UNIT-1

An Overview of Nutrition

Learning Outcomes

By the end of this unit the learner will be able to:

- ✓ Explain what is meant by 'Nutrition'.
- ✓ Identify key nutrients.
- ✓ Understand why we need energy.

Unit 1

An Overview of Nutrition

What is Nutrition?

Nutrition is the process of consuming, absorbing, and using nutrients by the body for growth, development, and maintenance of life.

It is a 3-way process. First, food or drink is consumed. Secondly, the body breaks down the food or drink into nutrients. Thirdly, the nutrients travel through the blood stream to different parts of the body, where they are used as fuel and for many other purposes. To give the body proper nutrition, a person has to eat and drink enough of the foods that contain key nutrients. When we talk about proper nutrition, we are talking about the food we eat and how the body uses that food for health and survival. This is what nutrition is all about. Eating fresh whole foods is much better for our health than eating processed foods. Having a balanced intake of different types of food is very important.

Nutrient deficiencies cause diseases and can have negative effects on our health. For instance, there are many people in the world that are blind due to a vitamin A deficiency. It has also become evident that eating too much, especially sugars, can cause health problems and diseases like diabetes, heart disease and obesity. A balanced diet contains five key nutrient groups, which are required in appropriate amounts for better health. These groups are outlined below:

- Proteins are involved in growth, repair, and general maintenance of the body.
- Carbohydrates are usually the main energy source for the body.
- Lipids or fats are a rich source of energy and a key component of cell membranes and signals molecules and as myelin, they insulate neurons (nerve cells).
- Vitamins are important in a range of biochemical reactions.
- Minerals are important in maintaining ionic balances and many biochemical reactions.

Water is crucial to life. Metabolic reactions occur in an aqueous environment and water acts as a solvent for other molecules to dissolve in. A deficiency of any one type of nutrient can lead to disease, starvation (or dehydration in the case of water), and subsequent death. **Fibre** is a component of food that is not nutritious but is important to include in our diet. Fibre or roughage is non-digestible carbohydrate and it has an important role in aiding the movement of food through the gut.

There is also an absolute requirement for some specific molecules in the diet. This is because, although the body can manufacture most of the molecules it needs, some essential molecules cannot be made by the body. These molecules are called essential nutrients, and must be supplied in the diet, for example, lysine and methionine, which are essential amino acids. Other components of the human diet are not nutrients at all, as they do not perform the functions of producing energy or promoting growth and repair, but are eaten for other purposes. For example, spices and other flavourings help make food more

palatable; tea and coffee drinks provide a good source of water and may also contain other valuable substances such as antioxidants.

An adequate diet is essential for health and education plays a key role in providing people with the knowledge of what constitutes a healthy diet, however, as with most science, the information keeps changing. The information about what we should be eating comes from various sources: in the UK a large amount of data was collected and published by COMA, the Committee on Medical Aspects of Food Policy (1991). This committee has been disbanded, but its publications still represent a valid source of information about diet.

Currently, the Scientific Advisory Committee on Nutrition (SACN) advises the Department of Health and the Food Standards Agency (FSA). The Food Standards Agency produces a guide to choosing a healthy diet, which is a balance of good health. A lack of adequate supply of any nutrient is known as malnutrition and leads to poor health.

What are Nutrients?

Food provides a range of different nutrients. Some nutrients provide energy, while others are essential for growth and maintenance of the body. Carbohydrates, proteins, and fats are macronutrients that we need to eat in relatively large amounts in the diet as they provide our bodies with energy, and also the building blocks for growth and maintenance of a healthy body. Vitamins and minerals are micronutrients which are only needed in small amounts, but are essential to keep us healthy.

In order to receive an adequate and appropriate nutrition, we need to consume a healthy diet, which should consist of a variety of nutrients. A healthy diet enables us to maintain a desirable body weight and composition (the percentage of fat and muscle in the body). If we consume too much food, this may result in obesity. If we consume large amounts of certain nutrients, usually vitamins or minerals, harmful effects (toxicity) may occur. If we do not consume enough nutrients, it may result in a nutritional deficiency (disorder).

Nutrients are the parts of our foods that our bodies use for energy, growth, and the rebuilding of the damaged or worn out structures of our bodies.

Components of the Diet: Generally, nutrients are divided into two classes:

- **Macronutrients:** Macronutrients are required daily in large quantities. They include proteins, fats, carbohydrates, some minerals, and water.
- **Micronutrients:** Micronutrients are required daily in small quantities - in milligrams (one thousandth of a gram) to micrograms (one millionth of a gram). They include vitamins and certain minerals that enable the body to use macronutrients. These minerals are called trace minerals because the body needs only very small amounts.

Energy is released when certain nutrients are metabolized in the body and this energy is used to power other chemical reactions and cellular processes while some energy is lost as heat. Energy is measured in kilocalories (kcal) or kilojoules (kJ):

Units of Energy

Energy can be measured in either joules or calories. In practice both units are used. Just as different units are used to measure liquids, e.g. pints, litres. The unit of energy with which most people are familiar is the calorie (cal) and 1000 calories is equivalent to 1 kilocalorie (kcal) or 1 Calorie (Cal).The international system of units (SI) measures energy in joules (J). The formula can be used to convert from one system to another is

1 kcal = 4.18 kJ
1MJ = 240 kcal

Why We Need Energy?

We need energy to grow, stay alive, keep warm and be active. Energy is provided by the carbohydrate, protein, and fat in the food and drinks we consume. Different food and drinks provide different amounts of energy. Carbohydrate is the most important source of energy for the body. Sources of carbohydrate include starchy foods, e.g. bread, rice, potatoes, pasta, pulses, and breakfast cereals. Human beings need energy for the following:

Basal Metabolism

This comprises a series of functions that are essential for life, such as cell function and replacement; the synthesis, secretion, and metabolism of enzymes and hormones to transport proteins and other substances and molecules; the maintenance of body temperature; uninterrupted work of cardiac and respiratory muscles; and brain function.

The amount of energy used for basal metabolism in a period of time is called the Basal Metabolic Rate (BMR). This is the amount of calories needed to run all essential functions and chemical reactions while in a rested and quiet state. This is also called Resting Metabolic Rate or RMR. RMR is the largest part of total metabolism and accounts for 65 - 75% of calories burned in a day.

Thermal Effect of Food (TEF)

The body uses energy to digest and absorb the nutrients present in the food we eat. The rate of energy used for the Thermic Effect of Food is about 10%; it can be increased depending on the composition of each meal. If we overeat, the TEF actually increases due to more food to digest, the stomach and intestines have to work harder and longer. It means if we ate an extra 3500 calories (number of calories per pound of fat) we wouldn't actually gain 1 pound of body fat because the TEF has to be accounted for, we would gain less. The opposite also happens if we cut 3500 calories to lose 1 pound. The TEF decreases

because there would be less food/nutrients to process so energy expenditure would reduce, thus we would lose less than a pound in weight.

Calories do count but our body has sophisticated mechanisms to balance energy which enables us to hold onto as much energy as possible for a time when starvation may occur!

- **Physical Activity** - this is the most variable and, after BMR, the second largest component of daily energy expenditure. Humans perform obligatory and discretionary physical activities. Obligatory activities can seldom be avoided within a given setting, and they are imposed on the individual by economic, cultural or societal demands. The term "obligatory" is more comprehensive than the term "occupational", obligatory activities include daily activities such as going to school, tending to the home and family and other demands made on children and adults by their economic, social and cultural environment. Discretionary activities, although not socially or economically essential, are important for health, well-being, and a good quality of life all around. They include the regular practice of physical activity for fitness and health; the performance of optional household tasks that may contribute to family comfort and well-being; and the engagement in individually and socially desirable activities for personal enjoyment, social interaction, and community development.

- **Growth** - the energy cost of growth has two components: 1) the energy needed to synthesize growing tissues; and 2) the energy deposited in those tissues. The energy cost of growth is about 35 percent of the total energy requirement during the first three months of age, which falls rapidly to about 5 percent at 12 months, remains at about 3 percent in the second year, then, 1 to 2 percent until mid-adolescence, and is negligible in the late teens.

- **Pregnancy** - during pregnancy, extra energy is needed for the growth of the foetus, placenta and various maternal tissues, such as in the uterus, breasts, and fat stores, as well as for changes in maternal metabolism and the increase in maternal effort at rest and during physical activity.

- **Lactation** - the energy cost of lactation has two components: **1) the energy content of the milk secreted and 2) the energy required to produce that milk.** Well-nourished lactating women can derive part of this additional requirement from body fat stores accumulated during pregnancy.

  Different people need different amounts of energy. This depends on our basal metabolic rate (BMR), which measures the amount of energy we use to maintain the basic functions of the body, as well as our level of activity. Some activities use more energy than the others. The more active we are, the more energy our body uses up.

Maintaining Energy Balance

Our weight depends on the balance between how much energy we consume from food and drinks, and how much energy we use up by being active. When we consume more energy by eating or drinking than we actually use, we put on weight; if we consume less energy from our diet than what, we spend, we

lose weight; but if we eat and drink the same amount of energy as we use up, we are in **energy balance** and our weight remains the same. Energy enables cells to do all of their functions, including building proteins and other substances, which are needed by the body. The energy can be used immediately or stored for use later.

When the supply of energy (the number of calories consumed in food) exceeds the body's immediate needs, the body stores the excess energy. Most excess energy is stored as fat. Some is stored as carbohydrates, usually in the liver and muscles. As a result, weight is gained. An excess of only 200 calories per day for 10 days is likely to result in a weight gain of nearly ½ pound, mostly gained as fat. When too few calories are consumed for the body's needs, the body begins to use carbohydrates stored in the liver and muscle. Because the body mobilises stored carbohydrates quickly and because water is usually excreted as carbohydrates are mobilised, weight loss tends to be fast initially. However, the small amount of stored carbohydrates provides energy for only a short time. Next, the body uses stored fat.

Because fat contains more energy per pound, weight loss is slower as the body uses fat for energy. However, the amount of fat stored is much larger and can, in most people, provide energy for a long time. Only during prolonged, severe shortages of energy, does the body break down protein. If normally nourished people experience total starvation (when no food is consumed), death occurs in 8 to 12 weeks. Energy requirements vary markedly from about 1,000 to more than 4,000 calories a day depending on age, sex, weight, physical activity, disorders present, and the rate at which people burn calories (metabolic rate).

Daily Energy Requirements

Calorie Requirements for Different Age Groups

There is no one exact answer to how many calories are needed to keep our bodies in good health at different stages of life. Age, gender, weight, and activity levels must be considered. These will all impact on the number of calories a person needs. Figures given in health charts are generally estimates and best used as a guide. Ideal numbers of calories will increase or decrease, even within the same age groups. By ensuring that nutrition comes from low calorie recipes and healthy eating, individuals can be confident that the calories they are consuming are the best kind.

A surprising 70% of the calories we consume daily maintain essential body processes - like breathing, pumping blood, keeping the body‘s organs working, walking, and eating. Even while sleeping, we consume calories.

Healthy Eating For Kids

A one-year-old baby needs **approximately 1,150** calories a day. These come mainly from breast milk or formula milk, and some solids, in the first year. In its first two years a baby grows more than at any other time in its life. It is best to avoid salt and sugar for babies, salt posing a danger to the baby’s kidneys and sugar encouraging a taste for sweet things.

There are foods, however, that must be included to ensure healthy eating for kids. While low calorie versions of milk are good for adults, children need full fat milk. Babies should not be fed semi-skimmed before they are two, or skimmed milk before they are five.
As they grow older, children need more calories

Healthy eating for kids means:

- **four to six-year-olds** require an **average** of **1,630** calories per day
- **seven to ten-year-olds need 1,855** calories per day
- **11 to 14-year-olds need 2,030** calories per day

There is a slight increase in these figures for boys and a slight decrease for girls. Because they grow rapidly, healthy eating for kids is essential and they need proportionately more nutrients than adults. As they approach their teens, another growth spurt will signal a need for even more nutrients. Some of the best of these are available in low calorie recipes.

Calorie Requirement for Young People in Their Mid to Late Teens

Among **15-18-year-olds,** the average is **2,755** for boys and **2,110** for girls.

Low calorie recipes will deliver balanced, filling, and nutritious meals are needed to meet these raised calorie requirements. Healthy eating for kids is very important at this time, especially since teenagers often develop a taste for fast food or even try experimenting with different food regimes. It is wise for parents to keep an eye on girls in particular, if they feel too much attention is being paid to calories, or if they notice meals are being missed.

Adult Figures for Healthy Eating

Adult requirements vary according to age as well as height, weight, activity, and gender. An average **1,940** calories daily should be consumed by women and **2,550** by men. An adult male who takes little or no exercise and sits at a desk all day will obviously require many fewer calories than a man whose job keeps him highly active or someone who works out at the gym.

Pregnant Women

In the case of a pregnant woman, there is no need to “eat for two”. A mother-to-be can however increase her daily average to 2,400 calories. This will allow an extra serving or two of energy foods, such as bread and cereals and extra glasses of milk, or their equivalent in yogurt or cheese, to make sure she is getting enough protein and calcium. Low calorie versions of other foods in her diet will still deliver enough nutrition.

In Old Age, Calorie Needs Decrease

It is natural for weight loss to occur as people grow older and appetites decrease. Though less active, older people need more nourishing foods than ever before in order to maintain optimum health through healthy eating.

The Best Kind of Calories

Probably just as important as knowing about calories is to know where the calories are coming from. The aim should be to consume as few calories as possible in the form of fats and sugary foods, which is why low calorie choices are the best option. Ideally, adults should get no more than 27-30% of their calories as fats, and of those, no more than 8% from saturated fats.

Individual requirements for nutrients vary considerably, depending upon factors, such as, age and sex as you saw above. Other relevant factors are size, metabolic rate (see below) and occupation. The situation is further complicated as interactions between components of the diet may alter the efficiency of absorption or utilization of a particular nutrient. The body also has stores of certain nutrients (fat-soluble vitamins, for example) so that variations in daily intake of such nutrients can be accommodated.

The average energy intake in the UK is 2,050 Kcal for men and 1,680 Kcal for women. The energy in diet is provided by carbohydrate, protein and fat. The amount of energy made available to the body by each of these varies. A gram of carbohydrate (starch or sugar) provides 4 Kcal, protein provides 4 Kcal per gram, and fat provides 9 Kcal per gram.

Basal Metabolic Rate

Our Basal Metabolic Rate (which is also known as Resting Metabolic Rate) is the minimum number of calories we need to burn to fuel essential bodily processes and keep our organs and tissues in working order - the processes that continue as we sit quietly or lie asleep, such as breathing and the beating of our heart. Further energy expenditure is necessary to carry out everyday activities beyond the energy required for the BMR; this is called the Total Energy Expenditure (TEE).

TEE is not only directly related to the total amount of muscular activity but also, to brain activity (the brain normally uses 20% of the available glucose and oxygen), age, environmental temperature (metabolism increases in cold climates to maintain body temperature), disease (metabolic rate increases by about 8% for every 0.5°C increase in fever), pregnancy and lactation, and energy intake (metabolic rate is decreased in prolonged under-nutrition). Individuals maintain a stable weight when their Total Energy Intake (TEI) balances their TEE.

There are two types of processes involved in metabolism: **catabolism,** which breaks down larger molecules into smaller ones, often with energy release and **anabolism,** which is the building up of larger molecules from smaller precursors, often requiring energy. The body requires energy to power anabolic,

mechanical (for example, muscle contraction and cellular movement), and transport (for example, the movement of substances across cell membranes) work within the body.

There is an "energy currency", which is used by the body in the same way that society uses money, this is known as Adenosine Triphosphate or ATP. ATP is synthesized when certain nutrients are catabolised by the body. Energy is released from ATP when it loses a phosphate group and becomes Adenosine Diphosphate or ADP. The energy released from this ATP catabolism can be used to power the energy-requiring processes in the body. So, using the money analogy, ATP is synthesized (or earned like money) and then, catabolised (spent) when and where necessary.

There is a difference in the analogy here in that the body is very efficient in how it uses ATP and wastes as little as possible, whereas we are not always as wise in the way we spend money! Proteins, carbohydrates and fats can all be categorized to produce ATP. The metabolism of these macromolecules involves quite complicated biochemical pathways to ensure that the maximum amount of ATP is synthesized from each starting molecule. ATP cannot be stored in the cell, so a constant supply of raw materials is necessary to maintain supplies. Energy is released when certain nutrients are metabolised in the body and this energy is used to power other chemical reactions and cellular processes while some energy is lost as heat.

Energy is measured in kilocalories (kcal) or kilojoules (kJ): one kcal is approximately 4.18 kJ and it is defined as the amount of energy required to raise the temperature of 1 litre of water by 1°C. Electrically igniting known quantities of the foodstuff in oxygen and then, it measures the heat output, which gives an indication of the energy content of foods. The heat energy that is released by burning the food in oxygen is equivalent to the energy released in the body when the complex molecules in the food are metabolised completely.

One of the reasons why metabolic pathways are so long and complex is that this makes room for a gradual release of the energy from the food, rather than a sudden massive energy release, as occurs with burning. The energy yields of different nutrients are shown below:

Nutrient Type	Available energy	
	Kcal g-1	Kj g-1
Carbohydrate	4	15-17
Fat	9	3
Protein	4	16

Table 1.1

Fats contain a more concentrated form of energy. It is easy, therefore, to exceed the DRVs for energy when eating a high-fat diet, and the excess is stored as fat in the body. Diets containing high proportions

of fats have also been linked with disease (e.g. cancer of the colon and cardiovascular disease). If other energy sources in the diet are insufficient, first stored fat and then proteins are catabolised to provide energy and this will ultimately lead to muscle wasting (as muscles are made of protein).

Several Things Determine our Metabolic Rate, Including:

- **Our genes:** some people have a naturally faster metabolism.
- **Our age**: as we age, our calorie needs decrease. On average, it drops 2% each decade.
- **Our muscle to fate ratio:** muscle cells are about 7 times more metabolically demanding than fat cells. So the greater our proportion of muscle to fat, the faster our metabolic rate.
- **Our activity level:** exercise burns calories. Even after we stop exercising, the effect continues. So we burn calories at a faster rate for several hours afterwards.
- **How we eat:** our metabolic rate increases during digestion of food, a process known as the Thermal Effect of food. In simple terms, if we go too long without food (5 hours for men; 3 hours for women), our body thinks there is a food shortage and our metabolism tends to slow down.
- **Our Health & Nutrition**: metabolism is governed by thousands of separate chemical reactions. To perform this process effectively, our body needs a constant supply of nutrients. Without these nutrients (like vitamin and minerals) metabolism can become inefficient and sluggish. The best way to ensure good dietary nutrition is to follow a balanced diet.

From activity	Energy expended/Kcal h-I
Lying still, awake	77
Sitting at rest	100
Typing rapidly	140
Dressing or undressing	150
Waling on level at 4.8 km h-I	200
Jogging at 9 km h-I	570

Table 1.2

Our diet and our lifestyle are the main influences on our weight; although there is an additional genetic influence. Even a modest weight loss will reap fantastic health benefits. Losing 5-10 kg (11 lb–22 lb) improves back and joint pain, lowers the risk of developing diabetes, reduces breathlessness and improves sleep quality, helping the person to feel fitter and more energised throughout the day. Losing 10% of body weight lowers blood pressure, improves blood sugar control and lowers total cholesterol.

In order to determine whether or not the person is consuming a proper amount of nutrients, doctors ask about his eating habits and diet and they do a physical examination to assess the composition and functionality of the body. A simple calculation, called the Body Mass Index (BMI), indicates whether an adult is a healthy weight for their height.

What is BMI?

BMI is a measure that can allow us to check if we are a healthy weight for our height. It allows for natural variations in body shape, giving a healthy weight range for a particular height. Although useful for most people, BMI doesn't work for everyone. It's not suitable for young children or older people. It's also not very useful if we have a high muscle bulk. The heavier muscles will push up the BMI measurement. For instance, heavily muscled rugby players have 'obese' BMIs, even though they are not carrying excess body fat. To calculate BMI weight (in kg) is divided by height (in metres) squared.

$$\text{BMI} = \frac{\text{weight/kg}}{(\text{height/m})^2}$$

To calculate BMI, take the weight (kg) and divide it by height (m). Then, divide that number once again by height (m).

An example of calculating BMI using the **Body Mass Index formula**:

Height = 165 cm (1.65 m)
Weight = 68 kg
BMI Calculation: $68 \div (1.65)^2 = 24.98$

A BMI of less than 18.5 is considered underweight, a BMI between 18.5 and 25 is considered healthy. A BMI of over 25 is considered as overweight. A BMI of over 30 is defined as obese.

- Underweight = <18.5
- Normal weight = 18.5-24.9
- Overweight = 25-29.9
- Obesity = BMI of 30 or greater

BMI 18.5-24.9

These BMI values are the ideal weight-for-height range. But it's still important for the people within this healthy range to eat a healthy diet, if they want to stay in that range, and to ensure that their body has all the nutrients it needs. A BMI below 18.5 is a health risk and too low for optimal health.

BMI 25.0-29.9

This weight is just above the ideal range. It's fine for an athlete with plenty of body muscle, but their health can suffer from the extra stored fat.

BMI 30.0-34.9

This is a wake-up call: People within this rage are at a much higher risk of developing ill-health due to their weight. They are 10 times more likely to get diabetes, arthritis, heart disease, and some cancers.

BMI 35.0+

People within this range are at raised risk of heart disease, stroke and premature death. Keep in mind that the **body mass index** is a screening tool; it is not used to diagnose any medical conditions but instead is used as one measure to assess a person's weight and his or her risk for developing certain medical conditions.

High BMI and Medical Conditions

If someone is determined to be overweight or obese, they are at increased risk for certain medical conditions, including, but not limited to:

- High blood pressure (hypertension)
- Type 2 diabetes
- Heart disease
- High cholesterol or other lipid disorders
- Stroke
- Sleep apnea
- Osteoarthritis
- Certain cancers
- Gallbladder disease
- Fatty liver disease

Other Factors besides BMI and Weight

BMI is just one factor to consider when assessing a person's ideal weight. To determine if excess weight is a health risk, a healthcare provider will perform further assessments. According to the recent guidelines, assessment of weight involves using three key measures:

BMI Waist circumference Risk factors for diseases and conditions associated with obesity.

Waist Circumference

To determine the waist circumference, a measuring tape is placed snugly around the person’s waist. It is a good indicator of the abdominal fat, which is another predictor of the chance for developing risk factors for heart disease and other serious health conditions. This risk increases with a waist measurement of over 40 inches in men and over 35 inches in women.

BMI for Athletes: An Overview

The **BMI** (**Body Mass Index**) score is valid for both men and women, but it does have some limits. One of these limits involves the accuracy of using BMI for athletes. Using BMI for athletes can overestimate their level of body fat because muscle is denser than fat and weighs more. Therefore, an athlete's body fat can be normal or even low, but the person may have a high BMI. This does not mean that they are unhealthy or overweight. In fact, a number of gold medal winning athletes at the Olympics would be considered obese based solely on their BMI. However, keep in mind that just because someone is an athlete does not mean that they cannot be overweight or obese and at risk for developing medical conditions related to obesity (such as type 2 **diabetes and heart disease**).

BMI for Athletes: Other Measurements of Body Fat

BMI is used as a screening tool to identify possible weight problems for adults and children. However, there are a number of different ways to measure body fatness. These other methods used to measure body fat include:

- Skinfold thickness measurements (with calipers)
- Underwater weighing
- Computerized tomography

These other methods of measuring body fatness are more accurate than BMI, especially in athletes. For an athlete with a high BMI, one of these alternative methods is recommended.

BMI and Assessing Risk for Athletes

Because of this limitation associated with using **BMI** for athletes, physicians will consider other factors besides BMI when assessing an athlete's health risk for certain medical conditions. These assessments might include:

- One of the alternative body fat measurements explained above
- Evaluations of diet, physical activity, and family history
- Other appropriate health screenings

Obesity and Overweight

Obesity is a condition in which abnormal or excessive fat accumulation in adipose tissue impairs health. In most cases, it is the result of energy intake exceeding energy expenditure over a period of years. It is defined in adults as a body mass index (BMI) above 30. Within the UK the data from the Health Survey for England 2006 showed that 24% of adults (both men and women) were obese and an additional 44% of men and 34% of women were overweight (BMI =25-29.9). Around 16% of children aged 2 to 15 years

were obese and an additional 14% were overweight. For those aged 2 to 10 years, 16.3% boys and 14.4% girls were obese. For those aged 11-15 years, 17.6% of boys and 19.0% of girls were obese.
In contrast to these figures, in the early 1980s just 6% of men and 8% of women in the UK were obese. According to the recent Foresight Obesity Report, which looks at the ways that the Government can tackle the obesity problem over the next 40 years, has projected that by 2050, 60% of the UK population could be obese, creating a cost to the economy of £45.5 billion.

Obesity is no longer a disease that only affects the more developed, affluent countries. It is now a worldwide public health problem, affecting all age and socio-economic groups. In 1995 it was estimated that worldwide there were 200 million obese adults and 18 million overweight children under-five. In 2000, the World Health Organization estimated that approximately 1.2 billion people in the world were overweight, of which at least 300 million adults were estimated to be obese: around 130 million in developed countries and 170 million in other countries. Overall, the increase in the prevalence of obesity has been most dramatic amongst more affluent populations living in less developed countries - those countries are said to be in transition.

Exercise is very helpful in aiding obese individuals lose weight, since it increases their TEE. Exercise also has the advantage of increasing BMR for hours beyond the termination of exercise. A long-term advantage of exercise can be an increase in the ratio of lean/fat body weight with subsequent advantages for keeping metabolic rate high.

Whilst it is desirable for obese individuals to exercise, this is easier said than done and the danger is that individuals can get into a vicious circle: as weight increases so exercise decreases. This means that later, even with the will to do it, an overweight person might not be able to perform enough exercise to increase metabolism sufficiently to lose weight.

The Whole Food Nutrition

Whole foods are the edible parts of foods that are as close to their natural state as possible, and are prepared in a way that retains enough nutritional value to be supportive of health. Using this definition, it is clear that a carrot, a cucumber and a bunch of leafy greens are whole foods, because they can be picked up and eaten in their natural form. Let‘s take the example of an apple.

We know that the edible part of the apple is most of the apple itself, but apple juice is not the whole food. To make juice we need many apples which are processed through a juicer. The juice is extracted and the fibre is thrown away. The juice though rich in vitamins, will also be high in sugar because the natural fibre which would have slowed down the digestion of this sugar is gone. High amounts of sugar are not good for health. Therefore, a glass of apple juice is not a healthy choice compared to a whole apple. This does not mean that the whole food diet should always contain foods which are in raw form. Certainly, there are many foods that can be eaten raw, such as the apple, but potato soup would be a whole food meal as we started with potatoes in their natural form before we cooked and blended them. They may have lost a few nutrients through cooking, but still they contain most of their nutrient value -

enough to be supportive for health. Even though they have been cooked and blended they are still the whole food.

Certain nutrients present in foods are actually enhanced after cooking; the phytonutrient lycopene found in tomatoes is found in greater amounts in cooked tomatoes than in raw tomatoes. Tomatoes are also a good source of vitamin C, and this vitamin is vulnerable to heat. So tomatoes are whole foods which retain enough nutritional value both in their raw and cooked forms.

What Are Refined Foods?

Refined foods are those which have been processed so that most of their nutrients have been stripped away from them. So for example, white rice is refined, while brown rice is whole food. Refined foods are actually nutrient thieves because in addition to not only providing nutrients they actually rob the body of its stored nutrients in order to make the energy it takes to digest them.

Specifics of a whole Food Diet: Whole Foods and Whole Food Helpers

Meat and Seafood

Meat and poultry that are organic and pasture-raised, or fish caught in the wild, will be the healthiest choices. The fats and protein of fish and red meat are healthiest if the food is just cooked, though poultry should always be well cooked.

Dairy

Pasteurised milk is difficult to digest because the protein of the milk has been damaged due to high heat, whereas organic raw milk is the healthy choice when compared to pasteurised milk. Often, people who think they are sensitive to dairy, find they do well on raw dairy products.

Eggs

Eggs are a very healthy food. However, they should come from chickens that are free range and grass fed – which means they should be fed on organic pastures. The nutrients in eggs are healthiest when the egg white is cooked and the yolk is as runny as possible.

Beans and Legumes

Beans and legumes are a good source of fibre. They provide protein but it is incomplete. Vegetarians can include nuts and seeds in their diet when using beans and legumes in order to make the protein complete.

Nuts and Seeds

Nuts are the seeds of trees and seeds are the embryonic plants. This means that they contain nutrients

needed to grow a new plant. They contain protein, fats, minerals, and vitamins, such as vitamin E. Organic and raw nuts and seeds should be used.

Grains

Grains are mostly carbohydrate foods, but they are complement protein to beans and legumes in vegetarian diets. Gluten is a protein found in wheat and other grains, such as barley and rye; it is a common problem protein as many people find that they are allergic to it. Grains that don't have this type of gluten include rice, millet, buckwheat, and corn.

Vegetables

Vegetables are replete with vitamins, minerals, and phytonutrients, but these nutrients will be at their optimum amounts if we eat the vegetables as close to the time it was picked as possible. These are also a good source of fibre. Leafy vegetables are those which have edible leaves, i.e. lettuce, spinach. The healthiest ways to prepare vegetables are to serve them raw, lightly steamed, boiled, or stirfried.

Whole Food Helpers

Like whole foods these foods are nutrient dense, which means they are a concentrated source of nutrients. Whole food helpers are not major part of our diet. These are consumed in small amounts only.

Fats and Oils

Fats and oils are the whole food helpers. We should not fill most of our plate with these even if they are plant-based. But small amount of fats and oils should be included as part of a healthy diet. The healthiest fats for cooking include butter, ghee, coconut oil, and olive oil.

Fruits

Fruits offer vitamins, minerals, phytonutreints, and fibre, but they are also high in natural sugar. Because of this, though fruit is nutritious, it should be more limited than vegetables in our diet.

Vegetables and Fruit Juices

Juices are a concentrated source of vitamins, minerals and phytonutrients. These should be consumed sparingly. Whereas, vegetable juices have less of a concentration of sugar than fruit juices.

Tofu

This is a protein food which is made from soya. In a traditional oriental diet, only small amounts of tofu are consumed at a time.

Chocolate

Chocolate comes from cacao beans, which have high levels of antioxidants, but it should be eaten very rarely.

Further Reading:

- ✓ *Human Nutrition – 2020 Edition, By Alan Titchenal, Jennifer Drapper*
- ✓ *Introduction to Human Nutrition, (2019), By Susan A. Lanham, Thomas R. Hill, Alison M. Gallagher, Hester A. Vorster*
- ✓ *Introduction to Nutrition and Metabolism 6th Edition, (2021), By David A. Bender, Shauna M C Cunningham*