

such important factors that may determine the health status of an individual are described below:

1. **Heredity:** The physical and mental traits of every human being are to some extent determined by the nature of his genes at the moment of conception. A number of diseases are now known to be of genetic origin e.g. epilepsy, mental retardation, diabetes, cancers, chromosomal abnormalities and errors of metabolism etc. Genetic factors are also responsible for certain abnormal types of responses to drugs or different metabolic patterns like succinylcholine apnea, acetylation of isoniazid, hemolysis caused by antimalarials and hepatic porphyrias caused by barbiturates. The state of health, therefore, depends partly on the genetic constitution of man.
2. **Environment:** Hippocrates first related diseases to the environment e.g. climate, water and air etc. This concept of disease environment association stands true even today. It is an established fact now that environment directly influences the physical, mental and social well-being of the human population. The environmental factors range from housing, water supply, air, noise, psychological stress and family structure through social and economic support system, to the organization of health and social welfare services in the community.
3. **Life Style:** Life style denotes the way people live, reflecting the social values, attitudes and activities. It consists of cultural and behavioural patterns and life-long personal habits like smoking and alcoholism. Life styles are adopted through social interaction with parents, peer groups, friends and siblings and through schools and mass media. There is definite association between health and life styles of individuals. Many health problems encountered today, especially in the developed countries like coronary heart disease, obesity, lung cancer and drug addiction, are associated with the life styles. However, certain life style factors also promote health. Examples include adequate nutrition, enough sleep, and sufficient physical activity.
4. **Socio-economic conditions:** Socio-economic conditions significantly influence the health of human beings. The health status of a given population is primarily determined by per capita GNP, education, nutrition, employment, housing and the political system of the country. Some of the important factors are:
 - (a) **Economic Status:** The per capita GNP is an accepted index of the general economic status of any country. Economic progress has been a major factor in reducing morbidity, increasing life

there is a higher incidence of disease in a particular geographic area, whether the disease occurs more often in men or women or in a particular age group and whether the host characteristic or behavior of those affected are different from those who are not affected. This study may contribute to the formulation of an etiological hypothesis. This aspect of epidemiology is also known as “descriptive epidemiology”.

- (c) **Determinants of disease :** This aspect is concerned with the testing of etiological hypotheses and identification of underlying causes or risk factors of a disease. This requires the application of epidemiological principles and methods and is described as “analytical epidemiology”. Analytical strategies help in developing scientifically sound health programmes, interventions and policies.

AIMS OF EPIDEMIOLOGY

According to the International Epidemiological Association, epidemiology has three main aims:

- (i) to describe the distribution and size of disease problems in human populations.
- (ii) to identify etiological factors in the pathogenesis of disease, and
- (iii) to provide the data essential to the planning, implementation and evaluation of services for the prevention, control and treatment of disease and to the setting up of priority among these services.

EPIDEMIOLOGICAL METHODS

The most important task of an epidemiologist is to study disease occurrence in people, who during the course of their lives are exposed to numerous factors and circumstances, some of which may have role in disease etiology. Whereas the clinician or laboratory investigator is able to study disease conditions more precisely, the epidemiologist employs carefully designed research strategies to explore disease etiology. These strategies are of three main types:

- (a) Descriptive epidemiology.
- (b) Analytical epidemiology.
- (c) Experimental epidemiology.

These studies compliment one another in order to fulfil the aims of epidemiology.

in certain countries it has been responsible for the elimination of the disease. Killed vaccines are administered by subcutaneous or intramuscular route.

Toxoids

Toxoids are considered highly effective and safe immunizing agents. They are modified bacterial toxins that have been rendered nontoxic (detoxified) but retain the ability to stimulate the formation of antitoxin and thus prevent bacterial toxicities.

Tetanus toxoid and Diphtheria toxoid are the examples of most commonly used effective immunizing agents from this class.

Cellular fractions :

Certain vaccines are prepared from extracted cellular fractions, for example meningococcal vaccine from the polysaccharide antigen of the cell wall and the pneumococcal vaccine from the polysaccharide contained in the capsule of the organism. Though, there is limited experience with these vaccines they appear to be highly effective and safe.

Combinations

When more than one kind of immunizing agent are incorporated in a vaccine it is called a mixed or combined vaccine.

The aim of combined vaccines is to simplify administration, reduce the cost and minimize the number of visits of the patients to the health care centre or hospital.

Some of the commonly used mixed vaccines include.

- (i) Measles, Mumps and Rubella Virus Vaccine live (MMR Vaccine).
- (ii) Diphtheria and Tetanus Toxoids and Pertussis Vaccine Adsorbed (Tri-immunal)

Polyvalent Vaccines

The vaccines prepared from two or more strains of the same species are known as polyvalent vaccines, e.g., Pneumococcal Vaccine Poly Valent (Pneumovax 23), Poliovirus Vaccine.

Immunoglobulins

The human immunoglobulin system consists of five major classes (IgG,

Staph. epidermidis, Strep. pyogens and clostridium species. Nonsurgical sites of wound infection include injections, umbilical stumps, ulcers and burns. **Ps aeruginosa** is the most frequent and important cause of infection in patients of burns. Neonatal tetanus has been reported due to the use of contaminated umbilical cord ties.

- (b) **Urinary tract infections** : UTIs generally occur in hospitalized patients following catheterization more so with the use of indwelling catheters. **E coli, Ps. aeruginosa, Proteus** and other gram negative bacilli are the frequently encountered causative agents and mixed infection is often seen.
- (c) **Respiratory infections** : Nosocomial pneumonia secondary to aspiration in unconscious patients or following pulmonary ventilation or instrumentation can be attributed to **Staph aureus** or gram negative pathogens.
- (d) **Bacteraemia and Septicaemia** : These are commonly associated with infected intravenous cannulae. The longer the cannulae are kept in situ, the greater the risk of infections. "Cut-downs" on the leg veins in infants and children with diarrhoea, generally get left in place for long periods, the site being bathed in diarrheal stools. Phlebitis sets in with consequent bacteraemia. Many children admitted with diarrhoea thus die of septicaemia. Gram negative bacilli are the common pathogens. Infections can be prevented by proper skin wash before "cut-down" and the use of stainless steel needles instead of plastic cannulae.

Prevention and Control of Nosocomial Infections

Nosocomial infections may occur sporadically or as outbreaks. Etiological diagnosis is made by the routine bacteriological methods of smear, culture, identification and sensitivity testing. In the event of an outbreak, the source has to be identified and eliminated as early as possible. This requires sampling of possible sources of infection such as hospital personnel, water, air, food, surgical dressings, and inanimate objects. Typical examples of sources of outbreaks are nasal carriage of staphylococci by surgeons or pseudomonas growing in hand lotion. Carriers should be adequately treated, sterilization techniques used in the hospital must be tested. It may be a defective autoclave or improper technique such as boiling of an infusion set in ward sterilizer that may be responsible for the outbreak.

The control of hospital infection should be a permanent ongoing ac-

ENVIRONMENT AND HEALTH

Sources of water supply • water pollution • purification of water • health and air • noise • light • solid wastes-disposal and control. Medical Entomology- Arthropod borne diseases and their control • rodents • other animals and diseases.

The health status of an individual is determined by the integration of the internal environment of man himself and the external environment which surrounds him. According to modern concept diseases are due to disturbances in the delicate balance between man and his environment.

In India much of the ill-health of the country is due to the defective environment. The first and most important step in any health programme is the elimination through environmental control of those factors which are detrimental to health. The environmental factors which are basic and fundamental to individual and community health are described below :

WATER

An important cause of the ill health in underdeveloped countries is the lack of safe drinking water. Water intended for human consumption should not only be safe but also wholesome. It should be free from pathogenic agents and harmful chemical substances, pleasant to taste and usable for domestic purposes. Water containing infective and parasitic agents, poisonous chemical substances, industrial or other wastes or sewage is said to be contaminated or polluted.

From public health point of view, water should be provided in adequate quantity. An average daily supply of 150-200 liters per head is considered the optimum quantity. However, the consumption of water depends upon climatic conditions, standard of living and habits of the people.

Sources of Water Supply

The selection of source for any given population needs professional