

Chapter 15: Lifecycle Approach to Healthy Diets

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Chapter 15: Lifecycle Approach to Healthy Diets

Good nutrition is essential for survival, physical growth, mental development, performance, productivity, health and well-being across the entire life span: right from fetal development up to birth, childhood, adulthood and aging. Nutritional needs and concerns vary during different stages of life. Nutritional needs should be met at every stage of the life cycle because nutritional status at one stage influences health status at a later stage.

This chapter focusses on how the individual's nutrient needs change through the lifecycle. If these needs are not met, they can adversely affect growth and development. For instance, iron deficiency experienced by young children can decrease intellectual capacity, and adequate vitamin D status during adolescence and early adulthood decreases the risk of breast cancer in older women. A focus is needed on meeting nutritional and other health needs of individuals during every stage of the life cycle in order to prevent diseases and promote good health.

Healthy individuals require the same nutrients throughout life, but amounts of nutrients needed vary based on age, growth, and development. Nutrient needs during each stage of the life cycle can be met through a variety of foods. There is no one best diet for everyone. Traditional diets defined by diverse cultures and regions provide the foundation for meeting individuals' nutritional needs.

The amount of nutrients needed by individuals vary depending on:

- Age
- Illness
- Body size
- Lifestyle habits (e.g. smoking, alcohol intake)
- Physical Activity
- Genetic traits
- Medication use
- Growth
- Pregnancy and lactation

Importance of first thousand days

The "First 1000 days" begin from the day a woman conceives and continues till the child turns two years of age (Figure 1).

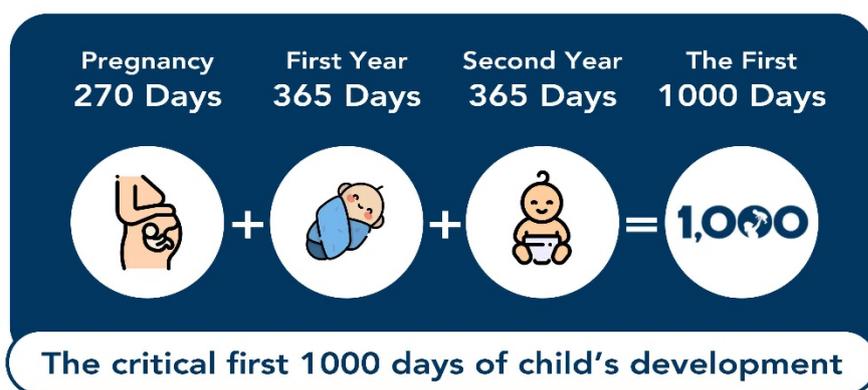


Figure 15. 1: The First 1000 days

The first 1,000 days is a unique period of opportunity when the foundation of child's optimum growth and development across the life span is established. This critical period of growth and development is largely affected by maternal and child nutrition. It is a period of great opportunity to provide adequate nutrition for the child without which the child becomes vulnerable to various birth defects and health problems. Inadequate nutrition before and during pregnancy may lead to low birth weight, poor mental development, greater chances of diseases such as overweight/obesity, diabetes, high blood pressure, heart diseases in later life and even death of the child. Therefore, it becomes critical to provide appropriate nutrition during the first 1,000 days of life. Let us now understand the entire 1,000 days in three stages with the focus on nutrition.

STAGE 1: Period between conception to birth of the child i.e. first 270 days.

STAGE 2: Period from birth of the child to 1 year i.e. 365 days.

- a. Stage 2a: Birth to 6 months.
- b. Stage 2b: Six months to 12 months.

STAGE 3: Period between 12 months to 24 months of child's age.

The World Health Organisation identifies early childhood as the most important developmental phase throughout the lifespan, with lasting impacts that will affect the individual and the community. Essential nutrients are important for brain development, healthy growth and a strong immune system. Major public health problems such as obesity, diabetes, heart disease, cancer and mental health problems which were once regarded as adult issues, are largely shaped by how the baby is nourished in the womb and during the first 1,000 days' period. Experiences in early childhood are also related to criminal behaviour, literacy level and employability.

Alarming Facts

Almost 21% of children under the age of 5 are stunted, as a result of chronic malnutrition. The effects of stunting last for the lifetime, beginning with lower IQ, weakened immune system and greater risk of diseases in later life. Children who are stunted, frequently earn upto 20 percent lower than average adults. (UNICEF/WHO/World Bank, 2020; UNICEF, 2012)

According to UNICEF (2012), children who get the right nutrition during this time

- are 10 times more likely to overcome most of life threatening childhood diseases
- complete 4.6 more grades at school
- go on to earn 21% more in wages as adults
- are more likely as adults to have healthier families

Nutritional care during pregnancy

The effects of poor nutrition in early life impact not only the child's health but also that of the child's offspring. In this way, the damaging effects caused by poor nutrition in early life have the potential to cascade down through generations. It is critical to break this cycle of malnutrition; otherwise undernourished girls will become undernourished women who give birth to low birth weight infants.

India has made groundbreaking progress in recent years in reducing maternal deaths during pregnancy. These have been possible because of the following schemes, initiatives and programs:

1. Institutional deliveries – Women are encouraged to deliver in hospitals and health care centres rather than at home. India has made a concerted push to increase access to quality maternal health services and hospital deliveries now stand at 79%.
2. State-subsidized schemes like the Janani Shishu Suraksha Karyakram – which allows all pregnant women delivering in public health institutions to free transport and no-expense delivery, including caesarian section.
3. Pradhan Mantri Surakshit Matritva Abhiyan, which allows women access to antenatal check-ups, gynecologists and to track high-risk pregnancies – exactly what is needed for healthier pregnancy outcomes.

Importance of healthy diet

During pregnancy, the quality of a mother's diet and the rate of weight gain are two of the most crucial factors that influence a child's future health. An inadequate diet will place the baby at risk for developmental delays, birth defects and poor brain development. When a woman lacks sufficient folic acid before becoming pregnant and in the early weeks of her pregnancy, it can lead to birth defects of the brain and spine (neural tube defects) that can cause death or lifelong disability. According to NFHS 4 data, more than half of the women in the reproductive age are anaemic. Although the pregnant woman needs to consume a balanced diet and the requirement for all nutrients increases, nutrients which are critical during pregnancy include:

- **Iodine** for foetal brain development and growth
- **Folic acid** to prevent birth defects and for better fetal development
- **Iron** to help in foetal brain development, expansion in blood volume and growth.
- **Vitamin B12** to prevent anemia and for nerve health.
- **Vitamin D** for calcium absorption and bone development.

In addition, the pregnant woman needs to take care about her meal timings and frequency, fluid intake, exercise and monitor weight gain. She should eat small and frequent meals as she will be unable to eat enough at a single meal. Foods rich in fats and spices should be avoided to prevent heartburn. She should avoid the foods or factors which trigger nausea such as smell of certain foods during initial months. Plenty of fluids should be taken to avoid dehydration and constipation. Gestational diabetes or hypertension need to be treated and appropriate medical nutrition therapy provided.

How does mother's weight gain affect the baby?

The weight gained by the woman during her pregnancy has a powerful influence on her child's lifelong health. Mothers' nutritional status also affects the birth outcome. Underweight and overweight mothers both have an adverse effect on the growth of foetus. Obesity in pregnancy poses a threat to a baby's future health. For example, it puts women at risk for gestational diabetes—a condition in which women exhibit high glucose levels during pregnancy. Gestational diabetes negatively impacts the baby's development in the womb and makes him more susceptible to obesity and type 2 diabetes later in life. Excessive weight gain during pregnancy significantly increases the risk of childhood obesity. Moreover, women who are already overweight, before they become pregnant, will have children who are more likely to have problems maintaining a healthy weight later in their life.

Nutritional care during lactation

In order to support breast feeding, the mother's body undergoes a number of physiological changes. Lactation is a period which puts great demands on maternal tissues as her breast milk has to meet the needs of a fully developed and rapidly growing infant. Adequate nutrition is very important to ensure good health of both mother and child. The effects of any nutritional inadequacies during this period can adversely affect the total quantity of milk produced. The nutrient content of the milk is usually maintained at the cost of maternal tissues, however the levels of certain nutrients in mother's milk can reduce if the mother is severely under nourished.

Lactation therefore is an important period and care needs to be taken to ensure good maternal nutritional status. The energy and protein requirement of the nursing mother increases along with several micronutrients. The additional micronutrients which the nursing mother needs to include in her daily diet include:

- **Calcium:** to replenish calcium secreted in the milk and ensure good bone health for mother and child.
- **Vitamin A:** secreted in breast milk, important for growth and development of baby, immunity and its role in vision
- **Vitamin C:** secreted in breast milk, important for collagen synthesis, immunity
- **Folic acid:** prevents anemia, important for growth and development
- **Vitamin B12:** prevents anemia, important for growth, development, and nerve health

Successful lactation requires adequate nutrition and rest, in addition to family support and encouragement. The nursing mother should take a lot of fluids to support the secretion of nearly 800 ml of milk during the initial 6 months. Small and frequent meals are better accepted as the mother needs to consume additional food to meet the increased energy needs of the body. There are no food restrictions during lactation except strongly flavoured and spicy foods, smoking, alcohol and drug abuse as they may pass into breast milk. Also, any medications if required should be taken under strict medical supervision only as they may also pass into breast milk.

Nutritional care during Infancy

A child's birth weight and whether the baby was born full-term or not are important markers of future health and development. Low birth weight is a leading cause of infant deaths in India. A baby is considered to be low birth weight when she weighs less than 2.5 kgs at birth. Intrauterine growth restriction due to poor maternal health and nutritional status may lead to low birth weight. **Premature babies**— that is babies born before 37 weeks of pregnancy also require additional care.

Why exclusive breast feeding is very important for babies?

- From birth through the first year, breastfeeding provides the healthiest start to the newborn. For the first 6 months the babies should be exclusively breast fed i.e. they shouldn't be given any other fluid or food including water. Giving infants water, other liquids or other foods before six months, reduces the breast milk consumed, and may introduce germs leading to disease and malnutrition.
- It is very important that newborns get colostrum, the first thick yellowish milk from the breast which is the child's 'first vaccine' and the best protection that she can have against illness, disease and death.
 - a. Breastfeeding within one hour of life protects the child from infections and reduces the risk of death by nearly 22 % in the first month of life. Every mother should start breastfeeding within one hour of life to take advantage of the newborn's intense suckling reflex and alert state to stimulate breast milk production.

- b. Starting breastfeeding within one hour of life and learning to breastfeed properly (positioning and attachment), helps the mother produce more milk for her child.
- Skin-to-skin contact with the mother through breastfeeding keeps the child warm and fosters mother-infant bonding.
- Breastfeeding on demand should be encouraged.

Children who are exclusively breast fed are 14 times more likely to survive the first six months of life than non-breastfed children. Mother's milk is all they need for survival and for optimal growth and development.

- Babies who are breastfed continue to be exposed to a wide range of flavours from their mothers' diet through her breast milk. This plays a key role in determining what foods are familiar to and thus preferred by the baby.
- Breastfeeding is a natural birth control measure as it helps to increase the time between pregnancies, which naturally help to space births.
- Exclusive breastfeeding is also financially advantageous as families do not need to spend money on expensive infant foods.
- It is not just the babies who benefit from breastfeeding. A longer duration of breastfeeding is associated with lower risk of overweight, obesity, type 2 diabetes, ovarian cancer, breast cancer and heart disease for the mother.

Thus breastfeeding-friendly workplaces and public spaces should be created to improve support for mothers to breastfeed. Organisations should provide paid parental leave and family-friendly workplace policies to support parents to give their children the strongest start.

How long should breast feeding be continued and when should the baby be weaned?

Babies should be exclusively fed on breast milk for the first 6 months of their lives. All the possible support should be given to the young mother to pursue breastfeeding for the first six months. This should be followed by continued breastfeeding for up to 2 years, alongside the appropriate introduction of complementary foods at 6 months.

If mothers must return to work within first year, they should be encouraged to express and store breast milk, which can be given to the baby while the mother is at work. The reasons why women avoid or stop breastfeeding vary, but women who want to breastfeed need stronger support from their families, communities, healthcare providers and employers.

By the end of sixth month, breast milk alone is not enough to meet an infant's nutrient requirements. Therefore, complementary feeding should begin at the seventh month. Babies who begin to eat solid foods before the age of 6 months are at greater risk for food

allergies. Age-appropriate complementary feeding adequate in quality, quantity and frequency should be available for children from 6-24 months. Young children have a very small stomach thus small frequent feeds are recommended. Infants should be fed slowly and patiently. Children should be presented with a variety of nutrient-dense foods to fuel their growth and development. A varied diet will also help shape their taste preferences for adulthood. Cow's milk as a drink should be avoided for the first 12 months (as babies can become allergic to it), though it can be used in the preparation of a dish such as porridge. Six monthly vitamin A supplementation is recommended.

Salt and sugar should not be introduced in the child's diet in the first year. Use natural fruits and vegetables to impart flavour. Mild flavours are preferred by infants. The temperature of the dishes should be neither hot nor cold. In fact, infancy is a golden window of opportunity to influence a child's preference for healthy foods. New foods should be introduced one at a time in small quantities, and tolerance to the food evaluated before presenting a larger serving to the infant. Introducing new foods at a time when the infant is hungry ensures better acceptance. The texture and consistency of the food also changes as the infant grows from strained gruels of flowing consistency to a semi-solid dish like mashed *khicheri*. By the age of one year the infant is ready to start the family meals albeit with less spices (texture to remain soft and mashed till teeth erupt for effective chewing).

What precautions should be taken during the weaning stage?

Infants aged 6 to 12 months old are more likely to suffer from diarrhoea than any other age group as this is the time period when they start eating complementary foods. If these foods are not handled in a safe and clean manner, it can lead to diarrhoea, illness and malnutrition. The following precautions need to be taken while preparing meals for infants:

- Boiled water should be given to infants and used for making their foods.
- Safe handling of foods and hygienic cooking and feeding practices are extremely important, as food contamination and subsequent diarrhoea contributes to 25% of undernutrition in infancy.
- Washing parents' and children's hands with soap before preparing and eating foods is one of the most important ways of preventing germs from getting into food and avoiding diarrhoea in young children. Hand washing with soap alone prevents up to 50% of childhood diarrhoea.
- Food served immediately after cooking and stored safely, reduces the risk of germs getting into food.
- Using clean utensils and crockery will stop germs from getting into food.
- Feeding bottles, which are difficult to keep clean, should be completely avoided. Instead cups and spoons should be used.

- Improper disposal of stools and subsequent unclean hands lead to germs entering the body of young children, causing diarrhoea, other infections and leading to growth failure and poor development.

Childhood - the growing years

“A child’s body needs nutrition, not just food”

- Julie Webb Kelley

Growth and development are a continuous process whereby each year builds upon the preceding one. In the pre-school age, the child grows more in height. The body fat decreases but as the child enters middle childhood years, there is an adiposity rebound. The child gains about 5-7cms in height and about 2-3kg weight every year. In middle childhood along with gross muscles, fine muscles develop rapidly. By tracking the growth, children with growth deficiencies such as stunting, wasting or underweight or overweight/obesity can be identified at an early stage and intervened. So, before we start to offer nutrition counseling, nutritional assessment is of topmost priority.

Importance of nutrition

Good nutrition improves the child’s physical well-being as well as cognitive development, leading to better growth and academic performance. Counselling of care givers on nutrition and healthy eating for children is important. Both quality and quantity of food intake from each food group needs to be focused on.

Nutrient requirements are high during the growing years. Dietary energy must be sufficient to ensure growth and spare protein to be used for tissue synthesis. At the same time care has to be taken to not allow excess weight gain and obesity. As the child grows the energy requirements also tend to increase during periods of rapid growth. The brain needs energy to function properly and hence the supply of glucose is relevant and critical. Cognitively demanding tasks, such as schoolwork, require regular supplies of glucose to the brain in order to enhance cognitive functioning and improves memory and mood. The major sources for energy are fats and carbohydrates.

Carbohydrates is the main source of energy for school-age children. The recommended intake of carbohydrates is approximately 60% of the total energy intake. Complex carbohydrate sources such as whole grains, fruits, vegetables and legumes should be chosen instead of refined carbohydrates like refined grains (Maida, corn flour etc.), fruit juices with added sugars or other foods with high sugar content. Foods with high fat, sugar and/or salt such as chocolates, cookies, puffs, patties, samosa, burger, pizza, carbonated beverages should also be avoided as these may lead to obesity and associated health problems.

Suggested intake of fat is not more than 30% of total energy being contributed by fat, mainly from mono- and polyunsaturated fats. Sources of these healthy fats include vegetable oils, peanut butter, nuts and seeds. Essential fatty acids especially omega-3 fatty acids, are important for the child’s cognitive development. Food sources high in omega-3

fatty acids include green leafy vegetables, whole grains, fatty fish, walnuts, soybeans, flaxseeds and pumpkin seeds.

As proteins are essential for muscle strengthening, body growth, maintenance, and to enhance immunity, protein requirements gradually increase as the child grows. High-quality protein foods include eggs, dairy products, meat and seafoods. The other protein rich sources include processed soy products, legumes, nuts and oil seeds. Vitamins and minerals are an integral part of healthy nutrition since they perform several functions in body. Children of school age are more prone to developing micronutrient deficiencies that can have adverse influence on their overall performances. Some nutrients of concern are listed below:

- **Vitamin A** deficiency in children may lead to night blindness.
- **Vitamin D** is required for bone growth and calcium metabolism. Lack of vitamin D (Sunshine Vitamin) leads to Rickets in especially children not exposed to sunlight.
- **Calcium** is important to support bone growth
- **Iron** deficiency anemia can affect the cognitive performance of children
- **Vitamin C** enhances the absorption of iron from meals besides providing other benefits.

Factors affecting dietary pattern

Most young children need some structure and routine to their day. Generally, they prefer meals and snacks at regular times, as governed by the family's lifestyle. They have a preference for simply prepared, mild tasting foods that they can easily handle. At this age children also tend to develop negative and positive associations with food. For example, sweets and chocolates which are given by parents as rewards for good behavior may be associated with positive emotions. On the other hand, foods which parents sometimes force their children to have like milk may get associated with negative emotions. It is important to know that early impressions associated with various uses of food, affect food-related attitudes and practices throughout life. When they grow up, they will be averse to consuming foods which evoke negative emotions. Food preferences can be influenced by parents and friends; as well as media advertisements may influence the child to select certain foods over others.

In contrast to the pre-school age where familial influence is higher, in the school-age, children are more influenced by their peer group. The food habits of school-age children are more scheduled due to specific school timings. However, many external influences may affect the child's food choices. It is estimated that children are spending more time in front of a screen (television, computer and mobile) rather than in outdoor recreation. The effects of this include decreased physical activity and hence loss of appetite. Studies have shown that television advertising influences children's food preferences and purchasing requests resulting in inclusion of unhealthy foods which increase the risk for obesity, dental caries, deficiency of micronutrients etc. Social events and parties often promote unhealthy eating habits.

The food served in school canteens or school lunch programs (Mid day meal programme in India) also influences the food choices of children. Availability of junk foods in or around the school acts as an enticement, and children land up making poor food choices. Hence it is very important to control the sale/service of unhealthy foods in the vicinity of schools. The Food Safety and Standards (Safe Food and Balanced Diets for Children in School) Regulation (2020) will regulate the sale of HFSS foods in schools and ensure that only healthy meals are served in schools.

Inculcating healthy eating practices

It is common among school children to skip breakfast. This makes the child feel inattentive and tired during class hours. Skipping breakfast affects both the nutritional status as well as the school performance of the students. Empirical evidence from research on the effects of breakfast on cognition shows that particularly for younger children, skipping breakfast can have adverse effects on both general energy levels and cognition of school children. The reason for skipping breakfast has to be identified and addressed.

As long as a child is at home the whole day, the mother can feed him meals. However, as soon as children enter school, they need to start eating a meal or two on their own. While packing tiffins the mothers need to make sure that it should be an item which is easy for the child to eat. The meal must be simple yet nutritious. For example, a vegetable-stuffed chapati or mixed vegetable rice or dal chawal cooked with vegetables can be chosen instead of too many items like chapati/rice, dal and sabzi separately.

Classroom lessons must include a subject on healthy eating habits. For small children the teacher may need to supervise the lunch ensuring that children inculcate good eating manners and finish their lunch.

Special effort needs to go into feeding a fussy eater. Active feeding rather than forced feeding should be done so that mealtimes do not become unpleasant for the child. Healthy foods of their choice must be packed, and variations must be considered. In a few cases, getting an attractive lunch box will also help to motivate the child into eating. For these children, mothers should involve them in the cooking process and teach them the benefits of each food. Family pot eating and family mealtime is important. Having meals together helps the child understand the importance of each meal. The whole family needs to eat healthy to inculcate healthy habits in the child.

Children who are underweight may need special care and attention. Children who are obese need to cut down unhealthy snacking especially on non - nutritive energy dense food. A study shows that for children of school going age, snacks may contribute up to one-third of the total calorie intake for the day. This is generally after-school snacks which are majorly influenced by peer pressure. Regular consumption of outside food increases the body weight and results in obesity. Children frequently consuming sweet foods such as sweets, chocolates, jellies, pastries, sugar sweetened beverages followed by poor oral hygiene tend to develop dental caries. Hence good oral hygiene is important.

Anaemia reduces the attention capacity of the child and brings down the academic performance. It may hinder the growth and development of the child. It is important to take care that iron rich foods are included in daily meals along with vitamin C rich foods for better

absorption of iron. Inhibitors of iron absorption (e.g. tannin, oxalate, phytate and calcium) which reduce the bioavailability of iron from the food should not be consumed along with meals rich in iron. Tea, coffee, tamarind, cocoa are few beverages and foods which have these inhibitors.

Adolescence – a critical period of development

Adolescence is the period of transition from childhood to adulthood and a period of rapid growth and maturity both physiologically and psychologically. Adolescence has been referred to as a window of opportunity to prepare for a healthy productive and reproductive life and prevent the onset of nutrition related chronic disease in adult life. The three dimensions of growth during adolescence are physical growth, mental and emotional blooming and sexual development. Inadequate intake of nutrients can result in slow growth and delayed sexual maturation.

WHO (2010) defines adolescence as the segment of life between the ages of 10-19 years. Considering the major physical, cognitive and emotional changes that take place, this age group is further divided into 3 stages:

- Early Adolescence: Ages 10-15 years
- Middle Adolescence: 14-17 years
- Late Adolescence: 16-19 years

Nutritional needs during Adolescence

During adolescence, the linear growth of childhood is suddenly altered by an increase in the velocity of growth. Almost 80% of adolescent growth is completed during early adolescence. Post-puberty, the growth spurt decreases. Growth spurt in adolescence is associated with cognitive, emotional and hormonal changes. Nutritional needs vary during adolescence. They are different for males and females. This is mainly due to differences in growth spurts and sexual maturation. Puberty hits females between the age group 10-14, whereas for males it occurs between 12-16 years of age. Differences are seen not just in caloric and macronutrient requirements, but also in the requirements of micronutrients. Iron requirements are generally higher in females due to increased physiological demands and menstrual losses. It must also be noted that there are differences in body composition. Boys have greater muscle mass as compared to females. Approximately 45% of the skeletal mass is added during adolescence. Girls on the other hand tend to accumulate more fat than muscle tissues.

Energy and Protein requirements: The considerable increase in energy and protein requirements is attributed to the gain in weight and height along with increase in muscle mass in boys and fat mass in girls. Increment in requirements correlates with growth patterns, with the peak in requirements occurring at the peak growth period of adolescence. While considering protein requirements, it is important to consider the quality of proteins and not just quantity. Good quality protein should be provided daily by including

sources of good quality protein viz. milk and milk products, eggs, meat, fish and/or by using ideal food combinations of cereal and pulse (e.g. *Dal-Roti*/rice, *khichdi*, etc.). Most Indian diets lack protein and thus efforts must be made to include a serving of good quality protein in every meal of an adolescent.

Minerals and Vitamins: Minerals and vitamins play a critical role in the growth and development. The role of these micronutrients is considered to be very crucial due to the peak in growth velocity, increase in body size, body density and puberty changes. Micronutrients are involved in various physiological processes in the form of catalytic enzymes, hormones, structural components and protective agents. Thus, it is necessary to ensure the provision of a diet that supplies all essential micronutrients in required amounts. Iron and calcium are two minerals for which the requirement increases as the blood volume as well as skeletal mass is increasing. If adolescents in the age group of 13-17 years fail to meet calcium requirements they may not achieve their peak bone mass, thus increasing the risk of developing osteoporosis at a later age. Adolescent girls are at increased risk of anaemia due to rapid growth and development in adolescence and menstruation which increases the demand for iron. Zinc is important for growth and sexual maturation in adolescent.

Nutritional Issues and Dietary Challenges

Adolescent growth and development are linked to the quality of the diet they receive during childhood and adolescence. Adequate nutrition of any individual is determined by two factors: (1) adequate availability of food in terms of quantity as well as quality, which depends on socioeconomic status, food practices, cultural traditions, and intra-family allocation of the food, (2) the ability to digest, absorb, and utilize the food. This ability can be hampered by infection and metabolic disorders.

Food choices made by adolescents is a major factor that impacts the nutritional status and thus the health status of this age group. Factors that influence food choices of adolescents are:

- Taste
- Peer influence, food trends and fads
- Mood
- Body image
- Food habits as influenced by family, culture, religion
- Influence of media, celebrity endorsements, Influencers
- Convenience foods

Mass media as well as social media play a big role in influencing adolescents. Use of social media has now become an addiction to many and it greatly affects self-perception and body image. Besides the physical ill-effects of increased screen time, social media has a greater impact that influences choices, behaviour patterns, and mental health and lifestyle habits. This powerful form of media should be used in a positive manner to provide authentic health and nutritional messages.

Adolescent health problems include sexual health issues, teenage pregnancy, problems related to menstruation, drugs, tobacco and alcohol abuse, anaemia, eating disorders, obesity, behavioural problems and oral health. Many teens may describe themselves as being overweight despite being of normal weight, signifying a distorted body image. This leads to eating disorders like Anorexia Nervosa, Bulimia Nervosa and Binge eating.

Anorexia nervosa is characterized by failure to maintain an adequate body weight, body image disturbance, and excessive dietary restriction and it may be accompanied by periodic binge eating and purging (e.g., self-induced vomiting, laxative use). The symptoms include muscle wasting, growth retardation, dry brittle hair, dry skin, and amenorrhea (absence of menses).

Bulimia Nervosa is characterized by recurrent binge eating (consuming large amounts of food while feeling out of control) accompanied by compensatory behaviors to prevent weight gain, and body image disturbances. Compensatory behaviors may be purging (self-induced vomiting, laxative, diuretic, or enema use) or non-purging (excessive exercise, fasting). Salivary gland enlargement, dental problems, heartburn, bloating and irregular menstrual periods are some common problems associated with bulimia nervosa.

Tendency to rely exclusively on junk food like potato chips or fries, burgers, pizzas, chocolates, etc. and consuming carbonated and, sweetened beverages on regular basis is on the rise among this age group. These snacks are easily available, convenient to be carried and inexpensive. Though most of these are energy dense due to their high fat/carbohydrate contents, they are devoid of important nutrients.

Skipping of meals is a common practice in this age group and this is more common in girls than boys. Girls generally miss meals in an effort to lose/maintain weight. Generally, breakfast, which is the most important meal of the day, is not consumed. When adolescents skip meals they tend to consume more snacks and fast foods which tend to be energy dense and low in other essential nutrients. Adolescent obesity is emerging as a major health problem, especially in urban populations. The reason is increased consumption of calorie dense foods and at the same time decreased physical activity. Obesity increases the risk for diabetes, heart disease, hypertension and polycystic ovary syndrome (PCOS) in girls.

Thus, it is important to promote not just good eating habits but also a good lifestyle which includes regular physical activity/exercise. Well-nourished adolescents ensure a healthier future of the nation.

Healthy diet during adolescence

Although dietary tips on food choices remain similar throughout the lifecycle, Figure 2 puts together foods to be encouraged and discouraged for the adolescents.

HEALTHY EATING TIPS

	
 Eat three meals a day with healthy snack.	 Avoid packaged foods & the use of excess salt
 Increase the intake of fibre.	 Avoid the use of excess sugar, honey, jaggery
 Drink enough water	 Avoid fruit juices, excess caffeine & cola beverages
 Choose whole grains like whole wheat, oats, barley, amaranth, jowar, bajra	 Avoid refined flour and products made from it
 Choose a variety of vegetables, including dark green, red & orange.	 Avoid large portions of meals
 Choose lean cuts of meats, fish & poultry	 Avoid red meat & butter-based gravies
 Vary your protein source —choose more fish, nuts, seeds, peas, and beans.	 Avoid overdoing on protein intake
 Watch your screen time & perform regular physical activity.	 Avoid any Fad diets & seek only professional help when in need

Figure 15. 2: Healthy Eating Tips for Adolescents

Source: Dietary guidelines for Indians – A Manual. Dietary Guidelines for Indians – A Manual. (2011). Hyderabad: National Institute of Nutrition; "Stanford Children's Health - Lucile Packard Children's Hospital Stanford"

Besides these, it is also advisable to involve children in selecting and preparing foods. The home and the school food environment should be conducive for them to make healthy food choices. Poor food choices are often linked to non-availability of healthier food alternatives at home or in and around school.

Counseling related to excessive energy intakes among adolescents should focus on intake of discretionary calories, especially those from added sugars consumed through soft drinks and from solid fats consumed through snack foods and fried food. Tips should be provided for selecting nutrient-dense foods and beverages at all locations where teens spend their time. An ideal meal pattern for an adolescent age group is a three-meal pattern with two in between snacks – required to meet the multi nutrient requirements.

Adulthood and Healthy Ageing

Adulthood marks a long period which begins with the cessation of active growth. Population above 65 years is regarded as the geriatric age group. Aging is a normal process that begins at conception and ends at death. Once the body reaches physiologic maturity, the rate of catabolic or degenerative change may become greater than the anabolic regeneration. The resultant loss of cells can lead to varying degrees of decreased efficiency and impaired function. Lifestyle factors that seem to influence physiologic age are adequacy and regularity of sleep, frequency of consumption of well-balanced meals, sufficiency of physical activity, smoking status, extent of alcohol consumption, and body weight. Disease and disability are not always inevitable consequences of aging. The use of preventive service, elimination of risk factors, and adoption of healthy lifestyle behaviours are some of the major determinants of how well a person ages.

Dietary needs and nutritional concerns

Dietary needs of adults change with age due to the physiological changes which accompany aging. Some of these changes raise nutritional concerns and have to be managed by appropriate dietary interventions:

- The sense of taste, smell, sight, hearing, and touch often diminish at individual rates in the older adult. A reduction in taste and smell reduces appetite and hence overall food intake putting them at a risk of undernutrition. Impaired vision, and loss of functional abilities may prevent older adults from cooking and eating on their own. Improving the flavour of food by using a variety of spices and herbs may help increase appetite.
- **Xerostomia** (dry mouth) can cause difficulty with chewing and swallowing, which can result in the avoidance of certain foods. In such cases every meal needs to have a moist item to facilitate swallowing of the dry items. People who have missing teeth or who wear dentures often chew less efficiently, which can cause them to eat less hard-to-chew foods such as fruits, and raw vegetables. Modifications of food texture or consistency may make some foods easier to eat and therefore improve a person's overall nutrient intake.
- **Dysphagia**, a weakening of the gag reflex that causes swallowing difficulties, can affect a person's ability to safely consume foods. A person with dysphagia may need modifications in the texture or consistency of food, method of eating, or both.

- **Gastric atrophy**, alterations in gastric acidity, delayed gastric emptying, changes in bowel motility rates, decreased lactase activity, and medication usage can affect intake and availability of nutrients. These conditions can affect the bioavailability of nutrients, overall nutritional status, and the risk for developing chronic diseases such as osteoporosis.
- **Constipation**, which makes it difficult to pass stools or causes incomplete or infrequent passage of stools, is one of the most common digestive complaints in older adults. It can be caused by insufficient fluid intake, inadequate dietary fibre intake, limitations in mobility or activity, psychological factors, and medications. Constipation can often be resolved by increasing intake of dietary fibre, fluid, and increasing physical activity.
- During the aging process, blood vessels become less elastic and total peripheral resistance increases, leading to an increased risk for and prevalence of **hypertension** and **cardiovascular** diseases. Salt needs to be controlled in the diet as well as fats and simple carbohydrates, in order to keep blood pressure and lipid levels in check.
- **Renal function** and the glomerular filtration rate can diminish as much as 60% between the ages of 30 and 80 years, primarily because of a reduction in the number of nephrons, the functional unit of urine formation in the kidney, resulting in reduced blood flow. Consequently, older adults are often less able to respond to changes in fluid status and challenges to the acid-base balance. Excessive amounts of protein waste products and electrolytes may become increasingly difficult to metabolize, so dietary modifications may be needed.
- As people age, bone resorption becomes more than bone formation. The cause of **osteoporosis** may be age related changes such as decreased estrogen production associated with menopause. Decreased intestinal absorption of calcium and production of vitamin D, reduced physical activity and increased parathyroid hormone secretion may also cause osteoporosis. Many avoidable risk actors like sedentary lifestyle, emotional stress, inappropriate diet may contribute to osteoporosis.
- Every second woman of the reproductive age group in India is **anaemic**. Nearly one fourth of the men are also anaemic. Iron inadequacy can be caused by low dietary intake, impaired absorption possibly resulting from lack of heme iron or vitamin C or blood loss. Treatment may involve using iron supplements together with a diet providing iron sources of high bioavailability and vitamin C to enhance absorption.
- Both forms of **malnutrition** -undernutrition and overnutrition may plague both the adults and elderly.

Nutrition plays an important role in delaying the ageing process. While planning diets for adults and elderly the physiological conditions as well as any existing pathology should be kept in mind. Elderly may require food with special modifications in texture and consistency.

To maintain a healthy life, one should keep in mind quantity of nutrients of concern like saturated fat, trans fat, sodium and added sugar in the diet. Excess consumption of these may increase the risk of obesity, metabolic syndrome, Type-2 diabetes, hypertension and other cardiovascular diseases and, certain cancers. Saturated fat and simple sugars intake should each provide less than 10% of energy. For further risk reduction less than 5 % energy from simple/free sugars is recommended. Salt intake should be less than 5g (1 teaspoon) in a day and trans fat intake should be less than 1 energy%.

Healthy lifestyle

As we have discussed in earlier chapters, healthy eating is the key for healthy living. Besides our diet, we need to focus on other aspects also which would lead to a healthy life. These factors include physical activity, stress, consumption of tobacco, alcohol etc.

WHO defines a healthy lifestyle as a way of living that lowers the risk of being seriously ill- a way of living that helps you enjoy more aspects of your life. Health is not just about avoiding a disease or illness. It is about physical, mental and social well-being too. When adults adopt a healthy lifestyle, they become a more positive role model for other members of their family, particularly children.

Healthy Eating – Eat Right Logo of FSSAI

The logo (figure 3) represents a healthy *thali* or plate to ensure a balanced and wholesome diet comprising all food groups in right quantity for a healthy life. Each colour in the logo represents different food groups. The size of the colour depicts the quantity of the food to be consumed.

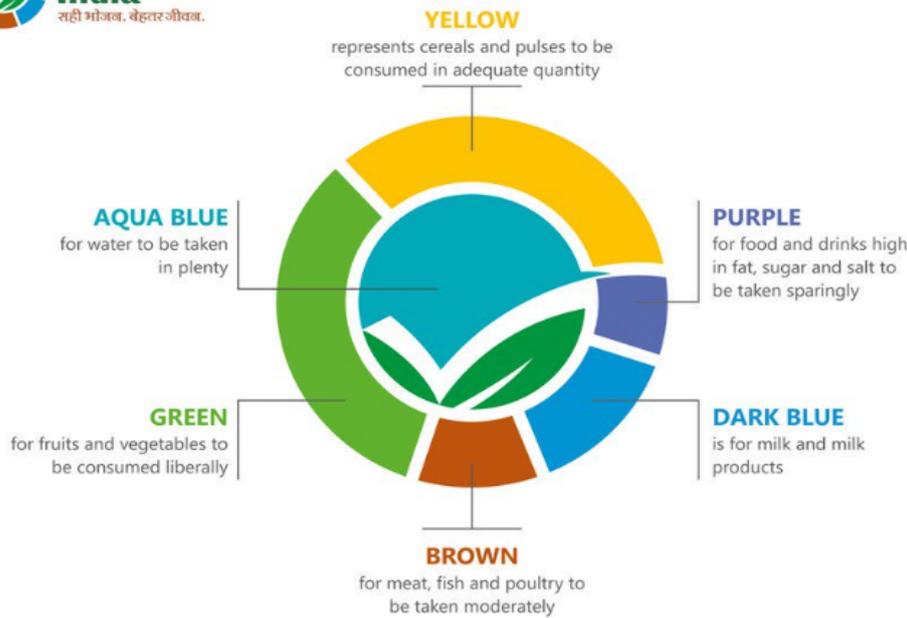


Figure 15. 3: Eat Right Logo of FSSAI

Physical activity and exercise is a major contributor to a healthy lifestyle. Physical activity is necessary to stimulate the body’s own natural maintenance and repair system. It is vital for the health of bones, joints, muscles, lungs and heart. Physical inactivity increases the risk of several diseases - coronary heart disease, stroke, high blood pressure, osteoporosis, etc. and in addition can contribute to poor posture, overweight, breathlessness, flabby body, low energy levels and stiff joints. Regular exercise can prevent and reverse age-related changes like decreases in muscle mass and strength, improve balance, flexibility, and endurance, and decrease the risk of falls in the elderly. Regular exercise can help prevent coronary heart disease, stroke, diabetes, obesity, and high blood pressure. Regular, weight-bearing exercise can also help prevent osteoporosis by building bone strength. It can help chronic arthritis sufferers improve their capacity to perform daily activities such as driving, climbing stairs etc. It also increases self-esteem and self-confidence, decreases stress and anxiety, enhances mood, and improves general mental health. Regular exercise can help control weight gain and, in some people, cause loss of fat. Box 1 outlines an action plan for increasing the physical activity level while Box 2 talks about the amount of sleep needed for different age-groups.

Box 1: Action Plan for Increasing Physical Activity

1. If you are not physically active identify when you could be more physically active and how (e.g. put more physical effort into housework; walk briskly, get off the bus or tram one stop earlier; choose to climb the stairs even if there is a lift, play sports).
2. Start slowly – don't do too much too soon. Listen to your body: if you experience dizziness, nausea, pain and extreme tiredness you are doing too much too soon.
3. If you are comfortable with what you are doing increase the amount of exercise and build it up gradually.
4. Aim at half an hour of moderately intense physical activity five or more days a week. Exercise can be broken up into smaller 10-minute sessions.

Almost any type of exercise (resistance, water aerobics, walking, swimming, weights, yoga, and many others) is helpful for everybody.

Smoking can cause respiratory illness, coronary heart disease and cancer. Use of tobacco causes cancers of the lung, mouth, lip, tongue, oesophagus, kidney, and bladder. It also further increases the risk of bladder cancer. Tobacco can cause atherosclerotic arterial disease (hardening and narrowing of the arteries) that can lead to heart attacks, strokes, and lack of blood flow to the lower extremities.

Drinking small amounts of **alcohol** may not be harmful for health however for many people it becomes difficult to draw the line. Raised blood pressure, which increases the risk of stroke; stomach disorders; depression and emotional disorders; cancers, particularly of the mouth, throat and gullet; hepatitis and cirrhosis of the liver; malnutrition; accidents at home, at work and on the roads; and suicides are some of the problems associated with alcohol consumption.

It is easy to become addicted to both tobacco and alcohol. Support and understanding from family members are often critical for sustained recovery. Medication can be useful for the prevention of relapses and for withdrawal symptoms.

Box 2: Get enough sleep daily

It is recommended that newborns (0-3 months) get at least 14 to 17 hours of sleep, infants (4-11 months of age) need 12 to 15 hours, Toddlers (1-2 years of age) need 11-14 hours, Preschoolers (3-5 years of age) need 10-13 hours, school age children (6-13 years) need 9 to 11 hours, and teenagers (14-17 years) need 8-10 hours and those 18 years and above need 7-9 hours of sleep. Older adults (65+ years) need about 7-8 hours but do not sleep as deeply and may awaken at night or wake early, so naps allow them to make up the total of seven to nine hours of sleep.

Source: <https://www.sleepfoundation.org/press-release/national-sleep-foundation-recommends-new-sleep-times>

Eating Mindfully

Nutrition researchers and practitioners have recently adopted the concept of “mindfulness” to better understand and modify dietary behaviour. Mindful eating, includes making conscious food choices, developing awareness of physical as opposed to psychological hunger; satiety cues, and eating healthfully in response to those cues. Mindfulness, even without specific training in mindful eating, may encourage people to better control portion sizes and choose less calorie-dense foods. Some simple tips which could be followed to ensure mindfulness while eating are:

- Stop eating when you are about 80% full even when eating something you love.
- Always judge the portion size before consuming any meal. When portion size of a dish is too large, share your dish.
- When you eat at “all you can eat” buffets, choose carefully and avoid tasting everything
- Even if there are dishes on the menu that you love, don’t take a second helping (especially when you are full).
- Avoid getting the larger size food or drink regardless of how hungry you are and how cost effective it is.
- Don’t get attracted to food advertisements and freebies (buy one get one offers or free gifts)- stop, judge and think about the benefits or harmful effects of eating that product.
- Don’t eat if not hungry.
- Avoid eating in front of a screen like television, mobile phone, tablet, computer etc. as the person does not realise what and how much they have eaten.
- Avoid any distractions while eating. Concentrate on your food and what you are eating at every meal.
- Avoid binge eating as an emotional response to when you are sad or stressed.

Summary

- Balanced diet is important during all stages of life with special attention required during pregnancy, lactation and infancy.
- During the first 1,000 days, the brain grows more quickly than at any other time in a person’s life. While a newborn’s brain is only one-quarter of the size of an adult’s, it grows to about 80% by 2 years of age. During this time in particular, protein, iron, zinc and iodine are essential to the toddler’s rapidly developing brain.

- Iron plays a very important role throughout the first 1,000 days and the damage done by iron deficiency in pregnancy and the first 2 years of a child's life can be irreversible. Iron deficiency in infants and toddlers can lead to impaired learning and social-emotional behaviour, including less alertness, increased irritability, less interest in play, contributing to poorer developmental outcomes. Early iron deficiency is also associated with higher levels of anxiety and depression later in life.
- Iron supplementation and deworming protect children from anaemia. Worms in children's intestine result in loss of nutrients including iron, therefore regular deworming is very important.
- On the other end of the spectrum, rapid weight gain throughout the first two years of life is associated with childhood obesity and other serious negative health outcomes throughout life.
- Adolescence is a period of change from childhood to adulthood. This is the time for the second growth spurt and hence good nutrition is very important.
- Adults should ensure a balanced diet along with a moderate level of physical activity. This would prevent the occurrence of diet related non communicable diseases.
- Nutritional needs of elderly should be modified based on any specific conditions they are facing. Special attention should be given as they are vulnerable to both under and over-nutrition.
- Mindful eating is a habit that needs to be inculcated from childhood itself. Knowledge about right food choices will help an individual to train their mind towards healthy eating.

Important Terms

- **Gestational diabetes:** Diabetes which develops during pregnancy
- **Anorexia nervosa:** Eating disorder characterised by a failure to maintain adequate body weight, body image disturbance and excessive dietary restrictions.
- **Bulimia Nervosa:** Eating disorder characterised by recurrent binge eating accompanied by compensatory behaviours to prevent weight gain and body image disturbances.
- **Low birth weight:** Birth weight less than 2.5 kg.
- **Premature:** Born before 37 weeks of gestation.
- **Colostrum:** The milk secreted after childbirth for the first few days. It is yellowish in colour and rich in nutrients.
- **Physical Activity:** The state of being active or in energetic action or movement.

- **Malnutrition:** Refers to the under/ over-nutrition or imbalances in the intake of energy, protein and/or other nutrients.

Exercises

1. What are the factors determining nutritional needs during the lifecycle?
2. List important vitamins and minerals required in increased quantity during pregnancy.
3. Why is it important for a pregnant woman to gain adequate weight during pregnancy?
4. What is colostrum? Why is exclusive breastfeeding important for the baby?
5. What is complementary feeding and explain the factors to be kept in mind during its initiation?
6. Explain the nutritional concerns of a school going child.
7. Why is adolescence considered to be a critical period of development?
8. What are the common conditions that impact the nutritional status in elderly?
9. Discuss how lifestyle changes can help ensure healthy ageing in adults.
10. What do you understand by 'mindful eating'?

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