

# UNIT 6 PLANNING BALANCED DIETS

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## 6.1 INTRODUCTION

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In the previous units you have been introduced to a number of nutrients—an amazing array of elements and compounds all with vital functions in our bodies. Each one of us needs these nutrients in specific amounts. How do we ensure that we meet our nutrient needs? Is there any easy way by which we can plan diets that supply adequate amounts of all the nutrients?

This unit will answer these questions. You will find that the key to planning nutritionally adequate or in other words balanced diets lies in selecting the right foods in the right amounts for each individual.

How do we know which foods to select? The best way of selecting the right kinds of foods for each meal is by using food groups. Each food group includes a specific list of food items which share the same function and contribute similar nutrients. As you know, the functions of the foods are dependent on the major nutrients they supply. Once the food groups have been identified, items can be selected from each food group for individual meals. If each meal is planned along these lines, one can be reasonably sure that all nutrients will be provided by the day's diet.

After deciding on the foodstuffs to be included, we need to decide on the amount to be consumed. This would, of course, depend on how much of each nutrient is required. Recommendations for daily nutrient intakes have been laid down in our country by the Indian Council of Medical Research (ICMR). These recommended dietary intakes (RDIs) are the basis for planning balanced diets.

This unit will introduce you to various ways of classifying food into groups as well as the use of food groups in planning balanced diets. It will also discuss in brief the use of RDIs for deciding on the amounts to be consumed.

### Objectives

After studying this unit, you will be able to:

- describe the concept of a balanced diet
- discuss the classification of food
- distinguish between requirements and recommended dietary intakes
- discuss the use of food groups and recommended dietary intakes in planning balanced diets
- identify the major factors influencing planning of balanced diets and
- list the steps involved in planning balanced diets

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## 6.2 CONCEPT OF A BALANCED DIET

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A balanced diet can be defined as *one which contains different types of foods in such quantities and proportions that the need for calories, minerals, vitamins and other nutrients is adequately met and a small provision is made for extra nutrients to withstand short durations of leanness*. Figure 6.1 illustrates this concept.

Foods

Nutrients

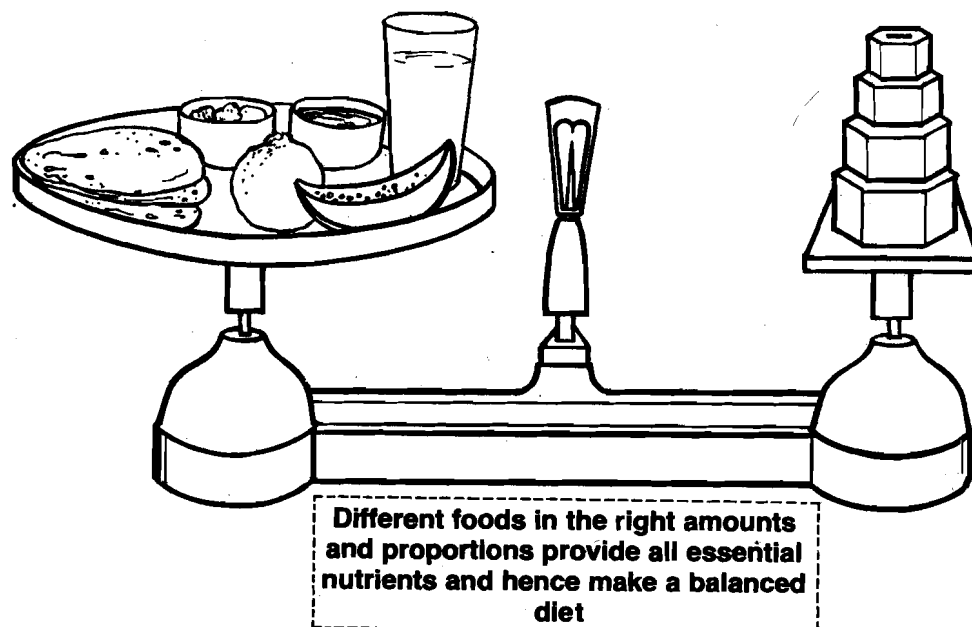


Fig. 6.1 Concept of a balanced diet

If you look at the definition carefully, you would realize that a balanced diet

- consists of different types of food items
- meets the need for nutrients and
- provides for periods of leanness when the diet may possibly not supply adequate amounts of all nutrients.

Let us talk about each of these aspects.

**A balanced diet consists of different types of food items:** A balanced diet includes a variety of foods. But how do we select these foods? The major aim is to ensure that all nutrients are supplied. This can be achieved by first classifying food into groups—each group supplying certain specific nutrients and then selecting items from each food group to plan a balanced meal or diet. Including items from each food group ensures that all the nutrients will be supplied. These aspects will be clearer when you read through subsection 6.3.1 which discusses the use of food groups in planning balanced diets.

**A balanced diet meets the nutrient needs:** A balanced diet meets nutrient needs because of the amounts and proportions of the foods selected.

How much should a person consume of individual foods to meet his needs? This would be based on the recommended dietary intakes (RDIs) laid down for the individual for whom the diet is planned. You will study more about RDIs in the subsection 6.3.2.

**Balanced diets provide for periods of leanness:** We have now examined the first two aspects of the definition of a balanced diet. Balanced diets also provide for periods of leanness. This implies that there is a “safety margin” or a “little extra” for those times when you do not meet your nutrient needs adequately. A normal individual consumes a variety of foods. It is possible that on a given day he may not consume foods in the amounts he requires. How, then, can we provide for such periods of leanness? Actually we do not need to make any special adjustments because RDIs already include a margin of safety. Planning diets on the basis of RDIs would take care of this aspect as well.

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## 6.3 PLANNING BALANCED DIETS

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Now that we have studied the concept of a balanced diet, we can move on to the planning of balanced diets. We have to arrive at simple techniques whereby we can plan diets for various individuals depending on physiological factors such as

age and sex. This section will introduce you to the basis of planning balanced diets i.e.

- the selection of the right kind of foods and
- the inclusion of suitable amounts of these foods so as to meet nutrient needs.

Let us first look at the usefulness of classifying food in helping us to include the right types of foods in our diet.

### 6.3.1 Use of Food Groups in Planning Balanced Diets

What is a food group? A food group, quite simply, consists of a number of food items sharing common characteristics. What are these common characteristics?

Depending on which way of classification is used, the common characteristic may be

- the source or
- the physiological function performed.

Let us now examine these two ways of classifying food into groups.

**A. Classification based on source:** The simplest and most obvious classification is based on the interrelatedness of certain food items in terms of similar sources.

The following categories are commonly identified even by a lay person:

- Cereals and millets
- Pulses
- Nuts and oilseeds
- Green leafy vegetables
- Root vegetables
- Other vegetables
- Fruits
- Milk and milk products
- Sugar and jaggery
- Fats and oils
- Flesh foods (fish, meat, poultry)
- Eggs
- Condiments and spices

Table 6.1 summarizes the major nutrients supplied by these food groups.

**Table 6.1 : Nutrients Supplied by Food Groups (based on source)**

Food group	Nutrients supplied	
i) Cereals and millets e.g. rice, wheat, maize, bajra, ragi, jowar	Major nutrient	: Carbohydrate
	Others	: Some protein (not of good quality; quality improves in combination with pulses; major contribution to protein content of Indian diets because of quantities consumed) B vitamins especially niacin and thiamine, iron (bajra in particular), calcium (ragi in particular), carotene (only yellow maize)
ii) Pulses e.g. red gram, green gram, lentils, bengal gram	Major nutrient	: Protein (not of good quality; quality improves in combination with cereals)
	Others	: Carbohydrate; B-vitamins especially thiamine, niacin; vitamin C (only in sprouted pulses)
iii) Nuts and oilseeds e.g. groundnuts, almonds, cashewnuts, til (sesame) seeds, mustard seeds	Major nutrients	: Protein, fat
	Others	: B-complex vitamins, calcium and other minerals

iv)	Green leafy vegetables e.g. spinach, amaranth, fenugreek leaves, mustard leaves, drumstick leaves		Calcium, iron, carotene, vitamin C, B vitamins (especially riboflavin and folic acid), fibre
v)	Root vegetables and tubers e.g. tapioca, potato, sweet potato, yam, colocasia	Major nutrient Others	: Carbohydrate : Carotene (yellow yam); vitamin C (potato, sweet potato, tapioca)
vi)	Other vegetables e.g. brinjal, ladies finger, french beans		Supply some amount of vitamins, minerals and fibre
vii)	Fruits		Specific fruits are major sources of the following: Vitamin C (guavas, amla, citrus fruits); carotene (mangoes, apricots, oranges, papaya); iron (dried fruits such as dates and raisins)
viii)	Milk and milk products e.g. milk, curd, cheese (cottage and processed)	Major nutrient Others	: Protein : Carbohydrate, fat, calcium, riboflavin
ix)	Sugar and jaggery		Carbohydrate (sugar is almost 100 per cent carbohydrate)
x)	Fats and oils e.g. ghee, vanaspati, butter, vegetable oils (mustard, soyabean, groundnut)	Major nutrient Others	: Fat : Retinol (butter, vanaspati) vitamin D (butter, vanaspati)
xi)	Flesh foods e.g. meat, fish, poultry	Major nutrient Others	: Protein (good quality) : B vitamins, retinol (liver), calcium (small fish consumed whole)
xii)	Eggs		Rich source of most nutrients particularly protein (good quality)
xiii)	Condiments and spices		Carotene (coriander leaves), vitamin C (green chillies). Contribution to diet insignificant because quantities consumed are small.

### Check Your Progress Exercise 1

- 1) Fill in the blanks.
  - a) A food group consists of a number of food items which share common .....
  - b) Nuts and oilseeds supply substantial amounts of both ..... and .....
  - c) Bajra is a good source of .....; ragi supplies substantial amounts of .....
  - d) The only cereal containing carotene is .....
  - e) Green leafy vegetables are good sources of vitamin ....., folic acid and carotene.
  - f) Sprouting of pulses improves the content of vitamin .....

- (g) Liver is a good source of vitamin .....
- (h) ..... and ..... are two major nutrients supplied by fruits.
- (i) Sugar is almost hundred per cent .....
- (j) A balanced diet provides for short periods of leanness when ..... intake is not adequate.

**B. Classification of food based on function:** The first classification you have studied is based on source. This classification is difficult to use in day-to-day life for planning diets because there are so many groups. Just imagine juggling with thirteen food groups! We need a much simpler classification. If you look at Table 6.1 you would notice that several groups are important for their content of the same nutrient and would, therefore, perform the same major function in the body. For example, eggs, milk and flesh foods all supply protein and therefore perform body-building functions. To overcome this problem of overlap and to make the groups easier to use, other ways of classification have been devised. Let us now study one of these—the *three group classification* based on function.

Food, as you learnt in Unit 1 of Block 1, has three basic physiological functions—energy-giving, body-building and protective/regulatory functions. You are also familiar with the fact that food performs these functions because of the specific nutrients it contains. Foods rich in carbohydrates or fats or both provide energy for instance. Similarly, foods rich in protein aid in body-building or in other words, addition of new tissues and repair of worn out tissues. Vitamins and minerals present in food contribute to preventing disease. This is called the protective function. Water, fibre and of course, the vitamins and minerals play a role in regulating body functions as you have learnt in Units 2 and 3 of Block 1 and in the previous units of this block. Food can, therefore, be classified into the following three categories based on function (see Figure 6.2):

- Group 1. Energy-giving foods  
Group 2. Body-building foods  
Group 3. Protective/regulatory foods

The *energy-giving* category includes three types of foods:

- 1) Carbohydrate-rich foods A
  - Cereals
  - Roots and tubers
- 2) Carbohydrate-rich foods B
  - Sugar
  - Jaggery
- 3) Fat-rich foods
  - Fats and oils

The primary nutrients provided by these foods, as you see, are carbohydrate/fat. In addition to carbohydrate, cereals also provide some protein, vitamins and minerals as you learnt in Table 6.1. Similarly, fats and oils provide fat-soluble vitamins in addition to fat.

The *body-building* group includes those foods which are rich in protein. The group includes:

- Milk and milk products
- Meat and meat products
- Fish
- Eggs
- Pulses
- Nuts and oilseeds.

The primary nutrient provided by all these foods is protein. These foods provide several other nutrients as well, some of them in significant amounts. Nuts and oilseeds, for example, are excellent sources of fat in addition to protein.

The third food group is called the *protective/regulatory* group. The primary nutrients provided by foods in this group are vitamins and minerals.

Foods in the protective/regulatory category include:

- Fruits
- Yellow and orange fruits (e.g. mango, papaya)
  - Citrus fruits (e.g. lemon, lime, orange)
  - Others (e.g. plum, banana)

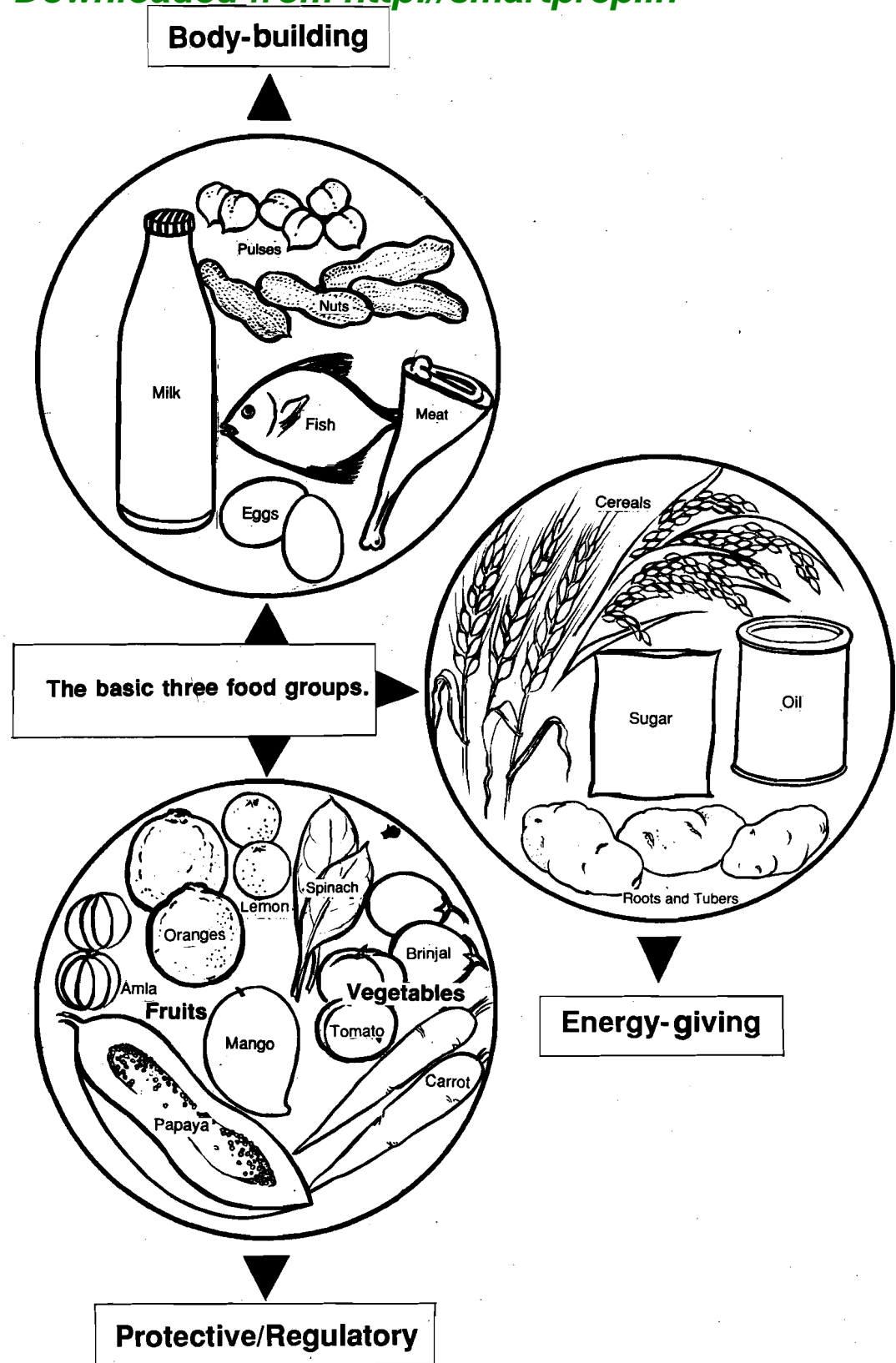


Fig. 6.2 The three group classification of food

**Vegetables**

- Green leafy vegetables (e.g. spinach, fenugreek, mustard)
- Yellow and orange vegetables (e.g. carrot, pumpkin)
- Others (e.g. ladies finger, brinjal, cauliflower, cabbage)

Green leafy vegetables, yellow and orange fruits and vegetables and citrus fruits are emphasized because they are particularly rich in carotene vitamin C as well as minerals.

This is a simple classification. However, it is useful in planning meals/diets and is the most commonly used classification. *One has to ensure that each and every meal includes foods from the energy-giving, body-building and protective/regulatory groups. In this manner the diet would supply all essential nutrients and would become balanced.*

Now that we have studied this simple way of classifying food, let us try to understand how food groups can be used to plan meals. Let us take lunch as an example.

Meal: Lunch

Food groups — The three group classification

Food group	Food items selected	
	Alternative 1	Alternative 2
Energy-giving	Rice, fat	Wheat, fat, sugar, potato
Body-building	Rajmah	Green gram, milk
Protective/ regulatory	Onion, beans, tomato	Carrot, onion, tomato

Two alternative lists of food items selected from each food group are mentioned. Now we must translate this into a list of dishes to be served. Such a list is called a menu. The following chart gives you an idea of how to convert these lists of food items into the magic of menus.

Alternative	Name of dish	Ingredients used for preparation
Alternative 1	Rice	Rice
	Rajmah curry	Rajmah, onion, tomato, fat
	Beans vegetable (dry preparation)	Beans, onion, fat
Alternative 2	Chapatis	Wheat flour
	Dal	Green gram, onion, tomato, fat
	Carrot-potato vegetable	Carrot, potato, fat
	Sweet curd	Curd, sugar

Let us now take an example typical of the south for tiffin (a meal consumed in the afternoon after a heavy breakfast consumed mid-morning).

Food group	Foods selected	Menu (ingredients)
Energy-giving	Rice, fat, potato	• Idlis (rice and urad dal)
Body-building	Urad dal, arhar or tur dal	• Sambar (arhar dal, ladies finger, potato, drumstick, brinjal, fat)
Protective/ regulatory	Ladies finger, drumstick, brinjal	

You can use the three group classification to plan for any meal. Remember to include a cereal and a source of fat—it could be ghee, vanaspati or a vegetable oil—

from the energy-giving group in each meal. If you are including a sweet item, sugar would also be part of the energy-giving group. You would also have noticed that *it is not necessary to include three items in a menu because there are three food groups*. In fact, *a single dish can also be a balanced meal*. The following example will make this point clear.

Food group	Food item selected	Menu
Energy-giving	Rice, fat	
Body-building	Green gram dal	Khichri
Protective/ regulatory	Spinach, onion, tomato	

You have now gained a good idea of how to plan balanced meals. Some more important aspects regarding the planning of balanced diets will be discussed later in this unit.

**Check Your Progress Exercise 2**

- 1) List the menu for the lunch you consumed yesterday. Was the meal balanced or not? Evaluate the meal on the basis of the three group classification.

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**6.3.2 Use of Recommended Dietary Intakes in Planning Balanced Diets**

The *Recommended Dietary Intake (RDI)* is the amount of a nutrient to be actually consumed in order to meet the requirements of the body. Recommended dietary intakes are hence based on requirements. Now what do we mean by the term “requirement”? The *requirement* for a particular nutrient is the *minimum amount that needs to be consumed to prevent symptoms of deficiency and to maintain satisfactory levels of the nutrient in the body*.

As mentioned earlier, recommended dietary intakes are based on requirements. How do we convert a requirement figure into recommended dietary intakes or RDIs? The *RDIs are basically the requirement plus a safety margin* (Figure 6.3).

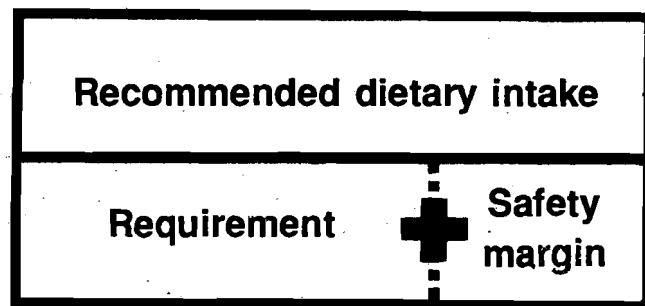


Fig. 6.3 Relationship between requirement and recommended dietary intake



The safety margin is added on to cover factors like:

- variation in requirement from individual to individual
- periods of low intake (periods of leanness)
- nature of diet
- cooking losses

Some of these points can be well illustrated with the following example. In experiments conducted with adults it was found that when the intake of vitamin C was 20 mg/day, vitamin C deficiency or scurvy could be prevented and satisfactory levels of vitamin C could be maintained in the body. Since all the persons studied were able to satisfactorily maintain body vitamin C levels at an intake of 20 mg/day, there was no need to make allowances for individual variation. Now, how is this figure for requirement converted into an intake figure for adults? Vitamin C is easily destroyed on cooking. On the average, a figure of 50 per cent cooking losses was considered reasonable. The recommended intake was therefore fixed at double the requirement i.e. 40 mg per day.

In addition to the factors already discussed, the nature of the diet has a significant influence on the RDIs fixed for certain specific nutrients. Take protein for example. Many Indians cannot afford animal protein and hence they consume a diet which supplies vegetable protein. Since vegetable protein is utilized to a relatively lower extent, more protein needs to be consumed and therefore RDIs increase. Similarly, in the case of iron, the availability of iron to the body depends on the type of food consumed. Absorption of iron from typical Indian diets is low as you learnt in the previous unit. Therefore more iron needs to be consumed to meet the requirement i.e. the RDI is fixed at a higher level.

You have now gained an idea about the concepts of requirement and recommended dietary intakes. There are three important points that you need to remember.

- 1) **RDIs are set high enough to meet the needs of almost all healthy people:** In other words, a generous margin is usually given for individual variation in a population of normal, healthy individuals.
- 2) **RDIs do not apply to people who are suffering from a disease which influences the nutrient needs:** A disease can cause an increase or decrease in the requirement of one or more specific nutrients. Sometimes medicines prescribed during illness influence nutrient need. For instance, when one takes antibiotics one also has to consume more of the B-complex vitamins. The RDIs only apply to individuals who are normal and not suffering from a disease likely to influence nutrient requirements.
- 3) **Recommended dietary intakes for adults are based on sex, age, body size and activity level:** In the case of adults, there are substantial variations in RDIs particularly for energy and protein depending on the age, body weight and activity pattern. This is why working out RDIs on the basis of a "reference individual" is useful. RDIs have, in fact, been fixed using this principle. The *Reference man* is an Indian man in the age group of 20-39 years doing moderate work and weighing 60 kg. Similarly, an Indian woman 20-39 years old doing moderate work and weighing 50 kg is referred to as the *Reference woman* (Figure 6.4). You would notice that the age range, weight and activity level have been specified in both cases.

Adjustments can be made in the case of RDIs for individuals who deviate from the standard references. You will learn more about the reference man and woman in Unit 7 of Block 3.

Let us now examine the recommended dietary intakes for Indians (Table 6.2). The table lists the RDIs for several nutrients.

Some of the salient features of recommended dietary intakes and how they are expressed are summarized in the following points. You will also come across explanations for various terms used in the table.

- i) **RDIs are expressed in kilocalories (Kcal), grams (g), milligrams (mg) or micrograms ( $\mu$ g):** RDIs for energy are expressed in Kcal. One kilocalorie is the amount of heat required to raise the temperature of one kilogram of water through 1°C.

Table 6.2: Recommended Dietary Intakes for Indians

Group	Particulars	Net Energy (Kcal)	Protein (g)	Fat (g)	Calcium (mg)	Iron (mg)	Vit. A ( $\mu$ g)		Thiamine (mg)	Riboflavin (mg)	Niacin (mg)	Ascorbic acid (mg)	Folic acid ( $\mu$ g)	Vit. B <sub>12</sub> ( $\mu$ g)
							Retinol	$\beta$ -Carotene						
Man	Sedentary Work	2425							1.2	1.4	16			
	Moderate Work	2875	60	20	400	28	600	2400	1.4	1.6	18	40	100	1
	Heavy Work	3800							1.6	1.9	21			
Woman	Sedentary Work	1875							0.9	1.1	12			
	Moderate Work	2225	50	20	400	30	600	2400	1.1	1.3	14	40	100	1
	Heavy Work	2925							1.2	1.5	16			
	Pregnant Woman	+300	+15	30	1000	38	600	2400	+0.2	+0.2	+2	40	400	1
	Lactation													
	0-6 Months	+550	+25	45	1000	30	950	3800	+0.3	+0.3	+4	80	150	1.5
	6-12 Months	+400	+18						+0.2	+0.2	+3			
Infants	0-6 Months	108/kg	2.05/kg											
	6-12 Months	98/kg	1.65/kg		500		350	1200	55 $\mu$ g/kg	65 $\mu$ g/kg	710 $\mu$ g/kg	25	25	0.2
Children	1-3 Years	1240	22			12	400	1600	0.6	0.7	8		30	
	4-6 Years	1690	30	25	400	18	400		0.9	1.0	11	40	40	0.2-1.0
	7-9 Years	1950	41			26	600	2400	1.0	1.2	13		60	
Boys	10-12 Years	2190	54			34			1.1	1.3	15			
Girls	10-12 Years	1970	57	22	600	19	600	2400	1.0	1.2	13	40	70	0.2-1.0
Boys	13-15 Years	2450	70			41			1.2	1.5	16			
	Girls	2060	65	22	600	28	600	2400	1.0	1.2	14	40	100	0.2-1.0
Boys	16-18 Years	2640	78			50			1.3	1.6	17			
	Girls	2060	63	22	500	30	600	2400	1.0	1.2	14	40	100	0.2-1.0

Source : Nutrient Requirements and Recommended Dietary Allowances for Indians, ICMR (1990)

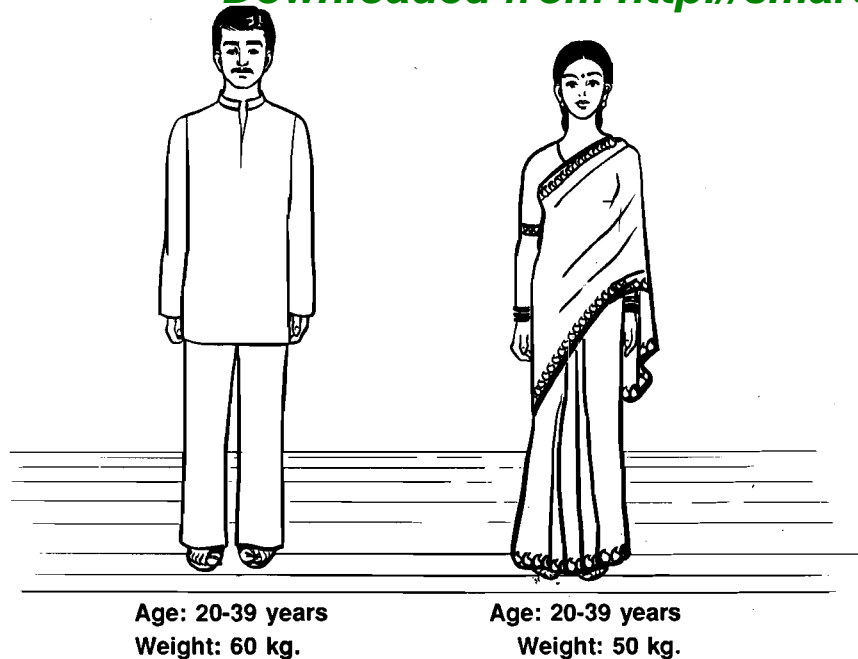


Fig. 6.4 The reference man and woman

1000 milligrams (mg) make one gram and 1000 micrograms ( $\mu\text{g}$ ) make one milligram. The RDIs for protein are given in grams while RDIs for vitamins are expressed in milligrams or micrograms.

- ii) **RDIs for energy for adult men and women are based on activity levels:** Activity levels can be described as sedentary (light), moderate or heavy. The more the activity, the higher would be RDIs for energy. You will learn more about this in Unit 7 of Block 3.
- iii) **RDIs for thiamine, riboflavin and niacin are dependent on RDIs for energy:** The relationship between the RDIs for these vitamins and energy is as follows:  
 RDI for thiamine = 0.5 mg/1000 Kcal; RDI for riboflavin = 0.6 mg/1000 Kcal; RDI for niacin = 6.6 mg/1000 Kcal. Can you explain why such a relationship exists? We discussed this aspect in Unit 4 of this block. You would remember that these three vitamins play a vital role in the release of energy from carbohydrates, fats and proteins.
- iv) **RDIs for protein are based on body weight:** The relationship can be expressed as 1g protein per kg body weight in the case of the adult. It varies for other age categories.
- v) **RDIs for energy and protein are given as additional intakes in pregnancy and lactation:** Pregnancy and lactation are periods of "physiological stress" because nutrient needs increase considerably to meet the needs of the growing foetus (in the case of pregnancy) and production of milk (in the case of lactation when the mother breastfeeds the baby). RDIs are given in terms of additional intakes (indicated by a "+" sign) for some nutrients like energy and protein. RDIs for the other nutrients are given as total intake figures.
- vi) **In infancy RDIs for energy, protein, iron, thiamine, riboflavin and niacin are expressed per kg body weight:** Here the expression "body weight" refers to the body weight expected for a healthy, normally growing infant of a particular age. Infancy is also a period of physiological stress just like any period characterized by rapid growth.
- vii) **RDIs for vitamin A have been given in terms of retinol or alternatively in terms of beta carotene:** Carotene is a precursor of vitamin A, as you know. The body cannot utilize all the carotene consumed to make retinol. About half of the beta carotene consumed is absorbed. Further, only about 50 per cent of the amount absorbed can be converted to retinol. In other words, only 25 per cent of the consumed beta carotene is actually converted into retinol. Hence for every 100 units of beta carotene taken in, only 25 is available to the body as retinol. This is why the carotene-retinol ratio is 4:1 (Figure 6.5)

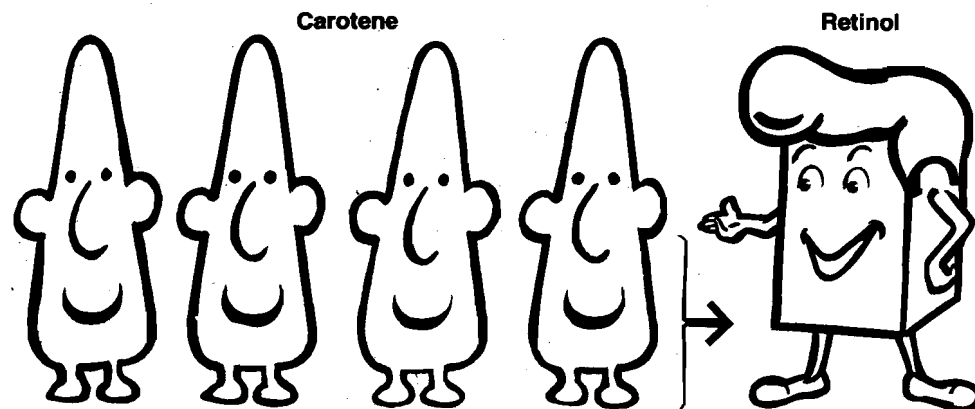


Fig. 6.5 Four units of carotene make one unit of retinol in the body

Most diets provide both retinol and carotene. However, RDIs are given in terms of either retinol or beta carotene. It would therefore help if we express the total vitamin A content of the diet either as retinol or beta carotene. To express the total vitamin A content of the diet in terms of retinol, the following relationship can be used:

$$\begin{array}{l} \text{Total Vitamin A} \\ \text{as retinol} \\ \text{(in micrograms)} \end{array} = \begin{array}{l} \text{Retinol} \\ \text{(micrograms)} \end{array} + \frac{\text{Beta Carotene in} \\ \text{micrograms}}{4}$$

**Example:** Assume a diet supplies 50 micrograms retinol and 2800 micrograms beta carotene. The total vitamin A supplied by the diet would be

$$50 + \frac{2800}{4} = 50 + 700 = 750 \text{ micrograms}$$

We have so far studied the concepts of requirement and recommended dietary intake. We have also examined the RDIs for Indians. Now we can move on to the study of how these are used in planning balanced diets.

**The amounts of different foods to be consumed would depend on the RDIs.** The higher the RDI for a particular nutrient, the more should be the consumption of foods rich in that nutrient. The amount of cereal consumed by a heavy worker, for example, should be more than that consumed by a light worker. Why is this so? This is because of the fact that energy requirements are far more for heavy workers and because cereals are a source of carbohydrates and, therefore, energy. Detailed information on planning balanced diets for infants, preschoolers, school children, adolescents, pregnant and lactating women is given in Block 3. In all these cases, the amount of food to be consumed would be dependent primarily on the RDIs.

### Check Your Progress Exercise 3

- 1) Fill in the blanks.
  - a) The RDI for thiamine is ..... mg per 1000 kilocalories.
  - b) One microgram of retinol is equivalent to ..... micrograms of carotene.
  - c) ..... micrograms make one milligram.

- d) During periods of physiological stress nutrient needs are .....
- e) ..... intakes of energy and protein become necessary in pregnancy.

2) Differentiate between requirement and recommended dietary intake.

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## 6.4 GUIDELINES FOR PLANNING BALANCED DIETS

You have gained considerable knowledge about the principles underlying the planning of balanced diets. Let us now look at some more important aspects. We have to remember that balanced diets are:

- individual-specific
- region-specific and
- income-specific

What do we mean by these terms? Why are these important in planning balanced diets? You will find the answers to these questions in the subsequent discussion.

A balanced diet is never generalized and suitable for all individuals. *It is specific firstly, to an individual of a given age (age-range) and sex.* In the case of adults, it is also specific to a given activity level—sedentary, moderate or heavy work. A balanced diet for a sedentary worker (e.g. typist or clerk) would differ from that of a heavy worker (e.g. construction labourer). A balanced diet for an infant would be very different from that of an adult (influence of age). A diet for an adolescent girl would be different compared to one for an adolescent boy (influence of sex).

Secondly, balanced diets are always region-specific. The particular foods available in a region can be used in planning; using others would be impractical and unsuitable. There is no point in including a cereal like ragi in a diet meant for a North Indian because ragi is grown only in the south. *A balanced diet for a particular region must reflect the characteristic meal patterns, the social and religious practices of that region.* These factors are taken into consideration to ensure that the diet planned is acceptable.

Thirdly, balanced diets are income-specific. Balanced diets for an individual of a given age and sex (and activity level where relevant) vary depending on income. A balanced diet would imply the use of all food groups—energy-giving, body-building and protective/regulatory — in each and every meal. However, the *selection of foods and the amounts in which they are consumed would vary depending on income.* As income increases, consumption of cereals reduces and consumption of milk and other animal protein foods, vegetables and fruits, fat and sugar tend to increase. While planning balanced diets for the affluent these trends are kept in mind but excessive amounts of fat and sugar are not recommended. Having more money does not mean spending more on fat, sugar and expensive foods like meat/cheese, nuts and dry fruits. It means consuming the amounts absolutely necessary so as to maintain good health and avoid putting on weight and developing other health problems. Having more money, however, enables a person to add more variety to the diet; unusual foods or foods not locally available can be purchased or ordered from elsewhere. Judicious selection of food is, however, as important for the rich as for the poor. The ultimate aim is always to meet the nutritional requirements



Let us now study the major steps in planning balanced diets. These are given in the following chart.

<b>Steps in planning balanced diets</b>	
1) IDENTIFY THE INDIVIDUAL AND HIS/HER SPECIFIC CHARACTERISTICS	
<ul style="list-style-type: none"> <li>• Age</li> <li>• Sex</li> <li>• Activity level (for adults)</li> <li>• Income</li> <li>• Socio-economic background</li> <li>• Religion</li> <li>• Region where residing</li> </ul>	
2) CONSULT RDIs FOR ENERGY AND PROTEIN	
3) DECIDE ON TOTAL AMOUNTS OF THE FOLLOWING GROUPS	
Energy-giving	Cereals Roots and tubers Fats and oils Sugar and jaggery
Body-building	Milk and milk products Meat/fish/poultry/egg Pulse
Protective/regulatory	Vegetables (green leafy, others) Fruits
4) DECIDE ON NUMBER OF MEALS TO BE CONSUMED	
5) DISTRIBUTE TOTAL AMOUNTS DECIDED BETWEEN MEALS	
6) DECIDE ON ITEMS AND THEIR AMOUNTS WITHIN EACH GROUP FOR EACH MEAL. DECIDE ON MENU	
7) CHECK DAY'S DIET FOR INCLUSION OF SPECIFIC FOOD GROUPS IN THE AMOUNT DECIDED	

Let us now discuss each of these steps.

- 1) **Identify the individual and his/her specific characteristics**  
You know the individual's characteristics and background would determine the type of diet planned. Income, socio-economic background, religion and the region where the individual stays are also important, as you are aware, in the planning of balanced diets.
- 2) **Consult RDIs for energy and protein**  
Generally diets which meet energy and protein needs meet the needs of other nutrients as well if care is taken to include rich sources of vitamins and minerals. Therefore in planning diets the total energy and protein needs are specified first.
- 3) **Decide on total amounts of specific groups**  
The amounts of cereals, fat, sugar, milk, meat/fish/poultry/eggs, pulse, vegetables and fruits to be consumed are decided based on the income. The amount included would be such that RDIs can be met for energy and protein. This will become clear to you when you study the Practical Manual.
- 4) **Decide on number of meals to be consumed**  
Meal frequency varies depending on income, the work/school schedule and convenience. People belonging to the higher income group consume more meals. Consider the following lists of meals consumed in a day.

(A)	(B)	(C)	(D)
Breakfast	Breakfast	Breakfast	Bed tea
Lunch	Lunch	Mid-morning meal	Breakfast
Dinner	Tea	Lunch	Mid-morning meal
	Dinner	Tea	Lunch
		Dinner	Mid-afternoon meal
			Tea
			Dinner
			Bed time

(A) is typical of the low income group

(B) & (C) are common in the middle income group

(D) is common in the high income group

Variations are often necessitated because of age. A child may not be able to consume much at a time. So he would need to consume more meals. The work/school schedule also becomes important as you will learn in Block 3.

**5) Distribute total amounts decided between meals**

The total amount of each food group decided must be distributed over the day's meals. You will learn how to do this using the Practical Manual.

**6) Decide on items and their amounts within each group for each meal**

The dishes to be included for each meal are decided based on the amount of each item in each of the three food groups decided on earlier. For specific dishes to be included specific items are selected from each food group as you learnt earlier.

**7) Check day's diet for inclusion of specific food groups in the amounts decided**

By step 6 we have decided on the menu (i.e. the dishes to be served in each meal) and listed the amounts of each ingredient used in preparation of the dishes. Now we have to check that we have included each item in the amounts decided in step 3 according to the distribution arrived at in step 5.

You will actually learn diet planning in practice in the Practical Manual—Part I. In the Manual you would find those steps discussed in detail. So, if you haven't clearly grasped the points mentioned don't worry. The Practical Manual will give you all the information you need. But wait till you have gone through Block 3 as well. After studying Blocks 1 to 3 you would be able to understand and use the Practical Manual.

**Check Your Progress Exercise 4**

1) Evaluate the following meals and state whether they are balanced or not. Give reasons for your answer and suggestions for improvement. (Use the three group classification of food.)

a) Rice-curd-mango pickle

.....  
 .....

b) Khichri (with rice, pulse and a green leafy vegetable)

.....  
 .....

c) Rotis (with atta/whole wheat flour and besan/bengal gram flour)-curd

.....  
 .....

d) Tea-toast with butter and jam

.....  
 .....

- e) Idlis (urad dal, rice) —coconut chutney—sambar (arhar dal, vegetables)

.....  
 .....

- 2) List four specific characteristics of an individual which determine planning of balanced diets.

.....  
 .....

## 6.5 LET US SUM UP

This unit introduced you to the concept of food groups. Food groups were described as a set of food items with common characteristics. Foods, as you studied, can be classified on the basis of source or function. Including the three food groups (energy-giving, body-building and protective/regulatory) in each and every meal ensures that the meals and, therefore, the day's diet is balanced.

A balanced diet has been described as “a diet containing different types of foods in such quantities and proportions that the need for all nutrients is adequately met and a small provision is made for extra nutrients to withstand short durations of leanness”. Balanced diets are planned on the basis of the recommended dietary intakes using the food groups. Various steps involved in planning balanced diets are also discussed starting with identifying the individual for whom we are planning and then selecting the right foods in the right amounts to be distributed over the day's meals.

Income, individual-specific and region-specific factors play an important role in determining food selection and meal patterns (Figure 6.6)

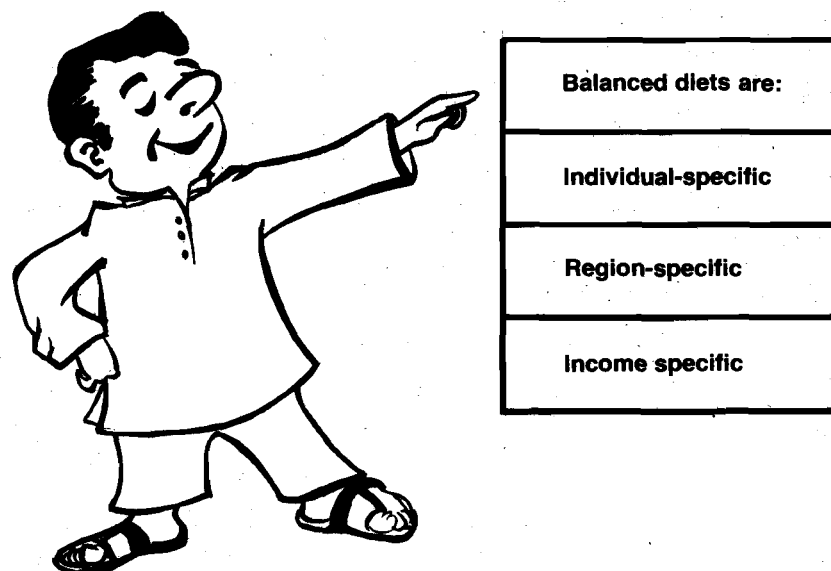


Fig. 6.6 Key points about balanced diets

## 6.6 GLOSSARY

- Activity level** : Level of activity of a person—sedentary (light), moderate or heavy. Activity level is chiefly related to the occupation of an individual.
- Foetus** : The unborn child.
- Lactation** : Period when the mother breastfeeds her infant.
- Meal Pattern** : Number of meals consumed in a day and the timing and nature of different meals.



- Mid-afternoon meal** : Referring to a meal consumed between lunch and tea usually consisting of items like fruits, soups, beverages, snacks.
- Mid-morning meal** : Referring to a meal consumed between breakfast and lunch usually consisting of a beverage and a snack. Soups and fruit-based items are also served.
- Physiological stress** : Stress on the body due to normal physiological events unlike the stress caused by disease. Periods of physiological stress are generally rapid growth phases (e.g. infancy, adolescence, pregnancy and lactation).

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## 6.7 ANSWERS TO CHECK YOUR PROGRESS EXERCISES

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### Check Your Progress Exercise 1

- 1) a) characteristics b) protein, fat c) iron, calcium d) yellow maize e) vitamin C  
f) C g) A h) Vitamins, minerals i) carbohydrate j) nutrient

### Check Your Progress Exercise 2

- 1) List the dishes you consumed for lunch and check for representation of all the three functional food groups.

### Check Your Progress Exercise 3

- 1) a) 0.5 b) 4 c) 1000 d) high e) additional
- 2) Requirement refers to the minimum amount of a nutrient required to prevent deficiency and maintain satisfactory body levels of that nutrient for the majority of people. An additional safety margin for individual variation, cooking losses, periods of low intake is added to the requirement figure to arrive at the RDI.

### Check Your Progress Exercise 4

- 1) (a) Rice and curd provide energy and protein respectively. The protective/regulatory group is represented only by the pickle. A vegetable preparation can be added to complete the meal even though curd does provide vitamins and minerals. (b) This is a balanced meal even though it is only one dish because energy (rice), protein (pulse) and vitamins and minerals (green leafy vegetables) are being provided. (c) A cereal-pulse combination is used to make the rotis. Cereals would provide energy. Both pulses and curd provide protein. Addition of vegetable to the rotis can help or a fruit can be given so as to include the protective/regulatory group. (d) This meal provides only calories and little of other nutrients. Milk and a fruit can be given. (e) This is a balanced meal. All the three food groups are represented.
- 2) Any four of the following: age, sex, activity, income, socio-economic/religious/regional considerations.

