Epidemiology is the study of the distribution and determinants of disease. We try to find out who gets the disease and why. For example. Is the disease more frequent among men or women, young or old, rich or poor, blacks or whites? Did they get the disease because of a genetic trait, an occupational exposure, or a lifestyle habit, such as cigarette smoking? Epidemiology differs from clinical medicine in two important regards: First, epidemiologists study groups of people; not individuals. Second, epidemiologists study well people, in addition to sick people, and try to find out the crucial difference between those stricken and those spared. Although a single study can be designed to provide descriptive and analytic data, in actual practice the design of a study is mainly determined by the need to obtain data of one or different kinds.

**Descriptive Studies**

Descriptive studies are carried out to find out the frequency of a disease, the type of people suffering from it and where and when it occurs. Such studies are often based upon hospital records which contain information on variables like age, sex, time and place where they developed disease. These studies show characteristics how people are affected by a disease and therefore it is necessary to relate observation made on the patients to similar observation in the general population. Descriptive studies are usually based on observations made at one point for this reason they are called cross-sectional studies. Now if the observations are repeated in the same community over a prolonged period then these studies are termed as longitudinal studies. Both cross-sectional and longitudinal studies are included in the term “descriptive studies”. These studies provide information which is of immediate relevance to the planning of medical services. Moreover they may indicate problems which may demand further work like marked geographical variations in the frequency of certain tumors as found in the cancer studies.

**Retrospective studies**

In retrospective studies, all the relevant events have already occurred where the ‘study is started. In these studies comparisons are made between a group which do not have the disease called the controls. The proportion of cases exposed to or possessing the characteristics or factor of etiological interest is compared to the corresponding proportion in the control. If a higher frequency of individuals with the characteristics is found among the cases than the controls, an association between the disease and the characteristics is indicated.

**Prospective Studies**

In these studies a sample of the populations is selected and information is obtained to determine if they have the characteristics, a particular living habit, exposure to a possible etiological agent that may be related to the development of the disease which is being investigated. This type of study is known by a number of terms, e.g., cohort, incidence, longitudinal, forward looking and followup. The most widely used is the word cohorts. Cohort is defined as a group of people sharing common experience.

**Epidemiological Measurements**

Following terms are generally used for the analysis of results: ‘a Rate To determine if a study is an epidemiologic study look for a control or comparison group To make a comparison you need to develop a rate
c. Birth rate:
   Number of births in a year
   ____________________________ x Unit
   Population at mid year

f. Death rate
   Number of deaths in a year
   ____________________________ x Unit
   Population at mid year

h. Preinatal mortality:
   Number of still birth + death in
   1st week of life
   ____________________________ x Unit
   Total birth

i. Specific death rate:
   Number of Deaths from a specific disease
   ____________________________ x Unit
   Population at mid year

j. Infant death rate:
   Number of infant deaths in a year
   ____________________________ x Unit
   Number of live births for the year

k. Neonatal death rate:
   Number of neonatal deaths in year
   ____________________________ x Unit
   Number of live births

l. Still birth rate:
   Number of still births for a year
   ____________________________ x Unit
   Number of live births

m. Maternal death rate:
   Number of maternal deaths for a year
   ____________________________ x Unit
   Number of live birth for the year

n. Case rate:
   Number of cases of specific disease
   ____________________________ x Unit
   Population at mid year

o. Severity rate:
   Number of days of illness
   ____________________________ x Unit
   Number of illness

Rate = \text{events} × 10,000 \text{Population at risk}

Example No of TB cases in town A
<table>
<thead>
<tr>
<th>Year</th>
<th>1975</th>
<th>1980</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of cases</td>
<td>60</td>
<td>80</td>
</tr>
<tr>
<td>Population</td>
<td>30,000</td>
<td>50,000</td>
</tr>
</tbody>
</table>

1975  Rate = $\frac{63}{30,000} \times 10,000 = 20$ per 10,000
1980  Rate = $\frac{80}{50,000} \times 10,000 = 16$ per 10,000

**Attack Rate**

An attack rate measure is the proportion of the population that develops disease among the total exposed to specific risk.

**Number of person ill**

**Attack Rate =** $\frac{\text{Number of person ill}}{\text{Number of person at risk}} \times 100$

Example: 500 guests (men 200 and women 300) attend marriage dinner. Food poisoning in 150 guests (90 men and 60 women). Find attack rate of men and women.

- Attack rate of men = $\frac{90}{200} \times 100 = 45\%$
- Attack rate of women = $\frac{60}{300} \times 100 = 20\%$.

**Incidence and prevalence**

*Incidence Rate*  Incidence rate are designed to measure the rate at which people without a disease develop the disease during a specific period of time, i.e., the number of NEW cases of a disease in a population over a period of time.

**No. of new cases developing a disease during a period of time**
Incidence rate = \[ \times 10,000 \]
Population at risk
d. Prevalence Rate: Prevalence rate measure the number of people in a population who have the
disease at a given point in time.

**Total number of cases of a disease at a given time**

Prevalence rate = \[ \frac{x \text{ Unit}}{\text{Total Population}} \]

[Where unit is 100 or 1000 or 10,000]

Example: Each heavy black line between the X’s on (Figure) represents an episode of infectious mononucleosis, and each line represents a person (so that there is a defined population of 20). For 1971 compute for mononucleosis1.

1. Incidence
2. Prevalence

Solu: Incidence rate = \( \frac{10}{20} \times 100 = 50\% \) (The episodes J-J1 is counted as contributing to incidence in 1971, although it appears to be reinfection)

Prevalence rate = \( \frac{11}{20} \times 100 = 50\% \) (10 new + 1 old)