UNIT 7 FOOD, ENERGY, ACTIVITY PATTERN AND BODY WEIGHT

You will study about the ideal body weight, its relation to the food you eat and the type of activity patterns you have

Structure

7.0 OBJECTIVES

When you complete this unit,you will be able to

- identify the foods you eat in terms of their energy content
- recognise your activity pattern and how it affects your energy needs and
- identify ways to regulate your energy balance and maintain your weight.

7.1 INTRODUCTION

As you have seen in Unit 6, if you do not eat according to the body's needs you will suffer from either under or overnutrition. You will certainly want to know how to avoid these pitfalls. Therefore it is very important for you to know how your body gets and spends the energy obtained from the foods you eat. In this unit you will learn how to select foods on the basis of their energy content. You will also learn about the energy needs of your body which is related to your activity pattern. Lastly you will learn how to maintain your energy balance and maintain your weight.

7.2 FOOD—THE SOURCE OF OUR ENERGY

Food supplies the energy needed for everything we do. As you learnt in Unit 1, two components of food—carbohydrates and fats—supply 85 to 92 per cent of the energy in the Indian diet; the remaining 8 to 15 per cent is provided by proteins. As you remember calorie is the unit used to express our energy requirements.

Food composition and calorie content: The calorie content of food is related to its composition. Table 7.1 illustrates the relation of food composition to the calorie content of foods. You will note that:

Foods which have a large percentage of water have a low calorie content.

Foods which contain mostly carbohydrates are fairly high in calories.

Foods which contain a large amount of fat are high in calories.

The calorie content of foods cha ges when they are prepared. When you cook rice, it absorbs water. Thus, cooked rice contains only about a third as many calories as an equal weight of raw rice.

When you prepare dal, a reduction in calorie content occurs, depending on the amount of water added. Thus, addition of water during cooking shows lowering of calories, when the raw and cooked foods are compared on an equal weight basis.

You use oil to season the dal. As you remember, each gram of oil has 9 calories. Thus seasoning with oil increases the calorie value of most of our preparations, such as dal, vegetables, salads, etc.

Table 7.1 : Food Composition And Calorie Content

Food	Moisture[1] (%)	Carbo-hydrate (gm) Per 100 g E.P.[2]	Fat (gm)	Energy (KCal)
Cucumber	96	2.5	0.1	13
Tomato	94	3.6	0.2	20
French beans	91	4.5	0.1	26
Orange	88	10.6	0.2	48
Milk (cow's)	87	4.4	4.1	67
Potatoes	75	22.6	0.1	97
Egg	73	—	13.3	173
Cereals—rice, wheat flour	12	78.2	1.0	345
Dal-urad, moong	11	59.6	1.4	345
Groundnuts	3	26.1	40.1	567
Butter	19	—	81.0	729
Oil, ghee, vanaspati	0	—	100.0	900

Courtesy: Nutritive Value of Indian Foods, ICMR, 1971.

1 Moisture—water

2 E. P.—Edible Portion

You prepare a number of foods by shallow or deep frying. For example, foods such as dosa, paratha, puries and papads absorb some oil during preparation. Therefore the calorie content of these foods is increased due to the oil absorbed.

You observe change in calorie content during food processing also. If water is lost in processing, as when you dry fruits, there is an increase in calorie value per unit weight of the food processed. In preparing jams, jellies and other fruit preserves, some water is lost and sugar is added, which results in an increase in calories.

Thus any change in the composition, during preparation or processing, affects the calorie content of the food product.

Check Your Progress

1 List three food preparations each having low, medium and high energy (calorie) value.

.....

.....

.....

2. Explain why the listed food preparations have differences in energy value.

.....

.....

.....

3 What is the effect of drying on calorie value of raisins?

.....

.....

4 Explain why tomatoes have less than half the calories than carrots.

.....

.....

.....

Activity

Effect of Preparation on Calorie Content

Observe and record the following:

a) Dal preparation in your home

Dal, raw taken—	= Katories/cups
water added to cook dal	= Katories/cups
water added to cooked dal	= katories/cups
Total amount of dal preparation	= katories/cups
Oil added to season	= teaspoons
* Number of katories/cups of prepared dal	=
Calories per katori/cup of prepared dal	=

b) Paratha/Chapati prepared in your home

Wheat flour taken	= katories/cups
Water added to make the dough	= katories/cups
Oil added in the dough	= teaspoon
Oil or ghee used to coat/fry Chapati/paratha	= teaspoon
Number of chapaties prepared	=
* Calories per chapati/paratha	=

c) Puri prepared in your home

Wheat flour taken	= katories/cups
Water added to make the dough	= katories/cups
Oil added in the dough	= teaspoon
Oil used for frying	= katori/cup
Number of puries made	=
• Calories per puri	=

- Record separately the weight (g) of pulse (dal) or cereal (wheat flour) and the weight of oil used in each preparation. Calculate the calorie value of the weight of these foods referring to "Nutritive value of Indian foods" ICMR, 1971 or to Table 7.1. Equate the calorie value of each to the total number of katories/cups of dal preparation, of number of chapatis/parathas or number of puries. Then obtain the calorie value per unit.

7.3 YOUR ENERGY NEEDS

The number of calories you need each day is decided by:

a) the involuntary activity of your body; and

b) the voluntary activity.

The energy spent for involuntary activity is the basal energy need of your body. It is measured as energy used per kilogram of body weight per hour, and is called the Basal Metabolic Rate (BMR). Involuntary activities,as the word suggests, are those which occur without conscious effort on you· part. The heart beat and movements of the digestive tract are good examples of involuntary activities. Meeting the calorie need for these involuntary

activities is an absolute must to ensure continuance of life. It has to be met every moment of your life without consideration of any other needs.

The amount of energy needed for involuntary activity of the body is much more than the amount you need for voluntary activity. The speed of your involuntary activity is set by the hormone called thyroxine. In the previous units we have mentioned that this substance is made by a gland in your neck, known as thyroid. If there is too much of thyroxine released, the energy use is increased; if too little is released, the energy use for involuntary activity is reduced. Thus these abnormal conditions affect requirements of energy and need to be treated medically. Luckily for us, such abnormalities are not very common. Most of us have a normally functioning thyroid and thus have a normal BMR.

Voluntary activity is what you choose to do. It includes:

- the work you do as part of your occupation, profession or the job you are engaged in;
- the activities you do during your leisure time, such as playing tennis, painting, etc. and
- the activities you do as part of your daily routine, such as brushing your teeth, having a bath, eating, commuting to work, doing laundry, washing dishes, etc.

The amount of energy spent in these voluntary activities depends on the size and number of muscles used, the time for which you use them and how hard these muscles are used. There are some basic facts you may note:

- Large muscles need more energy than small ones. Compare the muscle used in lifting loads with those used in typing.
- Rapid movement of muscles takes more energy than slow movement. Compare the muscle movement in running with that in walking.
- The energy spent increases with the time spent in a given activity. For example, your leg muscles are used for a longer time in walking 2 kilometers than in walking half a kilometer.
- When many muscles are used more energy is used as compared to when a few are used. You will notice that more muscles are used in rowing a boat than in sitting in the boat.

Some mental states affect your energy need. If you are tense or nervous, energy demand is increased due to increase in muscular activity. Please remember, mental work does not increase your energy need, as it does not use muscular energy enough to count. An hour of intense mental work does not need even five calories.

Check Your Progress

5 Explain the term involuntary activity.

.....

.....

.....

.....

.....

.....

6 List the voluntary activities you perform daily. How would you classify these?

.....

.....

.....

.....

.....

.....

.....

7 Explain what happens if the energy needs of a person are not met.

.....

.....

.....

.....

.....

7.4 YOUR ACTIVITY PATTERN

Your energy requirement is estimated on the basis of the level of your activity. The various categories of activity are given below. You can decide to which of these groups you belong.

Sedentary Group: You belong to this group if most of your time is spent in light muscular activity. It would involve a lot of sitting, some standing and moving around at work and mild forms of recreation and only occasional indulgence in swimming for recreation.

A large number of adults belong to this group. This includes professional and white-collar workers; blue collar workers, who work indoors; housewives, who have household help or have labour-saving devices.

Active group: You belong to this group, if you use many muscles and move fast and continuously.

Some of the people, who would be included in this group are—postman, truck driver, gardener, factory workers, waiters in hotels, housemaids, and women who do their housework themselves and look after their small children themselves. Farm work, during seasons of light work, is also included in this category. (Figure 7.1).

Very Active Group : You belong to this group, if you use most of your muscles, move very fast and carry out strenuous activities for several hours each day.

A student, who participates in strenuous competitive sports (football, basketball, tennis, squash or track events) and practices several hours each day would belong to this group. Workers involved in heavy construction work, miners, rickshaw pullers, loaders, coolies, and persons involved in other heavy work for many hours each day are included in this category. Farm work in the busy season is also very active work.

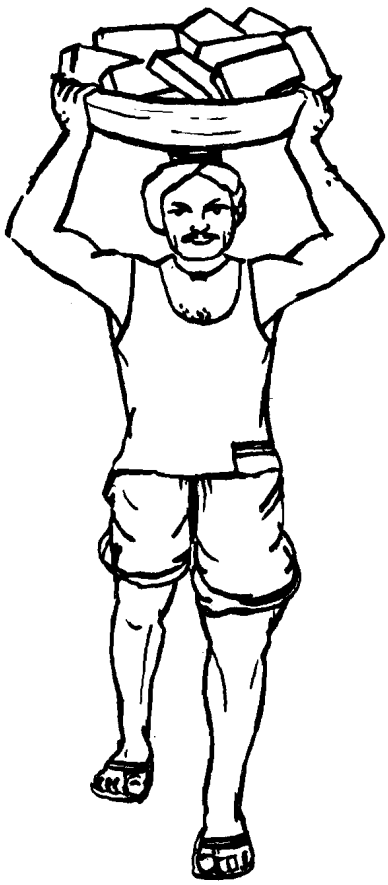
7.5 DEMAND AND SUPPLY OF CALORIES

Your weight is a balance between the calories supplied by your food and the energy you spend each minute of your life. You may be tempted to think of a similar question, 'what determines your bank balance?' You know it is not the size of your salary cheque that decides it. It is the balance between what you earn and the amount you spend—the supply and demand—that decides whether you have money left over, just come out even, or you have to draw money from your savings. The situation is similar in the case of energy used in the body. Just remember one thing, while in the case of a bank account, it is healthy to have a large balance, it is not desirable to have a large balance of energy in the body. Let us see what determines your demand for energy (calories) and how food meets this demand.

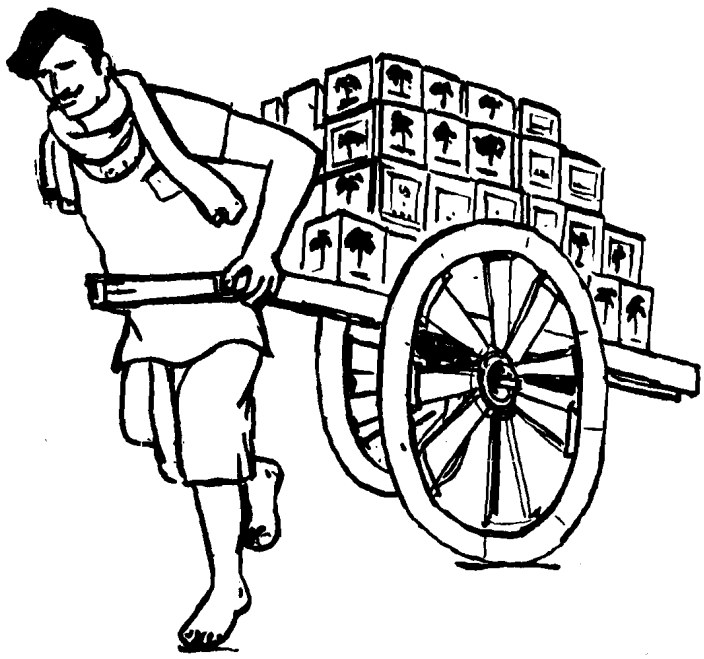
Activities and Calories : Food provides the energy your body needs for all its activities. Some of these activities keep the body going, such as, breathing, heart beat, blood circulation, growth and repair of the body; while others relate to the body's capacity to work e.g. to move, to carry a child or to sweep the floor. Thus,supplying calories (energy) is one of the main functions of the food you eat. As you read in Unit 4, the food is first

Figure 7.1 Energy needs vary with activity

Sedentary
2400 Kcal
55 kg.



Moderate Activity
2800 Kcal
55 kg.



Heavy Work
3900 Kcal
55 kg.

digested and the nutrients are transported by the bloodstream to all the cells of the body. The food components are oxidized by the oxygen in the cells and energy is released to meet the needs of the body.

You have learnt in the first unit that calorie is a unit of energy. Just as you record your weight in kilograms and your height in centimeters, you record the energy content of food in calories. And the energy spent in activities is also recorded in calories. When you talk about 'eating calories', it is only a figure of speech. You eat food, which provides energy, which is measured in calories.

When you eat foods that provide the number of calories needed to meet the body's expenditure of energy, your weight does not change. Thus maintenance of body weight in healthy adults indicates energy balance. When you eat more food than is needed to meet the body's requirements for energy, the excess is stored in the body. Your body cannot get rid of energy in excess of its needs. It can only deposit it in the most compact manner i.e. in the form of fat.

If you eat consistently less amount of food, which is unable to meet your needs of energy, body fat is oxidized to release energy to make up the deficit, and you lose weight. An underweight person has low vitality, and decreased resistance to disease and thereby his capacity to work is reduced. Let us now understand how to maintain the body weight at a desirable level.

Check Your Progress

8 What is energy balance?

.....

.....

.....

.....

.....

When do you gain weight and why?

.....

.....

.....

.....

.....

10 Indicate how activity patterns are grouped, for instance who is sedentary?

.....

.....

.....

.....

.....

7.6 MAINTENANCE OF BODY WEIGHT

Everyone is interested in his body weight. Some want to lose it, some need to put on weight, while others, who have managed to be of normal weight, wish to maintain it.

If you are not one of those people who are worried about their weight, you will wonder why weight is so important? Weight can affect our vitality, our appearance and our emotional life. Weight affects our longevity also. Weight is one of the gross parameters of our health. You will be interested to know that the life insurance companies collected data about weights and heights and developed the first tables of desirable weight for height to guide their agents to determine the premium to be paid by their clients. The clients, who were underweight or overweight were found to be greater risks, and therefore had to pay higher premium. Thus our weight indirectly affects our financial liability too.

Normal weight: There are three factors, which affect our normal or desirable weight. These are our age, height and body build. By the time we reach 25 years of age, the body building process is complete and so also our need to add weight. It is advisable for us to maintain the weight throughout life.

If you have reached your desirable weight for your height by 25 years of age, your weight should not increase after that. When you are 40, there is no reason to weigh more than what you were at 30. The same is true of the later years. But you will observe a number of men and women gain half a kilogram a year after the age of 35 or 40. You may think it is insignificant to worry about a gain of as little as half a kilogram. But when it continues for 10 to 15 years, those extra kilograms are certainly visible.

Weight for Height: Height and body build are determined by heredity. So you have little control over height and body build, but you can decide and control the weight you carry on this body frame. The desirable weights for men and women of different heights are given in Tables 7.2 and 7.3. These tables were prepared by the Life Insurance Corporation of India.

Record your weight regularly. Remember three things when you weigh yourself.

First, weigh at regular intervals, say once a month, at the same time of the day and as far as possible, on the same scale. Your weight may vary as much as a kilogram or more during a single day. This variation is due to the water you drink (about 1 kg per day), the food you eat (each meal may weigh 600-750 gm) and loss of weight through urine and faeces. If you have a scale at home, the best time to weigh is in the morning, before you eat or drink anything. If you weigh away from home, try to use the same scale each time you weigh yourself, so that the error due to the scale may be minimal.

Secondly, try to wear similar light clothing. Please weigh yourself without wearing shoes or chappals. If you are carrying a purse, a briefcase or a bag of books, please put these down before weighing yourself. Most of these can add 0.5 kg. or more to your weight and thus give a wrong value.

Table 7.2 : Weight for Height for Males and Overweight-Underweight Limits

Height (cm)	Weight (kg)	Overweight limit (+ 20%) (kg)	Underweight limit (− 20%) (kg)
148	47.5	57.0	38.0
152	49.0	59.0	39.0
156	51.5	62.0	41.0
160	53.5	64.0	43.0
164	56.0	67.0	45.0
168	59.0	71.0	47.0
172	62.0	74.5	49.5
176	65.5	78.5	52.4
180	68.5	82.0	55.0
184	72.0	86.5	57.5
188	75.5	90.5	60.5
190	77.5	93.0	62.0

Courtesy: Life Insurance Corporation, Agent's Manual.
Weights have been rounded off to the nearest half kilogram.
Overweight and Underweight limits are calculated from weight in column 2, by adding or subtracting 20%

Table 7.3 : Weight for Height for Females and Overweight-Underweight Limits

Height (cm)	Weight (kg)	Overweight limit (+ 20%) (kg)	Underweight limit (−20%) (kg)
148	46.5	56.0	37.0
152	48.5	58.0	39.0
156	50.5	60.5	40.5
160	52.5	63.0	42.0
164	55.0	66.0	44.0
168	58.0	69.5	46.5
172	60.5	72.5	48.5
176	64.0	77.0	51.0
180	67.0	80.5	53.5
184	70.5	84.5	56.5
188	74.0	89.0	59.0

1. Courtesy : Life Insurance Corporation, Agent's Manual.
2. Weights have been rounded off to the nearest half kilogram.
3. Overweight and Underweight limit have been calculated from weight in column 2, by adding or subtracting 20%.

Thirdly, record your weight in your diary or a notebook along with the date. Compare your weight with the desirable weight for your height. Compare your weight with the record of your weight last month and the month before that also. Suppose you weigh 55 kg today and you find that it is half a kg more than last time. You may think it is not important to worry about it, since your weight varies more than that in a day. But check your weight record and see if there is an increase. If that is the case, it is the time to take action, before it gets difficult to manage. If you are underweight, you need to watch too, to see that you gain steadily, until you reach the desirable weight for your height and body build.

☛ **Check Your Progress**

11 Why is it important to maintain weight in adult life?

.....

.....

.....

.....

.....

12 Which agency has developed the first weight for height tables? Why?

.....

.....

.....

.....

.....

13 Explain the precautions to be taken in maintaining your weight record.

.....

.....

.....

.....

.....

7.7 LET US SUM UP

In this unit, you have had an opportunity to learn the relation of food composition to calorie content. Your age, body build and weight affect the desirable weight of your body. You have learnt the importance of maintaining your weight record regularly and accurately. By noting your activity pattern you can decide whether you are sedentary, active or very active. You need to balance your energy intake with energy expenditure to maintain your weight at a desirable level.

7.8 GLOSSARY

BMR : Basal metabolic rate. It represents the rate at which energy is used by the body for its involuntary activities. It is measured in the early hours of the morning after the body has been at rest for about 12 hours.

Calorie : Calorie is the amount of heat required to raise the temperature of 1 litre water. It is also known as kilocalorie.

Involuntary activity : The body activities that occur without any conscious effort on our part.

Respiration : Action of breathing.

Voluntary activity : The activities, which are carried out by conscious effort on our part.

7.9 ANSWERS TO CHECK YOUR PROGRESS

1

Food Preparation	Energy value
Salad	Low
Dal	Medium
Jam	High

2 Salad contains mainly vegetables like radish, cabbage, salad leaves, carrot etc. These vegetables are high in moisture content and low in calories, so salad will have a low calorie value. Dal has more calories than salad due to the presence of carbohydrate and the used oil for seasoning.

Jam has a high concentration of carbohydrate or sugar because of the drying up of water during cooking, so it is rich in calories.

3 Calorie value of raisins is increased on drying.

4 Tomatoes have a higher moisture content than carrots and so has less calories for the same weight of carrots.

5 Involuntary activities are those that are carried on within the body without conscious effort on our part, e.g. beating of the heart and respiration.

6 If energy needs of a person are not met from food, the performance of the body's voluntary and involuntary activities will be decreased.

7 Energy balance is the maintenance of body weight in a healthy adult by eating foods that provide the number of calories needed to meet the body expenditure of energy.

8 When you eat more food than is needed to meet the body's requirements for energy, you gain weight. This happens because the excess energy is stored in the body as fat.

9 Activity patterns are based on the level of activity. All persons performing different activities but having the same level of activity (expenditure of energy) are grouped together into sedentary, active or very active groups.

A sedentary person is one who spends most of his time in light muscular activity which involves a lot of sitting and some standing and moving.

10 Weight affects our vitality, appearance, emotional life and longevity. Therefore it is important to maintain weight.

11 Life insurance companies developed the first weight for height tables to guide their agents to determine the premium to be paid by their clients. Underweight and overweight clients were found to be greater risks and therefore had to pay higher premium.

12 (1) Weigh at regular intervals say, once a month, at the same time of the day and on the same scale.

(2) Wear similar light clothing each time and weigh without chappals.

(3) Record weight in a notebook along with date.

Practical Exercise

1. Study of Activity Pattern of Individuals

a) Record your activities for the past 48 hours and indicate which of the following groups you belong to:

Sedentary
Active
Very Active

b) Ask two of your acquaintances to describe their daily activities and classify them according to the above groups.

Format of record of activities.

Time from/to	Activity	Type of activity	Duration Hours/Minutes

Practical Exercise—2

Record your weight every week for a month following the instructions given in the text.

Week	1	2	3	4
Date				
Weight in (kg.)				

Are there any significant changes in your weight? Yes/No. Is it increasing/decreasing/no change.

a) Record weight and height of all your family members including yourself.

Serial no.	Member	Age (Years)	Weight (kg.)	Height (cm.)

Compare the weight and height with standard weight for height tables.
Is there any member who is overweight?
Is there any member who is underweight?