**Unit – 1**

**HEALTH EDUCATION**

( Definition of Health, Health Education. Aims, objectives and Principles of Health Education. Concepts of health: Biomedical , ecological and holistic concepts. Dimensions of Health: physical, mental and social dimensions. Factors effecting Health, School Health Programme : Health Instructions, Health Supervision, Health Service. Balanced diet, constituents of balanced diet. )

**Historical development**

While the history of health education as an emerging profession is only a little over one hundred years old, the concept of educating about health has been around since the dawn of humans. It does not stretch the imagination too far to begin to see how health education first took place during pre-historic era. Someone may have eaten a particular plant or herb and become ill. That person would then warn (educate) others against eating the same substance. Conversely, someone may have ingested a plant or herb that produced a desired effect. That person would then encourage (educate) others to use this substance. At the time of Alma Ata declaration of Primary Health Care in 1978, health education was put as one of the components of PHC and it was recognized as a fundamental tool to the attainment of health for all. Adopting this declaration, Ethiopia utilizes health education as a primary means of prevention of diseases and promotion of health.

Before discussing about health education, it is imperative to conceptualize what health itself means. Health is a highly subjective concept. Good health means different things to different people, and its meaning varies according to individual and community expectations and context. Many people consider themselves healthy if they are free of disease or disability. However, people who have a disease or disability may also see themselves as being in good health if they are able to manage their condition so that it does not impact greatly on their quality of life. Every individual is concerned with health from the cradle to the grave. The life span can be lengthened if we require a little knowledge of how we can maintain it. So it is important to understand the meaning of health.

HEALTH:

Some persons regard health as the mere absence of disease; it is a condition of safe and sound. The dictionary meaning is “the state of being hale and sound in body, mind or soul especially free from physical disease or pain”. It is also defined as the state in which mental and physical activities of the body are adjusted satisfactorily to the environment.

DIFINITIONS:

According to British Dictionary, “The state of being bodily and mentally vigorous and free from disease.”

According to the Encyclopedia of Health, “It is that state in which the individual is able to mobilize at his resources-intellectual, emotional and physical – for optimum daily living.”

According to J.F. William *“*Health is the quality of life that enables the individual to live most and serve best*.”*

According to World Health Organization (WHO) “Health is a state of complete Physical, mental and social well-being and not merely the absence of disease or infirmity.”

The state of health is explained as “Sound body & Mind or Freedom from disease. Health is defined as “State of complete physical, mental and social well-being”. Health Education is knowledge about health and diseases. Health is needed for everyone in the world irrespective of age, sex, education, class creed and community.

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**Meaning and Definitions of Health Education**

In the words of Sophe, 1976 “Health education is concerned with the health related behavior of people. Therefore, it must take into account the forces that affect those behaviours, and the role of human behavior in the promotion of health and the prevention of disease. As profession it uses educational processes to effect change or to reinforce health practices of individuals, families, groups, organizations, communities and larger social system.

Health education is therefore an essential component in the educational process:

According the dictionary of education, health education is that part of education which if followed, enables us to maintain health.

According to the report of the President of Committee on Health Education, New York, ‘Health Education is the process that bridges gap between health information and health practices.

DEFINITIONS:

According to Thomas Wood Health Education is defined, as “Health education is the sum of experiences, which favorably influence habits, attitudes and knowledge, relating to individual, community and social health.”

According to the dictionary of education, “Health education is that part of education which, if followed enables us to maintain health”.

According to the Prof. Ruth Ellen Grout, “Health education is the translation of what is known about health into desirable individual and community behavior pattern by means of educational process”.

According to Carl Anderson, “Health Education as the growth within the child’s ability to understand health knowledge and to utilize and apply meaning to it.”

We can conclude that health education is a process, which enables an individual to understand the health matters.

THE AIMS OF HEALTH EDUCATION:

Aimsare the main, big general things towards which all education is directed.

The aim of Health Education is to engage people actively in programmes and services which are organized for the solution of health problems that is to help people learn to do things themselves for their own health improvement.

According to W.H.O. Expert Committee on Health Education, Health Education aims at creating ‘such quality of life as may enable individual may live most and to serve best.’

1. To provide information about health and its values as a community asset- it aims at acquainting the pupils and teachers with the rules of health and hygiene, functioning of the body, precautionary measures toward off diseases and working for common good.
2. To maintain the norms of good health- i.e. adequate ventilation, proper temperature, good sanitation and all round cleanliness etc.
3. To take pre cautionary and preventive measures against communicable diseases- it aims to take adequate precautions against contamination and spread of diseases, precautionary and preventive measures which helps the society in improving the standards.
4. To render assistance to school going children in understanding the nature and purpose of health services and facilities-it aims at discovering physical defects and other abnormalities in the child and promoting their reduction, if they are easily curable
5. To develop and promote mental and emotional health-While physical health makes a pupil physically fit, mental and emotional health enable him to maintain an even temper and a happy disposition.
6. To develop a sense of civic responsibility-It aims at realizing the people to make combined efforts and work for common good.

THE OBJECTIVES OF HEALTH EDUCATION:

Objectives are more specific and definite things that lead up to the aims and help in achieving them.

To achieve this aim of Health Education Ruth Ellen Grout has laid down certain specific objectives of Health Education.

* Optimum development of individual with special reference to physical and emotional development.
* Betterment of human relationships, particularly stand point of health.
* Application of health facts and principles in respect of economic efficiency in the production and consumption of goods and services.
* Civic responsibility especially in respect to health.
* To acquire relevant knowledge about health, develop positive attitudes and practices necessary to stay healthy
  1. To enable the students to develop a scientific point of view of health.
  2. Enable the students to identify the health problems and understanding their own role of health and medical agencies in meeting those problems.
  3. To enable the students to take interest in current events related to health.
  4. To enable the students to arrive at suitable conclusions based on the scientific knowledge.
  5. To enable the students to set an example of desirable health behaviour.
  6. To enable the students to understands the cause of the pollution of air, water, soil and food as well as means of prevention of pollution.
  7. To enable the students to gain scientific knowledge of first aid.
  8. To provide the desirable about marriage, sex and family planning to the students.
  9. To help the students to understanding the importance of physical training, sports, games and yogic exercises and their relationship with health education programme.
  10. To emphasize the students about the effects of bad habits like smoking and alcohol consumption.
  11. To acquaint the student about various organizations working for the maintenance of health.

PRINCIPLES OF HEALTH EDUCATION

* 1. The main principle of health education is to create interest among the people, so that they will listen to this education and changes their behaviors
  2. To find out the real health needs of the people and the programme should be in accordance with that needs.
  3. It should not be an artificial situation and formal teaching. It should be naturalistic.
  4. This programme should proceeds from known to unknown.
  5. This programme should be in accordance to the culture of the society.
  6. This should be a theoretical but mostly practical.
  7. Application of behavioral sciences is necessary to the health education.
  8. Know your area well:-schools, libraries, community halls, entertainment centres, government and non-governmental health and family welfare facilities.
  9. Identify health problems amenable to health education.

**CONCEPTS OF HEALTH:**

**The Changing and Evolving Concepts of Health:**

 An understanding of health is the basis of all health care. New concept of health is bound to emerge based on advance patterns of thought. Health has evolved over the centuries as a concept from an individual concern to a worldwide social goal and encompasses the whole quality of life. The brief account of the changing concepts of health is given below:

1. **Biomedical Concept :**

Health is viewed as the absence of disease. This Biomedical concept has the basis in 'Germ Theory of Disease' that dominated medical thought at the turn of 20th century. The medical profession viewed the human body as a machine, disease as the breakdown of machine and oneself as the mechanic. This concept has minimized the role of environmental, social, psychological and cultural determinants of health. So it was found inadequate to solve some of major health problems as malnutrition, accidents, drug abuse, mental illnesses, environmental pollution etc.

1. **Ecological Concept :**

This view considers health as the dynamic equilibrium between man and his environment, and disease as maladjustment of the human organism to environment. Human ecological and cultural adaptations do determine not only the occurrence of disease but also the availability of food and the population explosion. This concept raised two issues - imperfect man and imperfect environment.

Ecological health is a term that has been used in relation to both human health and the condition of the environment. In medicine, ecological health has been used to refer to multiple chemical sensitivity, which results from exposure to synthetic chemicals (pesticides, smoke, etc.) in the environment, hence the term ecological. The term has also been used in medicine with respect to management of environmental factors (taxes, health insurance surcharges) that may reduce the risk of unhealthy behavior such as smoking. As an urban planning term, ecological health refers to the “greenness” of cities, meaning composting, recycling, and energy efficiency.

1. **Psychosocial Concepts :**

Contemporary developments in social sciences revealed that health is influenced by social, psychological, cultural, economic and political factors of the people concerned. These factors must be considered in defining and measuring health. Thus health is both a biological and social phenomenon.

1. **Holistic Concept :**

The holistic model is a synthesis of all the above concepts. It recognizes the strength of social, economic, political and environmental influences on health. It is described as the unified or multidimensional process involving the well being of the whole person in the context of his environment. This view corresponds to the one held by Ancients. The emphasis is on the promotion and protection of the health.

**Dimensions of Health**

#### 1. Physical Health

Physical health can refer to any of the aspects that are needed to keep your body in top condition. Consuming a healthy diet and getting an adequate amount of exercise to build cardiovascular health, endurance or flexibility are essential to this goal. You are responsible for your health care which means treating minor conditions and consulting a professional to manage more serious conditions. On the path to good physical health, you should

* Monitor warning signs so you understand when your body is not getting the nutrition it needs or establishing an unhealthy state.
* Keep on top of your physical health which helps to improve determination, self-control and self-esteem.
* Get a sufficient amount of sleep, avoid harmful substances like tobacco products, and get annual physical exams.
* Know the ideal health numbers for conditions such as weight, cholesterol, blood pressure or blood sugar and develop a regular exercise routine.

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**Components of Physical Health**

Below are ways that each key area of physical health can be addressed through lifestyle choices:

**Physical activity**: Most healthy children and adults should be active on a daily basis. This should be a mix of both leisurely physical activity and structured exercise. Examples of leisurely physical activity include hiking and walking. Examples of more structured forms of exercise include strength training, running, and sports.

**Nutrition and diet**: A well-balanced diet should contain carbohydrates, proteins, fats, vitamins, and minerals. Restricting specific nutrients should only be done under the supervision of a licensed health professional. Fluid, ideally in the form of clean water, should be regularly consumed. Meals and snacks should be consumed throughout the day, and portion sizes should be sensible.

**Alcohol and drugs**: Substances that alter mood or other bodily processes should be avoided. Those with addictive tendencies or other health risks should consider complete abstinence from these substances.

**Medical self-care**: Basic items, such as bandages, lozenges, and over-the-counter pain-relieving medications, should be easily accessible from home. Long-term coughing, fevers, or other ailments should be addressed through primary care. Emergency treatment should be sought when signs and symptoms are significant or life-threatening.

**Rest and sleep**: While regular activity is essential for physical health, allowing the body to rest is just as important. Spending time relaxing or taking short naps can help rejuvenate the body. Sleep should take place in a quiet, dark environment and should last approximately 7-8 hours. Consistent sleep that is much shorter or longer than this duration, or is low quality, may need to be addressed by a health professional.

**2. Mental Health**

A person’s condition with regard to their psychological and emotional well-being.

Mental health is defined as a state of well-being in which every individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community.

Mental health includes our emotional, psychological, and social well-being. It affects how we think, feel, and act. It also helps determine how we handle stress, relate to others, and make choices. Mental health is important at every stage of life, from childhood and adolescence through adulthood.

## Early Warning Signs

Experiencing one or more of the following feelings or behaviors can be an early warning sign of a problem:

* Eating or sleeping too much or too little
* Pulling away from people and usual activities
* Having low or no energy
* Feeling numb or like nothing matters
* Having unexplained aches and pains
* Feeling helpless or hopeless
* Feeling unusually confused, forgetful, on edge, angry, upset, worried, or scared
* Experiencing severe mood swings that cause problems in relationships
* Having persistent thoughts and memories you can’t get out of your head
* Hearing voices or believing things that are not true
* Thinking of harming yourself or others
* Inability to perform daily tasks like taking care of your kids or getting to work or school

**Positive mental health allows people to:**

* Realize their full potential
* Cope with the stresses of life
* Work productively
* Make meaningful contributions to their communities

**Ways to maintain positive mental health include:**

* Getting professional help if you need it
* Connecting with others
* Staying positive
* Getting physically active
* Helping others
* Getting enough sleep
* Developing coping skills

**3. Social Health**

Social health refers to the ability to interact with people, respect yourself and others, develop meaningful relationships and develop quality communication skills.

Social health involves the ability to form satisfying interpersonal relationships with others. It also relates to your ability to adapt comfortably to different social situations and act appropriately in a variety of settings. Spouses, co-workers and acquaintances can all have healthy relationships with one another. Each of these relationships should include strong communication skills, empathy for others and a sense of accountability. In contrast, traits like being withdrawn, vindictive or selfish can have a negative impact on your social health. Overall, stress can be one of the most significant threats to a healthy relationship. Stress should be managed through proven techniques such as regular physical activity, deep breathing and positive self-talk.

**To effectively develop relationships and maintain good social health, individuals must be willing to:**

1. **Give of themselves**-This could include sacrificing time, effort, energy or money.
2. **Have adequate levels of self-esteem**-Being mentally and emotionally secure with oneself can help an individual maintain healthy relationships.
3. **Establish a sense of identity**-Sacrificing personal characteristics often results in less satisfying relationships, while acting like your true self will strengthen social bonds.

All relationships will have some level of emotional involvement, also known as intimacy. Determining how intimate a relationship will become is critical to long-term social health. While acquaintances or co-workers may have very little intimacy, family members and spouses often have intimacy levels high enough to be considered love.

**Characteristics of a healthy relationship include:**

* Trust - those involved have faith in each other and will do what is best for the relationship.
* Compassion - the physical and emotional well-being of others in the relationship is considered important.
* Respect - sacrifices made for the relationship such as time; effort and money are acknowledged and valued.
* Acceptance - changing individual characteristics and personality traits is not an expectation.
* Reciprocity - the give and take within the relationship is relatively equal.

**4. Spiritual Health**

#### Spiritual Health involves discovering a set of beliefs and values that brings purpose to your life. While different groups and individuals have a variety of beliefs regarding spiritualism but the general search for meaning for our existence is considered essential to creating harmony with yourself and others regardless of the path to spirituality you choose to follow.

It is considered healthier to find your own path to the meaning of life that allows you to be tolerant of the beliefs of others and life a life that is consistent with your beliefs. On the path to healthy a healthy spiritual life, you should

* Apply your values to your actions and decisions.
* Make time to relax each day.
* Accept the views of others.
* Make time for prayer or meditation.

**FACTORS EFFECTING HEALTH**

A person’s health is his own responsibility. Wise and timely attention to health offers a good reward, whereas negligence brings punishment.

The factors that influence our health either in the positive direction towards optimal health or in the negative direction towards zero health – can be classified as;

(1) **Personal Factors**: An individual wishing to live a fuller and rich life should include the following in his health programme.

(a) Daily Exercise

(b) Daily Bath

(c) Cleanliness of ear, nose,eyes

(d) Oral or dental hygiene

(e) Care of feet

(f) Good Posture

(g) Regular balanced diet

(h) Adequate sleep

(i) Suitable occupation

(j) Proper use of leisure

(k) Good mental attitude towards life.

(2) **Biological Factors**: The innate qualities given to us by our ancestors are called **heredity**. This is the major factor that influences health. It plays as important role in determining uniqueness as an individual and maintaining the identity of health status. Good heredity provides basis for sound body and sound mind whereas poor heredity increases susceptibility to disease and disorder.

Heredity refers to what we are born with and environment required hereafter. The physical bridge between the parents and their offspring. It is not the disease which is inherited but a tendency is transmitted which makes as individual more or less susceptible to a particular disease or disorder. No two individuals are similar in their response to environmental stimuli in term of health and disease resistance. The individual differences can only be explained on the basis of hereditary differences.

(3) **Environmental factors**: This means the surroundings, the climatic conditions, religious socio-cultural and emotional, in which an individual is living.

Environment is of two types:

(a) Internal Environment

(b) External Environment

Let us describe both of them one by one is detail.

**(a) Internal environment**: It includes inside the human body produced by the working

of all the organs and systems. In normal health, a state of ‘homeostasis’ is maintained, this means that the internal environment is maintained at a constant level. The composition of the blood and body fluid is kept at a constant level, the body temperature is kept constant and so on. However, during illness and due to various other causes, the internal environment gets disturbed and must be brought back to normal with the help of suitable treatment.

**(b) External Environmen**t: It refers to cleanliness of clothes, house, school, office, street, lights, supply of pure water, availability and shortage of nourishing food stuff, occupational and professional atmosphere.

The external environment can be sub-divided into:

(i) Physical, which is made up of air, light, temperature, food, water and housing.

(ii) Biological, which is made up of animals, plants, and disease producing micro-organism.

(iii) Social, which consists of the social life of man such as customs traditions, education, culture, civilization, economy, society and its organization.

**(4) Socio-Cultural Factor**: The principle of health education is to make one learn and act according to the social and cultural pattern of life. But individual outlook differs, depending on his situation and background. Superstitions, traditions, customs, food-habits and fads, cooking practices, child rearing practices, population, urbanization, family size, religious beliefs and rituals poverty, ignorance, economic standard and purchasing power, etc. all play a vital role in India.

**5. Mental Attitude:** Positive attitude adds zest to life and increases health and strength. Adjustment and accommodation lead to happiness. Negative, destructive, grumbling attitude leads to frustration, uneasiness and ill-health.

The personal health practice becomes a habit when it is performed as a daily activity. As habit plays a vital role in preservation of our health, one should cultivate healthy habits is one’s daily life. Most of the personal health practices have their roots in religion and culture. Thus the health practices are the outcome of one’s own family and social practices, cultural values and beliefs.

**HEALTH HABITS**

Good habits are to be developed gradually by repeating them so one gets used to them. Once a wrong hygienic practice is developed, it is very difficult to unlearn it and then learn the correct good habit. It is not possible to learn them from books. The practice makes a man perfect, so is the case with children. They should be explained about various practices in practical form. Whatever has been written in books may be forgotten. It is rightly said, “if I read, I may forget, if I see, I may remember and if I do, then I have learn it.”

**(i) PERSONAL CLEANLINESS**

If wrong or right health habits once developed, it is difficult to change when the child grows up. It is also well known that habits play an important role.

Excretory habits are to be taught in such a way that the child clears his/her bowels at a particular time (morning) regularly. It will avoid constipation or dyspepsia. He should not unnecessarily hold urine which may lead to uncomfortable sense or pain in abdomen. The right time of sleep always helps in getting sound sleep with fresh awakening same way the needed exercise also helps in maintaining health and vigor.

Regular bath and cleaning of private parts, trimming of nails and stress on night brushing are basic rules of hygiene.

Bath is not the only necessity but it should have cleaning effect on skin. Towelling after bath increases texture of skin due to increased circulation. If skin is dirty and use of common under-cloth or towel continues, the chances of developing eczema, ring-worm and infected pimples cannot be ruled out. Skin diseases like scabies, boils are very common among children of crowded and dirty localities.

No stick or sharp object like hairpin etc. should be inserted in the ears. They may damage the ear-drum or the skin of the outer ear. It may unnecessarily lead to ear infection, perforation ear drum or otitis media. If pain or discharge is there, never go to a quack and always consult a qualified doctor. Always remember that a little knowledge is a dangerous thing.

Whenever dirt, dust or foreign particle goes into eyes, never rub it, The natural reflex of blinking protects the eyes, Watering from eyes (tears) will bring the particle to lower lid from where it can be easily removed by clean corner of any cloth. Rubbing the eye may cause a dangerous condition – corneal ulcer.

Cleaning of nose is a healthy habit. Vascline may be applied to inside of each nostril. It will not allow the nose to get dry. Dry nose is one of the causes for bleeding nose because the child tries to remove the dried discharge and it bleeds.

Soap and shampoo may be used for washing and cleaning hairs. Oil massage with finger tips to scalp helps in getting nourishment to root of hair. Oil application to outer hair has no advantage. If dandruff is grown, Oil should not be applied. Use of individual comb is also a healthy habit.

Oro-dental region should be cleaned especially after meals or after eating sweet foods and milk products. Slight irritation of throat can be controlled by warm saline gargles.

Cotton under clothes is always safer than the nylon or synthetic ones. It is not necessary to wear costly dress. Dress should be regularly washed. The tight clothes should be avoided.

Properly fitted shoes are a necessity otherwise foot disorders may develop. Socks should be washed and dried before using.

Children should be taught to stand, sit, and walk in perfect posture. Incorrect posture if developed may interfere with functioning of diaphragm. Limiting action of diaphragm affects the flow of blood in large veins. If also causes displacement of heart and abdominal organs and ultimately digestive disturbances.

Smoking has all injurious effects. It affects vital capacity, oxygenation of blood. Lung disease and heart troubles. It is a bad habit and must be avoided.

Alcohol also damages the brain and stomach. It is more harmful than smoking as it causes addiction. An addicted individual cannot live without alcohol and the ultimate result if damage to liver and other organs.

After attending the toilets, hands should be washed thoroughy with soap or ashes and water.

SUMMARY

Health requires constant efforts of an individual to maintain it at optimum level determined by heredity. However, environment, Internal and external, social, cultural and economic status also play an important role in influencing health but mental attitude is the real determinant of health status. Positive attitude adds zest to life and improves health. Frustrating and grumbling attitudes crumble down health. Health is inherited but personal, environmental, socio-cultural and mental attitude determine its level and extent.

**School Health Programme:**

**HEALTH INSTRUCTIONS**

MEANING

As the instructions are given in other areas of life, the same way the health instructions from the very important aspect of school health programmes. At the primary level, it is not the duty of a health teacher alone but is of everybody. Various needed health aspects as per heed and time and suitability of listener should be given. Mother is the best health educator. If a child learns how to control the spread of infection while coughing through his teacher or mother, probably a kilogram of health literature about communicable diseases will be of little value. The important thing is how, when and who imparts the instruction. The child should learn it without thinking that he is being taught.

Basic objectives to be kept in mind before imparting health instructions may be as follows:

…information, motivation and guiding into action;

…adoption should come from awareness, interest and practice

…use of available health facilities in the school, nearby locality town etc.

The intention is to improve and protect the physical, mental, social and spiritual health of the school children.

The importance of this approach in making education itself as effective as possible as well as in promoting the child’s health as effectively as possible is self-evident. It is now well understood that preventive and curative services and particularly health instructions on it, counseling and guidance must be focused on and directed towards the child as a member of the family unit and not merely on the child within the school or classroom.

Harrison Clarke’s objectives of health instructions are :

a. To provide good instructions for children so that they may conserve and improve their own health, to the end that they shall be able to secure the vigour and vitality so fundamental for future happiness and usefulness.

b. To develop desirable health habits and attitudes by means of a motivational health instructional programme.

c. To promote satisfactory health understanding attitudes and behavior so that people today may become healthy parents and healthy citizens of their communities tomorrow.

d. To encourage the maintenance of the wholesome and healthful school environment so that it may be a healthy and safe place.

The following courses may be included in health instruction programme for primary school children:

1. Concept of health: meaning and scope of health and health education.Factors influencing health.

2. School health programmes may include healthful school living and school health services.

3. Personal hygiene. Need and importance of personal cleanliness. Care of different parts of the body:

4. Environmental hygiene may include safe water, sanitary facilities, heat, light and ventilation:

5. Food and Nutrition :Nutritive components of food; Balanced diet;Eating habits;Mal-nutrition and its effects; Identification of locally available foods and their nutritive values;

6. Safety education and First-aid :Rules of the Road;Precautions to be observed while walking, handling sharp-edged things, electrical gadgets. Safety at home and school, safety while palying.First-aid for drowning, poisoning, burns, shocks, fainting and snake bite.

7. Communicable diseases: Mode of transmission of communicable diseasesSymptoms of communicable diseases. Preventive measures and control:

8. Environmental Pollution;Due to air, Water and noise;Health hazards of different types of pollution;Control of pollution.

9. Health habits should be explained in concern with personal, environmental, food, diseases, safety and child care;

10. Posture Importance of rest, sleep and exercise, good posture, general postural deformities and remedial measures;

The term health instruction means instruction in health. It defines the efforts to promote understanding of health and the observance of desirable health practices. It also defines the effort and time given in class to promote understanding of health and the practice of health habits.

Purposes. The fundamental purposes of health instructions are :

1. To equip the students with sufficient knowledge about their health.

2. To enable to them attain the highest possible level of health, both in attitude and practice.

The most effective way of providing the necessary knowledge, habits and attitude for the entire population is through a programme of health instructions in the schools.

**OBJECTIVES OF HEALTH INSTRUCTIONS**

The chief aim of health instructions is to improve and protect the physical, mental and social health of school children.

H. Harison Clarke, in his book, ‘Health and Physical Education for the Elementary school Class Room Teacher’ has laid down the following objectives :

1. To provide good health instruction to children so that they may conserve and improve their own health, to the extent that they shall be able secure the vigour and vitality essential for future happiness and usefulness.

2. To promote satisfactory health understanding attitudes, and behavior so that pupils of today may become healthy parents and healthy citizens of tomorrow.

3. To develop desirable health habits and attitudes by means of motivational health instructional programme.

4. To encourage the maintenance of a wholesome and healthful school environment so that it may be a healthy and safe place.

BASIC PRINCIPLES OF HEALTH INSTRUCTIONS

C. L. Anderson Turner Sellary and Smith in their book ‘School Health Practices’ have given the following basic principles of health instructions. These are recognized as fundamental to effective health instructions :-

1. Throughout school life, health promotion should be one of the objectives of the whole school progrmme.

2. Instructional activities must always be related to the actual experience of the learners.

3. Repetition or drill is justified when learning is precise and used as a tool or skill.

4. Each child is unique who learns at his own rate and in his own way, and thus a variety of activities and materials is essential.

5. Health work in the school, cannot be fully effective unless integrated with the life of the home and the community and the forces in both, which can contribute to the child’s education.

6. Health is an end to be gained and not an academic subject.

7. The educational psychology as applied to other phases of education should be used in health teaching.

8. The child should think of health as a matter of conduct, and not as a subject of instruction.

9. Motivation should bridge the gap between knowledge and action.

10. The nature of habits should be recognized in health education Habits are acquired.

11. The laws of learning apply to health education. The laws of readiness, exercise and effect operate in building a habit.

12. Emphasis should be placed upon what to do rather than what not to do. Teaching should be positive, not negative.

13. The distribution of objectives and emphasis will vary from class to class but the goals in health education should be clear and specific.

14. Children should be commended for success. Failures should not be emphasized.

15. Particular care should be taken not to hold the child responsible for the improvement of conditions over which he has no control.

16. The teacher should help the child to see that the ultimate reward of health practices will be found in growth, in improved physical accomplishments, and in other concrete evidence of health.

17. Interest in growth is the best single incentive towards the improvement of health behavior in children.

18. The tendency of children to imitate those whom they admire is a force that may be used in developing improved health behavior.

19. Unhappy mental states should be avoided.

20. The gaining of knowledge and the development of a scientific attitude should be important objective in the higher grades.

21. Health education should contribute to character education.

**SEQUENCE OF HEALTH INSTRUCTIONS**

One of the most difficult problems that arise in connection with the school health programme is how to arrange health instructions so that every pupil may receive the essential instructions.

Rash, J. Keogh has identified three schools of thought concerning sequence of health instructions in the school. These are:-

1. The Continuous Plan :- Its proponents emphasize continuous emphasis on certain health problems. They believe that there is so much to teach in so little time. Repeated exercises must be placed on these special areas in order to become habit forming. But the weakness of this plan is that sometimes it encourages repetition and the teacher fails to discriminate the essential and non-essential aspect of health education.

2. The Psychological Approach :- The proponents of this plan argue that readiness (law of learning) is a vital factor in successful teaching. Teach a particular problem when the opportunity offers itself. Teach when the pupils are ready to receive or motivated to receive. But it fails to provide the assurance that each child is ready to learn those desirable habits and knowledge etc.

3. The Cycle Plan ;- It believes in repeating health instructions of the same health problem every three or four years. On the basis of changing needs, interests and abilities of the growing child health instructions are repeated. But sometimes this plan does not take full advantage of the experiences and situations that arise unexpectedly.

**Health Supervision:**

The school health service programme has the responsibilities for supervising health.They should also undergo the medical examinations.The follow up programmes for correction of defects must be done.The school teachers must supervise the students during illness and they should not be allowed to come into contact with other students as long as they are ill.

**Health Service:**

A. Appraisal of health of pupils and school personnel through physical examinations, dental examinations and psychological examinations.

B. Counseling of pupils, parents, and others by health personnel with regard to health problems.

C. Follow-up services in which the school health staff works cooperatively with parents and community agencies in securing correction of remedial defects either by private physicians or in clinics or hospitals.

D. Assistance in discovery and education of handicapped children with continuous appraisal of pupil placement and progress.

E. Prevention and control of communicable and other diseases through inspections, exclusions, readmissions, educational measures, immunization, sanitation and epidemic control.

F. Provisions of emergency services in case of injury or sudden illness. This involves the establishment of basic policies and procedures and the continuous appraisal of their effectiveness.

**BALANCED DIET**

Definition : The diet which contains different types of food in such quantities and proportions that the need for energy, amino acids, vitamins, minerals, fats, carbohydrate and other nutrients in adequate amount met for maintaining health, vitality and general well being and also makes a small provision for extra nutrients to withstand short duration of leanness.

**Constituents of Balanced Diet**

If we look at the history of food and nutrition, we find it as long as life of human beings. But the scientific research started in the Western World during the last century. Indian Rishis and Yogis (Saints and Prophets) were very clear about balanced diet which now doctors suggest for the patient of peptic ulcer. In the modern world where hurry, worry and curry have created most of the diseases to human beings, the old approach to nutrition seems to be meaningful.

Before discussing food and nutrition, we must know the dictionary meaning of couple of commonly used words.

K. Cal – Kilo Calorie. It is the heat necessary to raise the temperature of one liter by one degree centigrade.

**Food** – A composite mixture of various substances, the quantity of which may vary from very small amount in certain situations to very big amount in other situation e.g. wheat flour and lemon.

**Nutrition** – A dynamic process in which food that is consumed is utilized for nourishing the body. Food which we eat accumulate in our body for growth, repair and work. It also provides energy during rest and heavy activity. We also get material from food which regulate and maintain body functions processes.

**BASIC NUTRITIVE COMPONENTS OF FOOD**

Though the Nutritive Components of Food are many in number but basic components are mentioned hereunder:

A. Proximate Principles – Proteins, Fats, Carbohydrates.

(Note: Along with water, they form the main bulk of food. The water works as a solvent for nutrients, helps in regulating body temperature, help in removing waste and aid in function like osmosis).

B. Minerals, Salts – Calcium, Phosphorous, Potassium, Magnesium, Sodium Chloride (Salt).

C. Vitamins –

Fat Soluble Vitamins

Vitamin A Vision and dermal integrity.

Vitamin D Anti-rachatic.

Vitamin E Anti-sterility.

Vitamin K Coagulation.

Water Soluble Vitamins

Vitamin B1 Thiamine.

Vitamin B2 Riboflavin.

Vitamin P.P Pallagra-preventing factor

Vitamin B Pyridoxine or anti-dermatitis.

Vitamin H Biotin.

Vitamin B12 Anti-anaemia factor

Vitamin C Anti-scorbutic.

D. Trace Elements

Iron, Iodine, Fluorine, Zinc, Copper, Cobalt, Chromium , Selenium, Molybedenum.

**PROTEINS**

These are the body builders and help in growth and repair. The complex bodies present in both vegetarian and non-vegetarian food stuffs. By weight, they from the 17% of total human body. Proteins contain 16% nitrogen. They are the complex organic nitrogenous compounds. Their main functions are:

1. To provide material for growth, repair of tissues due to emergency or day to day work.

2. Helps in formation of enzymes needed for digestion.

3. Helps in defense of body by formation of antibodies.

4. May be transformed into carbohydrates which may finally form fats, if needed so.

Note: Proteins are composed of carbon, hydrogen, oxygen, nitrogen and sulphur in different proportions. They may also have phosphorus and iron along-with other elements.

Proteins may be of two types;

1. Proteins of High Biological Value (or superior)
2. Proteins of Low Biological Value

1. PROTEINS OF HIGH BIOLOGICAL VALUE (OR SUPERIOR)

They contain all essential amino-acids such as valine, tryptophan, threonine, phenylanine, methionine, leucine, isoleucine and lysine. The small children used another amino acid Hystadine for growth. E.g. meat, eggs, fish and milk.

2. PROTEINS OF LOW BIOLOGICAL VALUE

They are lacking in one or the other amino-acids. They are also known as second class proteins. It is suggested that one third of protein requirements should come from Class 1 Proteins. For children, milk is a necessity as besides other qualities it is a protein of high biological value. Milk is also digested easily than wheat, rice, pulses etc., Each gram of proteins provide 4 K. Cal.

**FATS**

Fats may be visible as oil, ghee, butter etc. There are invisible fats also in the diet which are present in food stuffs e.g., meat, pulses, nuts, etc. Fats contain carbon, hydrogen and oxygen. They are composed of fatty acids like lineleic acid and archindonic acids, linolenic acid.

Fats are utilized in the body for production of energy and heat, bodily work, body temperature, insulation, keeping various organs in shape and position. Twelve percent of the fat is present in the body, but the proportion of fats and proteins may vary according to age, sex and type of work and exercise. One gram of fat provides 9.3 K. Cal. They are also energy providers alongwith carbohydrates.

Because of high K. Cal. Production fats reduces, the bulk of food intake. Fat soluble vitamins like A, D, E and K are needed by body. Vitamin E and K are provided mainly by vegetable oils. In diet, 15% to 30% K. Cal should come from fats. Type of activity, genetic constitutions of individual and type and amount of fat consumed in diet determines the blood cholesterol levels.

Some fats like groundnuts, safflower oil which contains a high proportion of unsaturated fatty acids do not increase blood cholesterol but on the other hand fats like butter, ghee, coconut and hydrogenated fats like vanaspati ghee contain a high proportion of saturated fatty acids. If they are associated with lack of activity may give rise to cardio-vascular diseases like high blood pressure, heart attack etc.

**CARBOHYDRATES**

The main source of energy 60% to 80% comes from carbohydrates which may be present in the diet as starch, sugar and cellulose. Carbohydrates are composed of carbon, hydrogen and oxygen. It is also said that fat burns in carbohydrate flame which shows the necessity of this component in the diet.

Carbohydrates include glucose, milk, sugars, starch etc. Though they cannot be stored in the body and forms only one percent of total body. The extra amount is converted into fats and deposited as extra source of energy. For day to day activity they are the main source of energy. Grain foods largely composed of starch, cane sugar, glucose is more or less hundred percent carbohydrate. They are cheapest available source of energy. Though easily digested some carbohydrates may contain large proportion of ‘fibre’ or ‘roughage’ consisting of cellulose, which helps in movement of intestine peristalsis. Each gram of carbohydrate provides 4 K. Cal energy.

Quantity of food required depends mainly on age and sex, height and build-up, work and rest, climate and type of food stuffs consumed.

Approximate calculation for K. Cal. Requirements.

It is already known that more specifically each gram of carbohydrates, fat and proteins provide 4.1 K. Cal. 9.3 K. Cal. And 4.1 K. Cal. As energy but there is some loss of energy in each food stuff during process of digestion. Therefore, the actual energy which diet will provide is less. Due to this reason while calculating 10% of energy is counted for waste e.g. heat value of diet consisting of 100 gms. Of proteins and fats each as well as 500 gms. Of carbohydrates:

= 100 x 4.1 + 100 x 9.3 + 500 x 4.1

= 410 + 930 + 2050

= 3390 = 10% for wastage in cooking and digestion.

**MINERALS**

Minerals constitute 7% of total body weight in adults. Though some minerals may be present in very small amount but they have particular work for which they are needed. Changes in body are continuous features so there is a need of constant supply of minerals through food in order to maintain the growth and repair of cells. Minerals like calcium may be needed in large proportions in comparison to others like Iodine but both are of vital importance.

**1. Calcium** - It is a necessary part of blood which helps in clotting of blood (protective measure for blood loss or wound). It also regulates the contractility of muscles and rhythmic beat of heart. Milk is the best source of calcium for children. Eggs, Cheese and vegetables are also rich in calcium.

**2. Phosphorus** - It is a need for all cells of human beings. Its function is to maintain a balance between acidity and alkalinity of blood. It also maintains optimum amount of fluid in cells. Deficiency of phosphorus rarely occurs. Along with calcium it is present in bones and teeth.

**3. Potassium**: Most people who eat a healthy diet should get enough potassium naturally. [Low potassium](http://www.webmd.com/a-to-z-guides/hypokalemia) is associated with a risk of [high blood pressure](http://www.webmd.com/hypertension-high-blood-pressure/default.htm), [heart disease](http://www.webmd.com/heart-disease/default.htm), [stroke](http://www.webmd.com/stroke/default.htm), arthritis, cancer, [digestive disorders](http://www.webmd.com/digestive-disorders/default.htm), and [infertility](http://www.webmd.com/infertility-and-reproduction/default.htm). For people with low potassium, doctors sometimes recommend improved diets -- or potassium [supplements](http://www.webmd.com/vitamins-and-supplements/lifestyle-guide-11/default.htm) -- to prevent or treat some of these conditions.

Keeps fluids balanced in blood and tissue, Helps in controlling blood pressure, Allows nerves and muscles to work together. Common food sources are Bananas, papaya, sweet potato, dark leafy greens, avocado, prune juice, tomato juice, orange juice, Milk, yogurt. Dried beans such as navy, pinto and black beans, chickpeas, lentils, beef, pork, fish, nuts and seeds such as pistachio, almonds, pumpkin, flax and sunflower seeds.

**4. Magnesium**: Magnesium is a key mineral in human metabolism, and found in small to medium amounts in many of the World's Healthiest Foods. Vegetables (especially green leafy ones), nuts and seeds, and legumes are your best WHFoods sources for magnesium. We like to think of magnesium as the best supporting substance of the mineral kingdom. Keeps nerves and muscles strong Helps form bones and teeth food sources are Spinach and Swiss chard, Bran cereals and wheat germ, Dried beans, peas and lentils such as black, navy, chickpeas, nuts and seeds such as almonds, cashews, pumpkin, sunflower and flax seeds

**5. Sodium and Chlorine** – Along with food it is taken in the body as common salt (sodium chloride). It is also present in different food stuffs in natural form.

Too much salt is often added in Indian diets which is not needed and exerted along with urine. Even in summer, Indians hardly need extra salt. It is the potassium which is needed not the sodium. Due to this reason, fruit juices and banana is consumed have added advantage.

Most of the minerals except iron and Iodine by and large are found in sufficient amount in ordinary Indian diet.

**6. Iron** – It is low in diet and badly needed for needy persons. Though it is needed in very small quantity, yet it is exceedingly important. Lack of it may cause anaemia. There is about 3 gms. Of iron in the body. It is an essential element both of haemoglobin and chromatin substances of cells which reflects the characteristics of inheritance. The blood is the carrier of oxygen from lungs to the cells for the combustion of food. The carbon dioxide which is formed due to utilization of food and physical activity taken from the cells and carried to the lungs by red blood cells. The red blood cells have haemoglobin which is formed with the help of iron.

Milk contains least amount of iron. The child has sufficient amount stored in the liver at birth to meet the requirements. It is a wrong notion that mineral water and medicine are the best sources for supply of iron. It is cast iron pan in which green leafy vegetables if prepared will provide natural form of iron. Medicine iron cannot be used by the body unless copper is present. Rich sources of iron are – liver, meat, eggs, fish, cereals, pulses and green vegetables etc.

**7. Iodine**: Thyroid gland forms thyroxine with the help of iodine. Its deficiency leads to goiter, the disease common in sub-himalayan region of India. Need of Iodine increases during pregnancy, growth spurt and lactation.

**VITAMINS**

Though needed in very small amount but vitamins are essential as they work as catalysts for most of reactions. They are to be supplied from outside as they are not manufactured by the body. One should be very clear that no energy is provided by vitamins.

**Vitamin – A:** It falls in the category of fat soluble vitamins. It helps to maintain dermal integrity of epithelial tissue. It also helps in new cell growth and maintains resistance against infection. The most important role it plays in making proper vision during dim light. It can be stored in body for months together. The liver is the main store house. It is lost from cooking, storing of vegetables. High doses of these vitamins may lead to the tonic effects like headache, fatigue, nausea, irritability and diminished appetite.

Its deficiency causes night blindness, xerophthalmia, and muddy wrinkled bitot’s spots on conjunctiva. Other common deficiency disease is Keratomalacia. The type of blindness vitamin A Produces is preventable provided rich vitamin-A food stuffs are given to the children.

The following food stuffs are quite rich in Vitamin – A

Cabbage, Coriander leaves, Mango, Papaya, Mint, Butter, Curry leaves, Spinach, Ghee, Carrot, Milk, Egg and liver.

**Vitamin – D**: It is heat stable and fat soluble vitamin. It helps in utilization and retention of calcium and phosphorus in human body. Fruits and vegetables are its poor sources. The common deficiency disease in children is known as ‘rickets’ where development of child is delayed. End of bones may enlarge. The suffered child shows knock knee, bow legs.

Besides the following sources sunlight is the best source and is available in most parts of India free of cost.

Butter, Egg, Fish, and Milk: The rich sources are liver oil preparation of which may be given once in six months to the children; usual amount is one tea spoonful of cod liver oil, once in six months to children.

Too much of anything is harmful and same is the case with vitamin – D. It may cause over-dose symptoms i.e., of loss of appetite, vomiting, headache, diarrhea and too much or too less of urination.

**Vitamin – E (**[**Tocopherol**](https://en.wikipedia.org/wiki/Tocopherol)**)**: Anti-sterility or pharmacologically known as tocopherol. It is not destroyed by cooking but iron affects it so these two nutrients should not be taken together. Rich sources are – soya beans, beans, butter, egg, coconut oil and peas. It is present in sufficient amount in apples, orange, turnip green, liver;

**Vitamin-K**: assists in the maintenance of blood clotting. Deficiency may cause increased bleeding. Its requirements are unknown. Cabbage, carrots, cauliflower, soya beans, spinach and tomatoes are rich sources.

**B vitamins** are a class of water-soluble [vitamins](https://en.wikipedia.org/wiki/Vitamin) that play important roles in [cell](https://en.wikipedia.org/wiki/Cell_(biology)) [metabolism](https://en.wikipedia.org/wiki/Metabolism). Though these vitamins share similar names, research shows that they are [chemically](https://en.wikipedia.org/wiki/Chemical) distinct vitamins that often coexist in the same foods. In general, [dietary supplements](https://en.wikipedia.org/wiki/Dietary_supplement) containing all eight are referred to as a **vitamin B complex**. Individual B vitamin supplements are referred to by the specific name of each vitamin (e.g., B1, B2, B3, B6, B9, and B12).

**Vitamin – B1 (Thiamine)**: Though destroyed by neutral or alkaline solution, this group of vitamins plays an important role in carbohydrate metabolism. They are heat stable and water soluble. Normal function of then nervous system, normal hunger and digestion is maintained due to optimum amount of this Vitamin. Deficiency may cause dry and wet type of beri-beri.

**Riboflavin-B2**: Though heat stable but comparatively less soluble in water. Germination of seeds and bacterias in intestine increase its contents in food. Common sources are soya beans, spinach, leafy vegetables, liver, eggs, meat, pulses and milk.

**Niacin-B3:** Though it is water soluble but relatively more heat stable vitamin. Milling and throwing of cooking water decreases this vitamin in food stuffs. Rich sources are liver, Mutton, groundnuts, wheat and rice. Deficiency of this vitamin causes three Ds diseases i.e., dementia, diarrhea and dermatitis. Other diseases are soreness of mouth and tongue and anaemia. With the help of proteins, it forms the enzymes. Lack of this vitamin causes glossitis, fissuring of mouth and burning sensations in eyes, lips and tongue.

**Pyridoxin-B6**: It helps in the metabolism of amino-acids. During anti-tubercular treatment to prevent neuritis, it is needed. Lack of this vitamin causes morning sickness, dizziness, glossitis and vomiting. High content of this vitamin is found in meat, liver, cereals and pulses.

**Folic Acid-B9**: Especially needed during pregnancy, lactation and growth spurt as it stimulates formation of red and white cells. Deficiency of it causes macrocytic anaemia, irritability forgetfulness, and mental sluggishness. Rich sources of it or the mutton, fish, green leafy vegetables, soya beans, peas and nuts and apple.

**Cynacobalamine : B12**: Though little but it is heat stable. But its vitality is for cooking. Lack of vitamin causes anaemia and neurological lesions. It is found in the liver, fish, mutton, egg and milk.

**Vitamin-C:** Though highly soluble in water but quickly destroyed by heat. Useful for wound healing in combating stress and infection. Deficiency of this vitamin, which is also known as ascorbic acid, causes swelling and bleeding and tenderness of gums, delayed healing and bleeding under the skin and joints, general weakness and irritability. Rich sources of ascorbic acid are amla, guava, coriander cabbage, lime juice, orange and tomato.

Water: 63% of body in some form or the other is contributed by water. As it is a universal solvent so it is the part of each and every structure or human body, maintenance body temperature, helps in excretion of water and accumulation of food products.

**Unit - 2**

**HEALTH PROBLEMS IN INDIA**

**(Communicable diseases**: Chickenpox, Measles, Mumps, Influenza, Whooping cough, Typhoid, Malaria, Aids. **Non-Communicable Diseases**: Obesity, Hypertension, Stroke, Diabetes, Malnutrition. **Other problems:** Explosive Population, Personal and Environmental Hygiene for schools, Nutritional service, Health appraisal, Health record, Healthful school environment, first-aid and emergency care. )

##### **Communicable and Non-communicable Diseases:**

**Disease:**

The word disease in the literal sense means ‘un-easiness to the body’. Disease can be defined as the defective or abnormal functioning of the body. Diseases can be caused by a number of factors like: 1) Infections 2) Malnutrition 3) Congenital defects 4) Endocrine disorders 5) Development of tumors 6) Allergic conditions etc.

**COMMUNICABLE DISEASES**

**Introduction:**

“Communicable diseases are the diseases that be transferred from person to person”.

A disease is a sickness that occurs when there is an upset or breakdown in the way the body usually functions. Most diseases make one feel sick or like something are not quite right with the body, but some diseases upset places in the body that one cannot really feel, like blood, or one’s internal organs. Symptoms are the changes that one can see or feel when one has a disease.

Diseases that can be passed or transmitted from one person to another are called infectious or contagious, like the common cold. Illnesses like a heart attack or cancer are not contagious. If a person is around someone else who has an infectious disease. We say that person has been exposed.

**Communicable Diseases:**

A disease resulting from infection capable of being directly or indirectly transmitted from man to man, animal to animal form the environment like through air, dust, soil water, food etc. to man and to animal.

There are many communicable diseases like Aids, Small pox, Measles, Whooping cough, Tuberculosis, Viral hepatitis, Hepatitis B, Typhoid, Malaria, Rabies, Tetanus etc.

**Transmission of Communicable Diseases:**

Diseases that can be spread from one person to the other through some medium or the other are called communicable diseases. Communicable diseases occur due to an infectious agent or its toxic product, which is transmitted directly or through an intermediate host, vector or an inanimate environment. Communicable diseases include both infectious and contagious diseases.

**Control of Communicable Diseases:**

Communicable diseases can be controlled and prevented by adequate measures which involve:

1. Diagnosis 2) Notification 3) Isolation 4) Treatment 5) Quarantine 6) Investigation

7) Disinfection 8) Blocking of transmission 9) Immunization 10) Health Education.

**Diagnosis :**

It is the first step in the control of a disease. The disease should be diagnosed and treated immediately and effectively. This will prevent the spread of an infection.

**Notification:**

As soon as a disease is detected, it should be notified immediately to the local health authority. This helps in taking immediate preventive measures to control the spread of the disease.

##### **CHICKEN POX:**

**Cause:**

Chicken pox is a communicable disease caused by a virus called Herpes virus varicella zoster. This disease is characterized by eruptions of skin and mucous membranes. The eruptions occur mostly in the trunk and body.

**SIGNS AND SYMPTOMS**: It is a mild communicable disease of sudden onset with slight fever and the eruptions appears on the first day. The eruptions are most abundant on the trunk.

**Transmission:**

It is an air-borne infection transmitted mainly through droplet infection and droplet nuclei. Fumet (infected articles) can also spread the infection.

**Prevention and Control:**

Chicken pox is a mild disease with very low mortality. If at all death occurs due to chicken pox, it must be verified and notified immediately. Specimen should be collected from the dead body and sent for examination. Passive immunization can be done with herpes zoster immuno globulin. Recently, a killed vaccine has been produced for active immunization.

**MEASLES :**

**Cause :**

Measles is caused by a specific R N A group virus, Paramyxovirus (measles virus) and it is a disease which occurs in children. Measles is characterized by fever and catarrha followed by a typical rash.

**SIGNS AND SYMPTOMS**: It is the most common, highly communicable and a specific infectious disease affecting children. Its onset is characterized by sneezing, laryngitis cough, running of nose and eye, fever, eruptions which is dusty red and velvet to touch. An early sign is the presence of minute bluish white specks which may be seen on the gums and inside checks but not on the palate. The eruptions usually appear on the 4th day.

**Transmission:** Transmitted from the sick to healthy by means of direct contact, through discharge from mouth and nose, infected articles, toys etc.

**Prevention and control:**

Isolation, nasal and buccal secretions should be burnt away, disinfection of clothes etc; and children from infected house should not be allowed to go to schools.

|  |  |
| --- | --- |
| 1. | Immunization with measles vaccine (Preferably after the age of 1 year) |
| 2. | Administration of human normal immuno globulin within 3 days of exposure. |
|  |  |

MUMPS :

**Cause :**

It is a communicable disease caused by RNA GROUP of virus Paramyxovirus. Mumps occurs in the form of tenderness and enlargement of the parotid glands.

**Transmission :**

By droplet infection and through fumets.

**Prevention and control :**

|  |  |
| --- | --- |
| 1. | Isolation of the patient. |
| 2. | Disinfections of articles used by the patient. |
| 3. | Immunization with live virus vaccine. |

**INFLUENZA :**

It is an acute and highly communicable disease commonly known as “Flue”.

Causative agent : Virus

* Seasonal influenza is an acute viral infection that spreads easily from person to person.
* Seasonal influenza viruses circulate worldwide and can affect anybody in any age group.
* Seasonal influenza viruses cause annual epidemics that peak during winter in temperate regions.
* Seasonal influenza is a serious public health problem that causes severe illness and death in high risk populations.
* An influenza epidemic can take an economic toll through lost workforce productivity and strain health services.
* Influenza vaccination is the most effective way to prevent infection.
* Antiviral drugs are available for treatment, however influenza viruses can develop resistance to the drugs.

**SIGNS AND SYMPTOMS:** Abrupt onset of fever, headache, chills, great prostration, pain in limbs and the back and frequently by inflammation of the respiratory and gastro-intestinal tract and vomiting. Fever may rise up to 104 F.

#### Transmission :

Seasonal influenza spreads easily and can sweep through schools, nursing homes, businesses or towns. When an infected person coughs, infected droplets get into the air and another person can breathe them in and be exposed. The virus can also be spread by hands contaminated with influenza viruses. To prevent transmission, people should cover their mouth and nose with a tissue when coughing, and wash their hands regularly.

#### *Prevention :*

Isolation, hygienic living, disinfection of clothes, beddings and kerchiefs used by patients.

The most effective way to prevent the disease and/or severe outcomes from the illness is vaccination. Safe and effective vaccines are available and have been used for more than 60 years. Among healthy adults, influenza vaccine can provide reasonable protection. However among the elderly, influenza vaccine may be less effective in preventing illness but may reduce severity of disease and incidence of complications and deaths.

Vaccination is especially important for people at higher risk of serious influenza complications, and for people who live with or care for high risk individuals.

WHO recommends annual vaccination for:

* pregnant women at any stage of pregnancy
* children aged 6 months to 5 years
* elderly individuals (≥65 years of age)
* individuals with chronic medical conditions
* Health-care workers.

#### *Treatment:*

Antiviral drugs for influenza are available in some countries and may reduce severe complications and deaths. Ideally they need to be administered early (within 48 hours of onset of symptoms) in the disease. There are 2 classes of such medicines:

* adamantanes(amantadine and rimantadine); and
* Inhibitors of influenza neuraminidase (oseltamivir and zanamivir; as well as peramivir and laninamivir licensed in several countries).

**WHOOPING COUGH: (Pertussis):**

## Causes and effects:

Whooping cough (pertussis) is an infection of the [respiratory system](http://kidshealth.org/parent/general/body_basics/lungs.html) caused by the bacterium Bordetella pertussis (or B. pertussis). It mainly affects babies younger than 6 months old who aren't yet protected by immunizations, and kids 11 to 18 years old whose immunity has started to fade.

Whooping cough causes severe [coughing](http://kidshealth.org/parent/general/eyes/childs_cough.html) spells, which can sometimes end in a "whooping" sound when the child breathes in.

The *Bordetella pertussis* bacterium is spread by airborne droplets from the upper respiratory tract (when the infected person coughs or sneezes) and is highly infectious. The time from infection to appearance of symptoms (incubation period) is between six and 20 days.

**SIGNS AND SYMPTOMS** : Irritation cough lasting for a few days to several weeks, series of cough accompanied by sudden in-drawing of breath, producing the characteristic ‘Whooping’ sound in which the face become suffused, the tongue protrudes, the saliva is blood stained and finally vomiting takes place.

**MODE OF SPREAD**: Directly from person to person by droplet infection. The germs are present in the nose and throat of the patient and each time an infected person talks, sneezes or cough, these germs are sprayed in the air.

## Prevention:

The primary method of prevention for pertussis is [vaccination](https://en.wikipedia.org/wiki/Vaccination). There is insufficient evidence to determine the effectiveness of antibiotics in those who have been exposed but are without symptoms. Preventative antibiotics, however, are still frequently used in those who have been exposed and are at high risk of severe disease (such as infants).

**Isolation:** The infected boy should be excluded from the school for a period of 6 weeks.

## Treatment for whooping cough:

## In its early stages, the symptoms of whooping cough can be reduced by taking antibiotics. If treatment is given in the first 21 days of the illness, the risk of passing the infection to others might be reduced.

## Members of the infected:

## Household are at increased risk of acquiring the disease and are usually prescribed a strong antibiotic as a preventative measure, even if they are fully immunized.

**TYPHOID:**

Typhoid is an infectious disease caused by the bacteria Salmonella typhi. It is also known as enteric fever, or commonly just typhoid. Typhoid fever and paratyphoid fever are clinically indistinguishable diseases, collectively called enteric fever. It easily spreads through contaminated food and water supplies and close contact with others who are infected. The illness is characterized by very high fever, sweating, [gastroenteritis](http://www.medicalnewstoday.com/articles/154555.php), and [diarrhea](http://www.medicalnewstoday.com/articles/158634.php). Although typhoid is very rare in the developed world, it is still a serious health threat in the developing world. Typhoid is treatable with [antibiotics](http://www.medicalnewstoday.com/articles/10278.php).

**SIGNS AND SYMPTONS**

Severe frontal headache and backache – slow fever starts and goes on rising every day and continued 2 to 4 weeks. The temperature remains between 103 and 104 degrees for the first 3 weeks and then it begins to fall gradually in the fourth week. Tongue is dry and coated. Pulse is slow in comparison to temperature.

**Causes typhoid:**

Typhoid fever ultimately is caused by the Salmonella typhi bacteria, and it is most commonly transmitted through the fecal-oral route. That is, patients with typhoid can contaminate the water supply with their stool, where the bacteria flourish. The food supply can become contaminated by infected stool, poor sanitation, or someone who fails to wash his hands after using the bathroom. When another person consumes tainted food or water, he can pick up the typhoid bacteria and become infected.

Some people, known as chronic carriers, still harbor typhoid bacteria (and can still contaminate food and water supplies) even after receiving [antibiotic](http://www.medicalnewstoday.com/articles/10278.php) treatment and proving to be free of symptoms.

**PREVENTION AND CONTROL:**

Typhoid fever can be prevented through proper sanitation and hygiene. Since the disease spreads in places where human feces come into to contact with food and drinking water, prevention relies on careful food preparation and persistent hand washing. To prevent typhoid, people in endemic areas should avoid drinking untreated water, avoid raw fruits and vegetables, choose to consume hot foods where bacteria cannot survive, adequately clean household items, and avoid handling food if there is a risk of spreading the disease.

There are two vaccines that are recommended by the World Health Organization. They are usually only given to those who are traveling to typhoid endemic areas and they are from 50 to 80% effective in preventing typhoid.

MODE OF SPREAD

Spread by discharges from the bowls and urine through the medium of water, milk, articles of food, drink etc; and also agencies of flies, fomites and dust. Typhoid carriers are one of the important causes of spread of the disease, of which faecal carriers are more common than the urinary ones.

**TREATMENT:**

The Salmonella bacteria that cause typhoid can be killed by antibiotics such as ciprofloxacin or ceftriaxone. However, some strains become resistant to antibiotics after long-term use, and antibiotics have known side-effects.

Additional treatments for typhoid include drinking fluid to prevent [dehydration](http://www.medicalnewstoday.com/articles/153363.php) and eating a healthy diet to ensure the absorption of nutrients.

**MALARIA:**

**Cause:**

Malaria is communicable disease caused by a parasitic protozoa belonging to the genus plasmodium. Periodic chills and fever, enlargement of spleen and secondary anemia characterize malaria.

The Malaria parasite is a protozoa named PLASMODIUM. There are four types of Malarial parasites.

1) PLASMODIUM VIVEX : It has a cycle of 48 hours causing fever after every two days.

2) PLASMODIUM MALARIA : It has a cycle of 72 hours causing fever, recurring after every three days.

3) PLASMODIUM FALCIPARUM: The fever is very irregular and may occur after every 48 hours. The symptoms are very severe and of malignant type e.g. high fever, delirium and sometimes coma.

4) PLASMODIUM OVALE : a parasite which produce a mild form of tertian malaria.

**SIGNS AND SYMPTOMS:**

After the incubation period of malarial parasite, which averages 10 days, the attack begins. There are three stages;

1. The cold stage, 2. The hot stage 3. The sweating stage.

1. The cold stage: The patient feels cold, listless, with headache, nausea and vomiting. He soon shivers and the teeth chatter. The skin temperature is subnormal although the rectal temperature rises rapidly.

2. The hot stage: After one or two hours the patient begins to feel hot and headache intensifies. The pulse is rapid, cutaneous vessels dilate. Stuper, delirium and high fever may develop.

3. The sweating stage: The skin being dry and hot rapidly becomes moist and there is a lot of perspiration. The temperature falls to normal rapidly and the patient feels comparatively well. Anaemia and enlargement of spleen and Liver are after-effects of the disease.

**Transmission:**

It is transmitted by the bite of female Anopheles mosquito, which acts as a vector.

**Prevention and control:**

|  |
| --- |
|  |
|  |

1. To do away with conditions which render possible the breeding of mosquito by proper drainage system to prevent water collection in the pools, and compound of houses.

2. Destruction of mosquito larva or antilarval measures by using kerosene oil, diesel or fuel oil etc.

3. D.D.T. (Dichloro diphenyl – tricholoro – ethane) spraying.

4. In tanks and pools, Larvicidal fish are used

5. Using mosquito nets

|  |  |
| --- | --- |
| 6. | Early diagnosis through examination of blood smears. |
| 7. | Immediate notification to health authorities. |
| 8. | Hygienic measures like good drainage. This will prevent stagnation of water where mosquitoes bread. |
| 9. | Destruction of mosquitoes by spraying DDT or Kerosene. |

##### **AIDS**

##### What is AIDS?

##### *Aids stand for Acquired Immune Deficiency Syndrome.*

**A – Acquired:** means that is something people acquire from outside. It is not inherited from parents like eye color or blood type. It is transmitted through person’s own behaviour or situation.

**I – Immune:**  refers to the immune systems, the body’s defense mechanism against germs and infections (a weakened body defense system).

**D – Deficiency:** indicates a lack or weakening of (the immune system).

**S – Syndrome:** refers to the presence of a group of signs and symptoms. When the body’s defenses are weakened, it is possible for many infections or diseases to simultaneously infect the body. The condition is referred to as a syndrome. It is a collection of signs and symptoms that are generally found together in a particular disease or diseases.

##### **What is HIV?**

An organism called HIV causes AIDS.

**H – Human** indicated that the HIV only infects humans.

**I - Immunodeficiency** indicated that HIV causes the immune system to become weak and ineffective in defending the body against the germs. In this way, HIV leads to AIDS.

**V – Virus** is a disease-causing parasite.

|  |  |
| --- | --- |
| (i) | AIDS is Acquired because it is caught from someone and is not inherited |
| (ii) | Immune and Deficiency because the virus destroys the body’s defense system and as a result the person is more likely to get illness which the body would normally be able to fight off easily. |
| (iii) | Syndrome describes the different signs and symptoms of the illness that result from the HIV infections. These signs and symptoms appear as multiple infection or illness. |

There are only three modes of transmission:

* Sexual Transmission.
* Blood Transmission.
* Mother to Child Transmission.

**Sexual Transmission:** The virus can be transmitted from an infected person to his or her sex partner (man to woman, woman to man and man to man).

**Blood Transmission:** It occurs through the transfusion of infected blood or blood products or the use of blood contaminated needles, syringes or other skin piercing instruments. Recipients of a single unit of HIV infected blood have a virtually 100% probability of becoming infected.

Mother to Child Transmission: Transmission of HIV / AIDS from an infected women to her fetus / infant may occur before, during and shortly after birth. The overall risk of HIV transmission from HIV infected women to her foetus in utero or during delivery is delivery is about 30%.

**Major Signs :**

|  |  |
| --- | --- |
| (i) | Weight loss greater than 10% of the body weight. |
| (ii) | Continue fever for a period greater than one month. |
| (iii) | Chronic diarrhea (for more than one month). |

**Minor Signs :**

|  |  |
| --- | --- |
| (i) | Persistent cough for a period longer than one month. |
| (ii) | General itching dermatitis (Skin irritation). |
| (iii) | Recurrent Herpes zoaster (shingres) |
| (iv) | Oral pharyngeal candidiasis (fungus infection in the mouth / throat) |
| (v) | Swelling of the lymph glands. |

**NON COMMUNICABLE DISEASES**

* A **non-communicable disease,** or NCD, is a disease which is not contagious. Risk factors such as a person's lifestyle, genetics, or environment are known to increase the likelihood of certain non-communicable diseases. Of these three risk factors, 50% of all non-communicable diseases are a result of poor lifestyle choices such as drug use, alcohol and tobacco use, diet, lack of exercise or stress management.
* Examples of non-communicable diseases include heart disease, cancer, asthma, diabetes, allergies, stroke, and more.

# OBESITY:

**Meaning, Risk factors & Over fatness**

Obesity is a [medical condition](http://en.wikipedia.org/wiki/Medical_condition) in which excess [body fat](http://en.wikipedia.org/wiki/Body_fat) has accumulated to the extent that it may have an adverse effect on health, leading to decreases [life expectancy](http://en.wikipedia.org/wiki/Life_expectancy) and/or increased different health problems by inviting many degenerative diseases.

[Body mass index](http://en.wikipedia.org/wiki/Body_mass_index) **(BMI),** defines people as [overweight](http://en.wikipedia.org/wiki/Overweight) (pre-obese) if their BMI is between 25 and 30 kg/m2, and obese when it is greater than 30 kg/m2 accordingly.

Obesity increases the likelihood of [various diseases](http://en.wikipedia.org/wiki/Obesity_associated_morbidity), particularly cardio-vascular diseases, [diab](http://en.wikipedia.org/wiki/Diabetes_mellitus_type_2)etes mellitus, [obstructive sleep apnea](http://en.wikipedia.org/wiki/Obstructive_sleep_apnea), certain types of [cancer](http://en.wikipedia.org/wiki/Cancer), and [osteoarthritis](http://en.wikipedia.org/wiki/Osteoarthritis). Obesity is most commonly is due to combination of excessive [food energy](http://en.wikipedia.org/wiki/Food_energy) intake, lack of physical activity, and [genetic susceptibility](http://en.wikipedia.org/wiki/Polygenic_inheritance), although a few cases are caused primarily by [heriditical](http://en.wikipedia.org/wiki/Gene) conditions, [endocrine](http://en.wikipedia.org/wiki/Endocrine) disorders, [medications](http://en.wikipedia.org/wiki/Medication) or [psychiatric illness](http://en.wikipedia.org/wiki/Psychiatric_illness). Evidence shows that some obese people eat little yet gain weight due to a slow metabolic process. [Dieting](http://en.wikipedia.org/wiki/Dieting) and [physical exercise](http://en.wikipedia.org/wiki/Physical_exercise) are the main strategies of treatment for obesity and maintain body healthy.

BMI is a measure of an adult’s weights in relation to his or her height specifically the adults.

Weight in Kgs divided by the square of his or her height in meters.

< 18.5 = Under weight

18.5 to 24.9 = Healthy / Normal

25.0 to 29.9 = Over weight

≥30 = Obese

30 to 34.9 = Class I Obese

35 to 39.9 = Class II Obese

**≥** 40 **=** Extreme Obesity

**Health related correlates of obesity:**

* Increased workload on heart – left ventricular dysfunction – impairment of cardiac function.
* Breathing difficulty, Heart diseases, short lifespan, high cholesterol
* Hypertension or high blood pressure, respiratory problems
* Diabetes, as about 80% of adult onset.
* Renal dysfunction.
* Osteoarthritis, degenerative joint diseases.
* Abnormal plasma lipid and lipoprotein concentrations.
* Menstrual irregularities in women.
* High blood pressure
* Arthritis.
* Prone to infection.

**Treatment of Obesity**

Several scientific studies in the field of fitness management have conclusive evidences that the regular involvement in physical activity can prevent several degenerative diseases and as well can control them effectively by bringing positive changes in several risk factors and biomarkers of these diseases. Involvement in physical activities leads to improvement in physical fitness of the individuals and this in turn increases the capacity and opportunity of individuals to engage in more physical activity for better health benefits. Physical fitness is not directly linked to the enhanced health status as some individuals though possess high levels of physical fitness may still carry degenerative disease factor.

## Hypertension :

### Definition :

Hypertension is high blood pressure. Blood pressure is the force of blood pushing against the walls of arteries as it flows through them. Arteries are the blood vessels that carry oxygenated blood from the heart to the body's tissues.

Hypertension is serious because people with the condition have a higher risk for heart disease and other medical problems than people with normal blood pressure. Serious complications can be avoided by getting regular blood pressure checks and treating hypertension as soon as it is diagnosed.

If left untreated, hypertension can lead to the following medical conditions:

* arteriosclerosis, also called [atherosclerosis](http://medical-dictionary.thefreedictionary.com/atherosclerosis)
* [heart attack](http://medical-dictionary.thefreedictionary.com/heart+attack)
* [stroke](http://medical-dictionary.thefreedictionary.com/stroke)
* enlarged heart
* kidney damage.

### Causes and symptoms :

Many different actions or situations can normally raise blood pressure. Physical activity can temporarily raise blood pressure. Stressful situations can make blood pressure go up. When the [stress](http://medical-dictionary.thefreedictionary.com/stress) goes away, blood pressure usually returns to normal. These temporary increases in blood pressure are not considered hypertension. A diagnosis of hypertension is made only when a person has multiple high blood pressure readings over a period of time.

Risk factors for hypertension include:

* age over 60
* male sex
* race
* heredity
* salt sensitivity
* obesity
* inactive lifestyle
* heavy alcohol consumption
* use of [oral contraceptives](http://medical-dictionary.thefreedictionary.com/Oral+Contraceptives)

### Diagnosis :

Blood pressure measurements are classified in stages, according to severity:

* normal blood pressure: less than less than 120/80 mm Hg
* pre-hypertension: 120-129/80-89 mm Hg
* Stage 1 hypertension: 140-159/90-99 mm Hg
* Stage 2 hypertension: at or greater than 160-179/100-109 mm Hg

A typical [physical examination](http://medical-dictionary.thefreedictionary.com/physical+examination) to evaluate hypertension includes:

* medical and family history
* physical examination
* ophthalmoscopy: Examination of the blood vessels in the eye
* [chest x ray](http://medical-dictionary.thefreedictionary.com/Chest+X+Ray)
* electrocardiograph (ECG)
* blood and urine tests.

### Treatment :

There is no cure for primary hypertension, but blood pressure can almost always be lowered with the correct treatment. The goal of treatment is to lower blood pressure to levels that will prevent heart disease and other complications of hypertension. In secondary hypertension, the disease that is responsible for the hypertension is treated in addition to the hypertension itself. Successful treatment of the underlying disorder may cure the secondary hypertension.

Lifestyle changes that may reduce blood pressure by about 5 to 10 mm Hg include:

* reducing salt intake
* reducing fat intake
* losing weight
* getting regular [exercise](http://medical-dictionary.thefreedictionary.com/exercise)
* quitting [smoking](http://medical-dictionary.thefreedictionary.com/smoking)
* reducing alcohol consumption
* managing stress

**STROKE :**

A stroke is a sudden loss of brain function. It is caused by the interruption of flow of blood to the brain (ischemic stroke) or the rupture of blood vessels in the brain (hemorrhagic stroke). The interruption of blood flow or the rupture of blood vessels causes brain cells (neurons) in the affected area to die.

The effects of a stroke depend on where the brain was injured, as well as how much damage occurred. A stroke can impact any number of areas including your ability to move, see, remember, speak, reason and read and write.

## What are the types of stroke?

There are two main types of stroke: those caused by blood clots ([ischemic stroke](http://www.heartandstroke.com/site/lookup.asp?c=ikIQLcMWJtE&b=3484151)) and those caused by bleeding ([hemorrhagic stroke](http://www.heartandstroke.com/site/lookup.asp?c=ikIQLcMWJtE&b=3484153)). When clots stop blood from flowing to the brain for a short time, a TIA ([transient ischemic attack](http://www.heartandstroke.com/site/lookup.asp?c=ikIQLcMWJtE&b=4847223)) or “mini-stroke” can happen. Stroke can happen to anyone including babies and children ([pediatric stroke](http://www.heartandstroke.com/site/lookup.asp?c=ikIQLcMWJtE&b=5458215)).

### Is it Possible to Prevent a Stroke?

Up to 50% of all strokes are preventable. Many risk factors can be controlled before they cause problems.

**Controllable Risk Factors for Stroke :**

* [High blood pressure](http://www.webmd.com/hypertension-high-blood-pressure/ss/slideshow-hypertension-overview)
* [Atrial fibrillation](http://www.webmd.com/heart-disease/atrial-fibrillation/)
* Uncontrolled [diabetes](http://www.webmd.com/diabetes/default.htm)
* [High cholesterol](http://www.webmd.com/cholesterol-management/cholesterol-assessment/default.htm)
* [Smoking](http://www.webmd.com/smoking-cessation/default.htm)
* Excessive alcohol intake
* [Obesity](http://www.webmd.com/diet/am-i-obese)
* Carotid or [coronary artery disease](http://www.webmd.com/heart-disease/guide/heart-disease-coronary-artery-disease)

**Uncontrollable Risk Factors for Stroke:**

* Age (>65)
* Gender (Men have more strokes, but women have deadlier strokes)
* Race (African-Americans are at increased risk)
* Family history of stroke

Your doctor can evaluate your risk for stroke and help you control your risk factors. Sometimes, people experience warning signs before a stroke occurs.

These are called transient ischemic attacks (also called [TIA](http://www.webmd.com/stroke/tc/transient-ischemic-attack-tia-topic-overview) or "mini-stroke") and are short, brief episodes of the stroke symptoms listed above. Some people have no symptoms warning them prior to a stroke or symptoms are so mild they are not noticeable. Regular check-ups are important in catching problems before they become serious. Report any symptoms or risk factors to your doctor.

**Diabetes**:

Diabetes mellitus, also called simply diabetes, is a disorder of carbohydrate metabolism characterized by high blood sugar levels (hyperglycemia) and presence of sugar in the urine (glycosuria). It develops when there is inadequate production of insulin by the pancreas or an inability of insulin to facilitate the transport of glucose into the cells. Insulin is a hormone that reduces the amount of glucose circulating in the blood by facilitating its transport into the cells.

**CAUSE:**

Diabetes is due to either the [pancreas](https://en.wikipedia.org/wiki/Pancreas) not producing enough [insulin](https://en.wikipedia.org/wiki/Insulin) or the [cells](https://en.wikipedia.org/wiki/Cell_%28biology%29) of the body not responding properly to the insulin produced.

**Terminology and Classification**

Historically, diabetes mellitus was classified into two major categories: juvenile-onset diabetes (now known as type 1 diabetes) and adult onset diabetes (now known as type 2 diabetes). This classification was based on the age of onset of diabetes. Unfortunately, there has been an epidemic of type 2 diabetes in children, which largely can be attributed to the increased rates of obesity in children.

Type 1 diabetes is caused by the inability of the pancreas to produce sufficient insulin as a result of failure of the β – cells in the pancreas. Thus, this type is also referred to as insulin dependent diabetes mellitus (IDDM). Type 1 diabetes accounts for only 5 to 10% of all cases of diabetes.

Type 2 diabetes is the result of the ineffectiveness of insulin to facilitate the transport of glucose into the cells and is a result of insulin resistance. It is also referred to as non-insulin-dependent diabetes mellitus (NIDDM). Type 2 diabetes accounts for 90 to 95% of all cases of diabetes. Insulin resistance refers to the condition where a “normal” insulin concentration in the blood produces a less than normal biological response. Insulin’s primary function is to facilitate the transport of glucose from the blood into the cell, across the cell membrane. With insulin resistance, your body needs more insulin to transport a given amount of glucose across the cell membrane into the cell. Insulin sensitivity is a related term and provides an index of the effectiveness of a given insulin concentration in the blood. As insulin sensitivity increases, insulin resistance decreases.

A third type of diabetes, gestational diabetes, is a form of diabetes that develops in pregnant women and their fetuses in 2 to 5% of all pregnancies. Fortunately, it usually disappears in both mother and baby after delivery. Unfortunately, when gestational diabetes is present, there can be complications during pregnancy.

Another category, impaired fasting glucose, refers to those who are borderline diabetic. Diabetes mellitus of either type is diagnosed on the basis of a plasma glucose level of greater than 125mg/dl following an 8-h fast. Impaired fasting glucose is defined as a plasma glucose level of between 110 and 125 mg/dl, again following an 8-h.

There are also **symptoms** of diabetes that can be used to identify those at risk for diabetes.

These include

* frequent urination,
* excessive thirst,
* unexplained weight loss,
* extreme hunger,
* sudden vision changes,
* tingling or numbness in hands or feet,
* feeling very tired much of the time
* very dry skin
* sores that are slow to heal, and
* more infections than usual.

**Exercise prescription**:

In type 2 diabetic patients, aerobic running has been identified as the main treatment. Involving in the physical activity everyday contributes to optimum health and qualitative of life. Through daily exercises the life styles can be changed to improve health and fitness. Aerobic running stimulates lungs and heart and all working group of muscles and produces beneficial changes in the body and in mind. Many physiological changes are determined by daily participation in aerobic running. Running might have a persistent effect on energy expenditure and fat oxidation, resulting in increased fat loss. The involvement of physical activities, it balances the intake of food and well as expenditure of the energy. However, even without loss of weight, exercise results in positive metabolic effects. It is necessary to participate in different forms of physical exercises especially the aerobic running to improve the preventive and curative capacity from diabetes and control other different degenerative diseases especially the cardiovascular diseases like, coronary heart diseases, hypertension and psychological problems.

**PREVENTION AND TREATMENT:**

Prevention and treatment involve a [healthy diet](https://en.wikipedia.org/wiki/Healthy_diet), [physical exercise](https://en.wikipedia.org/wiki/Physical_exercise), not using [tobacco](https://en.wikipedia.org/wiki/Tobacco) and being a [normal body weight](https://en.wikipedia.org/wiki/Normal_body_weight). [Blood pressure](https://en.wikipedia.org/wiki/Blood_pressure) control and proper foot care are also important for people with the disease. Type 1 diabetes must be managed with [insulin](https://en.wikipedia.org/wiki/Insulin) injections. Type 2 diabetes may be treated with medications with or without insulin. Insulin and some oral medications can cause [low blood sugar](https://en.wikipedia.org/wiki/Hypoglycemia). [Weight loss surgery](https://en.wikipedia.org/wiki/Bariatric_surgery) in those with [obesity](https://en.wikipedia.org/wiki/Obesity) is sometimes an effective measure in those with type 2 DM. [Gestational diabetes](https://en.wikipedia.org/wiki/Gestational_diabetes) usually resolves after the birth of the baby.

**Malnutrition:**

The deficiency of any of the essential constituents of food, and their required proportions, lacking in quantity, which suits to his caloric requirement, leads to malnutrition. This may be the following reason they are

1. Poverty
2. Lack of knowledge
3. Adulterated food
4. Cultural influences
5. Food habits, customs, beliefs and attitudes.
6. religion
7. food fads
8. Child rearing practices.

**Symptoms of the malnutrition:**

1. Decrease in the amount of flesh and loss of weight
2. Muscular looseness and the complexion become pale.
3. Person feels fatigue and disease prone.
4. No concentration and eyes and teeth becomes weak and adopts bad posture.

The important two diseases are caused due to protein calories malnutrition.

Ex: Kwashiorkor, Marasmus.

**Kwashiorkar** :

1. It is a disease of protein – calories malnutrition.
2. It occurs in children in the age group of 1 to 4 years
3. The characters are edema, growth failure, mental, hair changer & anemia;

**Factors lead to this disease:**

1. Early termination of breast feeding
2. Feeding of diluted cow’s milk

**Prevention:**

1. Health protection by controlling infections and diarrheas, immunization and heffiene .
2. De worming of children
3. Using better substitutes of milk
4. Mother has take precautions

**Marasmus** :

1. It is occur due to deficiency in protein
2. It is also occur in children
3. The symptoms of this disease are retardation of growth and wasting of muscles and fat.
4. The child is reduced to just skin and bones with shrunk face (Monkey face)

**Prevention**:

1. At the childhood level only we have to give the pertinacious food.
2. Educate the mother’s about malnutrition. Prevention is better than cure adopting good hygienic habits.

**OTHER PROBLEMS**

**Population Explosion:**

**Definition and Causes of Rapid Population Growth:**

Population explosion refers to the rapid and dramatic rise in world population that has occurred over the last few hundred years. Between 1959 and 2000, the world’s population increased from 2.5 billion to 6.1 billion people. According to United Nations projections, the world population will be between 7.9 billion and 10.9 billion by 2050.

Most of the growth is currently taking place in the developing world, where rates of natural increase are much higher than in industrialized countries. Con­cern that this might lead to over population has led some countries to adopt population control policies.

However, since people in developing countries con­sume far less, especially of non-renewable resources, per head of population than people in industrialized countries, it has been argued that the West should set an example in population control instead of giving, for example, universal child benefit.

### The Causes of Rapid Population Growth:

Until recently, birth rates and death rates were about the same, keeping the population stable. People had many children, but a large number of them died before age of five.

During the Industrial Revolution, a period of history in Eu­rope and North America where there were great advances in science and tech­nology, the success in reducing death rates was attributable to several factors:

(1) increases in food production and distribution,

(2) Improvement in public health (water and sanitation), and

(3) Medical technology (vaccines and antibiotics), along with gains in educa­tion and standards of living within many developing nations.

Without these attributes present in many children’s lives, they could not have survived common diseases like measles or the flu. People were able to fight and cure deadly germs that once killed them. In addition, because of the technology, people could produce more and different kinds of food. Gradually, over a period of time, these discoveries and inventions spread throughout the world, lower­ing death rates and improving the quality of life for most people.

### ACTIONS AND STRATEGIES THAT CAN BE DEVELOPED TO SOLVE THESE PROBLEMS:

There is controversy over whether population growth is good or bad. Over-population and continuing population growth are making substantial contributions to the destruction of Earth's life support systems. In the past, human populations have rarely been subject to explosion. In numbers. The powerful long-term mo-mentum that is built into the human age structure means that the effects of fertility changes become apparent only in the future. For these reasons, it is now conven-tional practice to use the technology of population projection as a means of better understanding the implications of trends.

Population projections represent the playing out into the future of a set of as-sumptions about future fertility and mortality rates. More public education is needed to develop more awareness about population issues. Facts like the size or the growth rate of the human population should be in the head of every citizen. Schools should inform students about population issues in order for them to make projections about the future generations.

Action plans and strategies can be developed to increase public understanding of how rapid population growth limits chances for meeting basic needs. The spirit of open communication and empowerment of individual women and men will be key to a successful solution to many population problems. Collective vision about health care, family planning and women's education at the community level build a basis for action. The creation of action plans help to meet challenges to find cooperative solutions. Free and equal access to health care, family planning and education are desirable in their own right and will also help reduce unwanted fertility.

Individual choice, human rights and collective responsibility are key to al-lowing families to plan the size and spacing of their children. It is essential to achieve a balance between population and the available resources. Teachers, parents, community workers and other stakeholders should extend the range of choices about available resources to individuals, especially women, and by equalizing opportunities between the genders from birth onwards.

Teachers, parents, other educators, politicians and other concerned citizens can practice how to make good decisions in everyday life. Decisions about family size and resource will affect the future generations. Through community forums, specific issues about the population growth can be discussed and possible action plans can be developed.

Teachers, as well as students can use the information super highway to gain knowledge about other countries' population and resources. Teachers can help students with problems and decision making on a daily basis. The investigation of world population will raise the level of awareness, so that we can learn to handle problems based on data. This data can help us to analyze our situations in a practical way.

Teachers, students, parents and other stakeholders can look for trends in the population explosion. They can hold community meetings at school to discuss how this issue presents a challenge to the big picture of human population on the planet "Earth".

**Personal and Environmental Hygiene for schools**

**PERSONAL HYGEINE**

Students, faculty and staff should be instructed about the correct technique for hand washing, including the importance of washing hands before eating or preparing food, after touching any skin lesions (“sores”) and wounds or clothing contaminated by drainage from lesions and wounds, and after using the toilet. Instructions should include the following:

* Turn on faucet and wet hands with running water.
* Apply soap and spread across all surfaces of hands.
* Scrub all surfaces of hands, including between each finger, for at least 20 seconds (saying the alphabet slowly will take at least 20 seconds).
* Rinse hands under running water.
* Dry hands with paper towels or air dryers.
* If available, use a paper towel to turn off faucet handles.

Students, faculty and staff should be provided information about general hygienic measures, including the following:

* Keep your hands clean by washing thoroughly with soap and water. Use an alcohol hand gel when soap and water are not available.
* Avoid sharing eating and drinking utensils.
* Avoid sharing unwashed towels, washcloths, clothing, or uniforms.
* Avoid sharing personal items (e.g., deodorant, razors).
* Change socks and underwear daily.
* Wash bed linens and pajamas regularly, at least once a week if feasible.
* Wash soiled bed linens and clothes with hot water and laundry detergent. Drying clothes in a hot dryer, rather than air-drying, also helps kill bacteria in clothes.
* Bath or shower with soap each day.
* Bath or shower with soap after every sports practice or competition.
* Keep cuts and abrasions clean and covered with clean, dry bandages until healed.
* Follow your health care provider’s instructions on proper care of wounds.
* Avoid contact with other people’s wounds or material contaminated by wounds.

**HYGIENE FOR SPORTS PARTICIPANTS:**

In addition to the previously mentioned recommendations, sports participants should be provided these recommendations:

* Do not share towels, clothing or uniforms.
* Don’t store wet, dirty clothing in lockers.
* Avoid sharing personal equipment.
* Keep equipment clean. Follow coach’s directions about cleaning the equipment.
* Keep cuts, abrasions and wounds covered with clean, dry bandages. Persons with draining wounds or infections are not allowed to participate in practices or games until the wound has stopped draining.
* Report any cuts, abrasions or wounds to the coach and school nurse.

**ENVIRONMENTAL HYGEINE FOR SCHOOLS:**

School hygiene or school hygiene education is a [healthcare science](https://en.wikipedia.org/wiki/Healthcare_science), a form of the wider [school health education](https://en.wikipedia.org/wiki/School_health_education). School hygiene is a study of school environment influence; it explores affection of schooling to [mental](https://en.wikipedia.org/wiki/Mental_health) and physical health of students.

The primary aims of school hygiene education is to improve behavior through useful practices connected to personal, water, food, domestic and [public hygiene](https://en.wikipedia.org/wiki/Public_health). Also, it aims to protect water and food supplies and to safely manage environmental factors.

## School environment:

Schools can determine children's health and well-being by their exposure to a healthy or unhealthy school environment. There is lot of architectural and aesthetic aspects related to a school's hygienic needs, such as: school's building plan, safe water supply, disposition of waste, emergency lighting, heating and ventilation, as well as adequate school facilities (halls, classrooms, and common areas) and furniture.

### School location:

Due to health reasons (influence of noise, exhaust gases from vehicles, and potential risk of accident), schools in an urban and suburban areas should be located more than 100 meters away from major traffic and causeways. Some studies suggest it is best to orient and design a school building so that [natural light](https://en.wikipedia.org/wiki/Sunlight) can be a part of the lighting scheme of the school, and that buildings should avoid being placed in a [valley](https://en.wikipedia.org/wiki/Valley), due to air quality issues.

## Importance of school hygiene:

Schools have a central place in the health of a community. Inappropriate hygiene in schools can cause many diseases. If there are no school sanitation and hygiene facilities, or if they aren't maintained and used adequately, schools become places where diseases are likely transmitted.

**Nutritional Service**

### [Food Distribution Programs:](http://www.fns.usda.gov/fdd/food-distribution-programs)

[**Commodity Supplemental Food Program (CSFP)**](http://www.fns.usda.gov/csfp) **:**

CSFP works to improve the health of low-income pregnant and breastfeeding women, other new mothers up to one year postpartum, infants, children up to age six, and elderly people at least 60 years of age by supplementing their diets with nutritious USDA commodity foods. It provides food and administrative funds to States to supplement the diets of these groups.

[**Food Distribution Program on Indian Reservations (FDPIR)**](http://www.fns.usda.gov/fdpir) **:**

FDPIR is a Federal program that provides commodity foods to low-income households, including the elderly, living on Indian reservations, and to Native American families residing in designated areas near reservations.

[**The Emergency Food Assistance Program (TEFAP)**](http://www.fns.usda.gov/tefap) **:**

Under TEFAP, commodity foods are made available by the U.S. Department of Agriculture to States. States provide the food to local agencies that they have selected, usually food banks, which in turn, distribute the food to soup kitchens and food pantries that directly serve the public.

[**Child Nutrition Programs:**](http://www.fns.usda.gov/child-nutrition-programs)

[**Child and Adult Care Food Program (CACFP)**](http://www.fns.usda.gov/cacfp/child-and-adult-care-food-program) **:**

USDA’s Child and Adult Care Food Program plays a vital role in improving the quality of day care and making it more affordable for many low-income families. Each day, 2.6 million children receive nutritious meals and snacks through CACFP. The program also provides meals and snacks to 74,000 adults who receive care in nonresidential adult day care centers. CACFP reaches even further to provide meals to children residing in homeless shelters, and snacks and suppers to youths participating in eligible afterschool care programs.

[**Fresh Fruit and Vegetable Program (FFVP)**](http://www.fns.usda.gov/ffvp) **:**

The Fresh Fruit and Vegetable Program provide free fresh fruits and vegetables in selected low-income elementary schools nationwide. The purpose of the Program is to increase children’s fresh fruit and vegetable consumption and at the same time combat childhood obesity by improving children’s overall diet and create healthier eating habits to impact their present and future health.

[**National School Lunch Program (NSLP)**](http://www.fns.usda.gov/nslp/national-school-lunch-program-nslp) **:**

School districts and independent schools that choose to take part in the lunch program get cash subsidies and donated commodities from the USDA for each meal they serve. In return, they must serve lunches that meet Federal requirements, and they must offer free or reduced price lunches to eligible children. School food authorities can also be reimbursed for snacks served to children through age 18 in afterschool educational or enrichment programs.

[**School Breakfast Program (SBP)**](http://www.fns.usda.gov/sbp/school-breakfast-program-sbp) **:**

The School Breakfast Program operates in the same manner as the National School Lunch Program. School districts and independent schools that choose to take part in the breakfast program receive cash subsidies from the USDA for each meal they serve. In return, they must serve breakfasts that meet Federal requirements, and they must offer free or reduced price breakfasts to eligible children.

[**Special Milk Program (SMP)**](http://www.fns.usda.gov/smp/special-milk-program) **:**

Participating schools and institutions receive reimbursement from the USDA for each half pint of milk served. They must operate their milk programs on a non-profit basis. They agree to use the Federal reimbursement to reduce the selling price of milk to all children.

[**Summer Food Service Program (SFSP)**](http://www.fns.usda.gov/sfsp/summer-food-service-program-sfsp) **:**

SFSP is the single largest Federal resource available for local sponsors who want to combine a feeding program with a summer activity program. Children in your community do not need to go hungry this summer. During the school year, nutritious meals are available through the National School Lunch and School Breakfast Programs. But those programs end when school ends for the summer. The Summer Food Service Program helps fill the hunger gap.

### [Supplemental Nutrition Assistance Programs (SNAP)](http://www.fns.usda.gov/snap/supplemental-nutrition-assistance-program-snap) :

SNAP (formerly the Food Stamp Program) puts healthy food within reach for 28 million people each month via an EBT card used to purchase food at most grocery stores. Through nutrition education partners, SNAP helps clients learn to make healthy eating and active lifestyle choices.

### [Women, Infants, and Children (WIC)](http://www.fns.usda.gov/wic/women-infants-and-children-wic) :

The Special Supplemental Nutrition Program for Women, Infants, and Children - better known as the WIC Program - serves to safeguard the health of low-income women, infants, & children up to age 5 who are at nutritional risk by providing nutritious foods to supplement diets, information on healthy eating, and referrals to health care.

[**Farmers' Market Nutrition Program (FMNP)**](http://www.fns.usda.gov/fmnp) **:**

The WIC Farmers’ Market Nutrition Program (FMNP) provides fresh, unprepared, locally grown fruits and vegetables from local farmers' markets to Women, Infants and Children (WIC) recipients

[**Senior Farmers' Market Nutrition Program (SFMNP)**](http://www.fns.usda.gov/sfmnp/senior-farmers-market-nutrition-program-sfmnp) **:**

The Senior Farmers’ Market Nutrition Program awards grants to States, United States territories, and federally-recognized Indian tribal governments to provide low-income seniors with coupons that can be exchanged for eligible foods at farmers’ markets, roadside stands, and community supported agriculture programs.

**HEALTH** [**APPRAISAL**](http://www.wisegeek.com/what-is-an-appraisal.htm) **:**

Health appraisal is that phase of health service that is concerned with evaluating the health of the student in as objective way as possible, through examinations, observations and records.

**Purpose of the health appraisal :**

The health appraisal serves multiple purposes, whether provided by the

child’s health care provider or through the school health service program.

Among the purposes served are to:

1. Make an appropriate appraisal of the child’s current health status.

2. Provide information of value to the child, the parents, and school

personnel which will:

a. Determine the child’s fitness to participate in the school program

b. Indicate the need for and the extent to which the school program or

selected aspects of the program should be modified to benefit the

child.

3. Discover any health problems which require further investigation and

treatment, if such is indicated.

4. Provide an opportunity to counsel the child and the parents concerning:

a. Any health problems or conditions detecte.

b. Securing appropriate medical supervision.

5. Provide a valuable and positive health experience for the child.

The aim of health appraisal include identifying students in need of medical or dental treatment, those who have problems relating to nutrition, and those who are in need of treatment by a psychiatrist or guidance clinic. In addition, the objectives of health services are to measure the growth of pupils, identify students with non-sendial defects so that modified programmes may be provided, such as crippled/or mentally retarded people; identify students who need additional examinations, such as X-ray studies; and identify students who need programmes apart from the school setting, such as the blind and deaf.

The techniques of health appraisal are Medical, psychologic, and dental examinations, screening for vision and hearing, teacher observations, and health records.

For the successful health appraisal, the cooperation of many individual is needed. Teachers, administrators, physicians, dentist, psychologists, public health officials, social workers, parents and lay teachers must all work together.

## HEALTH RECORD

## Personal health record: A tool for managing your health:

### What is a personal health record?

A personal health record is simply a collection of information about your health. If you have a shot record or a box of medical papers, you already have a basic personal health record. And you've probably encountered the big drawback of paper records: You rarely have them with you when you need them.

Electronic personal health record systems remedy that problem by making your personal health record accessible to you anytime via a Web-enabled device, such as your computer, phone or tablet.

Personal health records are not the same as electronic health records or electronic medical records, which are owned and operated by doctors' offices, hospitals or health insurance plans. There are a growing number of doctors' offices using these systems, and while some practices may limit your access, many allow their patients to access and print their records at any time. Check with your doctor to find out what his or her practice's policies are regarding electronic health records.

### What information goes into a personal health record?

You decide what you put in your personal health record. In general, though, it needs to include anything that helps you and your health care providers manage your health — starting with the basics:

* Your primary care doctor's name and phone number
* Allergies, including drug allergies
* Your medications, including dosages
* Chronic health problems, such as high blood pressure
* Major surgeries, with dates
* Living will or advance directives
* Family history
* Immunization history

You can also add information about what you're doing to prevent disease, such as:

* Results of screening tests
* Cholesterol level and blood pressure
* Exercise and dietary habits
* Health goals, such as stopping smoking or losing weight

### What are the benefits of a personal health record?

Having a personal health record can be a lifesaver, literally. In an emergency you can quickly give emergency personnel vital information, such as a disease you're being treated for, previous surgeries or hospitalizations, medications you take, drug allergies, and how to contact your family doctor.

A personal health record not only allows you to share information with your care providers but also empowers you to manage your health between visits. For example, a personal health record enables you to:

* **Track and assess your health.** Record and track your progress toward your health goals, such as lowering your cholesterol level.
* **Make the most of doctor visits.** Be ready with questions for your doctor and information you want to share, such as blood pressure readings since your last visit.
* **Manage your health between visits.** Upload and analyze data from home-monitoring devices such as a blood pressure cuff. And remind yourself of your doctor's instructions from your last appointment.
* **Get organized.** Track appointments, vaccinations, and preventive or screening services, such as mammograms. In fact, a recent study found that when parents used personal health records for their children, the children were more likely to get their preventive well-child checkups on time.

# The Student School Health Record :

A student record system needs to be established in each school district for collecting, organizing and maintaining information about students in an orderly, effective manner.

School health personnel should participate in the development of both the health record and the record system procedures. All school health records should be considered as part of the district record system and must be retained in the school district for a legally required period of time.

A student health record containing information which is accurate, pertinent, objective and useful constitutes a method to serve the student's health and educational interests.

The task of gathering, organizing and maintaining health information about all students is a demanding one. An orderly and efficient procedure must be established as part of the district's program of student record management. Discretion and good judgment on the part of the professional staff must be exercised.

**What Is a Student Health Record?**

The term student health record means those records maintained by the school for each student which provides relevant information about the physical, developmental, intellectual, personal, social and environmental factors which affect the student's health and education.

Such information can be useful to school personnel in helping to make decisions about the individual student's school program.

**PRIMARY, CUMULATIVE:**

**Student Health Records :**

*A cumulative* health record is maintained for each student during their school years. It includes a place to record information regarding

-- health history,immunization procedures,medical examinations, screening procedures,medical recommendations,medical referrals, teacher observations, a problem list,progress notes, flowsheets, etc.

**SUPPLEMENTARY :**

**Student Health Records :**

The complete student health record frequently includes *supplementary* records such as:

-- health history reports from parents,reports of medical examinations by the family physician, dental examination reports, reports from vision and hearing specialists, and medical requests for program adaptation of various kinds.

The cumulative health record and all supplemental records included in the student's folder thus become part of the total health record of each student.

**Filing of Health Records:**

The method of filing health records is usually determined by the school student records system and, to some extent, by individual preference. There are advantages in maintaining a file folder for each student which will include the cumulative health record and all supplementary records and reports. Health records should be kept in locked files in the school health office to provide for accessibility and security.

**Transfer of Health Records:**

Original student health records should not be transferred from the jurisdiction of the school district where they were initiated. When a child transfers to another school district, a transcript or photocopy of the original should be forwarded to the school district to which the student has transferred *upon* *written request by that district* **and the parent.** Nonpublic schools are considered "another school district" even though the health services may have been provided by the district from which the child has transferred. Copies of health records being sent should be marked "Confidential."

**Disposition of Student Health Records:**

A procedure for disposition of school records has been established by school policy. *School health personnel should consult the district clerk each year for the* *latest regulations regarding the disposition of health records* and meet these criteria for disposition.

**HEALTHFUL SCHOOL ENVIRONMENT**

A. Provision of a healthful physical environment through sanitation of the school plant, involving the following.

1. Proper location of school building with respect to orientation, noise, dust, odours, traffic dangers, playgrounds and drainage.

2. Provision of suitable buildings with respect to construction, fire protection, water supply, toilets and lavatories, health service room, teacher’s rest room, classroom construction, lighting, heating, ventilation, seating and upkeep.

3. Provision of adequate and attractive space and facilities for a school lunch programme.

4. Attention to a safe environment of traffic control indoors and out; driver education, protective equipment in shops, laboratories, gymnasiums, and food service areas, operation of sound safety policies protecting children within the school, on the grounds, and during field trips and athletics.

B. Organization of healthful school day :

1. For pupil : Appropriate health promotion for pupils also includes a planned progrmme of physical activities requiring suitable playgrounds, gymnasiums, and playrooms in suitable location with adequate space and appropriate equipment, supplemented by showers and dressing rooms.

2. For Teachers : Opportunities for relaxation, satisfactory opportunity for obtaining lunch, limitation of extracurricular requirements, provision of undisturbed work place after school and sick leave.

C. Establishment of interpersonal relationship that will contribute to emotional and social well being of pupils.

FIRST AID AND EMERGENCY CARE

INTRODUCTION:

Physical education and sports activities demand sufficient knowledge of first aid since participation in sports involves variety of movements which sometimes lead to variety of injuries. Enter in the play field, gymnasium, and swimming pool different kinds of surfaces so must have the knowledge of fundamental principles of first aid.

Injury in sports may be as small as minor scratch on the body and as serious as may be danger to the life, needing prompt first aid.

First aid needs to be immediate in sever accidents complicated by bleeding, shock and loss of consciousness.

Meaning and Definition:

The term ‘First aid’ was adopted officially in England for the first time in 1879 by the St. John ambulance association.

First aid is a combination of simple but quite effective and active measures to prevent possible complications.

* First aid means the treatment given to the casualty till proper medical aid comes.
* First aid is the immediate and temporary care given to the victim of an accident or sudden illness.

Purpose of first aid till the medical aid is given by the competent and qualified medical personnel.

Purpose of first aid is to preserve life, assistant recovery and prevent aggravation of the condition, until the services of a doctor can be obtained or during transport to the hospital or to the causality home.

TYPES OF FIRST AID:

There are two types of first aid

1) Self aid

2) First aid.

1. Self-aid: Injured person (causality) can do for himself, in many cases the first form help is provided by the affected person himself. Stopping bleeding, supporting injured parts, covering the wounds, other for help and reaching the nearby health center for emergency treatment if possible.
2. First aid: Other people can do for the causality when he/she is unconscious or unable to move; there help provided to the causality is known as first aid.

FIRST AID BOX: Small handy kit box

1. Sterile gauge pieces.
2. Bandages of different sizes.
3. Adhesive plasters of different sizes.
4. Scissors, safety pins, needles.
5. Pads of various sizes.
6. Splints.
7. Antiseptic lotion: dettol, spirit, tincher.
8. Silver sulfa diazine cream.
9. Drug- analgesics, antibiotic.

PRINCIPLES OF FIRST AID:

1. Do first things first quickly, quietly and without panic.
2. Guard against or treat for shock by moving the casualty as little as possible and handling him gently.
3. Do not attempt too much.
4. Reassure the casuality and those around in order to reduce tension.
5. Give artificial respiration if breathing has stopped.
6. Stop any bleeding.
7. Do not allow people to crowd around, as fresh air is essential.
8. Do not remove clothes unnecessarily.
9. Arrange for the removal of casuality to care of a doctor or hospital as soon as possible.

FUNCTIONS OF FIRST AID:

1. General conditions of the patient.
2. Pulse of the patient.
3. Respiration.
4. Color of tongue, lips, conjunctiva (eyes) and nails.
5. Bleeding.
6. Burns.
7. Fracture of bone or dislocation.
8. Polishing.

FIRST AID FOR ELECTRIC SHOCK:

1. It is important to remember that a higher current causes more damage than a higher voltage.
2. While every effort must be made to instantly switch off the source of electricity time should not be wasted while removing the patient from the electrical source.
3. Push the patient with any wooden, plastic materials or a dry rope or even a hastily removed shirt or any other clothing materials.
4. There should be no metal, do not use metal knives or scissors to cut the wires.
5. Water and oil or dangerous conductors of electricity.
6. If in shock or suffering from electrical burns, transfer the affected person immediately to a hospital.
7. Burns by electrical shock can be extremely painful, as they are deep burns.

FIRST AID FOR DROWNING:

In India a large number of children die through drowning it can happen in the swimming pool, in the ponds, in the large water tanks, canals, or rivers while swimming, bathing or crossing deep contaminated or flowing water. The victim of drowning dies as result of getting choked this is due to water entering into air passages and into stomach.

NOTE: in case the patient has been drowned, his body is placed into prone position (face down) with the head lower than the chest and turned to one side to allow the water to flow out of the lungs and stomach. Mouth - to – mouth respiration should be given to such patient at once.

TREATMENT:

1. Clean the patient’s mouth or throat to remove the mud or any other thing that might have gone in it along with water swallowed.
2. Put the victim in prone lying position and press the back to bring out the water from the lungs and stomach.
3. If there is a breathing problem he should be given artificial respiration at once in the following way.
   1. Kneel at the side of the patient.
   2. Press on the lower side of the back with both hands with all your strength. This will force the air out of the lungs.
   3. After every two stop to allow air to rush into the lungs. Repeat these two movements 16 to 17 times a minute until the patient starts breathing.
4. When the victim starts breathing his wet clothes should be removed gradually and dry clothes put instead.
5. To keep the body warm he should be covered with blanket or other heavy cloth, depending upon the situation. Hot water bottle may be used to warm his body.
6. Hot tea or coffee may be given as soon as he is able to swallow for stimulation.
7. If the first aider realizes that he is not able to revive the breathing/respiration he should immediate make arrangement to take casuality to the doctor.

FIRST AID FOR BURNS:

They are two types 1) minor/boil water burns, 2) chemical burns.

1. MINOR/BOIL WATER BURNS:
   1. submerge the burnt are immediately in cold water (not ice water).
   2. Cover the burn, with a clean dry cloth but not cotton as it will stick on the wound and become painful to remove later.
   3. Do not open blisters as this can cause infection and scarring.
   4. Do not apply any oils as they may lead to infection later.
2. CHEMICAL BURNS :
   1. Wash the area with large amount of water in order to reduce damage.
   2. In the case of chemical burns to the eyes, make the patient lie down.
   3. Keep the eye open and pour water into the eyes from the inner cover of the eye outwardly to prevent the other eye from being affected.
   4. Do not allow patient to rub the eyes.
   5. In case of children, tie their hands behind the back to prevent rubbing the eyes.
   6. Cover the affected eye and seek medical help immediately.

FIRST AID FOR HAEMORRHAGE:

The blood is carried through the human body by the blood vessels, arteries, veins and capillaries, which permeate every organ and tissue. When an organ or tissue in the human body is damaged the blood vessels are also injured.

When the blood escapes from a blood vessel the condition is known as hemorrhages. The causes of hemorrhages

Are varied, the most common being a direct trauma (puncture incision, blow, stretching, crushing).

TYPES OF BLEEDING:

Bleeding can depends on the type of injury to the blood vessel, arterial, venous, capillary and parenhymatous bleeding.

1. Arterial Bleeding: The blood escapes from the injured arteries. It is bright red and flows in a tense pulsating stream. Arterial bleeding is most dangerous, very strong, and causes a heavy blood loss.
2. Venous Bleeding: Occurs in wounds of the veins. The blood pressure in veins is much lower than in arteries, so that the blood flows more slowly, in an even stream, and is dark – cherry in co lour. Venous bleeding is less strong than arterial bleeding.
3. Capillary Bleeding: Bleeding is caused by damage to the smallest blood vessels (capillaries) for example by superficial cuts or scratches of the skin. When clotting is normal the bleeding stops spontaneously.
4. Parenhymatous Bleeding: The liver, spleen, kidneys and other parenhymatous organs have a well-developed network of arteries, veins and capillaries. Wounds of these organs cause damage to the blood vessels and profuse bleeding known as parenhymatous. Never collapse and the bleeding never stop by it self.

EXTERNAL HAEMORRHAGE:

The blood escapes to the outside through the wound of the skin. Hemorrhage into the lumen of a hollow organ (stomach intestine, urinary bladder, and trachea) that has a contact with the environment is known external latent. When blood escapes into interstitial spaces (muscles, subcutaneous fat) haemorrhages or bruises form.

INTERNAL HAEMORRHAGES:

Occur in wounds, closed injuries (the rupture of an internal organ without skin breakage due to a strong blow, a fall from a height, compression) and disease of intestinal organs (ulcer, cancer, tuberculosis) in this type of hemorrhage the blood escapes into a closed cavity.

FIRST AID FOR EXTERNAL HAEMORRHAGE:

Techniques for temporary arrest of bleeding:

1. Raising the injured body part (in relation to the trunk).
2. Compressing the bleeding vessel at the site of injury with a pressure bandage.
3. Direct pressing the artery with the fingers.
4. Securing the limb so that the joint is stretched or bent to a maximum.
5. Compressing the circumference of the limb by a tourniquet.
6. Applying a common bandage on the wound easily arrests capillary bleeding.
7. Applying a compression bandage can temporarily arrest venous bleeding.
8. A pressure bandage can easily stop arterial bleeding from a small artery.

FIRST AID FOR WOUNDS:

A wound is a break in the continuity of the tissues of the body, which thus permits the escape of blood and the entrance of disease producing germs or other injurious agents.

1. Incised Wounds : Which are caused by a sharp instrument such as razor, and bleed freely because the blood vessels are clean cut.
2. Lacerated Wounds : Which have torn and irregular edges. Such things as machinery, a piece of shell or the claws of animals cause them. As the blood vessels are torn through, lacerated wounds bleed less freely than incised wounds.
3. Contused Wounds : Which are accompanied by bruising of the tissues, and are caused by direct blow by some blunt instrument or by crushing.
4. Punctured Wounds : Which have comparatively small opening but may be very deep and are caused by a stab from any sharp pointed instrument such as a needle, knife, or bayonet. Gunshot wounds come under one or more of the above heading.

TREATMENT:

1. Place the casualty in a suitable position, bearing in mid that blood escapes with less force when the patient sits and still less when the patient les down.
2. Elevate the bleeding part, except in the case of a fractured limb.
3. Expose the wound, removing as little clothing as possible.
4. Do not disturb any blood clot already formed.
5. Remove any foreign bodies, which are visible and can be easily picked out or wiped off with a piece of clean dressing.
6. Apply and maintain pressure a) direct b) indirect.
7. Apply a dressing pad and bandage.
8. Immobilize the injured part when the wound is near a joint immobilize the joint using splints if necessary ex: knee.

RESUSCITATION (ARTIFICIAL RESPIRATION):

Artificial respiration by the expired air method can be accomplished by several techniques. The simplest are 1) mouth – to – mouth, 2) mouth – to – nose, 3) external heart massage techniques.

Recently a manual device for artificial respiration has been developed it consists of a rubber bag and a mask.

1.Mouth – to – mouth respiration: The victim’s head is drawn back and his nostrils are pinched with the fingers.

Take a deep breath and covers the victims mouth with his own, blows air

From his lungs in the victims.

The number of breaths per minute should be around 16-20.

The air must be blown quickly and energetically, (less so in children).

So that the duration of each inhalation is twice that of each expiration.

2. mouth – to – nose respiration: The air is blown through the nose, the victims mouth being closed with the rescuers hand. Which is simultaneously shifting the lower jaw upwards to prevent the tongue from retracting.

3. External Heart Massage: Is essentially a rhythmical compression of the heart between the sternum and the spine. When the pressure on the sternum is released the heart cavities are filled again with blood. In order to apply external heart massage the patient is laid flat on his back on a hard base and not on a mat or something soft.

1. The helper kneels beside the patient and places his hands on the lower third of the sternum. He presses down on the lower sternum with the palms of his hands placed once over another.
2. Sufficient pressure is applied to push the sternum 4 or 5 cm down towards the spine.
3. The rate of compressions should be at least 50 to 70 per minute.

Artificial respiration is started only after the respiratory tract has been freed of foreign bodies or food.

BNDAGES:

A bandage is a dressing fastened on the body according to the special rules. Bandages are commonly applied to cover the wounds, to protect wounds from infection and to arrest bleeding.

1. Common (protective) bandages protect the wound from the harmful external effects and dressing and medicinal agents in position.
2. Pressure bandages that exert continuous pressure on a part of the body (arrest bleeding).
3. Immobilizing bandages that ensure needed immobility of the injured part of the body.
4. Bandages with traction that continuously extended apart of the body.

Bandages may be either soft or hard, depending on the dressing material used.

* 1. Soft bandages include gauze roller bandages, elastic wide mesh tubular bandages, and cotton bandages.
  2. Hard bandages may either include a hard material (wood or metal) or involve hardening materials such as plaster of Paris, special plastics, starch or glue.
  3. In first aid every type of soft bandages is used, while of the hard bandages splints are common.

SOFT BANDAGES:

They are many types of soft bandages are usually applied to retain the dress (gauze or cotton wool) and the medicament on the wound or in a disease focus.

BASIC TYPES OF BANDAGES:

* Triangular Bandages: Made from a square of material that is cut or folded diagonally. Triangular bandages are fastened with a pin or their ends are tied. Standard triangular bandages 135 x 100 x 100 cm in size. Little brick 5 x 3 x 3 cm in size. Triangular bandages can be used on any part of the body.
* Sling Bandage: Can be made from a wide roller bandage or piece of cloth 75 – 80 cm in length. It is split down both ends, but leaving the middle part 15 – 20 cm in length intact. The UN split part of the bandage is applied across the requisite part of the body. Splint ends on each side are crossed so that the lower band becomes the upper and vice versa and they are tied with the band from other side.
* Roller Bandages: vary in size from the narrow ones up to 5 cm for the application to smaller parts of the body, to medium size ones 7 – 10 cm used on the forearm, leg, neck, and head, and wide bandages up to 20 cm that are applied to the chest, abdomen, and hip.
* Circular Bandage: All the turns of the bandage are applied on the same place and they completely over leap each other. Circular bandages are most commonly applied on the wrist, the lower third of the leg and on the abdomen, neck and fore head.
* Spiral Bandage: Applied when a considerable are of the body should be bandaged. The turns of the bandage are passed somewhat obliquely from bottom to top and each turn overleaps two thirds of the preceding one. Bandaging is usually started with several circular fixing turns. A spiral bandage is easily applied on parts of the limbs of uniform thickness, but when it is applied on a forearm, for instance the bandage turns cannot fit smoothly over each other and the bandage wrinkles. In such cases spirals with reverse are made. The lower edge of the last turn is held with the thumb of the free hand where the wider part of the limb begins and the bandage is turned sharply on to itself at each turn so that its upper edge becomes the lower one.
* Figure –of – Eight Bandages: The turns cross one another in figure of eight. It is a convenient dressing for parts of the body that have complex shape such as ankle, shoulder joint, wrist, and the back of the head or the perineum.

HARD BANDAGES:

Plaster of Paris bandage are the best among the hard bandages. plaster bandages are usually left on for long periods of time(until the fracture heals completely) and are changed only when the bandage crumbles or new one is needed. Special conditions are required to apply them, while the plaster takes several hours to dry completely. That is why they are not used in rendering first aid.

Hard bandages made with a glue, gelatin or dextrin base are even more rarely used for first aid. Splints modeled from these plastic are hard, comfortable, and immobilize the limbs. Hard bandages also include transportation splints made of wood, wire, or pneumatic splints or any materials available at the site of an accident.

***PRINCIPLES OF MANAGEMENT OF SOFT TISSUE INJURY:***

**RICE:**

The accepted dearly management of soft tissue injury during the first forty-eight hours, i.e. the acute inflammatory phase, is the *RICE* regime.

1. **Rice**
2. **Ice**
3. **Compression**
4. **Elevation**

The aim of this regime is to minimise bleeding and swelling in the tissues.

It is imperative that as soon as possible after the injury the following treatment is applied to the injured part:

1. Its mobility must be limited, i.e., *rest.* Keep the injured area still, as movement will cause an increase in blood flow to the tissue, causing further damage and pain.
2. Ice must be applied, in the form of a wet towel with crushed ice in it, for ten minutes every hour for the first twenty-four hours if possible. This will constrict the blood vessels and decrease the bloodflow to the injured area, thus limiting swelling.

Note: - ice should not be placed directly on the skin, as this can cause painful skin burns.

1. The part should be compressed with a firm crepe bandage. Make sure the bandage is applied firmly from below the injured area, graduating to less firm as you go further up the limb. If a localised area of muscle bruising is present a small piece of foam or padding can be incorporated over this site to effect local compression.

Compression will control the accumulation of fluids, which leak out of the damaged blood vessels into the tissues of the injured area. It also arrests any further bleeding. The bandage should be left on at all times in the first 48 hours if possible. If pain is excessive medical advice should be obtained.

1. Elevation simply means lifting the injured part above the horizontal to allow a better drainage of fluid back toward the heart. If possible, the end of the bed should be elevated on blocks when sleeping.
2. These procedures should be strictly adhered to over the first 48 hours.

It is important not to consume alcohol in the early stages after injuries. Alcohol dilates the blood vessels, allowing more blood to travel to the affected area. Hence more bleeding and fluid accumulation can occur, increasing the extent of the injuries.

Heat in the form of hot baths or local heat packs should not be used in this early stage, as this will also aggravate.

**Unit - 3**

**ENVIRONMENTAL SCIENCE**

( Definition, Scope, Need and Importance of environmental studies, Concept of environmental education, Historical background of environmental education, Celebration of various days in relation with environment, Pollution of Plastic bags / covers, Role of school in environmental conservation and sustainable development. )

**ENVIRONMENTAL STUDIES:**

**Environmental studies** is the [interdisciplinary](https://en.wikipedia.org/wiki/Interdisciplinary) [academic field](https://en.wikipedia.org/wiki/Academic_field) which systematically studies [human interaction](https://en.wikipedia.org/wiki/Human_behavior) with the [environment](https://en.wikipedia.org/wiki/Natural_environment) in the interests of solving complex problems. It is a broad field of study that includes also the [natural environment](https://en.wikipedia.org/wiki/Natural_environment), [built environment](https://en.wikipedia.org/wiki/Built_environment), and the sets of relationships between them. The field encompasses study in basic principles of [ecology](https://en.wikipedia.org/wiki/Ecology) and [environmental science](https://en.wikipedia.org/wiki/Environmental_science), as well as associated subjects such as [ethics](https://en.wikipedia.org/wiki/Environmental_ethics), [geography](https://en.wikipedia.org/wiki/Environmental_geography), [policy](https://en.wikipedia.org/wiki/Environmental_policy), [politics](https://en.wikipedia.org/wiki/Environmental_politics), [law](https://en.wikipedia.org/wiki/Environmental_law), [economics](https://en.wikipedia.org/wiki/Environmental_economics), [philosophy](https://en.wikipedia.org/wiki/Environmental_philosophy), [environmental sociology](https://en.wikipedia.org/wiki/Environmental_sociology) and [environmental justice](https://en.wikipedia.org/wiki/Environmental_justice), [planning](https://en.wikipedia.org/wiki/Environmental_planning), [pollution control](https://en.wikipedia.org/wiki/Pollution_control) and [natural resource management](https://en.wikipedia.org/wiki/Natural_resource_management).

# Meaning, Objectives, Scope and Importance of Environmental Studies:

Environment literally means Surrounding in which we are living. Environment includes all those things on which we are directly or indirectly dependent for our survival, whether it is living component like animals, plants or non living component like soil, air water

Environmental Protection Act (1986) defined “Environment as the sum total of water, air and land, their interrelationship among themselves and with the human beings, other living beings and property.”

#### Ecology and Scope of Ecological Studies:

Ecology is that part of environmental studies in which we study about organisms, plants and animals and their relationship or interdependence on other living and non living environment.

The term ‘Ecology’ is derived from Greek word ‘Oekologue’ which is composed of two words:

(a) ‘Oekos’ means surrounding

(b) ‘Logos’ means study on a whole ecology means ‘Study of surrounding’

**The scope of ecological study includes:**

1. It deals with the study of flow of energy and materials in the environment.

2. It deals with the study of nature and its function.

3. It deals with the exchange of various materials between the biotic and abiotic components of environment. E.g., Biogeochemical cycles.

#### Meaning Of Environmental Studies:

Environmental studies are the scientific study of the environmental system and the status of its inherent or induced changes on organisms. It includes not only the study of physical and biological characters of the environment but also the social and cultural factors and the impact of man on environment.

#### Objectives and Guiding Principles of Environmental Studies :

According to UNESCO (1971), the objectives of environmental studies are:

(a) Creating the awareness about environmental problems among people.

(b) Imparting basic knowledge about the environment and its allied problems.

(c) Developing an attitude of concern for the environment.

(d) Motivating public to participate in environment protection and environment improvement.

(e) Acquiring skills to help the concerned individuals in identifying and solving environmental problems.

(f) Striving to attain harmony with Nature.

According to UNESCO, the guiding principles of environmental education should be as follows:

(a) Environmental education should be compulsory, right from the primary up to the post graduate stage.

(b) Environmental education should have an interdisciplinary approach by including physical, chemical, biological as well as socio-cultural aspects of the environment. It should build a bridge between biology and technology.

(c) Environmental education should take into account the historical perspective, the current and the potential historical issues.

(d) Environmental education should emphasise the importance of sustainable development i.e., economic development without degrading the environment.

(e) Environmental education should emphasise the necessity of seeking international cooperation in environmental planning.

(f) Environmental education should lay more stress on practical activities and first hand experiences.

#### Scope,need and Importance of Environmental Studies:

The disciplines included in environmental education are environmental sciences, environmental engineering and environmental management.

**(a) Environmental Science:**

It deals with the scientific study of environmental system (air, water, soil and land), the inherent or induced changes on organisms and the environmental damages incurred as a result of human interaction with the environment.

**(b) Environmental Engineering:**

It deals with the study of technical processes involved in the protection of environment from the potentially deleterious effects of human activity and improving the environmental quality for the health and well beings of humans.

**(c) Environmental Management:**

It promotes due regard for physical, social and economic environment of the enterprise or projects. It encourages planned investment at the start of the production chain rather than forced investment in cleaning up at the end.

It generally covers the areas as environment and enterprise objectives, scope, and structure of the environment, interaction of nature, society and the enterprise, environment impact assessment, economics of pollution, prevention, environmental management standards etc.

The importances of environmental studies are as follows:

1. To clarify modern environmental concept like how to conserve biodiversity.

2. To know the more sustainable way of living.

3. To use natural resources more efficiently.

4. To know the behaviour of organism under natural conditions.

5. To know the interrelationship between organisms in populations and communities.

6. To aware and educate people regarding environmental issues and problems at local, national and international levels.

#### Need of Public Awareness about Environment:

In today’s world because of industrialization and increasing population, the natural resources has been rapidly utilised and our environment is being increasingly degraded by human activities, so we need to protect the environment.

It is not only the duty of government but also the people to take active role for protecting the environment, so protecting our environment is economically more viable than cleaning it up once, it is damaged.

The role of mass media such as newspapers, radio, television, etc is also very important to make people aware regarding environment. There are various institutions, which are playing positive role towards environment to make people aware regarding environment like BSI (Botanical Survey of India, 1890), ZSI (Zoological Survey of India, 1916), WII (Wild Life Institute of India, 1982) etc.

**Defining Environmental Education :**

Environmental Education (EE) is a process in which individuals gain awareness of their environment and acquire **knowledge, skills, values, experiences**, and also the **determination,** which will enable them to act - individually and collectively - to solve present and future environmental problems.

EE is a complex process, covering not just events, but a strong underlying approach to society building as a whole. EE provides people with the awareness needed to build partnerships, understand NGO activities, develop participatory approaches to urban planning, and ensure future markets for eco-business.

Environmental education is a learning process that increases people’s knowledge and awareness about the environment and associated challenges, develops the necessary skills and expertise to address the challenges, and fosters attitudes, motivations, and commitments to make informed decisions and take responsible action (UNESCO, Tbilisi Declaration, 1978).

Environmental education enhances critical thinking, problem-solving, and effective decision-making skills, and teaches individuals to weigh various sides of an environmental issue to make informed and responsible decisions. Environmental education does not advocate a particular viewpoint or course of action.

The components of environmental education are:

1. Awareness and sensitivity to the environment and environmental challenges
2. Knowledge and understanding of the environment and environmental challenges
3. Attitudes of concern for the environment and motivation to improve or maintain environmental quality
4. Skills to identify and help resolve environmental challenges
5. Participation in activities that lead to the resolution of environmental challenges.

Environmental education is aimed at producing a citizenry that is knowledgeable concerning the biophysical environment and its associated problems, aware of how to help solve these problems, and motivated to work toward their solution.

# Environmental education, properly understood, should constitute a comprehensive lifelong education, one responsive to changes in a rapidly changing world. It should prepare the individual for life through an understanding of the major problems of the contemporary world, and the provision of skills and attributes needed to play a productive role towards improving life and protecting the environment with due regard given to ethical values.

# The concept of environmental education:

The Ministry of the Environment and the Ministry of Education and Research has created on the basis of joint initiates a Joint Action Memorandum, aiming to develop environmental education and awareness through such cooperation.

For this purpose, it is important that environmental themes be integrated to the curricula of general education schools. Legislation and regulations valuing environmental awareness are not enough on their own in order to improve the environmental awareness of the population of Estonia as well as practical nature recognition.  
  
The concept of environmental education establishes five arenas, which should be aimed at:

1. Environmental education is valued in society.
2. The points of emphasis of environmental education are changed according to need with the help of legislation, strategic documents and budgets.
3. Estonia has organised possibilities for acquiring environmental education in a way that is in line with internationally assumed responsibilities, strategies and legislation of Estonia.
4. Each age group has a possibility to get environmental education information needed and to develop the skills, attitudes and norms of behaviour necessary for the development of a sustainable lifestyle.
5. Environment and sustainable development are an obligatory part of all levels of education.

## Historical background of environment:

The roots of environmental education can be traced back as early as the 18th century when [Jean-Jacques Rousseau](https://en.wikipedia.org/wiki/Jean-Jacques_Rousseau) stressed the importance of an education that focuses on the environment in [*Emile: or, On Education*](https://en.wikipedia.org/wiki/Emile:_or,_On_Education). Several decades later, [Louis Agassiz](https://en.wikipedia.org/wiki/Louis_Agassiz), a Swiss-born naturalist, echoed Rousseau’s philosophy as he encouraged students to “Study nature, not books.” These two influential scholars helped lay the foundation for a concrete environmental education program, known as [nature study](https://en.wikipedia.org/wiki/Nature_study), which took place in the late 19th century and early 20th century.

The nature study movement used fables and moral lessons to help students develop an appreciation of nature and embrace the natural world. Anna Botsford Comstock, the head of the Department of Nature Study at Cornell University, was a prominent figure in the nature study movement and wrote the Handbook for Nature Study in 1911, which used nature to educate children on cultural values. Comstock and the other leaders of the movement, such as Liberty Hyde Bailey, helped Nature Study garner tremendous amounts of support from community leaders, teachers, and scientists and change the science curriculum for children across the United States.

A new type of environmental education, Conservation Education, emerged as a result of the Great Depression and [Dust Bowl](https://en.wikipedia.org/wiki/Dust_Bowl) during the 1920s and 1930s. Conservation Education dealt with the natural world in a drastically different way from Nature Study because it focused on rigorous scientific training rather than natural history. Conservation Education was a major scientific management and planning tool that helped solve social, economic, and environmental problems during this time period.

The modern environmental education movement, which gained significant momentum in the late 1960s and early 1970s, stems from Nature Study and Conservation Education. During this time period, many events – such as Civil Rights, the Vietnam War, and the Cold War – placed Americans at odds with one another and the U.S. government. However, as more people began to fear the fallout from radiation, the chemical pesticides mentioned in Rachel Carson’s [Silent Spring](https://en.wikipedia.org/wiki/Silent_Spring), and the significant amounts of air pollution and waste, the public’s concern for their health and the health of their natural environment led to a unifying phenomenon known as [environmentalism](https://en.wikipedia.org/wiki/Environmentalism). Environmental education was born of the realization that solving complex local and global problems cannot be accomplished by politicians and experts alone, but requires "the support and active participation of an informed public in their various roles as consumers, voters, employers, and business and community leaders"

One of the first articles about environmental education as a new movement appeared in the [*Phi Delta Kappan*](https://en.wikipedia.org/wiki/Phi_Delta_Kappan) in 1969, authored by [James A. Swan](https://en.wikipedia.org/w/index.php?title=James_A._Swan&action=edit&redlink=1). A definition of "Environmental Education" first appeared in [*The Journal of Environmental Education*](https://en.wikipedia.org/w/index.php?title=The_Journal_of_Environmental_Education&action=edit&redlink=1) in 1969, authored by [William B. Stapp](https://en.wikipedia.org/w/index.php?title=William_B._Stapp&action=edit&redlink=1).[[5]](https://en.wikipedia.org/wiki/Environmental_education#cite_note-5) Stapp later went on to become the first Director of Environmental Education for [UNESCO](https://en.wikipedia.org/wiki/UNESCO), and then the [Global Rivers International Network](https://en.wikipedia.org/w/index.php?title=Global_Rivers_International_Network&action=edit&redlink=1).

Ultimately, the first [Earth Day](https://en.wikipedia.org/wiki/Earth_Day) on April 22, 1970 – a national teach-in about environmental problems – paved the way for the modern environmental education movement. Later that same year, President Nixon passed the National Environmental Education Act, which was intended to incorporate environmental education into K-12 schools. Then, in 1971, the National Association for Environmental Education (now known as the North American Association for Environmental Education) was created to improve environmental literacy by providing resources to teachers and promoting environmental education programs.

Internationally, environmental education gained recognition when the UN Conference on the Human Environment held in Stockholm, Sweden, in 1972, declared environmental education must be used as a tool to address global environmental problems. The United Nations Education Scientific and Cultural Organization ([UNESCO](https://en.wikipedia.org/wiki/UNESCO)) and [United Nations Environment Program](https://en.wikipedia.org/wiki/United_Nations_Environment_Program) ([UNEP](https://en.wikipedia.org/wiki/UNEP)) created three major declarations that have guided the course of environmental education.

**Celebrations of various days in relation with environment**

# List of environmental dates :

| **Name** | **Date** |
| --- | --- |
| [World Wetlands Day](https://en.wikipedia.org/wiki/World_Wetlands_Day) | 02-02: February 2 | |
| [International Polar Bear Day](https://en.wikipedia.org/wiki/International_Polar_Bear_Day) | 02-27: February 27 | |
| [World Wildlife Day](https://en.wikipedia.org/wiki/World_Wildlife_Day) | 03-03: March 3 | |
| International Day of Action for Rivers | 03-14: March 14 | |
| [World Consumer Rights Day](https://en.wikipedia.org/wiki/World_Consumer_Rights_Day) | 03-15 : March 15 | |
| [World Sparrow Day](https://en.wikipedia.org/wiki/World_Sparrow_Day) | 03-20: March 20 | |
| [International Day of Forests](https://en.wikipedia.org/wiki/International_Day_of_Forests) | 03-21: March 21 | |
| World Planting Day | 03-21: March 21 | |
| [World Wood Day](https://en.wikipedia.org/wiki/World_Wood_Day) | 03-21: March 21 | |
| [World Water Day](https://en.wikipedia.org/wiki/World_Water_Day) | 03-22: March 22 | |
| [Earth Day](https://en.wikipedia.org/wiki/Earth_Day) | 04-22: April 22nd[[1]](https://en.wikipedia.org/wiki/List_of_environmental_dates#cite_note-1) | |
| [Arbor Day](https://en.wikipedia.org/wiki/Arbor_Day) | 04: Last Friday in April (each state also has its own observation based on best tree planting time) | |
| [Day of Remembrance for all Victims of Chemical Warfare](https://en.wikipedia.org/wiki/Day_of_Remembrance_for_all_Victims_of_Chemical_Warfare) | 04-29: April 29 | |
| [Green Up Day](https://en.wikipedia.org/wiki/Green_Up_Day) | 05: first Saturday of May in Vermont | |
| [Greenery Day](https://en.wikipedia.org/wiki/Greenery_Day) | 05-04: May 4 in Japan (previously April 29) | |
| [World Migratory Bird Day](http://www.worldmigratorybirdday.org) | second Saturday in May | |
| [International Migratory Bird Day](https://en.wikipedia.org/wiki/Bird_Day) | second Saturday in May (in the U.S. and Canada) and second Saturday in October (in Mexico, Central and South America, and the Caribbean) | |
| [International Day for Biological Diversity](https://en.wikipedia.org/wiki/International_Day_for_Biological_Diversity) (World Biodiversity Day) | 05-22: May 22 | |
| European day of parks (Europarc) | 05-24: May 24 | |
| [Bike-to-Work Day](https://en.wikipedia.org/wiki/Bike-to-Work_Day) | 05: Third Friday in May | |
| [World Environment Day](https://en.wikipedia.org/wiki/World_Environment_Day) | 06-05: June 5 | |
| [World Oceans Day](https://en.wikipedia.org/wiki/World_Oceans_Day) | 06-08: June 8 | |
| [Global Wind Day](https://en.wikipedia.org/wiki/Global_Wind_Day) | 06-15: June 15 | |
| [World Day to Combat Desertification and Drought](https://en.wikipedia.org/wiki/World_Day_to_Combat_Desertification_and_Drought) | 06-17: June 17 | |
| [World Population Day](https://en.wikipedia.org/wiki/World_Population_Day) | 07-11: July 11 | |
| [International Tiger Day](https://en.wikipedia.org/wiki/International_Tiger_Day) | 07-29: July 29 | |
| [World Elephant Day](https://en.wikipedia.org/wiki/World_Elephant_Day) | 08-12: August 12 | |
| [National Honey Bee Day](https://en.wikipedia.org/wiki/National_Honey_Bee_Day) | 08-22: August 22 | |
| [International Day for the Preservation of the Ozone Layer](https://en.wikipedia.org/wiki/International_Day_for_the_Preservation_of_the_Ozone_Layer) | 09-16: September 16 | |
| [Clean Up the World](https://en.wikipedia.org/wiki/Clean_Up_the_World) | 09-17 to 09-19: Weekend - September 16-18 | |
| [World Water Monitoring Day](https://en.wikipedia.org/wiki/World_Water_Monitoring_Day) | 09-18: September 18 | |
| [Zero Emissions Day](http://zeroemissionsday.org) | 09-21: September 21 | |
| [Car Free Day](https://en.wikipedia.org/wiki/Car_Free_Day) | 09-22: September 22 | |
| [Ecological Debt Day](https://en.wikipedia.org/wiki/Ecological_Debt_Day) (Earth Overshoot Day) | 09-23: September 23 in 2008, but receding | |
| World Environmental Health Day | 09-26: September 26 since 2011 (IFEH) | |
| [World Rivers Day](https://en.wikipedia.org/w/index.php?title=World_Rivers_Day&action=edit&redlink=1) | 09: every last Sunday in September | |
| [World Habitat Day](https://en.wikipedia.org/wiki/World_Habitat_Day) | 10: first Monday in October | |
| [International Day for Natural Disaster Reduction](https://en.wikipedia.org/wiki/International_Day_for_Natural_Disaster_Reduction) | 10: second Wednesday in October | |
| Sustainability Day | 10: fourth Wednesday of October | |
| [International Day of Climate Action](https://en.wikipedia.org/wiki/International_Day_of_Climate_Action) | 10-24: October 24 | |
| [International Day for Preventing the Exploitation of the Environment in War and Armed Conflict](https://en.wikipedia.org/wiki/International_Day_for_Preventing_the_Exploitation_of_the_Environment_in_War_and_Armed_Conflict) | 11-06: November 6 | |
| [America Recycles Day](https://en.wikipedia.org/wiki/America_Recycles_Day) | 11-15: November 15 | |
| [World Soil Day](http://www.fao.org/globalsoilpartnership/world-soil-day/en/) | 12-05: December 5 | |
| [International Mountain Day](https://en.wikipedia.org/wiki/International_Mountain_Day) | 12-11: December 11 | |
| [Ozone Action Day](https://en.wikipedia.org/wiki/Ozone_Action_Day) | at certain times during the summer months | |
| [eDay](https://en.wikipedia.org/wiki/EDay) | variable date | |

**Pollution of Plastic Bags/covers – Effects and Solutions:**

Plastic bags are among the items that are non-biodegradable. This means that they are not biodegraded or, in simpler terms, do not decay. Do you know that it takes thousands of years before one plastic bag can turn into small particles? Yes, that’s how long for plastic bags to vanish from our planet, Earth.

When they are thrown to garbage cans, plastic bags do not simply decay unlike biodegradable ones like paper and leftovers. Try doing that and observe for many days to see what the plastic becomes afterwards. If they are scattered anywhere on the ground, they become the sources of water pollution. It is possible that they will eventually end up in waterways. If that happens, it can cause blockage to holes and give a much inconvenient situation to the society. Have you seen some water with plastics floating on it? That’s because of the wrong doings of people when they do not properly throw plastic bags. Well, there are many negative impacts that can cause by plastic bags. That’s what you are going to learn as you continue to read.

What should people like you need to do in order to avoid having plastic bags pollution? This is an important question when you read something about plastic bags pollution. You must not only get information to be aware of the effects of plastic bags. It is also very vital to know and apply solutions to limit the rapid growth of plastic bags pollution. Plus, the way to solve this kind of problem always begins with you. Do not expect the government, environment organization or charities to do that. It has to start with you, in your family, at home and everywhere you go. That is one small way you can make which can turn into a big difference.

**What Makes Plastic Bags Harmful to the Environment?**

Plastic bags are made of various chemicals which are mainly toxic. That is certainly very harmful to the health and the environment. The chemicals used to make plastic bags are xylene, ethylene oxide and benzene. These are toxic chemicals that are sources of various diseases as well as disorders in humans. They do not only provide negative effects on the health of people and animals but also to the air. These chemicals can pollute the air too which again harm the living organisms. They will not only affect humans and animals but also plants, water and air.

**How Plastic Bags Cause Danger to the Health and Environment?**

There are various ways on how plastic bags can harm the health of humans and the entire environment. Two major methods that release toxic chemicals of plastic bags are by burning and throwing. Whether you burn or throw plastic bags, all the chemicals are released which can cause harm to the society.

Some countries in the world do not throw plastic bags the right way. Instead of putting in the non-biodegradable can, people tend to throw them in the biodegradable or anywhere on the ground. This is one mistake most people do these days. Even the smallest plastic bag like the cover of candy has to be thrown properly. Others also try to burn them and this is not also helpful as it poses a great threat in the air and soil. . I did some of these mistakes before but I have opened my eyes and see the effects of it. Now, I do not want that to happen that’s why I’m sharing this.

When the chemicals are exposed, humans can inhale them which cause problems in the respiratory. If they are thrown on grounds, animals and birds may mistakenly think they’re foods causing poison after consumption. When plastic bags are dumped in water, sea creatures and fish won’t live longer. The entire marine life is also harmed.

**Which Ways Help Resolve Plastic Bags Pollution?**

It takes self-discipline to solve water pollution, air pollution and soil pollution caused by plastic bags. The answer is not solely about government campaigns or organizations. It starts within yourself aright at your own backyard and inside house. Here are very simple and effortless things you can do to help resolve plastic bags pollution.

**1. Ban the Use of Plastic Bags**

If possible, do not use any plastic bags anymore. It may be difficult to do that because plastic bags are normally easy and light to carry. If only you can limit your use until you are able to 100% stay away from it, then you are helping the advocacy against plastic bags pollution.

**2. Use Eco-Friendly or Biodegradable Bags**

You do not have to worry about banning plastic bags. There are environmentally friendly bags that you can use as an alternative. When you go out to the grocery store or super market to buy things, have eco friendly bags with you. That way you can say no to the use of plastic bags even if the stores offer plastic bags. In fact, there are now new plastic bags that are biodegradable. They can also be good options to use without having to worry about pollution.

**3. Reuse Plastic Bags**

It is also possible to recycle the use of plastic bags. Instead of throwing them, have them usable for your next usage. It helps you to reduce getting more plastic bags in this case too. This is actually the first start on how you can totally ban the use of plastic bags. If you think your plastic bags have been reused for many times, then that’s the time you can throw in the non-biodegradable can.

**4. Donate Plastic Bags to Recycling Centers**

From stores to industrial companies, there are places where you can give your plastic bags for recycling. You can even find in your place some recycling centers where you can donate the plastic bags you have. Instead of throwing them away, just give them to these places to help prevent pollution.

**5. Do Not Throw Plastic Bags**

Another easy way to avoid water and air pollutions is to avoid throwing plastic bags. You can just reuse or donate them to recycling centers. It is also a good approach to throw them at the right garbage can, which must be in a non-biodegradable can.

**The Roles of Schools in Environmental Protection:**

Like all entities, schools have an environmental footprint. Those in the school generate trash. They use energy for heating, lighting, photocopying and so on. Schools are cleaned using chemicals that have environmental impacts. The list continues.

But schools also have a very unique role in environmental protection: They help students become conscientious stewards of (and advocates for) the environment, protecting it for themselves and generations to come. As we look to schools in the effort to preserve our environment, we should consider both roles to maximize their impact.

### Act:

Of course, simply by minimizing their own environmental footprint, schools can do a great deal to help the environment. As Redmond (WA) environmental science teacher Mike Town has pointed out, "in Redmond and in most of the small cities in the United States -- suburban cities, rural cities -- the single biggest greenhouse point source is the local high school."

In addition to raising thermostats in the summer and turning out lights when classrooms and auditoriums are not in use, one relatively easy step that schools and districts can take to lessen their environmental impact is "cleaning green."

In a recent edition of [The State Education Standard](http://nasbe.org/press-releases/green-cleaning-schools/), the National Association of State Boards of Education (NASBE) offered ["A Roadmap to Implementing Green Cleaning in Districts and Schools,"](http://nasbe.org/wp-content/uploads/Davis_Implementation_article_Feb2012.pdf) suggesting a few simple steps to help schools (and districts) start a green cleaning program:

* **Develop a comprehensive program** focusing on low-hanging fruit or a significant challenge. It should include prevention (in terms of both dirt entering the building and exposure of students and staff to chemicals), conservation (of energy, water and chemicals), education (of the community and staff) and evaluation (of both cost and quality of cleaning and products)
* **Switch to green cleaning products** as identified by standards set by third-party organizations like Green Seal, EcoLogo and the EPA's Design for the Environment. Such a switch is often cost-neutral
* **Introduce green equipment and supplies** such auto scrubbers that reduce water consumption and chemical use and high-quality entryway mats that reduce dirt contaminations. While the upfront costs of such materials may be higher than traditional options, they can save money as well as the environment in the long-term
* **Adopt green cleaning procedures** adjusting the frequency, technique or time of a cleaning. Such changes can have environmental and cost impacts as large as switching products and equipment
* **Share the responsibility** to ensure that teachers, administrators, students, outside contractors and others join the custodial staff in efforts to maintain a green cleaning program.

**UNIT - 4**

**NATURAL RESOURCES AND RELATED ENVIRONMENTAL ISSUES**

( Water resources, food resources and Land resources, Definition, effects and control measures of Air Pollution, Water Pollution, Soil Pollution, Noise Pollution, Thermal Pollution, Role of pollution control board. )

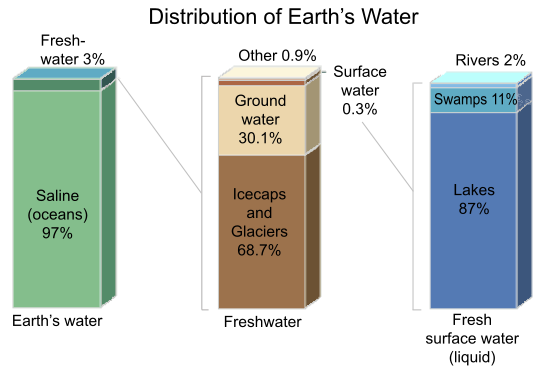
[**WATER RESOURCES**](http://www.iwawaterwiki.org/xwiki/bin/view/Articles/WaterResources)

[Water resources](http://www.iwawaterwiki.org/xwiki/bin/view/Articles/WaterResources) are sources of [water](http://en.wikipedia.org/wiki/Water) that are useful or potentially useful to [humans](http://en.wikipedia.org/wiki/Human). Uses of water include [agricultural](http://en.wikipedia.org/wiki/Agricultural), [industrial](http://en.wikipedia.org/wiki/Industry), [household](http://en.wikipedia.org/wiki/Household), [recreational](http://en.wikipedia.org/wiki/Recreational) and [environmental](http://en.wikipedia.org/wiki/Natural_environment) activities. Virtually all of these human uses require [fresh water](http://en.wikipedia.org/wiki/Fresh_water).

97% of water on the Earth is salt water, leaving only 3% as fresh water of which slightly over two thirds is frozen in [glaciers](http://en.wikipedia.org/wiki/Glacier) and [polar](http://en.wikipedia.org/wiki/Polar_climate) [ice caps](http://en.wikipedia.org/wiki/Ice_cap). The remaining unfrozen freshwater is mainly found as groundwater, with only a small fraction present above ground or in the air.

Fresh water is a [renewable resource](http://en.wikipedia.org/wiki/Renewable_resource), yet the world's supply of clean, fresh water is steadily decreasing. Water demand already [exceeds supply](http://en.wikipedia.org/wiki/Supply_and_demand) in many parts of the world and as the [world population](http://en.wikipedia.org/wiki/World_population) continues to rise, so too does the water demand. Awareness of the global importance of preserving [water](http://en.wikipedia.org/wiki/Water) for [ecosystem services](http://en.wikipedia.org/wiki/Ecosystem_services) has only recently emerged as, during the 20th century, more than half the world’s [wetlands](http://en.wikipedia.org/wiki/Wetlands) have been lost along with their valuable environmental services. [Biodiversity](http://en.wikipedia.org/wiki/Biodiversity)-rich [freshwater](http://en.wikipedia.org/wiki/Freshwater) ecosystems are currently declining faster than [marine](http://en.wikipedia.org/wiki/Marine_%28ocean%29) or land [ecosystems](http://en.wikipedia.org/wiki/Ecosystem). The framework for allocating [water resources](http://www.iwawaterwiki.org/xwiki/bin/view/Articles/WaterResources) to water users (where such a framework exists) is known as [water rights](http://en.wikipedia.org/wiki/Water_rights)

A natural [wetland](http://www.iwawaterwiki.org/xwiki/bin/view/Articles/Wetlandecosystemservices)



A graphical distribution of the locations of water on Earth

**Sources of fresh water :**

1. **Surface water :**

[Surface water](http://en.wikipedia.org/wiki/Surface_water) is water in a river, [lake](http://en.wikipedia.org/wiki/Lake) or fresh water [wetland](http://en.wikipedia.org/wiki/Wetland). Surface water is naturally replenished by [precipitation](http://en.wikipedia.org/wiki/Precipitation_%28meteorology%29) and naturally lost through discharge to the [oceans](http://en.wikipedia.org/wiki/Oceans), [evaporation](http://en.wikipedia.org/wiki/Evaporation), and sub-surface seepage.

Although the only natural input to any surface water system is precipitation within its [watershed](http://en.wikipedia.org/wiki/Drainage_basin), the total quantity of water in that system at any given time is also dependent on many other factors. These factors include storage capacity in lakes, [wetlands](http://www.iwawaterwiki.org/xwiki/bin/view/Articles/Wetlandecosystemservices) and artificial [reservoirs](http://en.wikipedia.org/wiki/Reservoir_%28water%29), the permeability of the [soil](http://en.wikipedia.org/wiki/Soil) beneath these storage bodies, the [runoff](http://en.wikipedia.org/wiki/Surface_runoff) characteristics of the land in the watershed, the timing of the precipitation and local [evaporation](http://www.iwawaterwiki.org/xwiki/bin/view/Articles/Evaporationandretentionstructures) rates. All of these factors also affect the proportions of water lost.

Human activities can have a large and sometimes devastating impact on these factors. Humans often increase storage capacity by constructing reservoirs and decrease it by draining [wetlands](http://www.iwawaterwiki.org/xwiki/bin/view/Articles/Wetlandecosystemservices). Humans often increase runoff quantities and velocities by paving areas and channelizing stream flow.

The total quantity of water available at any given time is an important consideration. Some human water users have an intermittent need for water. For example, many [farms](http://en.wikipedia.org/wiki/Farm) require large quantities of water in the spring, and no water at all in the winter. To supply such a farm with water, a surface water system may require a large storage capacity to collect water throughout the year and release it in a short period of time. Other users have a continuous need for water, such as a [power plant](http://en.wikipedia.org/wiki/Power_plant) that requires water for cooling. To supply such a power plant with water, a surface water system only needs enough storage capacity to fill in when average stream flow is below the power plant's need.

Nevertheless, over the long term the average rate of precipitation within a watershed is the upper bound for average consumption of natural surface water from that watershed.

Natural surface water can be augmented by importing surface water from another watershed through a [canal](http://en.wikipedia.org/wiki/Canal) or [pipeline](http://en.wikipedia.org/wiki/Pipeline_transport). It can also be artificially augmented from any of the other sources listed here, however in practice the quantities are negligible. Humans can also cause surface water to be "lost" (i.e. become unusable) through [pollution](http://en.wikipedia.org/wiki/Pollution).

[Brazil](http://en.wikipedia.org/wiki/Brazil) is the country estimated to have the largest supply of fresh water in the world, followed by [Russia](http://en.wikipedia.org/wiki/Russia) and [Canada](http://en.wikipedia.org/wiki/Canada).

1. **Under river flow**

Throughout the course of the river, the total volume of water transported downstream will often be a combination of the visible free water flow together with a substantial contribution flowing through sub-surface rocks and gravels that underlie the river and its [floodplain](http://www.iwawaterwiki.org/xwiki/bin/view/Articles/FloodplainManagement) called the [hyporheic zone](http://en.wikipedia.org/wiki/Hyporheic_zone). For many rivers in large valleys, this unseen component of flow may greatly exceed the visible flow. The hyporheic zone often forms a dynamic interface between surface water and true ground-water receiving water from the ground water when aquifers are fully charged and contributing water to ground-water when ground waters are depleted. This is especially significant in [karst](http://en.wikipedia.org/wiki/Karst) areas where pot-holes and underground rivers are common.

1. **Ground water**

Sub-surface water, or [groundwater](http://en.wikipedia.org/wiki/Groundwater), is fresh water located in the [pore](http://en.wikipedia.org/wiki/Porosity) space of soil and [rocks](http://en.wikipedia.org/wiki/Rock_%28geology%29). It is also water that is flowing within [aquifers](http://en.wikipedia.org/wiki/Aquifer) below the [water table](http://en.wikipedia.org/wiki/Water_table). Sometimes it is useful to make a distinction between sub-surface water that is closely associated with surface water and deep sub-surface water in an aquifer (sometimes called "fossil water").

Sub-surface water can be thought of in the same terms as surface water: inputs, outputs and storage. The critical difference is that due to its slow rate of turnover, sub-surface water storage is generally much larger compared to inputs than it is for surface water. This difference makes it easy for humans to use sub-surface water unsustainably for a long time without severe consequences. Nevertheless, over the long term the average rate of seepage above a sub-surface water source is the upper bound for average consumption of water from that source.

The natural input to sub-surface water is seepage from surface water. The natural outputs from sub-surface water are [springs](http://en.wikipedia.org/wiki/Spring_%28hydrosphere%29) and seepage to the oceans.

If the surface water source is also subject to substantial [evaporation](http://www.iwawaterwiki.org/xwiki/bin/view/Articles/Evaporationandretentionstructures), a sub-surface water source may become [saline](http://en.wikipedia.org/wiki/Salinity). This situation can occur naturally under [endorheic](http://en.wikipedia.org/wiki/Endorheic) bodies of water, or artificially under [irrigated](http://en.wikipedia.org/wiki/Irrigation) farmland. In coastal areas, human use of a sub-surface water source may cause the direction of seepage to ocean to reverse which can also cause [soil salinization](http://en.wikipedia.org/wiki/Soil_salinization). Humans can also cause sub-surface water to be "lost" (i.e. become unusable) through pollution. Humans can increase the input to a sub-surface water source by building reservoirs or detention ponds. 

**Desalination**

[Desalination](http://en.wikipedia.org/wiki/Desalination) is an artificial process by which [saline water](http://en.wikipedia.org/wiki/Saline_water) (generally [sea water](http://en.wikipedia.org/wiki/Sea_water)) is converted to fresh water. The most common [desalination](http://www.iwawaterwiki.org/xwiki/bin/view/Articles/Desalinization) processes are [distillation](http://en.wikipedia.org/wiki/Distillation) and [reverse osmosis](http://en.wikipedia.org/wiki/Reverse_osmosis). [Desalination](http://www.iwawaterwiki.org/xwiki/bin/view/Articles/Desalinization) is currently expensive compared to most alternative sources of water, and only a very small fraction of total human use is satisfied by [desalination](http://www.iwawaterwiki.org/xwiki/bin/view/Articles/Desalinization). It is only economically practical for high-valued uses (such as household and [industrial](http://www.iwawaterwiki.org/xwiki/bin/view/Articles/IndustrialWastewaterTreatment_0)uses) in [arid](http://en.wikipedia.org/wiki/Arid) areas. The most extensive use is in the [Persian Gulf](http://en.wikipedia.org/wiki/Persian_Gulf).

1. **Frozen water**

The Himalayas, which are often called "The Roof of the World", contain some of the most extensive and rough high altitude areas on Earth as well as the greatest area of glaciers and permafrost outside of the poles. Ten of Asia’s largest rivers flow from there and more than a billion people’s livelihoods depend on them. To complicate matters, temperatures are rising more rapidly here than the global average. In Nepal the temperature has risen with 0.6 degree over the last decade, whereas the global warming has been around 0.7 over the last hundred years.

An iceberg as seen from [Newfoundland](http://en.wikipedia.org/wiki/Newfoundland_and_Labrador) Several schemes have been proposed to make use of [icebergs](http://en.wikipedia.org/wiki/Iceberg) as a water source, however to date this has only been done for novelty purposes. Glacier runoff is considered to be surface water.

**Uses of fresh water:**

Uses of fresh water can be categorized as consumptive and non-consumptive (sometimes called "renewable"). A use of water is consumptive if that water is not immediately available for another use. Losses to sub-surface seepage and [evaporation](http://www.iwawaterwiki.org/xwiki/bin/view/Articles/Evaporationandretentionstructures) are considered consumptive, as is water incorporated into a product (such as farm produce). Water that can be [treated](http://en.wikipedia.org/wiki/Water_treatment) and returned as surface water, such as [sewage](http://www.iwawaterwiki.org/xwiki/bin/view/Articles/ANALTERNATIVETOBIOLOGICALTREATMENTFORSEWAGE), is generally considered non-consumptive if that water can be put to additional use.

**Agricultural**

In some areas of the world irrigation is necessary to grow any crop at all, in other areas it permits more profitable crops to be grown or enhances crop yield. Various irrigation methods involve different trade-offs between crop yield, water consumption and capital cost of equipment and structures. Irrigation methods such as [furrow](http://en.wikipedia.org/wiki/Furrow_irrigation) and overhead [sprinkler](http://en.wikipedia.org/wiki/Sprinkler) irrigation are usually less expensive but are also typically less efficient, because much of the water evaporates, runs off or drains below the root zone. Other irrigation methods considered to be more efficient include [drip or trickle irrigation](http://en.wikipedia.org/wiki/Drip_irrigation), [surge irrigation](http://en.wikipedia.org/wiki/Surface_irrigation#Surge_Irrigation), and some types of sprinkler systems where the sprinklers are operated near ground level. These types of systems, while more expensive, usually offer greater potential to minimize runoff, drainage and [evaporation](http://www.iwawaterwiki.org/xwiki/bin/view/Articles/Evaporationandretentionstructures). Any system that is improperly managed can be wasteful, all methods have the potential for high efficiencies under suitable conditions, appropriate irrigation timing and management. One issue that is often insufficiently considered is salinization of sub-surface water.

[Aquaculture](http://en.wikipedia.org/wiki/Aquaculture) is a small but growing agricultural use of water. Freshwater commercial fisheries may also be considered as agricultural uses of water, but have generally been assigned a lower priority than irrigation (see [Aral Sea](http://en.wikipedia.org/wiki/Aral_Sea) and [Pyramid Lake](http://en.wikipedia.org/wiki/Pyramid_Lake)).

As global populations grow, and as demand for food increases in a world with a fixed [water supply](http://www.iwawaterwiki.org/xwiki/bin/view/Articles/WaterSupply), there are efforts underway to learn how to produce more food with less water, through improvements in irrigation[[7]](http://en.wikipedia.org/wiki/Water_resources#cite_note-6) methods[[8]](http://en.wikipedia.org/wiki/Water_resources#cite_note-7) and [technologies](http://en.wikipedia.org/wiki/Technologies), agricultural [water management](http://en.wikipedia.org/wiki/Water_management), crop types, and water monitoring.

A farm in [Ontario](http://en.wikipedia.org/wiki/Ontario). It is estimated that 69% of worldwide water use is for irrigation, with 15-35% of irrigation withdrawals being unsustainable.[[6]](http://en.wikipedia.org/wiki/Water_resources#cite_note-WBCSD_Water_Facts_.26_Trends-5)

**Industrial**

A power plant in [Poland](http://en.wikipedia.org/wiki/Poland) It is estimated that 22% of worldwide water use is industrial[[6]](http://en.wikipedia.org/wiki/Water_resources#cite_note-WBCSD_Water_Facts_.26_Trends-5). Major [industrial](http://www.iwawaterwiki.org/xwiki/bin/view/Articles/IndustrialWastewaterTreatment_0)users include power plants, which use water for cooling or as a power source (i.e. [hydroelectric](http://en.wikipedia.org/wiki/Hydroelectric) plants), [ore](http://en.wikipedia.org/wiki/Ore) and [oil](http://en.wikipedia.org/wiki/Petroleum) refineries, which use water in chemical processes, and manufacturing plants, which use water as a solvent.

The portion of industrial water usage that is consumptive varies widely, but as a whole is lower than agricultural use.

Water is used in power generation. Hydroelectricity is electricity obtained from [hydropower](http://www.iwawaterwiki.org/xwiki/bin/view/Articles/Hydropower%2DPracticeandApplication). Hydroelectric power comes from water driving a water turbine connected to a generator. Hydroelectricity is a low-cost, non-polluting, renewable energy source. The energy is supplied by the sun. Heat from the sun evaporates water, which condenses as rain in higher altitudes, from where it flows down.

Three Gorges Dam is the largest hydro-electric power station Pressurized water is used in water blasting and water jet cutters. Also, very high pressure water guns are used for precise cutting. It works very well, is relatively safe, and is not harmful to the environment. It is also used in the cooling of machinery to prevent over-heating, or prevent saw blades from over-heating.

Water is also used in many industrial processes and machines, such as the steam turbine and heat exchanger, in addition to its use as a chemical solvent. Discharge of untreated water from industrial uses is pollution. Pollution includes discharged solutes (chemical pollution) and discharged coolant water (thermal pollution). Industry requires pure water for many applications and utilizes a variety of purification techniques both in [water supply](http://www.iwawaterwiki.org/xwiki/bin/view/Articles/WaterSupply) and discharge.

**Household**

It is estimated that 8% of worldwide water use is for household purposes[[6]](http://en.wikipedia.org/wiki/Water_resources#cite_note-WBCSD_Water_Facts_.26_Trends-5). These include [drinking water](http://en.wikipedia.org/wiki/Drinking_water), [bathing](http://en.wikipedia.org/wiki/Bathing), [cooking](http://en.wikipedia.org/wiki/Cooking), [sanitation](http://www.iwawaterwiki.org/xwiki/bin/view/Articles/Sanitation), and [gardening](http://en.wikipedia.org/wiki/Gardening). Basic household water requirements have been estimated by [Peter Gleick](http://en.wikipedia.org/wiki/Peter_Gleick) at around 50 liters per person per day, excluding water for gardens. Drinking water is water that is of sufficiently high quality so that it can be consumed or used without risk of immediate or long term harm. Such water is commonly called potable water. In most developed countries, the water supplied to households, commerce and industry is all of drinking water standard even though only a very small proportion is actually consumed or used in food preparation.

**Recreation**

[Recreational](http://en.wikipedia.org/wiki/Recreation) water use is usually a very small but growing percentage of total water use. Recreational water use is mostly tied to reservoirs. If a reservoir is kept fuller than it would otherwise be for recreation, then the water retained could be categorized as recreational usage. Release of water from a few reservoirs is also timed to enhance [whitewater](http://en.wikipedia.org/wiki/Whitewater) boating, which also could be considered a recreational usage. Other examples are anglers, water skiers, nature enthusiasts and swimmers.

Recreational usage is usually non-consumptive. [Golf courses](http://en.wikipedia.org/wiki/Golf_course) are often targeted as using excessive amounts of water, especially in drier regions. It is, however, unclear whether recreational irrigation (which would include private gardens) has a noticeable effect on [water resources](http://www.iwawaterwiki.org/xwiki/bin/view/Articles/WaterResources). This is largely due to the unavailability of reliable data. Additionally, many golf courses utilize either primarily or exclusively treated effluent water, which has little impact on potable water availability.

Some governments, including the Californian Government, have labelled golf course usage as agricultural in order to deflect [environmentalists](http://en.wikipedia.org/wiki/Environmentalist)' charges of wasting water. However, using the above figures as a basis, the actual statistical effect of this reassignment is close to zero. In Arizona, an organized lobby has been established in the form of the Golf Industry Association, a group focused on educating the public on how golf impacts the environment.

Recreational usage may reduce the availability of water for other users at specific times and places. For example, water retained in a reservoir to allow boating in the late summer is not available to farmers during the spring planting season. Water released for whitewater rafting may not be available for hydroelectric generation during the time of peak electrical demand.

**Environmental**

Explicit environmental water use is also a very small but growing percentage of total water use. Environmental water usage includes artificial [wetlands](http://www.iwawaterwiki.org/xwiki/bin/view/Articles/Wetlandecosystemservices), artificial lakes intended to create wildlife habitat, [fish ladders](http://en.wikipedia.org/wiki/Fish_ladder) , and water releases from reservoirs timed to help fish spawn.

Like recreational usage, environmental usage is non-consumptive but may reduce the availability of water for other users at specific times and places. For example, water release from a reservoir to help fish spawn may not be available to farms upstream.

**Food resources**

**Food**

Food is any substance consumed to provide nutritional support for the body. It is usually of [plant](https://en.wikipedia.org/wiki/Plant) or [animal](https://en.wikipedia.org/wiki/Animal) origin, and contains essential [nutrients](https://en.wikipedia.org/wiki/Nutrient), such as [fats](https://en.wikipedia.org/wiki/Fat), [proteins](https://en.wikipedia.org/wiki/Protein_%28nutrient%29), [vitamins](https://en.wikipedia.org/wiki/Vitamin), or [minerals](https://en.wikipedia.org/wiki/Mineral). The substance is [ingested](https://en.wikipedia.org/wiki/Ingestion) by an [organism](https://en.wikipedia.org/wiki/Organism) and assimilated by the organism's [cells](https://en.wikipedia.org/wiki/Cell_%28biology%29) to provide [energy](https://en.wikipedia.org/wiki/Energy), maintain life, or stimulate growth.

Historically, people secured food through two methods: [hunting and gathering](https://en.wikipedia.org/wiki/Hunter-gatherer), and [agriculture](https://en.wikipedia.org/wiki/Agriculture). Today, most of the [food energy](https://en.wikipedia.org/wiki/Food_energy) required by the ever [increasing](https://en.wikipedia.org/wiki/Population_growth) [population of the world](https://en.wikipedia.org/wiki/World_population) is supplied by the [food industry](https://en.wikipedia.org/wiki/Food_industry).

[Food safety](https://en.wikipedia.org/wiki/Food_safety) and [food security](https://en.wikipedia.org/wiki/Food_security) are monitored by agencies like the [International Association for Food Protection](https://en.wikipedia.org/wiki/International_Association_for_Food_Protection), [World Resources Institute](https://en.wikipedia.org/wiki/World_Resources_Institute), [World Food Programme](https://en.wikipedia.org/wiki/World_Food_Programme), [Food and Agriculture Organization](https://en.wikipedia.org/wiki/Food_and_Agriculture_Organization), and [International Food Information Council](https://en.wikipedia.org/wiki/International_Food_Information_Council). They address issues such as [sustainability](https://en.wikipedia.org/wiki/Sustainability), [biological diversity](https://en.wikipedia.org/wiki/Biological_diversity), [climate change](https://en.wikipedia.org/wiki/Climate_change), [nutritional economics](https://en.wikipedia.org/wiki/Nutritional_economics), [population growth](https://en.wikipedia.org/wiki/Population_growth), [water supply](https://en.wikipedia.org/wiki/Water_supply), and [access to food](https://en.wikipedia.org/wiki/Food_security).

The [right to food](https://en.wikipedia.org/wiki/Right_to_food) is a [human right](https://en.wikipedia.org/wiki/Human_right) derived from the [International Covenant on Economic, Social and Cultural Rights](https://en.wikipedia.org/wiki/International_Covenant_on_Economic,_Social_and_Cultural_Rights) ([ICESCR](https://en.wikipedia.org/wiki/ICESCR)), recognizing the "right to an adequate standard of living, including adequate food," as well as the "fundamental right to be free from hunger."

**Food Resources :**

Most food has its origin in plants. Some food is obtained directly from plants; but even animals that are used as food sources are raised by feeding them food derived from plants. [Cereal](https://en.wikipedia.org/wiki/Cereal) grain is a [staple food](https://en.wikipedia.org/wiki/Staple_food) that provides more food energy worldwide than any other type of crop. [Maize](https://en.wikipedia.org/wiki/Maize), [wheat](https://en.wikipedia.org/wiki/Wheat), and [rice](https://en.wikipedia.org/wiki/Rice) – in all of their varieties – account for 87% of all grain production worldwide. Most of the grain that is produced worldwide is fed to livestock.

Some foods not from animal or plant sources include various edible [fungi](https://en.wikipedia.org/wiki/Fungi), especially [mushrooms](https://en.wikipedia.org/wiki/Mushroom). Fungi and ambient [bacteria](https://en.wikipedia.org/wiki/Bacteria) are used in the preparation of [fermented](https://en.wikipedia.org/wiki/Fermentation_%28food%29) and [pickled](https://en.wikipedia.org/wiki/Pickled) foods like [leavened](https://en.wikipedia.org/wiki/Baker%27s_yeast) [bread](https://en.wikipedia.org/wiki/Bread), [alcoholic drinks](https://en.wikipedia.org/wiki/Alcoholic_drinks), [cheese](https://en.wikipedia.org/wiki/Cheese), [pickles](https://en.wikipedia.org/wiki/Pickled_cucumber), [kombucha](https://en.wikipedia.org/wiki/Kombucha), and [yogurt](https://en.wikipedia.org/wiki/Yogurt). Another example is [blue-green algae](https://en.wikipedia.org/wiki/Blue-green_algae) such as [Spirulina](https://en.wikipedia.org/wiki/Spirulina_%28dietary_supplement%29). Inorganic substances such as [salt](https://en.wikipedia.org/wiki/Salt), [baking soda](https://en.wikipedia.org/wiki/Sodium_bicarbonate) and [cream of tartar](https://en.wikipedia.org/wiki/Potassium_hydrogen_tartrate) are used to preserve or chemically alter an ingredient.

1. **Plants :**

Many plants and plant parts are eaten as food and around 2,000 plant species which are cultivated for food. Many of these plant species have several distinct [cultivars](https://en.wikipedia.org/wiki/Cultivar).

[Seeds](https://en.wikipedia.org/wiki/Seed) of plants are a good source of food for animals, including humans, because they contain the nutrients necessary for the plant's initial growth, including many healthful fats, such as [Omega fats](https://en.wikipedia.org/wiki/Omega-3). In fact, the majority of food consumed by human beings are seed-based foods. Edible seeds include [cereals](https://en.wikipedia.org/wiki/Cereal) ([maize](https://en.wikipedia.org/wiki/Maize), [wheat](https://en.wikipedia.org/wiki/Wheat), [rice](https://en.wikipedia.org/wiki/Rice), [et cetera](https://en.wikipedia.org/wiki/Et_cetera)), [legumes](https://en.wikipedia.org/wiki/Legume) ([beans](https://en.wikipedia.org/wiki/Bean), [peas](https://en.wikipedia.org/wiki/Pea), [lentils](https://en.wikipedia.org/wiki/Lentil), [et cetera](https://en.wikipedia.org/wiki/Et_cetera)), and [nuts](https://en.wikipedia.org/wiki/Nut_%28fruit%29). [Oilseeds](https://en.wikipedia.org/wiki/Oilseed) are often pressed to produce rich oils - [sunflower](https://en.wikipedia.org/wiki/Sunflower), [flaxseed](https://en.wikipedia.org/wiki/Flaxseed), [rapeseed](https://en.wikipedia.org/wiki/Rapeseed) (including [canola oil](https://en.wikipedia.org/wiki/Canola_oil)), [sesame](https://en.wikipedia.org/wiki/Sesame), [et cetera](https://en.wikipedia.org/wiki/Et_cetera).

Seeds are typically high in [unsaturated fats](https://en.wikipedia.org/wiki/Unsaturated_fat) and, in moderation, are considered a [health food](https://en.wikipedia.org/wiki/Health_food), although not all seeds are edible. Large seeds, such as those from a [lemon](https://en.wikipedia.org/wiki/Lemon), pose a choking hazard, while seeds from [cherries](https://en.wikipedia.org/wiki/Cherries) and [apples](https://en.wikipedia.org/wiki/Apple) contain [cyanide](https://en.wikipedia.org/wiki/Cyanide) which could be poisonous only if consumed in large volumes.

[Fruits](https://en.wikipedia.org/wiki/Fruit) are the ripened ovaries of plants, including the seeds within. Many plants and animals have [coevolved](https://en.wikipedia.org/wiki/Coevolution) such that the fruits of the former are an attractive food source to the latter, because animals that eat the fruits may [excrete](https://en.wikipedia.org/wiki/Excretion) the seeds some distance away. Fruits, therefore, make up a significant part of the diets of most cultures. Some botanical fruits, such as [tomatoes](https://en.wikipedia.org/wiki/Tomato), [pumpkins](https://en.wikipedia.org/wiki/Pumpkin), and [eggplants](https://en.wikipedia.org/wiki/Eggplant), are eaten as vegetables.[[7]](https://en.wikipedia.org/wiki/Food#cite_note-7) (For more information, see [list of fruits](https://en.wikipedia.org/wiki/List_of_fruits).)

[Vegetables](https://en.wikipedia.org/wiki/Vegetable) are a second type of plant matter that is commonly eaten as food. These include [root vegetables](https://en.wikipedia.org/wiki/Root_vegetable) ([potatoes](https://en.wikipedia.org/wiki/Potato) and [carrots](https://en.wikipedia.org/wiki/Carrot)), bulbs ([onion](https://en.wikipedia.org/wiki/Onion) family), [leaf vegetables](https://en.wikipedia.org/wiki/Leaf_vegetable) ([spinach](https://en.wikipedia.org/wiki/Spinach) and [lettuce](https://en.wikipedia.org/wiki/Lettuce)), [stem vegetables](https://en.wikipedia.org/wiki/Category:Stem_vegetables) ([bamboo](https://en.wikipedia.org/wiki/Bamboo) shoots and [asparagus](https://en.wikipedia.org/wiki/Asparagus)), and [inflorescence vegetables](https://en.wikipedia.org/wiki/Category:Inflorescence_vegetables) ([globe artichokes](https://en.wikipedia.org/wiki/Globe_artichoke) and [broccoli](https://en.wikipedia.org/wiki/Broccoli) and other vegetables such as [cabbage](https://en.wikipedia.org/wiki/Cabbage) or [cauliflower](https://en.wikipedia.org/wiki/Cauliflower)).

1. **Animals :**

Animals are used as food either directly or indirectly by the products they produce. [Meat](https://en.wikipedia.org/wiki/Meat) is an example of a direct product taken from an animal, which comes from [muscle](https://en.wikipedia.org/wiki/Muscle) systems or from [organs](https://en.wikipedia.org/wiki/Organ_%28anatomy%29).

Food products produced by animals include [milk](https://en.wikipedia.org/wiki/Milk) produced by [mammary glands](https://en.wikipedia.org/wiki/Mammary_glands), which in many cultures is drunk or processed into [dairy products](https://en.wikipedia.org/wiki/Dairy_product) (cheese, [butter](https://en.wikipedia.org/wiki/Butter), etc.). In addition, birds and other animals lay [eggs](https://en.wikipedia.org/wiki/Egg_%28food%29), which are often eaten, and [bees](https://en.wikipedia.org/wiki/Bee) produce [honey](https://en.wikipedia.org/wiki/Honey), a reduced [nectar](https://en.wikipedia.org/wiki/Nectar) from flowers, which is a popular sweetener in many cultures. Some cultures [consume blood](https://en.wikipedia.org/wiki/Blood_as_food), sometimes in the form of [blood sausage](https://en.wikipedia.org/wiki/Blood_sausage), as a thickener for sauces, or in a [cured](https://en.wikipedia.org/wiki/Curing_%28food_preservation%29), [salted](https://en.wikipedia.org/wiki/Salting_%28food%29) form for times of food scarcity, and others use [blood](https://en.wikipedia.org/wiki/Blood) in stews such as [jugged hare](https://en.wikipedia.org/wiki/Jugging).

Some cultures and people do not consume meat or animal food products for cultural, dietary, health, ethical, or ideological reasons. [Vegetarians](https://en.wikipedia.org/wiki/Vegetarian) choose to forgo food from animal sources to varying degrees. [Vegans](https://en.wikipedia.org/wiki/Vegan) do not consume any foods that are or contain [ingredients](https://en.wikipedia.org/wiki/Ingredients) from an animal source.

1. **Production :**

Most food has always been obtained through [agriculture](https://en.wikipedia.org/wiki/Agriculture). With increasing concern over both the methods and products of modern [industrial agriculture](https://en.wikipedia.org/wiki/Industrial_agriculture), there has been a growing trend toward [sustainable agricultural](https://en.wikipedia.org/wiki/Sustainable_agriculture) practices. This approach, partly fueled by consumer demand, encourages [biodiversity](https://en.wikipedia.org/wiki/Biodiversity), local self-reliance and [organic farming](https://en.wikipedia.org/wiki/Organic_farming) methods. Major influences on food production include international organizations (e.g. the [World Trade Organization](https://en.wikipedia.org/wiki/World_Trade_Organization) and [Common Agricultural Policy](https://en.wikipedia.org/wiki/Common_Agricultural_Policy)), national government policy (or law), and war.

In popular culture, the mass production of food, specifically meats such as [chicken](https://en.wikipedia.org/wiki/Chicken_%28food%29) and [beef](https://en.wikipedia.org/wiki/Beef), has come under fire from various [documentaries](https://en.wikipedia.org/wiki/Documentary_film), most recently [Food, Inc](https://en.wikipedia.org/wiki/Food,_Inc), documenting the mass slaughter and poor treatment of animals, often for easier revenues from [large corporations](https://en.wikipedia.org/wiki/Corporate_farming). Along with a current trend towards [environmentalism](https://en.wikipedia.org/wiki/Environmentalism), people in [Western culture](https://en.wikipedia.org/wiki/Western_culture) have had an increasing trend towards the use of [herbal supplements](https://en.wikipedia.org/wiki/Herbalism), foods for a specific group of person (such as dieters, women, or athletes), [functional foods](https://en.wikipedia.org/wiki/Functional_food) (fortified foods, such as [omega-3](https://en.wikipedia.org/wiki/Omega-3) eggs), and a more ethnically diverse diet.

Several organisations have begun calling for a new kind of agriculture in which [agroecosystems](https://en.wikipedia.org/wiki/Agroecosystem) provide food but also support vital [ecosystem](https://en.wikipedia.org/wiki/Ecosystem) services so that [soil fertility](https://en.wikipedia.org/wiki/Fertility_%28soil%29) and [biodiversity](https://en.wikipedia.org/wiki/Biodiversity) are maintained rather than compromised. According to the [International Water Management Institute](https://en.wikipedia.org/wiki/International_Water_Management_Institute) and [UNEP](https://en.wikipedia.org/wiki/UNEP), well-managed agroecosystems not only provide food, fiber and animal products, they also provide services such as [flood mitigation](https://en.wikipedia.org/wiki/Flood_mitigation), [groundwater recharge](https://en.wikipedia.org/wiki/Groundwater_recharge), [erosion control](https://en.wikipedia.org/wiki/Erosion_control) and habitats for plants, birds fish and other animals.

**LAND RESOURCES**

**What Are Land Resources?**

They occupy nearly 20 percent of the earth surface. It covers around 13000 million hectares of the area. The houses, roads and factories occupy nearly one third of the land. The forests occupy another one third of the land. The rest of land is used for ploughing and for meadows and pastures. The soil forms the surface layer of land which covers more than the 80 percent of land. The soil is defined as a natural body which keeps on changing and allows the plants to grow. It is made up of organic and inorganic materials. This definition is given by the Buckman and Brady. The branch of science which deals with the formation and distribution of soil in the different parts of the world is referred as a pedology. The professional which deals with the soil is known as the pedologist. The inorganic component in the soil is 45 percent and the organic component in the soil is 5 percent. The water component in the soil is 25 percent and the air component in the soil is 25 percent. The soil particles have fine spaces which are known as the pore spaces. These are also known as the interstices. They contain air and water along with the dissolved substances. The water and air content in the soil is inversely related to each other. The more is the water content lesser is the space for air to exist. The soil has both the plants and animals. The micro flora consists of the heterotrophic and autotrophic bacteria. It also contains the fungi and algae. The heterotrophic bacterium consists of the nitrogen and non nitrogen fixing bacteria. The nitrogen fixing bacteria can be symbiotic, non symbiotic, aerobic and anaerobic. The non nitrogen fixing bacteria can be aerobic or anaerobic. The fungus includes the yeast and mushrooms. The algae can be red or brown or green. The fauna can be micro or macro. The micro fauna includes the protozoa and nematodes. The macro fauna includes the earthworm, mites, termites, snails and mice. The soil has different types of soil particles. The mineral composition of the rock determines them along with the size of particles. It includes the gravel particles, sand, silt and clay particles. The gravel particles are mainly small stones and have a few sand particles and are used to make roads. The sand particles have pores and are aerated. They can hold little bit of water and are made up of large quartz. The silt particles are moved by the help of water. They are left at the bank of river. They are inert and are made up of large quartz. The clay particles have nutritive salts and have ability to retain water. They are not inert and react chemically. Some of their pure forms are not suitable for the growth of plants as they form a non penetrable mass. The other components of the soil mix with the clay particle and form a granular soil. This type of soil is ideal for the cultivation. It has pores as well as has the ability to hold water. It also contains the nutritive salts.

The loamy soil is made up of clay, silt and sand. The proportion of the clay is least and is half as compared to the silt and sand. The silt and sand are twice and equal in the proportion. It is also a good soil for the growth of plants as it has pores as well as has the ability to hold water. It also contains some nutritive salts. There are many factors which control the nature of soil. They are porosity, water holding capacity and the texture. They come under the physical nature of soil. The chemical nature of soil is governed by the salt content, inorganic and organic content includes certain metals. The topography, climate and the organisms also play a vital role in deciding the nature of soil. The half decayed and half synthesized part of organic material in the soil forms humus. It contains the nutrients and help in growth. It makes the soil granular by its porosity and water holding capacity. It has the ability to absorb the heat and warm the soil.

**Land Resource Use:**

**Various Energy Resources:**

* [Air Emissions](http://www.epa.gov/cleanenergy/energy-and-you/affect/air-emissions.html)
* [Water Resource Use](http://www.epa.gov/cleanenergy/energy-and-you/affect/water-resource.html)
* [Water Discharges](http://www.epa.gov/cleanenergy/energy-and-you/affect/water-discharge.html)
* [Solid Waste Generation](http://www.epa.gov/cleanenergy/energy-and-you/affect/sw-generation.html)
* [Land Resource Use](http://www.epa.gov/cleanenergy/energy-and-you/affect/land-resource.html)

Electricity generation generally requires the use of land resources (e.g., for mining and extraction of fuel, and for siting the electricity generating facilities themselves). The reasons that land is used and the specific environmental impacts of land use vary from technology to technology, as described below.

* **Natural Gas :**

The extraction of natural gas and the construction of natural gas power plants can destroy natural habitat for animals and plants. Possible land resource impacts include erosion, loss of soil productivity, and landslides.

* **Coal :**

Soil at coal-fired power plant sites can become contaminated with various pollutants from the coal and take a long time to recover, even after the power plant closes down. Coal mining and processing also have environmental impacts on land. Surface mining disturbs larger areas than underground mining.

* **Oil :**

The construction of large oil-fired power plants can destroy habitats for animals and plants. Waste products from refining and from power plants (such as wastewater sludge and residues) can cause land contamination if not properly disposed. In addition, when oil spills occur on land, soils are degraded.

* **Nuclear Energy :**

The construction of nuclear power plants can destroy natural habitat for animals and plants or contaminate local land with toxic by-products. For example, the storage of radioactive waste may preclude any future re-use of these contaminated lands.

**Municipal Solid Waste :**

MSW power plants, much like fossil fuel power plants, require land for equipment and fuel storage. The non-hazardous ash residue from the burning of MSW is typically deposited in landfills.

**Hydroelectricity**

The construction of hydropower plants can alter sizable portions of land when dams are constructed and lakes are created, flooding land that may have once served as wildlife habitat, farmland, and scenic retreats. Hydroelectric dams can cause erosion along the riverbed upstream and downstream, which can further disturb wildlife ecosystems and fish populations.

**Non-Hydroelectric Renewable Energy**

* **Solar :**

Photovoltaic systems require a negligible amount of land area because they are typically placed on existing structures. In contrast, solar-thermal technologies may require a significant amount of land, depending upon the specific solar-thermal technology used. Solar energy installations do not usually damage the land they occupy, but they prevent it from being used for other purposes. In addition, photovoltaic systems can negatively affect wildlife habitat because of the amount of land area the technology requires.

* **Geothermal :**

Geothermal power plants typically require the use of less land than fossil fuel power plants. However, if water is not re-injected into the ground after use to maintain pressure underground, it may cause sinking of land at the surface.

* **Biomass :**

Generating electricity from biomass can affect land resources in different ways. Biomass power plants, much like fossil fuel power plants, require large areas of land for equipment and fuel storage. If these biomass plants burn a waste source such as construction wood waste or agricultural waste, they can provide a benefit by freeing areas of land that might otherwise have been used for landfills or waste piles. Biomass grown for fuel purposes requires large areas of land and, over time, can deplete the soil of nutrients. Fuel crops must be managed so that they stabilize the soil, reduce erosion, provide wildlife habitat, and serve recreational purposes.

* **Landfill Gas :**

Burning landfill gas to produce electricity has little impact on land resources. While the equipment used to burn the landfill gas and generate electricity does require space, it can be located on land already occupied by the existing landfill, thus avoiding any additional use of land.

* **Wind :**

Wind turbines generally require the use of land, although they may also be sited offshore. Land around wind turbines can be used for other purposes, such as the grazing of cattle or farming.

When wind turbines are removed from land, there are no solid wastes or fuel residues left behind. However, large wind farms pose aesthetic concerns and wind turbines that are improperly installed or landscaped may create soil erosion problems. Wind farms can also have noise impacts, depending on the number of wind turbines on the farm. New blade designs are being used to reduce the amount of noise. Bird and bat mortality has been an issue at some wind farms. Improvements to wind turbine technologies and turbine siting have helped mitigate bird mortality. Research on impacts to birds and bats is available at the American Wind Energy Association website.

ENVIRONMENTAL POLLUTION

Environment means whatever surrounds the individual. In other words, whatever surrounds the individual constitutes his environment. It is also known as external environment which includes the air, water, soil, noise, sun radiations, plants, deserts, rocks, buildings, etc. On the other hand, everyone has internal environment which consists of his body, his internal systems and their functions. The body maintains balance between the external and the internal environment, but sometimes the state of balance is disturbed due to the environment pollution and causes diseases. Environment is polluted when some foreign substances enter in it and affects the life of an individual. These foreign substances degrade the quality of water, air, noise and many other factors.

**AIR POLLUTION**

Truly speaking, there has never been pure air. Air is the closest component of environment for all lives. It provides oxygen for respiration carries sound and smell and helps in maintaining the body temperature. The air may contain dust and smoke which when inhaled may cause sickness and death. Foreign substances have been present in the air at all times and at all places. The term air pollution is, therefore, applied when there is an excessive concentration of foreign matter in the external atmosphere which is harmful to man or his environment. Air pollution is the growing problem of the world. this problem was first brought in to focus when the air poluton epidemics takes place in the Los angels.

**Causes of air pollution :**

The sources of air pollution may classifie4d in to 4 categories. They are

1. Industrial processes: industries are big sources of air pollution. Specially chemical and metallurgical industries, oil refineries, fertilizer factories etc. all these have contributed significantly to air pollution.
2. Combustion: Industrial and domestic combustion of coal, oil and other source of smoke, dust, sulfur dioxide, carbon dioxide and so on. The London diaater was due to the domestic coal burning.
3. Motor vehicles: vehicles are the major source of the air pollution the urban areas of the world. These motor vehicles includes trucks, trains, aircrafts, two wheelers, three wheelers, light motor vehicles, tractors and other forms of transport, contribute to air pollution by emitting black smoke and foul smelling fumes.
4. Miscellaneous: Use of insecticides and pesticides for crops, nuclear energy programme also contributes the air pollution. Many harmful chemicals have been identified as chemical pollutants. Some of them are carcinogenic agents an agent that increases the chance of any cell becoming cancerous.

**Effects of polluted Air :**

Air pollution effects health to a large extent. The respiratory system is the most affected system by air pollution. The most common disease due to prolonged exposure to polluted air is chronic bronchitis. It is a chronic lung inflammation caused by the inhaled injurious substances. It is not a single disease but having a complex symptoms of various causes. The patient complaints of cheast pain, productive cough, fever off and on and the general weakness. Even plants and animals are also very sensitive to this pollution. The depletion of Ozone layer is another problem due to this the Global warming and Green house effects may takes place.

**Remedial measures :**

The World health Organization (WHO) published a document in 1968 “Research in to environmental pollution” which recommends certain remedial measures for prevention of air pollution are as follows

1. Containment: means trying to stop the release of toxic substances in to the air by taking measures like providing enclosures, ventilation and air cleaning. Therefore containment can be achieved by a variety of such engineering methods.
2. Replacement: this is related with replacing the products and technological processes with new technologies and products.
3. Dilution: The contaminant present in the air was diluted by vegetation and plantation. The establishment of green belts are comes under this process.
4. Legislation: many countries adopted legislation for control of air pollution. In India there is smoke nuisance act which is effective in big cites and the factory regulatory act also there to control the air pollution.
5. International action: to deal with the air pollution globally the WHO established the international network of various centers and laboratories for controlling and study of air pollution and advises to prevent it.

**Ozone Layer :**

The air around us consists mainly nitrogen and oxygen. It also contains small amounts of other gases, including carbon dioxide, hydrogen and Ozone. Some people wrongly thinks that ozone is the fresh air we breathe in and at the sea side it is a poisonous kind of oxygen. At ground level there is less amount of ozone. But above the 24 kms in the atmosphere there is a thin layer of it which will blocks the ultra violet rays from the sun.these rays are very dangerous and kils the animals and plants so that the eco balance will be destroyed. Gases called Chloroflurocarbons (CFC’s)( which are found in refrigerators, air conditioners and sprays will destroys this layer and makes a hole to this layer so that the ultraviolet rays from the sun directly hits the Earth.in this condition chlorine and other gases accumulate on the earth.

If the Ozone destroys compleate3ly the following effects may be realized-

The size of the eyes reduced and cataracts developed, the size of the nose will be longer, the height will be smaller, it may leads to skin cancer, and there may be low yield of crops. To save the ozone layer there are captions given by international organizations “ Save Ozone ; save Earth”. To save the ozone layer there are some Do’s and Don’ts they are:

|  |  |
| --- | --- |
| **Do’S** | **Don’ts** |
| Choose eco friendly product by buying refrigerators and air conditioners which do not use C.F.C’s.  Design the houses nad offices to allow max. natural air, light and heat to avoid artificial ligting and conditioning facilities.  Use and promote environmental friendly products. | Avoid using the products like foam mattresses, which are linked to ozone depleting substances. (O.D.S)  Reduce the using plastic and plastic products.  Avoid use of synthetic room fresheners, go for natural fresheners. |

**Water Pollution**

Water is polluted when some foreign substance is present in it which degrades its quality and makes it unfit or harmful for use. This foreign substance can be organic, inorganic, biological or some physical substance. This can be in the form of dissolved gases (e.g. hydrogen, sulphide, carbon dioxide, oxygen, ammonia, nitrogen); or dissolved minerals (e.g. salts of calcium, magnesium, sodium); suspended impurities (e.g. clay, silt, sand, mud) and microscopic plants and animals like worms or bacteria’s.

In simple words polluted water is impure water with some foreign substance which is detrimental to the health of human being, animals, and plants i.e. when the quality of water changes and becomes less suitable for drinking purpose, agricultural activities, aquatic organisms or other purposes. Polluted water can cause various intestinal infections like cholera or dysentery or other certain disease like jaundice.

**Causes of water pollution :**

The water pollution is mainly due to the human activity i.e industrialization, urbanization etc. water pollution may occur in the following forms they are

1. **Sewage :**

It contains decomposable organic matter and pathological agents. It is an important source of pollution in urban centers. The disposal of liquid waste in urban centers could not keep pace with the growing population, especially in developing countries. Liquid waste comes from the residential areas, institutions, hotels, hospitals, public buildings, commercial areas etc. this water contains human excreta, urine, detergents, chemicals, fruit skin etc.

1. **Industrial and trade wastage :**

it contains toxic agents ranging from metal, synthetic, organic chemicals; industrial waste is another major source of water pollution. Various industries like chemicals, paper, tanneries, breweries, dyeing, textile, sugar jute, oil refineries etc. produce millions of industrial waste.

1. **Agricultural and related activities :**

the use of chemical fertilizers, pesticides, insecticides and herbicides is common in modern agricultural practices. These are frequently used to increase the productivity but they have proved harmful. e.g the use of D.D.T as on insecticide has been banned in many countries because it is very dangerous to the animals and fishes when it diluted in the water. When the water used by the human also may causes the respiratory diseases.

**Effects of Water pollution :**

At present water pollution becomes major health hazard. Polluted water causes water borne diseases. In this form man is directly affected. The polluted water taken by land and aquatic animals is also affects the human because man is consuming them as part of food chain. Water pollution causes huge economic loss to human. Huge money is spending to keep water clean and keep the big rivers clean for the aquatic animal’s sake.

**Preventive measures :**

The water pollution can be controlled by taking the following measures.

1. treatment of waste water: this can be done under two types they are
2. Domestic sewage waste treatment: domestic sewage can be treated in three phases collection, treatment and reuse. We have to collect the sewage and treat it sand to filter the organic agents and then with chemicals to filter and neutralize the chemicals in that sewage.
3. Industrial waste water management: this waste water also known as effluent. This treatment can be done in three phases they are treating the floating pollutions e.g oils, fats and grease etc. treating the suspended pollutions they can be organic or inorganic. And the last one is treating the dissolved pollutions treating these pollutions can be done by the using the chemical substances. Calcifying, neutralizing, and stabilizing the acids.
4. Population control: the remedial measure is to control over the population so we can reduce the cause of the pollution and so the pollution will be reduced.
5. Educative measures: keeping in view the water pollution problems the central and state universities, boards should make their earnest efforts to introduce syllabus in the country. The governments and the people of the country should be educated in terms of prevention of water pollution.
6. Legislation: water pollution is now a global problem. Therefore national governments of the countries should pass a legislation to prevent water pollution. By a country or a particular industry or even an individuals.

**SOIL POLLUTION**

**What is Soil Pollution?**

With the rise of concrete buildings and roads, one part of the Earth that we rarely see is the soil. It has many different names, such as dirt, mud and ground. However, it is definitely very important to us. The plants that feed us grow in soil and keeping it healthy is essential to maintaining a beautiful planet. However, like all other forms of nature, soil also suffers from [pollution](http://www.conserve-energy-future.com/PollutionTypes.php). The pollution of soil is a common thing these days, and it happens due to the presence of manmade elements.

The main reason why the soil becomes contaminated is due to the presence of man made waste. The waste produced from nature itself such as dead plants, carcasses of animals and rotten fruits and vegetables only adds to the fertility of the soil. However, our waste products are full of chemicals that are not originally found in nature and lead to soil pollution.

**Main Causes of Soil Pollution :**

1. **Industrial Activity :**

Industrial activity has been the biggest contributor to the problem in the last century, especially since the amount of mining and manufacturing has increased. Most industries are dependent on extracting minerals from the Earth. Whether it is iron ore or coal, the by products are contaminated and they are not disposed off in a manner that can be considered safe. As a result, the [industrial waste](http://www.conserve-energy-future.com/causes-effects-of-industrial-pollution.php) lingers in the soil surface for a long time and makes it unsuitable for use.

1. **Agricultural Activities :**

Chemical utilization has gone up tremendously since technology provided us with modern pesticides and fertilizers. They are full of chemicals that are not produced in nature and cannot be broken down by it. As a result, they seep into the ground after they mix with water and slowly reduce the fertility of the soil. Other chemicals damage the composition of the soil and make it easier to erode by water and air. Plants absorb many of these pesticides and when they decompose, they cause soil pollution since they become a part of the land.

1. **Waste Disposal :**

Finally, a growing cause for concern is how we dispose of our waste. While industrial waste is sure to cause contamination, there is another way in which we are adding to the pollution. Every human produces a certain amount of personal waste products by way or urine and feces.

While much of it moves into the sewer the system, there is also a large amount that is dumped directly into landfills in the form of diapers. Even the sewer system ends at the landfill, where the [biological waste](http://www.conserve-energy-future.com/waste-to-energy.php) pollutes the soil and water. This is because our bodies are full of toxins and chemicals which are now seeping into the land and causing pollution of soil.

1. **Accidental Oil Spills :**

[Oil leaks](http://www.conserve-energy-future.com/effects-of-oil-spills.php) can happen during storage and transport of chemicals. This can be seen at most of the fuel stations. The chemicals present in the fuel deteriorate the quality of soil and make them unsuitable for cultivation. These chemicals can enter into the groundwater through soil and make the water undrinkable.

1. **Acid Rain:**

[Acid rain](http://www.conserve-energy-future.com/causes-and-effects-of-acid-rain.php) is caused when pollutants present in the air mixes up with the rain and fall back on the ground. The [polluted water](http://www.conserve-energy-future.com/sources-and-causes-of-water-pollution.php) could dissolve away some of the important nutrients found in soil and change the structure of the soil.

**Effects of Soil Pollution:**

1. **Effect on Health of Humans :**

Considering how soil is the reason we are able to sustain ourselves, the contamination of it has major consequences on our health. Crops and plants grown on polluted soil absorb much of the pollution and then pass these on to us. This could explain the sudden surge in small and terminal illnesses.

Long term exposure to such soil can affect the genetic make-up of the body, causing congenital illnesses and chronic health problems that cannot be cured easily. In fact, it can sicken the livestock to a considerable extent and cause food poisoning over a long period of time. The soil pollution can even lead to widespread famines if the plants are unable to grow in it.

1. **Effect on Growth of Plants :**

The ecological balance of any system gets affected due to the widespread contamination of the soil. Most plants are unable to adapt when the chemistry of the soil changes so radically in a short period of time. Fungi and bacteria found in the soil that bind it together begin to decline, which creates an additional problem of soil erosion.

The fertility slowly diminishes, making land unsuitable for agriculture and any local vegetation to survive. The soil pollution causes large tracts of land to become hazardous to health. Unlike deserts, which are suitable for its native vegetation, such land cannot support most forms of life.

1. **Decreased Soil Fertility :**

The toxic chemicals present in the soil can decrease soil fertility and therefore decrease in the soil yield. The contaminated soil is then used to produce fruits and vegetables which lacks quality nutrients and may contain some poisonous substance to cause serious health problems in people consuming them.

1. **Toxic Dust :**

The emission of toxic and foul gases from landfills pollutes the environment and causes serious effects on health of some people. The unpleasant smell causes inconvenience to other people.

1. **Changes in Soil Structure :**

The death of many soil organisms (e.g. earthworms) in the soil can lead to alteration in soil structure. Apart from that, it could also force other predators to move to other places in search of food.

A number of ways have been suggested to curb the current rate of pollution. Such attempts at cleaning up the environment require plenty of time and resources to be pitched in. Industries have been given regulations for the disposal of hazardous waste, which aims at minimizing the area that becomes polluted. [Organic methods of farming](http://www.conserve-energy-future.com/OrganicGardening.php) are being supported, which do not use chemical laden pesticides and fertilizers. Use of plants that can remove the pollutants from the soil is being encouraged. However, the road ahead is quite long and the prevention of soil pollution will take many more years.

**Image credit:** [**Aproximando Ciência e Pessoas**](http://www.flickr.com/photos/97513256@N06/9044202806/sizes/m/)

## Control of Soil Pollution:

1. Use of pesticides should be minimized.  
2. Use of fertilizers should be judicious.   
3. Cropping techniques should be improved to prevent growth of weeds.  
4. Special pits should be selected for dumping wastes. 5. Controlled grazing and forest management.   
6. Wind breaks and wind shield in areas exposed to wind erosion   
7. Planning of soil binding grasses along banks and slopes prone to rapid erosion.   
8. Afforestation and reforestation.

**Control measures of soil pollution:**

1. **Soil erosion can be controlled** by a variety of forestry and farm practices.

Ex: Planting trees on barren slopes

Contour cultivation and strip cropping may be practiced instead of shifting cultivation

Terracing and building diversion channels may be undertaken.

Reducing deforestation and substituting chemical manures by animal wastes also helps arrest soil erosion in the long term.

* 1. **Proper dumping of unwanted materials:** Excess wastes by man and animals pose a disposal problem. Open dumping is the most commonly practiced technique. Nowadays, controlled tipping is followed for solid waste disposal. The surface so obtained is used for housing or sports field.
  2. **Production of natural fertilizers**: Bio-pesticides should be used in place of toxic chemical pesticides. Organic fertilizers should be used in place of synthesized chemical fertilizers. Ex: Organic wastes in animal dung may be used to prepare compost manure instead of throwing them wastefully and polluting the soil.
  3. **Proper hygienic condition**: People should be trained regarding sanitary habits.

Ex: Lavatories should be equipped with quick and effective disposal methods.

* 1. **Public awareness**: Informal and formal public awareness programs should be imparted to educate people on health hazards by environmental education.

Ex: Mass media, Educational institutions and voluntary agencies can achieve this.

* 1. **Recycling and Reuse of wastes:** To minimize soil pollution, the wastes such as paper, plastics, metals, glasses, organics, petroleum products and industrial effluents etc should be recycled and reused.

Ex: Industrial wastes should be properly treated at source. Integrated waste treatment methods should be adopted.

* 1. **Ban on Toxic chemicals:** Ban should be imposed on chemicals and pesticides like DDT, BHC, etc which are fatal to plants and animals. Nuclear explosions and improper disposal of radioactive wastes should be banned.

**NOISE**

Noise pollution is another big environment problem, especially in the big urban centers. Noise means excessive and unwanted sound. It can be defined as “an excessive”, offensive, persistent or starting sound”. In other words it may be defined as “wrong sound, in the wrong place, at the wrong time”. In simple words noise pollution is unwanted and excessive sound forces into atmosphere without any consideration. Some of the psychologists have defined noise as under.

According to Harrel, “Noise is an unwanted sound which increases fatigue and under certain conditions it causes deafness”.

**Causes of Noise Polution :**

The source of noise is many and varied. These are automobiles, industries, aircrafts, radios, televisions, amplifiers, industrial sources etc. the noise has two important characteristics:-

1. loudness or intensity:- the loudness or intensity depends up on the amptitude of the sound waves produced from the source. The loudness of the noise is measured in decibel (db) units. One decibel is the smallest amptitude which can be heard by the human ear.
2. Pitch or frequency of sound is denoted in the hertz (hz). One hz is equal to one wave per second.

**Effects of noise pollution :**

noise is very harmful and serious health problem. This pollution affects a man in many ways such as annoyance, irritation, disturbance in sleep etc. a constant exposure to the noise can impair our hearing but sudden and severe exposure can cause deafness. this pollution may also causes illness like hypertension, giddiness, mental disturbances etc.

**Remidial measures :**

To control the noise pollution there are three components such as source of noise, medium of noise and the object affected by noise must be taken in to consideration. The most important medium is individual, society and government. General awareness among masses is a powerful medium. People must be educated through various media about the ill affects of the noise pollution.

**THERMAL POLLUTION**

**Thermal Pollution:**

An increase in the optimum water temperature by industrial process (steel fac­tories, electric power houses and atomic power plants) may be called as “Thermal Pollution.” Many industries generate their own power and use wa­ter to cool their generator.

This hot water is released into the system from where it was drawn, causing a warming trend of surface water. If the system is poorly flushed, a permanent increase in the temperature may result. However, if the water is released into the well flushed system, permanent increase in tempera­ture does not occur.

**Causes or Sources of Thermal Pollution:**

**The various causes of thermal pollution are as follows:**

**(1) Coal-fired Power Plants:**

Some thermal power plants use coal as fuel. Coal-fired power plants constitute the major source of the thermal pollution.

**(2) Industrial Effluents:**

Industries generating electricity require large amount of Cooling water for heat removal. Other industries like textile, paper, and pulp and sugar industry also re­lease heat in water, but to a lesser extent.

**(3) Nuclear Power Plants:**

Nuclear power plants emit a large amount of unutilized heat and traces of toxic radio nuclear into nearby water streams. Emissions from nuclear reactors and processing installations are also responsible for increasing the temperature of water bodies.

**(4) Hydro Electric Power:**

Generation of hydro-electric power also results in negative thermal loading of water bodies.

**(5) Domestic Sewage:**

Domestic sewage is often discharged into rivers, lakes, canals or streams with­out waste treatment. The municipal water sewage normally has a higher tem­perature than receiving water. With the increase in temperature of the receiv­ing water the dissolved oxygen content (DO) decreases and the demand of oxy­gen increases and anaerobic conditions occur.

**Effects:**

Many organisms are killed instantly by the hot water resulting into a high mor­tality. It may bring other disturbance in the ecosystem. The egg of fish may hatch early or fail to hatch at all. It may change the diurnal and seasonal be­haviour and metabolic responses of organisms. It may lead to unplanned mi­gration of aquatic animals.

Macro-phytic population may also be changed. As temperature is an important limiting factor, serious changes may be brought about even by a slight increase in temperature in a population. For minimising thermal pollution, hot water should be cooled before release from factories and removal of forest canopies and irrigation return flows should be prohibited.

**Control of Thermal Pollution:**

Control of thermal pollution is necessary as its detrimental effects on aquatic ecosystem may be detrimental in the future. Viable solutions to chronic ther­mal discharge into water bodies are as follows:

**(1) Cooling Ponds:**

Cooling ponds or reservoirs constitute the simplest method of controlling ther­mal discharges. Heated effluents on the surface of water in cooling ponds maximize dissipation of heat to the atmosphere and minimize the water area and volume. This is the simplest and cheapest method which cools the water to a considerable low tem­perature. However, the technique alone is less desirable and inefficient in terms of air-water contact.

**(2) Cooling Towers:**

Using water from water sources for cooling purposes, with subsequent return to the water body after passing through the condenser is termed as cooling process. In order to make the cooling process more effective, cooling towers are designed to control the temperature of water. In-fact, cooling towers are used to dissipate the recovered waste heat so as to eliminate the problems of thermal pollution.

**(3) Artificial Lake:**

Artificial lakes are man-made bodies of water which offer possible alternative to once through cooling. The heated effluents may be discharged into the lake at one end and the water for cooling purposes may be withdrawn from the other end. The heat is eventually dissipated through evaporation.

These lakes have to be rejuvenated continuously. A number of methods have been suggested and developed for converting the thermal effluents from power plants into useful heat resources for maximing the benefits.

**Some of the potential physical applications for thermal discharge (rejected heat) of power plants are:**

i. Industrial and space heating.

ii. Biological applications such as soil warming.

iii. Fish culture, livestock shelters and for heating greenhouses.

Most of these potential physical applications are of colder regions or locations.

**ROLE OF POLLUTION CONTROL BOARD**

The main function of the Pollution Control Board is to improve the quality of air, promote cleanliness of water bodies and to prevent pollution.

If may also perform the following functions:

1. Advise the Government on prevention and control of pollution.

2. Carry out and encourage investigations and research relating to pollution problems.

3. Plan and organize training programmes for persons involved in prevention and control of pollution.

4. Organize through mass media, a comprehensive programme regarding pollution and control.

5. Collect, compile and publish technical and statistical data, manuals, codes and guides.

6. Establish or recognize laboratories for analyzing pollution parameters.

7. Advise the Government regarding the suitability of any site for the location of industry.

8. Issue environmental no objection certificate to start an industry.

9. Inspect and review sewage or industrial effluent treatment plants and to grant consent.

10. Prescribe effluent quality standards and the quality of receiving waters resulting from the discharge of effluents.

11. Evolve economical and reliable methods of treatment, utilization, and disposal of sewage and industrial effluent with regard to soil, climate and water resources of the region under consideration.

12. Inspect air pollution control areas to assess the quality of air and to take steps for prevention of pollution.

13. Lay down standards for the quality of air and emission of air pollutants into the atmosphere, to frame rules and regulations to improve the quality of environment.

14. Regulate and control noise producing and generating sources.

15. Monitor the compliance of the standards regarding ground water, ambient air, leachate quality, compost quality and incineration standards.

16. Close down a defaulting industrial plant or withdraw its supply of power or water.