

SAMPLE

Human Nutrition

Aim

Explain the role of different food types in human health.

Knowledge about nutrition can be looked at in many different ways, and the focus in any consideration of human diet depends largely upon the context and situation. Certain foods or nutrients may be deficient in the diets of particular groups of people, such as elderly widowers, teenage girls or even particular cultural groups. These deficiencies must be addressed when considering such groups. Other foods might be eaten excessively in some situations, and may need to be reduced significantly in the diet. All food types should normally be eaten by all people to ensure a balanced diet, though adjustments can be made to compensate for the lack of certain foods that make up a typical western diet, such as meat or dairy products. In some cultures, for instance, milk products are rarely eaten, if at all, and calcium is derived from other calcium-rich foods. Vegetarians and vegans can also obtain essential nutrients such as complete proteins from vegetables, pulses and grains rather than from meat. Overall, though, a varied diet is much more beneficial than a diet heavy in one or more kinds of food. And, as the saying goes, moderation is the best approach.

The food and drink that we consume each day have a direct bearing on our state of health. It is important to vary our intake of foods so that we are deriving the full range of nutrients and other substances that the body needs. Too much of one or two food types, even healthy foods, is not recommended for long-term health. In addition to being more healthful, a varied diet is also a lot more interesting for the taste buds. A balanced and adequate diet is essential to our wellbeing. The extra time and thought needed to prepare good quality meals is easily rewarded with increased stamina and alertness, better resistance to illness, and clear and healthy skin, eyes and hair. However, to maximize the health benefits of what we eat, we need to understand some basic nutrition requirements and principles, which are discussed below.

IMPORTANT FACTORS IN NUTRITION

Quality of Ingredients

Fresh food is superior to processed and packaged food because in the processing, some nutrients are lost, and often, less desirable ingredients such as sugars, fats, and chemical additives are added. Fruit, vegetables, bread, meat and dairy products should ideally be consumed when fresh. Also pay attention to the quality of the food. Fruits and vegetables are freshest and most nutritious when in season and locally grown, as they can be picked later in the ripening stage, whereas produce that is transported large distances is usually picked well before it is ripe, as it travels better and lasts longer. Look for signs of quality: good colouring; aroma; firmness, crispness or softness, as appropriate; no signs of disease.

Price is not always an indicator of quality, but in general, you get what you pay for with foods, and cheaper produce carried by one shop might be inferior in nutritional value than slightly more expensive produce in a neighbouring shop. Good chefs choose their produce very carefully because they know that quality ingredients result in tastier, more nutritious, and appealing dishes. Good produce might cost more, but it will be higher in nutritional value. Some people spend more to buy organic produce. While there has been some research into the advantages of organic food over conventionally grown food, it is still not clear if there is a significant difference in overall nutritional value. However, the flavour of organic produce is usually reported to be better, and the possibility of chemical contamination is also greatly reduced.

Range of Ingredients

No one food or food group can supply us with everything that we need for good health. An important principle of nutrition is to eat a wide variety of foods daily. This gives our body the best chance of obtaining all the

nutrients required. A diet dominated by bread will provide plenty of starch and other carbohydrates, but will be deficient in some vitamins, minerals and protein. A diet heavy in meat will supply lots of protein, but again will be deficient in some nutrients and can also over tax parts of the system. On the other hand, eating mainly vegetables and fruit may provide adequate levels of vitamins, but energy from carbohydrates and strength from proteins may be insufficient.

When we consider specific vitamins, minerals and other elements of the diet, we can see more clearly that we need a range of foods in our diet to obtain all the nutrients we need for optimum health. For example, dietary zinc can be easily obtained from red meats and some shellfish, but vegetables are a poor source of zinc. For cobalt and molybdenum, it is the other way around: leafy greens have a high concentration, while meats do not. Vitamin and mineral supplements are not a substitute for a balanced, varied diet. Vitamins and minerals are not absorbed beyond the body's needs, and the body will either eliminate what it does not use or store it, which can result in toxicity. Also, it is difficult to keep track of every vitamin, mineral, or nutrient that you need and eat. The simplest way to get what you need is to eat lots of different foods. It is also more appealing from a culinary point of view.

Cooking Methods Used

Cooking food is useful because it softens hard ingredients, increases the availability of some nutrients (eg. carotene), releases and mixes flavours, and makes foods (some of which are inedible when raw) palatable. While proper cooking may slightly reduce the nutritional value of food, over-cooking should definitely be avoided. In general, the longer the cooking time, the greater the nutrient loss. Boiling can leach (cause loss of) out large amount of nutrients, although in the case of soups and stews this is not a problem because the liquid is consumed. Cook rice, lentils, etc. by the absorption method, rather than by boiling in water and then draining off the nutrient-rich excess water. Frying, grilling, baking and barbecuing can convert some materials into carcinogens (cancer-causing substances) if the ingredients are burnt, although the quantities present are usually minute. With over cooking, the chemicals in foods can sometimes change from useful to detrimental chemicals. It is important to include raw foods in the diet, such as fruits, vegetables and nuts. A platter of vegetable sticks and a couple of dips is a simple and healthy snack or meal.

Excessive use of fats and oils can occur in frying and baking. Instead, try dry frying, grilling or simply using a smaller amount of fat or oil. To improve taste, use herbs and spices in preference to salt.

The cooking equipment can also affect food. Glass, stainless steel or enamel pots and pans should be used. Copper can interfere with the vitamins in food. The use of aluminium pots and pans is said to increase the amount of aluminium entering the body, which could lead to health problems such as muscle weakness, bone problems and Alzheimer's disease. Cooking with acidic foods in aluminium (eg. vinegar, tomatoes, citrus fruits) can make the situation worse.

Eating

After food is prepared, its nutritional value for the body can be affected by the way the food is eaten, and the circumstances in which the meal occurs. Chewing is the first stage in the digestion of food. Without going overboard, food should be chewed adequately to reduce the particle size, add moisture for easier swallowing, and to add a number of enzymes that will breakdown starches into sugars. Saliva, secreted from six glands within the mouth, contains the water and enzymes necessary for this stage of digestion. Once the food has been mashed and mixed with saliva, swallowing occurs. This involves the combined action of muscles in the mouth, tongue and throat pushing the bolus of food down into the pharynx. As the food goes down, the epiglottis stops it from entering the wind-pipe (larynx). It then passes through the oesophagus and into the stomach.

A relaxed state of mind and body is necessary for complete digestion. When you eat 'on the run', your mental energy is not on the meal but on other things, and your physical energy is being used to keep your body and mind running, and diverted from the important processes of digestion. Stress and tension can lead to poor digestion through poor chewing, unbalanced stomach acid release and bowel blockages.

MAJOR FOOD GROUPS

Foodstuffs can usually be arranged into the following groups:

Foodstuff	Nutrients
Cereals	Mainly carbohydrate, including fibre, 7-12% protein, some contain fat
Meats	Protein, all essential amino acids, fat, minerals, some B group vitamins
Dairy	Protein, vitamins and minerals, fat, simple sugar (lactose)
Eggs	Protein, vitamins and minerals, fat in the yolk
Legumes	Rich protein source, fibre, minerals
Root vegetables	Similar in nutrient content to cereals
Other vegetables	Vitamins and minerals, some protein and fibre, little carbohydrate or fat
Fruits	Vitamins, simple sugar (fructose) fibre and starch
Fats oils & sugars	Rich energy source, fats and oils may have some micronutrients and are carriers for vitamins A, D, E and K.

Carbohydrates

These are found in all plants in two main forms: sugars and starches. Carbohydrates are the main source of energy for most people. If you are using a lot of energy, you should be eating more carbohydrate. However, if you eat more carbohydrate than your body needs, you can become obese. One gram of carbohydrate yields 4 calories of energy.

- Sources for Complex Carbohydrates: (Starches): bread, cereal, flour pasta, rice, nuts and potatoes
- Sources for Simple Carbohydrates: (Sugars): fruit, ice cream, immature (sweet) vegetables, soft drinks
- Sources of both Simple and Complex Carbohydrates: Pies, cakes, biscuits.

Symptoms of carbohydrate deficiency include:

- Weight loss as stored fats are burned for energy
- Metabolic acidosis from increased use of fat deposits
- Tissue wasting as the body burns proteins for energy.

Symptoms of carbohydrate toxicity/excess include:

- Nutritional deficits (high carb diets often lack essential micronutrients)
- Weight gain
- Digestive tract irritation
- Increased levels of fat in the blood.

Recommended Daily Intake of carbohydrate for an average adult = 125 to 175 grams and 55-60% of total calories ingested.

Types of Carbohydrate

There are four main types of carbohydrates:

- Monosaccharides

The simplest carbohydrates that are the building blocks of larger saccharides. The body converts simple sugars to glucose and can then metabolise it to release energy

- Disaccharides

Small compound sugars made up of two saccharides

- Oligosaccharides

These are compound sugars which when hydrolysed will yield two to six molecules.

- Polysaccharides

These are compounds that yield a large number of monosaccharides when they hydrolyse.

Fats

Fats is a general term for all kinds of oils and fats, correctly called 'lipids'. Fats have a characteristic 'greasy' appearance, whether solid or liquid. Solid lipids are actually fats, while liquid lipids are oils. They contain carbon, hydrogen and oxygen, but in different proportions to carbohydrates. There are a range of different types of lipids eaten: the most common types are "Triglycerides" and "Triglycerols". Cholesterol and phospholipids are other types that may be eaten.

Fats are an important source of energy to some people, and some fats are essential for health. However, we are not designed to require large amounts of fat, and when we do so, we can become obese or ill. One gram of fat yields 9 calories. Some types of fats (ie: saturated) create a significant heart disease risk and are essentially mild toxins.

Fats (not including cholesterol) are changed to fatty acids and monoglycerides through digestion. They are then converted into triglycerides and transported in the lymphatic system. The liver is very efficient at converting fatty acids from one type into another type. It can't synthesise linoleic acid, however. This fatty acid must be ingested. Research has indicated that linoleic acid might also need to be ingested. Both of these fatty acids occur in most vegetable oils.

- Animal sources of lipids

Meat, poultry, eggs, milk, milk products, lard.

- Plant sources of lipids

Corn, soy beans, sunflower seeds/oil, olive oil, coconut, nuts, cocoa beans

- Sources of essential fatty acids

Corn, soy oil, wheat germ, seeds, oils, vegetable shortenings

- Sources of cholesterol

Liver, kidneys, brains, egg yolk, fish roe, fatty meats, cream, cheese, milk.

Recommended intake (from American Heart Foundation):

- Fat intake should be no greater than 30% of total calorie intake.
- Saturated fats should be no greater than 10% of total fat intake.
- Daily cholesterol should not exceed 250 mg (ie. the amount in one egg yolk).

The National Heart Foundation in Australia similarly produces recommendations in Australia. The current Australian Heart Foundation position statement recommends that trans and saturated fats together should not exceed more than 8% total energy intake, while polyunsaturated fat should not exceed 8-10% and is best obtained from fatty fish (omega-3 fatty acids) which should be eaten twice a week. In a commercial setting, it is important to be aware of the fat content of dishes and beverages and more and more people will be seeking dishes that are low in trans and saturated fats.

While fats are often named as the main culprits in weight control, they are necessary in the diet. Fats impart flavour to foods, and more importantly provides a source of lipid soluble vitamins, Vitamins A, D, E and K. So, while fats in excess are undesirable, they are needed in the diet.

Proteins

These are very complex substances that, like carbohydrates and fats, contain hydrogen, oxygen and carbon, and they also contain nitrogen. Proteins are large molecules made up of different combinations between any of 22 different amino acids.

The body needs eight essential amino acids throughout all stages of life. These are:

- Tryptophan
- Methionine
- Valine
- Threonine
- Phenylalanine
- Leucine
- Isoleucine
- Lysine

For infants, a ninth "essential" amino acid is also needed: Histidine.

Uses in the Body

Proteins are generally used to either:

- build up the body - making or regulating the production of compounds that are the building blocks of the body.
- burn as fuel (ie. to provide a source of energy).

Proteins are found in all active tissues of the body (eg: muscle cells, the liver, glands, etc.). Though one gram of protein can yield 4 calories, the most important functions of the protein are tissue building, and repair and provision of the ingredients for the formation of enzymes, hormones and antibodies.

Whether a protein is burnt to supply energy, or used in a more constructive way depends on the following:

- The All or None Rule

An appropriate amount of all necessary amino acids must be present to make a particular protein, or the protein will not be made. Any essential amino acids not used to make proteins will soon be oxidised for energy, or converted to produce carbohydrates or fats.

- Calorie Intake Adequacy

If a diet doesn't contain adequate carbohydrates or fats for calories in ATP production, tissue proteins are used for energy. (NB: ATP is a chemical involved in the process of storage and release of energy, allowing work to occur in the body).

- Body Nitrogen Balance

In healthy adults, the rate at which proteins are synthesised should be the same as the rate at which they are broken down in the body. This balance is reflected by the nitrogen balance in the body based on the fact that all protein averages approximately 16% nitrogen. The body is considered in balance when the amount of nitrogen ingested in protein is equal to the amount excreted in urine.

Under physical or emotional stress, the protein breakdown can be affected and exceed by the amount of protein being synthesised: this is called a "negative nitrogen balance".

- Hormone Activity

Anabolic hormones can cause acceleration of protein synthesis and growth. The affect of these hormones may continually change (affected by things such as age, stress, growth rate etc), hence growth rates and protein synthesis rates can be continually changing.

Suggested Protein Intake

Protein requirement varies from person to person depending upon the individual's characteristics, size and level of activity. As a general guide: approximately 0.75 gm of protein per kilogram of body weight may be needed by an average person per day. A more physically active person will require more protein than one who is less active (eg. A strength athlete may need 1.2 – 1.5gm of protein per kilogram of body weight per day.

Typically a small serve of fish and a glass of milk may be adequate for an average person.

Some dietary plans consider that raising the overall level of protein intake is a good thing and will in fact suppress the desire to eat as much carbohydrate. Opinions vary on this issue as excessive protein intake can tax the kidneys.

Grains

Grains are valuable foods; a good source of protein, complex carbohydrates, fibre and many different minerals and vitamins. Different grains have different food values. Whole grains are generally better nutritionally than processed grains, particularly with respect to dietary fibre.

Nutritional Value of Various Grains

GRAIN	PROTEIN	CALORIES/100g m (Raw dry grain)	GOOD SOURCE FOR:
Barley	Medium levels	360	Slightly more nutritious than rice
Buckwheat	Medium levels	363	B group vitamins and minerals
Corn	Lacks some amino acids	350-400	Vitamins and minerals
Oats	Higher than many grains	400	Iron, potassium, zinc, manganese, Vitamin E and more
Rice	Variable -wild rice is higher than brown rice	360	Varies between types, many minerals and vitamins
Rye	High	335	Many minerals and vitamins
Triticale	High content	360	Iron, potassium and B group vitamins
Wheat	Wheat germ is high in protein	300	E and B group vitamins

Vegetables

Vegetables are a source of some proteins. Legumes are possibly the best source of protein amongst vegetables. Peas and all types of beans (dried or fresh) are high in protein, as are all seeds. The average root or leaf vegetables have been determined to contain only 1% (approximately) of protein, whereas dried beans or peas may be as high as 20% protein. Beans are also a good source of vitamin C, and provide a range of other minerals

and vitamins, including some vitamin C. Bean sprouts have an increased amount of vitamin C (which is produced as they germinate). Providing fibre is one of the strengths of all vegetables. Dietary fibre is excellent in beans and even better in sprouted beans.

Vitamins

Vitamins are complex organic substances that are essential for the satisfactory utilization of energy foods by the body. Many vitamins must be derived from the diet, because the body is unable to make them. Since vitamins B and C are water soluble, they are absorbed and eliminated more quickly. Vitamins that are manufactured within plants are much easier to digest than vitamins and minerals of animal origin. The presence of plant vitamins is dependant to some extent on the overall health and vigour of the plant, the plant variety and the conditions under which the plant is grown.

Minerals

Minerals are inorganic (containing no carbon) chemical elements that are required for regulation of the body's metabolism and formation of the body's structure. They play an important role in the health of teeth, bones, hair, blood, skin and connective tissue. Minerals are also an important part of the enzymes, vitamins and hormones that are involved in many chemical processes in the body. Each mineral has specific functions, but for proper functioning, it depends on concentrations of other minerals in the body.

The eight major essential minerals are Sodium, Potassium, Calcium, Magnesium, Iron, Phosphorus, Sulphur and Chlorine. Recommended daily intake for minerals is usually quite low. For example, magnesium requirements are about 320 milligrams for men and 270 milligrams for women. Minor or trace elements have recently been recognised as also being essential to good health, in very small quantities though. The more important ones are Copper, Zinc, Iodine, Fluorine, Chromium, Manganese, Selenium and Cobalt.

A number of mineral deficiencies are common in Western diets. Iron, calcium and zinc are probably the most significant, with the first two being more common in women. They are largely due to an inadequate intake of the particular mineral, especially in a vegetarian or vegan diet. Too much of any mineral can be toxic. Sources of overdose can be over-use of mineral supplements, or environmental pollution. This can be a problem with the trace elements because they are usually only present in minute amounts.

FOOD ALLERGIES

Food allergies are more common than most people realize. Food allergies may be subtle: an allergy may cause a headache that you attribute to a late night or stress. They can also be life-threatening in some people, causing a severe set of symptoms known as anaphylactic shock that is treatable only with a shot of epinephrine and hospitalisation. Common foods which some people have problems with include wheat, sugar, chocolate, citrus and dairy.

The best way to determine a food allergy, if one is suspected, is to undergo an elimination diet. This should be done under the supervision of a doctor or naturopath, and consists of eliminating particular groups of food from the diet until the culprit is found.

TERMINOLOGY

Food has a language of its own. You must learn this language if you are to communicate in this field. In some lessons, you will be given several terms that might be new to you. Use a dictionary to find the meanings of these term. Diet guides or nursing dictionaries often have the terminology you need. If you cannot find a definition, or cannot understand the definition, ask your tutor to assist you.

WEIGHT AND ENERGY CONVERSIONS

The following conversions will likely be useful to you during this course:

USEFUL CONVERSIONS	
1 kg	2.2 lb

1 kg	1000 g
1 g	0.035 oz
1 lb	16 oz
1 lb	0.45 kg
1 cal	4.2 kJ
1 kJ	0.238 cal

RESOURCES

No matter what, where or how you study, it is vital that you develop good research skills. To do this, develop a list of resources that can provide you with relevant information (on foods, nutrition, health, diet, careers, hospitality, or whatever you want or need to know).

Some sources of information are listed below:

- **Books, Magazines and Newspapers**

- Articles in newspapers and popular magazines can sometimes provide wonderful recipes and other hints that can be used in a food service business.
- Cooking and Diet books abound. Some are good, others are not so good. Always consider the author's credentials and experience as well as the content of a book. If you need advice, ask your tutor for suggestions or check titles available in the school's online bookshop www.acsbookshop.com
- Books by respected restaurateurs or professional, qualified dieticians are recommended.
- Trade publications from the Food industry (and related industries) can be very useful; though these are not generally available through retail outlets (eg. news stands). To find such industry publications, you need to search the internet or consult with people who work in the food and beverage industry.

Examples:

Food Service News and Food Management News: These two magazines are available from Yaffa Publishing Group, GPO Box 606, Sydney, NSW, 1005. Ph: (02) 9281 2333, Fax: (02) 9281 2750.

- **Government Departments**

Most government departments produce publications -booklets, leaflets etc. Sometimes these are given away free; sometimes they are sold. Some government departments operate advisory services, etc. Information on cooking and food can frequently be obtained from government departments:

- Health departments for information on diet and health
- Agriculture departments for information on growing and marketing foodstuffs
- Energy departments (electricity and gas etc.) for information on equipment, energy uses, safety, etc.

- **Clubs, Societies and Professional Associations**

Search on the internet, or look in the yellow pages under "Organizations", or check local newspaper bulletin boards. Nutrition Australia is a good source of general nutritional information.

- **Shows and Exhibitions**

Trade shows, displays in exhibition centres/ show grounds, shopping centres etc. Often health food stores and chemists will have visiting professionals in once a week or month and they will often have brochures and leaflets to distribute regarding nutritional supplements, for example.

- **Commercial Organisations**

Businesses supplying goods or services in the food and beverage industries, particularly those with interests in health foods and nutrition.

- **People**

Individuals or groups with experience to share. Consultants, mentors or colleagues. Make friends and develop professional relationships with others in this field, and build up a number and variety of contacts. Examples might include fresh produce suppliers, farmers, chefs, restaurateurs, and so on.

DEVELOPING CONTACTS

Developing a network of contacts is an important part of being successful in the food and beverage industry.

Whether you are an employee, a manager or employer, your ability to perform your job better and advance your career in this industry can often be just as much about who you know, as what you know.

How Can Contacts Help a Restaurant Manager?

- Attracting good staff to work for you
- Encouraging good customers to return to your restaurant, and recommend it to others. (Restaurateurs should make a point of cultivating warm relationships with customers)
- Obtaining the best produce
- Finding materials, equipment and services quickly whenever they are needed.
- Developing business deals that can bring extra custom (eg. Clubs and other organisations will use restaurants for meetings, celebrations and other functions. The more people who know you, the more opportunities arise for you to attract significant group bookings in the restaurant).

How Can Contacts Help the Restaurant Employee?

- You will be more aware of opportunities to move to better jobs when they arise. (Restaurateurs in any region do get to know who has the best chef, and the best waiters etc. It is not uncommon in an industry where a lot of staff are transient or casual, for good staff to move from one restaurant to another)
- In many countries, restaurant staff earn a large part of their income from tips; and personal relationships with regular patrons can be important to getting good tips.
- Staff who are well connected are highly valued by employers, and will be more secure in their employment, more likely to be paid well, and more likely to be promoted if an opportunity comes along.

SET TASK

Resource File:

The resource information that you find while undertaking this course, should be filed away for safe keeping. You never know when you might need to refer to a book, magazine article, or a person you came across a few years earlier.

Start compiling a resource file now. Collect names and contact details of useful resources, and jot down what kinds of information they can provide. Record this information in a card file or exercise book that you have

organised in alphabetical order. Begin by contacting resources you are aware of and obtaining leaflets and any other information you can.