
CHAPTER - 1

Concept of Health and Disease

1.1 Health

According to WHO 1948, Health is defined as a person's state of complete mental, physical, social well-being and complete absence of a disease or disorder. But in recent years the ability to lead a social and economic life also plays a major role on health. Thus, the WHO definition has been disapproved. Some people say health must be defined as a process of continuous adjustment to the changing conditions of life. They explain health as a dynamic concept which helps the people to work well, enjoy and to live well (1).

Due to these limitations, the definition of health defined by the WHO is considered as broad. The definition of health has been changed to set out the standard which is defined as positive health. The changed definition represents the objective that has to be followed by the nations for the health of the people. The WHO has defined the operational definition of health as condition and quality of a person in expressing the maximum function of organism in a given condition (2).

Positive health: Positive health is defined as an indication of complete and perfect health of a person both mentally and physically. Biologically positive health is defined as a state in which every cell and organ in the body is functioning with maximum capacity. Psychologically it is defined as the condition of the person in which he feels the sense of perfect wellbeing. Positive health is always a dream and it can't become real because everything in a person's life is changed time to time. Wellness or good health is defined as the state of positive health of an individual (3). Ex: sense of wellbeing, quality of life.

Characteristics of Positive Health

1. Capacity of a person to do work.
2. Completely efficient to think and take decisions.
3. Complete healthy mental state.
4. Free from diseases and disorders.
5. Person without mental tensions.

1.1.1 Concept of Health

Health is the main basis for health care and it effects the complete quality of life. Many new concepts of health are emerging in the world due to continuous changes.

The concept of health is evolving as worldwide social goal.

The changing concepts of health are (4):

1. Biomedical concept of health.
2. Ecological concept of health.
3. Psychosocial concept of health.
4. Holistic concept of health.

1. Biomedical concept of health

According to biomedical concept, health is defined as a state of a person with complete absence of a disease. The person was considered healthy if he is free from disease. The scientists consider human body as a machine and disease as a condition that causes breakdown of the machine. The main drawback in the biomedical concept is it has not discussed the role of social, environment, psychological and cultural factors of health.

In the biomedical concept some of the major health issues like chronic disease, drug abuse, accidents, malnutrition, mental illness etc. we're not discussed. So finally, the biomedical concept can't explain the developments in social and medical sciences.

2. Ecological concept of health

Due to some deficiencies in the biomedical concept, many new concepts have been raised. One of the concepts explained by ecologists is an assumption which says health is a strong balance between environment and man (5). They defined disease as a concept of maladjustment of the human being to environmental conditions.

They defined health as a condition free from pain, discomfort and continuous adjustment and adaptation of human being to the environment to maintain optimum function of organism. The economic and cultural adaptations of humans determine the phenomenon of disease but the drawback is the increased population and food availability also effect the disease conditions.

Imperfect man and imperfect environment are the main criticism against the ecological concept. History strongly believes that when the humans are adapting better to the environment than the life expectancy of the humans increases and even though in the absence of modern health services it provides better quality of life.

3. Psychosocial concept of health

Psychosocial concept explains health as both social and biological fact. As the social sciences are developing, they revealed that health is not only a biomedical fact but it is also influenced by cultural, social, economic and psychological factors (6). So, the psychosocial concept says that all these factors influence the concept of health.

4. Holistic concept of health

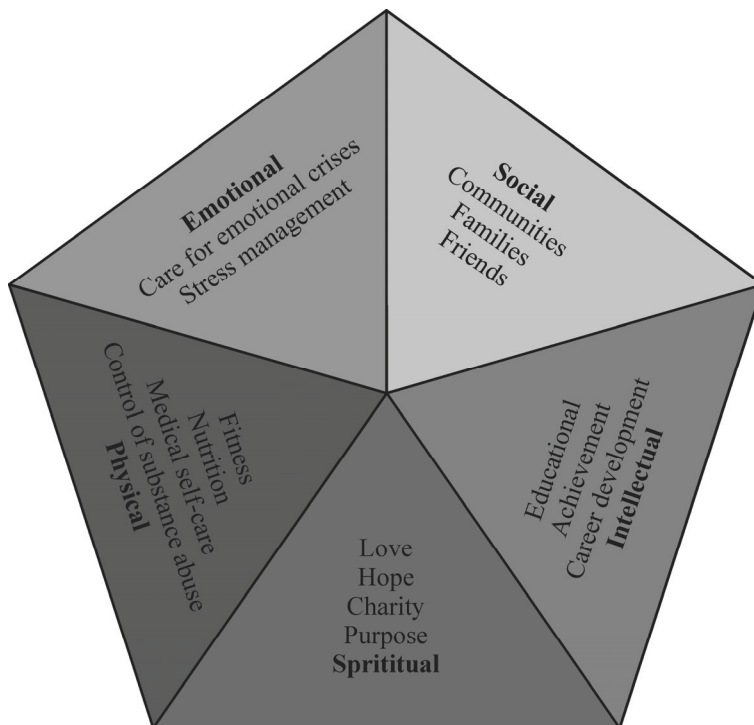
All the concepts discussed above are explained in the holistic concept. This concept simply defined health as a multidimensional process. According to this concept,

health of a person depends on his whole life and environment in which he lives. Many factors like food, education, public works, agriculture, industry and communication effects the health of an individual (2).

1.2 Dimensions of Health

Health is a multidimensional concept. But it mainly consists five dimensions. All these five dimensions of health gives a full idea of health and how a small change in any one-dimension effects the other one. The relationship among these five dimensions is also one of the most important aspect.

1. Physical dimension of health.
2. Mental dimension of health.
3. Social dimension of health.
4. Spiritual dimension of health.
5. Emotional dimension of health.



Source: (7)

Fig. 1. Five dimensions of health.

1. Physical dimension

The absence of disease and injury is defined as the physical dimension of health. Physical dimension of health is related to the physical activity of human body. This dimension is very easy to understand. Physical health of a person indicates the perfect function of the body. This concept biologically explains health as a state where every organ and every cell in the body is functioning with maximum capacity.

Physical health affects other four dimensions of health. Decrease in physical health of a person can affect other forms of health.

For example, if a person is infected with an infectious disease, he is isolated from others so that other people in the society are not infected and if a person is unhealthy, he struggles to concentrate on studies and to do his work.

Indications of physical health

Some of the indications of good physical health are good appetite, good sleep, regular activity of organs with normal size, good special senses, normal blood pressure, smooth and coordinated body movements.

How to evaluate physical health

1. Individual assessment of overall health.
2. Checking the symptoms of disease or disorder.
3. Checking the degree of fitness.
4. Nutrition and diet assessment.
5. Inquiry of risk factors.
6. Nutritional and dietary assessment.
7. Laboratory and biochemical investigations.
8. Clinical examination etc.

2. Mental dimension

Absence of mental illness is defined as mental health condition of a person. A person's state of balancing himself in the surrounding environment is defined as good mental health(8). Mental health is the ability of an individual to react and respond to various conditions in life with flexibility and ease. In simple way, mental health is the condition of the person to use his mind to solve the problems in life, to recall the past, to focus on cognitive aspects etc.

Mentally healthy person characteristics

- (a) Mentally healthy person should balance the surroundings and should be free from disturbances.
- (b) He should be able to get along well with others in the society.
- (c) He should know about himself, his needs and problems.

- (d) He should have control over his emotions.
- (e) While facing problem, he should be able to solve the problem with his intelligence.

3. Social dimension

Social dimension of health is defined as the ability of a person to maintain a meaningful and healthy relation with others. It also includes appropriate relationship of a person with the society, behavior and maintaining acceptable standards in the society. A socially wellbeing person indicates integration within the person, between the family members and with other individuals in the society and world.

Social dimension of health is simply defined as the quality and quantity of a person's interpersonal relationship and his extent of relation with the society (9). Social health effects the other dimensions of health in many ways. A person from unhealthy social environment makes the person to feel isolated in the society and lead to unwanted feelings. Such thoughts in the person may lead to decrease in physical activity and finally leads to depression.

Social dimension includes social functions, social skills and the ability of a person to be a member of the society. Social health involves every individual as a part of a family. It mainly involves social and economic conditions of a person and his management skills in the society.

4. Spiritual dimension of health

Spiritual dimension of health is defined as the person's feeling of overall purpose of life. It plays a major role in maintaining the health of a person. People always find a way and purpose in life from faith or belief. When a person is having purpose in life, he is said to be a healthier person when compared with the person who is not having any purpose or aim in life.

Spiritually healthy person strives for meaningful aim in the life and reaches his goals. Spiritual health is an impalpable thing that transcends psychology and physiology of humans (10). It is a new concept and it also includes ethics, principles and integrity in life.

5. Emotional dimension

Emotional dimension of health refers a person's behavior which is under the control of hormones and how a person is controlling and balancing emotions. Generally emotional and mental dimensions of health can be considered as a single dimension because both the elements are very close. Mental health includes emotional health both indirectly and directly.

However, a definite difference between emotional and mental health is necessary. But a clear difference between mental and emotional health is mental health deals with the "knowing" or "cognition" of a person while emotional health deals with the feelings of a person.

1.3 Public Health

Public health is a science of improving and protecting the health of a society or a community by educating the people, by providing health services, through research on diseases, by policy making and injury prevention etc. (11).

Checking health conditions of a population and the problems they are facing are the main basis in the study of public health. The main aim of public health is to improve the quality and health of life by controlling, preventing and treating the diseases in the society. It also includes the mental health condition. The quality of life can be improved through health indicators and by the promotion of healthy behaviors in the society.

Evaluation of Public Health

We can evaluate the public health condition by the following things:

1. By regularly monitoring the health status of the people in the society and by identifying the health problems of them.
2. To diagnose and investigate health problems in the people.
3. By giving information and by educating the people about the health problems.
4. By organizing community partnerships for identification of health problems in the society.
5. To develop plans and policies to increase the community health.
6. To maintain regulations so that it helps in protection of health.
7. To ensure the regulations of health care and to connect the people in need of health care services.
8. To evaluate the quality, effectiveness in population- based health services.

1.3.1 Concepts in Public Health

In the history of public health mainly four phases were observed. The four phases are:

- (a) Disease control phase (1880-1920).
 - (b) Health promotion phase (1920-1960).
 - (c) Social engineering phase (1960-1980).
 - (d) Health for all phase (1980-2000 AD).
- (a) Disease control phase (1880-1920)**

Mainly in 19th century during disease control phase the public health aimed at the control of environmental factors that are affecting the public health. It mainly involves the control of sewage disposal, water supply, maintaining clean surroundings etc. During this phase many preventive measures are taken to maintain the public health. The main drawback was, this phase has not aimed at the control of a particular disease. But in this phase the health of the people due to diseases improved a lot due to control of physical environmental factors.

(b) Health promotion phase (1920-1960)

From the beginning of 20th century, the concept of health promotion has taken a shape. Initially a citizen was treated as an individual but not as a member of public health but later it has changed. The state has the responsibility to maintain the health of every citizen in the state. So, in addition to the disease controlling activities the government has added new goal to the public health that is the health promotion program (12).

In the health promotion program many programs like industrial health services, rehabilitation services, mental health services, mother and child health services are involved. In this health promotion phase the public health departments had expanded their programs towards health promotion. In 1920, C.E.A Winslow defined public health as art of promoting health, preventing diseases and prolonging the life of humans. This definition given by C.E.A Winslow has fulfilled the definition of public health and it remained true even today (12).

The two great programs in this phase of public health are:

- (i) Basic health services: Initially through primary health centres and subcentres the basic health services are provided in the rural and urban areas. In the history of public health among different types of basic health services, the health centre program is an important development. In India the Bhore committee (1946) had announced the establishment of health centres for providing health services and preventive measures(13). This was followed by many developing countries and established health centres for providing basic health services to all people.
- (ii) Community development program: This program is initiated to promote village development. By involving the whole community in the development program, the health of the community can be increased. But this program failed due to the lack of whole community involvement in the programmes. But the establishment of primary health care centres has provided good health services to the people.

(c) Social engineering phase (1960-1980)

In the developed world the changes and development in the public health services, preventive medicines have changed the pattern of diseases. Due to many types of preventive medicines severe acute and chronic diseases have been controlled. But the drawback is as diseases are treated and cured many new health problems has begun to emerge. e.g., cardiovascular diseases, diabetes, cancer, alcoholism etc. Thus, in 1960's the public health has entered a new phase that is the social engineering phase. In this phase the importance was given to behaviour and social aspects of disease.

But in this phase a new concept called "risk factors" came in to existence as determinants of diseases. Thus, the consequences of diseases placed a great burden on the society. New problems in diseases has brought new challenges to the public health. Due to this more reorientation is needed towards the social objectives. Thus, the public health than included rehabilitative aspects of chronic diseases, preventive measures and behavioural problems in it. In the process of adding these new aspects the goals of public health and preventive medicine changed and became identical

namely prevention of disease, prolongation of life and promotion of health. In simple words we can say the term “public health” has been changed to “community health” even though the term public health is still used. The services provided by the community health services are more when compared with the preventive medicine(14).

(d) “Health for all” phase (1981-2000 AD)

In this phase health development in developing and developed countries are compared. The people in the developed countries are enjoying all the aspects of good health such as sanitation, adequate income, education, nutrition, good health, safe drinking water etc.

But in developing countries only 10 to 20 percent of the population are enjoying health services of any kind. In developing countries, the life expectancy of a person is 30 percent lower when compared with the developed countries(15). More than half of the people in world’s population have no access to health care at all. In some cases, they receive the health care but it does not answer the problem they have. Within the countries and between the countries the health gap between poor and rich people should be reduced and finally it has to be eliminated. In 1981, WHO has taken pledge to provide “Health for All” by the year 2000. The main aim is to attain a level of health in all people to lead an economically and socially productive life. (16).

1.4 Concept of Disease

Disease is defined as an abnormal condition of a human body that mainly effects the function or structure of any part or all the parts in an organism. Webster defined disease as a condition where the body health is impaired and leads to change in the state of health like interrupting the body functions, dysfunction of an organ etc. (17).

In humans, a disease is defined as a condition that causes dysfunction, pain and may lead to the death of the person. A disease also involves infections, disorders, syndromes, injuries and atypical changes in the function and structure of organs in the body. A person effected by the disease, is physically and mentally disturbed and the disease also alters the person’s perspective on life.

The term sickness is similar to disease. It is defined as a state of social dysfunction due to a disease. It is the part of a disease and it is the role of a person assumes when ill. When a person is sick, he likes to be away from the regular social activities and when a person is aware of being sick with particular signs and symptoms than the state of the person is stated as illness. (18).

1.5 Concept of Causation of Disease

From the past, many concepts of disease causation are present. Some of the widely used concepts of causation of a disease are:

1. Germ theory
2. Epidemiological triad

3. The triangle of epidemiology

4. Multi factorial theory

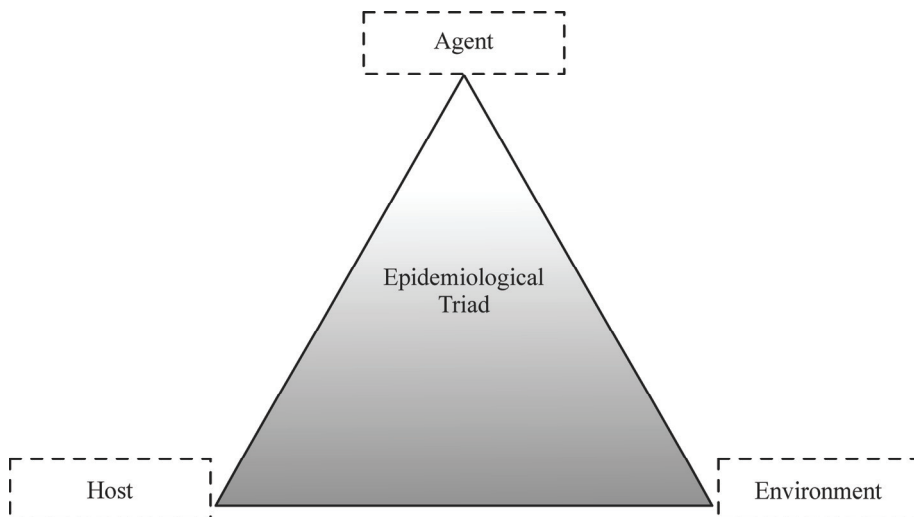
1. Germ theory

Germ theory was first proposed by Robert Koch (1843-1910) and Louis Pasteur (1822-1895). This theory is a revolutionary concept during 19th and 20th century. This theory says every disease is mainly caused by microorganisms or germs. A specific disease is caused by a specific microorganism. Pathogen is an organism which causes disease in the human body. e.g. Viruses, fungi, parasites, protozoa's, bacteria etc.

Communicable diseases are the diseases where an infected person can transmit pathogen to another person. Whereas non communicable diseases are the diseases where a pathogen cannot pass from one person to other. The germ theory led the epidemiologists to think only on one side that, the disease is caused by microorganisms. Even though the germ theory was a revolutionary concept it did not recognised that a disease is not caused by a single agent or microbe but it depends on many other factors.

2. Epidemiological Triad

Many limitations are observed in the germ theory. For example, everyone is not exposed to the chicken pox virus and the exposure to the virus by a susceptible person may lead to disease. The person with good immunity may not lead to disease. So, it led to the demand of new concepts of disease causation. The epidemiological triad says that in a suitable environment, an external factor or agent can lead to disease in susceptible host. The causative agent is observed as the first or necessary factor in the epidemiological triad when compared to environment and host.



Source: (19)

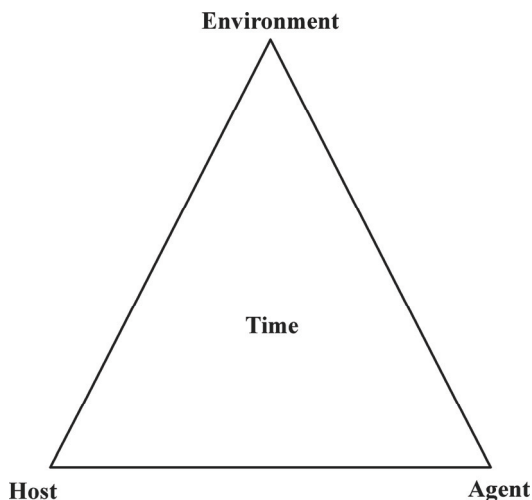
Fig. 2. Epidemiological triad.

The disease will occur if all the sufficient factors are involved: which include a host, a individual or a group of people susceptible to the disease causing agent. The susceptibility of a person depends on the factors like age, sex, occupation etc..

3. The Triangle of epidemiology

This model explains the inter relationship of the agent (cause of disease), environment, host and time. The causative agent is the main cause of disease. The Human body or animal is considered as a host. The environmental conditions allow the transmission of the disease and finally time accounts for the incubation periods, duration of illness. In case of infectious disease, the agents include viruses, fungi, bacteria and parasites.

In case of non-infectious disease, the agent refers to injury, disability of the person. The host offering the pathogen may or may not develop the disease. Many factor's like immunity of the host, genetic makeup, level of exposure, fitness of the person etc... determines the effect of disease. Environmental conditions like social, cultural and physical aspects effects the disease transmission and finally, the time of exposure of the host to the agent decides the severity of illness.



Source: (20)

Fig. 3. The triangle of epidemiology.

4. Multi factorial theory

All the above theories cannot in detail explain the main causing factor of all the diseases which led to multifactorial theory. Even though many infectious diseases are present which can be explained by above theories the diseases like coronary heart disease, lung cancer, mental illness etc... cannot be explained. Immunity, metabolism, nutrition etc. are considered as causative factors in many diseases. English Hippocrates, Sydenham (1644-1689) has given an important information that different things are together responsible for the causation of different diseases. He said that if the body fails to expel the dead materials from it than it leads to disease.

The diseases such as cancer, coronary heart diseases are mainly caused due to multiple factors. Thus, the term agent is not used for these diseases it is replaced with causative factor(21).

1.6 Concept of Prevention and Control of Disease

Prevention is always better than cure. A successful prevention of a disease depends upon the many factors like:

- (a) How the disease is caused?
- (b) How the disease is transmitted?
- (c) Risk factors in disease.
- (d) Signs and symptoms.
- (e) Early identification and treatment measures.

A detailed history of a disease is necessary to follow particular preventive measures of a disease. In many types of diseases elimination of main cause of disease is sufficient to prevent the occurrence of disease.

1.6.1 History of Disease

Disease mainly occurs due to interaction between man, agent and the environment. By studying the history of a disease, we can explain how the disease is evolved from its early stages of pre pathogenesis, how it is affecting the persons health, its termination and disability of a person if the patient is not treated. Each and every disease has its natural history but its nature is not same in every infected person. It is very necessary to study the pathogenesis phases of a disease to apply particular preventive measures. The history of a disease consists of 2 phases:

1. Pre-pathogenesis phase of disease.
2. Pathogenesis phase of disease.

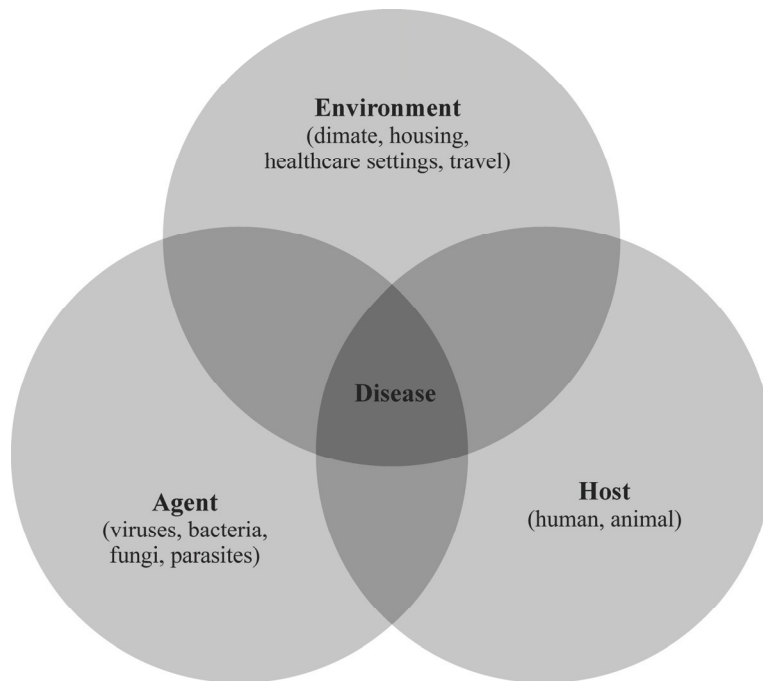
1. Pre-pathogenesis phase of disease

The process of a disease that occurs in the environment is defined as pre-pathogenesis phase or simply it is defined as a phase before the onset of disease. The factors which makes the agent to interact with the host and the factors where the person is exposed to the disease are considered as the pre-pathogenesis phase of disease.

The factors which cause disease are classified as:

- (a) Agent
- (b) Host and
- (c) Environment (22).

All these factors are called epidemiological triad. For a disease to occur, the presence of host, agent and the suitable environment is not sufficient. The interaction of all these factors is necessary for the onset of disease (22).



Source: (23)

Fig. 4. Epidemiological concept of interaction of the 3 factors.

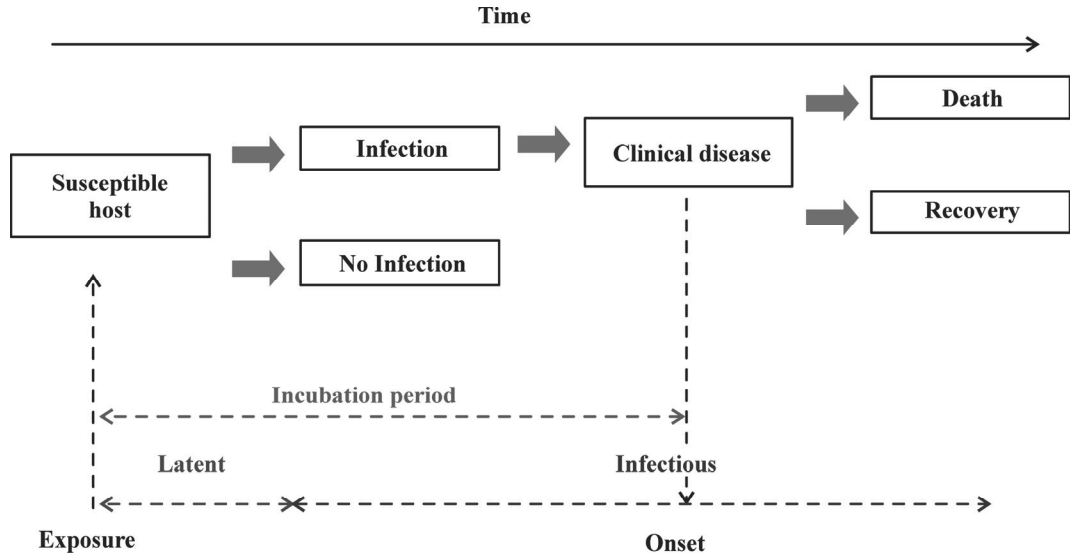
The onset of a disease and its distribution depends on the combination of occurrence of agent, host and environment.

2. Pathogenesis phase

This phase of disease starts from the entry of disease-causing agent in to the susceptible human host. In infectious diseases the disease-causing agent gets multiply and induces physiological changes in the host. The disease progresses slowly in the host body through period of incubation and then by pathogenesis. Finally, the disease outcome is may be recovery or it may lead to disability or death. By immunization and chemotherapy, we can modify the pathogenesis phase of a disease.

We can't predict the reaction of the host after the entry of the disease agent. The infection may be clinical or subclinical. In some conditions the host become a carrier e.g.: hepatitis B, diphtheria.

In case of diseases like hypertension, coronary heart diseases early pathogenesis phase is less observed and in case of chronic diseases early pathogenesis phase is termed as pre symptomatic phase. In the pre-symptomatic stage, we can't observe the symptoms and when the clinical stage is started, we can observe the signs and symptoms.



Source: (24)

Fig. 5. Natural history of disease.

1.6.2 Factors Causing the Disease

1. Agent related factors.
2. Host related factors and
3. Environment related factors.

1. Agent related factors

Disease agent is defined as living or non-living substance. The excessive presence or lack of relative factors may cause disease. A single disease-causing agent can cause disease directly or it may cause disease by combining with other independent agents. In some conditions two or more complex factors are involved in causing a disease.

Disease causing agents are classified broadly in to following groups (25):

- (a) **Biological disease-causing agents:** Biological agents are the living microorganisms which cause disease. e.g.: bacteria, fungi, virus etc. Biological disease-causing agents exhibit “host-related” biological properties. Some of the terms used for the biological agents are:
- (i) **Infectivity:** The ability of the infectious or biological agents to enter the host and to multiply.
 - (ii) **Pathogenicity:** The ability of a biological agent to induce pathological changes in the host and leads to illness.
 - (iii) **Virulence:** This is defined by the severity of clinical cases effected by the agent.

- (b) **Nutrient agents:** Essential nutrients for the human body are carbohydrates, proteins, fats and vitamins etc. Excess or deficiency of intake of the nutrients, results in nutritional deficiencies and disorders. e.g. anaemia, obesity, malnutrition etc.
- (c) **Physical agents:** When a person is exposed to the physical agents for a long period of time then it leads to disease or disorder. E.g. cold, radiation, electricity, sound, heat, pressure etc...
- (d) **Chemical agents:** Chemical agents are divided into 2 types:
 - (i) Endogenous chemical agents
 - (ii) Exogenous chemical agents
- (i) **Endogenous chemical agents:** In the body due to the dysfunction of the organs it leads to the production of the endogenous chemicals e.g. bilirubin, uric acid, calcium carbonate, urea etc. Excess of production of these endogenous agents leads to many diseases. e.g. jaundice occurs due to the excess of serumbilirubin in levels; renal calculi occur due to the excess of production calcium carbonate.
- (ii) **Exogenous chemical agents:** Exogenous chemical agents are the agents which are present outside the body. The ingestion, inhalation of exogenous chemical agents leads to disease. e.g. metals, fumes, gases, insecticides etc.

2. Host related factors

Host factors are very important to determine the outcome of the person exposure to the disease. These factors are classified in to 2 types:

- (a) Demographic characteristics.
- (b) Biological characteristics.
- (a) **Demographic characteristics:** The demographic characters of a person such as age, sex, ethnicity determines the severity of the disease.
- (b) **Biological characteristics:** Biological factors such as blood groups, cellular constituents of blood, physiological functions, enzymes, immunological factors of the body determine the severity of the disease.

3. Environmental related factors

Environmental factors are considered as the extrinsic factors. These factors are very complex. They are simply defined as all the substances that are present external to the host. The environmental substance may be living or nonliving which are in constant interaction with the human host. The environmental factors are divided into three components:

- (a) Physical components.
- (b) Biological components.
- (c) Psychosocial components.
- (a) **Physical components:** The physical factors with which the person is in contact are defined as physical components. It mainly includes soil, water, heat, radiation, air etc.

A person has to overcome his physical environment factors for the improvement of health. In developing countries, the lack of good environment is the main health problem. e.g., lack of sanitation, air pollution, water pollution etc. The people have to maintain a good environment to improve the health. The recent problem is the fast growth in the telecommunication system, television transmitters, radar installation, radio broadcasting etc. has increased the exposure of electromagnetic radiation to humans. The exposure of electromagnetic radiations to the humans leads to many disturbances in the health.

- (b) **Biological environment:** The living things which are surrounding the man comes under the biological environment e.g. insects, rodents, microorganisms, animals and plants. The living things in the environment works constantly for the survival. During the survival of these living things the organisms acts as the vectors of disease, reservoirs of infection, disease producing agents etc. A harmonious interrelationship, is maintained between the living organisms and humans. When this harmonious relationship is disturbed, it leads to disturbance in the health of a person, ill-health.
- (c) **Psychosocial environment:** The psychosocial environment factors are the factors which mainly effects the health care and personal health in the community. The psychosocial behaviour of a person and the structure of social groups effects the community(26). The psychosocial factors include habits, religion, morals, beliefs, community, social services, lifestyle etc.

Directly or indirectly the behaviour of a person effects other people. Tensions in work, discussions among groups or between individuals can lead to disturbance in the community. Social environment is having both negative and positive aspects in maintaining the health of individuals in the society. When a good environment is provided to the people in the society than it leads to good health. E.g. opportunities for students to achieve good position. It is also necessary in the society to maintain traditions and customs that favours good health (26).

1.6.3 Levels in Prevention of Diseases

Prevention of disease have become a broad-based concept. From the natural history of disease mainly 4 levels of prevention of diseases are identified:

1. Primordial prevention of disease.
2. Primary prevention of disease.
3. Secondary prevention of disease.
4. Tertiary prevention of disease (25).

1. **Primordial prevention of disease:** It is defined as a primary prevention of disease. In the prevention of many types of chronic diseases primordial prevention is receiving a special attention. By preventing the development of risk factors and by reducing the emergencies the primary prevention of disease is possible. The main concept in the primordial prevention of disease is educating the people about the risk factors. Many of

the problems in adults such as hypertension, obesity have their early origin in the childhood due to eating patterns, smoking etc.

- 2. Primary prevention of disease:** Preventive measures that are taken before the onset of disease is defined as primary prevention. Many primary preventive measures are developed and designed to increase the quality of life, to promote health and to increase the quality of life. By following the preventive measures, the occurrence of disease can be controlled and life of the person is prolonged.

Concept of “positive health” is mainly involved in the primary prevention of disease. It helps to achieve and maintain the level of health. It mainly concerns about the individual’s thinking towards health and the initiatives the person takes about the health.

For the prevention of chronic diseases like coronary heart diseases, hypertension the concept of primary prevention is mainly used. By increasing the standard of primary prevention, some of the diseases are completely eradicated in the developed countries ex: leprosy, typhoid etc. The success in the eradication of these diseases like polio is mainly through the immunization process. In recent years the prevention of chronic diseases is possible, by applying the primary preventive measures.

The reduction in the communicable diseases is mainly due to increase in public health measures and hygiene. Hand washing, immunization, garbage collection, waste management, maintaining general sanitation had decreased the infectious diseases in the population. 2 types of approaches were recommended by WHO for the primary prevention of chronic diseases:

(a) Population strategy approach.

(b) High risk strategy approach(27).

(a) Population strategy approach: This approach mainly involves socioeconomic, behavioral and life style changes e.g. if a group of population is reducing the serum cholesterol levels and maintaining an average blood pressure levels than we can observe a large reduction in the cases with cardiovascular disease in that population.

(b) High risk strategy approach: This approach mainly increases the preventive care of a person at high risk. The condition of the person is observed and optimum medical care is provided to the patient(27).

- 3. Secondary prevention of disease:** In secondary prevention process of disease, the preventive measures are followed to reduce the progress of disease in the patient. From the initial stage of disease, the preventive measures are followed to reduce the further disease complication.

The specific preventive measures that reduces the progress of disease are

(a) Early screening of the disease.

(b) Finding the new case.

(c) Providing adequate treatment (26).

The disease progress can be reduced by providing early diagnosis and adequate treatment to the patient. By treating the person with suitable medicine, we can improve the condition of the patient who is affected by the disease.

Secondary prevention of disease mainly includes the health programs initiated by the government. But the secondary prevention programs are more expensive when compared with the primary prevention of disease and the main problem is the patient is already subjected to disease and physical pain (28).

4. **Tertiary prevention of disease:** In the tertiary process of prevention of disease maximum all the measures are implemented to reduce the impairment of a person. Even though the disease has advanced maximum in the patient still some possible prevention process is available in tertiary prevention. In this prevention process the further disability of the person or disability limit can be prevented by undertaking particular treatment process. Ex: rehabilitation process can prevent the further disability process (25).

Table 1: Levels of prevention of disease.

Primordial Prevention	Primary Prevention	Secondary Prevention	Tertiary Prevention
1. Prevent emergence or development of risk factor.	1. Specific disease protection. 2. Health promotion	1. Early diagnosis. 2. Prompt treatment. 3. Prevent complication.	1. Disability limitation. 2. Rehabilitation.

Source: (29).

1.6.4 Disease Prevention

The methods that can interrupt the development of a disease in a person are defined as the modes of intervention. These are the some of the interventions for disease prevention:

- (a) Health promotion in the society.
- (b) Specific protection of a disease.
- (c) Early diagnosis of a disease.
- (d) Disability limitation.
- (e) Rehabilitation (30).

(a) Health Promotion in the society

Health promotion is defined as the process of educating the people to improve health and to control the spread of diseases (30). The main aim of health promotion is to increase the immunity strength of the host against various diseases. Some of the approaches in the health promotion are:

- (i) Educating the people.
- (ii) Modifying the environment.
- (iii) Nutritional changes.
- (iv) Behaviour and lifestyle changes(31).

- (i) **Educating the people:** It is one of the most effective and important intervention in health promotion. By educating the people and by making them to understand the necessary precautions to be followed in time, we can prevent the occurrence of number of diseases.

The knowledge on medicine, physiology, health is very essential to maintain the health of an individual or society (30).

- (ii) **Modifying the environment:** By environmental modification we can prevent the spreading of many infectious diseases and we can successfully control the diseases in the society. e.g. sanitation, improving housing, control of insects that spread diseases, providing safe water etc.
- (iii) **Nutritional changes:** Educating the people about nutrition requirements can improve the health of the community. Nutritional improvement of poor people, food distribution, feeding programs are implemented to improve the health of an individual with malnutrition in the society.
- (iv) **Behaviour and lifestyle changes:** Changing the behaviour and life style in a good way can improve the health of a person. Health education plays a major role in changing the lifestyle, behaviour of the person in the society. So, a well-organized health promotion program would help to identify the risk group individuals in the society and then helps in educating the people to change their behaviour and lifestyle (31).

- (b) **Specific protection of disease:** By following some of the specific protection methods the health of a person can be improved.

Some of the interventions followed by the specific protection are (30):

- (a) Immunization.
- (b) Avoiding allergens.
- (c) Protection against accidents.
- (d) Chemoprophylaxis.
- (e) Use of specific nutrients.
- (f) Protection against occupational hazards.
- (g) Protection from carcinogens.

- (c) **Early diagnosis of a disease**

Early diagnosis of a disease is the main intervention for the control of a specific diseases. When diseases are identified in early stages and treated then further secondary cases and long-term disability can be reduced. We can't explain early diagnosis of a disease as primary prevention of disease because the person is already affected by the disease. As the early diagnosis process intercepts the disease, it should be included in the prevention of disease but the main goal of prevention is to prevent the cause of disease and prevention reduces the change of entry of disease in to the host.

Detection of disturbances of homeostasis, biochemical changes, morphological, and functional changes can reduce further progress of the disease and can reduce the damage to the person. But primary prevention of disease is more effective when compared with the early diagnosis and treatment. then early diagnosis and treatment. The mortality rate can be reduced by early diagnosis and treatment to the patient. For example, early detection and treatment of cancer can reduce the mortality rate.

(d) Disability limitation

When a patient having a disease is not reporting in pathogenesis phase, the severity of the disease increases which leads to disability of the person. The main objective in the disability limitation is to prevent the disease to enter in to disability stage.

Concept of disability: Following are the events which leads to disability of a person: If a disease is not treated properly it leads to impairment in the person then leads to disability and finally leads to handicap (32).

Accidents, communicable diseases, malnutrition are some of the causes of disability in developing countries. The primary prevention of disease is the most effective way of reducing the disability of the person suffering with disease.

(e) Rehabilitation

Rehabilitation is defined as a process of combined use of social, medical and educational measures on the patient to increase the functioning ability of the body (33). Rehabilitation main aim is to achieve the social integration by reducing the disability and handicapping conditions.

The active participation of handicapped, disabled people in the social life is defined as social integration (30).

Rehabilitation process mainly involves different types of therapies such as speech therapy, social work, psychology, physical medicine, placement services etc. The role and responsibility of medical staff doesn't end when the disease reduces. The doctor has to check whether the patient is completely restored back to his life completely or not. So, the medical rehabilitation should be started before the process of treatment. Many rehabilitation centers are started to help the non-productive people and to make productive people from the non-productive ones.

e.g.: Schools for blind, changing the life style for tuberculosis, cardiac patients, reconstructive surgery for leprosy patients etc.

1.6.5 Control of Disease

All the precautions and measures which are designed to reduce or prevent the disease are termed as disease control. Disease control aims in reducing the following:

- (a) The occurrence of disease.
- (b) The transmission of disease.
- (c) The effect of infection.

Eradication of Disease

Disease eradication is defined as termination of all the ways of transmission of disease or an infection by terminating the infection causing agents (25). Simply, it is “all or none phenomenon” (34).

Measures to Control Disease

1. To control the reservoir of infection.
2. To prevent the transmission of disease.
3. To protect people at risk (the susceptible host)(34).

1. To control the reservoir of infection

One of the most desirable and best method of controlling the disease is by controlling the reservoir of infection. In the chain of disease causation, the first step is controlling the reservoir of infection. By controlling disease-causing agent, we can control the disease. We have to follow some measures to eliminate the reservoir. If the reservoir of infection is animal, it is very easy for the elimination when compared with other type of reservoirs of infection e.g., brucellosis. But it is not possible in humans to control the reservoir of infection.

The general measures to be taken in humans to control the reservoir of infection are:

- (i) Early diagnosis of the disease in humans.
 - (ii) Notification.
 - (iii) Investigation.
 - (iv) Isolation.
 - (v) Treatment(34).
- (i) Early diagnosis of the disease in humans:** The first step in the control of disease is identifying the disease. Many laboratory procedures are available for the diagnosis of the disease. Early diagnosis of a disease is necessary for:
- (a) Giving treatment to the patients.
 - (b) For investigate on epidemiological sources of infection. E.g. to know the primary source of infection.
 - (c) To study the descriptive epidemiology.
 - (d) To design preventive and control measures(33).
- (ii) Notification:** If a new infectious disease is noticed or suspected immediately the information has to be notified to the local health authority. The local health authority has to respond immediately and has to operate control measures. Some of the diseases which are serious to the public health or communicable diseases are included in notifiable diseases list. In some cases, diseases like cancer, accidents etc also comes under the notifiable disease even though these are non-communicable diseases.

Notification of a new disease is very important in source for epidemiological information. It is helpful to prevent disease outbreaks. The health authority initiates immediate actions to control the spread of diseases. Under IHR (International Health Regulations) certain diseases are notified by National Health Authority to World Health Organization. The diseases are divided into:

- (a) Diseases subjected to IHR (International Health Regulation's) 1969, Third Annotated Edition, cholera, plague and yellow fever.
- (b) Diseases under the surveillance by World Health Organisation like relapsing fever, malaria, paralytic polio, viral influenza A, louse borne typhus fever, small pox, SARS etc.

Under international surveillance and International Health Regulations all the health administrations should notify communicable diseases to WHO Geneva(30).

- (iii) **Investigation:** The magnitude of epidemic outbreak is defined as epidemiological investigation. It mainly involves in the terms of place, time and person. Through the epidemiological investigation process source of infection and factors effecting the spread of disease are identified (31).
- (iv) **Isolation:** Isolation is the oldest method of controlling the communicable diseases. It is a process of separating an infected person or animal from other healthy people in that area to prevent the transmission of infection from one person to another person. Infection from human and animal sources are controlled by physical isolation of the carrier, which transmits the disease. The infected person is isolated until the person is free from the infected disease. The main purpose of isolation is to protect other people in the community from the infection and to prevent the transmission of infection from reservoirs to the susceptible hosts (35).

Depending upon the spread and severity of disease the type of isolation varies. They are various types of isolation processes: strict isolation, high security isolation, protective isolation, standard isolation etc. The relative risk of disease and transmission of infection from patient to other person is assessed and then appropriated isolation process is followed. The duration of isolation depends upon the communicability of the disease and effect of medicines on infection.

In some disease's isolation is also possible by ring immunization process. In this process the infected patients are encircled with a barrier of immune persons through whom the infection can't spread. Ring immunization process is mainly use in 1960's and 1970's worldwide to eradicate small pox. In North America, through this process diseases like measles are controlled and eradicated(33).

In some infectious diseases like cholera, diphtheria, respiratory infections etc. isolation of infected person plays a major role in control of disease. Now a day's isolation is recommended when the risk of transmission of disease is very serious(32).

(v) Treatment

Many effective drugs are available in the market for the treatment of diseases. The main process and objective of treatment is to kill or remove infectious agent from the reservoir. The main use of the treatment is:

- (a) It decreases the transmission of disease.
- (b) It decreases the duration of illness.
- (c) It prevents the development of secondary cases.

In some diseases like tuberculosis, leprosy the early diagnosis and treatment are very important to interrupt the transmission of disease(36).

2. To prevent the transmission of disease

The most important aspect in communicable diseases is to break the “transmission chain” or to interrupt the transmission of disease. This is possible by changing components in the environment where people are living. Thus, the entry of disease-causing agent or infective agent in to the body of susceptible person can be prevented.

Ex: Diseases like hepatitis A, typhoid, cholera etc. are transmitted through contaminated water. So, by providing purified water the entry of disease can be eliminated. Control of source of contamination of disease is important to control the disease(35). Some of the sources of contamination are (37):

Food-borne diseases: In the areas of low sanitation, the food borne disease can occur. By following clean practices, the food-borne diseases can be controlled. Ex: hand washing before and after taking food, adequate cooking, avoiding contaminated foods.

Vector-borne diseases: Vector is defined as an organism that transmits disease from one person to another person.

So, in case of vector borne diseases, measures are taken to control the breeding of vector or to kill the vector. Ex: destruction of animals that spread infective disease, control of cattle and pets that spread infection from infected person to another person (38).

Air-borne diseases: When the infection is spreading by droplets or droplet nuclei in air then it is controlled effectively by interrupting the mode of spread from infected person to healthy person. By proper handling of excretions and secretions from infected person the disease can be eradicated.

3. To protect people at risk (the susceptible host): In the chain of transmission the third link is the susceptible person or host. The susceptible hosts can be protected from infection or disease by following the strategies like immunization. It is a way of protecting great number of people from diseases by decreasing the number of susceptible hosts in the population.

Active immunization is the best way of controlling the infection. In modern science immunization is a powerful and cost-effective process to control diseases. Diseases like polio, measles, tetanus are completely eradicated with the help of immunization.

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