UNIT-9

Nutrition Requirments for Different People

Learning Outcomes

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

- ✓ Discuss the diet and nutrition of groups with special dietary needs at different stages in their lives including: pregnancy, breastfeeding, babies and children, young people and the elderly.

Unit 9

Nutrtion Requirments for Different Peoples

Pregnancy and Lactation

Everyone should be advised to eat a healthy diet, but this is particularly important during pregnancy and lactation because of the influence of nutrition on the infant's health. Although dietary guidelines for pregnancy and lactation do not differ from those for other healthy adults, women tend to be particularly receptive to nutritional advice at this time. Dietary advice before conception is particularly important because one of the most significant influences on the infant's birth weight is the mother's nutritional state at the beginning of pregnancy. Ideal weight should be attained before the pregnancy starts.

Being a healthy body weight is important before pregnancy. If the woman is very underweight, it can be more difficult for her to conceive. Being obese may also cause problems with conceiving, especially if the woman suffers from **Polycystic Ovary Syndrome**.

Obesity during pregnancy increases the risk of complications during pregnancy, delivery, and in the few days after birth.

The ideal weight range is usually calculated using the **Body Mass Index (BMI)**. A BMI between 18.5 to 25 is a healthy weight for most people and is associated with relatively low risks. For people with a BMI over 30, even a little weight loss can greatly increase the ability to conceive and have a healthy pregnancy.

Folic Acid

The Department of Health recommends that all women who are planning a pregnancy, or who may become pregnant, should take a folic acid supplement. Supplementation should continue until the 12 week of pregnancy. Different doses are recommended depending on the level of risk. In addition women should be advised to increase their intake of folate-rich foods.

Recommended Doses of Folic Acid before Conception and After Pregnancy

High risk 5 mg daily
Low risk 0.4 mg daily

Dietary sources of folate

Food	Folate content (microgram/µg)
Milk 1 pint	35
2 slices white bread	16
2 slices wholemeal bread	30
1 serving spinach	80

1 serving green beans	50
1 serving potatoes	45
1 serving cauliflower	45
1 serving baked beans	50
1 orange	50
1 glass orange juice	40

Vitamin A

An adequate intake of Vitamin A is required before conception, but too much can substantially increase the risk of birth defects. The Department of Health has warned women who could become pregnant to avoid eating liver and liver products. This is because liver is a particularly concentrated source of Vitamin A.

Women who are planning a pregnancy should also be advised to avoid dietary supplements containing Vitamin A. This recommendation has caused some confusion. It does not mean that Vitamin A should be avoided altogether – in any case it would be difficult to eat a diet devoid of Vitamin A – but most women consume more Vitamin A than they require in the diet. Thus, to avoid excessive intake, dietary supplements containing Vitamin A should be avoided.

Nutritional Advice for Women Planning a Pregnancy

A woman who is planning a pregnancy should:

- Eat a diet based on healthy eating guide lines.
- Increase intake of folate-rich foods.
- Take a supplement of folic acid until 12th week of pregnancy.
- Avoid liver or products containing it.
- Avoid any dietary supplements containing Vitamin A.
- Stop taking oral contraceptive three months before planned conception.

Pregnancy

Pregnancy and the needs of the growing foetus impose increased nutritional demands on the mother, but large increases in nutrient intake are not required. This is because absorption of many nutrients increases, excretion decreases and metabolism is generally more efficient.

A Balanced Diet

With a few exceptions, one can continue to eat a normal, healthy diet before and during pregnancy. This includes regular meals and snacks, and a sensible healthy eating regime containing:

- Plenty of starchy carbohydrates - bread, rice, pasta, breakfast cereals, chapattis, couscous, and potatoes.
- Plenty of fruit and vegetables - at least five portions a day.
- Low or reduced fat dairy products such as milk, yoghurt, fromage frais, and pasteurised cheeses.
- Lean sources of protein, such as, meat, poultry, fish, eggs (well-cooked), beans, and pulses;.
- Not too many fat-rich and sugary foods.
- At least eight medium glasses of water each day.
- Very little or no alcohol.

Generally, pregnancy can progress well with the need for only very small increases in protein, carbohydrate, fat, vitamins, and minerals. The digestive system in pregnant women changes and becomes more efficient at absorbing certain nutrients. In fact, with only a few exceptions, most of the additional nutrient needs of pregnancy can be met by eating a well-balanced and varied diet. So the old saying 'eating for two' doesn't mean that one should eat twice as much food.

Weight Gain

Optimum weight gain in pregnancy depends on the pre-pregnant weight. The baby and amniotic fluid are only a small part of the weight gain; the rest is an increase in the mother's fat stores to provide an energy reserve for later breastfeeding. There are no specific recommendations for pregnancy weight gain in the UK. However in the USA, thinner women are encouraged to gain a little more weight, anywhere between 12.8 kg and 18 kg (28 lb to 40 lb), while women of an average weight should aim for between 11.5 kg and 16 kg (25 lb to 35 lb). Overweight and obese women should aim to gain less weight.

Energy

An adequate energy intake is essential during pregnancy, both for the growth and development of the foetus and also for the development of the mother’s stores adipose tissue for lactation. However, it is neither necessary nor desirable to eat for the two; the department of health has recommended an average increase in energy intake of .08 MJ (200 kcal) and that only in the last trimester. Excessive energy intake will obviously result in undesirable weight gain, and this may result in the production of too heavy an infant as well as hypertension in the mother.

Probably the best guideline for energy intake is the achievement of desirable weight gain in the mother. This varies depending on her initial weight as follows:

- 9 kg for women who are in the ideal weight range (i.e. between 80 and 120% of ideal body weight) at start of pregnancy.
- 13.5 kg for women who are under weight (i.e. less than 80% of ideal weight) at the start of the pregnancy.
- 7.5 kg for women who are overweight (i.e. more than 120% of ideal weight) at the start of pregnancy.

Women normally gain about 4 kg by the end of 20th week, and then about 0.5 kg/week until birth.

Iron

Iron supplements are required by those women who have low iron stores at the start of pregnancy. Women who are likely to have poor iron status, usually have heavy periods and those who have had several pregnancies in close succession.

Folic Acid

The DOH recommends that folic acid supplements should be taken by all pregnant women, starting from the time when they begin planning a pregnancy until at least the 12th week of pregnancy.

Dietary Advice for Common Problems

Nausea and Vomiting

Nausea and vomiting are common, particularly in early pregnancy, but usually subside by the 16th week. There is no harm in snacks replacing full meals provided that the snacks are nutritious.

Suitable snacks include:

- Plain biscuits or crackers
- Breakfast cereals;
- Hot or cold milk drinks
- Yoghurt
- Fresh fruit or raw vegetables
- Jacket potatoes
- Sandwiches
- Soups
- Bread or toast

Heartburn and Indigestion

If you are pregnant, the following advice may be helpful to avoid heartburn:

- Avoiding any foods which cause the symptoms
- Eating smaller meals more frequently
- Eating slowly
- Avoiding heavy meals before bed

Constipation

Women should be advised to increase their intake of Non-Starch Polysaccharides (NSP) by eating whole meal bread, brown pasta and rice, whole grain cereals, pulses, and fruit and vegetables. Fluid intake should be increased at the same time.

Infants

Good nutrition is essential not only to promote growth and development, but also because it may contribute to disease prevention in adult life. The risk of developing obesity, hypertension, coronary heart disease, and cancer may be altered by diet in the first few weeks and months of life.

Birth to Six Months

Breastfeeding

The Department of Health recommends that, wherever possible, infants are breastfed exclusively until six months of age. Breast milk is the best source of nutrition for newborn babies, as it provides easily digestible nutrients in the right quantities. It is also packed with antibodies and helps to establish the baby's immune system.

Babies who are breastfed exclusively are reported to be at less risk of stomach upsets and ear, respiratory and urinary tract infections, than those who are bottle-fed formula milk. They are also less likely to become obese or experience constipation and vomiting. If there's a family history of allergies or diabetes, breastfed babies are less likely to develop these.

Breast milk contains substances that help the development of a baby's brain, retinas, gut lining and protective sheath for the central nervous system. Breast milk also contains hormonal factors that help the baby's growth and development. It carries digestive enzymes as well, which help to digest the nutrients in milk, helping the baby's immature digestive tract.

When Not to Breastfeed

Breastfeeding isn't recommended for all women. For example, women who are HIV-positive risk transmitting the disease to their baby through their milk. Therefore, they should not breastfeed their babies.

Types of Breast Milk

During the first few days after birth, the mother's breasts produce a substance called colostrum. This yellowish fluid is packed with antibodies and is rich in protein, making it ideal for newborn babies. The colostrum soon changes and becomes thin and white (transitional milk). Then, after three or four days, the mature breast milk starts to come through.

At each feed, the breasts produce two types of milk: foremilk, produced at the beginning of feed, and hind milk, which has more fat, energy and essential nutrients. As babies grow, it is important they receive the hind milk in order to meet their nutritional needs.

Establishing and Maintaining Breast Feeding

The infant should be put to the breast immediately after delivery in order to develop the suckling reflex. Thereafter, the baby should be fed every 2-3 hours as frequent suckling stimulates the milk supply. Once lactation is well-established, feeding can be spaced apart. Support for the mother from family, friends and health professionals is essential during the early weeks after delivery.

Complementary Feeding

This is the term used when infant formula milks are given in addition to breast feeding. This may be done for reasons of convenience, or if the mother's milk supply is in adequate. However, complementary feeding diminishes the mother's milk supply even further, and a return to full breast feeding will be difficult.

Dietary Supplements

In general, the mother does not need to take dietary supplements, but if there is any doubt about the mother's diet, vitamin drops may be prescribed for the baby.

Bottle Feeding

Despite encouragement to breast feed, some mothers choose to bottle feed and their decision should be respected.

Types of Infant Feeds

Infant feeds are available in the form of powders for reconstitution, concentrates, and ready to feed liquids.
There are several different feeding options and these are:

- Whey-based milks
- Casein-based milks
- Follow-on milk
- Pre-digested milks
- Lactose-free, casein- based feeds
- Pre-term milks

Whey-based Milk

Whey-based milk most closely mimics breast milk, and mothers wishing to bottle feed should generally be advised to use them. They contain whey:casein ratio of about 60:40 which is similar to that of breast milk. In this milk the whey:casein ratio is 20:80 and is similar to cow's milk. Like whey based milks casein-based milks may be used from birth.

Follow-on Milk

Follow-on milks differ from whey and casein-based milks in that they contain a higher concentration of protein and electrolytes. They also contain more iron and vitamin D than either whey and casein-based milks or cow's milk. They are designed for use in infants over six months old and should not be used for younger babies.

Soya-Based Formulas

Soya-Based Formulas do not mimic breast milk as closely as either whey- or casein-based formulas. Soya-based Formulas are prescribed for lactose intolerance, proven whole cow's milk sensitivity, Galactokinase Deficiency, and Galactosaemia.

Weaning (six months to one year old)

When to Start Weaning

At six months, a baby's digestive system has matured enough to cope with solid food, and other developmental changes (such as the ability to bite and chew) mean the baby is ready to experience new tastes and textures. The Department of Health recommends that weaning shouldn't be introduced until the age of six months, but the baby may show signs of wanting to try solids earlier than this. The aim of weaning is gradually to introduce a variety of tastes and textures so that by the age of one the baby is enjoying a varied and healthy diet. Every baby is different. Some enjoy trying new tastes and textures, moving through weaning quickly and easily, while others need a little more time to get used to new foods.

How to Start

Given below are some general tips for successful weaning:

- First of all, a good time of day should be chosen for the baby to start on solids. This should be when they're not too tired or hungry (in the early stages, offering a breastfeed or a little formula beforehand will mean that the baby is not too hungry and so is less frustrated with learning to take solids from a spoon).
- Plenty of time should be allowed to the baby for eating.

- The food should not be forced on the baby. If they don't want to try a food, it should be taken away and can be offered later or in a few days' time.
- Plenty of bibs and cloths should be available to clear up the mess.
- Only a small amount of food should be heated up so the food that the baby does not eat is not wasted.
- Previously uneaten food should not be reheated for use.
- The temperature of food should always br tested before it is given to the baby.
- Self-feeding should be encouraged. As the baby develops and shows signs of wanting to feed independently, finger foods should be given.

Stages of Weaning

Stage 1

When starting to give baby solid foods, a teaspoon of one of the following can be mixed with the baby's usual milk (both breast and formula):

- smooth vegetable purées, such as carrots, parsnips, potatoes, or yams.
- fruit purées, such as bananas, cooked apples, pears, or mangoes.
- cereal (not wheat-based), such as, baby rice, sago, maize, cornmeal, and millets.

This should be offered to the baby before or after one of the usual milk feeds, or in the middle of a feed, if that works better. Most babies take time to learn how to take food from a spoon, so one should be patient and be prepared for some mess. Food should not be forced on the baby. If the food really doesn't seem to be wanted, it should be stopped and one should wait until the next time. The main aim at this stage is to get the baby used to the idea of taking food from a spoon. The baby will still be getting most of their nourishment from breast or formula milk (around 500-600 ml a day).

Stage 2

Feeds will still be mainly breast or formula milk (around 500-600 ml a day), but gradually the amount of solid food can be increased, either before, during, or after the milk feed. At the same time, one can move gradually from solid food at one feed in the day to solid food at two, and then three feeds. At this stage the baby can be given full-fat cows' milk products, such as yoghurt or cheese sauce as a solid food.

Cereals can also be given to the baby but just once a day. Different foods and different tastes can also be added. Foods already cooked for the family just as mash, sieve, or purée can also be tried but in a small amount and without adding salt, honey or sugar.

Preparing larger quantities than required and then freezing small portions for later use, for example, in an ice cube tray, can save time and effort.

More first Foods to Try

Add to the vegetable, fruit, and cereal purées other foods, such as:

- Purées of meat and poultry
- Purées of pulses, such as, lentils (dahl), hummus
- Full-fat milk products such as yoghurt or fromage frais - unless advised otherwise by health visitor or GP
- Full-fat milk can also be used for cooking, for example in cheese sauce, but it should be avoided giving it to the baby as a drink until after they are a year old.

Stage 3

As solid food becomes a bigger part of a baby's diet, it's important to offer a range of different foods. This is to provide the baby with all the vitamins and minerals they need. The baby should still be having a minimum of 500-600 ml of breast or formula milk a day.

The baby should be given two to three servings a day of starchy foods such as potatoes, yams, rice or bread. Fruit and vegetables make good finger foods and should be included at two or more meals each day. The baby should have one serving of soft cooked meat, fish, egg, tofu or pulses such as beans or lentils (dahl) a day. Red meat such as beef and lamb is an excellent source of iron. Eggs (well cooked) are a quick, nutritious and cheap source of protein.

As babies continue to develop, foods with a thicker consistency and a lumpier texture can be introduced to encourage them to learn to chew and manage small pieces of food, even if they don't have teeth yet. Finger foods such as toast, bread, breadsticks, pitta bread or chapatti, peeled apple, banana, carrot sticks, or cubes of cheese can be given to the baby. Sweet biscuits and rusks, should be avoided so that the baby doesn't get into the habit of expecting sweet snacks.
Once the baby is over six months, they can be given vitamin drops containing vitamins A, C and D. However, if the baby is on infant formula, there is no need to start giving them vitamins until they are having less than 500 ml of formula a day. This is because infant formula already contains added vitamins and minerals.

Stage 4

As the baby became increasingly used to eating solid foods, they should be learning to fit in with the family by eating three minced or chopped meals a day, plus breast or formula milk as the main drink (around 500-600 ml a day). The baby should be given fruit or other healthy snacks between meals. Babies have small stomachs and they need energy to grow, so they should be given full-fat dairy products. Cutting back on fat is sensible for adults, but not for babies or young children.

Three to four servings a day of starchy foods and of fruit and vegetables should be given to the baby. Biscuits and cakes should be avoided because these foods will fill the baby up without providing the right nutrients.

Babies on a Strictly Vegetarian Diet

For those who have decided not to give their baby meat or fish, they must make sure that they give their babies two servings a day of pulses (such as, red lentils, beans, or chickpeas), or tofu to make sure that the baby gets all the energy and nutrients he/she needs. The vitamin C in fruit and vegetables might help bodies absorb iron, so they should be given fruit and vegetables at mealtimes. It is especially important to give vitamin drops to babies who are on a vegetarian diet.

Vegan diets, which contain no foods or by-products from animals, cannot easily give babies all the energy and nutrients they need. For this reason, vegan diets aren't recommended for young babies.

What Foods to Avoid

Salt

Salt should not be added to food given to the baby because a young baby's kidneys can't cope with it. Some foods, such as cheese, sausages and bacon, are high in salt, so these should be given in small amounts only.

Most of the salt we eat comes from the food products we buy, food labels often give figures for sodium rather than salt. Lower salt (or lower sodium) versions should be chosen for the baby. Babies under a year should have less than 1 g salt per day, which is less than 0.4 g sodium.

Sugar

Sugary foods and drinks can encourage a sweet tooth and lead to tooth decay when the baby's teeth start to come through. Sugar can only be added to foods if it's really necessary. Sweet puddings, biscuits, sweets and ice creams are not recommended for babies under a year.

Honey

Honey should not be given to the babies, even for easing coughs, until they are a year old. Very occasionally honey contains a type of bacteria that can produce toxins in babies' intestines. This can cause a very serious illness called infant botulism. Honey is also a sugar, which means that like sugar, it can encourage a sweet tooth and lead to tooth decay.

Low-Fat, Low-Calorie and High-Fibre

It isn't advisable to give 'low-fat', 'low-calorie', or 'high-fibre' foods to babies. Babies have small stomachs, but they are growing fast. They need foods that provide lots of calories and nutrients in a small amount of food, rather than bulky high-fibre foods.

Fat gives them energy and provides some vitamins that are only found in fat. So full-fat dairy foods should be chosen. Babies should not be given high-fibre versions of foods, especially those with added bran. It stops babies from absorbing important minerals such as calcium and iron. It's better not to give the baby brown rice, wholemeal pasta or bran-enriched breakfast cereals until they are older, although they can be given some brown bread.

Fish

Sharks. swordfish, and marlins should *not* ever be given to the baby. This is because the levels of mercury in these fish can affect a baby's growing nervous system. One should also avoid giving raw shellfish to babies to reduce their risk of getting food poisoning.

Eggs

Raw or lightly cooked eggs should not be given to babies. Eggs can be given to babies over six months, but they should be thoroughly cooked until both the white and yolk are solid.

Starting Solids before Six Months

When deciding to start baby on solid foods before six months, it should be remembered that there are many foods that should be avoided at this age including:

- soft and unpasteurised cheeses
- liver
- peanuts
- nuts
- seeds
- cow's milk
- eggs
- foods that contain wheat or gluten
- fish and shellfish

Food Allergies

If it is feared, or likely (because of genetics), that the baby might develop a food allergy, it's a good idea to introduce the foods that are most likely to cause food allergies one at a time and to start with just a

small amount (but don’t introduce them before six months). These foods are: peanuts, nuts, seeds, egg, milk, soya, wheat (and other cereals that contain gluten such as rye, barley and oats), fish and shellfish.

Peanut Allergy

If the baby has already been diagnosed with an allergy, such as a food allergy or eczema, or if there is a history of allergy in their immediate family (if their parents, brothers, or sisters have an allergy such as a food allergy, asthma, eczema, hay fever, or other types of allergies) then the baby has a higher risk of developing peanut allergy. If the baby hasn't been diagnosed with any allergies and there isn't a history of allergy in their immediate family, one can choose to give them peanuts or foods containing peanuts after they are six months old.

Cows' Milk Allergy

If the baby has an allergy to cows' milk, the GP might prescribe hydrolysed protein infant formulas. Babies who are allergic to cows' milk may also be allergic to soya. So only soya-based infant formulas should be used. Milks based on goats' milk protein have not been approved for use by the European Food Safety Authority for babies under a year old, so these should not be given to babies. Most babies with cows' milk allergy are also likely to react to goats' milk and sheep's milk. This is because some of the proteins in these types of milk are similar to those found in cows' milk. The levels of lactose are also similar in these milks, so milks based on goats' milk protein are also unsuitable for babies that are lactose-intolerant.

Water

This is the best alternative drink to milk, but fully breastfed babies don't need any water until they start eating solid food. For babies under six months old, tap water should be used after boiling. Water should be allowed to cool off before giving it to the baby.
Bottled water isn’t a healthier choice than tap water and usually isn’t sterile. In fact, some natural mineral waters aren’t suitable for babies because of the amount of minerals they contain. When giving bottled water to babies under six months, it should be boiled and cooled down just like tap water.

Fruit Juice

Fruit juices, such as orange juice, are a good source of vitamin C. But giving the baby juices and other drinks will reduce his or her appetite for milk. Fruit juice also contains sugars, which are present naturally, and these can cause tooth decay. Fruit juice is also acidic. For these reasons, it's important not to give baby fruit juice before they are six months old.

Other Drinks

The following drinks aren't suitable for babies and they could fill them up so they aren't hungry for more nutritious foods:

- Juice drinks, fizzy drinks, sugary drinks, and squashes
- Diet drinks, 'low-calorie', and 'no added sugar' drinks
- Flavoured milks and flavoured waters
- Baby drinks and herbal drinks
- Tea and coffee

Pre-School Children (one to four years old)

Nutrition for Children

It is important to establish good dietary habits in childhood to lay the foundation for life-long healthy eating. This is not always easy, but every effort should be made. Young children are completely dependent on parents and carers for their meals, and will often want to imitate what is being eaten by the rest of the household. The presence of a young child can therefore be a time for the whole family to review their eating habits. Healthy eating habits will benefit the parents and help to set a good example to the young child.
Food and nutrients help to form strong teeth and bones, muscles and a healthy body. A good diet can also help to protect the child against illness now and in the future.
This is a critical time to complete the weaning process, reducing the amount of milk and establishing the foundations of the child's diet. A young child's diet needs special care and planning - the need for energy and nutrients is high, but appetites are small and eating habits can be fussy. Their diet must be made up of small, regular, nutrient-dense meals.

Key Nutrients and Dietary Sources

Suitable Foods

The food given to the child should be based on the following food groups to help ensure they're getting all the important nutrients. Pre-school children should be allowed to eat according to appetite, as there are no specified recommendations on portion sizes for this age group.

At this age, children are often good at regulating their appetite. There's no need to rely on pre-prepared toddler foods. If the family diet is healthy, children can just have family food.

1. At least one kind of starchy carbohydrate, such as bread, rice, pasta, noodles, cereals or potatoes, should be served with all meals. Young children have small appetites, so fibre-rich carbohydrates can be bulky and inhibit the absorption of some minerals. High fibre carbohydrate foods, such as whole-wheat pasta and brown rice, should be introduced gradually so that by the time children are five years old, they're eating the same fibre rich foods as the rest of the family.
2. Fruit and vegetables are important. Children should be given at least five servings of fruits and vegetables a day, where a serving is about a handful in size.

The following are some guidelines, which should be used for giving fruits and vegetables to the children:

- Fruit should be used in puddings and as snacks
- Frozen and canned fruit and vegetables can be just as nutritious as fresh varieties
- Vegetables can be eaten raw or cooked (serve crunchy rather than very soft to preserve the vitamins and minerals)
- If vegetables aren't a favourite, try hiding them by pureeing them into soups, sauces, casseroles, and pizza toppings

3. Milk and dairy foods are an important source of calcium. A child should be having about one pint (500 to 600 ml) of milk a day. Full-fat varieties or semi-skimmed may be given from the age of two if the overall diet contains enough energy and nutrients. Milk can be used on cereals or in drinks, puddings and sauces cheese, frays or yoghurt can be given instead of some milk grated cheese, cheese spreads, or cheese portions can be used on sandwiches or toast yoghurts can be used as a pudding or snack between meals, served alone or with fruit.

4. Meat, fish, and alternatives should be eaten by the child once or twice a day:

- Minced beef, turkey, chicken, and pork should be cooked slowly to ensure its soft and tender.
- The Food Standards Agency recommends at least two servings of fish a week, one of which should be oily. But a child should not be given more than two servings of oily fish a week. Sharks, swordfish, and marlin should also be avoided, as these contain high levels of mercury, which might affect a child's developing nervous system.
- Egg can be given as either boiled, in sandwiches, as omelettes or scrambled.

Different beans and pulses, such as lentils, baked beans, peas, and chickpeas can be given.

Children 5 to 12 years

Although their growth is slower than in infancy, school-aged children still have high nutritional needs but fairly small appetites. So, it's crucial that all meals and snacks continue to be rich in nutrients and energy. The food choices children make during the crucial years of development can influence their future health risk and can also influence food habits in later life. A structured eating plan with regular meals and snacks is important to establish good eating habits. Ensure there's also plenty of variety - burgers and chips are fine occasionally, but not for every meal. A limited number of foods make it difficult to obtain the full range of nutrients. Therefore a child should be given a range of foods based on each of the main food groups.

Energy

School children still have a high energy requirement for growth and activity, but increasing numbers are becoming overweight. This is because they're eating too many calories and not being active enough to use up the extra energy they've eaten.

Their meals and snacks should be based on five main groups but fatty and sugary snacks should be avoided where possible. An overweight child still needs a nutrient-packed diet that provides all the essential building blocks for growth and development. Healthy eating ensures that children maintain healthy weight.

Calcium

This mineral is important for healthy bone development. Good sources include dairy products such as milk, cheese, yoghurt, and fromage frais, as well as fortified orange juice, green leafy vegetables, cereals, sesame seeds and tofu. A child should be given three servings of calcium-rich food per day, for example, a 150 ml glass of milk, a small pot of yoghurt and a small matchbox-sized piece of cheese.

Folate

This vitamin is important for growth, but intake is low in some children, especially those who skip breakfast because fortified cereals are a good source of folate. Other sources include bread, green, leafy vegetables, and pulses.

Iron

This mineral helps to keep red blood cells healthy. Insufficient iron intake can lead to iron-deficiency anaemia, but this is much less common in primary school-aged children than their younger and older siblings. Good sources of **iron** include red meat, liver, fortified breakfast cereals, beans, and pulses. To help absorb the iron more effectively from non-meat sources, it can be combined with vitamin C-rich foods such as citrus fruits and fruit juice.

Fatty and Sugary Foods

This group includes spreading fats (such as butter), cooking oils, sugar, biscuits, cakes, crisps, sweets, cream and ice cream, chocolate, and sugary drinks. These foods shouldn't be eaten too often and when they are, should only be consumed in small amounts. They're loaded with calories, fat and sugar, and don't necessarily contain many vitamins and minerals. Also, sugary foods and drinks (including fruit juice) can increase the risk of dental decay.

The amount of sugar and sweets should be limited or should be offered at the end of meals, rather than in-between. Some sugar-free or diet drinks can also cause decay because of their acidity. Milk or water is the best drink between meals.

Adolescence

Adolescence is a time of great physiological and psychological change. Physiological changes influence nutritional requirements and psychological changes tend to affect different eating patterns. Physiological changes include a marked acceleration in growth and gain in bone and muscle tissue. During the growth spurt, boys gain on average about 20 cm in height and girls about 10 cm. Boys gain proportionately more muscle and bone and girls more fat. For most boys and girls the teenage years are a period of increasing independence from the family, and often a time of rebellion.

Teenagers and Diet

Teenagers' diets should sustain growth and promote good health. During this time a number of physiological changes occur that affect nutritional needs, including rapid growth and considerable gains in bone and muscle (especially in boys). This is also a time when teenagers begin to develop real independence from their parents, including making decisions about the food they eat. Teenagers often choose food in response to peer pressure or as an act of defiance against parents. It's not all bad news, as there are many opportunities to encourage healthy dietary habits in teenagers, particularly when relating good food choices to sporting or physical prowess. There should be plenty of healthy options available at home for healthy meals and snacks.

Nutrition

The National Diet and Nutrition Survey of Young People Aged 4-18 Years provides detailed information on the nutritional intake and physical activity levels of young people in the UK. The findings reveal average consumption of saturated fat, sugar and salt is too high, while that of starchy carbohydrates and fibre is low. During the seven-day recording period, more than half the young people surveyed hadn't eaten any citrus fruits, green leafy vegetables (such as cabbage or broccoli), eggs or raw tomatoes. The survey also showed that one in ten teenagers have very low intakes of vitamin A, magnesium, zinc and potassium. Intake of iron and calcium was also below ideal levels among many of the teenagers. Meanwhile the rising levels of obesity suggest many young people are eating too many calories.

Iron Deficiency

Iron Deficiency is one of the most common nutritional deficiencies in the UK. In the National Diet and Nutrition Survey, up to 13% of teenage boys and 27% of girls were found to have low iron stores. Rapid growth, coupled with a fast lifestyle and poor dietary choices, can result in iron deficiency anaemia.

Teenage girls need to take particular care because their iron stores are depleted each month following menstruation.
The main dietary source of iron is red meat, but there are lots of non-meat sources, too, including fortified breakfast cereals, dried fruit, bread and green leafy vegetables. The body doesn't absorb iron quite as easily from non-meat sources, but iron absorption can be enhanced by combining these foods with a food rich in vitamin C (found in citrus fruits, blackcurrants and green leafy vegetables). In contrast, tannins, which are often found in tea, reduce the absorption of **iron**, so it's better to have a glass of orange juice with the breakfast cereal than a cup of tea.

Calcium Deficiency

The survey also highlighted that about 25% of teens had a calcium intake below the recommended level, which has serious implications for their future bone health. Osteoporosis is a disease that causes bones to become brittle and break very easily. Bones continue to grow and strengthen until the age of 30, and the teenage years are very important to this development. Vitamin D, calcium, and phosphorous are vital for this process of development; calcium requirements, for teenagers, ranges from 800 mg to 1,000 mg per day. Calcium-rich foods should be consumed every day.

The richest source of calcium in most people's diet is milk and dairy products. Teenagers should be encouraged to eat two to three portions of dairy food each day – for example, a glass of milk, a 150 g pot of yoghurt and a small matchbox-sized piece of cheese. If a teenager doesn't eat dairy products, they should try fortified soya milk. Dairy foods are often avoided by teenage girls because of concerns about fat content. Low-fat dairy foods are equally rich in calcium, so providing these versions to aid consumption can be helpful.

Foods to Choose

Adolescence is a time of rapid growth, and the primary dietary need is for energy - often reflected in a voracious appetite. Ideally, foods in the diet should be rich in energy and nutrients. Providing calories in the form of sugary or fatty snacks can mean nutrient intake is compromised, so teenagers should be encouraged to choose a variety of foods from the other basic food groups:

- Plenty of starchy carbohydrates - bread, rice, pasta, breakfast cereals, chapattis, couscous, and potatoes
- Plenty of fruit and vegetables, at least five portions every day
- Two to three portions of dairy products, such as milk, yoghurt, fromage frais, and pasteurised cheeses
- Two servings of protein, such as meat, fish, eggs, beans, and pulses
- Not too many fatty foods
- Limit sugar-rich food and drinks

Other important dietary habits to follow, during adolescence, include:

- Drinking at least eight glasses of fluid a day.
- Eating regular meals, including breakfast, as it can provide essential nutrients and improve concentration in the mornings. Choosing a fortified breakfast cereal with semi-skimmed milk and a glass of fruit juice.
- Taking regular exercise, which is important for overall fitness and cardiovascular health, as well as, bone development.

Adults

Nutrient Requirements

By eating a nutritious diet and being physically active, one can maintain a healthy body weight and reduce the risk of developing diet-related illnesses, such as type 2 diabetes, heart disease, and certain types of cancer.
Some of the most important risk factors for premature death in adults are:

- Excessive alcohol intake
- Smoking
- Obesity
- Physical inactivity
- Raised blood cholesterol
- Raised blood pressure

With the exception of smoking, applying the principles of healthy eating and being more physically active can make a significant impact on all of these risk factors.

Importance of a Healthy Diet

To understand how one can eat healthily, it's important to know which types of food to consume and why. The body requires a well-balanced diet, with a good supply of carbohydrates, especially high fibre foods, plenty of fruits and vegetables, some protein, low-fat dairy products, and plenty of fluids. The best way to get the right balance is to follow the principles of healthy eating.

A consumer survey carried out by the Food Standards Agency revealed that knowledge of what constitutes a healthy diet is actually quite high. Most of the adults surveyed knew which kinds of food they should be eating more of, such as fruit and vegetables, or less of, such as fat and salt. But data from the National Diet and Nutrition Survey, published in 2003, shows that adults in the UK eat too much saturated fat, sugar, and salt and do not eat enough dietary fibre and, on average, their fruit and vegetable intake is fewer than three portions a day. The rising number of people becoming overweight also tells us that, for a variety of reasons, this knowledge about diet is not being translated into positive action to achieve a healthier diet.

Everyone should be eating a variety of food to achieve a healthy diet, but some nutrition issues are more specific to men or women.

Nutrition Issues

While both sexes need to maintain a healthy body weight, men, in particular, should be wary of excess weight. In men extra pounds tend to be stored around the tummy. This is sometimes referred to as *abdominal fat* and it increases the risk of developing heart disease and diabetes to a greater extent than fat stored on the hips and thighs, which is more typical for women. This risk of abdominal obesity is even greater for men of Afro-Caribbean and Asian origin.

The Elderly

The number of older adults in the world is growing both in absolute and relative terms. In 1994, 16% of the UK population was aged over 65. By 2031, this will increase to 23% and 10% of this figure will be made up of people over 75 years old. The greatest challenge over the coming years will be maintaining the health of this increasing number of older adults. Deciding what we mean by 'older people' is a little arbitrary. The World Health Organisation classifies people aged between 45 and 59 as 'middle age', 60 to 74 as 'elderly' and over 75 as 'old'. There may be a little difference in the energy requirements of a 50 and a 70 year old.

Although the requirement of energy may fall the need for nutrients does not, and Dietary Reference Values for vitamins and minerals in the elderly are no different from those in young and middle aged adults. The only exception is iron in women; the need for iron falls after menstruation ceases. The fact that the energy requirement tends to fall and the nutrient needs remain the same means that the quality of the diet is very important. In other words, dietary advice to elderly people needs to emphasise the importance of nutrient-dense foods.

But the nutritional needs of older adults are difficult to neatly categorise into absolute age groups. Dietary needs depend on current health, and while many older people are fit and active, some others who are younger may be frail and require additional care.

Nutrition for Generally Fit and Healthy Older Adults

Activity

Research shows that remaining active can help to maintain both mental and physical health. Keeping up the activities one enjoys doing helps to maintain physical fitness and preserve muscle tissue. Preserving the strength of muscles will help to maintain independence. Activity doesn't necessarily mean joining an exercise class - gardening, walking to shops, and housework can all count as types of activity as well.

Energy

Energy requirements can decline with age, particularly if physical activity is limited, but the need for protein, vitamins and minerals remains the same. It is vital that food choices are nutritionally dense,

which means the elderly still need to eat a variety of foods to get all the vitamins and minerals they need, but with fewer calories. If the person is overweight or obese, it is even more important for him to be **calorie conscious**.

Fat

Advice to restrict fat intake, particularly cutting saturated fat to improve heart health, remains true for older people who are fit and well. A dietary survey of older people showed that most eat too much saturated fat. Above the age of 75, fat restriction is less likely to be beneficial, and isn't appropriate if the person is frail, has suffered weight loss or has a very small appetite. In fact, in these situations additional fat may be used to increase the calories in meals and snacks to aid weight gain.

Fibre

Older people can suffer from constipation and bowel problems mainly due to a reduced gut motility and inactivity. To relieve they can try eating high-fibre cereal foods, fruit and vegetables. Raw bran and excessive amounts of very high-fibre foods are not the answer though; they're too bulky and may interfere with the absorption of certain nutrients. To help the gut work properly, it's also important to drink plenty of fluid, approximately eight medium glasses a day.

Fluid

Dehydration can make people feel drowsy or confused, therefore it is important to drink a lot, even if this means extra trips to the toilet. The risk of dehydration can be higher in older people because their kidneys don't function as efficiently as those of younger people. Older people are also not as sensitive to the feeling of thirst. Fluid intake doesn't just mean water - it can also include such drinks as tea, coffee, fruit juice, and squash.

Sugar

Generally fit and healthy older people should limit foods and drinks that are rich in sugar, as it can impair dental health and contribute to weight gain when energy intake is too high. But for people who have a poor appetite, or who have lost weight, sugar-rich foods can be a useful source of calories.

Iron

Anaemia is common in older adults. Poor absorption of iron, due to changes in the gastrointestinal tract, blood loss and the use of certain drugs, together with a poor dietary intake, may be causal factors. Iron intake should be sufficient which can be taken from red meat and foods from non-meat sources (such as fortified cereals, dried fruit, pulses and green leafy vegetables) every day. Absorption of iron from a meal

containing non-meat sources is maximised by consuming foods rich in vitamin C at the same time (such as a glass of fruit juice, fresh fruit or vegetables).

Factors that Affect Nutrition

There are many factors that influence nutritional status in older adults, and they can be broadly grouped into four main areas:

- Those that naturally occur during the ageing process, such as a reduced ability to absorb nutrients efficiently, or a sore mouth due to dentures.
- Disease-specific conditions, such as cancer, which places greater nutritional demands on people.
- Some drugs that interact with nutrients and prevent absorption, for example aspirin, which can interfere with the absorption of vitamin C.
- Social influences, such as not being able to get to shops or social isolation.

Continuing to enjoy food and to eat a diet that maintains nutritional status is key to coping with illness. Poor nutrition has been shown to increase the risk of infections, bed sores, chest infections and poor wound healing. Good nutritional status will help ensure a quicker recovery. Other common problems:

Loss of Taste

The ability to taste flavours declines as we age. Food can often taste bland to older people so they can try the following:

- Using herbs and spices, tomatoes and other flavourings, such as lemon juice to flavour food, but must avoid using too much salt.
- Choosing foods with a strong taste, go for strong-flavoured meats, sauces, dressings, mustards, and pickles.

Loss of Interest in Food

Older people can lose interest in food for a variety of reasons. Depression due to loss of independence or bereavement, or simply eating alone can reduce appetite. They can be advised to:

- Explore the possibility of lunch clubs in the area.
- Eat with company when they can.
- Make meal times special by bringing out table settings and presenting food in an attractive way.
- Choosing a variety of foods, where possible, to keep the experience interesting.

Poor Appetite

If an elderly person is unable to eat much, they can try small appetising meals and calorie-rich snacks in between meals to boost nutrient intake. To increase the calorie intake, the following tips can be

helpful:

- Fats and sugars provide energy and help food to taste good, so these should be used generously. Extra cheese can be added to sauces or grate on potatoes, or butter or margarine can be added to vegetables.
- Pudding can be enjoyed once or twice a day, such as yoghurt, milky puddings, ice cream, trifle, cake, fruit pie, and sponge puddings with custard and ready prepared desserts. Cakes, biscuits, chocolate, and crisps provide extra energy when eaten with meals, but one should make sure that they don't spoil their appetite for more nourishing foods by indulging in these foods.

Dietary Supplements

There should be no need for the dietary supplements provided the diet is varied and enough food is consumed. However, many elderly people are unable to eat a healthy and varied diet, so recommending a multivitamin and mineral supplement is a wise precaution. Vitamin D supplements are important for those who are housebound.

Problems Associated with Nutrition

Nutrition Deficiency

Some elderly people are at a higher risk of vitamin deficiency because of a poor diet. Intake of vitamin C is frequently poor, so elderly people should be encouraged to eat plenty of fruit and vegetables. If people become housebound it becomes increasingly difficult to obtain adequate vitamin D, which comes from sunlight, on the skin. Elderly people should be encouraged to expose at least some of their skin to sunlight, as regularly as possible, during the summer months. If this is not possible, vitamin D supplementation should be considered, especially during the winter and early spring.

Constipation

Constipation is a common problem in the elderly, often because of lack of food or exercise or both. It is essential to find out whether the problem is of long duration or of sudden onset and to consider the possibility of underlying disease. It is also important to establish what the person considers to be normal bowel habit.

The best advice is to increase the in-take of Non-Starch Polysaccharides (NSP) by eating more wholemeal bread, wholegrain cereals and fruit and vegetables. Raw bran should be avoided because of its phytate content, which may prejudice mineral absorption. Fluid in-takes should be increased to about 8 cups a day and regular exercise such as walking should be encouraged, if possible.

Osteoporosis

Emphasis should be given to calcium intake and exercise. It is particularly important to resume exercise promptly after periods of ill health.

Sports Nutrition

Whether it's playing football, swimming, or jogging, athletes need to eat a nutritious, balanced diet to fuel their body. Good nutrition, like any sporting event, has basic ground rules. The main consideration for the athlete is the provision of sufficient energy.

Energy Metabolism

Energy is obtained most efficiently and quickly from glucose, which can be obtained either from the stores of glycogen in the liver and muscle or to a lesser extent from amino acids. Stores of energy in the form of glucose are not large compared with needs; even in a trained athlete, they can provide no more than about 3.4 MJ (800 kcal) which could easily be used up in an hour's intensive activity. The most important thing is to concentrate on eating a nutritious, balanced diet every day. This provides plenty of energy to grow and exercise. Here are a few tips about eating before, during and after exercise.

Before

- Some high carbohydrate foods, such as bananas, bagels, or fruit juices should be consumed. These foods are broken down quickly and provide glucose to the muscles.
- The timing of this meal depends on athletes' preference for eating before exercise, but researchers have found that eating something from 1 to 4 hours before exercise helps keep plenty of blood glucose available for working muscles.
- It is also critical to drink plenty of cool water before exercise to keep muscles hydrated.

During

- Perspiration and exertion deplete the body of fluids necessary for an optimal performance and lead to dehydration. It is important to drink plenty of cool water, at least a half a cup of water every 20 minutes of exercise. Adding a teaspoon of sugar, a little fruit juice or a small amount of powdered drink mix flavours plain water and may encourage more fluid intake.
- Usually there is no need to worry about replacing carbohydrates unless the exercise lasts over 90 minutes and is hard and continuous. When this happens, drinking a sports drink or other beverage with some sugar in it will fuel and water to the muscles being exercised.
- You can make a homemade sports drink by mixing no more than 4 teaspoon of sugar, 1/4 teaspoon of salt and some flavouring (like a teaspoon of lemon juice) in 8 ounces of water.

After

If the exercise was strenuous and lasted a long time, glycogen stores may need re-fueling. Consuming foods and beverages high in carbohydrates right after exercise will replenish glycogen stores if they are low after exercising.
No matter the intensity of the exercise, it's important to drink plenty of water and eat a nutritious, balanced meal that has lots of carbohydrate rich foods such as grains, pastas, potatoes, vegetables, and fruits.

What Diet is Best for Athletes?

All athletes need a diet that provides enough energy in the form of carbohydrates and fats, as well as, essential protein, vitamins, and minerals. This means a diet containing 55-60% of calories from carbohydrates (10-15% from sugars and the rest from starches), no more than 30% of calories from fat and the remaining (about 10-15%) from protein. That translates into eating a variety of foods every day, including grains, vegetables, fruits, beans, lean meats, and low fat dairy products. The base of the diet should come from carbohydrates in the form of starches and sugars. Fluids, especially water, are also important in the winning combination. Dehydration can stop even the finest athlete from playing their best game.

Why is it Important for an Athlete to Eat Right?

If an athlete eats right they will:

- Help to train longer and at a higher intensity
- Delay the onset of fatigue
- Promote recovery
- Help body adapt to workouts
- Improve body composition and strength
- Enhance concentration
- Help maintain healthy immune function
- Reduce the chance of injury
- Reduce the risk of heat cramps and stomach aches

Are Carbohydrates Important for Athletes?

When starches or sugars are eaten the body changes them all to glucose, the only form of carbohydrate used directly by muscles for energy. Whether carbohydrates are in the form of starches (in vegetables and grains), sucrose (table sugar), fructose (found in fruits and juices), or lactose (milk sugar), carbohydrates are digested and ultimately changed to glucose. The body uses this glucose in the blood for energy. Most glucose is stored as glycogen in the liver and muscles. During exercise glycogen is broken down in the muscles and provides energy. Usually there is enough glycogen in muscles to provide fuel for 90 to 120 minutes of exercise. Most exercise and sport games do not use up glycogen stores so

eating carbohydrates during the activity usually isn't needed. However, for some athletes, eating or drinking carbohydrates during exercise helps maintain their blood glucose and energy levels.

Most athletes need not be concerned with 'carbohydrate loading', the special technique of eating a lot of carbohydrates for several days before an endurance event. Instead, focus on getting enough carbohydrates every day. The best way to ensure plenty of energy for exercise is to eat a nutritious, balanced diet that is high in carbohydrates and low in fat with lots of different foods.

Carbohydrates needs will depend on the type of training someone is doing. Recommended amounts and sources of carbohydrates are below.

Type of Training	Daily Carbohydrate needs per kilogram (per kg body weight)	Daily Carbohydrate needs per pound (per lb body weight)
Light to moderate training	5 to 7 grams per kilogram	2.3 to 3.2 grams per pound
Heavy training load and high intensity	7 to 10 grams per kilogram	3.2 to 4.5 grams per pound
Extreme training and high intensity races (longer than four to five hours)	≥ 10 to 12 grams per kilogram	≥4.5 to 5.5 grams per pound

Fat

Fat is a vital source of energy for lengthy, lower to moderate-intensity exercise and sport training. Healthy sources of fat include fatty fish, nuts, nut oils, vegetable oils, spreads made from a vegetable oil base, avocados, and olives. Athletes should limit their in-take of saturated fats, which comes from dairy foods, such as, whole milk, butter, and high-fat cheese and animal products, such as, lard and highly-marbled cuts of meat.

However, since dairy and animal products contribute energy and nutrients to the diet, they can opt for leaner options, such as low-fat or fat-free milk, low-fat cheeses and lean, trimmed meats. This way, they can get calcium and protein with much less saturated fat, they should minimise consumption of foods that contain trans-fats, such as hydrogenated oils.

Protein

Intensive training results in deposition of protein in the muscle, which leads to an increased requirement for protein. In most cases, adequate protein can be obtained from the diet. Eating large quantities of

meat, milk, eggs, and cheese is expensive, and because it may reduce the appetite for carbohydrate-rich foods, it should not be encouraged. Protein needs depend on the type of training.

Recommended amounts and sources of protein:

Type of Training	Daily Protein needs per kilogram	Daily Protein needs per pound
	(per kg body weight)	(per lb body weight)
Light to moderate training	1.2 to 1.7 grams per kilogram	0.55 to 0.8 grams per pound
Heavy training load and high intensity	1.4 to 2.0 grams per kilogram	0.7 to 0.9 grams per pound

Fluids and Electrolytes

Prolonged exercise leads to a loss of water and electrolytes from the body. As much as two litres of fluids an hour can be lost during prolonged exercises in a hot environment. Thirst is not always a reliable indicator of the state of hydration, and athletes should always drink plenty of fluid before, during and after an event. Athletes should be advised to drink 200-500 ml of fluid about 20 minutes before the event. Urine production falls as soon as the exercise begins, so there should be no necessity for a toilet stop.

Sports supplements can be broadly divided into the following groups:

- Energy supplements
- Sports drinks
- Vitamins and minerals
- Amino acid supplements
- Lactic acid buffers
- Herbs
- Caffeine

Vitamin Needs of Athletes

Vitamins do not provide energy, but they are crucial for turning food into energy. Although some research suggests the high activity levels of athletes may increase their vitamin needs, at present, the Institute of Medicine does not make vitamin recommendations specific to athletes. While vitamins will not enhance the performance, a shortage is sure to get one down.
Here's a view of the role vitamins play, as well as, their Dietary Reference Intakes (DRI):

Vitamin B1 (Thiamine)

Thiamine helps breakdown carbohydrates and proteins for energy. Taking more than the DRI does not appear to enhance performance.

- **DRI**: 1.2 mg (men), 1.1 mg (women)
- **Good sources**: Whole and enriched grains and fortified cereals

Vitamin B2 (Riboflavin)

Riboflavin is integral to energy production. It also plays a role in red blood cell formation. Athletes need the DRI of this vitamin.

- **DRI**: 1.3 mg (men), 1.1 mg (women)
- **Good sources**: Almonds, milk, yogurt, wheat germ, fortified breads, and cereals

Niacin

Niacin supports both anaerobic and aerobic performance. Too much or too little niacin can shift the body's use of energy from fat to carbohydrates or vice versa, this might affect performance.

- **DRI**: 16 mg (men), 14 mg (women)
- **Good sources**: Meat, fish, poultry, peanuts, peanut butter, and enriched grain products

Vitamin B6

Vitamin B6 is involved in over 100 metabolic reactions in your body, including the production of energy and haemoglobin, a protein in red blood cells. In-takes below the DRI can hurt performance.

- **DRI**: 1.3 mg (31-50 year old), 1.7 (men 51 and over), 1.5 (women 51 and over)
- **Good sources**: Meat, fish, poultry, eggs, beans whole grains, seeds, and oysters

Vitamin B12

Because of its role in red blood cell formation, B12 is crucial for getting oxygen to tissues. B12 is only found in animal products, putting vegan and vegetarian athletes at risk for anaemia. Such groups should try to get as much B12 from food as possible. Taking a B12 supplement or eating B12-fortified foods may be needed, as well.

- **DRI**: 2.4 mcg
- **Good sources**: Seafood, meats, milk and cheese, eggs, and fortified breakfast cereals

Folate

Folate is important for cell production, healthy hearts, and protection against birth defects. The DRI appears to be enough to support the energy demands of athletes. Female athletes of childbearing age should include folate in their diet every day.

- **DRI**: 400 µg
- **Good sources**: Enriched grains, dark leafy greens, whole-grain breads, cereals, and citrus fruits

Vitamin C

Perhaps the most famous antioxidant, vitamin C offers a wide variety of health benefits, including protecting from infection and damage to body cells, helping produce collagen (the connective tissue that holds bones and muscles together), protecting the body from bruising by keeping capillary walls and blood vessels firm, and helping in the absorption of iron and folate.

- **DRI**: 90 mg (men), 75 mg (women)
- **Good sources**: citrus fruits (oranges, grapefruits, and tangerines), strawberries, sweet peppers, tomatoes, broccoli, and potatoes

Pantothenic Acid

This vitamin is needed for the breakdown of fats, proteins and carbohydrates into usable energy. It is found in almost all plant and animal foods. Athletes should aim to meet the adequate intake for Pantothenic Acid.

- **DRI**: 5 mg
- **Good sources**: Poultry, seafood, nuts, seeds, avocados, and whole grains

Biotin

Biotin plays an important role in energy production.

- **DRI**: 30 mcg
- **Good sources**: Nuts, eggs, soybeans, and fish

Vitamin D

'Vitamin' D is not technically a vitamin, but a hormone. Your body can make its own vitamin D with enough sun exposure. Vitamin D is important for bone health; athletes in weight-sensitive sports such as gymnastics, running or cycling should take care to get enough. A physician may suggest vitamin D and/or calcium supplements for some athletes.

- **DRI**: 200 IU, 400 IU (51-70 years old), 600 IU (71+ years old)
- **Good sources**: Fortified milk and cereals, cod-liver oil, seafood, and eggs

Vegetarianism

Vegetarian diets are growing more and more common. The Vegetarian Society defines a vegetarian diet as one that includes grains, pulses, nuts, seeds, fruits and vegetables, and excludes all meat, poultry, fish, and their derivatives, with or without, the use of free range eggs, milk, and dairy products. Generally, there are four different types of vegetarians:

- Strict Vegetarian (which is known as a vegan): A vegetarian diet that excludes all animal products such as meat, poultry, fish, eggs, milk, cheese, and other dairy products.
- Lacto Vegetarian: A vegetarian diet that excludes meat, poultry, fish, and eggs but includes dairy products.
- Lacto-Ovovegetarian: A vegetarian diet that excludes meat, poultry, and fish but includes eggs and dairy products. Most vegetarians in the United States fall into this category.
- Flexitarian: A semi-vegetarian diet with a focus on vegetarian food with occasional meat consumption.

Food Sources of Important Nutrients

No matter which category of vegetarian a person falls into, it is important to choose a variety of foods, including whole grains, fruits, vegetables, legumes, nuts, and seeds.

Calcium

Vegetarians should consume a variety of calcium sources in order to meet the daily requirements. Studies have shown vegetarians absorb and retain more calcium from foods than do non-vegetarians. Dairy products are a rich source of calcium. If dairy products are not included in your diet, adequate amounts of calcium can be obtained from plant foods. Lacto vegetarians can get plenty of calcium from fortified soymilk, non-fat yoghurt, and low-fat cheeses.

Here are some other vegetarian-friendly sources of calcium:

- Cow's milk
- Fortified soymilk or rice milk
- Leafy, green vegetables
- Broccoli
- Beans
- Calcium-fortified juice
- Calcium-set tofu
- Almonds and almond butter
- Sesame seeds and sesame butter
- Soy nuts
- Blackstrap molasses
- Figs

Iron

Vegetarians should consume a variety of iron sources in order to meet their daily requirements. Consuming a good source of vitamin C (which comes from citrus fruits, orange juice, and tomatoes) at each meal increases iron absorption. Good sources include dried beans, dark green vegetables, such as, spinach and beet greens, dried fruits, prune juice, blackstrap molasses, and fortified breads and cereals. Other good vegetarian-friendly sources of iron include:

- Instant oatmeal
- Nuts and nut butters
- Potatoes (should be eaten with the skin still on it)
- Enriched pasta

Protein

Protein is found in most plant foods as well as animal foods. The body will make its own complete protein if a variety of foods and enough calories are eaten during the day.
Good sources of protein include, but are not limited to:

- Beans
- Whole grains
- Soy products
- Nuts and nut butters
- Dairy products
- Eggs

Vitamin B12

B12 is found in all foods of animal origin, including eggs and dairy products. An adequate intake of vitamin B12 is generally not a concern for vegetarians who eat some dairy products or eggs. Strict vegetarians or vegans however, may need to supplement their diet by choosing a fortified breakfast cereal or by taking a vitamin B12 (cobalamin) supplement of no more than 100% of the Daily Value.

Good sources of B12 include:

- Vitamin B12-fortified foods (nutritional yeast, soymilk, meat analogs, or ready-to-eat cereals)
- Dairy products
- Eggs

Vitamin D

Few foods are naturally high in vitamin D, but dairy products are fortified with vitamin D in the United States. People who choose not to eat dairy products and who do not receive exposure to sunlight on a

regular basis may wish to consider taking a vitamin D supplement of no more than 100% of the Daily Value.
Good sources of vitamin D include:

- Eggs
- Vitamin D-fortified foods (soymilk, cow's milk, orange juice, and ready-to-eat cereals)
- Vitamin D is also made in the skin from sunlight

Further Reading:

- ✓ ***Personal Nutrition, (2013), By Marie Boyle***
- ✓ ***Examining Food and Nutrition, (2007), By Jenny Ridgwell***
- ✓ ***Drugs During Pregnancy and Lactation: Treatment Options and Risk Assessment, (2015), edited by Christof Schaefer, Paul W.J. Peters, Richard K Miller***
- ✓ ***Nutrition During Pregnancy and Lactation: An Implementation Guide, (1991), By Institute of Medicine (U.S.). Subcommittee for a Clinical Application Guide***