CHAPTER 1

Introduction to Health and Epidemiology

Health

Before we conduct epidemiological studies, it is necessary to understand the meaning and definition of health. The widely accepted definition of health as stated by the World Health Organization (1948) in the preamble to its constitution is "Health is a state of complete Physical, Mental and Social well-being and not merely an absence of disease or infirmity".

In the recent years this statement has shown its interest to include the ability to lead a socially and economically productive life. But the WHO definition of health has been criticized as being too broad. One group or many argue that health cannot be defined as "State" at all, but it must be seen as a process of continuous adjustment to the changing demands of living and of the changing means, we give to the life. It is a dynamic concept, it helps people in the society to live well, work well and enjoy life, which every human being expects in life. Some consider it is an irrelevant definition for everyday demands, as nobody qualifies as healthy when the perfect biological, psychological and social aspects are considered. If we accept the WHO definition of health, we cannot find healthy people, as everybody will be sick for one reason or the other.

But this definition only symbolizes the aspirations of people and represents an overall objective or goal towards which our nation and world should strive. Therefore the WHO definition of health can be taken as an idealistic goal than a realistic proposition. According to that definition, it may exist in few individuals, rather than everyone all the time.

In addition to the above mentioned three dimension, WHO can explore the possibility of including the spiritual dimension. According to the vision of health profession "Health for all by 2020", we the people of this world, should focus on spiritual dimension. The public should be aware of what is spirituality in true sense, its impact and benefits by adopting this dimension.

In true sense the spiritual dimension is not going to explain about any religion, but it mainly directs the people of the world on how one should live and work with their true nature. In reality the true nature in the society is, everyone should work in a state of nobody and content.

In general, spiritual dimension is striving to explain and reach each individual by explaining what is life and what is the purpose of life. This spirituality explains the factors which can be considered as root cause for few diseases. The very meaning and purpose of life is to be happy for no reason. This can be achieved, when the people of a particular profession work in a state of nobody and work with content.

The spiritual dimension is described and is interpreted as the need for, meaning, purpose and fulfillment of life. It is important to gain overall sense of health, well-being and quality of life (referred to as the health potential).

The important spiritual values are the truth, righteousness, peace, love and non-violence. These spiritual values are also human values and are fundamental roots of a healthy, vibrant and viable work career.

The spiritual dimension is the tangible "Something" that transcends physiology and psychology. It will transfer from somebody to nobody state.

Determinants of Health

The term 'determinants of health' refer to those factors that have a significant influence, whether positive or negative, on health. The term should not imply a cause–effect relationship between a risk factor and a health status. Health is the result of multiple factors including the genetic, biological, and lifestyle factors related to the individual and the factors relating to the structure of society and its policies.

Epidemiology

Epidemiology is the basic science of preventive and social medicine. It has evolved rapidly during the past decades. In general epidemiology can be defined as the study of distribution and determinants of disease in human population. The first known epidemiologist, also named as father of medicine who has given a major contribution to epidemiology is the Greek Physician Hippocrates (460-377 BCE). Hippocrates has explained how a particular disease is related to time, season, place and environment of the place where they are living. The important factors of the environment are water and change in season. Some excellent epidemiologic studies were conducted before 20th century, but design and evaluation of epidemiological studies began only in the second half of the 20th century. This epidemiology began with Adam and Eve, both trying to investigate the qualities of the "Forbidden Fruit". The word Epidemiology is derived from the word Epidemic (Epi = Among; demos = People; logos = Study). Many of the epidemiological studies were initiated on large scale, in the year 1940. The public health problems were established through observed or measured phenomena in the population of interest. For example, the community-intervention trail of fluoride supplementation in water that was started during the year 1940 gave the solution to prevent dental caries. Later in 1949, the Framingham heart study, was initiated and focused on several long-term follow-up studies of cardiovascular disease, that has contributed to understand the causes of enormous public health problems.

Its ramifications covers not only study of distributions and causation (and thereby Preventive), but also health and health-related events occurring in human populations. Presently the medical sciences in epidemiology has given rise to newer off-shoots such as infectious disease epidemiology, clinical epidemiology, cancer epidemiology, occupational epidemiology, neuro epidemiology, corona study etc.

These studies have added substantially to the advancement of medical knowledge is indisputable. The main concern of the society was the investigation and prevention of infectious diseases. It has been firmly established in medical education and research. Epidemiology identifies the distribution of diseases, factors which are the sources and cause, and methods for their control of diseases which are caused by different factors. This requires an understanding of

how political, social and some scientific factors which intersect to increase the risk of the disease, which makes epidemiology a unique science.

In general we can say that epidemiology is a science which has multidisciplinary approach to the study of human health and disease. It applies various techniques of systematic observation, and the formulation, testing, and modification of hypotheses. Generally epidemiology is a highly complex science as it has to focus on different types of variables which are associated with human diseases, such as pathogens, human social or travel dynamics, and the environment etc.

The community and public health medicine very often uses the concept and tools of epidemiology. Epidemiologists study the mechanism, how and why diseases and health related problems arise and how these diseases are distributed among population. The epidemiologist and public professional are interested in studying, why and what are the risk factors for getting the disease and why some members of the population, are free from the disease.

Epidemiology study mainly focuses on the factors, which are associated with induction, promotion and expression of a disease. These risk factors can also be called as explanatory variables, predictor, covariates, independent variables and exposure variables.
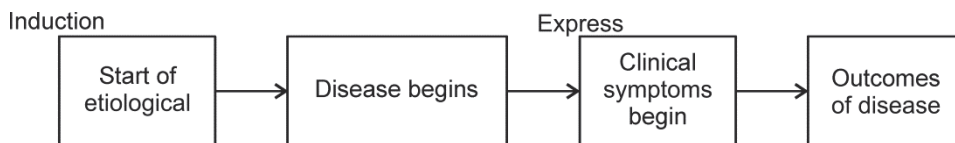
Flow chart of Disease Evolution

In addition to these factors, there are certain factors associated, during induction, promotion and expression which are different from the above factors.

For example, malnutrition is a factor which is associated during induction and promotion stages.

But in disease like coronary heart disease CHD, we can consider three other factors, which are associated with the above factors like dietary factors associated with induction, high blood pressure with promotion, and age and sex with expression.

Disease intervention is of course a very important mechanism to prevent the development of diseases in the entire universe or population. But the intervention strategies vary depending on whether the purpose is to prevent induction, promotion or expression. Public health intervention mainly focus on induction and expression, where as clinical trial or treatment is designed with an intension to alter the expression or the final stage of a disease.

But in epidemiological study, three major components, on which one has to focus are (i) Studies of disease frequency (ii) Studies of distribution and iii) studies of determinants.

These three components spread an important message to the public health.

Aims of Epidemiology:

The three main aims of epidemiology are listed below

 (i)   To find out the distribution and size of the disease problem in the world

(ii) To find the aetiological factors, which are considered as root cause for disease

(iii) To collect and provide the data which is very much required for planning, implementation and evaluation of data, which is required by the authority, who is going do service for the prevention, control and for treating the disease

The ultimate aim of epidemiological study is (a) To reduce or eliminate the health problem or its consequences. (b) Secondly to promote the health and well being of the population in the world.

Determinants: Determinants are factors that produce an effect, result or consequence in another factor. A determinant is a cause or factor that precipitate disease.

The determinants may be

- Physical Stresses – Excessive heat, cold and noise
- Radiation - Electromagnetic, Ultrasound, Microwave etc.
- Climate Change – Drug, acids, heavy metals, Poison and some enzymes
- Biological – Disease causing infectious agents or pathogens (Virus, Bacteria, fungi and Parasites)
- Psychological Problems: Families (Married and Divorced), households, Socioeconomic status, social networks and social support.
- Investigator can refer to any potential aetiological agent under study as a risk factor for the disease of interest, sometimes, it is named as determinant of the disease.

The main aim of epidemiology is to inform health professionals, and the public at large, in order to improve general health of public. This can be achieved by applying descriptive and aetiological analyses.

Descriptive analyses focuses on the optimal allocation of health services and targeting for the promotion of public health.

Aetiological analyses explains, what one has to do to lessen the chance of development of the disease in question.

Clinical Epidemiology

Clinical epidemiology is a branch in clinical setup, will deal more about the application of epidemiological methods in clinical trials.

It mainly focuses on evaluating, patient screening, diagnosis, treatment and prognosis, Here, different statistical tools will be applied for evaluating the accuracy of screening and diagnostic tests, identifying the level of risk associated with screening, diagnostic testing and treatment and identifying deadliness and survival probability of illness.

Population and Sampling

An epidemiological study mainly focuses on the collection of data, analysis and draw inference about the human population. In epidemiological study, investigator wish to draw the conclusions

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about the population, which is termed as target population. The specific population from which the investigator collect the data is called as study population.

In some studies, the target population is defined on the basis of geographical criteria. But in majority of the epidemiological study population is based on geographical, institutional or occupational definitions. Another way of selecting the study population for epidemiological study is based on the stage or condition of the disease. Investigator goes to the diseased population, when their aim is about prevention of disease and also the study population is free from disease would be an ideal choice, when the investigator goes for follow-up studies.

If the study requires collection of any new data, we need to make groups of sample from the study population chosen for investigation. Then the investigator has to generalize from the sample to the study population and from study population to target population.

Many times the epidemiologist use the term study population as group of people from where the investigator collect the data. The rationale is that this group is the totality of those being studied, monitored ill health during a follow-up period.