

Nutritional Requirements of Pre-school Children

The 'Preschool age' is considered between 1 - 6 years. The preschool age is marked by the following characteristics—

⇒ Continuous but slow rate of growth

Gain in weight is about 150-200 gm/month in the 2nd and 3rd years of life.

Activity is much more than an infant.

Full dentition develops so range of food intake is vast.

Cognitive development is also pronounced.

These changes are common for all healthy preschoolers and for these the following nutritional contributions are necessary.

◆ **Energy** : As growth rates differ for each child, so do their energy needs. The energy requirements vary greatly based on different growth rates and levels of activity. If Calorie intake is not sufficient then growth will be compromised.

◆ **Protein** : Protein is the primary factor in many body tissues. Proteins build, maintain and restore tissues in the body. As the child grows and develops, protein is crucial for optimal growth. The increase in the muscle mass that must accompany bone growth requires positive

nitrogen balance that is met by protein intake of 1.5 to 2 gm/kg body weight. Bone and blood formation occurs continuously for which protein is necessary.

◆ **Fat** : Until age 3 dietary fat plays a role in brain development. Fat comprises approximately 60% of the central and peripheral nervous system that essentially control, regulate and integrate every body systems. Moreover fat provides satiety (feeling of fullness). Fat is also the main source of fat soluble vitamins.

The energy from fat should be about 25% of total energy and energy from essential fatty acid is should be 5 - 6%.

◆ **Minerals** : Among the minerals, the most important are—

● **Calcium** : Calcium deposition is not uniform throughout the growing period and this decides the calcium requirement in accordance with the deposition. About 400 mg/day calcium is needed to support bone and teeth growth. The best sources of calcium are milk and milk products.

● **Iron** : For an increase in 1 kg in body weight, about 30 mg of iron is required. If it is believed that a child grows by about 2 kg/year on an average, the iron requirement will be 0.2 mg daily.

Iron is needed for the increase in body weight. The iron content of the body during this time is almost doubled.

Children of this period are extremely prone to develop anaemia. So to prevent this and to supply a high amount of iron, rice flakes, egg yolk and green leafy vegetables should be included in the diet.

The other minerals that should be monitored are zinc, sodium, selenium, copper etc.

◆ **Vitamins** : The vitamins are important components that help to regulate body processes. The vitamins that are necessary include—

Fat soluble Vitamins : Although the sources of Vit A are cheap and readily available, Vit A deficiency is very common in India, especially in the preschool category. Vit A deficiency can cause Bitots Spot, Night Blindness, or in severe cases, total blindness also. Thus milk, eggs, carrots and green leafy vegetables should be included in the diet. Moreover maintenance of hygiene and sanitation is important to prevent diarrhoea and losses of Vit A.

Vit D is needed for proper calcium metabolism. In tropical countries deficiency of Vit D is not common due to the synthesis in the skin with the help of the rays of the sun.

Water soluble Vitamins : The B vitamins are needed according to the energy requirement. Folic acid and Vit B₁₂ should be given since they are needed for the expanding blood volume.

◆ **Water** : Water helps the body to maintain homeostasis, allows for the transport of nutrients into cells, and also functions in the removal of the waste products of metabolism. Plain water, soups, juices should be incorporated in the daily diet.

□ **Other general dietary guidelines** :

- i) The diet should be well-balanced in terms of quantity and quality.
- ii) Fibre-rich foods should be given like fruits, vegetables, whole grains etc. which can prevent constipation.
- iii) The meal should include foods from the various food groups.
- iv) Foods should be made attractive and appealing by using various colours in food, shapes etc. This makes the food more acceptable to the preschooler.
- v) Slight seasoning can be used to make the food tasty.
- vi) The child should not be forced to eat; he should be allowed to choose his food.
- vii) Child should preferably be given food with the family so that he develops the correct habit of eating.

- ✓iv) ⇒ Adults should not be judgemental about any particular food in front of the child.
- (x) Meal times should be maintained.
- ×) Different cooking methods and new food combinations should be used.
- ×i) Milk and milk products like curd should be included in the diet everyday.

◆ Problems of Preschoolers :

1. Nutritional Problems :

a. **Vit-A deficiency** : Vit. A deficiency is common in the children of preschool category. Children from rural and tribal areas belonging to low socio-economic conditions are more vulnerable. Inadequate intake of vit. A or carotene, infections, malaria, measles, diarrhoea, respiratory tract diseases etc. are some of the common aetiological factors leading to Vit A deficiency.

Signs of Vit A deficiency manifestation in the eyes are known as *Xerophthalmia*.

b. **Protein Energy Malnutrition (PEM)** : It is defined as a *range of pathological conditions arising from coincident lack of varying proportions of protein and calorie, occurring most frequently in infants and young children*. The prevalence of kwashiorkor is frequently seen in the age group of 2 - 3 yrs and marasmus in the age group of 1 - 2 yrs.

All the five types of PEM are prevalent in preschool children i.e. kwashiorkor, marasmus, nutritional dwarfing, marasmic kwashiorkor and underweight.

2. Other Problems :

a. **Dental problems** : Tooth decay may occur in children with nutritional deficiencies. Vit. A is necessary for enamel formation and vit. C is essential for development of the dentine. Calcium, phosphorus and vit. D are needed for calcification. If the child consumes sticky, carbohydrate rich foods like candies, these adhere to the teeth, causing bacterial growth and caries. Fermentable carbohydrates are the main causes of this and lead to cariogenesis.

b. **Pica** : Intake of non-nutrient substances like clay, charcoal, ashes etc. Pica may be due to mental deprivation, parental deprivation, poor supervision, lower socio-economic status etc. children with pica are at increased risk of lead poisoning, iron deficiency anaemia and parasitic infections.

c. **Feeding problems** : Some common feeding problems in pre-schoolers include dysphagia, food refusal, choking, gagging, under and over eating etc.

□ 1. **PEM** : Protein energy malnutrition or protein caloric malnutrition is a common feature in infancy in any developing country. PEM is a spectrum of diseases with varied clinical signs. The five distinct clinical types of PEM are—

- (a) **Kwashiorkar** : Oedema is the main feature due to protein deficiency. The child looks healthy generally.
- (b) **Marasmus** : Calorie deficiency is mainly followed by protein deficiency. The child is severely emaciated with very less body weight.
- (c) **Nutritional dwarfing** : There is generalised stunting of growth and the total height is much reduced.

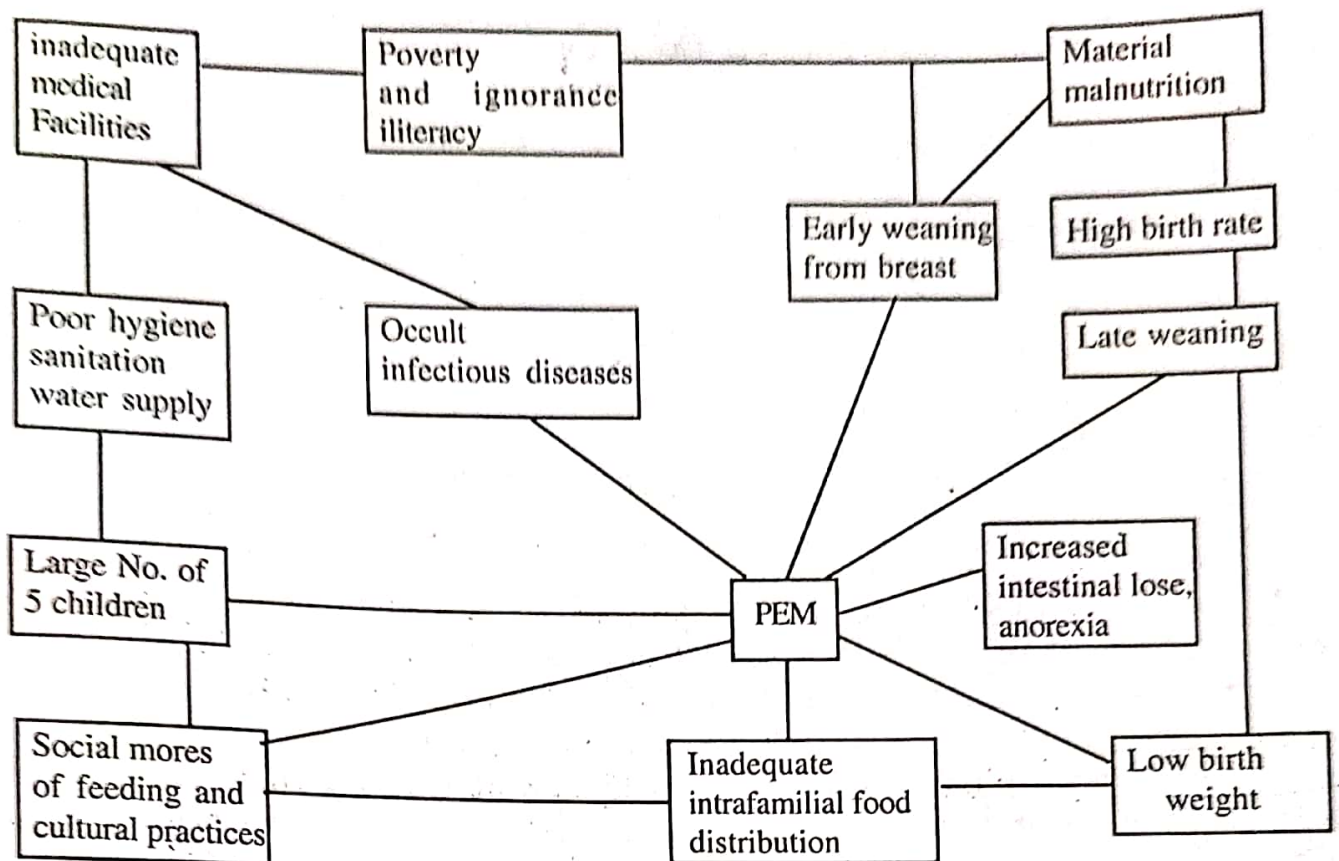


Fig 4.3. : Ecology of PEM

(d) **Marasmic kwashiorkar :** Both the symptoms of kwashiorkar and marasmus are present. This is the most common type of PEM seen in India.

(e) **Under weight :** This is another very common condition seen in PEM. The weight generally is lower due to a total deficient intake of food

Nutritional Requirements of School Children

The school-age is considered to be between 6 - 12 yrs where the growth is slower and body changes take place gradually. This time period is known as the '*latent period*'. It has been seen generally that girls grow faster than boys of the same age and the nutritional requirements are thus according to these changes. Till about 9 yrs, the requirements are similar but after that it changes according to age and sex.

The nutritional requirements are—

◆ **1. Calories** : The energy requirement is based on the extent of body growth, physical activities, and other such factors. As a school goer has enhanced mental and physical activities, the energy requirement steadily increases.

Girls between 7 - 12 yrs of age have the same energy requirement but in case of boys the requirement between 7 - 9 yrs is lesser than that between 10 - 12 yrs; this follows the growth

pattern and also helps to prepare the body for the approaching adolescence. The younger school age children require more energy/kg of body weight.

◆ **2. Protein** : The amino acids that are present in the protein molecules act as building blocks for the synthesis of body cells and tissues. Due to the continuous but gradual increase in body height, weight and enhancement of metabolism, it is obvious that protein would be necessary in quite high amounts. The proteins help in muscular development in boys and is needed for the approaching menarche in girls.

High biological value proteins should be included in the diet.

◆ **3. Fat** : Good quality plant fats with essential fatty acids should be given and saturated animal fats should be avoided.

◆ **4. Carbohydrate** : A good balance between mono-, di- and polysaccharides should be maintained.

◆ **5. Minerals** : Among the minerals, the most mentionable are calcium, iron, zinc, selenium, sodium and some others.

Calcium is needed for skeletal growth. In boys the bone mass increases for which a steady supply of calcium is needed.

Increase in body weight leads to expansion of blood volume, for which iron is needed. Moreover, the haemoglobin concentration is also increased, for which iron is needed.

The muscle pigment **myoglobin** is an iron-containing compound which has to be synthesized in boys of this age since they have a greater muscular development than girls. On the other hand, girls also require iron for the approaching menarche. Since the absorption rate of iron in girls is more their requirement is lesser than boys.

◆ **6. Vitamins** : Vitamins A and E are fat-soluble, anti-oxidant vitamins whereas vit. C is a water soluble antioxidant. These antioxidants are needed for 'scavenging' free radicals and protecting the body.

B vitamins are needed according to the energy demands.

◆ **7. Fibre** : Fibre not only regulates the calorie uptake but also is necessary for some important physiological functions like bowel movements. About 5 gm of dietary fibre should be given to the school age children.

◆ **8. Fluids** : Fluids form the medium of all metabolism reactions. They themselves perform several functions without which life would not be possible. Thus fluids like plain water, juice, milk etc. should be given.

□ **Other Dietary guidelines :**

(i) A well balanced diet prepared by selection of food from all food groups should be given which should meet the demands of the school age children.

(ii) Menus should include dishes which are quick to eat, attractive and satisfying.

(iii) Variety in menus, in terms of colour, texture, taste and flavour, is necessary.

(iv) Small, frequent meals are preferred more than large meals.

(v) The child should be made to eat with the entire family so that interactions between family members can take place leading to normal development.

(vi) Foods that are healthy but are not liked by the child can be disguised and used in dishes. E.g. vegetables can be given with chicken stew.

(vii) Snacky foods, highly seasoned and processed foods, fried foods should be avoided.

(viii) Media influence on food intake should be prevented, if possible.

◆ **Feeding Problems of School Children :** The common feeding problems of school children include—

1. **Obesity :** Low activity, excess energy intake and irregularity of meal patterns lead to obesity. In childhood this condition is more dangerous as it creates several complications later on in life. High fibre, low fat foods should be consumed to prevent nutritional obesity.

2. **Underweight :** Another problem, just opposite to obesity, is underweight. In a country like India, where most people do not get enough to eat, malnutrition is common, not only in low socio-economic groups but also in affluent families as well. Malnutrition is rampant due to faulty eating. Skipping breakfast, emotional disturbances at school, jealousy, problems with siblings at home are some of the common causes that lead to poor intake of food and thus causes problems of underweight.

3. **Constipation :** Low fibre, low fluid intake and irregularity of food intake are the primary causes of constipation. Early morning hurry to go to school, lack of sleep, low physical activity can also lead to constipation.

4. **Dental caries :** Irregular brushing of teeth, especially before going to bed, eating sticky sweets can lead to tooth decay and thus to dental caries. Eating raw fruits, chewing foods well, brushing teeth properly can prevent this.

Packed Lunch/School Tiffin :

School Tiffin or Packed Lunch can be defined as the food eaten at school, carried from the homes in packets/boxes etc, and provides satiety and nutrition to the child till his next full meal.

Needs for packed lunch :

A packed lunch is needed because—

- ⇒ School hours are long and the child may become hungry.
- ⇒ School is away from the house and the child cannot come back home for food usually.
- ⇒ To provide satiety and nourishment to the child and help him to concentrate better in studies.

◆ Contributions of the packed lunch :

★ It should meet $\frac{1}{3}$ rd of the daily requirement of calories, protein and other nutrients of the child.

- ★ It should boost energy for the rest of the day.
- ★ It helps to develop independent eating habits in children.

Planning of the packed lunch :

- Δ One serving of green leafy vegetable to provide vitamins and minerals.
- Δ Some amount of milk/milk products like curd, cheese etc.
- Δ Incorporation of egg in different forms.
- Δ Variety should be there in the food.
- Δ Consistency of the food should be correct; watery foods will leak out and dry foods may become stiff.
- Δ Hygiene and sanitation has to be maintained.
- Δ The child should be involved in planning and preparation of the food.
- Δ The packed lunch should be simple.
- Δ Small portion should be given so that the child can finish it on time and does not have to hurry and gulp down the food.

□ Some examples of. packed lunch :

- ★ Sandwiches (with chicken, egg or vegetables)
- ★ Stuffed paratha (with vegetables like potato, fenugreek, spinach etc.)
- ★ Fried rice (with vegetables and egg/chicken)
- ★ Veg or non-veg cutlets.
- ★ Fruit salad
- ★ Upma.

FEEDING PROGRAMMES

Integrated Child Development Services (ICDS)

This scheme was started on 2nd October 1975 and was partly funded by the central government and partly by UNICEF. ICDS comes under Ministry of Social Welfare. Universalisation of the Integrated Child Development Services safeguards the child's right to nutrition, health and preschool education. These rights are expressed in Article 39(f) of the Indian Constitution which directs the State to ensure that "children are given opportunities and facilities to develop in a healthy manner and in conditions of freedom and dignity". This is the main role of the ICDS centre or anganwadi. ICDS is the only major national scheme that addresses the needs of children under six.

Objectives

- to improve the nutritional and health status of children in the age group of 0–6 years.
 - to lay the foundations for proper psychological, physical and social development of the child.
 - to reduce the incidence of mortality, morbidity, malnutrition and school drop-out.
 - to achieve an effective coordinated policy and its implementation amongst the various departments to promote child development.
 - to enhance the capability of the mother to look after the normal health and nutritional needs of the child through proper nutrition and health education.
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Services to Target Groups

Children 0–36 months

- **Monthly growth monitoring:** Health status of preschool children can be evaluated with the help of Growth Chart. Figure 4.10 shows the comparative growth curves of normal and undernourished Indian children up to 5 years of age. Weights of preschool children are recorded in growth charts under ICDS scheme. Mid arm circumference is measured once in three months of children 1-5 years to know the nutritional status.
- **Selective Therapeutic food supplementation:** The unique feature of this project is selective feeding for 6–36 months old children. All children falling within the nutritional status grades of II, III and IV are fed with therapeutic supplementary food. This food is given as a medicine to combat protein energy malnutrition and it is given as a first food in addition to routine feeds at home. The growth faltered children in the Normal and I grade are also fed with supplementary food. The children once selected for feeding are fed continuously for 90 days. If the children are not graduated after 90 days feeding they are referred for medical interventions. Severely malnourished children are referred for medical intervention immediately and feeding is also started simultaneously.

- Immunisation is carried against tuberculosis, diphtheria, whooping cough, tetanus, measles and polio.
- Vitamin 'A' administration 2,00,000 I.U. of vitamin A solution is given orally every six months.
- Diarrhoeal and acute respiratory infection management
- Periodical health checkup—Frequent health checkups are done by the medical officers. Each Anganwadi is equipped with a medical kit with medicines to treat common minor ailments like cold, cough and skin infections. The Anganwadi workers have knowledge in using these medicines.
- Referral of malnourished children/also for minor and major ailments.

Children 37–72 months

- Quarterly growth monitoring
- Providing nutritious noon meal in the centre. This meal consists of 80 g rice 10 g dal (either red or masoor gram) and 2 g of oil. Thrice a week, Monday, Wednesday and Friday eggs are given. On Tuesday 20 g bengal gram and on Sunday green gram is given. On Friday potato is given.
- IFA supplementation
- Vitamin 'A' administration
- Mass deworming biannually
- Early identification of disability and referral
- Referral for ailments
- Pre-school education.

● Nutritional Requirements of Adolescence ●

The period of transition from childhood to adulthood is called adolescence. During this time physical, bio-chemical and emotional development has been accelerated. *The time period between 12 - 18 yrs is referred to as "adolescence" or teenage.* The extremely rapid and sudden increase in growth rate during this time is known as "*growth spurt.*"

The growth spurt of boys is slower than that of girls. Several physical changes occur in the body followed by various physiological changes as well. The limitation of menstrual bleeding in adolescent girls is a significant change that creates a tremendous nutritional demand.

The nutritional requirements of adolescents are—

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◆ **Energy** : As growth rate increases, the calorie requirement also increases. Girls generally require fewer calories, although individual demands vary. The appetite, especially in boys, increases and so it is usually not difficult to meet the high calorie demand.

◆ **Proteins** : The protein needs represent 11 - 12% of energy intake. The protein intake usually exceeds 1 gm/kg body weight. This meets growth needs and for the pubertal changes in both sexes and for developing the muscle mass in boys. The protein requirement in girls, between 10-12 yrs, is higher compared to boys. High biological value proteins should be given.

◆ **Fats** : Essential fatty acids should be given to the adolescent which should provide at least 3 en%. The desirable level of visible fat intake for adolescents is 20 gm/day. The saturated fat intake and the consumption of trans fats should be avoided as much as possible. α -linolenic acid is beneficial to reduce abdominal pains during menstrual periods and helps muscles to relax.

◆ **Minerals** : Calcium and phosphorus ratio of 1 : 1 should be maintained. Bone growth, especially in boys, requires large amounts of calcium.

Iron is needed for blood formation. Girls lose about 0-5 mg iron/day during menstruation and for this iron supply is necessary through the diet.

Zinc is also necessary for pubertal growth.

◆ **Vitamins** : All the fat soluble vitamins are needed according to RDA. Vit D is especially needed for skeletal growth and calcium metabolism.

The 'calorigenic vitamins' i.e. B₁, B₂ and niacin have to be supplied according to the energy intake. Folic acid and vit. B₁₂ are needed for DNA synthesis since there is rapid cell division in adolescence due to the growth spurt.

Tissue growth requires amino acids for which protein metabolism is needed. B₆ helps in protein metabolism and also helps to reduce premenstrual stress in adolescent girls.

□ **Other General Dietary Guidelines :**

⇒ A well balanced nutritious food should be given to the adolescent which does not contain either excess or deficient quantities of nutrients, to prevent obesity and underweight respectively.

⇒ Regular meal times should be maintained and skipping of meal times should be avoided.

⇒ Junk and fast foods should be avoided.

⇒ Foods should be made attractive and appealing.

⇒ Media influence and emotions should not guide food intake.

⇒ Physical activities should be encouraged.

◆ **Eating Disorders :**

1. **Anorexia Nervosa** : It is a condition marked by extremely low intake of food. It is an eating disorder that makes people lose more weight than is considered healthy for their age and height. Persons with this disorder may have an intense fear of weight gain. It is mostly common in the adolescent girls.

□ **Signs & Symptoms :**

★ Rapid loss of weight

★ Loss of menstrual periods

★ Nausea, vomiting, constipation or bloating after eating normal amounts of food.

★ Lanugo (hair on arms, legs, cheeks)

★ Refusing to eat, denying hunger

★ Avoiding social invitations to avoid food

★ Depression, mood swings

- ★ Low self-esteem
- ★ Fatigue and weakness
- ★ Obsessed with exercising

◆ **Prevention and Treatment** : Since this is mainly a psychological problem, generally nutrition counselling is necessary. Correct idea about food should be given to the patient and correct selection of food should be taught. Anorexia, bulimia and binge eating can only be corrected if the patient himself/herself is motivated.

2. **Bulimia Nervosa** : In this condition the *person binges on food followed by purging or consuming a large amount of food in a short time followed by an attempt to rid oneself of the food consumed (purging), typically by vomiting, taking a laxative or diuretic and / or excessive exercise.*

This is also common in adolescent girls.

□ **Signs and Symptoms** :

- ⇒ Weight fluctuations
- Calluses (calcified tissue on the back of hands)
- Dental enamel, erosion and cavities
- Fatigue or weakness
- Irregular menstrual periods
- Hiding eating from others
- Avoiding social invitations
- Depression, loneliness, feeling of emptiness
- Alcohol or drug abuse. ⇒

3. **Binge Eating Disorders** : This is characterized by sudden periods of excessive eating followed by periods of extreme dieting. Usually the patients are obese.

□ **Signs & Symptoms** :

- Trying to avoid physical activities.
- Depression loneliness, guilt emotional problems.
- Feeling out of control when eating and being unable to stop.
- Being preoccupied with food.
- Having low self-esteem.