UNIT 15 OLDER CHILDREN AND ADOLESCENTS

Structure

15.1 INTRODUCTION

We just got to know the meal planning and nutrient needs of fast-growing infants and preschoolers in the previous unit. In this unit, we move on to the next stage i.e., older children and adolescents and find out how their nutrient requirements vary from the younger children.

After preschool stage, the growth is steady and slow. The growth rate characteristic of infants and preschoolers does not continue during the school-age years. However, adolescence is marked with a rapid growth and increasing the nutrient requirements to all time high. This period offers an opportunity of 'catch up' and registers highest nutritional needs in the entire lifecycle. It is a critical period of nutritional care. In order to delay onset of degenerative diseases in adulthood, it is important that the faulty dietary and lifestyle practices are checked at this age so that they do not track into adulthood. In this unit, you would learn how important it is to develop good food habits, how to ensure adequate food intake and plan meals and diets for school children and adolescents.

Objectives

After studying this unit, you will be able to:

- describe the characteristics of the school years and adolescence,
- discuss the concept of catch-up growth, how to reduce gaps in what the child has achieved versus the maximum growth potential,
- list the recommended dietary intakes for the school child and adolescent, address the range of problems of nutritional and non-nutritional nature in this age group,
- discuss the important factors in planning meals and diets for school children and adolescents,
- promote good dietary and lifestyle practices to prevent obesity and early onset of degenerative diseases, and
- get sensitized to several government facilities extended for school children and adolescents to ensure long term good health.

15.2 OLDER CHILDREN AND ADOLESCENTS

Before embarking yourself to go through this unit, here is an activity for you to perform. Talk to 2-3 school boys and girls. Find what are their usual doubts related to food intake – both type and amount. Secondly, do they believe in special foods/ diets to achieve 'optimum' growth? Thirdly, find out what they consider as 'optimum' growth. Fourthly, ask them what faulty dietary practices are seen in other children of their age group.

Note: You will be surprised to know that they know a lot. Sometimes you feel wrong information crops in. The problem will be identified in the practices and the attitudes. Profound impact of media and peer pressure is clearly evident. Don't guide them yet, till you have actually gone through the contents of this unit and gathered some more relevant information and experience. This age group is very sharp and receptive.

So then get started. Read the discussion related to the growth of school children and adolescent presented next.

Older children (7-9 years) after preschool years grow slowly. This is called *latent period of growth*. WHO defines 10-18 years children as adolescents. *Adolescence is a period of second growth spurt after infancy*. Growth spurt refers to *a sudden increase in the rate of growth*. The rate of growth is not constant in both sexes. In both sexes it occurs in spurts.

Growth and development in children can be studied under the following heads:

- Changes in physical development and body composition
- Sexual maturity
- Psychosocial changes

Let us briefly discuss each of these and find out what are these changes.

15.2.1 Changes in Physical Development and Body Composition

The rate of growth slows considerably after the first year of life, as you may recall studying in Unit 14. In general, growth is steady and slow during the preschool years and school age years. This is a period of latent growth. This growth should not lag behind but may happen in the under privileged children. It should therefore be monitored in the less privileged poorer children and compared with the growth of normal well-to-do children as given in Table 15.1.

Table 15.1: Height (cm) and Body Weight (kg) of children and adolescents (5-18y) reported from WHO datasets

Age	Boys		Girls	
	Weight (kg)	Height (cm)	Weight (kg)	Height (cm)
5	18.5	110	18.3	110
6	20.5	116	20.2	115
7	22.9	122	22.4	121
8	25.4	127	25.0	127
9	28.1	133	28.2	133
10	31.2	138	31.9	139
11	34.6	143	36.2	145
12	38.9	149	41.1	151
13	44.3	156	46.0	156
14	50.6	163	50.1	160
15	56.5	169	52.8	162
16	61.3	173	54.7	163
17	64.8	175	55.7	163
18	67.3	176	56.7	163

Source: WHO, 2007

Following a period of slow growth during late childhood, the changes in adolescence is as rapid as that of early childhood. Puberty, *the process of physically developing from a child to an adult*, is initiated by physiological factors and includes maturation of the total body. Figure 15.1 illustrates the rate of linear growth during the adolescence years compared with that of early years of life. As you may have noticed, large gains in weight occurs in both infancy and adolescence years, whereas the very high length gain in infancy is never reached again. Adolescence, therefore, is one of the most challenging periods in human development. Adolescence is a period of second growth spurt after infancy. Most girls begin the adolescent growth spurt between the age of 10 and 13 years, whereas most boys begin it somewhat later, between the age of 12 and 15 years. Early maturing girls may begin their growth spurt as early as 7 to 8 years and boys at 9 to 10 years.

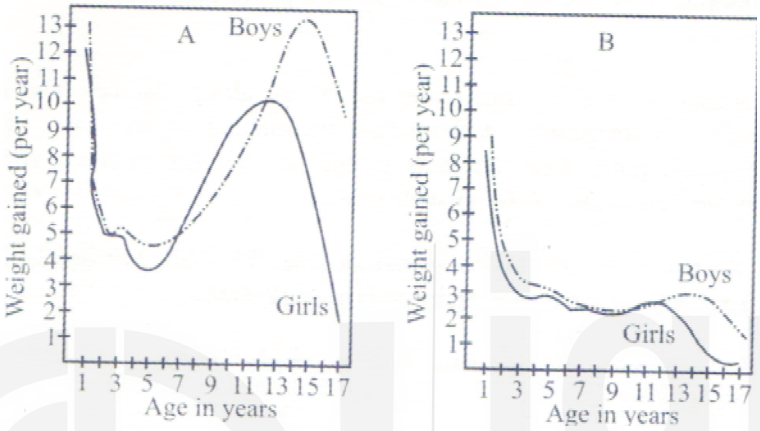

Figure 15.1: Growth rates

Nearly every organ in the body grows during this period of rapid growth. Most noticeable are increases in height and weight (as you may have noticed in Figure 15.1 and Table 15.1) and development of secondary sexual characteristics. During the growth spurt, girls gain about 25 cm height and boys 30 cm height. From age 10 years, girls tend to accumulate both lean body mass (LBM) and fat, whereas, boys tend to gain mostly lean tissue. The growth in LBM corresponds to increase in spontaneous physical activity in boys and increase in work capacity and heart volume. Boys double their LBM while girls increase by 1.5 fold.

Height gain is essentially complete by 19 years. Head size in proportion to total height shrinks from 1/4th to 1/8th between infancy to adulthood. Growth ceases in girls and boys when skeleton reaches its final size. Growth plates at the end of the bones, called *epiphyses*, fuse at different ages, beginning around 14 years of age in girls and 15 years of age in boys. Final stages in this process end at about 19 years of age in girls and 20 years of age in boys. Ultimate fusion prevents further increase in linear bone growth. Research data shows that undernutrition delays menarche in girls permitting them to increase height over longer period. The height gain may be delayed beyond 17 years in these girls. Despite this extended growth spurt, it is still possible that these undernourished girls do not realize their full genetic potential for growth.

The failure of the skeleton to show catch-up growth after early bouts of under-nutrition is important reason why total growth of the body is affected. Therefore, muscles can increase in diameter late in life but can grow no longer than the bones to which they are attached. A 15 year - old girl who is 4/ 8" tall cannot grow taller as a teenager. Girls experience their peak rate of growth before menarche. Once the growth spurt ceases in girls, which is 2 years after menarche, an adequate nutrient intake will help maintain health and lead to increased weight by allowing normal cellular hypertrophy.

Due to different growth patterns observed in boys and girls after 10 years of age, nutrient requirements are spelled out separately for 10+ years adolescents of both sexes. The criteria of meeting energy and protein requirements adequately are assessed from adequate weight and height instead of weight-for-age.

Next, we move on to the sexual maturity that occurs during the period of adolescence.

15.2.2 Sexual Maturity

Sexual maturity develops along with growth spurt in adolescence. In girls, growth stops on attaining menarche (puberty). Research data shows that in recent past, girls have gradually shown menarche at a younger age than earlier times. This is partly attributed to better nutritional status. The other changes seen in sexual maturity of girls is development of breasts, axillary hair and pubic hair. Menarche occurs only after this growth.

In boys, changes in sexual maturity and growth go along together. The secondary sexual changes are deepening of the voice, broadening of shoulders, developing axillary, body and pubic hair. There is growth in the size of penis and testicles occurring in the beginning of the growth spurt.

There are distinct changes in hormonal milieu. The sex hormones determine thermogenesis, moods, food intake and body composition.

Finally, let us review the psycho-social changes that occur during the period of childhood and adolescence.

15.2.3 Psycho-social Change

Adolescence is a period of maturation for both mind and body. Along with the physical growth, emotional and intellectual development are rapid. The child develops gradually the ability to reason, develop problem solving skills, and attain emotional maturity.

Adolescence marks a major shift from protected parental care to move into adult life pattern. During this transition, they try to build self-identity. Adolescents often feel uncomfortable with their rapidly changing bodies. Developing an image of the physical self is intertwined with nutritional issues. There is tremendous peer pressure. Peer pressure and some adult idol determine their food habits, dressing and group conduct. There is a tremendous impact of mass media on this age group.

Having looked at the physical, sexual and emotional changes characteristics of the adolescent period, next let us get to know how these changes influence the nutrient needs. But before we move on to this, let us try to recall what we have learnt so far. Answer the check your progress exercise 1.

Check Your Progress Exercise 1

1) Whom would you classify as school children? How is their pattern of growth and development different from infants?

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2) Enumerate a few features which influence the nutrient needs of a school child.

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3) Enumerate the characteristics specific to growth and development among children and adolescents.

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15.3 NUTRIENT NEEDS AND RECOMMENDED DIETARY INTAKES

Table 15.1 depicts growth of normal well-to-do Indian children. Their intake is the criteria to assess nutrient requirements till 10 years of age. In adolescence, maintenance and growth requirements can be computed separately for energy and protein. For mineral requirements, accretion data has given important data. ICMR (2010) gives requirements of 4-6 years and 7-9 years categories. After 10 years of age, boys and girls are separately categorized into three categories – 10-12 years, 13-15 years and 16-18 years – as illustrated in Table 15.2. The differences in their growth pattern and body composition warrant such a classification. Boys, as compared to girls, have higher lean body mass (LBM), skeletal mass and lower fat as a ratio of total body mass. This difference in body composition leads to differences in their nutrient needs as LBM has more metabolic activity than adipose.

Let us get to know about the nutrient needs in greater details. We begin with the energy requirements.

Energy: Table 15.2 depicts the energy requirements of school children and adolescents, as recommended by ICMR (2020).

As per guidelines laid by FAO/WHO/UNU 2004, the total energy expenditure (TEE) is computed by double labeled water technique or heart rate monitoring. To this, growth requirements are added, as you may recall studying earlier in Unit 2 while studying about the energy requirements for children. TEE is calculated by using predictive quadratic equations based on median weight at midpoint of each year of age. These equations are given herewith.

$TEE_{(Boys)}$ (Kcal/day) = 310.2 + 63.3 × BW (kg) – 0.263 × BW (kg^2)

$TEE_{(Girls)}$ (Kcal/day) = 263.4 + 65.3 × BW (kg) – 0.454 × BW (kg^2)

Table 15.2 : RDA For Children-2020

Age Group	Category of work	Body Wt	Protein	CHO	Calcium	Magnesium	Iron	Zinc	Iodine	Thiamine	Riboflavin	Niacin	Vit B6	Folate	Vit B12	Vit C	Vit A	Vit D	Energy **	Visible Fat**
		(kg)	(g/d)	(g/d) d)	(mg/ /d)	(mg d)	(mg/ /d)	(mg day)	(µg/ /d)	(mg /d)	(mg /d)	(mg d)	(mg/ /d)	(µg d)	(µg/ d)	(mg/ d)	(µg/	(IU/d)	(kcal/d)	(g/d)
Children	7-9 y	25.3	23.0	130	650	175	15	5.9	90	1.1	1.6	11	1.5	170	2.2	45	630	600	1700	30
Boys	10-12y	34.9	32.0	130	850	240	16	8.5	100	1.5	2.1	15	2.0	220	2.2	55	770	600	2220	35
Girls	10-12y	36.4	33.0	130	850	250	28	8.5	100	1.4	1.9	14	1.9	225	2.2	50	790	600	2060	45
Boys	13-15y	50.5	45.0	130	1000	345	22	14.3	140	1.9	2.7	19	2.6	285	2.2	70	930	600	2860	50
Girls	13-15y	49.6	43.0	130	1000	340	30	12.8	140	1.6	2.2	16	2.2	245	2.2	65	890	600	2400	35
Boys	16-18y	64.4	55.0	130	1050	440	26	17.6	140	2.2	3.1	22	3.0	340	2.2	85	1000	600	3320	40
Girls	16-18y	55.7	46.0	130	1050	380	32	14.2	140	1.7	2.3	17	2.3	270	2.2	70	860	600	2500	35

*: AI; **: There is no RDA for energy. The EAR is equivalent to the Estimated Energy Requirement (EER); #: Visible fat requirement is in proportion to EER;

Occupational and recreational activities variably affect energy requirements. The WHO/ FAO/UNU 2004 recommendations have taken this into consideration and energy requirements are calculated for children over five years of age and for adolescents with lifestyles involving three levels of habitual physical activity as enumerated herewith:

Examples of populations with *light* physical lifestyles, or that are *less active than average*, are children and adolescents who every day spend several hours at school or in sedentary occupations; do not practice physical sports regularly; generally use motor vehicles for transportation; and spend most leisure time in activities that require little physical effort, such as watching television, reading, using computers or playing without much body displacement.

Examples of populations with *vigorous* lifestyles, or that are *more active than average*, are children and adolescents who every day walk long distances or use bicycles for transportation; engage in high energy-demanding occupations, or perform high energy-demanding chores for several hours each day; and/or practise sports or exercise that demand a high level of physical effort for several hours, several days of the week.

Children and adolescents with habitual physical activity that is more strenuous than the examples given for a light lifestyle, but not as demanding as the examples for vigorous lifestyle, would qualify in the category of *average* or *moderate* physically active lifestyles.

Look up Tables 2.8 and 2.9 in Unit 2 earlier, which presents the energy requirements for boys and girls in populations with these three levels of habitual physical activity.

Next, let us learn ablout the requirement for proteins and other nutrients.

Protein: FAO/WHO/UNU (1985) recommends factorial method to compute their protein requirements. The factorial value is increased by 50% to obtain the physiological requirements for growth and further + 2SD (25%) has been added to give safe level of intake. These values are further corrected for NPU-65 for dietary proteins. Body weight of well –to-do Indian children has been used for computations.

Fats: The linoleic acid requirements for school children and adolescents have been set at 4-10 en%. In terms of visible fats, ICMR (2020) has recommended an intake of 10 en%. ICMR (2020) suggests a desirable level of visible fat intake of 25-30 g/d and 35-50 g/d for older children and adolescents respectively.

Calcium: Calcium requirements in children and adolescents can be calculated on the basis of calcium accretion during growth. In absence of definite data on Indian children and the rate of absorption, ICMR recommended 500-650 mg (1-9 y); 850 mg (10-12y) and 1050 mg 16-18y) (refer to Table 15.2). Calcium accretion in growth period of 18-20 years suggests approximately 150 mg is laid per day. This deposition is not uniform during the growth period and likely to be greater in early childhood and adolescence. In a research study, 10-11 years old Indian children indicated positive balance of 120 mg/d on 350 mg intake. Probably RDA depicted in Table 15.2 will suffice their needs. Good physical activity, adequate calcium intake and Ca:P ratio of 1:1 is recommended for adequate bone mass. Western data suggests calcium requirement of 1-2 g/d for optimal skeletal mass and prevention of osteoporosis in later years. FAO/ WHO 2004 Expert Consultation on the Human Vitamin and Mineral Requirements recommends 700 mg for children 7-9 years and 1300 mg for 10-18 years. Refer Table 9.4 in Unit 9 for FAO/WHO 2004 calcium requirements.

Iron: The iron requirements are also computed by factorial method and should therefore add iron requirement of maintenance, growth and increase in blood volume. The maintenance requirements are computed as 15 mg/d for 7-9 year. Iron requirement for growth refer to the iron needed for expansion of hlood valume and the need for increase in lean body mass. Increase in lean body mass requires iron, primarily for muscle myoglobin and also non-heam iron. Iron content of skeletal muscle is

approximately 0.026 mg/g wet weight. If half of the increase in body weights is associated with greater muslce mass, the requirement would be 47 mg/y or 0.13 mg/d in this age group. Thus the additonal requirements during Adolescence for the growth would be 12 µg/kg for boys and 8 µg/kg for girls. Girls would require an additional 8 µg/kg to compensate menstrual blood loss.

Vitamin A: The vitamin A requirement of children and adolescents has been computed from growth curve interpolation data. This considers that infant requirements of retinal is 60 µg/kg BW and adults 15 µg/kgBW. On this basis, the vitamin A requirement of children will be 390-630 mg retinal/d. In view of high vitamin A deficiency in India and low serum levels, ICMR 2020 recommends different quantities of retinol to school children and adolescents (Table 15.2).

Other fat-soluble vitamins: ICMR (2020) does not give recommendations for vitamin E and K. Vitamin D is very important for skeletal growth and optimal utilization of calcium and phosphorus. School children and adolescents, who spend plenty of time in outdoor games in school or home, get vitamin D by bioconversions. Only those children or adolescents who do not move outdoor, have inadequate housing, purdah system etc. should be supplemented with 400 IU. Requirement of vitamin D for older children and adolescents is 600 IU/d (Table 15.2). Vitamin K deficiency is rare in this age group and vitamin E intake is related to PUFA intake @ 0.8 mg/g of essential fatty acids. Most PUFA oils are source of vitamin E. Particularly good sources are palm oils and rice bran oil.

Water-soluble vitamins: The suggested requirements are given in Table 15.2 (ICMR 2020). Thiamin is computed as 0.8 mg/1000 Kcal, riboflavin as 0.6 mg/1000 Kcal and niacin as 10 mg niacin equivalents/1000 Kcal, for children aged between 7-9 years. Folate requirements are computed on per kg body weight basis (Refer Table 15.2). Vitamin B_{12} requirement ranges between 0.2-1.0 mcg/d and needs to be ascertained age-wise, if any. In absence of precise data on vitamin C requirements of Indian children and adolescents, different values are adopted to be sufficient for all ages 1-17 years and adults (Table 15.2). Vitamin C is heat labile and destroyed on storage. Its adequacy is important everyday for enhancing availability of iron from diets.

Trace elements: Iodine requirements peak in adolescence. Consumption of iodized salt should be ensured. Adequacy of zinc for growth is well established. Zinc requirements are age specific, as you can see in Table 15.2 children aged 7-9 years require 5.9 µg/d of zinc for growth, whereas the RDA for adolscents (16-18 years) is 17.6 mg/d for males and 14.2 mg/d for females (ICMR, 2020).

For FAO/WHO 2004 recommendations for vitamins and minerals for children and adolescents, we suggest you look up Units 7, 8, 9 and 10 under the respective vitamins and minerals.

Now that you are well versed with the nutrient requirements for children and adolescents, let us next review the diet and dietary patterns of older children and adolescents.

15.4 DIET AND DIETARY PATTERNS

This section focuses on the diet and dietary patterns specific to children and adolescents. Let us begin our study with the diet pattern for children.

Diet for Children

By preschool stage, their routines are set and dietary choices become more and more firm by the time they are in senior school. Further, there is tremendous peer pressure. Irrespective of income groups they exhibit wide variations in their food intake. Some well-to-do will eat less while some of them will eat in excess. Missing breakfast is on

a rise and most of the adolescents skip breakfast, do not carry packed lunch and prefer to snack in school canteen. Dislike for vegetables may continue for only a few. If properly guided and encouraged, acceptance of fruit may be good.

Good breakfast helps in attention span, good social behaviour, sense of security and contentment and prevent snacking and bingeing. Yet most school children and adolescents rush through their breakfast or completely skip it. One common reason for skipping breakfast is sleeping late and rising late. Pressure of school routine puts them into a rushed morning routine. They are not able to regain adequate appetite in this rushed routine in the morning.

Adequacy of children's food and nutrient intake depends on:

- Sibling company
- Peer pressure
- Model set by parents and other adults in the family
- Their personal attitudes and practices. Sometime they have knowledge but cannot translate into practice
- Harmony at home and stress of school
- Mass media
- Convenience foods and fast food joints.

Working mothers may be forced to adopt convenient options which the children can fix on their own. Popularity of fast foods is by personal choice and peer pressure. They should be encouraged to minimize the frequency of eating out and counseled on healthy food choices while eating-out. One reasonable method is by making limited money available to children and adolescents coupled with helpful friendly dialogue.

Diet for Adolescents

For adolescents, other than points covered above, there are two more important points of considerations.

- Inanition
- Fad diets

Inanition actually refers to *exhaustion from lack of nourishment; starvation*. Many teenagers rarely relate today's food habits to tomorrow's health. They have a notion of 'desirable' body shape and 'ideal' body weight which is not their true ideal body weight for height. Some girls imitate a model or a celebrity whose weight was say reported in press to be 37 kg. They purposely starve to maintain such a weight. Very often they might miss meals at home, often skipping breakfast and lunch altogether, whereas during this time of peak growth velocity, adolescents usually need to eat often and in large amounts.

On the other hand, fad diets are common especially among boys. For girls, fad diets are selected to make them loose weight and for adolescent boys for muscle building, broadening shoulders, waist narrowing etc. Simple nutritious diet, rich in iron, plenty of fruits and vegetables, low fat and low sucrose diet with plenty of exercise and sports can in fact ensure good physique and long term good health.

Some simple nutritional guidelines for children and adolescent are highlighted next. You may advocate these eating habits among children and adolescents.

Guidelines of School Children and Adolescents

1) Do not skip breakfast. At least have milk, fruit and cereal. Some children prefer to flavour the milk with cereal or protein supplement to make breakfast less bulky. Munching fruits freshens and massages the mouth too. This ensures non-irritable behaviour and good attention span in school.

2) Carry a nutritious and interesting tiffin. Avoid eating out and in canteen on daily basis. Upto 70% of school children snacked regularly.

3) Avoid junk food. Aerated beverages consumption should be kept minimal. Some school children report as much as 2-3 cold drinks a day. Some school canteens have substituted aerated beverages for lemonade or juice.

4) Have 4-5 meals per day. Keep gap of 3-4 hour between meal but not more than 4 hours. Avoid nibbling.

5) Avoid highly fried and oily dishes. Make proper dish selection while eating out. Avoid too many sweets and sticky foods to prevent dental caries.

6) Regularly exercise or play games outdoor in school and home. Monitor weight. Know your ideal body weight and maintain it (Table 15.1). Upto 30% of well-to-do children and adolescents were overweight or obese in India.

7) Eat plenty of fruits and vegetables. They are protective foods which are rich in vitamins and minerals and have dietary fibre. They ensure satiety and delay onset of hunger. Upto 20% of children don't eat fruit.

8) Drink plenty of water especially during sports.

9) Include items from all food groups in the daily diet. Table 15.3 gives approximate amounts to meet needs of children. (ICMR, 2010)

10) Children should consume plenty of milk (3-4 servings/d).

11) Visible fat should not exceed 60 g/d. Taste should be developed for moderate salt intake. Special emphasis should be given to good food habits as already mentioned above, since adolescents are most vulnerable to erratic dietary practices at this age due to peer pressure, media and self likes.

The balanced diet for children and adolescents as recommended by ICMR (2010) is presented in Table 15.3.

Table 15.3: Balanced diet for children and adolescents

Food Groups	Years						
	7-9	10-12		13-15		16-8	
		Girls	Boys	Girls	Boys	Girls	Boys
Cereal and Millets (g)	180	240	300	330	420	330	450
Pulses (g)	60	60	60	60	75	75	90
Milk (ml) & milk products	500	500	500	500	500	500	500
Roots and Tubers (g)	100	100	100	100	150	200	200
Green leafy vegetables (g)	100	100	100	100	100	100	100
Other vegetables (g)	100	200	200	200	200	200	200
Fruits (g)	100	100	100	100	100	100	100
Sugars (g)	20	30	30	25	20	25	30
Fat/oil (visible) (g)	30	35	35	40	45	35	50

Source: Dietary Guidelines for Indians - A Manual, NIN, Hyderabad, ICMR, 2010

ICMR (2010) recommends that as compared to sedentary woman, 7-18 years old girls should have an extra cup of milk while 7-18 years old boys should have an extra cup of milk as compared to sedentary man. Values may change according to new guidelines issued by ICMR 2020 shown in table 15.2.

Finally, let us review a few handy tips for packed lunches and tiffin.

Tips for Tiffin: Protein Rich and Satiety

1) Paneer parantha with fruit.
2) Sprout upma/poha with fruit/sprout chat.
3) Missi parantha with vegetable (as carrot, peas, pumpkin, aloo methi).
4) Palak/bathua/methi/missi parantha with oil-free lemon-ginger pickle.
5) Vegetable and peanut idli with low fat dal-gun powder.
6) Paneer and vegetable pulao.
7) Vegetable and nugget noodles (avoid plain noodles).
8) Rajma/paneer low fat patty (presto toaster)

Assignment: Ask an adolescent what tiffin they carry. What items they like most. Suggest modifications to 'make it low fat and cover all food groups'. Encourage the child in this principle so that they themselves learn food selection and selection of good cooking methods. Suggest low calorie desserts if child has a liking for sweets.

Tiffin should contain food item that do not flow, preferably be a finger food, non messy and not very oily. Moderate oil content to make paranthas and pulao, with least amount of fat possible, improves palatability when the tiffin is eaten cold.

Now let us take a break here and try to recapitulate what we have learnt so far by answering the check your progress exercise 2.

Check Your Progress Exercise 2

1) Briefly discuss the nutrient needs of school children.

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2) Which nutrients would you emphasize in the diet of adolescent girls and why?

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3) Describe the special considerations to be kept in mind while planning packed lunch for a school child.

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Next, we shall briefly review the national programmes that provide with nutrition intervention measures for improving children and adolescents nutritional status.

15.5 NATIONAL PROGRAMMES TARGETING CHILDREN AND ADOLESCENTS

Two programmes specially target children and adolescents as a vulnerable group. These are:

a) Mid Day Meal Programme (MDM)

b) Integrated Child Development Services (ICDS)

Other initiatives which are much needed are taken in selective pockets of our country, are not actually national programmes. These are the initiatives that address various categories of children and adolescents. One such programme (HRIDAY, SHAN) is a school based intervention in the prevention of heart diseases. Internationally, ILSI has taken initiatives in Asia for promoting physical activity and giving nutrition education in order to prevent obesity in school children especially in Singapore.

Details related to the national programmes mentioned above are already included in the Public Nutrition Course (MFN-006) in Unit 10. They are listed here as a ready reckoner which will enable us to suitably counsel parents and children access various government initiatives. So, let us quickly review these.

Mid-day Meal Programme

The National Programme of Nutritional Support to Primary Education commonly known as the Mid Day Meal (MDM) Scheme (was launched in August 1995) is intended to give a boost to universalization of education and simultaneously impact upon the nutritional status of children in primary classes. You may recall studying in the Public Nutrition Course (MFN-006) in Unit 10, sub-section 10.6.1 that the major component of MDM is food supplementation, with the food supplement/meal providing roughly 350-450 Kcal and 20-30g protein per child, which is expected to meet one-third of the energy and half of the protein recommended dietary intakes of the children.

Integrated Child Development Services (ICDS)

The adolescent girl scheme under ICDS intends to cover school dropout girls, 11-18 years in age with a view to meet their needs of self development, nutrition, health, education, literacy, recreation and skill formation. Though the scheme is not very effectively implemented, food supplements are provided (in some selected blocks only) to the adolescent girls along with pregnant and lactating mothers and 0.5-6 years old children. Special emphasis is also placed on reducing nutritional anaemia among this group. Hence, iron and folate supplementation once a week through the ICDS is also being tried out in few States.

National Nutritional Anaemia Prophylaxis Programme (NNAPP)

In past, both access to and intake of iron-folate tablets have been poor in children and therefore had a little impact in terms of reduction of anaemia in childhood. A new initiative called as National Iron plus initiative (NIPI) has been implemented to reduce the prevalence of aneamia in women, preschool children and adolescences. Also as a part of school health check up and having a mechanism to cover the same for out-of-school children, who are likely to have a higher prevalence of anaemia are being covered. Further, screening of all anaemic children for worms and its education is also intended.

National Iodine Deficiency Disorder Control Programme (NIDDCP)

The prevalence of iodine deficiency disorders (IDD) are seen more among adolescents, young adults and school age children. More females are affected than males. The area is said to be endemic when more than 5% of the population or children aged 6-12 years have goitre.

National Iodine Deficiency Disorder Control Programme (NIDDCP) was named in 1992, of the original NGCP launched in 1962. The 12th year Plan goals are to also achieve universal access to iodized salt and generate district wise data on iodized salt consumption. Therefore, this is a population targetted programme and not exclusively for children and the adolescents. Universal access to iodized salt and ban on non-iodized salt will cover this age group adequately.

With a brief review of the national programmes, we shall move on to the study of the problems of older children and adolescents.

15.6 PROBLEMS OF OLDER CHILDREN AND ADOLESCENT NUTRITION

In the previous sections, we studied about growth and development nutrient needs and dietary patterns of older children and adolescents.

Let us now have a look at a few common nutritional problems of older children and adolescents.

Obesity

One of the major problems is rising obesity rates (upto 30%) in urban, well-to-do school children. This is of special significance because obesity in adulthood tracks back to obesity in childhood and adolescence. With nutritional transition, increased food availability and income, increased physical inactivity and faulty food habits and food selection in adolescents, the instances of obesity in adulthood are on a rise. Most degenerative diseases like insulin resistance, diabetes and heart diseases are seen much earlier in age.

Excessive eating out and snacking, especially long TV watching and snacking, parental neglect, little physical activity especially in case of girls, lack of safe places to play contribute to childhood obesity in not - so rich children. Stress and exam anxiety adds to this problem of over-nutrition.

So then what measures/initiatives can we adopt to combat this problem. These initiatives are highlighted herewith.

a) *Promote physical activity*: For many children, low physical activity rather than excessive energy intake is the primary culprit. Management of obesity in children has led to several initiatives. Children are encouraged to play sports. Sports are encouraged by 'catch them young' for enhancing sports skills, as well as, promoting physical activity. There are some tips for counseling to:

1) Skip TV watching once per week.

2) Join a local sport/dance club.

3) Play in school, don't make excuses.

4) Get the family together for a brisk walk in the evening.

5) Must spend atleast 60 minutes per day in active sport/jog/dance, to prevent overweight.

FAO/WHO 2004 Report on Energy Requirements clearly highlight that recommendations for appropriate levels of physical activity must accompany recommendations for dietary energy intakes for children. There is no direct experimental or epidemiological evidence on the minimal or optimal frequency, duration and intensity of exercise that promotes health and well-being in children, but it has been suggested that children should perform a minimum of 60 minutes per day of moderate-intensity physical activity, which may be carried out in cumulative bouts of ten or more minutes, and

which should be supplemented by activities that promote flexibility, muscle strength and increase in bone mass (*Boreham and Riddoch*, 2001). This can be pursued by promoting walking, climbing stairs or cycling as part of everyday activities, and encouraging participation in games and sports that involve body displacement and a certain degree of physical effort.

b) *Formation of healthy food habits*: Discarding faulty habits as early as possible. Most food habits formed at this age are for a life time. Special counseling for fixed meal pattern, don't skip breakfast, carry a packed lunch, modify cooking for low fat, avoid fried foods and sweets on a regular basis, judicious food selection when eating out and avoid eating out are usual tips. Junk food and nibbling should be avoided. However, weight loss diet should be strictly avoided as it may impede growth. 'Eat plenty, work out plenty' is more apt as eating plenty will provide much needed nutrients needed for growth.

c) *Behaviour modification*: It is very important. A heavy parental hand and parents attitude and behaviours towards child's eating, interferes in the child's ability to eat sensibly. Eating on table, eating with the family, avoid eating in front of TV and portioning judiciously only once in your plate, fixed meal time, avoid nibbling are the important behaviour modifications. Support, admiration and encouragement are more conducive to child's efforts for healthy eating practices than humiliation and broken self esteem.

The adolescent mindset is also important aspect to be considered.

Teenager mindset and the eating disorders

Self image is an important determinant of weight and figure. Mostly girls under eat, as already mentioned earlier, in order to maintain or achieve self identified 'ideal' weight which maybe well below the true ideal weight for height. This may lead to out of proportion inanition as in *anorexia nervosa* when thought or sight of food makes them nervous. The child has a complete inability to eat and the body fat dips to 4-7%. Look up Unit 10 in the Clinical and Therapeutic Nutrition Course (MFN-005) for more information regarding the eating disorders and how to manage them.

On the other hand, boys eat for physical development especially muscle building, fitness and vigour. They need counseling for a right healthful diet. Parents have to make efforts to feed plenty of salads, fruits and vegetables and low fat dips and dishes. They should be encouraged to come to the table at mealtime. Teenagers usually are not very concerned about the risk of future health problems. They have an approach that dietary modifications for concern of good health should come only later in age. Hence, even if they have knowledge, they need correct building of attitudes.

Eating out

Teenagers can't be asked to remain indoors nor can be counseled to abstain from eating out. They desire peer acceptance and seek identity and independence. Limiting fried foods, making healthy food choices in the quick-service joints, avoiding alcohol and smoking goes a long way in ensuring long term good health and asserting self identity.

Next, let us review another important health problem linked with older children and adolescents i.e. nutrient deficiencies.

Inadequate calcium intake and iron deficiency anaemia

The requirement of iron and calcium is at its peak in adolescence due to an increase in the skeletal mass and blood volume. Ensuring adequate physical activity promotes bone mass and raise in aerobic capacity. Extra helping of milk, fruits and vegetables, iron absorption promoters such as vitamin C rich foods – amla, guava etc. and iron

rich food items need special selection for them. Mere knowledge of food pyramid does not ensure adequate intake of these minerals. They are ensured only after special food selection.

Clinicians who work with teenagers including physicians, dietitians and health workers need to be well versed and prepared to discuss and deal with a variety of concerns like body build, acne, skin health, sports nutrition, eating disorders like bulimia and anorexia nervosa, use of steroids, drugs and alcohol abuse, homosexuality, HIV/AIDS, reproductive health counseling etc. Handling this age group requires maturity and body language of being a confident.

Check Your Progress Exercise 3

1) Enlist the national programmes targeting children and adolescents. Briefly discuss the role of ICDS in alleviating the problem of undernutrition.

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2) Enumerate the common nutritional problems of older children and adolescents.

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3) What measures would you suggest to overcome obesity during adolescence?

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4) Discuss a few steps in order to promote physical activity among adolescents.

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15.7 LET US SUM UP

In this unit, we started our discussion with the school age and its characteristics. We learnt about the physical growth and development patterns and psycho-social changes that occur in them. We discussed about their nutrient requirements and principles of meal planning for them. We also got to know about simple tips to improve their eating behaviour and to correct their faulty eating habits and food choices.

Then, we moved on to the next stage i.e., adolescence which we saw, is a period of marked rapid growth. This growth, we learnt, occurs in spurts, has no calendar and differs in the two sexes. The difference is more evident in the area of body composition.

We also studied that the adolescents undergo distinct sexual maturity and psychosocial changes. Social maturity has no targets and its complexities learnt lifelong. This is however a period of maximum peer pressure and urge for peer acceptance. The role of various nutrients in light of these changes was also emphasized.

Finally, focus was laid on formation of sound dietary habits such as consuming healthy and nutritious breakfast, carrying wholesome tiffin and inclusion of foods from all food groups. With regard to adolescents, the calcium and iron requirement need special attention as they are linked to growth and long term good health.

Various national programmes which are targetted for school children and adolescents are mid-day meal programme, ICDS, NIDDCP and anaemia prophylaxis programme. More initiatives are needed for prevention and treatment of obesity in children and

controlling CHD from childhood. The common problems of nutrition in this age category are obesity, addressing teenager's mindset, eating out patterns, inadequate calcium, iron and certain eating disorders.

15.8 GLOSSARY

Anorexia nervosa : an eating disorder characterized by refusal to maintain a minimally normal weight for height and age.

Axillary : region of the armpits.

Bulimia : an eating disorder characterized by binge eating followed by forced purging by means of self induced vomiting or use of laxatives.

Circulatory system : the system of blood vessels in the body which carry blood from the heart to the tissues and then return it from the tissues to the heart.

Fad diets : a weight loss plan or aid that promises dramatic results.

Growth spurt : a sudden increase in the rate of growth in terms of height or weight.

Hormones : chemical substances secreted by certain glands which exert their effects elsewhere in the body e.g. the sex hormones are produced by the sex glands and cause effects in the sex organs and are responsible for the appearance of secondary sex characteristics.

Inanition : exhaustion resulting from a lack of food, either from partial or complete starvation.

Menarche : the time when menstruation i.e. monthly loss of blood in the girl, begins. In other words, the time when the first menstrual cycle occurs.

Net protein utilization : the ratio of amino acid converted to proteins to the ratio of proteins supplied.

Processed foods : foods which have been subjected to certain procedures such as drying, exposure to heat/cold and then packaged for sale. Processed foods usually require further cooking after unpackaging.

Pubic : middle part of the lower abdominal region; pubic hair refers to the hair appearing in this region.

Ready-to-eat foods : foods already cooked by roasting or frying or backing which can be consumed as such.

Respiratory system : the system consisting of the body parts necessary for breathing i.e. nasal cavity (entry for air through the nose) which leads into a tube called the (ii) trachea. The trachea branches into the (iii) branchi which enter the (iv) lungs.

15.9 ANSWERS TO CHECK YOUR PROGRESS EXERCISES

Check Your Progress Exercise 1

1) Children from the age of 7 years to 10 years. As compared to infants, their growth rate is slow and characterized by an improved functioning of most tissues and organ systems. Also, sex differences appear around the age of 10 years.

2) Some of the features which influence nutrient needs of school children are differences in rate of growth, differences in body composition, differences in blood volume, mineralization of bones and formation of teeth etc.

3) The characteristics specific to growth and development among children and adolescents include: changes in physical development and body composition, sexual maturity, and psychosocial changes.

Check Your Progress Exercise 2

1) The nutrient needs of children can be summarized as:

   Energy: To meet the growth needs and body composition in terms of muscle tissue and adipose tissues more energy is needed.

   Protein: Support growth and to fulfill the increased body demands.

   Vitamins and Minerals: A well-planned and balanced diet sufficient in calcium, iron and vitamin A among other nutrients will meet the nutrient needs of children.

2) Nutrients which need to be emphasized in the diet of the adolescent girls include:

   energy, protein, iron, calcium. For importance of these nutrients in the diet of adolescent girls, refer section 15.3.

3) Tiffin should not flow, preferably be a finger food, non messy and not very oily. Moderate oil content to make paranthas and pulao, with least amount of fat possible, improves palatability when the tiffin is eaten cold.

Check Your Progress Exercise 3

1) Mid Day Meal Programme, Integrated Child Development Services, National Nutritional Anaemia Prophylaxis Programme, National Iodine Deficiency Disorders Control Programme.

   The adolescent girl scheme under ICDS intends to cover school drop-out girls, 11-18 years in age with a view to meet their needs of self development, nutrition, health, education, literacy, recreation and skill formation. Special emphasis is also placed on reducing nutritional anaemia among this group. Food supplements are also provided (in some selected blocks) to the adolescent girls along with pregnant and lactating mothers and 0.5-6 years old children).

2) Obesity, inadequate Ca intake, iron deficiency, eating out are some of the problems.

3) Look up section 15.6 under the heading ‘Obesity’ and answer the question on your own.

4) Look up section 15.6 and answer the question on your own.