

Glossary

Terms here are defined in the context of this Report. Some terms may have other meanings in other contexts.

Absorption

The movement of **nutrients** and other food constituents from the gut into the blood.

Acid-base balance

The appropriate acidity of the blood and tissues. Abnormal acid-base balance may indicate a change in respiratory or metabolic status.

Adduct (see DNA adduct)

Adenocarcinoma

Cancer of glandular **epithelial** cells.

Adenosine triphosphate (ATP)

The principal molecule used for storage and transfer of **energy** in metabolic processes.

Adipose tissue

Body fat. Tissue comprising mainly cells (adipocytes) containing triglyceride. It acts as an **energy** reserve, provides insulation and protection, and secretes metabolically active **hormones**.

Adiposity rebound

The age at which **body mass index** (BMI) increases after reaching a nadir at around 4–6 years of age. Earlier age of adiposity rebound has been linked to later development of **obesity**.

Adjustment

A statistical tool for taking into account the effect of known **confounders** (see box 3.1).

Adrenarche

The period, typically between age 6 and 10 years, characterised by an increase in secretion of **androgens** from the adrenal cortex.

Aerobic metabolism

The normal process of producing **ATP** as a source of **energy** using oxygen.

Aflatoxins

Naturally-occurring **mycotoxins** that are produced by many species of *Aspergillus*, a fungus, most notably *Aspergillus flavus* and *Aspergillus parasiticus*. Aflatoxins are toxic and carcinogenic to animals, including humans (see box 4.1.4).

Age-adjusted incidence

The number of events in a population, usually expressed per 100,000 people, over a defined period of time, adjusted for the varying proportion of people in each age group between populations and over time. It allows for comparisons between countries with different age structures (see box 7.1.1).

Alpha-linolenic acid

An essential n-3 **polyunsaturated fatty acid** (C18:3 n3).

Amenorrhoea

The absence of menstruation.

Amino acid

An **organic compound** containing an amino group and a carboxylic acid group. The basic building blocks of proteins such as **enzymes**.

Anaerobic metabolism

The process of producing **ATP** as a source of **energy** without oxygen, resulting in lactic acid accumulation.

Androgen

Any masculinising sex **hormone**, such as **testosterone**.

Angiogenesis

The process of generating new blood vessels.

Antioxidants

Any substance that inhibits oxidation or traps or quenches **reactive oxygen species** generated during metabolism.

Anthropometric measures

Measures of body dimensions.

ATP (see adenosine triphosphate)

Basal energy expenditure (see basal metabolic rate)

Basal metabolic rate (BMR)

The amount of **energy** required to maintain the essential body functions in resting and fasting conditions, expressed as megajoules, kilojoules, or kilocalories per minute, hour, or day.

Begg's test

A statistical test for small study effects such as **publication bias**.

Beta-glucans

Non-starch polysaccharides composed of glucose subunits linked in such a way as to render them indigestible by pancreatic amylase. A major component of the cell wall polysaccharides of oats (see non-starch polysaccharides and **dietary fibre**).

Bias

In epidemiology, deviation of an observed result from the true value in a particular direction (systematic error) due to factors pertaining to the observer or to study design or analysis. See also **selection bias**.

Bile

A greenish-yellow fluid secreted by the liver and stored in the gallbladder. Bile plays an important role in the intestinal **absorption** of fats. Bile contains **cholesterol**, bile salts, and waste products such as bilirubin.

Biliary tract

The biliary tract includes the **bile** ducts within the liver, the common bile duct, which connects the liver and gallbladder to the small intestine, and the cystic duct, which connects the gallbladder to the common bile duct.

Bioavailability

The degree to which a **nutrient** (or other substance) can be absorbed and used by the body.

BMI (see body mass index)

BMR (see basal metabolic rate)

Body mass index (BMI)

Body weight expressed in kilograms divided by the square of height expressed in metres (BMI = kg/m²). It provides an indirect measure of body fatness. Also called Quetelet's Index.

Caffeine

An alkaloid found in coffee, tea, kola nuts, chocolate, and other foods that acts as a stimulant and a diuretic.

Cancer survivor

Any person who has received a diagnosis of cancer

Cantonese-style salted fish

Fish that has been treated with varying amounts of salt and dried in natural conditions outdoors. It is characterised by treatment with less salt than typically used and is also subject to **fermentation** during the drying process due to relatively high outdoor temperature and moisture levels (see box 4.3.5).

Carcinogen

Any substance or agent capable of causing cancer.

Carcinoma

Malignant tumour derived from **epithelial** cells, usually with the ability to spread into the surrounding tissue (invasion) and produce secondary tumours (**metastases**).

Carcinoma in situ

The first stage of carcinoma in which the **malignant** tumour has not spread beyond the **epithelium**.

Cardiovascular disease

A group of diseases that involve the heart and/or blood vessels (arteries and veins). While the term technically refers to any disease that affects the cardiovascular system, it is usually used to refer to those related to atherosclerosis.

Case-control study

An epidemiological study in which the participants are chosen based on their disease or condition (cases) or lack of it (controls) to test whether past or recent history of an **exposure** such as smoking, genetic profile, alcohol consumption, or dietary intake is associated with the risk of disease (see box 3.4).

CE

Common Era — the period of measured time beginning with the year one on the Gregorian calendar. The notations CE and BCE (Before Common Era) are alternative notations for AD and BC, respectively.

Cell cycle

The sequence of stages that a cell passes through between one cell division and the next.

Cell signalling

Mechanisms whereby cells send messages to, or respond to external stimuli from, other cells.

Cerebrovascular disease

A group of diseases of the brain due to damage to the blood vessels, in which an area of the brain is transiently or permanently affected by ischaemia or bleeding.

Cholesterol

The principal sterol in animal tissues, synthesised in the body; an essential component of cell membranes and the **precursor** of the **steroid hormones** and vitamin D.

Chromatin

Mass of genetic material in the nucleus of a cell, composed of **DNA** and proteins that condense to form chromosomes.

Chronic disease

A disease that develops or persists over a long period of time. Includes noncommunicable diseases such as cancer, **cardiovascular disease**, and **diabetes**, and some infectious diseases such as tuberculosis.

CI (see **confidence interval**)**Celiac disease**

Intolerance to the gliadin fraction of the protein gluten from wheat, rye, and barley. The villi of the small intestine atrophy and **nutrient absorption** from food is poor. Stools are often bulky and contain a large amount of unabsorbed fat.

Cohort study

A study of a (usually large) group of people whose characteristics are recorded at recruitment (and sometimes later), followed up for a period of time during which outcomes of interest are noted. Differences in the frequency of outcomes (such as disease) within the cohort are calculated in relation to different levels of **exposure** to factors of interest, for example smoking, alcohol consumption, diet, and **exercise**. Differences in the likelihood of a particular outcome are presented as the **relative risk** comparing one level of exposure to another (see box 3.4).

Compliance

The extent to which people such as study participants follow an allocated treatment programme.

Computed tomography (CT)

A form of X-ray that produces cross-sectional or other images of the body.

Confidence interval (CI)

A measure of the uncertainty in an estimate, usually reported as 95% confidence interval (CI), which is the range of values within which there is a 95% chance that the true value lies. For example the effect of smoking on the **relative risk** of lung cancer in one study may be expressed as 10 (95% CI 5–15). This means that in this particular analysis, the estimate of the relative risk was calculated as 10, and that there is a 95% chance that the true value lies between 5 and 15.

Confounder

A variable, within a specific epidemiological study, that is associated with an **exposure**, is also a risk factor for the disease, and is not in the causal pathway from the exposure to the disease. If not adjusted for, this factor may distort the apparent exposure–disease relationship. An example is that smoking is related both to coffee drinking and to risk of lung cancer and thus, unless accounted for (controlled) in studies, might make coffee drinking appear falsely as a possible cause of lung cancer (see box 3.1).

Confounding factor (see **confounder**)**Confounding variable** (see **confounder**)**Cretinism**

Underactivity of the thyroid gland (hypothyroidism) in infancy, resulting in poor growth, severe mental retardation, and deafness.

CT (see **computed tomography**)**Curing**

Various preservation and flavouring processes, especially of meat or fish, by the addition of a combination of salt, sugar, and either **nitrate** or **nitrite**. Curing processes often involve **smoking**. The addition of saltpetre (sodium nitrate) gives a pinkish colour to meat. Bacteria convert the nitrates in cured meats to nitrites and **nitrosamines**, which are potentially carcinogenic to humans (see box 4.3.2).

Cytotoxic

Poisonous to living cells.

Deoxyribonucleic acid (DNA)

The double-stranded, helical molecular chain found within the nucleus of each cell that carries the genetic information.

DEXA (see **dual energy X-ray absorptiometry**)**Diabetes mellitus**

A metabolic disorder involving impaired metabolism of glucose due either to failure of secretion of the **hormone insulin** (type 1 diabetes) or to impaired responses of tissues to insulin (type 2 diabetes), which results in complications including kidney failure, blindness, and increased risk of **cardiovascular disease**.

Dietary fibre

Constituents of plant cell walls that are not digested in the small intestine. Several methods of analysis are used, which identify different components. The many constituents that are variously included in the definitions have different chemical and physiological features that are not easily defined under a single term. The different analytical methods do not generally characterise the physiological impact of foods or diets. **Non-starch polysaccharides** are a consistent feature and are fermented by colonic bacteria to produce **energy** and short chain **fatty acids** including butyrate. The term dietary fibre is increasingly seen as a concept describing a particular aspect of some dietary patterns (see box 4.1.2).

Dietary supplement

A substance, often in tablet or capsule form, which is consumed in addition to the usual diet. Dietary supplements typically refer to vitamins or **minerals**, though **phytochemicals** or other substances may be included.

Differentiation

The process of development of cells to take on the structural and functional characteristics specific to a particular tissue. Also, the degree to which tumour cells have the structure or function of the organ from which the tumour arose. Tumours can be described as well, moderately, or poorly differentiated: well-differentiated tumours appear similar to the cells of the organ in which they arose; poorly differentiated tumours do not. The degree of differentiation is often of prognostic significance.

Disaccharide

A carbohydrate composed of two **monosaccharides**.

Diverticular disease

The presence of pouch-like hernias (diverticula) through the muscle layer of the colon, associated with a low intake of **dietary fibre** and high intestinal pressure due to straining. Faecal matter may be trapped in these diverticula, causing them to become inflamed, causing pain and diarrhoea (diverticulitis).

DNA (see **deoxyribonucleic acid**)**DNA adducts**

DNA adducts are compounds formed by the reaction of a chemical with DNA, which may damage the DNA. If repaired, some adducts can be excreted and measured in the urine as a marker of DNA damage. If not repaired, DNA may function abnormally and may therefore be a stage in carcinogenesis.

Docosahexaenoic acid (DHA)

A long-chain n-3 **polyunsaturated fatty acid** (C22:6 n3).

Dose response

A term derived from pharmacology that describes the degree to which an effect changes with the level of an **exposure**, for instance the intake of a drug or food (see box 3.2).

Double bond

A covalent bond between two carbon atoms each with one hydrogen atom, for instance in **fatty acids**.

Dual energy X-ray absorptiometry (DEXA)

A means of measuring the density of different body tissues such as bone or fat, using two X-ray beams with differing energy levels.

Dyslipidaemia

Any disorder of lipoprotein metabolism resulting in abnormal plasma concentrations or forms of lipoprotein, such as high total or **low-density lipoprotein (LDL) cholesterol** or triglyceride, and low high-density lipoprotein (HDL) cholesterol concentrations.

Dysplasia

Abnormal development of the cells of a tissue.

Ecological study

A study in which differences in patterns of **exposure**, for instance in consumption of a particular **nutrient** or food, are compared at aggregate level, with populations (rather than individuals) as the unit of analysis (see box 3.4).

Egger's test

A statistical test for small study effects such as **publication bias**.

Eicosapentaenoic acid (EPA)

A long-chain n-3 **polyunsaturated fatty acid** (C20:5 n3).

Effect modifier/effect modification

Effect modification (or effect-measure modification) occurs when a measure of effect for an **exposure** changes over levels of another variable (the modifier) (see box 3.6).

Emulsifier

A substance that promotes the formation of a stable mixture, or emulsion, of two substances that do not normally mix well (for example oil and water).

Endocrine

Referring to organs or glands that secrete **hormones** into the blood.

Energy

Energy, measured as calories or joules, is required for all metabolic processes. Fats, carbohydrates, proteins, and alcohol from foods and drinks release energy when they are metabolised in the body.

Energy adjustment

The use of statistical methods to 'adjust' intakes of a dietary factor under study for total **energy** intake (see box 3.7).

Energy balance

The state in which the total **energy** absorbed from foods and drinks equals total energy expended. Also the degree to which intake exceeds expenditure (positive energy balance) or expenditure exceeds intake (negative energy balance).

Enzyme

A protein that acts as a catalyst in living organisms, promoting chemical reactions and regulating the rate at which they proceed.

Epidemic

A widespread or rapidly spreading disease that affects many individuals in a population at the same time, markedly in excess of the number normally expected.

Epigenetic

Relating to the control of **gene expression** through mechanisms that do not depend on changes in the nucleotide sequence of **DNA**, for example through methylation of DNA or acetylation of histone.

Epithelial (see **epithelium**)**Epithelial-mesenchymal transition (EMT)**

A disorder of cell **differentiation** where cells assume a mesenchymal rather than an **epithelial phenotype**. Cancer cells may have phenotypic similarities to EMT.

Epithelium

The layer of cells covering internal and external surfaces of the body, including the skin and mucous membranes lining body cavities such as the lung, gut, and urinary tract.

Essential amino acid

An amino acid that is required for normal cellular structure and metabolic function but which humans cannot synthesise and so must obtain from food.

Evidence

Information that helps to determine whether a proposal or belief is true or valid, or false or invalid.

Exercise

A type of **physical activity**, often deliberate such as sport, which improves fitness or health.

Exposure

A factor to which an individual may be exposed to varying degrees, such as intake of a food, level or type of **physical activity**, or aspect of body composition.

Extracellular fluid

All body fluid not contained within cells. Includes the fluid in blood vessels (plasma) and between cells (interstitial fluid).

Factor analysis

A statistical technique used to examine the structure underlying the interactions between several variables.

Fat-free mass

The mass of all body tissue excluding the **lipid** components.

Fatty acid

A carboxylic acid with a carbon chain of varying length, which may be either saturated (no **double bonds**) or unsaturated (one or more double bonds). Three fatty acids attached to a **glycerol** backbone make up a triglyceride, the usual form of fat in foods and **adipose tissue**.

Fermentation

The anaerobic metabolic breakdown of molecules such as glucose. Fermentation yields **energy** in the form of lactate, acetate, ethanol, or other simple product.

Fetal programming (see **programming**)**Food systems**

The interconnected agricultural, ecological, economic, social, cultural, and technological systems involved in food production, distribution, and consumption.

Forest plot

A simple visual representation of the amount of variation between the results of the individual studies in a **meta-analysis**. Their construction begins with plotting the observed **exposure** effect of each individual study, which is represented as the centre of a square. Horizontal lines run through this to show the 95% **confidence interval**. Different sized squares may be plotted for each of the individual studies, the size of the box increasing with the size of the study and the weight that it takes in the analysis. The overall summary estimate of effect and its confidence interval can also be added to the bottom of this plot, if appropriate, and this is represented as a diamond. The centre of the diamond is the pooled summary estimate and the horizontal tips are the confidence intervals (see box 3.3).

Fortification

The deliberate addition of **nutrients** to foods or drinks as a means of increasing the level of intake in a population (see box 4.10.1).

Functional food

Any food, similar in appearance to conventional food, claiming to have specific physiological effects that benefit health and/or reduce the risk of disease. Products are sometimes sold in medicinal forms (see box 4.10.2).

Gene expression

The active production of the **RNA** and protein that are coded for by a particular gene. In any cell, not all genes are expressed (see **epigenetic**).

Genetic modification

The manipulation of a living organism's genetic material by eliminating, modifying, or adding copies of specific genes, often from other organisms. Also known as 'genetic engineering'.

Germ cell (see **germ line**)**Germ line**

Eggs and sperm and the cells that develop into them, through which genetic information is passed from generation to generation.

Genotype

The genetic makeup of a cell or organism.

GH (see **growth hormone**)**Gleason score**

A quantitative measure of the degree of **differentiation** of prostate cancers. High Gleason scores, representing aggressive disease, are associated with poor prognoses. **Whitemore and Jewett scales** are used to assess prostate cancer stage.

Glycaemic index

A system for ranking foods containing carbohydrates according to the effect of a standard amount on blood glucose levels. Foods that raise the blood sugar the most have the highest glycaemic index (see box 4.1.3).

Glycaemic load

The **glycaemic index** of a food multiplied by the number of grams of carbohydrate in the serving of food (see box 4.1.3).

Glycerol

A three-carbon molecule that forms the backbone of triglyceride in fats (see **fatty acid**).

Goitre

Enlargement of the thyroid gland, seen as a swelling in the neck; may be hypothyroid, with low production of thyroid **hormone**, euthyroid (normal levels), or hyperthyroid (excessive production). Deficiency of iodine is one cause.

Gross domestic product

The total market value of all the goods and services produced within a nation in a given year.

Growth hormone (GH)

Also known as somatotropin, a **hormone** secreted by the pituitary gland that stimulates secretion of growth factors from the liver and so also protein synthesis and growth of the long bones in the legs and arms. It also promotes the breakdown and use of **fatty acids**, rather than glucose, as an **energy** source.

Haem

The part of the organic molecule haemoglobin in red blood cells containing iron to which oxygen binds for transport around the body.

Herbicide

A pesticide used to kill or control the growth of unwanted plants. Selective herbicides kill certain targets while leaving a desired crop relatively unharmed. Non-selective herbicides kill every plant with which they come into contact.

Heterocyclic amines

A family of compounds formed from protein and sugars in meat, chicken, and fish cooked at very high temperatures by grilling (broiling) or frying that have potential carcinogenic effects (see box 4.3.4).

Heterogeneity

A measure of difference between the results of different studies addressing a similar question. In **meta-analysis**, the degree of heterogeneity may be calculated statistically using the I^2 test.

High fructose corn syrup (HFCS)

A form of corn syrup that has undergone enzymatic processing in order to increase its fructose content. Used to sweeten soft drinks, juices, ice cream, and many other processed foods, especially in the USA (see box 4.6.1).

High-income countries

Countries with a gross average annual national product of more than an agreed figure per head (in 2006 this was more than \$US 10 726). This term is less judgemental and more descriptive than 'economically developed' countries.

Homeostasis

The maintenance of biological conditions in a stable state.

Hormone

A substance secreted by specialised cells that affects the structure and/or function of other cells or tissues in another part of the body.

Hydrogenation

The process by which unsaturated **fatty acids** in vegetable oils are made more saturated by the addition of hydrogen. This makes liquid oils more solid at room temperature and more resistant to oxidation, for instance in the manufacture of margarines. Incomplete hydrogenation can lead to the formation of **trans-fatty acids** (see box 4.5.1).

Hyperkeratosis

Excessive thickening of the outer horny layer of the skin, affecting the palms and soles.

Hyperplasia

An increase in the number of cells in a tissue.

Hypertension

High blood pressure; a risk factor for **cardiovascular** and kidney disease.

Hypoxia

Abnormally low levels of oxygen in blood or tissues.

IARC

International Agency for Research on Cancer (www.iarc.fr).

IGF binding proteins

Proteins that bind to insulin-like growth factors (which are implicated in the cancer process, see Chapter 2) in the bloodstream.

Immune response

The production of antibodies or specialised cells in response to foreign proteins or other substances.

Incidence rates

The number of new cases of a condition appearing during a specified period of time expressed relative to the size of the population, for example 60 new cases of breast cancer per 100 000 women per year.

Inflammation

The immunologic response of tissues to injury or infection. Inflammation is characterised by accumulation of white blood cells that produce several bioactive chemicals, causing redness, pain, and swelling.

Inflammatory bowel disease

A term used to describe Crohn's disease and **ulcerative colitis**: both are characterised by chronic **inflammation** of the gut.

Insulin

A protein **hormone** secreted by the pancreas that promotes the uptake and utilisation of glucose, particularly in the liver and muscles. Inadequate secretion of, or tissue response to, insulin leads to **diabetes mellitus**.

Intrinsic sugars

Sugars naturally integrated into the cellular structure of foods, for example those present in unprocessed fruits and vegetables.

Intra-abdominal fat

Also known as visceral fat. Fat stored within the abdomen surrounding the internal organs (see **adipose tissue**).

In utero

In the uterus; refers to events that occur before birth.

Invasive cancer

Tumours that spread into surrounding healthy tissue.

Iron-deficiency anaemia

A low blood concentration of haemoglobin due to a deficiency of iron, due either to unusually high demands or low intake or impaired **absorption**.

Irradiation

Exposure to ionising radiation. Food irradiation is used to disinfect, sterilise, or preserve food.

Jewett scale (see **Whitmore and Jewett scales**)**K-ras**

One of a class of genes (proto-oncogenes) which when mutated can malfunction to become an **oncogene**, promoting the transformation of normal cells into cancer cells (see box 2.2).

Lactation

The production and secretion of milk by the mammary glands.

Lacto-ovo-vegetarian diet

A vegetarian diet characterised by the inclusion of eggs and dairy products, but no other animal products.

Latency

The period of time between the onset of a disease process and its detection or clinical appearance.

Lean body mass

The mass of those parts of the body that are not **adipose tissue**. Lean body mass includes some **lipid** and is not synonymous with **fat-free mass**.

Lesion

A general term for any abnormality of cells or tissues, including those due to cancerous change.

Linoleic acid

An essential n-6 **polyunsaturated fatty acid** (C18:2 n6).

Lipids

Naturally occurring organic molecules that are insoluble in water, including triglycerides; **fatty acids**; phospholipids; lipoproteins; carotenoids; **cholesterol**, which is a **precursor** of **steroid hormones** and vitamin D; and the other fat-soluble vitamins A, E, and K. Lipids are an essential component of cell membranes and many metabolic processes.

Low-density lipoprotein (LDL) cholesterol

A class of lipoproteins that is the major carrier of cholesterol in the blood in humans. A high blood LDL cholesterol concentration is a cause of coronary artery disease.

Low-income countries

Countries with a gross average annual national product of less than an agreed figure per head (in 2006 this was \$US 875). This term is less judgemental and more descriptive than 'economically developing' countries.

Lymphocyte

Several types of white blood cell, part of the immune system, found in the blood and lymph glands.

Macronutrient

Those **nutrient** components of the diet that provide **energy**: carbohydrate, fat, and protein; ethanol also provides energy but is not a nutrient.

Magnetic resonance imaging (MRI)

A technique that produces images of parts of the body using analysis of the behaviour of water molecules within body tissues when placed in a strong magnetic field.

Malignant

A tumour with the capacity to spread to surrounding tissue or to other sites in the body.

Melanoma

Malignant tumour of the skin derived from the pigment-producing cells (melanocytes).

Membrane potential

The difference in electrical charge across the cell membrane.

Menarche

The beginning of menstruation (see boxes 6.1 and 6.2).

MET (see **metabolic equivalent**)**Meta-analysis**

The process of using statistical methods to combine the results of different studies.

Metabolic equivalent (MET)

One MET equals the **resting metabolic rate**, measured as the rate of oxygen consumption, which is approximately 3.5 millilitres of oxygen per kilogram body weight per minute. Equivalent to **physical activity ratio** (see box 5.1).

Metabolic syndrome

A common cluster of a variety of several risk factors for **cardiovascular disease** including **insulin** resistance, abdominal **obesity**, high blood pressure, and abnormal blood **lipids**.

Metastasis

The spread of **malignant** cancer cells to distant locations around the body from the original site.

Micronutrients

Vitamins and **minerals** present in foods and required in the diet for normal body function in small quantities, conventionally of less than 1 g/day (see box 4.2.3).

Migrant study

A study of people who migrate from one country to other countries with different environments and cultural backgrounds. The experience, such as mortality or disease incidence, of the migrant group is compared with that of people in their current country of residence and in their country of origin.

Mineral

An inorganic compound in food required by the body for normal function, such as calcium, magnesium, and iron.

Monosaccharide

Simple sugar consisting of a single sugar molecule, such as glucose, fructose, and galactose. They form the basis of **disaccharides** such as sucrose, and of **oligosaccharides**, starch, and **non-starch polysaccharides**.

MRI (see **magnetic resonance imaging**)**Mucosal**

Relating to mucous membranes.

Mutagens

Chemical compounds or physical agents capable of inducing genetic mutations.

Mycotoxins

Toxins produced by fungi (moulds), especially *Aspergillus flavus* under tropical conditions and *Penicillium* and *Fusarium* species under temperate conditions (see box 4.1.4).

Neoplasm

A benign or **malignant** tumour.

Nested case-control study

A **case-control study** in which cases and controls are drawn from the population of a **cohort study**; often used for studies of prospectively collected information or biological samples.

Neurotransmitter

A chemical secreted by one nerve cell that stimulates a response in a neighbouring nerve cell.

Night blindness

A condition in which a person has impaired vision in the dark, characteristic of vitamin A deficiency.

Nitrate

A salt containing the nitrate ion, which contains nitrogen and oxygen in proportion 1:3 (NO₃). Derived from decomposing organic material such as manure, plants, and human waste, and a component of chemical fertilisers (see box 4.3.2).

Nitrite

A salt containing the nitrite ion, which contains nitrogen and oxygen in proportion 1:2 (NO₂). Sodium nitrite is added to many **processed meats**. Nitrites are also formed in the body from **nitrates** in plant foods that are eaten. When consumed, nitrites can lead to the generation of **N-nitroso compounds**, some of which are known **carcinogens** (see box 4.3.2).

Nitrosamines

A group of chemicals formed by the reaction of **nitrites** with amines; some nitrosamines are **carcinogens** (see box 4.3.2).

N-nitroso compound (see **nitrosamines**)**Non-caloric sweetener**

A food additive that replicates the sweetness of sugar but with negligible food **energy** (see box 4.6.2).

Non-exercise activity thermogenesis (NEAT)

The **energy** used in non-conscious or **spontaneous physical activity**, such as fidgeting and posture maintenance.

Non-milk extrinsic sugars

Sugars not present within the cellular structure of foods, apart from those in milk or milk products. For example those added to foods or in juices, syrups, or honey.

Non-starch polysaccharide

A carbohydrate comprising at least 10 simple sugar molecules; a major component of plant cell walls and the principal analytic fraction characterising **dietary fibre** (see box 4.1.2).

Nucleic acid

The four building blocks of **DNA** – guanine, thymine, cytosine, and adenine.

Nutrient

A substance present in food and required by the body for maintenance of normal structure and function, and for growth and development. Nutrients include **macronutrients** (fat, protein, and carbohydrate), which provide **energy** as well as performing metabolic and structural functions, and **micronutrients** (vitamins and **minerals**), which do not provide energy but are necessary for normal metabolic function.

Obesity

Excess body fat to a degree that increases the risk of various diseases. Conventionally defined as a **BMI** of 30 kg/m² or more. Different cut-off points have been proposed for specific populations.

Odds ratio

A measure of the risk of an outcome such as cancer, associated with an **exposure** of interest, used in **case-control studies**; approximately equivalent to the **relative risk**.

Oligosaccharide

A compound comprising between 2 and 10 simple sugar molecules (**monosaccharides**).

Oncogene

A gene whose protein product contributes to the transformation of normal cells into cancer cells. Oncogenes result from the mutation of normal genes called proto-oncogenes (see box 2.2).

Organic compounds

Any member of a large class of chemical compounds whose molecules contain carbon (and other elements), with exception of carbides, carbonates, and carbon oxides. Most occur naturally only in the bodies and products of living organisms.

Organic farming

Agricultural production system without or with only limited use of pesticides, synthetic fertilisers, growth regulators, and livestock feed additives (see box 4.9.2).

Osteomalacia

A disease due to vitamin D deficiency characterised by inadequate bone mineralisation, pain, and increased bone fragility.

Osteoporosis

Loss of the tissues of bone (bone cells, mineral, and protein) to an extent that increases the risk of fracture.

Oxidative damage

Damage to cells or structures in cells caused by oxidation, either by chemicals or by radiation. Some oxidants are generated in the normal course of metabolism. Oxidation of **DNA** is one cause of mutation.

p53

A protein central to regulation of cell growth. Mutations of the p53 gene are important causes of cancer (see **oncogene** and box 2.2).

Pasteurisation

Partial **sterilisation** of foods at a temperature that destroys microorganisms such as bacteria, viruses, moulds, yeast, and protozoa without major changes in the chemistry of the food.

Pathogenesis

The origin and development of disease. The mechanisms by which causal factors increase the risk of disease.

Pedometer

An instrument that records the number of steps taken.

Peer review

The scrutiny of scientific papers by one or more suitably qualified scientists.

Pentosan

A **polysaccharide** composed of pentose sugars (with a ring comprising 5 carbon atoms), for example arabans or xylans.

Phenotype

The characteristics displayed by an organism; this depends on both the **genotype** and environmental factors.

Phosphorylation

Addition of phosphate groups to hydroxyl groups on proteins, catalysed by a protein kinase with **ATP** as phosphate donor. A key process in **cell signalling** and **energy** transfer.

Physical activity

Any movement using skeletal muscles.

Physical activity level (PAL)

Energy expenditure per day as a multiple of **basal metabolic rate** (BMR) (see box 5.2).

Physical activity ratio (PAR)

The **energy** cost of an activity per minute divided by the energy cost of **basal metabolic rate** per minute. Thus, the energy cost of sitting at rest is about 1.2; for walking at a normal pace, 4; and for jogging, 7.

Phytochemicals

Compounds found in plants not required for normal structure or function, which may modify physiological functions and influence health (see box 4.2.1).

Point estimate

An estimate that is reported as a single value. The precision of a point estimate is indicated by the width of the **confidence interval** that surrounds it.

Point mutation

Mutation of a single **DNA** base in a gene often leading to a single peptide change in a protein, which can influence its function.

Polycyclic aromatic hydrocarbons

A family of chemical compounds, including several known **carcinogens**, formed by incomplete combustion of organic substances such as wood, coal, diesel, fat, or tobacco (see box 4.3.4).

Polymorphisms

Common variations (more than 1 per cent of the population) in the **DNA** sequence of a gene.

Polyphenol

Any of a group of chemical substances found in plants that have more than one phenol group per molecule; includes tannins, lignins, and flavonoids.

Polysaccharide

A polymer composed of multiple subunits of **monosaccharides** (simple sugars) linked together.

Polyunsaturated fatty acids

Fatty acids containing two or more **double bonds**.

Pooled analysis (see pooling)**Pooling**

In epidemiology, a type of study where original individual-level data from two or more original studies are obtained, combined, and re-analysed.

Positive energy balance (see energy balance)**Prebiotic**

Dietary carbohydrate that reaches the colon, where it promotes growth of beneficial bacterial flora (see box 4.10.2).

Precursor

A chemical compound from which another compound is formed.

Processed meat

Meat (usually **red meat**) preserved by **smoking, curing**, or salting, or by the addition of preservatives. Definitions vary between countries and studies as to what precisely is included (see box 4.3.1).

Programming

The process whereby events happening during fetal life (fetal programming), such as growth restriction, or in infancy can permanently affect the structure and function of particular organs, and so also metabolic processes. Combined with other factors, this can in turn alter the response to environmental **exposures** and so susceptibility to disease.

Promoter region

The region of **DNA** in a gene which initiates the **transcription** of DNA to **RNA** when the **enzyme** RNA polymerase binds to it.

Prostaglandins

A range of **hormones** derived from essential **fatty acids**. Among many other processes, they influence blood pressure and **inflammation**.

Publication bias

A **bias** in the overall balance of **evidence** in the published literature due to selective publication. Not all studies carried out are published, and those that are may differ from those that are not. Publication bias can be tested for with either **Begg's** or **Egger's tests**.

Randomised controlled trial (RCT)

A study in which a comparison is made between one intervention (often a treatment or prevention strategy) and another (control). Sometimes the control group receives an inactive agent (a placebo). Groups are randomised to one intervention or the other, so that any difference in outcome between the two groups can be ascribed with confidence to the intervention. Neither investigators nor subjects usually know to which condition they have been randomised; this is called 'double-blinding' (see box 3.4).

RCT (see randomised controlled trial)**Reactive oxygen species**

Oxygen-containing radical or reactive ion that oxidises DNA (removes electrons); can be hydroxyl radical (OH⁻), hydrogen peroxide (H₂O₂) or superoxide radical (O₂⁻).

Red meat

Meat from domesticated cattle, pigs, sheep, and goats; not poultry and fish or meat from wild animals.

Refined sugars

Sugars obtained by purification from plants which contain it, principally sugar cane or beet.

Relative risk (RR)

The ratio of the rate of disease or death among people exposed to a factor, compared to the rate among the unexposed, usually used in **cohort studies** (see **odds ratio**).

Resting metabolic rate

Metabolic rate in a fasting subject sitting quietly (also see **basal metabolic rate**).

Reverse causation

The situation when an abnormal level of an **exposure** is caused by the cancer or its treatment, rather than the other way round. For example if cancer causes weight loss, then the finding that low **BMI** is associated with increased risk may reflect weight loss due to cancer rather than low weight causing cancer.

Ribonucleic acid (RNA)

The molecule created by RNA polymerase from **DNA (transcription)** which carries the genetic message to ribosomes (**translation**), where proteins are made.

Rickets

Malformation of the bones in growing children due to deficiency of vitamin D. In adults the equivalent is **osteomalacia**.

RNA (see ribonucleic acid)**Salt iodisation**

The practice of **fortifying** salt with iodide as a means of ensuring adequate iodine intake.

Satiation

The development of fullness during eating that limits the size of a meal consumed (see **satiety**).

Satiety

The suppression of appetite after eating that inhibits the starting of eating (see **satiation**).

Saturated fatty acids

Fatty acids that do not contain any **double bonds**.

Selection bias

Bias arising from the procedures used to select study participants and from factors influencing participation.

Single bond

A covalent bond between two carbon atoms, each with two hydrogen atoms, for instance in **saturated fatty acids**.

Single nucleotide polymorphism (SNP)

DNA sequence variation where a single nucleotide in the DNA is altered. SNPs account for 90% of all human genetic variation (see **polymorphism** and **point mutation**).

SLR (see systematic literature review)

Smoking (foods)

Smoking is the process of **curing**, cooking, or seasoning food by exposing it for long periods of time to the smoke from a wood fire. 'Hot smoking' is a process that can be used to fully cook raw meats or fish, while 'cold smoking' is an hours- or days-long process that is generally used to preserve or flavour foods (usually meats or fish, but sometimes cheeses, vegetables, fruits).

SNP (see single nucleotide polymorphism)**Socioeconomic status**

A combined product of social and economic status reflecting education level, personal wealth, class, and associated factors.

Solvent

Substances (usually liquid) capable of dissolving or dispersing one or more other substances.

Spontaneous physical activity (see non-exercise activity thermogenesis)**Squamous cell carcinoma**

A **malignant** cancer derived from squamous **epithelial** cells.

Stabiliser

One of a number of food additives, such as agar or pectin (used in jam, for example), that give foods a firmer texture. While they are not true **emulsifiers**, they help to stabilise emulsions.

Statistical significance

The probability that any observed result might not have occurred by chance. In most epidemiologic work, a study result whose probability is less than 5% ($p < 0.05$) is considered sufficiently unlikely to have occurred by chance to justify the designation 'statistically significant' (see **confidence interval**).

Stem cell

A cell that can self-renew or give rise to a lineage of more differentiated cells.

Sterilisation

The destruction of bacteria or other microorganisms by heat, radiation, or chemical means.

Steroid hormone

One of several **hormones** derived from **cholesterol** and having a central effect on growth and metabolism.

Supplement (see dietary supplement)**Systematic literature review (SLR)**

A means of compiling and assessing published **evidence** that addresses a scientific question with a predefined protocol and transparent methods (see box 3.5).

Testosterone

An androgenic **steroid hormone** and the principal male sex **hormone**.

Thermodynamics

The branch of physics concerned with the study of energy and its conversion between different forms.

Thermogenesis

The process of heat production. In adults, arising from the metabolic processes during the digestion and assimilation of food and during shivering.

Tocotrienol

A form of vitamin E.

Total energy expenditure

The **energy** expended in a 24-hour period by an individual or a group of individuals. It reflects the average amount of energy spent in a typical day, but may not be the exact amount of energy spent each and every day.

Transcription

Synthesis of **RNA** from **DNA** by the **enzyme** RNA polymerase.

Transition cultures

Countries in the process of changing from one predominant social/cultural structure to another, for instance moving from lower-income to higher-income status with the accompanying changes that this implies.

Translation

The process by which **RNA** carries the genetic message from **DNA** to generate proteins in the ribosome.

Tumour suppressor gene

A gene whose protein product inhibits tumour formation (see also **oncogene** and box 2.2).

UICC

International Union Against Cancer (www.uicc.org).

Ulcerative colitis

A disease causing chronic **inflammation** of the large intestine (colon). Together with another disease of inflammation of the intestines called Crohn's disease, referred to as **inflammatory bowel disease**.

Underwater weighing

A method for estimating the proportions of body fat and lean mass. By comparing weight underwater with weight on land, and taking account of the different densities of fat and lean tissue, the proportions of fat and lean can be calculated.

UVA/UVB

Ultraviolet light of different wavelengths. UVA has relatively long wave lengths, UVB relatively short.

Visceral fat (see intra-abdominal fat)**Waist to hip circumference ratio (WHR)**

A measure of body shape indicating fat distribution.

Weight cycling

Repeated abnormal losses and regains of weight, often the result of repeated diet regimes.

Whitemore and Jewett scales

A scale used to describe the stage of prostate cancer.

WHO

World Health Organization (www.who.int).

Wholegrain

Cereal grain that retains the bran and germ as well as the endosperm, in contrast to refined grains that retain only the endosperm. All components of the grain are retained in their usual proportions, though the term 'wholegrain' may apply to products that include other constituents, so that the complete product comprises less than 100% wholegrain (see box 4.1.1).

WHR (see waist to hip circumference ratio)