

## **EPIDIOIOLOGY**

The study of the distribution and determinants of health related states or events in specified populations and the application of this body to the control of health problems.

**-John M Lost**

### **COMPONENTS OF EPIDEMIOLOGY**

- 1. Disease frequency:** Frequency of disease, disability or death, and summarizing this information in the form of rates or ratios.
- 2. Distribution of disease:** The study of distribution of disease in the various subgroups of population by time, place. person.
- 3. Determinants of disease:** is to test etiological hypothesis and identify the underlying causes of disease.

### **AIMS OF EPIDEMIOLOGY**

1. To describe the distribution and magnitude of health and disease problems in human population.
2. To identify the etiological factors in the pathogenesis of disease.
3. To provide the data essential for planning, implementation and evaluation of services for the prevention and to setting up of priorities among those services.

### **ULTIMATE AIM OF EPIDEMIOLOGY:**

- To eliminate or reduce the health problem or its consequences.
- To promote the health and well being of the society as a whole.

## **EPIDEMIOLOGICAL APPROACH**

The epidemiological approach to problems of health and disease is based on two major foundations

- Asking questions
- Making comparisons

### **1. ASKING QUESTIONS**

#### **Related to health events**

- What is the problem?
- Where did it happen?
- When did it happen?
- Who are affected?
- Why did it happen?

#### **Related to health actions**

- What can be done to reduce this problem and its consequences?
- How can it be prevented in the future?
- What actions should be taken by the community?
- What resources are required?

### **2. MAKING COMPARISONS**

This may be comparison of two (or more groups) – one group having the disease and the other group(s) not having the disease, or comparison between individuals.

## **TOOLS OF MEASUREMENT**

**Rates:** A rate measures the occurrence of some particular event in a population during a given time period.

**Ratios:** It expresses relation in size between 2 random quantities. The numerator is not a component of the denominator. The ratio of white blood cells relative to RBCs is 1:600.

**Proportions:** It is ratio which indicates relation in magnitude of a part of the whole. The numerator is always included in the denominator

## MORTALITY RATES AND RATIOS

### Crude Death Rate:

The number of deaths from all causes per 1000 estimated mid year population in one year in a given place.

$$\frac{\text{Number of deaths during the year}}{\text{Mid year population}} \times 1000$$

Number of deaths during the year  
Mid year population

### Specific death rate:

The specific death rate may be-

1. Cause or disease specific. Ex: TB.
2. Related to specific age groups. Ex: age specific, sex specific, age and sex specific.

**Case fatality ratio:** It represents the killing power of disease.

Total number of deaths due to a particular disease

$$\frac{\text{Total number of deaths due to a particular disease}}{\text{Total number of cases due to the same disease}} \times 100$$

Total number of cases due to the same disease.

### Proportional mortality rate (ratio)

#### **a. Proportional mortality from a specific disease:**

number of deaths from the specific disease in a year

$$\frac{\text{number of deaths from the specific disease in a year}}{\text{Total deaths from all cause in that year}} \times 100$$

Total deaths from all cause in that year

**b. Underfive proportionate mortality rate**
$$\frac{\text{Number of deaths under 5 yrs of age in the given year}}{\text{Total number of deaths during the same period}} \times 100$$
**c. Proportional mortality rate for aged 50 yrs and above:**
$$\frac{\text{Number of deaths of persons aged 50 yrs and above}}{\text{Total deaths of all age groups in that year}} \times 100$$
**d. Proportional mortality rate for aged 50 yrs and above:**
$$\frac{\text{Number of deaths of persons aged 50 yrs and above}}{\text{Total deaths of all age groups in that year}} \times 100$$
**Survival Rates**
$$\frac{\text{Total number of patients alive after 5 years}}{\text{Total number of patients diagnosed or treated.}} \times 100$$
**MEASUREMENT OF MORBIDITY****INCIDENCE**
$$\frac{\text{Number of new cases of specific disease during a given time period}}{\text{Population at risk during that period}} \times 1000$$

Ex: if there had been 500 new cases of an ailment in a population of 30,000 in a year, the incidence would be:  $500/30,000 \times 1000 = 16.7$  percent per year.

**Use of incidence rate:**

- To control disease.
- For research into etiology and pathogenesis, distribution of diseases, efficacy of preventive therapeutic and preventive measures

## **PREVALENCE**

The term disease prevalence refers to all current cases (old and new) existing at a given point in time, over a period of time in a given population.

### **Prevalence is of 2 types:**

- ✓ Point prevalence
- ✓ Period prevalence

### **POINT PREVALENCE:**

Number of all current cases (old and new) of a specified disease existing at a given point of time

$$\frac{\text{Number of all current cases (old and new) of a specified disease existing at a given point of time}}{\text{Estimated population at the same point in time}} \times 100$$

### **PERIOD PREVALENCE:**

Number of existing cases (old and new) of a specified disease existing during a given period of time interval

$$\frac{\text{Number of existing cases (old and new) of a specified disease existing during a given period of time interval}}{\text{Estimated mid interval population at risk}} \times 100$$

### **USES OF PREVALENCE:**

- To estimate the magnitude of health/ disease problems in the community and identify potential high risk population
- Prevalence are especially useful for administrative and planning purposes. Ex: hospital beds, manpower needs, rehabilitation needs.

**Definitions pertaining to infectious disease epidemiology are given  
below:**

**Infection:** The entry and development or multiplication of an infectious agent in the body of man or animals.

**Contamination:** The presence of an infectious agent on a body surface. : also on or in clothes, beddings, toys, surgical instruments or dressings, water, milk, food.

**Infestation:** For persons or animals the lodgment, development and reproduction of arthropods on the surface of the body or in the clothing ex: lice, itch mite.

**Epidemic:** Epi= upon, Demos= people. The unusual occurrence in a community or region of disease, specific health related behaviour (ex. Smoking) or other health related events (ex.traffic accidents) clearly in excess of expected occurrence,

**Endemic:** En= in, demos= people. It refers to the constant presence of a disease or infectious agent within a given geographic area or population group, without transportation from outside, may also refer to the usual or expected frequency of the disease within such area or population group.

**Sporadic:** The word sporadic means scattered about. The causes occurs irregularly, haphazardly from time to time , and generally , infrequently. The cases are so few and separated widely in space and time that they show little or no connection with each other , nor a recognizable common source of infection. Ex: polio, tetanus, meningitis.

**Pandemic:** An epidemic usually affecting large proportion of the population , occurring over a wide geographic area such as section of nation , entire nation, a continent or the world.

**Exotic:** Diseases which are imported into a country in which they do not otherwise occur. Ex: Rabies in UK.

**Zoonosis:** An infection or infectious disease transmissible under natural conditions from vertebrate animals to man.

**Epizootic:** An outbreak of disease in an animal population.

**Epornithic:** An outbreak of disease in a bird population.

**Nosocomial Infection:** Nosocomial(hospital acquired) infection is an infection originating in a patient while in hospital or other health care facility.