritional supplementation programmes.

NUTRITIONAL REQUIREMENTS OF AN INDIVIDUAL OR GROUP FOR TWO MAJOR REASONS:

- ***Diagnostic reasons:*** mainly to identify whether a group or an individual is suffering from malnutrition of any kind; for example:
- to evaluate nutritional intervention programmes.
- to determine whether the food available in the stock is adequate to feed the household or nation for a certain duration of time.

In order to estimate nutritional requirements of individuals or groups, we need to consider the following factors:

- Physical activity — whether a person is engaged in heavy physical activity
- The age and sex of the individual or group
- Body size and composition — what the general build is of a person or group
- Climate — whether a person or group is living in hot or cold climate
- Physiological states, such as pregnancy and lactation.

Based on these factors, nutritional requirements in the different segments of the population can be classified into four groups. These correspond to different parts of the lifespan, namely

a) **pregnancy and lactation**
b) **infancy and childhood**
c) **adolescence and adulthood, and**
d) **old age**

NUTRITION DURING PREGNANCY AND LACTATION

An unborn child needs a healthy and well-nourished mother to grow properly. Therefore, a mother needs to gain weight during pregnancy to help nourish her growing baby. Women who do not gain enough weight often have babies that weigh too little (**low birth weight**).

A baby weighing less than 2.5 kg has an increased chance of both physical and mental health problems. It may also suffer more from infection and malnutrition compared with babies of normal weight. The increased requirement of nutrients during pregnancy and lactation is shown in the next slide.

- **Increased requirements**: energy, protein, essential fatty acids, vitamin A, vitamin C, B vitamins (B1, B2, B3, B5, B6, B12, folate), calcium, phosphorus, iron, zinc, copper and iodine.
- Women should gain at least 11 kg during pregnancy. If the mother gains less than this, the baby's chances of survival and health declines. If a mother is overweight, she still needs to gain for her baby's health. She should not try to lose weight while she is pregnant.

GAINING WEIGHT IN PREGNANCY

- A pregnant mother should gain weight smoothly and steadily. If weight gain occurs suddenly, she should see a health professional.
- During the first three months, she should expect to gain a total of 1–2 kg.
- During the last six months, she needs to gain about 0.5 kg each week.
- If she has already gained 11 kg after six–seven months, she should continue to gain moderately until delivery.
- The baby puts most of its weight during the last few months.
- A 29 weeks pregnant woman (that is seven months and one week) has already gained 12 kilograms of weight.

EATING DURING PREGNANCY

- Women's nutrition during pregnancy and lactation should focus on the three micronutrients (vitamin A, iron and iodine) and extra energy intake/reduction of energy expenditure. Therefore the following are essential nutrition actions related to maternal nutrition.
- A pregnant or breastfeeding woman needs extra foods, especially those that are good sources of iron.
- A pregnant woman needs to cut down her energy expenditure. She should reduce her involvement in strenuous household tasks that lead to higher energy expenditure.
- Pregnant women should eat iodised salt in their diet.

- Pregnant women should take vitamin A rich foods (such as mango, tomato, carrot, and green leafy vegetable) and animal foods (such as fish and liver).
- In the malarious areas, pregnant women should sleep under an insecticide-treated bed net.
- Pregnant women during the third trimester of pregnancy should be de-wormed using mebendazole or albendazole.
- Pregnant women need a well balanced diet containing mixture of foods. This should include as far as possible food from the different food groups (animal products, fruits, vegetables, cereals and legumes).
- Remember, there is no need for high-priced foods!

  A pregnant or lactating woman can get extra foods by eating a little more of ordinary meals. She should increase the amount of nourishment at one or two meals, not every meal.

PREVENTING ANAEMIA IN PREGNANCY

- Some women feel weak and tired when pregnant. They may be anaemic, which in turn means that they may have difficulty in pregnancy and childbirth. Common problems linked to the mother's anaemia include:
- Babies will be born without three to six months iron supply
- Breastmilk may have insufficient iron.
- A pregnant or breastfeeding mother should have enough iron to keep herself and her baby healthy. She should eat plenty of iron-rich foods every day such as dried beans, legumes, dark green leafy vegetables, liver, kidney and heart.
- A pregnant mother should go for her first antenatal care visit at the latest by the three/fourth month of her pregnancy. At the clinic, check her urine for excess sugar and proteins, and her blood for malaria (if she is showing signs of infection).

YOU DIAGNOSE ANAEMIA IN THE FOLLOWING WAY:

- Examine the lower eyelids, the inside of the lips and the palms which should be bright pink; if there is anaemia, all of these will be pale whitish.
- Give the mother iron tablets or tablets with iron and folate to build strong blood
- Remind the mother to take the tablets after a main meal. She should not take iron tablets with tea, coffee or milk
- If the iron tablets upset the mother or cause side effects, she should not stop taking iron, but eat more leafy vegetables.

PREGNANT WOMEN WITH SPECIAL NEEDS

- Some pregnant women in your community will be particularly vulnerable. As a Health Extension Practitioner it is important that you identify the women who may need extra help and support.
- Here some examples of women who may need special help from you and outlines the kinds of service you can provide for them.
- Identifying and helping pregnant women who need special help

PREGNANT WOMEN WHO MIGHT NEED SPECIAL HELPÀINCLUDE:

- Women from poor families, or who are unemployed
- Women who are widows/separated, and have no support
- Mothers who have given birth to many babies over a short time
- Women who are ill from diseases like Tuberculosis (TB)
- Women who look thin and depressed
- Mothers whose previous babies were small and malnourished
- Teenagers
- Women with a history of their baby or babies dying in their first year of life
- Mothers overburdened with work
- Mothers who are very worried, particularly first time pregnancies.

THE HEALTH EXTENSION PRACTITIONER'S ROLE:

- Visit the pregnant women often.
- Encourage them to eat as good mixture of foods as they can afford (fruits, vegetables, animal source foods)
- Let them be the first ones to receive iron or food supplements, when available
- Help them to get proper healthcare
- Encourage other members of the household to do some of the work and lessen the work burden on the woman.

NUTRITION DURING LACTATION (BREASTFEEDING)

- If all babies are to be healthy and grow well, they must be fed breastmilk. When a baby sucks at the nipple, this causes the milk to come into the breast and continue to flow.
- Breastmilk is food produced by the mother's body especially for the baby, and it contains all the nutrients (nourishment) a healthy baby needs.
- A lactating woman needs at least two extra meals (550 Kcal) of whatever is available at home. In addition a dose of vitamin A (200,000IU) should be given once between delivery and six weeks after delivery. This will enable the baby to get an adequate supply of vitamin A for the first six months. During the first six months the best way of feeding the baby is for the mother to breastfeed exclusively.

INCREASED NUTRIENTS REQUIRED DURING LACTATION

- **Increased requirements**: vitamins A, C, E, all B vitamins, and sodium (applies only to individuals under age 18).
- In addition to extra meals and one high dose of vitamin A, a breastfeeding woman also needs:
- Iodised salt in her diet
- At least one litre of water per day
- Vitamin A rich foods (such as papaya, mango, tomato, carrot and green leafy vegetables) and animal foods (such as fish and liver).

NUTRITIONAL REQUIREMENTS IN INFANCY, CHILDHOOD AND ADOLESCENCE

The common feature of infancy, childhood and adolescence is that all these age groups are undergoing rapid growth and development. This in turn poses a heavy demand on their nutritional requirements. Small children and infants do not have a well developed body nutrient store, and therefore are more vulnerable to infection. In addition they have a larger surface area compared to their body size. All these factors increase their basal metabolic rate (BMR), resulting in an increased requirement for nutrients.

ADOLESCENT GROWTH SPURT

- Adolescents also undergo a very rapid growth during their puberty (called the **pubertal growth spurt**). During the pubertal growth spurt, they increase rapidly both in weight and height. Therefore, they need a nutrient intake that is proportional with their rate of growth. The growth rate is very high right after birth (infancy). Then the growth rate slows down until the age of 12–14 years. At about 15–16 years (the pubertal period) there is a sharp rise in growth rate/velocity. After that, the growth rate slows down again.
- Requirements for macronutrients (proteins, carbohydrates and fats) and micronutrients are higher on a per kilogram basis during infancy and childhood than at any other developmental stage. These needs are influenced by the rapid cell division occurring during growth, which requires protein, energy and fat. Increased needs for these nutrients are reflected in daily requirements for these age groups, some of which are briefly discussed in the next slide.

INCREASED NEED FOR NUTRIENTS

Energy

- While most adults require 25–30 calories per kg, a 4 kg infant requires more than 100 kilocalories per kg (430 calories/day). Infants of four to six months who weigh 6 kg require roughly 82 kilocalories per kg (490 calories/day). Energy needs remain high through the early formative years. Children of one to three years require approximately 83 kilocalories per kg (990 calories/day). Energy requirements decline thereafter and are based on weight, height, and physical activity.
- As an energy source, breastmilk offers significant advantages over manufactured formula milk. Breastfeeding is associated with reduced risk for obesity, a wide range of allergies, hypertension, and type 1 diabetes. It is also linked with improved cognitive development; and with decreased incidence and severity of infections. It is also less costly than formula feeding. The list below outlines the nutrients and other constituents of breastmilk:
- Water = 87–89%
- Vitamins (particularly vitamin A)
- Fat = 3–5%
- Energy = 60–70 kcal/100 ml
- Carbohydrate (lactose) = 6.9–7.2%
- Mineral = 0.2%
- Protein = 0.8–0.9%

Higher intakes of protein and energy for growth are recommended for adolescents. For most micronutrients, recommendations are the same as for adults. Exceptions are made for certain minerals needed for bone growth (e.g. calcium and phosphorus).

Evidence is clear that bone calcium accretion increases as a result of exercise rather than from increases in calcium intake. Since weight gain often begins during adolescence and young adulthood, young people must establish healthy eating and lifestyle habits that reduce the risk for chronic disease later in life.

Water

- Infants and children need plenty of water to drink, particularly when ill, or exposed to extreme temperatures.
- Total water requirements (from beverages and foods) are also higher in infants and children than for adults. Children have a larger body surface area per unit of body weight and a reduced capacity for sweating when compared with adults, and therefore are at greater risk of morbidity and mortality from dehydration. Parents may underestimate these fluid needs, especially if infants and children are experiencing fever, diarrhoea or exposure to very cold or very hot temperatures.

Essential fatty acids

- Requirements for fatty acids or fats on a per kilogram basis are higher in infants than adults. Some fatty acids play a key role in the central nervous system. However infants and children should not ingest large amounts of foods that contain predominantly fats, so it is important to get the balance right.
- Increased nutrients required during infancy, childhood and adolescence

Infancy and childhood

- Increased requirements of energy, protein, essential fatty acids, calcium and phosphorus.

- **Adolescence**: Increased requirements of energy, protein, calcium, phosphorus and zinc.

  Nutritional requirements during adulthood

- The nutritional needs in adults of 19–50 years of age differ slightly according to gender. Males require more of vitamins C, K, B1, B2 and B3, and zinc. Females require more iron, compared with males of similar age.
- You have already seen that pregnant women and lactating mothers have particular nutrient requirements that are necessary for their own health as well as the health of their baby.

NUTRITIONAL REQUIREMENTS DURING LATER YEARS

- Elderly people are especially vulnerable to nutritional problems due to age related changes in their body (impaired physiological and anatomical capacity).
- Possible nutritional issues in old age
- Problems of procuring and preparing foods
- Psychosocial problems
- Digestion problems
- Nutrient absorption problems
- Renal changes
- Memory loss (senile dementia), which may include forgetting to eat
- Sensory changes
- Physical problems like weakness, gouty arthritis and painful joints.

SPECIFIC NUTRIENT REQUIREMENTS IN OLD AGE

An elderly person requires less energy than a younger individual due to reductions in muscle mass and physical activity. Some daily requirements for elderly people differ from those of younger adults. For example, in order to reduce the risk for age related bone loss and fracture, the requirement for vitamin D is increased from 200 IU/day to 400 in individuals of 51–70 years of age and to 600 IU/day for those over 70 years of age. Suggested iron intakes reduce however from 18 mg per day in women aged 19–50 to 8 mg/day after age 50, due to better iron conservation and decreased losses in postmenopausal women compared with younger women.

Some elderly people have difficulty getting adequate nutrition because of age or disease related impairments in chewing, swallowing, digesting and absorbing nutrients. Their nutrient status may also be affected by decreased production of chemicals to digest food (digestive enzymes), changes in the cells of the bowel surface and drug–nutrient interactions.

Some elderly people demonstrate selenium deficiency, a mineral important for immune function. Impaired immune function affects susceptibility to infections and tumours (malignancies). Vitamin B6 helps to boost selenium levels, so a higher intake for people aged 51–70 is recommended.

Nutritional interventions should first emphasise healthy foods, with supplements playing a secondary role. Although modest supplementary doses of micronutrients can both prevent deficiency and support immune functions, very high dose supplementation (example, high dose zinc) may have the opposite effect and result in immune-suppression. Therefore, elderly people also need special attention with regard to nutritional care.

Nutritional Requirements Throughout the Life Cycle: Conclusion

Requirements for energy and micronutrients change throughout the life cycle. Although inadequate intake of certain micronutrients is a concern, problems also come from the dietary excesses of energy, saturated fat, cholesterol and eating refined carbohydrates, all of which are contributing to obesity and chronic disease.

ELDERLY PEOPLE

Below is a summary of the number of meals required at different stages in the lifecycle that might assist you in your work in your community.

Need at least two and if possible more meals each day as they may not eat much at each meal. They need fewer calories than younger people, but about the same amount of protein and other nutrients. Women who have stopped menstruating need less iron than childbearing women. Old people may need soft food.

MEN

Need at least two mixed meals every day and some snacks. They can get enough energy from few large meals and from bulky food.

WOMEN

Need at least two mixed meals every day and some snacks. If they are pregnant or lactating they need as almost as much food as men, especially if they are also doing hard physical work. They need much more iron and folate than men especially when they are pregnant.

ADOLESCENTS

Need at least two large mixed meals and some snacks each day. They can eat bulky food. Boys need a lot of calories. Girls need plenty of iron. Pregnant adolescent girls are still growing so they need more food than pregnant women.

SCHOOL AGED CHILDREN

Need at least two to three mixed meals and some snacks each day.

CHILDREN 1-5 YEARS OLD

Need breastmilk until they are at least two years old. They need at least three mixed meals and two snacks each day. They cannot eat large bulky meals. It is especially important for the meals to be clean and not to contain parasites or microorganisms that could cause diarrhoea or other infection.

BABIES 6-12 MONTHS

Need breastmilk eight to ten times or more each day. They need small meals, which are not bulky, three to five times a day.

BABIES UNDER 6 MONTHS OLD

Need only breastmilk at least eight to ten times each day.

As a Health Extension Practitioner, you can assist families in choosing foods that keeps energy intake within reasonable bounds, while maximising intake of nutrient-rich foods, particularly vegetables, fruits, legumes and whole grains.

THANK YOU