STUDY MATERIAL FOR B.Sc MICROBIOLOGY

NUTRITION AND HEALTH HYGIENE

SEMESTER – II

ACADEMIC YEAR 2024-25

PREPARED BY

MICROBIOLOGY DEPARTMENT

INDEX

NUTRITION AND HEALTH HYGIENE

Unit I

Nutrition – definition, importance, Good nutrition, and mal nutrition; Balanced Diet: Basics of Meal Planning. Carbohydrates, Lipids, Proteins and Vitamins –functions, dietary sources, effects of deficiency. Macro and micro minerals –functions, effects of deficiency; food sources of Calcium, Potassium, and Sodium; food sources of Iron, Iodine, and Zinc. Importance of water– functions, sources, requirements and effects of deficiency

Unit II

Nutrition for Life Cycle: Balanced diet - Normal, Pregnant, lactating women, Infancy, young children Adolescents, Adults, and the Elderly; Diet Chart; Nutritive value of Indian foods.

Unit III

Improper diets: Definition, Identification, Signs and Symptoms - malnutrition, under-nutrition, over-nutrition, Protein Energy Malnutrition, obesity; Nutritional Disease and Disorder - hypertension, diabetes, anemia, osteomalacia, cardiovascular disease.

Unit IV

Health - Determinants of health, Key Health Indicators, Environment health & Public health; Health-Education: Principles and Strategies. Health Policy & Health Organizations: Health Indicators and National Health Policy of Govt. of India; Functioning of various nutrition and health organizations in India.

Unit V

Hygiene – Definition; Personal, Community, Medical and Culinary hygiene; WASH (Water, Sanitation and Hygiene) programme. Rural Community Health: Village health sanitation & Nutritional committee. Community & Personal Hygiene: Environmental Sanitation and Sanitation in Public places.

Unit I

Nutrition

Nutrition is a critical part of health and development. Better nutrition is related to improved infant, child and maternal health, stronger immune systems, safer pregnancy and childbirth, lower risk of non-communicable diseases (such as diabetes and cardiovascular disease), and longevity. Healthy children learn better. People with adequate nutrition are more productive and can create opportunities to gradually break the cycles of poverty and hunger. Malnutrition, in every form, presents significant threats to human health. Today the world faces a double burden of malnutrition that includes both under nutrition and overweight, especially in low- and middle-income countries. There are multiple forms of malnutrition, including under nutrition (wasting or stunting), inadequate vitamins or minerals, overweight, obesity, and resulting diet-related noncommunicable diseases. The developmental, economic, social, and medical impacts of the global burden of malnutrition are serious and lasting for individuals and their families, for communities and for countries.

Balanced Diet – Nutrients and Deficiency Diseases

A diet which comprises adequate amounts of necessary nutrients required for the healthy growth and development of our body. A balanced diet includes both sufficient and nutritious food to ensure good health.

A normal balanced diet contains a sufficient amount of fibre and the other nutrients provide the appropriate amount of energy and adequate amounts of water.

Importance and Objectives of Maintaining a Balanced Diet

A balanced diet covers different food types in the right amounts to stay healthy. It is essential for a healthy body and a healthy mind. Just eating a single food would not provide all essential nutrients. As per the nutritionist's advice, a normal balanced diet is essential for maintaining good health and sensible body weight. Improper diet results in poor development of a body with malnourishment and overeatingleads to weight, diabetes, obesity and other diet-related diseases.

The main objectives of the balanced diet include:

- For a healthy weight and energy balance.
- To provide essential nutrients required for proper functioning and maintenance of cells, tissues, and organs of our body.

- Limited consumption of saturated fats, processed foods, junk foods, simple sugar, iodized salt, sodium, etc.
- Include a high amount of fruits, vegetables, legumes, nuts and whole grains.
- To avoid malnourishment and other nutritional deficiency diseases.

According to the Department of Nutrition and Food Science, nutrients are divided into two groups:

- **Micronutrients** – Carbohydrates, fats, and proteins are classified as micronutrients
- **Macronutrients** –Vitamins (A, B, C, D, E, and K) Water and other minerals – calcium, phosphorus, magnesium, selenium, zinc, etc. are classified as macronutrients.

Both nutrients are important for the overall good health. An imbalanced diet may either lead to the excess or inadequate intake of a nutrient. Insufficient intake of a particular nutrient leads to certain deficiency diseases.

Let's have a glance at each nutrient in detail.

Carbohydrates

Carbohydrates are a vital source of nutrients which provide energy for our body. Glucose/blood sugar produced by converting carbohydrates is utilized as a source of energy for the cells, tissues, and tissues organs.

- Sources of carbohydrates: cereal, grains, potatoes, processed cheese, corn, beans, lentils, peanuts, peas, whole-grain bread, pasta, milk, refined sugars like candy, and carbonated beverages like soda, syrups, and other dairy products.
- The function of carbohydrates: The main function of carbohydrates is to deliver energy and is also involved in fat metabolism and the breakdown of proteins for energy.
- Deficiency diseases of carbohydrates: This results in hypoglycemia, ketosis, tiredness, decreased energy levels, unhealthy weight loss, low sodium level, etc.

Fats

Fats are considered as the most concentrated source of energy. Fats belong to a group of elements called lipids. There are two types of fats – saturated fats (bad fats) and unsaturated fats (good fats).

- Sources of fats: Almonds, ghee, red meat, fish, cheese, butter, walnuts, cream, oils including coconut, rice bran, mustard soya bean and ground nut

- The function of fats: They are mainly involved in the transportation of vitamins and also they act as insulators by protecting vital organs like the heart, liver, kidney, etc.

- Deficiency diseases of fats: There are no such deficiency diseases other than skin and nervous disorders.

Proteins

They are the building blocks of our body as they provide metabolism and strength to our body. Proteins are large biomolecules involved in functioning and regulating our body cells, tissues and organs. They are made of smaller units of amino acids.

- Sources of proteins: almonds, eggs, chicken, fish, seafood, beans, soya, pulses, cottage cheese, yoghurt, broccoli, milk and other dairy products.

- The function of proteins: Proteins are the major source of energy which is mainly used for body movements. They are mainly involved in producing enzymes, hormones, creating DNA molecules and other metabolic chemicals. Proteins also play a key role in boosting our immunity, building muscles, cell communication, digestion and production of Keratin (required for hairs and nails).

- Deficiency diseases of proteins: This results in kwashiorkor, weight loss, marasmus, etc.

Vitamins

Vitamins are organic compounds which help in performing the biological functions of a living organism. It is a vital nutrient that should be included in our daily diet in a required quantity. Vitamins are categorized into two types based on their solubility.

Fat-soluble (A, D, E, and K) and Water soluble Vitamin (C and B)

- Sources of vitamins: milk, cheese, egg, liver, red meat, poultry, fish oils, green leafy vegetables, dark-coloured fruits and vegetables, vegetable oils, cereals and pulses, peanuts, lentils and other legumes.

- The function of vitamins: Vitamins are very much essential for maintaining proper vision, growth, a healthy immune system, and healthy skin, bones, teeth, and gum. It is also involved in the proper functioning of nerve cells and in the production and synthesis of both erythrocytes (RBC) and leukocytes (WBC).

- Deficiency diseases of vitamins: They are mainly related to problems with eyes (vision), teeth, gums, skin, and growth. Other deficiency diseases include scurvy, Rickets, Beriberi, etc.

Calcium

Calcium is the most abundantly found mineral in our body when compared to other minerals. It is an essential nutrient which is necessary for the development and maintenance of strong bones and teeth. It also helps in the normal functioning of the heart, nerves, muscles, and other body systems. Calcium's role in bone formation takes place in a process called "bone mineralization". The formation of bones is by the combination of the mineral complex – calcium phosphate, which provides more strength, structure, and density to the bones.

- Sources of Calcium: milk, yoghurt, cheese, green leafy vegetables, baked beans, soy milk, broccoli, cabbage, sapodilla, onions, sprouts, gooseberries, oranges, egg yolk, dried fish, etc.

- The function of Calcium: Calcium is the major and essential mineral for the growth of bones and teeth, for the regulation of enzyme activity and the formation of cell membranes. It is also involved in nerve conduction, muscle contraction, and exocytosis.

- Deficiency diseases of Calcium: The deficiency of calcium is mainly related to problems with blood circulation and other diseases like osteoporosis, dry skin, hypertension, cardiovascular disease, colon cancer, kidney stones, tooth decay, allergies, etc.

Mineral Nutrition:

Mineral nutrition is also known as natural nutrients. Minerals are the essential nutrients that allow the body to grow and survive. Minerals perform several vital functions that are very important for the body. For example, your body needs minerals to build strong bones and teeth and turn food into energy. Like vitamins, a healthy diet should also provide all the minerals your body requires to function properly. The body uses minerals for many things—from building strong bones to sending messages through the nervous system. Some minerals are used to make hormones or to maintain a regular heartbeat.

Classification of Minerals:

Based on biological roles:

According to their biological roles, mineral elements are classified as essential elements with a known biological role and non-essential elements with unknown functions and toxic substances. Sodium, potassium, phosphorus, iron, calcium, zinc, selenium, magnesium, copper, tin, cobalt,

manganese, fluorine, etc., are examples of essential nutrients. On the other hand, boron, aluminium, mercury, lead, and cadmium are non-essential elements. Of these, boron and aluminium are non-nutritive and non-toxic, whereas the rest are non-nutritive, toxic elements.

Based on the amount required for the human body:

Minerals are classified as Principal elements and Trace elements. Principal elements are also known as Macro minerals/Macronutrients, and Trace elements are Micro minerals/Micronutrients.

Macronutrients:

Macronutrients constitute about 60: 80% of the body's inorganic material. These are Magnesium, Phosphorous, Potassium, Calcium, Sodium, Chloride and Sulphur.

These are required in amounts greater than 100mg/day.

Calcium: Major constituent of bones and teeth. It helps in muscle contraction. It also ensures that your blood clots normally, which is important for healing. Primary sources are milk and milk products, leafy vegetables and beans.

Phosphorous: Major constituent of bones and teeth. It is used to form high-energy phosphates, nucleic acids, nucleotides, etc. Primary sources are milk, cereals and leafy vegetables.

Magnesium: Major constituent of bones and teeth. This is used as a cofactor for enzymes. Primary sources are cereals, vegetables, fruits and milk.

Sodium: Helps in muscle functions and acid-base balance. Primary sources are table salt and salt-added foods.

Potassium: Chief cation of intracellular fluids and muscle functions. Potassium helps the body maintain the balance of fluids and keeps your heart healthy and functioning correctly. Primary sources are fruits, nuts and vegetables.

Chlorine: Helps in regulation of acid-base balance and formation of HCL. The primary source is table salt.

Sulphur: It is a constituent of amino acids and other components. Its primary source is sulfur-containing amino acids.

Micronutrients:

Micronutrients are required in amounts of less than 100mg/day. Microminerals occur in living tissues in minute quantities. These are subdivided into three categories:

1. Essential trace elements: Copper, Iron, Manganese, Iodine, Molybdenum, Zinc, Cobalt, Selenium, Fluorine and Chromium.
2. Possibly essential trace elements: Vanadium, Nickel, Barium and Cadmium.
3. Non-essential trace elements: Lead, Aluminium, Boron, Silver, Mercury, Bismuth, etc.

Iron: It is the constituent of haem and is involved in O2 transport and biological oxidation. If you don't have enough iron in your diet, you're at risk of developing iron-deficiency anaemia. Primary sources are organ meat, leafy vegetables, iron cookware, etc.

Copper: It is the main constituent of enzymes and helps in iron transport. Primary sources: Organ meat cereals, leafy vegetables.

Iodine: Helps your body make the thyroid hormones that keep your cells and metabolic rate healthy. It is the principal constituent of thyroxine. Primary sources are iodized salt and seafood.

Manganese: It is the cofactor for enzymes. Primary sources are cereals, leafy vegetables, etc.

Zinc: It is the major cofactor for enzymes. Primary sources are meat, fish, milk.

Molybdenum: It is a significant constituent of enzymes. Primary sources are vegetables.

Cobalt: It is the principal constituent of Vitamin B12. Primary sources are foods of animal origin.

Fluorine: It helps in the proper formation of bones and teeth. The primary source is drinking water.

Selenium: It is involved in antioxidant function and is a good source of vitamin E. Primary sources are organ meats and seafood.

Chromium: It promotes insulin function. Primary sources are Brewer's yeast, meat, whole grains, etc.

Role of minerals:

Mineral salts are responsible for structural functions (including skeletal and soft tissue functions) and regulatory functions (including neuromuscular transfer, blood clotting, oxygen transport and enzymatic activity).

Calcium:

Calcium is the most abundant mineral in the human body, making up 1.5 to 2% of total body weight. About 1,200 g of calcium is present in the adult body; more than 99% is found in the bones. All living things have powerful ways of conserving calcium and maintaining the concentration of cells and outer cells. These activities are vital to a person's survival. When he is severely deficient or abnormally calcium deficient in the body, he can break bones to prevent even the slightest level of hypocalcaemia. People need more calcium in their diet when they make bones, when the absorption of calcium in the gut is impaired and when excess calcium is lost in the environment.

Phosphorous:

Phosphorus and calcium are essential in the bone count, i.e., 85% of body phosphorus is found in the skeleton. The rest of the body's phosphorus is needed in the soft tissues as a cofactor in many enzymes involved in digestion carbohydrates, lipids, and proteins. In the form of high-energy phosphate compounds, phosphorus affects metabolic potential. Phosphate ions also play an important role in acid/base balance.

Magnesium:

Across magnesium, 60 to 65% is found in the bones and 27% is found in the muscles. Magnesium is second only to potassium as the most prominent interaction between cells and is essential for many enzymes' functions and neuromuscular transmission.

Some other roles of minerals are:

- Maintenance of osmotic pressure
- Bone and tooth health
- Energy production
- Nerve and muscle function
- Immune health

Mineral Deficiency:

One major cause of mineral deficiency is not getting enough essential minerals from food or supplements. There are different types of diets that might result in this deficiency. For example, a poor diet that relies on junk food or a diet that lacks adequate fruits and vegetables can be possible causes. Alternatively, a very low-calorie diet may produce this deficiency. This includes

people in weight-loss programs or with eating disorders. Older adults with poor appetite may also not get enough calories or nutrients in their diet. There are five main categories of mineral deficiency: calcium, iron, magnesium, potassium, and zinc.

1. **Calcium deficiency:** cramping of the muscles, numbness, tingling in the fingers, fatigue, poor appetite, irregular heart rhythms

2. **Iron deficiency:** The symptoms of iron deficiency anaemia include feeling weak and tired. Iron deficiency develops slowly and can cause anaemia.

3. **Magnesium deficiency:** Numbness, tingling, muscle cramps, seizures, abnormal rhythms of the heart

4. **Potassium deficiency:** Symptoms of potassium deficiency include weakness, muscle cramping, bloating, constipation, or abdominal pain caused by paralysis of the intestines.

5. **Zinc deficiency:** Zinc deficiency can cause loss of appetite, taste, or smell. Decreased function of the immune system and slowed growth are other symptoms.

Conclusion:

Given the importance of these mineral elements in the diet of humans, animals, and plants and their metabolic interrelationship, it is important to keep up-to-date with information about mineral content in processed foods, cereals, grains, fruits, and vegetables.

Deficiency diseases:

Deficiency diseases are caused due to insufficient quantity of one or more nutrients in the body. This deficiency leads to weakness and vulnerability to infection in a person. The different deficiencies are as follow:-

Proteins, carbohydrates, and fats deficiency:

1. Protein-energy malnutrition (PEM) is caused by a deficiency of proteins, carbohydrates, and fats.

2. The age group which is at most risk due to this kind of deficiency belongs to the 1-5 years old age group.

3. The commonly seen characters in those children are retarded growth of height and weight.

4. Kwashiorkor and marasmus are some of the common types of diseases caused due to protein-energy malnutrition.

5. Kwashiorkor is a deficiency disease caused due to the lack of proteins in the diet of children during the infant stage and early childhood. The commonly observed symptoms are swollen feet, lean legs, protruding abdomen, hair loss, stunted growth, diarrhea, and slow mental development.

6. Marasmus develops in children less than one-year-old due to the deficiency of proteins and carbohydrates in the diet. This disease is characterized by wrinkling dried skin, protruding ribs, and mental retardation.

Vitamin deficiency:

1. Vitamins are nutrients required for the proper functioning of the body. Deficiency of vitamins leads to impairment of fighting capabilities against diseases, weakness in the body, and lethargy.

2. Deficiency of vitamin A in the diet causes night blindness.

3. Deficiency of vitamin B1 in the diet causes beriberi.

4. Deficiency of vitamins B12 in the diet causes anemia.

5. Deficiency of vitamin C in the diet causes scurvy.

6. Deficiency of vitamin D in the diet causes rickets.

7. Deficiency of vitamin E in the diet.

8. Deficiency of vitamin K in the diet leads to excessive bleeding.

Minerals deficiency:

1. Minerals promote the growth and development of the body.
2. Deficiency of calcium in a balanced diet leads to rickets in children. It causes the bone and tooth decay.
3. Deficiency of sodium and potassium in daily diet can ultimately lead to body muscle weakness and paralysis.
4. Deficiency of phosphorus leads to bone and teeth diseases.
5. Iron deficiency in the diet causes anemia.
6. Deficiency of iodine in the diet can lead to goiter.
7. Deficiency of fluorine leads to dental decay.

Unit - II

Consuming a healthy diet throughout the life-course helps to prevent malnutrition in all its forms as well as a range of noncommunicable diseases (NCDs) and conditions. However, increased production of processed foods, rapid urbanization and changing lifestyles have led to a shift in dietary patterns. People are now consuming more foods high in energy, fats, free sugars and salt/sodium, and many people do not eat enough fruit, vegetables and other dietary fibre such as whole grains.

The exact make-up of a diversified, balanced and healthy diet will vary depending on individual characteristics (e.g. age, gender, lifestyle and degree of physical activity), cultural context, locally available foods and dietary customs. However, the basic principles of what constitutes a healthy diet remain the same.

For adults

A healthy diet includes the following:

- Fruit, vegetables, legumes (e.g. lentils and beans), nuts and whole grains (e.g. unprocessed maize, millet, oats, wheat and brown rice).
- At least 400 g (i.e. five portions) of fruit and vegetables per day (2), excluding potatoes, sweet potatoes, cassava and other starchy roots.
- Less than 10% of total energy intake from free sugars (2, 7), which is equivalent to 50 g (or about 12 level teaspoons) for a person of healthy body weight consuming about 2000 calories per day, but ideally is less than 5% of total energy intake for additional health benefits (7). Free sugars are all sugars added to foods or drinks by the manufacturer, cook or consumer, as well as sugars naturally present in honey, syrups, fruit juices and fruit juice concentrates.
- Less than 30% of total energy intake from fats (1, 2, 3). Unsaturated fats (found in fish, avocado and nuts, and in sunflower, soybean, canola and olive oils) are preferable to saturated fats (found in fatty meat, butter, palm and coconut oil, cream, cheese, ghee and lard) and trans-fats of all kinds, including both industrially-produced trans-fats (found in baked and fried foods, and pre-packaged snacks and foods, such as frozen pizza, pies, cookies, biscuits, wafers, and cooking oils and spreads) and ruminant trans-fats (found in meat and dairy foods from ruminant animals, such as cows, sheep, goats and camels). It is suggested that the intake of saturated fats be reduced to less than 10% of total energy intake and trans-fats to less than 1% of total energy intake (5). In particular, industrially-produced trans-fats are not part of a healthy diet and should be avoided (4, 6).

- Less than 5 g of salt (equivalent to about one teaspoon) per day (8). Salt should be iodized.

For infants and young children

In the first 2 years of a child's life, optimal nutrition fosters healthy growth and improves cognitive development. It also reduces the risk of becoming overweight or obese and developing NCDs later in life.

Advice on a healthy diet for infants and children is similar to that for adults, but the following elements are also important:

- Infants should be breastfed exclusively during the first 6 months of life.
- Infants should be breastfed continuously until 2 years of age and beyond.
- From 6 months of age, breast milk should be complemented with a variety of adequate, safe and nutrient-dense foods. Salt and sugars should not be added to complementary foods.

Practical advice on maintaining a healthy diet

Fruit and vegetables

Eating at least 400 g, or five portions, of fruit and vegetables per day reduces the risk of NCDs (2) and helps to ensure an adequate daily intake of dietary fibre.

Fruit and vegetable intake can be improved by:

- Always including vegetables in meals;
- Eating fresh fruit and raw vegetables as snacks;
- Eating fresh fruit and vegetables that are in season; and
- Eating a variety of fruit and vegetables.

Fats

Reducing the amount of total fat intake to less than 30% of total energy intake helps to prevent unhealthy weight gain in the adult population (1, 2, 3). Also, the risk of developing NCDs is lowered by:

- Reducing saturated fats to less than 10% of total energy intake;

- Reducing trans-fats to less than 1% of total energy intake; and
- Replacing both saturated fats and trans-fats with unsaturated fats (2, 3) – in particular, with polyunsaturated fats.

Fat intake, especially saturated fat and industrially-produced trans-fat intake, can be reduced by:

- Steaming or boiling instead of frying when cooking;
- Replacing butter, lard and ghee with oils rich in polyunsaturated fats, such as soybean, canola (rapeseed), corn, safflower and sunflower oils;
- Eating reduced-fat dairy foods and lean meats, or trimming visible fat from meat; and
- Limiting the consumption of baked and fried foods, and pre-packaged snacks and foods (e.g. doughnuts, cakes, pies, cookies, biscuits and wafers) that contain industrially-produced trans-fats.

Salt, sodium and potassium

Most people consume too much sodium through salt (corresponding to consuming an average of 9–12 g of salt per day) and not enough potassium (less than 3.5 g). High sodium intake and insufficient potassium intake contribute to high blood pressure, which in turn increases the risk of heart disease and stroke (8, 11).

Reducing salt intake to the recommended level of less than 5 g per day could prevent 1.7 million deaths each year (12).

People are often unaware of the amount of salt they consume. In many countries, most salt comes from processed foods (e.g. ready meals; processed meats such as bacon, ham and salami; cheese; and salty snacks) or from foods consumed frequently in large amounts (e.g. bread). Salt is also added to foods during cooking (e.g. bouillon, stock cubes, soy sauce and fish sauce) or at the point of consumption (e.g. table salt).

Salt intake can be reduced by:

- Limiting the amount of salt and high-sodium condiments (e.g. soy sauce, fish sauce and bouillon) when cooking and preparing foods;
- Not having salt or high-sodium sauces on the table;
- Limiting the consumption of salty snacks; and
- Choosing products with lower sodium content.

Some food manufacturers are reformulating recipes to reduce the sodium content of their products, and people should be encouraged to check nutrition labels to see how much sodium is in a product before purchasing or consuming it.

Potassium can mitigate the negative effects of elevated sodium consumption on blood pressure. Intake of potassium can be increased by consuming fresh fruit and vegetables.

Sugars

In both adults and children, the intake of free sugars should be reduced to less than 10% of total energy intake (2, 7). A reduction to less than 5% of total energy intake would provide additional health benefits (7).

Consuming free sugars increases the risk of dental caries (tooth decay). Excess calories from foods and drinks high in free sugars also contribute to unhealthy weight gain, which can lead to overweight and obesity. Recent evidence also shows that free sugars influence blood pressure and serum lipids, and suggests that a reduction in free sugars intake reduces risk factors for cardiovascular diseases (13).

Sugars intake can be reduced by:

- Limiting the consumption of foods and drinks containing high amounts of sugars, such as sugary snacks, candies and sugar-sweetened beverages (i.e. all types of beverages containing free sugars – these include carbonated or non-carbonated soft drinks, fruit or vegetable juices and drinks, liquid and powder concentrates, flavoured water, energy and sports drinks, ready-to-drink tea, ready-to-drink coffee and flavoured milk drinks); and
- Eating fresh fruit and raw vegetables as snacks instead of sugary snacks.

How to promote healthy diets

Diet evolves over time, being influenced by many social and economic factors that interact in a complex manner to shape individual dietary patterns. These factors include income, food prices (which will affect the availability and affordability of healthy foods), individual preferences and beliefs, cultural traditions, and geographical and environmental aspects (including climate change). Therefore, promoting a healthy food environment – including food systems that promote a diversified, balanced and healthy diet – requires the involvement of multiple sectors and stakeholders, including government, and the public and private sectors.

Governments have a central role in creating a healthy food environment that enables people to adopt and maintain healthy dietary practices. Effective actions by policy-makers to create a healthy food environment include the following:

Creating coherence in national policies and investment plans – including trade, food and agricultural policies – to promote a healthy diet and protect public health through:

- increasing incentives for producers and retailers to grow, use and sell fresh fruit and vegetables;
- Reducing incentives for the food industry to continue or increase production of processed foods containing high levels of saturated fats, trans-fats, free sugars and salt/sodium;
- Encouraging reformulation of food products to reduce the contents of saturated fats, trans-fats, free sugars and salt/sodium, with the goal of eliminating industrially-produced trans-fats;
- Implementing the WHO recommendations on the marketing of foods and non-alcoholic beverages to children;
- Establishing standards to foster healthy dietary practices through ensuring the availability of healthy, nutritious, safe and affordable foods in pre-schools, schools, other public institutions and the workplace;
- Exploring regulatory and voluntary instruments (e.g. marketing regulations and nutrition labelling policies), and economic incentives or disincentives (e.g. taxation and subsidies) to promote a healthy diet; and
- Encouraging transnational, national and local food services and catering outlets to improve the nutritional quality of their foods – ensuring the availability and affordability of healthy choices – and review portion sizes and pricing.
- Encouraging consumer demand for healthy foods and meals through:
- Promoting consumer awareness of a healthy diet;
- Developing school policies and programmes that encourage children to adopt and maintain a healthy diet;
- Educating children, adolescents and adults about nutrition and healthy dietary practices;
- Encouraging culinary skills, including in children through schools;
- Supporting point-of-sale information, including through nutrition labelling that ensures accurate, standardized and comprehensible information on nutrient contents in foods (in line with the Codex Alimentarius Commission guidelines), with the addition of front-of-pack labelling to facilitate consumer understanding; and
- Providing nutrition and dietary counselling at primary health-care facilities.

Promoting appropriate infant and young child feeding practices through:

- Implementing the International Code of Marketing of Breast-milk Substitutes and subsequent relevant World Health Assembly resolutions;
- implementing policies and practices to promote protection of working mothers; and
- Promoting, protecting and supporting breastfeeding in health services and the community, including through the Baby-friendly Hospital Initiative.

Pregnancy is a demanding physiological state. In India, it is observed that diets of women from the low socioeconomic groups are essentially similar during prepregnant, pregnant and lactating periods. Consequently, there is widespread maternal malnutrition leading to high prevalence of low birth weight infants and very high maternal mortality. Additional foods are required to improve weight gain in pregnancy (10-12 Kg) and birth weight of infants (about 3 Kg). It is hence important to ensure provision of extra food and healthcare to pregnant and lactating women

Balanced diet for pregnant woman with nutrient content values

Food Composition	Amount (g /day)	Nutrient	Vegetarian diet	Non-vegetarian diet	EAR	RDA
Cereals & Millets	325	Energy (kcal)	2060	2040	2480	-
		Protein (g)	71.7	71.6	54	68
Pulses (Legumes)[1]	90	Visible fat (g)	15	15	30	30
Green leafy vegetables	100	Calcium (mg)	980	970	800	1000
Other Vegetables	200	Iron (mg)	27.2	26.0	21	27
Roots & Tubers (excluding potatoes)	100	Zinc (mg)	13.1	12.8	12.0	14.5
Fruits	150	Magnesium (mg)	786	747	370	440
Milk	400	Vitamin A (µg) *	1821	1818	406	900
Fats & Oils	25	B-carotene (µg)	9634	9597	-	-
Oil seeds& Nuts (gingely seeds & Pea nuts)	40	Thiamine (mg)	1.64	1.60	1.6	2.0
Spices	10	Riboflavin (mg)	1.8	1.84	2.3	2.7
		Niacin (mg)	16.0	16.7	14	16
		Vitamin B_6 (mg)	2.0	2.0	1.9	2.3
		Vitamin C (mg)	210	210	65	80
		Total Folates (µg)	484	447	480	570
		Vitamin B_{12} (µg)	2.0	2.4	2.2	2.5

Note: Total protein from the above diet = 78.8g, Digestible protein = 70g, PDCAAS = 88%
[1]Pulses can be replaced with animal foods (egg, meat, fish and chicken) for non-vegetarians.
* Retinol derived from β carotene from diet was also added to the total Vitamin A.
For cereals and millets, it is recommended to consume 50% as whole grains.

Key points regarding nutrition for pregnant and lactating women

- Pregnancy is physiologically and nutritionally a highly demanding period. Extra food is required to meet the requirements of the foetus.

- A woman prepares herself to meet the nutritional demands by increasing her own body fat deposits during pregnancy.
- A lactating mother requires extra food to secrete adequate quantity/ quality of milk and to safeguard her own health.

Important nutrition tips for pregnant and lactating women

- Eat more food during pregnancy.
- Eat more whole grains, sprouted grams and fermented foods.
- Take milk/meat/eggs in adequate amounts.
- Eat plenty of vegetables and fruits.
- Avoid superstitions and food taboos.
- Do not use alcohol and tobacco. Take medicines only when prescribed.
- Take iron, folate and calcium supplements regularly, after 14-16 weeks of pregnancy and continue the same during lactation.

Nutrients that require special attention during pregnancy and lactation period

The daily diet of a woman should contain an additional 350 calories, proteins - 7.6 g during second trimester and 17.6 g during third trimester of pregnancy. Some micronutrients are specially required in extra amounts during these physiological periods. Folic acid, taken throughout the pregnancy, reduces the risk of congenital malformations and increases the birth weight. The mother as well as the growing foetus needs iron to meet the high demands of erythropoiesis (RBC formation). Calcium is essential, both during pregnancy and lactation, for proper formation of bones and teeth of the offspring, for secretion of breast-milk rich in calcium and to prevent osteoporosis in the mother. Similarly, iodine intake ensures proper mental health of the growing foetus and infant. Vitamin A is required during lactation to improve child survival. Besides these, nutrients like vitamins B 12 and C need to be taken by the lactating mother.

Ways to meet the nutritional demands during pregnancy and lactation

- The pregnant/lactating woman should eat a wide variety of foods to make sure that her own nutritional needs as well as those of her growing foetus are met.
- There is no particular need to modify the usual dietary pattern. However, the quantity and frequency of usage of the different foods should be increased.

- She can derive maximum amount of energy (about 60%) from rice, wheat and millets. Cooking oil is a concentrated source of both energy and polyunsaturated fatty acids.
- Good quality protein is derived from milk, fish, meat, poultry and eggs. However, a proper combination of cereals, pulses and nuts also provides adequate proteins.
- Mineral and vitamin requirements are met by consuming a variety of seasonal vegetables particularly green leafy vegetables, milk and fresh fruits.
- Bioavailability of iron can be improved by using fermented and sprouted grams and foods rich in vitamin C such as citrus fruits.
- Milk is the best source of biologically available calcium.
- Though it is possible to meet the requirements for most of the nutrients through a balanced diet, pregnant/lactating women are advised to take daily supplements of iron, folic acid, vitamin B and calcium.

Additional care required during pregnancy and lactation

Adequate intake of a nutritious diet is reflected in optimal weight gain during pregnancy (10 kg) by the expectant woman. She should choose foods rich in fibre (around 25 g/1000 kcal) like whole grain cereals, pulses and vegetables, to avoid constipation. She should take plenty of fluids including 8-12 glasses of water per day. Salt intake should not be restricted even to prevent pregnancy-induced hypertension and pre-eclampsia. Excess intake of beverages containing caffeine like coffee and tea adversely affect foetal growth and hence, should be avoided.

In addition to satisfying these dietary requisites, a pregnant woman should undergo periodic health check-up for weight gain, blood pressure, anaemia and receive tetanus toxoid immunization. She requires enough physical exercise with adequate rest for 2-3 hrs during the day. Pregnant and lactating women should not indiscriminately take any drugs without medical advice, as some of them could be harmful to the fetus/baby. Smoking and tobacco chewing and consumption of alcohol should be avoided. Wrong food beliefs and taboos should be discouraged. The most important food safety problem is microbial food borne illness and its prevention during pregnancy is one of the important public health measures. Avoiding contaminated foods is important protective measure against food borne illness.

Importance of eating Folate-Rich Foods

- Folic acid is essential for the synthesis of haemoglobin.
- Folic acid deficiency leads to macrocytic anaemia.

- Pregnant women need more of folic acid.
- Folic acid supplements increase birth weight and reduce congenital anomalies.
- Green leafy vegetables, legumes, nuts and liver are good sources of folic acid.
- 500 mg (0.5mg) folic acid supplementation is advised pre-conceptionally and throughout pregnancy for women with history of congenital anomalies (neural tube defects, cleft palate).

Importance of eating Iron-Rich Foods

- Iron is needed for haemoglobin synthesis, mental function and to provide immunity against diseases.
- Deficiency of iron leads to anaemia.
- Iron deficiency is common particularly in women of reproductive age and children.
- Iron deficiency during pregnancy increases maternal mortality and low birth weight infants.
- In children, it increases susceptibility to infection and impairs learning ability.
- Plant foods like green leafy vegetables, legumes and dry fruits contain iron.
- Iron is also obtained through meat, fish and poultry products.
- Iron bio-availability is poor from plant foods but is good from animal foods.
- Vitamin C - rich fruits like gooseberries (Amla), guava and citrus improve iron absorption from plant foods.
- Beverages like tea bind dietary iron and make it unavailable. Hence, they should be avoided before during or soon after a meal.
- Commonly consumed plant based diets provide around 18mg of iron as against recommended intake of 35mg per day. Therefore, supplementation of iron (100 mg elemental iron, 0.5 mg folic acid) is recommended for 100 days during pregnancy from 16th week onwards to meet the demands of pregnancy.

Elderly people diet

The Eat well guide is used to show the different types of foods commonly eaten and the proportions that are recommended to achieve a healthy, balanced diet.

No single food provides all the nutrients you need, so it's important to include a wide variety of foods in the diet.

The Eat well guide is split into five main food groups:

- Fruit and vegetables
- Potatoes, bread, rice, pasta and other starchy foods
- Dairy and alternatives
- Beans, pulses, fish, eggs and other proteins
- Oils and spreads

Further information on the Eat well guide is available at:

- The Eat well guide and resources(external link opens in a new window / tab)

Minerals and vitamins

You should try to make sure you are getting the right amount of certain vitamins. The following minerals and vitamins are important in the later years of life.

Calcium

Osteoporosis is a major health issue for older people, particularly women.

This is where bone density reduces and so the risk of fractures increases.

Good sources of calcium are dairy products such as milk, cheese and yoghurt. Choose lower-fat varieties when you can.

Calcium is also found in canned fish with bones, such as sardines.

Other sources of calcium include green leafy vegetables (such as broccoli, cabbage and spinach), soya beans and tofu.

Iron

You should eat plenty of iron-rich foods to help keep up your body's store of iron.

The best source of iron is red meat. It can also be found in:

- Pulses (such as peas, beans and lentils)
- Oily fish such as sardines
- Eggs
- Bread
- Green vegetables
- Breakfast cereals with added vitamins

Vitamin C

Foods and drinks rich in vitamin C will help the body absorb iron, so you could have some fruit or vegetables or a glass of fruit juice with an iron-rich meal.

Fruit, especially citrus fruit, green vegetables, peppers, tomatoes and potatoes are all good sources of vitamin C.

Vitamin A

Having too much vitamin A (more than 1.5mg of vitamin A every day, from food or supplements) might increase the risk of bone fracture.

Liver is a rich source of vitamin A, so you should avoid eating liver or liver products such as pâté more than once a week, or you could eat smaller portions.

Vitamin D

Vitamin D is an essential vitamin for everyone, to help develop and maintain healthy bones, teeth and muscles.

You get vitamin D from three main sources:

- sunlight
- food
- Vitamin D supplements

During the summer months most people will usually get enough vitamin D from sunlight, so you may choose not to take a supplement over the summer months (late March/ April to the end of September).

If a person is confined indoors for long periods then they will need a daily supplement of ten micrograms of vitamin D because their skin is not exposed to sunlight to make vitamin D.

For older adults, vitamin D with added calcium may be recommended by healthcare staff to protect bone health and guard against osteoporosis.

Potassium

As you get older, your kidneys become less able to remove potassium from your blood.

You should avoid taking potassium supplements unless on medical advice.

Folic acid

Foods containing folic acid help maintain good health in older age.

Good sources are green vegetables and brown rice, as well as bread and breakfast cereals that have vitamins added.

What to drink

It's very important to make sure you're drinking enough.

Your body needs plenty of fluid to work properly, such as helping to stop you getting constipated or confused.

Aim to drink about six to eight glasses of water, or other fluids, every day to stop you getting dehydrated.

When the weather is warm or when you get active, your body is likely to need more than this.

Water and other drinks

How to tell if you're drinking enough

As you get older, your sense of thirst reduces which means you might not always feel thirsty when your body is already dehydrated.

Keep a look out for the following symptoms of dehydration:

- Urine has a dark colour and you don't pass much when you go to the toilet
- Headaches
- Confusion and irritability

- Lack of concentration

As you get older, these signs of dehydration could also be signs of other issues so check with your GP if you're concerned about any symptoms.

Your local doctor (GP)

Healthy weight

Try to keep your weight at a healthy level.

As you grow older, if you're overweight this will affect your mobility, which can affect your health and your quality of life.

Being overweight increases your risk of diseases such as heart disease and diabetes.

Equally, sudden weight loss is not healthy and may be a sign either that you are not eating enough food or that you are not well.

If you are concerned about your weight you should speak to your GP.

Healthy weight

Eating less

As you get older it's natural to start eating less because you will become less physically active and so your body will adapt and adjust your overall food intake.

You may find it difficult to tolerate the meals you used to eat. Try having smaller meals more often and with nutritious snacks in between.

It's important to eat regularly, at least three times a day.

You might not always feel like cooking so you could increase your intake of tinned, chilled and frozen ready-prepared meals.

Always make sure you heat chilled and frozen food until it's steaming hot all the way through.

You might eat less because you're finding it more difficult to buy or prepare food or you're finding it harder to get around if you have conditions such as arthritis.

You may be able to get help with these sorts of problems through your GP.

Cutting down on salt

On average, you should aim to keep your salt intake to less than 6g per day (about 2.4g of sodium).

If you're buying processed foods, remember to check the information given on the labels to choose those with less salt.

Try replacing salt with pepper, herbs and spices to add flavour to your favourite dishes.

Cutting down on sugar

Adults should eat no more than 30g of sugar per day, roughly equal to seven sugar cubes.

Alcohol

Although many people enjoy alcohol socially, alcohol in large quantities can be a significant source of calories, which may result in weight gain.

Alcohol can also impair judgement, which can increase the risk of falls.

As you get older, you tend to have less body weight than younger adults, so the alcohol is more concentrated in the blood.

You may also need more prescription medication or over the counter medication.

It is important to check whether the medication you are taking will be affected by alcohol intake.

Diet Chart For Indian

About

Diversity in Indian culture is responsible for diversity in the Indian diet. Food is substantially different in various parts of India and uses locally grown produce, be it spices, herbs, vegetables, and fruits. The traditional Indian diet uses less processed and more natural ingredients. The meals are a sit-down affair with family, friends.

Over the years, the influence of Mughal, Turks, Mauryans, Guptas, Portuguese and British is clearly seen in the Indian diet, but have easily been incorporated owing to the versatility and continuous evolution.

Indian diet is one of the healthiest diet, rich in taste, texture, and most of all satisfying, if prepared with minimal oil and healthy cooking methods.

Most of the food is prepared from scratch, using fresh produce which means less preservative and more nutrients.

The basic north Indian diet consists of Lentils (contains vitamin A, B, C, E, are rich in calcium, iron, potassium, dietary fibers, help in controlling blood sugar, blood cholesterol and increases digestion), Grains (contains wheat, jowar, bajra, barley, these are rich in fibers, carbohydrate), fresh Vegetables, and Fruits.

Indian cooking uses spices like Turmeric which reduces cholesterol, blood pressure and prevents blood clotting, Curry Leaves washes out toxins from body, cuts down fat, prevents greying of hair, Chilly burns fat and improves metabolism, Garlic is antibacterial and reduces cholesterol, fat.

Curd, an essential part of south Indian diet, keeps the digestive tract healthy. Calcium prevents the development of Insulin resistance.

Diet Chart

Sunday

Breakfast (8:00-8:30AM)	Aloo Paratha (2) + Raita (1 cup)
Mid-Meal (11:00-11:30AM)	Fruit Salad (1 cup) + Tender Coconut Water (1 glass)
Lunch (2:00-2:30PM)	1 cup moong dal + 1 cup bhindi + 2 chapatti + salad
Evening (4:00-4:30PM)	Tea/ Coffee (1 cup) + Boiled Chana Chat (1 cup)
Dinner (8:00-8:30PM)	Chapati (2) + Jeera Aloo (1 cup)

Monday

Breakfast (8:00-8:30AM)	Chapati (2) + Daal (1 cup)
Mid-Meal (11:00-11:30AM)	Fruit Salad (1 cup) + Tender Coconut Water (1 glass)
Lunch (2:00-2:30PM)	1 cup rajma + 1 cup gobhi aloo + 1 cup cucumber raita + 1 cup rice + 1 chapatti + onion salad
Evening (4:00-4:30PM)	Tea/ Coffee (1 cup) + Aloo Chat (1 cup)
Dinner (8:00-8:30PM)	Chapati (2) + Mix Veg.

Tuesday

Breakfast (8:00-8:30AM)	Cheela (2) + Raita (1 cup)
Mid-Meal (11:00-11:30AM)	Fruit Salad (1 cup) + Tender Coconut Water (1 glass)
Lunch (2:00-2:30PM)	1 cup chicken curry + 1 cup boiled rice + 2 chapatti + salad
Evening (4:00-4:30PM)	Tea/ Coffee (1 cup) + Papri Chat (1 cup)
Dinner (8:00-8:30PM)	Chapati (2) + Fish Curry (1 cup)

Wednesday

Breakfast (8:00-8:30AM)	Veg. Poha (1 cup) + Raita (1/2 cup)
Mid-Meal (11:00-11:30AM)	Fruit Salad (1 cup) + Tender Coconut Water (1 glass)
Lunch (2:00-2:30PM)	1 cup white chana + palak paneer + 1 cup rice + 1 chapatti + salad
Evening (4:00-4:30PM)	Tea/ Coffee (1 cup) + Mur-mure Chat (1 cup)
Dinner (8:00-8:30PM)	Chapati (2) + Mustard Greens (1 cup)

Thursday

Breakfast (8:00-8:30AM)	Aloo Paratha (2) + Raita (1 cup)
Mid-Meal (11:00-11:30AM)	Fruit Salad (1 cup) + Tender Coconut Water (1 glass)
Lunch (2:00-2:30PM)	1 cup soy bean curry + 1 cup tinda vegetable + 2 chapatti + salad

Evening (4:00-4:30PM)	Tea/ Coffee (1 cup) + Boiled Chana Chat (1 cup)
Dinner (8:00-8:30PM)	Chapati (2) + Bottle Gourd Curry (1 cup)

Friday

Breakfast (8:00-8:30AM)	Chapati (2) + Daal (1 cup)
Mid-Meal (11:00-11:30AM)	Fruit Salad (1 cup) + Tender Coconut Water (1 glass)
Lunch (2:00-2:30PM)	1 cup fish curry + 1 cup boiled rice + 1 chapatti + 1 cup ghia raita + salad
Evening (4:00-4:30PM)	Tea/ Coffee (1 cup) + Aloo Chat (1 cup)
Dinner (8:00-8:30PM)	Chapati (2) + Matar n Mushroom Curry (1 cup)

Saturday

Breakfast (8:00-8:30AM)	Veg Upma (1 cup) + Raita (1/2 cup)
Mid-Meal (11:00-11:30AM)	Fruit Salad (1 cup) + Tender Coconut Water (1 glass)
Lunch (2:00-2:30PM)	1 cup chicken curry + 1 cup rice + salad
Evening (4:00-4:30PM)	Tea/ Coffee (1 cup) + Papri Chat (1 cup)
Dinner (8:00-8:30PM)	Chapati (2) + Kofta (1 cup)

Food Items To Limit

1. Avoid candy, soda, sugar, white rice, white pasta, white bread, sweet syrup, breakfast cereal, desserts, and pastries contain simple carbohydrates.
2. Avoid margarine, butter, eggs, milk, cheese, and red meat are high in saturated fat.
3. Avoid eating red meat as it contains high levels of saturated fat that shoot up the cholesterol levels in the blood.
4. Avoid eating fried foods such as fried chicken, deep fried foods, and potato fries.
5. Avoid alcohol
6. Avoid aerated and artificially sweetened drinks.

Do's And Dont's

Do's:

1. Eat Healthy Fat to Lose Weight
2. Eat 2-3 hours before going to sleep
3. Make Healthy Swaps
4. Follow Smart Tips for Dining Out

Don'ts:

- Don't starve yourself
- Dont dehydrate yourself
- Dont eat if your are not hungry
- Dont eat too much saturated fat

Food Items You Can Easily Consume

1. Non-starchy fruits and vegetables
2. Complex carbohydrates, found in whole grain bread and pasta, bran, etc.
3. Use olive oil, vegetable oil, rice bran oil, canola oil, mustard oil, and peanut oil.
4. Eat lentils, beans, soy, mushroom, tofu, fish, turkey, chicken breast, and lean cuts of beef.
5. Have five or six small meals throughout the day.
6. Eat a heavy breakfast

Unit - III

Improper diet

Diets high in sugars, saturated and transfats, low fibre foods and high-sugar drinks contribute to non-communicable diseases (NCDs) and other health problems. High intake of fast food and processed foods increases these health risks. According to the World Health Organization, an optimal diet includes: a balance between energy intake from food and energy expenditure from physical activity; energy from fats less than 30% of total intake, shifting fat consumption away from saturated fats; eliminating trans-fats; limiting intake of sugar and salt and increasing consumption of fruits, legumes, whole grains and nuts. Healthy foods such as fruit and vegetables are often unavailable or unaffordable among poor communities in both developed and developing countries. Increasing urbanisation causes people to move away from producing and cooking their own food and turn to prepared foods that are often high in sugar, salt and fat. Marketing influences food choices, and unhealthy foods are the most heavily marketed, especially among children. Globally, poor communities are often the ones hurt most by unhealthy diets. In many countries, fat and sugar have become the cheapest and easiest way to get calories, more accessible than fruit and vegetables and often even cheaper than traditional staples like grains, beans or lentils. Low- and middleincome countries form the largest growing markets and therefore are fertile ground for aggressive marketing of unhealthy foods like soft drinks and fast foods. Policies regulating food prices, production, processing and distribution can make healthy foods cheaper and more accessible. Legislation and other policies that restrict marketing can reduce the promotion of unhealthy foods, especially to children. Health professionals can emphasize the importance of healthy diet and they can advocate for policies and practices that promote healthy diet. School health programmes and community campaigns can educate children, parents, teachers and community leaders about the impact of diet on health and show how these groups can change the conditions that promote unhealthy choices

Malnutrition is when a person's diet does not provide enough nutrients or the right balance for optimal health. Symptoms often involve weight loss, reduced appetite, tiredness, and irritability.

Causes of malnutrition include:

- Unsuitable dietary choices
- Having a low income
- Difficulty obtaining food
- Various physical and mental health conditions

Under nutrition is one type of malnutrition Trusted Source. It occurs when the body does not get enough food and enough necessary nutrients. It can lead to:

- Delayed growth
- Low weight
- Wasting

If a person does not get the right balance of nutrients, they can also have malnutrition. It is possible to have obesity with malnutrition.

When a person has too little food, a limited diet, or a condition that stops their body from obtaining the right balance of nutrients, it can severely impact their health. In some cases, this can become life threatening.

This article looks at malnutrition in detail, including the causes, symptoms, and treatments.

What is malnutrition?

Malnutrition is an imbalance in dietary intake. It occurs when a person has too much or too little food or essential nutrients. A person with malnutrition may lack vitamins, minerals, and other essential substances that their body needs to function.

People may become malnourished if they do not eat enough food overall. However, people who eat plenty but do not have enough variation in their diet can also become malnourished.

Malnutrition can lead to:

- Short- and long-term health problems
- Slow recovery from wounds and illnesses
- A higher risk of infection

Some deficiencies can trigger specific health problems. For example:

Lack of vitamin A

Around the world, many children develop vision problemsTrusted Source due to a lack of vitamin A.

Lack of vitamin C

A lack of vitamin CTrusted Source can result in scurvy.

Scurvy is rare in the United States (U.S.), but it can develop if a person does not have a varied diet with plenty of fruits and vegetables. Fresh, frozen, and canned fruits and vegetables all contain vitamin C.

People who are particularly at risk of scurvy include:

- Older adults
- Young children
- Those who consume a lot of alcohol
- Some people with certain mental health conditions

An overall deficiency

Malnutrition can lead to marasmus, which is a severe form of malnutrition. Marasmus is a deficiency of protein and overall energy intake.

A person with marasmus will have very little muscle or fat on their body.

Over nutrition

Over nutrition is another type of malnutrition. It occurs when a person takes in more nutrients than they need. The result may be an accumulation of body fat from the excess nutrients, resulting in overweight or obesity.

Over nutrition has several health implications Trusted Source. People who have overweight or obesity are at greater risk of:

- Heart disease
- High blood pressure

- Diabetes
- Cancer
- High cholesterol

The rate of over nutrition is growing worldwide. The World Health Organization (WHO) reports that in 2020, 5.7% of children under 5 were overweight, an increase from 5.4% in 2000.

In addition, the number of adults with obesity almost tripled Trusted Source worldwide from 1975 to 2016.

Symptoms

Some signs and symptoms of malnutrition include:

- Weight loss
- A lack of appetite or interest in food or drink
- Tiredness and irritability
- An inability to concentrate
- Always feeling cold
- Depression
- Loss of fat, muscle mass, and body tissue
- A higher risk of getting sick and taking longer to heal
- Longer healing time for wounds

Eventually, a person may also experience heart failure Trusted Source.

Symptoms in adults vs. children

Children may present with different malnutrition symptoms than adults.

In children, there may be:

- A lack of growth and low body weight
- Tiredness and a lack of energy

- Irritability and anxiety
- Slow behavioral and intellectual development, possibly resulting in learning difficulties

Treatment is possible. In some cases, however, malnutrition can have long-term effects.

Causes

Malnutrition can occur for various reasons. The sections below outline these potential causes in more detail.

Low intake of food

Some people develop malnutrition because there is not enough food available, or because they have difficulty eating or absorbing nutrients.

This can happen as a result of:

- Cancer
- Liver disease
- Conditions that cause nausea or make it difficult to eat or swallow
- Taking medications that make eating difficult — due to nausea, for example

Mouth problems such as poorly fitting dentures may also contribute to malnutrition.

Mental health conditions

Under nutrition or malnutrition can affect people with:

- Depression
- Dementia
- Schizophrenia
- Anorexia nervosa

Social and mobility problems

Factors that can affect a person's eating habits and potentially lead to malnutrition include:

- Being unable to leave the house or go to a store to buy food

- Finding it physically difficult to prepare meals
- Living alone, which can affect a person's motivation to cook and eat
- Having limited cooking skills
- Not having enough money to spend on food

Digestive disorders and stomach conditions

If the body does not absorb nutrients efficiently, even a healthful diet may not prevent malnutrition.

Examples of digestive and stomach conditions that may cause this include:

- Crohn's disease
- Ulcerative colitis
- Celiac disease
- Persistent diarrhea, vomiting, or both

Alcohol use disorder

Consuming a lot of alcohol can lead to gastritis or long-term damage to the pancreas. These issues can make it hard to:

- Digest food
- Absorb vitamins
- Produce hormones that regulate metabolism

Alcohol also contains calories, so a person may not feel hungry after drinking it. They may, therefore, not eat enough healthful food to supply the body with essential nutrients.

Risk factors

In some parts of the world, widespread and long-term malnutrition can result from a lack of food.

In wealthier nations, however, those most at risk of malnutrition include:

- Older adults, especially when they are in the hospital or in long-term institutional care

- People who are socially isolated — for example, due to mobility issues, health problems, or other factors
- People with a low income
- People recovering from or living with a serious illness or condition
- Those who have difficulty absorbing nutrients
- People with chronic eating disorders, such as bulimia nervosa or anorexia nervosa

When to contact a doctor

A few key signs of malnutrition indicate that it is time for a person to seek care from a doctor. These signs include:

- Unexplained, unintentional weight loss of more than 5% in the last 3–6 months
- Presence of other malnutrition symptoms
- A worry that someone else may be showing signs of malnourishment
- If a person experiences signs of an eating disorder, or sees these in someone else

Likewise, a person should encourage a loved one to see a doctor if they show signs of malnourishment. Some people may not recognize the symptoms in themselves, while loved ones sometimes can.

Diagnosis

If a person shows or notices any symptoms or signs of malnutrition, the first step is to find out why.

If a doctor suspects Crohn's disease, celiac disease, or another condition, they may evaluate the patient's condition by:

- Asking about medical history
- Conducting a physical exam
- Ordering testing

Treating underlying conditions can improve a person's nutritional status.

A healthcare professional may also carry out the followingTrusted Source:

- Blood tests for general screening and monitoring
- Tests for specific nutrients, such as iron or vitamins
- Prealbumin tests, as malnutrition commonly affects levels of this protein
- Albumin tests, which may indicate liver or kidney disease

A tool to identify risk

Some tools can help identify people who have or are at risk of malnutrition.

One way to assess adults is by using the Malnutrition Universal Screening Tool (MUST). 2018 research Trusted Source has shown this to be a reliable tool.

Experts designed this tool to identify adults, especially older adults, with malnourishment or a high risk of malnutrition. It is a five-step plan to help healthcare professionals diagnose and treat these conditions.

The five steps are as follows:

1. Measure a person's height and weight, calculate their body mass index (BMI), and provide a score.
2. Note the percentage of unplanned weight loss and provide a score. For example, an unplanned loss of 5–10% would give a score of 1, while a 10% loss would score a 2.
3. Identify any mental or physical health conditions and provide a score. For example, if a person has been acutely ill and taken no food for over 5 days, this would lead to an additional 2 points.
4. Add the scores from steps 1, 2, and 3 to obtain an overall risk score.
5. Use local guidelines to develop a care plan based on the score.

The score will be one of the following:

- Low risk: 0
- Medium risk: 1
- High risk: 2 or more

Doctors only use MUST to identify overall malnutrition or the risk of malnutrition in adults. The test will not identify specific nutritional imbalances or deficiencies.

Nutritional deficiency anemia can result if a person's diet cannot provide the nutrients they need. Learn more about it here.

Treatment

If a doctor diagnoses malnutrition, they will make a treatment plan for the person. The person may also need to meet with a dietician and other healthcare professionals.

Treatment will depend on the severity of the malnutrition and the presence of any other underlying conditions or complications.

It may include:

- Ongoing screening and monitoring
- Making a dietary plan, which might include taking supplements
- Treating specific symptoms, such as nausea
- Treating any infections that may be present
- Checking for any mouth or swallowing problems
- Suggesting alternative eating utensils

In severe cases, a doctor may administer nutrients intravenously (through an IV).

The person's healthcare team will continue to monitor them to ensure they get the nutrition they need.

Prevention

To prevent malnutrition, people need to consume a range of nutrients from various food types.

Older adults, young children, people with severe or chronic illness, and others may need additional care to obtain the nutrients they need.

Anyone who starts to show signs of malnutrition or undernutrition should see a doctor for a diagnosis and treatment.

In the U.S., effective treatment is usually available, although the outlook and time needed for recovery will depend on the cause of the malnutrition.

Summary

Malnutrition is the result of an improper diet. It can result from too few nutrients (under nutrition) or too many nutrients (over nutrition).

People who experience under nutrition often have:

- Low weight
- Difficulty recovering from injuries
- Lack of appetite
- Fatigue
- Depression
- Among other symptoms

But malnutrition is not the result of poor diet choices in every case. Sometimes, malnutrition occurs because a person:

- Does not have easy access to food
- Cannot leave their home to buy food
- Cannot cook meals
- Has a digestive disorder that prevents their body from properly absorbing nutrients

Over nutrition is the form of malnutrition that happens when you take in more of a nutrient or nutrients than you need every day. Energy over nutrition is common in developed countries like the United States. Under nutrition is the form of malnutrition that occurs when you don't get enough of nutrition (or nutrients). Energy under nutrition is more common in under-developed countries. Over nutrition of energy nutrients: It happens when you consume too much energy. Over time it causes you to gain weight unless you increase your physical activity. It doesn't matter if those extra calories come from fat, carbohydrates or proteins, because your body can take whatever it doesn't need and store it as fat. Being overweight or obese is a risk factor for cardiovascular disease, some types of cancer and type 2 diabetes. Treating this kind of over nutrition requires dietary adjustments to reduce overall calories and improve the balance of the

diet to include more fruits and vegetables, whole grains, calcium sources and healthful protein sources with a few fats. At the same time, it helps to increase physical activity and avoid junk foods, which are foods that are high in calories but have little nutritional value. Sometimes, medical disorders such as hypothyroidism make it harder to lose excess weight. Over nutrition of micronutrients: It is possible to get too much of most vitamins or minerals, but usually, this happens when you take megadoses of dietary supplements. Getting too much of micronutrients from food is rare. Micronutrients over nutrition can cause acute poising, like taking too many iron pills at once, or it can be chronic, for example taking large doses of vitamin B-6 over several weeks or months. The Institute of Medicine has established tolerable upper limits for most micronutrients, but the best way to avoid this type of over nutrition is to stay away from mega doses of dietary supplements unless directed by your healthcare provider. Under nutrition of micronutrients: This occurs when your diet is out of balance, and it can happen whether or not you're getting enough calories. Iron and calcium are often insufficient in the typical diet. In some cases, the deficiency is due to a disease, such as pernicious anemia that results in a lack of vitamin B-12. Symptoms usually don't occur immediately, but problems arise over time. Micronutrient deficiencies can be treated by correcting the diet. Adding dietary supplements or treating any underlying disorders. Under nutrition of energy nutrients: Under nutrition is the form of malnutrition that people usually mean when they use the word malnutrition. Energy under nutrition or protein-energy malnutrition (PEM) occurs when you don't get enough energy. Children who are undernourished suffer from weight loss and difficulties with learning and school. Underweight women frequently give birth to babies who are also underweight. There are two forms of (PEM). Starvation, sometimes called marasmus, is a severe form of malnutrition due to lack of total energy, resulting in poor growth, infertility, and even death. The body breaks down its own tissues to survive, and the body becomes emaciated in appearance.

What is obesity?

Obesity is a complex, chronic disease with several causes that lead to excessive body fat and sometimes, poor health. Body fat itself is not a disease, of course. But when your body has too much extra fat, it can change the way it functions. These changes are progressive, can worsen over time, and they can lead to adverse health effects.

The good news is that you can improve your health risks by losing some of your excess body fat. Even small changes in weight can have a big impact on your health. Not every weight loss method works for everyone. Most people have tried to lose weight more than once. And keeping the weight off is just as important as losing it in the first place.

Is obesity defined by your weight?

Healthcare providers commonly use the Body Mass Index (BMI) to define obesity in the general population. The BMI measures average body weight against average body height. As a

generalization, healthcare providers associate a BMI of 30 or higher with obesity. Although BMI has its limitations, it's an easily measurable indicator and can help alert you to obesity-related health risks.

Examples of limitations include bodybuilders and athletes, who have more muscle and may have higher BMI scores even though their fat levels are low. It's also possible to have obesity at a "normal" weight. If your body weight is average but your body fat percentage is high, you may have the same health risks as somebody with a higher BMI.

Healthcare providers have also observed ethnic differences in how much extra weight different people can carry before it affects their health. For example, people of Asian descent are more likely to have health risks at a lower BMI, and Black people are more likely to have health risks at a higher BMI.

Another way of assessing obesity is by measuring waist circumference. If you have more body fat around your waist, you are statistically more at risk of obesity-related diseases. The risk becomes significant when your waist size is more than 35 inches for people assigned female at birth or 40 inches for people assigned male at birth.

What are the three types of obesity?

Healthcare providers classify obesity into class types based on how severe it is. They use BMI to do it. If your BMI is between 25.0 and 29.9 kg/m², they put you in the overweight category. There are three general classes of obesity that healthcare providers use to evaluate what treatments may work best for each person. They include:

- **Class I obesity:** BMI 30 to <35 kg/m².
- **Class II obesity:** BMI 35 to <40 kg/m².
- **Class III obesity:** BMI 40+ kg/m².

What is "morbid" obesity?

"Morbid obesity" is an outdated term for class III obesity. In medical language, "morbidity" means associated health risks. Doctors referred to class III obesity as "morbid" because it was most likely to come with related health problems. However, they retired the term because of its negative connotations.

How is childhood obesity assessed?

Healthcare providers also use BMI to calculate obesity in children, but they calculate it relative to the child's age and assigned sex. A child older than 2 years may be diagnosed with obesity if their

BMI is greater than 95% of their peers in the same category. Different growth charts may present slightly different BMI averages, based on the population they are sampling.

How common is obesity?

Obesity in American adults was last surveyed in 2017-2018. The prevalence was 42.5%, up from 30.5% in 1999-2000. In that same period, the prevalence of class III obesity almost doubled from 4.7% to 9.2%. Childhood obesity in America from 2017-2018 was 19.3%.

Worldwide, obesity has nearly tripled in the last 50 years. The rise has been especially dramatic in lower-income countries where malnutrition is common. These communities now have greater access to higher-calorie foods with low nutritional value. Obesity now commonly coexists with undernutrition in these countries.

Symptoms and Causes

How does obesity affect my body?

Obesity affects your body in many ways. Some are simply the mechanical effects of having more body fat. For example, you can draw a clear line between extra weight on your body and extra pressure on your skeleton and joints. Other effects are more subtle, such as chemical changes in your blood that increase your risk for diabetes, heart disease and stroke.

Some effects are still not well understood. For example, there is an increased risk of certain cancers with obesity. We don't know why, but it exists. Statistically, obesity increases your risk of premature death from all causes. By the same token, studies show that you can significantly improve these risks by losing even a small amount of weight (5% to 10%).

Metabolic changes

Your metabolism is the process of converting calories into energy to fuel your body's functions. When your body has more calories than it can use, it converts the extra calories into lipids and stores them in your adipose tissue (body fat). When you run out of tissue to store lipids in, the fat cells themselves become enlarged. Enlarged fat cells secrete hormones and other chemicals that produce an inflammatory response.

Chronic inflammation has many adverse health effects. One way that it affects your metabolism is by contributing to insulin resistance. This means your body can no longer use insulin to efficiently lower blood glucose and blood lipid levels (sugars and fats in your blood). High blood sugar and blood lipids (cholesterol and triglycerides) also contribute to high blood pressure.

Together, these combined risk factors are known as metabolic syndrome. They are grouped together because they all tend to reinforce each other. They also reinforce further weight gain and make it harder to lose weight and sustain weight loss. Metabolic syndrome is a common factor in obesity and contributes to many related diseases, including:

- **Type 2 diabetes:** Obesity specifically raises the risk of Type 2 diabetes seven-fold in people assigned male at birth and 12-fold in people assigned female at birth. The risk increases by 20% for every additional point you gain on the BMI scale. It also diminishes with weight loss.

- **Cardiovascular diseases:** High blood pressure, high cholesterol, high blood sugar and inflammation are all risk factors for cardiovascular diseases, including coronary artery disease, congestive heart failure, heart attack and stroke. These risks increase hand-in-hand with your BMI. Cardiovascular disease is the leading cause of preventable death worldwide and in the U.S.

- **Fatty liver disease:** Excess fats circulating in your blood make their way to your liver, which is responsible for filtering your blood. When your liver begins storing excess fat, it can lead to chronic liver inflammation (hepatitis) and long-term liver damage (cirrhosis).

- **Kidney disease:** High blood pressure, diabetes and liver disease are among the most common contributors to chronic kidney disease.

- **Gallstones:** Higher blood cholesterol levels can cause cholesterol to accumulate in your gallbladder, leading to cholesterol gallstones and potential gallbladder diseases.

Direct effects

Excess body fat can crowd the organs of your respiratory system and put stress and strain on your musculoskeletal system. This contributes to:

- Asthma.
- Sleep apnea.
- Obesity hypoventilation syndrome.
- Osteoarthritis.
- Back pain.
- Gout.

According to the U.S. Centers for Disease Control and Prevention, 1 in 3 adults with obesity also has arthritis. Studies have shown that for every 5 kg in weight gain, your risk of knee arthritis increases by 36%. The good news is that, together with exercise, weight loss of 10% can significantly reduce arthritis-related pain and improve your quality of life.

Indirect effects

Obesity is also associated indirectly with:

- Memory and cognition, including a heightened risk of Alzheimer's disease and dementia.
- Female infertility and pregnancy complications.
- Depression and mood disorders.
- Certain cancers, including esophageal, pancreatic, colorectal, breast, uterine and ovarian.

What causes obesity?

On the most basic level, obesity is caused by consuming more calories than your body can use. Many factors contribute to this. Some factors are individual to you. Others are built into the structure of our society, either on a national, local or family level. In some ways, preventing obesity requires consciously working against these multiple factors.

Factors that may increase calorie consumption include:

- **Fast and convenience foods:** In communities and families where highly-processed fast and convenience foods are dietary staples, it's easy to consume a lot of calories. These foods are high in sugar and fat and low in fiber and other nutrients, which can leave you hungrier. Their ingredients promote addictive eating patterns. In some communities, these may be the only types of foods readily available, due to both cost and access. The Centers for Disease Control estimate that 40% of households in America live more than a mile from healthy food retailers.
- **Sugar is in everything:** The food industry is not designed to maintain our health. It's designed to sell products that we will become addicted to and want to buy more of. High on that list of products are sweets and sugary drinks, which have no nutritional value and a lot of added calories. But even standard foods have high levels of added sugar to make them more appealing and addictive. It's so common that it's changed our taste expectations.
- **Marketing and advertising:** Pervasive advertising pushes processed foods, sweets and sugary drinks, the products that we need the least but that the industry needs us to buy

the most. Advertising makes these products seem like a normal and necessary part of everyday life. Advertising also plays a large role in selling alcohol, which adds a lot of empty calories.

- **Psychological factors:** Boredom, loneliness, anxiety and depression are all common in modern society, and can all lead to overeating. They may especially lead to eating certain types of foods that activate pleasure centers in our brains, foods that tend to be higher in calories. Eating to feel better is a primal human instinct. We evolved to find food, and evolution hasn't caught up to the kind of abundance of food that Western societies now enjoy.

- **Hormones:** Hormones regulate our hunger and satiety signals. Many things can disrupt these regulatory processes, including common things like stress and lack of sleep and less common things like genetic variations. Hormones can cause you to continue to crave more food even when you don't need any more calories. They can make it hard to tell when you've had enough.

- **Certain medications:** Medications that you take to treat other conditions may contribute to weight gain. Antidepressants, steroids, anti-seizure medications, diabetes medications and beta-blockers are among them.

Factors that may decrease how many calories we spend include:

- **Screen culture:** As work, shopping and social life continue to move online, we increasingly spend more time in front of our phones and computers. Streaming media and binge-watching make long hours of sedentary entertainment more possible.

- **Workforce changes:** With industry changes trending toward automation and computers, more people now work at desks than on their feet. They also work longer hours.

- **Fatigue**: Sedentary lifestyles have a snowball effect. Studies show that the longer you sit still, the wearier and less motivated you become. Sitting makes your body stiff and contributes to aches and pains that discourage movement. It also causes general stress, which adds to fatigue.

- **Neighborhood design:**. Many people lack local places to be active, either due to access or safety issues. More than half of Americans don't live within half a mile of a park. They may not live in walkable neighborhoods, and they may not see others in their communities being active in day-to-day life. When there is no public transportation option, most people can only travel by car.

- **Childcare trend:** Children spend less time playing outside than they used to. They spend more time in enclosed childcare environments, which may not have adequate space or facilities for physical activity. This is partly due to cultural trends that don't find it safe for children to play outside unattended. It's also due to inadequate access to public spaces and inadequate access to quality childcare. Many childcare environments substitute TV for free play.

- **Disability:** Adults and children with physical and learning disabilities are most at risk for obesity. Physical limitations and lack of adequate specialized education and resources can contribute.

Diagnosis and Tests

How is obesity diagnosed?

Your healthcare provider will measure your weight, height and waist circumference at your appointment.

More importantly, when you come to your healthcare provider for care, they will want to know your whole health story. They will ask you about your history of medical conditions, medications and weight changes. They'll also want to know about your current eating, sleeping and exercise patterns and stress factors and whether you have tried any weight loss programs in the past. They may ask about your biological family's health history.

They will also examine your vital functions by taking your heart rate and blood pressure and listening to your heart and lungs. They may give you a blood test to check your blood glucose and cholesterol levels and screen for hormone problems. They'll use this complete profile to diagnose your obesity and any related conditions you might have.

Management and Treatment

How is obesity treated?

Your complete health profile will determine your individual treatment plan. Your healthcare provider will target your most urgent health concerns first, then follow up with a longer-term weight loss plan. Sometimes there may be quick changes they can recommend for an immediate impact, like switching your medications. The overall treatment plan will be more gradual and probably involve many factors. Since everyone is different, it may take some trial and error to figure out which therapies work best for you. Studies have repeatedly shown that intense, team-based programs with frequent, personal communication between your provider and you are the most successful in helping people lose weight and keep it off.

Your treatment plan may include:

Dietary changes

The dietary changes you personally need to make to lose weight will be individual to you. Some people may benefit from cutting portion sizes or snacks between meals. For others, it may be more about changing what they eat than how much. Almost everyone can benefit from eating more plants. Fruits, vegetables, whole grains and legumes tend to be lower in fat and higher in fiber and micronutrients. They are more nutritious and can make you feel fuller and more satisfied after eating fewer calories.

Increased activity

Everyone has heard that diet and exercise are both important to weight loss and weight maintenance. But exercise doesn't have to mean a gym membership. Just walking at a moderate pace is one of the most efficient types of exercise for weight loss. Just 30 minutes, five days a week is what healthcare providers suggest. A daily walk at lunchtime or before or after work can make a real difference.

Behavioral therapies

Counseling, support groups and methods such as cognitive behavioral therapy may have a role to play in supporting your weight loss journey. These methods can help rewire your brain to support positive changes. They can also help you manage stress and address emotional and psychological factors that may be working against you. Weight and weight loss efforts affect us on many levels, so it can be helpful to have support on the human side as well as on the practical side.

Medication

Your healthcare provider may recommend medications to use in conjunction with other treatments. Medications aren't the whole answer to weight loss, but they can help tackle it from another angle. For example, appetite suppressants can intercept some of the pathways to your brain that affect your hunger. For some people, this might be a small piece of the puzzle, but for others, it might be a bigger one.

Common FDA-approved drugs for treating obesity include:

- **Orlistat (Xenical®, Alli®):** Reduces absorption of fat from your gut.
- **Phentermine (Adipex-P®, Lomaira®, Suprenza®):** Decreases your appetite. It's approved for use for three months at a time.
- **Benzphetamine (Didrex®, Regimex®):** Decreases your appetite.

- **Diethylpropion (Depletite # 2®, Radtue®, Tenuate®):** Decreases your appetite.
- **Phendimetrazine (Bontril®, Melfiat®):** Decreases your appetite.
- **Bupropion-naltrexone (Contrave®):** May reduce cravings and food intake.
- **Liraglutide (Saxenda®):** Reduces appetite and slows digestion.
- **Semaglutide (Wegovy®):** Suppresses appetite.
- **Cellulose and citric acid (Plenity®):** Makes you feel full.
- **Lisdexamfetamine dimesylate (Vyvanse®):** Helps manages symptoms of binge eating disorder.
- **Phentermine-topiramate (Qsymia®):** Makes you less hungry.
- Combination of SGLT2 inhibitors and glucagon-like-1 receptor agonists.

Weight loss surgery

If you have been diagnosed with class III obesity, bariatric surgery may be an option for you. Surgery is a severe but highly effective solution to long-term, significant weight loss. It works by changing your biology instead of just your mind or your habits. All bariatric surgery procedures alter your digestive system in some way. They restrict the number of calories you can consume and absorb. They also change hormonal factors in your digestive system that affect your metabolism and hunger.

Bariatric surgery procedures include:

- Gastric sleeve (sleeve gastrectomy).
- Gastric band (LAP band).
- Gastric bypass (Roux-en-Y).
- Duodenal switch.

Prevention

How can I prevent obesity?

Preventing obesity is easier than treating it once it has taken hold. Once your body has established a new high “set point," it will consider that to be your new baseline weight. Your body works to

modulate your hunger signals and energy expenditure to maintain the same body mass, in spite of your weight-loss intentions.

If you've noticed a pattern of recent weight gain in yourself or your child, or if you have a family history of obesity, you might want to take steps to intervene sooner rather than later. Examining your habits and making reasonable changes now can help you prevent future obesity and weight loss struggles.

For example:

- **Make a small sacrifice**: Do you have a daily snack habit or "pick-me-up," such as a sugary drink, that is high in calories? Consider replacing it. Just 150 extra calories a day can add up to 10 extra pounds in a year. That's equal to a snack-size bag of potato chips, or just two double-stuffed Oreos.

- **Add a small activity:** Alternatively, consider what you might do to spend an extra 150 calories in a day. For example, go for a hike or use an elliptical machine for 25 minutes, or take the dog for a brisk walk for 35 minutes.

- **Shop intentionally:** Stock your home with healthy foods and save sweets and treats for special occasions when you go out. Whole foods are higher in fiber and lower on the glycemic index, so they don't cause your blood sugar to spike and drop the way processed snacks and treats do.

- **Cultivate overall wellness:** Reduce your screen time, go outside and go for a walk. Manage your stress and try to get adequate sleep to keep your hormone levels in check. Focus on positive changes and healthy activities rather than how your efforts affect your weight.

Outlook / Prognosis

What is the outlook for me if I have obesity?

Obesity puts you at risk of certain adverse health conditions. That doesn't mean you have those conditions right now. And it doesn't mean that you can't do anything about them. The risks are worth your concern, but they're also reversible or manageable. Your healthcare provider will encourage you to reduce them by losing weight. While it will be challenging, it can be done.

Remember, weight loss of just 5% to 10% can significantly improve your health risks. It can slow or stop the progression of fatty liver disease, metabolic syndrome and diabetes. With medical guidance, weight loss of at least this much is achievable, and possibly much more. Sticking with a long-term treatment plan can help you maintain weight loss.

A note from Cleveland Clinic

You may have experienced a bias that obesity is a personal choice or a moral failure. If you're seeking medical advice for obesity, chances are you've already tried to manage it several times on your own.

The good news is that as research continues, breakthroughs in medicine continue to offer new hope for treating obesity. It might take some exploring to land on the right formula for you, but together with your healthcare provider, you can take your health back into your own hands. Even a little weight loss can improve your health on almost every level, and you can reap lifelong benefits from healthy diet and lifestyle changes.

Hypertension (high blood pressure) is when the pressure in your blood vessels is too high (140/90 mmHg or higher). It is common but can be serious if not treated.

People with high blood pressure may not feel symptoms. The only way to know is to get your blood pressure checked.

Things that increase the risk of having high blood pressure include:

- Older age
- Genetics
- Being overweight or obese
- Not being physically active
- High-salt diet
- Drinking too much alcohol

Lifestyle changes like eating a healthier diet, quitting tobacco and being more active can help lower blood pressure. Some people may still need to take medicines.

Blood pressure is written as two numbers. The first (systolic) number represents the pressure in blood vessels when the heart contracts or beats. The second (diastolic) number represents the pressure in the vessels when the heart rests between beats.

Hypertension is diagnosed if, when it is measured on two different days, the systolic blood pressure readings on both days is ≥140 mmHg and/or the diastolic blood pressure readings on both days is ≥90 mmHg.

Risk factors

Modifiable risk factors include unhealthy diets (excessive salt consumption, a diet high in saturated fat and trans fats, low intake of fruits and vegetables), physical inactivity, consumption of tobacco and alcohol, and being overweight or obese.

Non-modifiable risk factors include a family history of hypertension, age over 65 years and co-existing diseases such as diabetes or kidney disease.

Symptoms

Most people with hypertension don't feel any symptoms. Very high blood pressures can cause headaches, blurred vision, chest pain and other symptoms.

Checking your blood pressure is the best way to know if you have high blood pressure. If hypertension isn't treated, it can cause other health conditions like kidney disease, heart disease and stroke.

People with very high blood pressure (usually 180/120 or higher) can experience symptoms including:

- Severe headaches
- Chest pain
- Dizziness
- Difficulty breathing
- Nausea
- Vomiting
- Blurred vision or other vision changes
- Anxiety
- Confusion
- Buzzing in the ears
- Nosebleeds
- Abnormal heart rhythm

If you are experiencing any of these symptoms and a high blood pressure, seek care immediately.

The only way to detect hypertension is to have a health professional measure blood pressure. Having blood pressure measured is quick and painless. Although individuals can measure their own blood pressure using automated devices, an evaluation by a health professional is important for assessment of risk and associated conditions.

Treatment

Lifestyle changes can help lower high blood pressure. These include:

- Eating a healthy, low-salt diet
- Losing weight
- Being physically active
- Quitting tobacco.

If you have high blood pressure, your doctor may recommend one or more medicines. Your recommended blood pressure goal may depend on what other health conditions you have.

Blood pressure goal is less than 130/80 if you have:

- Cardiovascular disease (heart disease or stroke)
- Diabetes (high blood sugar)
- Chronic kidney disease
- High risk for cardiovascular disease.

For most people, the goal is to have a blood pressure less than 140/90.

There are several common blood pressure medicines:

- ACE inhibitors including enalapril and lisinopril relax blood vessels and prevent kidney damage.
- Angiotensin-2 receptor blockers (ARBs) including losartan and telmisartan relax blood vessels and prevent kidney damage.
- Calcium channel blockers including amlodipine and felodipine relax blood vessels.

- Diuretics including hydrochlorothiazide and chlorthalidone eliminate extra water from the body, lowering blood pressure.

Prevention

Lifestyle changes can help lower high blood pressure and can help anyone with hypertension. Many who make these changes will still need to take medicine.

These lifestyle changes can help prevent and lower high blood pressure.

Do:

- Eat more vegetables and fruits.
- Sit less.
- Be more physically active, which can include walking, running, swimming, dancing or activities that build strength, like lifting weights.
    - Get at least 150 minutes per week of moderate-intensity aerobic activity or 75 minutes per week of vigorous aerobic activity.
    - Do strength building exercises 2 or more days each week.
- Lose weight if you're overweight or obese.
- Take medicines as prescribed by your health care professional.
- Keep appointments with your health care professional.

Don't:

- Eat too much salty food (try to stay under 2 grams per day)
- Eat foods high in saturated or trans fats
- Smoke or use tobacco
- Drink too much alcohol (1 drink daily max for women, 2 for men)
- Miss or share medication.

Reducing hypertension prevents heart attack, stroke and kidney damage, as well as other health problems.

Reduce the risks of hypertension by:

- Reducing and managing stress
- Regularly checking blood pressure
- Treating high blood pressure
- Managing other medical conditions.

Diabetes is a chronic, metabolic disease characterized by elevated levels of blood glucose (or blood sugar), which leads over time to serious damage to the heart, blood vessels, eyes, kidneys and nerves. The most common is type 2 diabetes, usually in adults, which occurs when the body becomes resistant to insulin or doesn't make enough insulin. In the past 3 decades the prevalence of type 2 diabetes has risen dramatically in countries of all income levels. Type 1 diabetes, once known as juvenile diabetes or insulin-dependent diabetes, is a chronic condition in which the pancreas produces little or no insulin by itself. For people living with diabetes, access to affordable treatment, including insulin, is critical to their survival. There is a globally agreed target to halt the rise in diabetes and obesity by 2025.

About 422 million people worldwide have diabetes, the majority living in low-and middle-income countries, and 1.5 million deaths are directly attributed to diabetes each year. Both the number of cases and the prevalence of diabetes have been steadily increasing over the past few decade. Symptoms of type 1 diabetes include the need to urinate often, thirst, constant hunger, weight loss, vision changes and fatigue. These symptoms may occur suddenly. Symptoms for type 2 diabetes are generally similar to those of type 1 diabetes but are often less marked. As a result, the disease may be diagnosed several years after onset, after complications have already arisen. For this reason, it is important to be aware of risk factors.

Type 1 diabetes cannot currently be prevented. Effective approaches are available to prevent type 2 diabetes and to prevent the complications and premature death that can result from all types of diabetes. These include policies and practices across whole populations and within specific settings (school, home, workplace) that contribute to good health for everyone, regardless of whether they have diabetes, such as exercising regularly, eating healthily, avoiding smoking, and controlling blood pressure and lipids.

The starting point for living well with diabetes is an early diagnosis – the longer a person lives with undiagnosed and untreated diabetes, the worse their health outcomes are likely to be. Easy access to basic diagnostics, such as blood glucose testing, should therefore be available in primary health care settings. Patients will need periodic specialist assessment or treatment for complications.

A series of cost-effective interventions can improve patient outcomes, regardless of what type of diabetes they may have. These interventions include blood glucose control through a combination of diet, physical activity and, if necessary, medication; control of blood pressure and lipids to reduce cardiovascular risk and other complications; and regular screening for damage to the eyes, kidneys and feet to facilitate early treatment.

Anemia is a condition in which the body does not have enough healthy red blood cells. Red blood cells provide oxygen to body tissues.

Different types of anemia include:

- Anemia due to vitamin B12 deficiency
- Anemia due to folate (folic acid) deficiency
- Anemia due to iron deficiency
- Anemia of chronic disease
- Hemolytic anemia
- Idiopathic aplastic anemia
- Megaloblastic anemia
- Pernicious anemia
- Sickle cell anemia
- Thalassemia

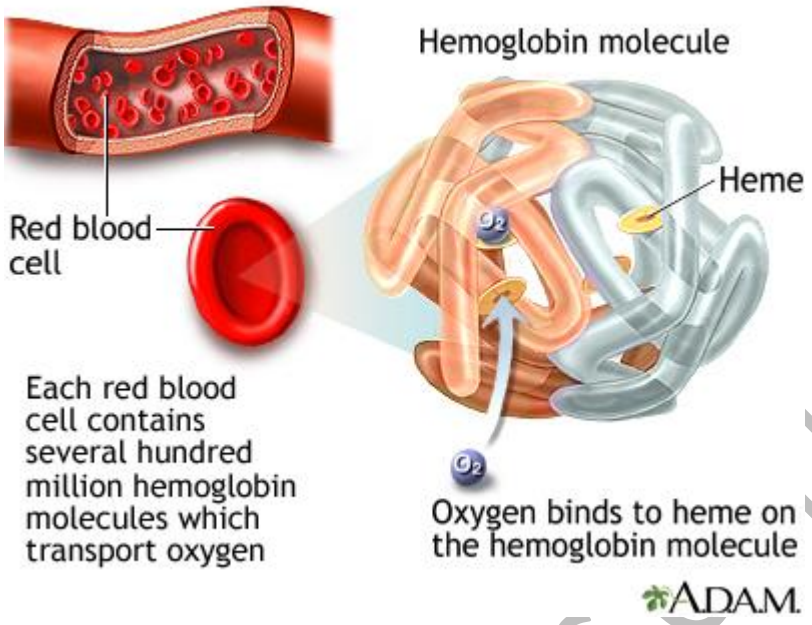
Iron deficiency anemia is the most common type of anemia.

Causes

Although many parts of the body help make red blood cells, most of the work is done in the bone marrow. Bone marrow is the soft tissue in the center of bones that helps form all blood cells.

Healthy red blood cells last between 90 and 120 days. Parts of your body then remove old blood cells. A hormone called erythropoietin (epo) made in your kidneys signals your bone marrow to make more red blood cells.

Hemoglobin is the oxygen-carrying protein inside red blood cells. It gives red blood cells their color. People with anemia do not have enough hemoglobin.



The body needs certain vitamins, minerals, and nutrients to make enough red blood cells. Iron, vitamin B12, and folic acid are three of the most important ones. The body may not have enough of these nutrients due to:

- Changes in the lining of the stomach or intestines that affect how well nutrients are absorbed (for example, celiac disease)
- Poor diet
- Surgery that removes part of the stomach or intestines

Possible causes of anemia include:

- Iron deficiency
- Vitamin B12 deficiency
- Folate deficiency
- Certain medicines
- Destruction of red blood cells earlier than normal (which may be caused by immune system problems)
- Long-term (chronic) diseases such as chronic kidney disease, cancer, ulcerative colitis, or rheumatoid arthritis

- Some forms of anemia, such as thalassemia or sickle cell anemia, which can be inherited
- Pregnancy
- Problems with bone marrow such as lymphoma, leukemia, myelodysplasia, multiple myeloma, or aplastic anemia
- Slow blood loss (for example, from heavy menstrual periods or stomach ulcers)
- Sudden heavy blood loss

Symptoms

You may have no symptoms if the anemia is mild or if the problem develops slowly. Symptoms that may occur first include:

Feeling weak or tired more often than usual, or with exercise

Headaches

- Problems concentrating or thinking
- Irritability
- Loss of appetite
- Numbness and tingling of hands and feet

If the anemia gets worse, symptoms may include:

- Blue color to the whites of the eyes
- Brittle nails
- Desire to eat ice or other non-food things (pica syndrome)
- Lightheadedness when you stand up
- Pale skin color
- Shortness of breath with mild activity or even at rest
- Sore or inflamed tongue
- Mouth ulcers

- Abnormal or increased menstrual bleeding in females
- Loss of sexual desire in men

Exams and Tests

The provider will perform a physical examination, and may find:

- A heart murmur
- Low blood pressure, especially when you stand up
- Slight fever
- Pale skin
- Rapid heart rate

Some types of anemia may cause other findings on a physical exam.

Blood tests used to diagnose some common types of anemia may include:

- Blood levels of iron, vitamin B12, folic acid, and other vitamins and minerals
- Complete blood count
- Reticulocyte count

Other tests may be done to find medical problems that can cause anemia.

Treatment

Treatment should be directed at the cause of the anemia, and may include:

- Blood transfusions
- Corticosteroids or other medicines that suppress the immune system
- Erythropoietin, a medicine that helps your bone marrow make more blood cells
- Supplements of iron, vitamin B12, folic acid, or other vitamins and minerals

Possible Complications

Severe anemia can cause low oxygen levels in vital organs such as the heart, and can lead to heart failure.

Osteomalacia

What is osteomalacia?

Osteomalacia means "soft bones." Osteomalacia is a disease that weakens bones and can cause them to break more easily. It is a disorder of decreased mineralization, which results in bone breaking down faster than it can re-form. It is a condition that occurs in adults. In children, inadequate concentrations of vitamin D may cause rickets.

Symptoms and Causes

What causes osteomalacia?

Osteomalacia develops most commonly due to avitamin D deficiency (often from not getting enough sunlight), or less frequently, due to a digestive or kidney disorder. Vitamin D is essential for calcium absorption and for maintaining bone health. These disorders can interfere with the body's ability to absorb vitamins. There are also rare genetic conditions that can cause osteomalacia.

What are the symptoms of osteomalacia?

The most common symptoms of osteomalacia are pain in the bones and hips, bone fractures, and muscle weakness. Patients can also have difficulty walking.

Diagnosis and Tests

How is osteomalacia diagnosed?

There are various tests that can be performed to determine if someone has osteomalacia.

- The most important indicator is low levels of vitamin D, but low levels of calcium or a significant drop in phosphate levels may also indicate osteomalacia.
- X-rays may be taken to see if there is any evidence of osteomalacia.
- A bone mineral density scan may be helpful in evaluating the amount of calcium and other minerals present in a patient’s bone segment. These scans are not required to make the diagnosis of osteomalacia. However, they may give important information about a patient’s bone health.

Rarely, the doctor may perform a bone biopsy, in which a sample of bone tissue is taken and examined.

Management and Treatment

How is osteomalacia treated?

Patients who have osteomalacia can take vitamin D, calcium or phosphate supplements, depending on the individual case. For instance, people with intestinal malabsorption (the intestines cannot absorb nutrients or vitamins properly) may need to take larger quantities of vitamin D and calcium.

Other treatments to relieve or correct osteomalacia symptoms may include:

- Wearing braces to reduce or prevent bone irregularities
- Surgery to correct bone deformities (in severe cases)
- Adequate exposure to sunlight

Cardiovascular diseases (CVDs) are a group of disorders of the heart and blood vessels. They include:

- Coronary heart disease – a disease of the blood vessels supplying the heart muscle;
- Cerebrovascular disease – a disease of the blood vessels supplying the brain;
- Peripheral arterial disease – a disease of blood vessels supplying the arms and legs;
- Rheumatic heart disease – damage to the heart muscle and heart valves from rheumatic fever, caused by streptococcal bacteria;
- Congenital heart disease – birth defects that affect the normal development and functioning of the heart caused by malformations of the heart structure from birth; and
- Deep vein thrombosis and pulmonary embolism – blood clots in the leg veins, which can dislodge and move to the heart and lungs.

Heart attacks and strokes are usually acute events and are mainly caused by a blockage that prevents blood from flowing to the heart or brain. The most common reason for this is a build-up of fatty deposits on the inner walls of the blood vessels that supply the heart or brain. Strokes can be caused by bleeding from a blood vessel in the brain or from blood clots.

What are the risk factors for cardiovascular disease?

The most important behavioural risk factors of heart disease and stroke are unhealthy diet, physical inactivity, tobacco use and harmful use of alcohol. The effects of behavioural risk factors

may show up in individuals as raised blood pressure, raised blood glucose, raised blood lipids, and overweight and obesity. These "intermediate risks factors" can be measured in primary care facilities and indicate an increased risk of heart attack, stroke, heart failure and other complications.

Cessation of tobacco use, reduction of salt in the diet, eating more fruit and vegetables, regular physical activity and avoiding harmful use of alcohol have been shown to reduce the risk of cardiovascular disease. Health policies that create conducive environments for making healthy choices affordable and available are essential for motivating people to adopt and sustain healthy behaviours.

There are also a number of underlying determinants of CVDs. These are a reflection of the major forces driving social, economic and cultural change – globalization, urbanization and population ageing. Other determinants of CVDs include poverty, stress and hereditary factors.

In addition, drug treatment of hypertension, diabetes and high blood lipids are necessary to reduce cardiovascular risk and prevent heart attacks and strokes among people with these conditions.

What are common symptoms of cardiovascular diseases?

Symptoms of heart attacks and strokes

Often, there are no symptoms of the underlying disease of the blood vessels. A heart attack or stroke may be the first sign of underlying disease. Symptoms of a heart attack include:

- Pain or discomfort in the centre of the chest; and/or
- Pain or discomfort in the arms, the left shoulder, elbows, jaw, or back.

In addition the person may experience difficulty in breathing or shortness of breath; nausea or vomiting; light-headedness or faintness; a cold sweat; and turning pale. Women are more likely than men to have shortness of breath, nausea, vomiting, and back or jaw pain.

The most common symptom of a stroke is sudden weakness of the face, arm, or leg, most often on one side of the body. Other symptoms include sudden onset of:

- Numbness of the face, arm, or leg, especially on one side of the body;
- Confusion, difficulty speaking or understanding speech;
- Difficulty seeing with one or both eyes;

- Difficulty walking, dizziness and/or loss of balance or coordination;
- Severe headache with no known cause; and/or
- Fainting or unconsciousness.

People experiencing these symptoms should seek medical care immediately.

What is rheumatic heart disease?

Rheumatic heart disease is caused by damage to the heart valves and heart muscle from the inflammation and scarring caused by rheumatic fever. Rheumatic fever is caused by an abnormal response of the body to infection with streptococcal bacteria, which usually begins as a sore throat or tonsillitis in children.

Rheumatic fever mostly affects children in developing countries, especially where poverty is widespread. Globally, about 2% of deaths from cardiovascular diseases are related to rheumatic heart disease.

Symptoms of rheumatic heart disease

Symptoms of rheumatic heart disease include: shortness of breath, fatigue, irregular heartbeats, chest pain and fainting.

Symptoms of rheumatic fever include: fever, pain and swelling of the joints, nausea, stomach cramps and vomiting.

Why are cardiovascular diseases a development issue in low- and middle-income countries?

At least three-quarters of the world's deaths from CVDs occur in low- and middle-income countries. People living in low- and middle-income countries often do not have the benefit of primary health care programmes for early detection and treatment of people with risk factors for CVDs. People in low- and middle-income countries who suffer from CVDs and other noncommunicable diseases have less access to effective and equitable health care services which respond to their needs. As a result, for many people in these countries detection is often late in the course of the disease and people die at a younger age from CVDs and other noncommunicable diseases, often in their most productive years.

The poorest people in low- and middle-income countries are most affected. At the household level, evidence is emerging that CVDs and other noncommunicable diseases contribute to poverty due to catastrophic health spending and high out-of-pocket expenditure. At the macro-economic level, CVDs place a heavy burden on the economies of low- and middle-income countries.

How can the burden of cardiovascular diseases be reduced?

The key to cardiovascular disease reduction lies in the inclusion of cardiovascular disease management interventions in universal health coverage packages, although in a high number of countries health systems require significant investment and reorientation to effectively manage CVDs.

Evidence from 18 countries has shown that hypertension programmes can be implemented efficiently and cost-effectively at the primary care level which will ultimately result in reduced coronary heart disease and stroke. Patients with cardiovascular disease should have access to appropriate technology and medication. Basic medicines that should be available include:

- Aspirin;
- Beta-blockers;
- Angiotensin-converting enzyme inhibitors; and
- Statins.

An acute event such as a heart attack or stroke should be promptly managed.

Sometimes, surgical operations are required to treat CVDs. They include:

- Coronary artery bypass;
- Balloon angioplasty (where a small balloon-like device is threaded through an artery to open the blockage);
- Valve repair and replacement;
- Heart transplantation; and
- Artificial heart operations.

Medical devices are required to treat some CVDs. Such devices include pacemakers, prosthetic valves, and patches for closing holes in the heart.

WHO response

In 2013, WHO Member States agreed on global mechanisms to reduce the avoidable NCD burden including a "Global action plan for the prevention and control of NCDs 2013-2020". This Plan aims to reduce the number of premature deaths from NCDs by 25% by 2025 through nine voluntary global targets. Two of the targets directly focus on preventing and controlling CVDs.

Target 6: Reduce global prevalence of raised blood pressure by 25% between 2010 and 2025.

Target 8: At least 50% of eligible people should receive drug therapy and counselling (including glycaemic control) to prevent heart attacks and strokes by 2025.

In addition, target 9 states that there should be 80% availability of the affordable basic technologies and essential medicines, including generics, required to treat major NCDs in both public and private facilities.

Unit - IV

Determinants of health

Many factors combine together to affect the health of individuals and communities. Whether people are healthy or not, is determined by their circumstances and environment. To a large extent, factors such as where we live, the state of our environment, genetics, our income and education level, and our relationships with friends and family all have considerable impacts on health, whereas the more commonly considered factors such as access and use of health care services often have less of an impact.

The determinants of health include:

- The social and economic environment,
- The physical environment, and
- The person's individual characteristics and behaviours.

The context of people's lives determine their health, and so blaming individuals for having poor health or crediting them for good health is inappropriate. Individuals are unlikely to be able to directly control many of the determinants of health. These determinants—or things that make people healthy or not—include the above factors, and many others:

- Income and social status - higher income and social status are linked to better health. The greater the gap between the richest and poorest people, the greater the differences in health.
- Education – low education levels are linked with poor health, more stress and lower self-confidence.
- Physical environment – safe water and clean air, healthy workplaces, safe houses, communities and roads all contribute to good health. Employment and working conditions – people in employment are healthier, particularly those who have more control over their working conditions
- Social support networks – greater support from families, friends and communities is linked to better health. Culture - customs and traditions, and the beliefs of the family and community all affect health.
- Genetics - inheritance plays a part in determining lifespan, healthiness and the likelihood of developing certain illnesses. Personal behaviour and coping skills – balanced eating,

keeping active, smoking, drinking, and how we deal with life's stresses and challenges all affect health.

- Health services - access and use of services that prevent and treat disease influences health
- Gender - Men and women suffer from different types of diseases at different ages

Health indicators

TYPES OF HEALTH INDICATORS A comprehensive list of indicator types, classified according to the event to be measured, could be listed in this section. To demonstrate the usefulness and limitations of indicators, this section concerns itself with a limited number of indicators in four domains: the health situation (morbidity); health situation (mortality); behavioral risk factors; and health services. At the conclusion of this section, there is a list of links with examples and technical specifications for a number of health indicators, such as the WHO Global Reference List of 100 Core Health Indicators and the Inter-agency Health Information Network (RIPSA) document.

MORBIDITY INDICATORS These indicators can be expressed by measuring incidence or by measuring prevalence. Assessing morbidity rates requires direct observation (surveys and other research); reporting of events in surveillance systems; and reporting of diseases in hospitals and outpatient information systems, specific registries, etc. Various factors can affect the accuracy of the measurement of morbid events, namely: Morbidity indicators are designed to measure the occurrence of diseases, injuries, and disabilities in populations.

a. Data quality: Poor data quality makes it difficult to interpret and compare data from different areas of a country or among different countries. Data quality is compromised by the diversity of data sources on morbidity such as surveillance systems, routine public and private hospital in-patients and outpatients records; surveys prepared by national institutions, and research conducted by academic groups. b. The validity of measurement instruments: The accuracy of medical diagnostic tests (probability of diagnostic errors, such as false positives and false negatives) and the validity of the data collection instruments used in the surveys, as well as the coverage and quality of the information systems being used, can compromise the validity of measurement instruments. The use of more precise and accurate diagnostic tests can have a significant effect on the identification of cases 27 (incident or prevalent cases), and can highlight apparent, but non-real, changes in trends of those indicators. c. Disease severity: The severity of a disease affects the probability of it being diagnosed and reported. A disease can manifest itself with different degrees of severity, resulting in hospitalization (captured information) or no hospitalization (uncaptured information).

A disease can also occur more than once in a given lifetime which can result in attributing several episodes to a single person. d. Cultural norms: Cultural perceptions affect health-seeking behaviors and the manner in which different diseases are detected and managed by family members. e. Confidentiality: The desire for confidentiality on the part of patients and the omission of events in reports (e.g., cases of HIV infection and illegal abortion) affect the accuracy of data. f. Health information systems: The existence or absence of health information systems capable of generating reliable data from hospitals, outpatients, reportable diseases registries, cancer registries, and other data sources can also affect the accuracy of data.

b. Calculation method: The rate is the number of new diagnosis of HIV in a population during a specified period of time divided by the number of persons at-risk for developing HIV during that period of time. HIV diagnosis rate can be calculated per 100,000 and disaggregated by age, sex, ethnicity, and other variables. The definition of a confirmed case of AIDS is based on the specific criteria adopted by the countries.

c. Common sources: The data for the numerator normally come from national health surveillance systems and other disease reporting systems.

d. Examples of interpretation: This indicator estimates the risk of developing AIDS for members of a defined population during a specified time period. Analysis of this estimate at different points in time and in different population subgroups provide useful information to monitor the indicator's magnitude. This indicator can also provide preliminary evidence of the effectiveness of disease prevention policies, programs, and actions. As an example, it can also provide input for research on possible associations between the incidence of the disease on one hand, and risk behaviors and/or the extent of antiretroviral therapy coverage, on the other. Some examples of morbidity indicators, method of calculation, data sources and the purpose of the indicator are described below: HUMAN IMMUNODEFICIENCY VIRUS (HIV) DIAGNOSIS RATE 28

e. Calculation method: The number of existing cases of hypertension (per 100,000), divided by the number of persons in the population in a specified time. The rate can be disaggregated by sex, age groups, ethnicity and other variables of interest.

f. Common sources: The data for the numerator normally come from population surveys using representative (national or local) samples. Consequently, the indicator is an estimate of a sample and should be accompanied by the degree of certainty of the estimate and the amount of unexplained variability (confidence interval).

g. Examples of interpretation: This indicator estimates the prevalence of hypertension in the population. Analysis of this estimate over time and in different population subgroups makes it possible to monitor its magnitude and to forecast the demand for health services related to the disease, as well as to plan preventive and promotional interventions.

h. Calculation method: The number of hospital admissions, by groups of external causes (per 100,000) divided by the total number of hospital admissions for external causes in a specified time period. The proportion can be disaggregated by sex, age groups, ethnicity and other variables of interest.

i. Common sources: The data for this indicator's numerator and denominator normally come from the information systems of (national or local) hospitals. In interpreting the indicator, care must be taken to ensure that both public and private hospitals, are represented.

j. Examples of interpretation: This indicator estimates the proportion of all hospital admissions that are due to external causes. Analysis of this estimate over time and in different population subgroups makes it possible to monitor the indicator's magnitude and distribution as well as to measure the impact of preventive interventions. HYPERTENSION PREVALENCE RATE PROPORTION OF HOSPITAL ADMISSIONS FOR EXTERNAL CAUSES

MORTALITY INDICATORS Mortality in a specified place at a specific time can be measured in a number of ways such as in absolute numerical terms, as proportions, and as rates. Unlike morbidity, death is a unique and clearly identifiable event that reflects the occurrence and severity of a disease. It is advisable to disaggregate mortality data by characteristics, such as, cause, age, sex, place of residence and occurrence; and ethnic origin, among other factors. Mortality is the oldest and most common source of data on a population's health status. Mortality data collection is compulsory in all countries of the Americas, and the use of death certificates is mandatory. WHO has issued international recommendations concerning the variables that should be included in death certificates as well as the guidelines for the sequencing and medical coding of the diseases entered on the certificate. Most of the countries in the Region use the International Classification of Diseases, 10th revision (ICD-10) to code the causes of death, allowing for comparisons between and among different countries at different times. Various factors can affect the accuracy with which death and its characteristics are measured—particularly, the underlying cause of death5 (5). These factors include: Mortality data are a fundamental source of demographic, geographic and cause-ofdeath information. This data is used to quantify health problems as well as to define or monitor health priorities and goals. a. The existence of national legislation requiring the issuance of a death certificate as a legal prerequisite for authorizing burial. b. The accuracy of medical diagnostic tests (probability of diagnostic errors

such as false positives and false negatives); validity of data collection instruments; data coverage as well as the quality of the death certification and medical coding processes. c. The cultural norms that can affect the correct completion of death certificates can also lead to errors in classifying certain characteristics of deaths (causes, circumstances, etc.). d. The patients' desire for confidentiality (in cases such as suicide, HIV infection, illegal abortion, etc.), resulting in an omission of certain health-related events in surveys, death certificates, and other sources of mortality data. 5 Underlying cause of death has been defined as "(a) the disease or injury which initiated the train of events leading directly to death; or (b) the circumstances of the accident or violence which produced the fatal injury." 30 e. The training of the certifier and medical coder regarding the correct methods to complete and code deaths using the ICD guidelines. f. The competitive risk: depending on the age structure of the population and the most frequent causes of death in the younger age groups, certain causes of death may be obscured (reducing the probability that they will be noted), due to what is called "competing mortality6 risks." (6) For example, in a population with high numbers of death due to road traffic accidents, mortality among young men, and mortal events at more advanced ages, such as deaths from prostate cancer, are less likely to be noted. Examining age- and sex-specific rates can help minimize the effect of competing risks and foster a better understanding of mortality risks in the population. Table 2 on page 25 shows three categories of mortality indicators according to the underlying cause of death based on absolute numbers of deaths, and in relative terms (proportional mortality per hundred deaths and mortality per 10,000 inhabitants). Some examples of mortality indicators are listed below: INFANT MORTALITY RATE 6 A competing risk is an alternative result that has a clinical importance equal to or greater than the primary result, and that changes the probability of the result in question (6).

• **Calculation method:** number of deaths of children under 1 year of age (per thousand) divided by the total number of live births in the population during a given year.

• **Common sources:** The data for this indicator's numerator normally come from national mortality systems and vital registration systems, while the data for the denominator come from national live birth records systems and vital registration.

• **Examples of interpretation**: This indicator estimates the risk that infants born alive will die during the first year of life. Analysis of this estimate over time and in relation to different causes and age subgroups (neonatal, early neonatal, late neonatal, post-neonatal) makes it possible to monitor the magnitude of the indicator, while offering preliminary evidence of the effectiveness of policies, programs, and interventions to prevent infant deaths. 31 MATERNAL MORTALITY RATIO

• **Calculation method:** The number of maternal deaths—deaths of women due to causes and conditions associated with gestation, childbirth and puerperium (up to 42 days after the

pregnancy is taken to term)—per thousand, divided by number of live births in the population in a given year.

• **Common sources**: The data for this indicator's numerator normally come from national mortality and vital registration systems, with supplementary information from maternal mortality surveillance, while data for the denominator are obtained from national live birth records and vital registration systems.

• **Examples of interpretation:** This indicator, albeit indirectly, estimates the risk of a woman dying from pregnancy-related causes. It reflects access to services and the quality of care provided to women during pregnancy, childbirth, and puerperium. Analysis of this estimate over time for different subgroups of causes of death and different population subgroups makes it possible to monitor the indicator's magnitude. This type of analysis provides evidence of the effectiveness of policies, programs, and interventions to prevent maternal deaths. Most of these deaths are preventable with quality ante- and post-natal care and other improvements in the health services. MORTALITY FROM ACUTE RESPIRATORY INFECTION IN CHILDREN UNDER AGE FIVE

• **Calculation method:** The number of deaths due to acute respiratory infection (ARI) in children under age five (per thousand), divided by the number of children under five in the population in a given year.

• **Common sources:** The data for this indicator's numerator normally come from national health statistics units and national mortality data collection systems.

• **Examples of interpretation:** This indicator estimates the risk of death from ARI in children under age five, and reflects the quality of care provided to children. Analysis of this estimate over time and in different population subgroups makes it possible to monitor the indicator's magnitude. Additionally, the indicator provides preliminary evidence of the effectiveness of policies, programs, and interventions to prevent mortality from this cause. PROPORTIONAL MORTALITY FROM ILL-DEFINED CAUSES

• **Calculation method:** The number of deaths from ill-defined causes (per hundred), divided by total number of deaths in the population in a specified year.

• **Common sources:** Data for this indicator's numerator and denominator normally come from national health statistics units and national mortality information systems. 32

• **Examples of interpretation:** This indicator estimates the proportion of deaths that occur from ill-defined causes. Analysis of this indicator over time and in different population subgroups makes it possible to monitor the quality of information on underlying causes of death as well as the accuracy of the ICD coding.

INDICATORS OF BEHAVIORAL RISK FACTORS

In recent decades, changes in the demographic and epidemiological profiles of populations in many countries have led to an increase in the relative importance of chronic non-communicable diseases (CNCD) and their risk factors. This poses a challenge for the adaptation of health surveillance practices which have traditionally dealt with infectious diseases. The monitoring of mortality and morbidity due to CNCD plays an important role, but it is late in capturing the trends that reflect cumulative exposures during a lifetime. For example, the increase in mortality due to lung cancer was only observed in the developed countries decades after the epidemic increase in tobacco use, which, until then, was considered a harmless habit. Thus, health protection and promotion initiatives, in particular those related to CNCD, should focus on their more distal determinants in order to formulate and monitor risk factors indicators. Among the determinants of CNCD is a set of behavioral risk factors associated with lifestyles that are changeable through health promotion, surveillance, and primary health care. Examples of indicators of modifiable behavioral risk factors associated with the main CNCDs are: prevalence rates of smoking, sedentary lifestyle, unhealthy eating, and excessive alcohol consumption. WHO has indicated that these four risk behaviors are associated with the four groups of causes of death with the greatest incidence worldwide (cardiovascular diseases, neoplasms, diabetes, and respiratory diseases

Numerous risk factor indicators have been proposed, of which the following are examples. PREVALENCE OF CURRENT ADULT SMOKERS

• **Calculation method:** The number of adults (18 years of age and older) who smoke—regardless of the number of cigarettes smoked and frequency of smoking, and regardless of the duration of the habit—(per hundred), divided by the number of adults (18 years of age and older), which can mean either inhabitants or interviewees. 33 PREVALENCE OF REGULAR CONSUMPTION OF FRUITS AND VEGETABLES

• **Calculation method**: The number of adults (15 years of age and older) who report regular consumption of fruits and vegetables (per hundred), divided by the number of adults (15 years of age and older) interviewed. Regular consumption of fruits and vegetables is defined as consuming these foods five or more days per week.

• **Common sources:** The data for this indicator's numerator normally come from population surveys using representative (national or local) samples. Thus, the indicator is a sample estimate and

• **Common sources**: The data for this indicator's numerator normally come from base population surveys using representative (national or local) samples. As a consequence, the indicator is a sample estimate and should be accompanied by the degree of certainty of the estimate and the amount of unexplained variability (confidence interval).

• **Examples of interpretation:** This indicator estimates the frequency of current tobacco use in the adult population (18 years of age and older). Analysis of this indicator over time and in different population subgroups (age, sex, geographic region, educational level) makes it possible to monitor the indicator's magnitude and distribution. This indicator provides preliminary evidence of the effectiveness of anti-smoking policies, programs, and interventions. It also provides input for research on associations between smoking and the incidence of pulmonary diseases, cancers, and cardiovascular and other diseases. PREVALENCE OF INSUFFICIENT PHYSICAL ACTIVITY

• **Calculation method:** The number of insufficiently active people between the ages of 15 and 69 years (per hundred), divided by the number of interviewees between the ages of 15 and 69 years.

• **Common sources:** The data for this indicator's numerator normally come from population surveys using representative (national or local) samples. Thus, the indicator is a sample estimate and should be accompanied by the degree of certainty of the estimation and the amount of unexplained variation (confidence interval).

• **Examples of interpretation:** This indicator estimates the frequency of insufficiently active people between the ages of 15 and 69 years in the population. Analysis of this indicator over time and in different population subgroups makes it possible to monitor the indicator's magnitude. The indicator provides preliminary evidence of the effectiveness of the policies, programs, and interventions to promote regular physical activity and prevent sedentary lifestyles. Additionally, it provides input for studies on the association between insufficient physical activity and diabetes, different types of cancer, and ischemic and other diseases. 34 should be accompanied by the degree of certainty of the estimate and the amount of unexplained variability (confidence interval).

• **Examples of interpretation:** This indicator estimates the frequency of regular consumption of fruits and vegetables in the adult population (15 years of age and older). Analysis of this estimate over time and in different population subgroups makes it possible to monitor the indicator's magnitude. The indicator provides preliminary evidence of the effectiveness of policies, programs, and interventions to promote the consumption of fruits and vegetables. Additionally, it provides input for studies of the association of irregular or no consumption of fruits and vegetables with overweight and obesity as well as with the incidence of non-communicable diseases.

PREVALENCE OF EXCESSIVE ALCOHOL CONSUMPTION

• **Calculation method:** The number of people 15 years of age and older who report having engaged in excessive consumption of alcoholic beverages in the last 30 days (per hundred), divided by the number of people 15 years of age and older. The numerator is obtained by multiplying the number of drinks consumed on the same day multiplied by the number of days on

which this occurred, divided by the number of days in the reference period. The WHO definition of excessive consumption of alcoholic beverages is more than two drinks daily for men and more than one drink daily for women (8).

• **Common sources:** The data for this indicator's numerator normally come from population surveys employing representative (national or local) samples. Thus, the indicator is a sample estimate and should be accompanied by the degree of certainty of the estimate and the amount of unexplained variability (confidence interval).

• **Examples of interpretation:** This indicator estimates the frequency of excessive consumption of alcoholic beverages in the population 15 years of age and older. Analysis of this estimate over time and in different population subgroups makes it possible to monitor the indicator's magnitude. The indicator provides preliminary evidence of the effectiveness of policies, programs, and interventions to prevent excessive consumption of alcoholic beverages. Additionally, it provides input for studies designed to analyze the association between excessive alcohol consumption and the incidence of diseases associated with excessive alcohol consumption, such as, alcoholic cirrhosis, alcoholic pancreatitis, dementia, polyneuropathy, myocarditis, malnutrition, hypertension, myocardial infarction, and certain types of cancers (oral, pharynx, larynx, esophagus, liver), among other diseases.

HEALTH SERVICES INDICATORS Various conceptual frameworks provide different methods of formulating indicators that measure the quality of health services. Although this publication does not attempt to review all types of health service indicators, it recognizes the importance of these indicators. Globally, health care services and systems face numerous challenges such as, rising costs and expenditures (for both government and citizens). This shift is due largely to ever-increasing innovative treatments and the use of new technologies; the need to adapt services to new demand; the challenges created by demographic transitions and aging populations; epidemiological trends and changes in the patterns of diseases; nutritional needs and other behavioral factors; the sector's role in reducing (or increasing) health inequities; pressures from market demand; and litigation. Indicators of the performance and quality of health services fulfill countless functions and are essential for institutional and social monitoring. Consequently, there has been a vast proliferation of health care quality indicators (9). In discussing health services indicators, a pertinent question is "what is quality of care?" and from whose perspective should it be evaluated: users, health professionals, the general population, managers? This question can be pursued by consulting the relevant bibliographical sources at the end of this section. One of the most widely recognized approaches to evaluating the quality of health services uses the categories of "structure," "process," and "outcomes" proposed by Donabedian (10-11). Although this author's thinking focuses on the quality of medical care, the concepts are applicable more broadly to the quality of overall care provided by the health services. His proposed framework assumes that good health care facilities increase the probability that there will be good processes,

and that these in turn increase the probability of good health outcomes. Structure indicators reflect a system's relatively fixed characteristics, including the quality of material resources (buildings, equipment, and financial resources), human resources (number and qualifications), and organizational structure (organization of medical teams, quality control methods, and reimbursement methods) (10-11). Process indicators describe the important processes that contribute to the achievement of outcomes. These indicators describe the actual process of providing health care, and thus includes diagnostic activities, treatment recommendations, and care, among other factors. Health care outcome indicators reflect the state of health of patients and of the population—better knowledge on the part of patients; patients' behavioral changes related to self-care, and patient satisfaction with respect to care they have received. 36 Before formulating and monitoring any of the available indicators related to the quality of health services, there must be clarity regarding the expected (plausible) relationships between the structure and process indicators to be monitored, and the proposed outcome indicators. Furthermore, the concept of quality of care must guide a definition of the criteria and patterns sought by, and that are the object of, the structure and process indicators, based on an appropriate theoretical framework (valid and reasonable body of knowledge) (10-11). With regard to the difference between outcome indicators and impact indicators, while the former may be measured in the short term, the latter require a longer time for measurement. An example of this is a health promotion intervention for smoking cessation and prevention. A variable that can be used to measure outcomes could be the reduction of smoking prevalence rates and the measure of impact would be reduced lung cancer mortality.

RATIO OF HOSPITAL BEDS TO INHABITANTS

• **Calculation method:** The number of hospital beds (per thousand), divided by total inhabitants in a given year (typically adjusted for a six-month period).

• **Common sources:** The data for this indicator's numerator normally come from national statistics institutes, records of health institutions, and specific research on the structure of health services.

• **Examples of interpretation:** This indicator estimates the relationship between the supply (or potential coverage) of hospital beds and the population. It should be noted that in some countries, only public sector beds are included in the data set. Analysis of this indicator at different points in time and in different population subgroups makes it possible to monitor the ratio. This indicator provides preliminary evidence of the effectiveness of policies, programs, and actions to expand hospital capacity for admissions. It also provides input for research on the structure of hospital care. In general, hospital beds are concentrated in urban areas. Monitoring of this indicator can help place the issue of more equitable geographical distribution of hospital beds on the national negotiating agenda.

PROPORTION OF CESAREAN SECTIONS

• **Calculation method:** The number of births by cesarean section (per hundred), divided by total number of births in the population during a specific year. 37

• **Common sources:** The data for this indicator's numerator and denominator normally come from national birth information systems as well as from demographic and health surveys.

• **Examples of interpretation:** This indicator estimates cesarean sections as a proportion of all deliveries in the population. Analysis of the indicator at different points in time and in different population subgroups makes it possible to monitor its magnitude. This indicator provides preliminary evidence of the effectiveness of policies, programs, and actions to promote natural delivery. In addition, the indicator provides input for research on a society's procedures and practices with regard to accessibility to, and utilization of health care services during childbirth.

MORTALITY FROM VACCINE-PREVENTABLE DISEASES IN CHILDREN UNDER ONE YEAR OF AGE

• **Calculation method:** The number of deaths due to vaccine-preventable diseases in children under one year of age (per 100,000), divided by total number of births in the population in a specific year.

• **Common sources:** The data for this indicator's numerator normally come from national mortality information systems, while data for the denominator come from national birth information systems.

• **Examples of interpretation:** This indicator estimates the risk that children under one year of age will die from some cause among a group of diseases for which the health service has optimal immunization programs for children. Analysis of this indicator at different points in time and in different population subgroups makes it possible to monitor its magnitude. This indicator provides preliminary evidence of the effectiveness of policies, programs, and interventions to foster expanded access to vaccines. The indicator also provides input for research on the health services' procedures and practices with regard to monitoring coverage for immunization services for infants in the first year of life. Figure 2 summarize the fifteen indicators described in this section and how they can be classified for analysis.

Prevalence of current smokers Proportion Negative Prevalence (probability that a person in the base population at a specified time is a smoker) Risk factor Prevalence of insufficient physical activity Proportion Negative Prevalence (probability that a person in the base population at a specified time is insufficiently active) Risk factor Prevalence of regular consumption of fruits and vegetables Proportion Positive Prevalence (probability that a person in the base population at a specified time regularly consumes fruits and vegetables) Risk factor Prevalence of excessive alcohol consumption Proportion Negative Prevalence (probability that a person in the base

population at a specified time consumes alcohol excessively) Risk factor AIDS incidence rate Proportion Negative Incidence (risk that a person in the base population at a specified time will develop AIDS) Health status: morbidity Hypertension prevalence rate Proportion Negative Prevalence (probability that a person in the base population at a specified time is hypertensive) Health status: morbidity Proportion of hospitalizations for external causes Proportion Negative Prevalence (probability that a hospitalized person in the base population at a specified time was hospitalized for an external cause) Health status: morbidity Infant mortality rate Proportion Negative Incidence (risk that a live newborn in the base population will die during the first year of life) Health status: mortality Maternal mortality ratio Reason Negative Ratio of the number of maternal deaths to the number of live births. This is an indirect measure (proxy) of incidence (risk that a pregnant woman in the base population in a given time period will die from causes directly related to pregnancy) Health status: mortality Mortality from acute respiratory infection (ARI) in children under age five Proportion Negative Incidence (risk that a child under age five in the base population in a given time period will die from ARI) Health status: mortality Proportional mortality from ill-defined causes Proportion Negative Probability that a person in the base population at a specified time will die from an ill-defined cause Health status: mortality Ratio of number of hospital beds to inhabitants Ratio Positive Number of available hospital beds (potentially and on average) for every individual in the base population at a specified time)

Environmental health

Environmental health is the branch of public health concerned with all aspects of the natural and built environment affecting human health. In order to effectively control factors that may affect health, the requirements that must be met in order to create a healthy environment must be determined.[1] The major sub-disciplines of environmental health are environmental science, toxicology, environmental epidemiology, and environmental and occupational medicine.

Five basic disciplines generally contribute to the field of environmental health: environmental epidemiology, toxicology, exposure science, environmental engineering, and environmental law. Each of these five disciplines contributes different information to describe problems and solutions in environmental health. However, there is some overlap among them.

- Environmental epidemiology studies the relationship between environmental exposures (including exposure to chemicals, radiation, microbiological agents, etc.) and human health. Observational studies, which simply observe exposures that people have already experienced, are common in environmental epidemiology because humans cannot ethically be exposed to agents that are known or suspected to cause disease. While the inability to use experimental study designs is a limitation of environmental epidemiology, this discipline directly observes effects on human health rather than estimating effects from animal studies.[15] Environmental epidemiology is the study of the effect on human

health of physical, biologic, and chemical factors in the external environment, broadly conceived. Also, examining specific populations or communities exposed to different ambient environments, Epidemiology in our environment aims to clarify the relationship that exist between physical, biologic or chemical factors and human health.[16]

- Toxicology studies how environmental exposures lead to specific health outcomes, generally in animals, as a means to understand possible health outcomes in humans. Toxicology has the advantage of being able to conduct randomized controlled trials and other experimental studies because they can use animal subjects. However, there are many differences in animal and human biology, and there can be a lot of uncertainty when interpreting the results of animal studies for their implications for human health.[17]

- Exposure science studies human exposure to environmental contaminants by both identifying and quantifying exposures. Exposure science can be used to support environmental epidemiology by better describing environmental exposures that may lead to a particular health outcome, identify common exposures whose health outcomes may be better understood through a toxicology study, or can be used in a risk assessment to determine whether current levels of exposure might exceed recommended levels. Exposure science has the advantage of being able to very accurately quantify exposures to specific chemicals, but it does not generate any information about health outcomes like environmental epidemiology or toxicology.[18]

- Environmental engineering applies scientific and engineering principles for protection of human populations from the effects of adverse environmental factors; protection of environments from potentially deleterious effects of natural and human activities; and general improvement of environmental quality.[19]

- Environmental law includes the network of treaties, statutes, regulations, common and customary laws addressing the effects of human activity on the natural environment.[20][21]

Information from epidemiology, toxicology, and exposure science can be combined to conduct a risk assessment for specific chemicals, mixtures of chemicals or other risk factors to determine whether an exposure poses significant risk to human health (exposure would likely result in the development of pollution-related diseases). This can in turn be used to develop and implement environmental health policy that, for example, regulates chemical emissions, or imposes standards for proper sanitation.[22][page needed] Actions of engineering and law can be combined to provide risk management to minimize, monitor, and otherwise manage the impact of exposure to protect human health to achieve the objectives of environmental health policy.

Environmental health addresses all human-health-related aspects of the natural environment and the built environment. Environmental health concerns include:

- Biosafety.
- Disaster preparedness and response.
- Food safety, including in agriculture, transportation, food processing, wholesale and retail distribution and sale.
- Housing, including substandard housing abatement and the inspection of jails and prisons.
- Childhood lead poisoning prevention.
- Land use planning, including smart growth.
- Liquid waste disposal, including city waste water treatment plants and on-site waste water disposal systems, such as septic tank systems and chemical toilets.
- Medical waste management and disposal.
- Occupational health and industrial hygiene.
- Radiological health, including exposure to ionizing radiation from X-rays or radioactive isotopes.
- Recreational water illness prevention, including from swimming pools, spas and ocean and freshwater bathing places.
- Solid waste management, including landfills, recycling facilities, composting and solid waste transfer stations.
- Toxic chemical exposure whether in consumer products, housing, workplaces, air, water or soil.
- Vector control, including the control of mosquitoes, rodents, flies, cockroaches and other animals that may transmit pathogens.

According to recent estimates, about 5 to 10% of disability-adjusted life years (DALYs) lost are due to environmental causes in Europe. By far the most important factor is fine particulate matter pollution in urban air.[26] Similarly, environmental exposures have been estimated to contribute to 4.9 million (8.7%) deaths and 86 million (5.7%) DALYs globally.[27] In the United States, Superfund sites created by various companies have been found to be hazardous to human

and environmental health in nearby communities. It was this perceived threat, raising the specter of miscarriages, mutations, birth defects, and cancers that most frightened the publi

Public health

Public health is "the science and art of preventing disease, prolonging life and promoting health through the organized efforts and informed choices of society, organizations, public and private, communities and individuals".[1][2] Analyzing the determinants of health of a population and the threats it faces is the basis for public health.[3] The public can be as small as a handful of people or as large as a village or an entire city; in the case of a pandemic it may encompass several continents. The concept of health takes into account physical, psychological, and social well-being.[1][4]

Public health is an interdisciplinary field. For example, epidemiology, biostatistics, social sciences and management of health services are all relevant. Other important sub-fields include environmental health, community health, behavioral health, health economics, public policy, mental health, health education, health politics, occupational safety, disability, oral health, gender issues in health, and sexual and reproductive health.[5] Public health, together with primary care, secondary care, and tertiary care, is part of a country's overall healthcare system. Public health is implemented through the surveillance of cases and health indicators, and through the promotion of healthy behaviors. Common public health initiatives include promotion of hand-washing and breastfeeding, delivery of vaccinations, promoting ventilation and improved air quality both indoors and outdoors, suicide prevention, smoking cessation, obesity education, increasing healthcare accessibility and distribution of condoms to control the spread of sexually transmitted diseases.

There is a significant disparity in access to health care and public health initiatives between developed countries and developing countries, as well as within developing countries. In developing countries, public health infrastructures are still forming. There may not be enough trained healthcare workers, monetary resources, or, in some cases, sufficient knowledge to provide even a basic level of medical care and disease prevention.[6][7] A major public health concern in developing countries is poor maternal and child health, exacerbated by malnutrition and poverty coupled with governments' reluctance in implementing public health policies.

From the beginnings of human civilization, communities promoted health and fought disease at the population level.[8][9] In complex, pre-industrialized societies, interventions designed to reduce health risks could be the initiative of different stakeholders, such as army generals, the clergy or rulers. Great Britain became a leader in the development of public health initiatives, beginning in the 19th century, due to the fact that it was the first modern urban nation worldwide.[10] The public health initiatives that began to emerge initially focused

on sanitation (for example, the Liverpool and London sewerage systems), control of infectious diseases (including vaccination and quarantine) and an evolving infrastructure of various sciences, e.g. statistics, microbiology, epidemiology, sciences of engineering

Characteristics and components

Public health is a complex term, composed of many elements and different practices. It is a multi-faceted, interdisciplinary field.[10] For example, epidemiology, biostatistics, social sciences and management of health services are all relevant. Other important sub-fields include environmental health, community health, behavioral health, health economics, public policy, mental health, health education, health politics, occupational safety, disability, gender issues in health, and sexual and reproductive health.

Modern public health practice requires multidisciplinary teams of public health workers and professionals. Teams might include epidemiologists, biostatisticians, physician assistants, public health nurses, midwives, medical microbiologists, pharmacists, economists, sociologists, geneticists, data managers, environmental health officers (public health inspectors), bioethicists, gender experts, sexual and reproductive health specialists, physicians, and veterinarians.

The elements and priorities of public health have evolved over time, and are continuing to evolve. Different regions in the world can have different public health concerns at a given time.

Common public health initiatives include promotion of hand-washing and breastfeeding, delivery of vaccinations, suicide prevention, smoking cessation, obesity education, increasing healthcare accessibility and distribution of condoms to control the spread of sexually transmitted diseases

Health Education

Health Education is a sophisticated subject for national government, local authorities, health authorities and educational agencies. Health education plays a very important role in the growth of a healthy, inclusive and fair social, psychological and physical environment. It imitates current best practice, using an empowering, multi-dimensional, multi-professional approach which relates to all settings, organizations and parts and levels of society, including schools, colleges, universities, the health services, the community and the workplace.

Along with instructing society, health education is actually a fundamental necessity and finest approached method to make people competent to think about them simply. Being of main concern of society and government's impedes, it becomes indispensable during academic activities also, to edify the students with how to take care of itself as well as family and society. Making a healthy milieu in society along with keeping aware the people about various factors of

health is of course good decision of government as they appoint experts in almost entire region to make aware society for wellbeing and fitness.

Right through health education, key points are discussed in the society usually about responsibility of citizens and healthcare department, obligatory steps, nutrition, fitness, growth, social health etc. Schools, colleges are now added this topic in their syllabus as per government's norm as well as with the intention of making a healthy society along with organizing activities for health instruction.

Health Education in India

Health education in India is a state government liability with the national health policy laying down the necessary health policy in India. The central council of health and welfare plans the various health care projects and health department reform policies. The administration of health industry in India with the technical needs of the health sector is the responsibility of the ministry of health and welfare India. There are many schools, colleges and universities which provide health education in India. These educational institutes provide all facilities to their candidates during health education programs.

The main objective of health education programs is to inspire students to preserve and improve their health and trim down the health related risk behaviors. Health education is very necessary these days because the amount of people falling to common sicknesses increases year per year. Health education promotes one's responsibility to one's health by addressing health concerns such as nutrition, exercise, fitness, disease prevention, growth and development, environmental and social health, conflict resolution and violence protection.

To make a healthy society, health education is divided into many parts like health education for kids, adult health education, community health education and many more. Lots of health education activities are held by government and NGOs. Through health education activities people are made aware about their health. Health education is today's need. It helps to create a healthy society. Poor health is frequently caused by unhealthy environment, by lack of information and by wrong health services. Health education assists in obtaining good health by creating healthy environment, providing correct information and good health services.

Health education covers a large number of topics. Recent topics included in Health Education are:

- Sex and sexuality
- Mental health
- Occupational health education

- Health communication
- The arts and health
- Personal change
- Healthy eating
- User involvement
- Drug and tobacco education
- Ethical issues in health education
- Developing the evidence base

India Health and Nutrition Organizations

Food and Nutrition Board

Food and Nutrition Board is primarily engaged in Nutrition Education and Training Activities, Mass Awareness Campaigns, Promotion of Infant and Young Child Nutrition and Follow up Action on instruments of National Nutrition Policy.

http://wcd.nic.in/fnbweb.htm

Indian Council for Medical Research

Indian Council of Medical Research (ICMR), NewDelhi, the apex body in India for the formulation, coordination and promotion of biomedical research, is one of the oldest medical research bodies in the world.

http://www.icmr.nic.in

Indian Dietetic Association

Indian Dietetic Association is a scientific body consisting of nutritionists, dietitiansand workers in the allied health fields primarily working towards the importance of dietetics and nutrition in the maintenance of health, and in the prevention and treatment of diseases.

http://www.idaindia.com

National Institute of Nutrition

The National Institute of Nutrition (NIN) is one of the premier permanent research Institutes of the Indian Council of Medical Research (ICMR), an autonomous body under the aegisof the Ministry of Health and Family Welfare, Government of India. The history of this Institutes pans over eight decades.

http://www.ninindia.org/

Nutrition Foundation of India

The Nutrition Foundation of India (NFI) is an on-governmental voluntary agency dedicated to the upliftment of the nutrition status of Indians. It playsacatalyticrole of advocacy and education to focus attention on major nutritional problems; provides leads for practical action in overcoming these problems; and combats inadequacies in the implementation of ongoing nutrition programmes.

http://nutritionfoundationofindia.res.in

World Health Organisation India

WHO India was set up with avisiontobuilda strong, proactive, and technically excellent and dedicated WHO country team, partofaglobal network; provide leadership in health; and collaborate with governments, civil society and other partners

http://www.who.int/countries/ind/en/

India Commodity Organizations

Central Organisation for Oil Industry & Trade

The Central Organisation for Oil Industry &Trade (COOIT) is an Apex Organisation. Several leading associations in different arts of the country representing different segments of industry and trade such as Oil Milling Industry, Refining Industry, Vanaspati, Solvent Extraction, Soap Industry, Export-Import Trade etc. including Export Promotion Associations and Future Trading Exchanges in oilseeds/oils are members of the COOIT. Their main objective is to promote aid, help, encourage, develop and protect industry, commerce and trade in oilseeds, vegetable oils, oil cakes and allied products.

http://www.cooit.org

Oil Technologists' Association of India

The Oil Technologists' Association of India is a pioneer International Association in the field of Oils and allied products, is continuously engaged in disseminating the latest relevant information regarding the latest scientific and technical development by way of organizing symposia workshops, refresher courses, popular lectures etc. on current topic of common interest to its members.

http://www.otai.org

Unit - V

Hygiene is a set of practices performed to preserve health. According to the World Health Organization (WHO), "Hygiene refers to conditions and practices that help to maintain health and prevent the spread of diseases. Personal hygiene refers to maintaining the body's cleanliness. Hygiene activities can be grouped into the following: home and everyday hygiene, personal hygiene, medical hygiene, sleep hygiene, and food hygiene. Home and every day hygiene includes hand washing, respiratory hygiene, food hygiene at home, hygiene in the kitchen, hygiene in the bathroom, laundry hygiene, and medical hygiene at home.

Many people equate hygiene with "cleanliness", but hygiene is a broad term. It includes such personal habit choices as how frequently to take a shower or bath, wash hands, trim fingernails, and wash clothes. It also includes attention to keeping surfaces in the home and workplace clean, including bathroom facilities. Adherence to regular hygiene practices is often regarded as a socially responsible and respectable behavior, while neglecting proper hygiene can be perceived as unclean or unsanitary, and may be considered socially unacceptable or disrespectful, while also posing a risk to public health.

Hygiene is a practice related to lifestyle, cleanliness, health, and medicine. In medicine and everyday life, hygiene practices are preventive measures that reduce the incidence and spread of germs leading to disease.

Hygiene practices vary from one culture to another.

In the manufacturing of food, pharmaceuticals, cosmetics, and other products, good hygiene is a critical component of quality assurance.

The terms cleanliness and hygiene are often used interchangeably, which can cause confusion. In general, hygiene refers to practices that prevent spread of disease-causing organisms. Cleaning processes (e.g., handwashing) remove infectious microbes as well as dirt and soil, and are thus often the means to achieve hygiene.

Other uses of the term are as follows: body hygiene, personal hygiene, sleep hygiene, mental hygiene, dental hygiene, and occupational hygiene, used in connection with public health.

Home hygiene overview

Home hygiene pertains to the hygiene practices that prevent or minimize the spread of disease at home and other everyday settings such as social settings, public transport, the workplace, public places, and more. Hygiene in a variety of settings plays an important role in preventing the spread of infectious diseases. It includes procedures like hand hygiene, respiratory hygiene, food and

water hygiene, general home hygiene (hygiene of environmental sites and surfaces), care of domestic animals, and home health care (the care of those who are at greater risk of infection).

At present, these components of hygiene tend to be regarded as separate issues, although based on the same underlying microbiological principles. Preventing the spread of diseases means breaking the chain of infection transmission so that infection cannot spread. "Targeted hygiene" is based on identifying the routes of pathogen spread in the home and introducing hygiene practices at critical times to break the chain of infection. It uses a risk-based approach based on Hazard Analysis Critical Control Point (HACCP).

The main sources of infection in the home are people (who are carriers or are infected), foods (particularly raw foods), water, pets, and domestic animals. Sites that accumulate stagnant water – such as sinks, toilets, waste pipes, cleaning tools, and face cloths – readily support microbial growth and can become secondary reservoirs of infection, though species are mostly those that threaten "at risk" groups. Pathogens (such as potentially infectious bacteria and viruses – colloquially called "germs") are constantly shed via mucous membranes, feces, vomit, skin scales, and other means. When circumstances combine, people are exposed, either directly or via food or water, and can develop an infection

The main "highways" for the spread of pathogens in the home are the hands, hand and food contact surfaces, and cleaning cloths and utensils (e.g. fecal–oral route of transmission). Pathogens can also be spread via clothing and household linens, such as towels. Utilities such as toilets and wash basins were invented to deal safely with human waste but still have risks associated with them. Safe disposal of human waste is a fundamental need; poor sanitation is a primary cause of diarrhea disease in low-income communities. Respiratory viruses and fungal spores spread via the air.

Good home hygiene means engaging in hygiene practices at critical points to break the chain of infection. Because the "infectious dose" for some pathogens can be very small (10–100 viable units or even less for some viruses), and infection can result from direct transfer of pathogens from surfaces via hands or food to the mouth, nasal mucous, or the eye, "hygienic cleaning" procedures should be adopted to eliminate pathogens from critical surfaces.

Hand washing (or hand washing), also known as hand hygiene, is the act of cleaning one's hands with soap or hand wash and water to remove viruses/bacteria/microorganisms, dirt, grease, or other harmful and unwanted substances stuck to the hands. Drying of the washed hands is part of the process as wet and moist hands are more easily decontaminated. If soap and water are unavailable, hand sanitizer that is at least 60% (v/v) alcohol in water can be used as long as hands are not visibly excessively dirty or greasy. Hand hygiene is central to preventing the spread of infectious diseases in home and everyday life settings.

The World Health Organization (WHO) recommends washing hands for at least 20 seconds before and after certain activities. These include the five critical times during the day where washing hands with soap is important to reduce fecal-oral transmission of disease: after using the toilet (for urination, defecation, menstrual hygiene), after cleaning a child's bottom (changing diapers), before feeding a child, before eating and before/after preparing food or handling raw meat, fish, or poultry

Respiratory hygiene

Correct respiratory and hand hygiene when coughing and sneezing reduces the spread of pathogens particularly during the cold and flu season:

- Carry tissues and use them to catch coughs and sneezes, or sneeze into your elbow.
- Dispose of tissues as soon as possible.

Hygiene in the kitchen, bathroom and toilet

Routine cleaning of hands, food, sites, and surfaces (such as toilet seats and flush handles, door and tap handles, work surfaces, and bath and basin surfaces) in the kitchen, bathroom, and toilet rooms reduces the spread of pathogens.[20] The infection risk from flush toilets is not high, provided they are properly maintained, although some splashing and aerosol formation can occur during flushing, particularly when someone has diarrhea. Pathogens can survive in the scum or scale left behind on baths, showers, and washbasins after washing and bathing.

Thorough cleaning is important to prevent the spread of fungal infections. Molds can live on wall and floor tiles and on shower curtains. Mold can be responsible for infections, cause allergic reactions, deteriorate/damage surfaces, and cause unpleasant odors. Primary sites of fungal growth are inanimate surfaces, including carpets and soft furnishings.[21] Airborne fungi are usually associated with damp conditions, poor ventilation, or closed air systems.

Hygienic cleaning can be done through:

- Mechanical removal (i.e., cleaning) using a soap or detergent. To be effective as a hygiene measure, this process must be followed by thorough rinsing under running water to remove pathogens from the surface.
- Using a process or product that inactivates the pathogens in situ. Pathogen kill is achieved using a "micro-biocidal" product, i.e., a disinfectant or antibacterial product; waterless hand sanitizer; or by application of heat.

- In some cases combined pathogen removal with kill is used, e.g., laundering of clothing and household linens such as towels and bed linen.

Laundry hygiene

Laundry hygiene involves practices that prevent disease and its spread via soiled clothing and household linens such as towels. Items most likely to be contaminated with pathogens are those that come into direct contact with the body, e.g., underwear, personal towels, facecloths, nappies. Cloths or other fabric items used during food preparation, or for cleaning the toilet or cleaning up material such as feces or vomit are a particular risk.

Microbiological and epidemiological data indicates that clothing and household linens are a risk factor for infection transmission in home and everyday life settings as well as institutional settings. The lack of quantitative data linking contaminated clothing to infection in the domestic setting makes it difficult to assess the extent of this risk. This also indicates that risks from clothing and household linens are somewhat less than those associated with hands, hand contact and food contact surfaces, and cleaning cloths, but even so these risks need to be managed through effective laundering practices. In the home, this should be carried out as part of a multibarrier approach to hygiene which includes hand, food, respiratory, and other hygiene practices.

Infectious disease risks from contaminated clothing can increase significantly under certain conditions, e.g., in healthcare situations in hospitals, care homes, and the domestic setting where someone has diarrhoea, vomiting, or a skin or wound infection. The risk increases in circumstances where someone has reduced immunity to infection.

Hygiene measures, including laundry hygiene, are an important part of reducing spread of antibiotic-resistant strains of infectious organisms. In the community, otherwise-healthy people can become persistent skin carriers of MRSA, or faecal carriers of enter bacteria strains which can carry multi-antibiotic resistance factors (e.g. NDM-1 or ESBL-producing strains). The risks are not apparent until, for example, they are admitted to hospital, when they can become "self infected" with their own resistant organisms following a surgical procedure. As persistent nasal, skin, or bowel carriage in the healthy population spreads "silently" across the world, the risks from resistant strains in both hospitals and the community increases. In particular the data indicates that clothing and household linens are a risk factor for spread of S. aureus (including MRSA and PVL-producing MRSA strains), and that effectiveness of laundry processes may be an important factor in defining the rate of community spread of these strains. Experience in the United States suggests that these strains are transmissible within families and in community settings such as prisons, schools, and sport teams. Skin-to-skin contact (including unabraded skin) and indirect contact with contaminated objects such as towels, sheets, and sports equipment seem to represent the mode of transmission.

During laundering, temperature and detergent work to reduce microbial contamination levels on fabrics. Soil and microbes from fabrics are severed and suspended in the wash water. These are then "washed away" during the rinse and spin cycles. In addition to physical removal, micro-organisms can be killed by thermal inactivation which increases as the temperature is increased. Chemical inactivation of microbes by the surfactants and activated oxygen-based bleach used in detergents contributes to the hygiene effectiveness of laundering. Adding hypochlorite bleach in the washing process achieves inactivation of microbes. A number of other factors can contribute including drying and ironing.

Drying laundry on a line in direct sunlight is known to reduce pathogens.

In 2013 the International Scientific Forum on Home Hygiene reviewed 30 studies of the hygiene effectiveness of laundering at temperatures ranging from room temperature to 70 °C (158 °F), under varying conditions. A key finding was the lack of standardization and control within studies, and the variability in test conditions between studies such as wash cycle time, number of rinses, and other factors. The consequent variability in the data (i.e., the reduction in contamination on fabrics) in turn makes it extremely difficult to propose guidelines for laundering with any confidence. As a result, there is significant variability in the recommendations for hygienic laundering given by different agencies.

Medical hygiene at home

Medical hygiene pertains to hygiene practices that prevent or minimize disease and the spreading of disease in relation to administering medical care to those who are infected or who are more at risk of infection in the home. Members of "at-risk" groups are cared for at home by a carer who may be a household member and who requires a good knowledge of hygiene. People with reduced immunity to infection, who are looked after at home, make up an increasing proportion of the population (as of 2009, up to 20%). The largest proportion are the elderly who have co-morbidities that reduce their immunity to infection. It also includes the very young, patients discharged from hospital, taking immuno-suppressive drugs, or using invasive systems, etc. For patients discharged from hospital, or being treated at home, special "medical hygiene" procedures may need to be performed for them, such as catheter or dressing replacement, which puts them at higher risk of infection.

Antiseptics may be applied to cuts, wounds, and abrasions of the skin to prevent the entry of harmful bacteria that can cause sepsis. Day-to-day hygiene practices, other than special medical hygiene procedures, are no different for those at increased risk of infection than for other family members. The difference is that, if hygiene practices are not correctly carried out, the risk of infection is much greater.

Chemical disinfectants are products that kill pathogens. If the product is a disinfectant, the label on the product should say "disinfectant" or "kills" pathogens. Some commercial products, e.g. bleaches, even though they are technically disinfectants, say that they "kill pathogens" but are not actually labelled as "disinfectants". Not all disinfectants kill all types of pathogens. All disinfectants kill bacteria (called bactericidal). Some also kill fungi (fungicidal), bacterial spores (sporicidal), or viruses (virucidal).

An antibacterial product acts against bacteria in some unspecified way. Some products labelled "antibacterial" kill bacteria while others may contain a concentration of active ingredient that only prevents them from multiplying. It is, therefore, important to check whether the product label states that it "kills bacteria". An antibacterial is not necessarily anti-fungal or anti-viral unless this is stated on the label.

The term sanitizer has been used to define substances that both clean and disinfect. More recently this term has been applied to alcohol-based products that disinfect the hands (alcohol hand sanitizers). Alcohol hand sanitizers however are not considered to be effective on soiled hands.

The term biocide is a broad term for a substance that kills, inactivates or otherwise controls living organisms. It includes antiseptics and disinfectants, which combat micro-organisms, and pesticides.

Personal hygiene involves those practices performed by a person to care for their bodily health and well-being through cleanliness. Motivations for personal hygiene practice include reduction of personal illness, healing from illness, optimal health and sense of wellbeing, social acceptance, and prevention of spread of illness to others. What is considered proper personal hygiene can be culture-specific and may change over time.

Practices that are generally considered proper hygiene include showering or bathing regularly, washing hands regularly and especially before handling food, washing scalp hair, keeping hair short or removing hair, wearing clean clothing, brushing teeth, and trimming fingernails and toenails. Some practices are gender-specific, such as by a woman during her menstruation.

Toiletry bags hold body hygiene and toiletry supplies.

Anal hygiene is the practice that a person performs on their anal area after defecation. The anus and buttocks may be either washed with liquids or wiped with toilet paper, or by adding gel wipe to toilet tissue as an alternative to wet wipes or other solid materials in order to remove remnants of feces.

People tend to develop a routine for attending to their personal hygiene needs. Other personal hygienic practices include covering one's mouth when coughing, disposal of soiled tissues appropriately, making sure toilets are clean, and making sure food handling areas are clean, besides other practices. Some cultures do not kiss or shake hands in order to reduce transmission of bacteria by contact.

Personal grooming extends personal hygiene as it pertains to the maintenance of a good personal and public appearance, which need not necessarily be hygienic. It may involve, for example, using deodorants or perfume, shaving, or combing.

Hygiene of internal ear canals

Excessive cleaning of the ear canals can result in infection or irritation. The ear canals require less care than other parts of the body because they are sensitive and mostly self-cleaning. There is a slow and orderly migration of the skin lining the ear canal from the eardrum to the outer opening of the ear. Old earwax is constantly being transported from the deeper areas of the ear canal out to the opening where it usually dries, flakes, and falls out. Attempts to clean the ear canals through the removal of earwax can push debris and foreign material into the ear that the natural movement of ear wax out of the ear would have removed.

Oral hygiene

It is recommended that all healthy adults brush twice a day, softly, with the correct technique, replacing their toothbrush every few months (~3).

There are a number of common oral hygiene misconceptions. The National Health Service (NHS) of England recommends not rinsing the mouth with water after brushing – only to spit out excess toothpaste. They claim that this helps fluoride from toothpaste bond to teeth for its preventative effects against tooth decay. It is also not recommended to brush immediately after drinking acidic substances, including sparkling water. It is also recommended to floss once a day, with a different piece of floss at each flossing session. The effectiveness of amorphous calcium phosphate products, such as Tooth Mousse, is in debate. Visits to a dentist for a checkup every year at least are recommended

Sleep hygiene is the recommended behavioral and environmental practices that promote better quality sleep. These recommendations were developed in the late 1970s as a method to help people with mild to moderate insomnia, but, as of 2014, the evidence for effectiveness of individual recommendations is "limited and inconclusive". Clinicians assess the sleep hygiene of people who present with insomnia and other conditions, such as depression, and offer recommendations based on the assessment. Sleep hygiene recommendations include establishing a regular sleep schedule, using naps with care, not exercising physically or mentally too close to

bedtime, and avoiding alcohol as well as nicotine, caffeine, and other stimulants in the hours before bedtime. Further recommendations include limiting worry, limiting exposure to light in the hours before sleep, getting out of bed if sleep does not come, not using the bed for anything but sleep, and having a peaceful, comfortable, and dark sleep environment.

Personal care services hygiene

Personal care services hygiene pertains to the care and use of instruments used in the administration of personal care services to people:

Personal care hygiene practices include:

- Sterilization of instruments used by service providers including hairdressers, aestheticians, and other service providers
- Sterilization by autoclave of instruments used in body piercing and tattooing
- Cleaning hands

Challenges

Excessive body hygiene is a possible sign of obsessive–compulsive disorder. Neglecting bodily hygiene, or the cleanliness of one's environment, may be a sign of major depression and other psychological disorders.

Hygiene hypothesis and allergies

Although media coverage of the hygiene hypothesis has declined, popular folklore continues to sometimes assert that dirt is healthy and hygiene unnatural. This has caused health professionals to be concerned that hygiene behaviors which are the foundation of public health are being undermined. In response to the need for effective hygiene in home and everyday life settings, the International Scientific Forum on Home Hygiene developed a "risk-based" or targeted approach to home hygiene that seeks to ensure that hygiene measures are focused on the places and times most critical for infection transmission. While targeted hygiene was originally developed as an effective approach to hygiene practice, it also seeks, as far as possible, to sustain "normal" levels of exposure to the microbial flora of our environment to the extent that is important to build a balanced immune system.

Although there is substantial evidence that some microbial exposures in early childhood can in some way protect against allergies, there is no evidence[citation needed] that humans need exposure to harmful microbes (infection) or that it is necessary to develop a clinical infection. Nor is there evidencethat hygiene measures such as hand washing, food hygiene, etc., are linked to

increased susceptibility to atopic disease. If this is the case, there is no conflict between the goals of preventing infection and minimizing allergies. A consensus is now developing among expertsthat the answer lies in more fundamental changes in lifestyles that have led to decreased exposure to certain microbial or other species, such as helminths, that are important for development of immuno-regulatory mechanisms. There is still much uncertainty as to which lifestyle factors are involved.

Medical hygiene

Medical hygiene pertains to hygiene practices related to the administration of medicine and medical care that prevents or minimizes the spread of disease.

Medical hygiene practices include:

- I of infectious persons or materials to prevent spread of infection
- Sterilization of instruments used in surgical procedures
- Proper bandaging and dressing of injuries
- Safe disposal of medical waste
- Disinfection of reusables (i.e., linen, pads, uniforms)
- Scrubbing up, handwashing, especially in an operating room, but in more general health-care settings as well, where diseases can be transmitted
- Ethanol-based sanitizers

Most of these practices were developed in the 19th century and were well-established by the mid-20th century. Some procedures (such as disposal of medical waste) were refined in response to late-20th century disease outbreaks, notably AIDS and Ebola.

Food hygiene

Culinary hygiene (or food hygiene) pertains to practices of food management and cooking that prevent food contamination, prevent food poisoning, and minimize the transmission of disease to other foods, humans, or animals. Culinary hygiene practices specify safe ways to handle, store, prepare, serve, and eat food.

Food safety (or food hygiene) is used as a scientific method/discipline describing handling, preparation, and storage of food in ways that prevent foodborne illness. The occurrence of two or more cases of a similar illness resulting from the ingestion of a common food is known as a food-borne disease outbreak. This includes a number of routines that should be followed to avoid potential health hazards. In this way, food safety often overlaps with food defense to prevent harm to consumers. The tracks within this line of thought are safety between industry and the market and then between the market and the consumer. In considering industry-to-market practices, food safety considerations include the origins of food including the practices relating to food labeling, food hygiene, food additives and pesticide residues, as well as policies on biotechnology and food and guidelines for the management of governmental import and export inspection and certification systems for foods. In considering market-to-consumer practices, the usual thought is that food ought to be safe in the market and the concern is safe delivery and preparation of the food for the consumer. Food safety, nutrition and food security are closely related. Unhealthy food creates a cycle of disease and malnutrition that affects infants and adults as well

Water, Sanitation and Hygiene (WASH) for all Initiative

The core activity of WASH emphasizes the teaching of basic sanitation and hygiene to communities and school children with a particular focus on girls' education and gender equality, as a necessary complement to the success of water and sanitation infrastructure projects.

This integrated approach to the delivery of basic services is the product of "lessons learned" from the International Drinking Water Supply and Sanitation Decade (1981-1990). While advancements were made in increasing the access to safe drinking water, less progress was made on the provision of sanitation services and in hygiene education and training. These valuable lessons are now the focus of a global effort to improve the health and productivity of the urban and rural poor in the developing world.

The core activity is complemented by a recent initiative to deliver by 2015, safe, affordable and reliable water, sanitation to over 1.1 billion people who have no access to water supply and to more than 2.6 billion people who have no adequate sanitation. A WASH Partnership, jointly agreed between the Water Supply and Sanitation Collaborative Council (WSSCC) and UNICEF, seeks to contribute towards the achievement of the Millennium Development Goals (MDG) seven, target 10, through a combination of actions directed at influencing policy at national level and global level, and effecting behavioural change at the grassroots level. The WASH Partnership supports coalition-building among multi-stakeholders at national and grassroots level. With advocacy at the centre of these main activities, it focuses on demand-creation, behavioural change, capacity building and implementation, to reach 15 million people with sanitation and hygiene by Partners

Governments:

Government of Bangladesh
Government of Brazil
Government of Bulgaria
Government of Burkina Faso
Government of Colombia
Government of Ethiopia
Government of Ghana
Government of Guatemala
Government of Guyana
Government of India
Government of Indonesia
Government of Jamaica
Government of Kenya
Government of Kyrgyzstan
Government of Lesotho
Government of Madagascar
Government of Malawi
Government of Maldives
Government of Mauritius
Government of Morocco
Government of Mozambique
Government of Myanmar
Government of Nepal
Government of Nigeria
Government of Philippines
Government of Senegal
Government of South Africa
Government of Sri Lanka
Government of Trinidad and Tobago
Government of Uganda
Government of Ukraine
Government of United Republic of Tanzania - Tanzania
Government of Uzbekistan
Government of Zimbabwe

Major Groups:

CINARA (Colombia)

Centre for Environment Education (CEE) (India)

Sulabh International (India)

TERI (India)

NETWAS (Kenya)

Nepal Water for Health (NEWAH) (Nepal)

Gender and Water Alliance (GWA) (Netherlands)

IRC International Water and Sanitation Centre (Netherlands)

Streams of Knowledge (Philippines)

Centre Regional pour l'Eau Potable et l'Assainissement (CREPA) (Senegal)

Water Research Commission (WRC) (South Africa)

International Water Management Institute (IWMI) (Sri Lanka)

SANDEC/EAWAG (Switzerland)

SKAT (Switzerland)

Tearfund (United Kingdom of Great Britain and Northern Ireland)

Television Trust for the Environment (United Kingdom of Great Britain and Northern Ireland)

Water Aid (United Kingdom of Great Britain and Northern Ireland)

Water, Environment and Development Centre (WEDC) (United Kingdom of Great Britain and Northern Ireland)

UN System:

United Nations Educational, Scientific, Cultural Organization (UNESCO) (France)

United Nations Human Settlements Programme (UN-Habitat) (Kenya)

Water and Sanitation Program (WSP)-Africa, World Bank (Kenya)

World Health Organization (WHO) (Switzerland)

UN- Water Interagency Task Force on Gender and Water (United States of America)

United Nations (UN) / Department of Economic and Social Affairs (DESA) (United States of America)

United Nations Children's Fund (UNICEF) (United States of America)

United Nations Department of Public Information (DPI) (United States of America)

United Nations Development Programme (UNDP) (United States of America)

World Bank Group (United States of America)

Other intergovernmental organizations:

Water Supply and Sanitation Collaborative Council (WSSCC) (Switzerland)

European Union (Belgium)

African Development Bank (AfDB) (Ethiopia)

World Water Council (WWC) (France)

Water and Sanitation program (WSP) Africa, World bank (Kenya)

Asian Development Bank (ADB) (Philippines)

Global Water Partnership (GWP) (Sweden)

Swedish International Water Institute (SIWI) (Sweden)

South East Asia Ministers of Education Organization (SEAMEO) (Thailand)

WELL (United Kingdom of Great Britain and Northern Ireland)

Inter-American Development Bank (United States of America)

Other:

International Secretariat for Water (ISW) (Canada)

Global Rainwater Harvesting Collective (GRWHC) (India)

International Federation of Environmental Journalists (IFEJ) (India)

London School of Hygiene and Tropical Medicine (LSHTM) (United Kingdom of Great Britain and Northern Ireland)

International Trachoma Initiative (ITI) (United States of America)

Rural community health

In medicine, rural health or rural medicine is the interdisciplinary study of health and health care delivery in rural environments. The concept of rural health incorporates many fields, including wilderness medicine, geography, midwifery, nursing, sociology, economics, and tele health or telemedicine.

On average, people who live in rural areas have different health care needs than people in urban or suburban areas, and rural areas often suffer from a lack of access to care. There are differences in demography, geography, individual healthy behaviors, population density, socioeconomics, and the work force. For example, many rural communities have different age distributions Specifically, they have higher dependency ratios, with a higher percent of residents either too young or too old to work. People living in rural areas also tend to have less education, lower socioeconomic status, higher rates of alcohol and tobacco use, and higher mortality rates when compared to their urban counterparts. In many regions of the world, there is a higher rate of poverty among rural dwellers, and poverty is one of the biggest social determinants of health.

Many countries have made it a priority to increase funding for research on rural health. These efforts have led to the development of several research institutes with rural health mandates, including the Centre for Rural and Northern Health Research in Canada, Countryside Agency in the United Kingdom, the Institute of Rural Health in Australia, and the New Zealand Institute of Rural Health. These research efforts are designed to help identify the healthcare needs of rural communities and provide policy solutions to ensure those needs are met. The concept of incorporating the needs of rural communities into government services is sometimes referred to as rural proofing.

There is no international standard for defining rural areas, and standards may vary even within an individual country. The most commonly used methodologies fall into two main camps: population-based factors and geography-based factors. The methodologies used for identifying rural areas include population size, population density, distance from an urban centre, settlement patterns, labor market influences, and postal codes.

The reported number of individuals living in rural areas can vary greatly depending on which set of standards is applied. Canada's rural population can be identified as anywhere from 22% to 38% of the population. In the United States the variation is greater; between 17% and 63% of the population may be identified as living in rural areas. The lack of consensus makes it difficult to identify the number of individuals who are in need of rural healthcare services

Studies show that in many parts of the world, life expectancy is lower in rural areas than urban areas. There is some evidence to suggest that the gap may be widening in these countries as economic conditions and health education has improved in urban areas.

From 1986 through 1996 in Canada, among people assigned male at birth, life expectancy was 2.79 years lower among those in the most rural areas versus the most urban areas. Before or during the 2000s in Australia, among all people, it was 6 years lower. Before or during the 1990s in China, among people assigned female at birth, it was 1.13 years lower. But among those assigned male, it was 10.74 years.

On one hand, there are some countries where the trend is reversed. For example, from 2000 through 2007 in the United Kingdom, people assigned female lived about 1.5 more years, and people assigned male lived 2 more. On the other hand, that statistic comes from comparing upper class rural people to upper class urban people. Many of the upper class rural people presumably acquired their wealth by working in urban areas, and they moved to the countryside for retirement. Around the world, people who are born in rural areas in low income households struggle more to get out of poverty

Personal health

It is not only geography, population density, and other large scale differences that impact rural health. Individuals who live in rural areas can improve their lives by making certain personal choices. Rural people are less likely to consume enough fruits and vegetables and to do enough aerobic exercise. In addition, they are more likely to have obesity, to smoke and be exposed to second hand smoke, and to use alcohol and tobacco.


Bangladeshi boys

Physical environment

In many countries a lack of critical infrastructure and development in rural areas can impair rural health. The physical isolation of some rural communities coupled with the lack of infrastructure makes it increasingly difficult for those that live in these regions to travel to seek care in clinics and hospitals. Insufficient wastewater treatment, lack of paved roads, and exposure to agricultural chemicals have been identified as additional environmental concerns for those living in rural locations. The Australian Institute of Health and Welfare reports lower water quality and increased crowding of households as factors affecting disease control in rural and remote locations. In hot climates, some scholars are exploring how hybrid solar energy systems could to provide power to different kinds of healthcare equipment. The solar energy solution would dramatically reduce costs in tropical climate countries such as the Philippines as well as utilize their proximity to the equator. This allows for extending business hours in rural health clinics which could better accommodate community members' schedules making services more inclusive and equitable.

Environmental sanitation

Environmental sanitation was an instrumental concept in the founding of the World Health Organization and was defined as the control of all those factors in the physical environment which may exercise a harmful effect on human beings' physical development, health and survival. This broad conceptualization of environment and health requires an expansion of the water, sanitation and hygiene space to include vector control, solid waste and animal excreta management and drainage. This definition also involves recognizing related layers of distal environmental health factors (including the natural and built environment, industrial waste and pollution, food safety and air quality) that are increasingly relevant considering population growth, resource use intensification, migration and climate change. The primary reason for returning to environmental sanitation as a framing concept is that water, sanitation and hygiene has become narrowly focused on – and constrained by – a few pathways of disease transmission that are used to justify a limited set of mostly ineffective interventions at the household level. The global health community needs to consider adjacent factors that determine whether, how and under what circumstances water, sanitation and hygiene can deliver improvements in public health at scale. We need to give greater recognition of the interconnected nature of human health and the natural and built environments and greater attention to community-level exposures. An environmental sanitation perspective would allow interventions to consider the community-level factors that contribute towards infection to sufficiently transform services and improve health outcomes.

Sanitation describes the factors that affect people's health related to drinking water and the "treatment and disposal of human faeces and sewage." By creating a sanitary environment that hinders the spread of diseases, mainly through the faecal-oral pathway, sanitation systems seek to protect human health. All the locations are crowded with people when we visit them, whether it be a market square, a park, an airport, a hospital, a theatre, a train station, or a bus stop.

Sanitation in Public Places

Bus terminals, train stations, and fairgrounds are public gathering locations where proper sanitation and hygiene facilities should be present. The government has placed sufficient restrooms and trash cans in most public areas. When offering public restrooms in areas with a large number of people, the following factors should be taken into account.

- There should be sufficient restrooms with soap and hand washing facilities. In these facilities, cleanliness and hygiene should be upheld.

- The number of trash cans should be sufficient. The correct and routine disposal of trash is required. It shouldn't be allowed to build up as it can draw flies and other pests.

- Health and hygiene should be promoted straightforwardly and appealingly using posters, hoardings, and other types of advertising in public spaces. People should be educated on fundamental hygienic practices, including hand washing, using trash cans and restrooms, etc.

Sanitation in Rural Areas

Most people in developing and impoverished nations lack access to toilets, bathrooms, and functional drainage systems in their homes and public spaces. Approximately 70% of people in our nation are considered to be poor. There are no toilets in their residences. Both men and women use the restrooms in public.

They defecate in fields, railroad tracks, riverbeds, and vacant ground. These waste products in the open fields damage surface and groundwater when they mix with rainwater and enter the soil. People that drink this contaminated water become ill with a variety of water-borne illnesses, including dysentery, typhoid, cholera, polio, meningitis, hepatitis, etc.

How to Maintain Sanitation in Public Places

The local municipality is in charge of upholding sanitary conditions in public areas, but we can also support their efforts. By adopting some basic habits, we can improve sanitation in public areas:

- Do not discard trash in public areas, including paper, food scraps, bags, empty plastic water bottles, etc.
- It is required to put trash in the proper trash cans. However, if there isn't a trash can nearby, we must bring it home and put it in the trash can.
- We shouldn't spit in public spaces.
- After eating a banana, you are not permitted to discard the peel in a public area or on the side of the road.
- Never relieve beside a roadside.

Importance of Sanitation

In public spaces, it's crucial to practice good hygiene since dirt can spread contamination. Insects and mosquitoes can breed in wastewater that has been left outside. Diseases like cholera and dysentery are primarily brought on by a lack of hygiene. Waste production is a necessary component of human activities. However, we can control the quantity and quality of garbage produced. We can assist with proper waste disposal as well.

Hygiene vs Sanitation

Both phrases essentially apply to illness prevention and health promotion. Hygiene and the human body are commonly connected. We use the word "hygiene" for our physical well-being when we wash our teeth, take regular baths, and perform other similar activities. The most common measure to stop the spread of microorganisms, which falls under the heading of hygiene, is hand washing.

In contrast, "sanitation" refers to removing trash, including human and environmental waste. There are many distinct forms of sanitation, such as basic sanitation, which deals with handling human waste like faeces; on-site sanitation, which describes how people handle and dispose of various types of waste; food sanitation, which deals with treating food appropriately; environmental sanitation, which includes industrial sanitation; and ecological sanitation.

Key Features

- Sanitation is the term used to describe issues with public health related to drinking water and the "treatment and disposal of human faeces and sewage.
- Bus terminals, train stations, and fairgrounds are examples of public gathering locations where proper sanitation and hygiene facilities should be present.
- Most people in developing and impoverished nations lack access to toilets, bathrooms, and functional drainage systems in their homes and public spaces.
- By not littering and placing trash in trash cans, each individual can contribute significantly to reducing and managing waste. Excreta must be properly disposed of.
- Encourage others to produce less garbage, to dispose of it properly, etc.

The basic rules for sanitation in public places are:

1) There should be sufficient toilet facilities.

2) The toilet facilities should be arranged in separate blocks for men and women.

3) The men’s toilet block should have urinals and toilet compartments. The women’s block should have toilet compartments only.

4) There must be a wash basin with clean water.

5) There must be a clean and reliable water supply for hand washing, personal hygiene and flushing of the toilet facilities.