

Babylon University – College Of Medicine  
Department of Community Medicine

*Lectures in Community Medicine  
For 4<sup>th</sup> Stage Students  
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2010 – 2011*

## **Lecture 3**

# **Measurements of Health and Disease**

### **Count**

The simplest and most frequently performed quantitative measurement in epidemiology is a count of the number of persons in the group who have a particular disease or a particular characteristics, for example, it may be noted that to people in two college dormitories developed infectious hepatitis type A. 10 students in the first one and 20 students in the second .

### **Proportion:**

For a count to be descriptive of a group it must be seen in proportion to it; that is must be divided by the total number in the group. The 10 hepatitis cases would have quite different significance for the dormitory housed 20 student than if it housed 500

In the first case the proportion would be 0.5 (50%). In the second case the proportion would be 0.02 (2%) The use of denominators to convert counts into proportion seems simple to mention. A proportion is one basic way to describe a group. It is important to enumerate appropriate denominators in order to describe and compare groups in a meaningful and useful way.

### **Ratio**

Is numerical expression, which indicates the relationship in quantity between two parts, the ratio of male to female is 2:1.

### **Rate**

A rate is the quantity, amount or degree of something measured in specific period of time.

### **Population at risk**

Is that part of population that is potentially susceptible to the disease studied. For instance, men should not be included in calculation of carcinoma of the cervix. Occupational injuries occur only among working people (workforce).

### Prevalence:

The number of existing cases depends on the number of people who develop their illness in the past and have continued to be ill at the present time.

### Period prevalence:

The presence of particular disease over a longer period.

### Incidence :

Is defined as the number (No.) of new cases of disease.

### Incidence rate :

Number of new cases in the population during specific period / no of population at risk of developing the disease at that period. Incidence is the measure of disease developing in a person who did not have the disease

$$\text{Incidence rate} = \frac{\text{Number of new cases in the population during specific period}}{\text{Number of population at risk of developing the disease at that period}} \times K$$

### Influencing Factors of prevalence rate :

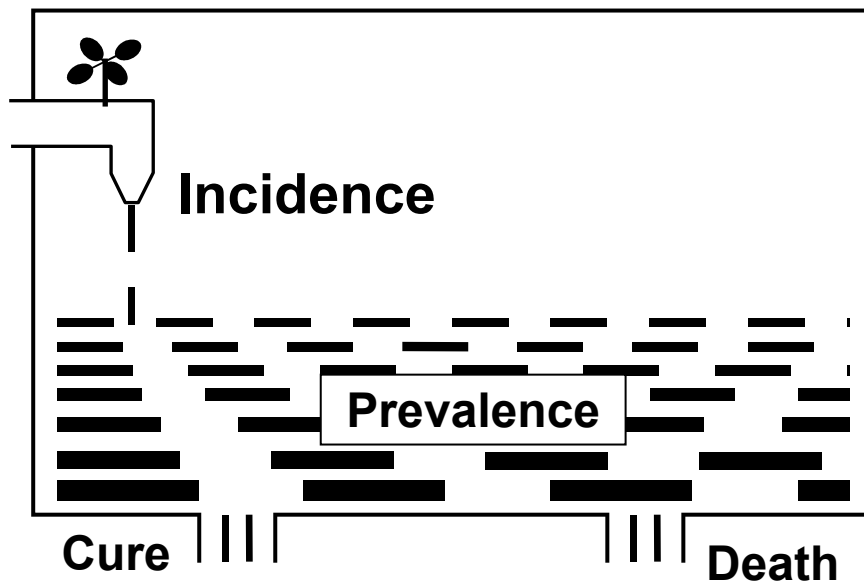
1. The number of new cases
2. The severity of illness
3. The duration of illness

### Period prevalence:

The prevalence of a particular disease in a longer period such as one month , six months, one year or even more (life time prevalence).

### Point prevalence :

Is used to know how much of a particular disease is present in a population at a particular point in time, example Dec., 31, 2010.

Relationship between incidence and prevalence:

$$\text{Prevalence} = \text{Incidence} \times \text{average duration of disease}$$

Incidence is a measure of a disease developed in a person who did not have the disease (transition from non disease to disease status, any person in the Y (denominator) has the potential to become part of the group that is counted in the numerator (X)

The important point in incidence is that whatever time period is used in the calculation must be clearly specified, and all individuals included in the calculation must have been observed (at risk) for the entire period .

Vital statistics:

Tools used to evaluate the health status of the community.

By vital statistics we refer to data collected from ongoing recording, registration of all vital events (birth, deaths, fetal deaths, marriages and divorces).

The physician is responsible for filling the certificates of death, birth and fetal death.

Measures of fertility :

Fertility refers to actual bearing of children.

Fecundity refers to the capacity to bear children.

## Crude Birth Rate (CBR)

$$\frac{\text{No. of live births (during a year)}}{\text{Average (mid-year population)}} \times K$$

Crude Birth Rate (CBR): Is the No. of live births per 1000 population of certain locality and year.

$$\frac{\text{No. of live births of certain locality and year}}{\text{Mid year locality}} \times 1000$$

## General fertility rate

$$\frac{\text{No. of live births (during a year)}}{\text{Total no. of women of child-bearing age (15-45 years)}} \times K$$

## Age specific fertility rate

$$\frac{\text{No. of live births to women of a certain age}}{\text{Total no. of women of the specified age}} \times K$$

## Total Fertility Rate:

The average number of children that would be born to women surviving until menopause.

Birth rate is generally high in developing countries including Iraq, due to:

1- High fertility rates due to social and traditional motives.

2- Poor family planning facilities

3- Factors related to marriage (the youngest age of marriage is associated with long childbearing period).

## MORTALITY RATES

A mortality rate is a measure of the frequency of occurrence of death in a defined population during a specified interval.

### Crude Death Rate (CDR) =

$$\frac{\text{Total No. of deaths for all ages and causes}}{\text{Mid-Year Population (MYP) of the same year}} \times K$$

### Age Specific Death Rate:

**Mortality at specific age group.**

### Infant Mortality Rate

**The infant is the baby in the first year of life (the baby below one year of age)**

**Infant Mortality Rate: It is the number of deaths of infants (below one year) per 1000 live births in a certain locality (or country) and year**

### **Infant Mortality Rate (IMR):**

$$\frac{\text{No. of deaths under 1 year of age in a certain locality \& year}}{\text{Total No. of live births in the same locality \& year}} \times K$$

**What is the infant mortality rate in Iraq???**

### Neonatal Mortality Rate (NMR):

Is the number of deaths of infants during their first month (or 4 weeks) per 1000 live births in a certain locality and year.

### Post - neonatal Mortality Rate:

Is the number of deaths of infants from one month to one year of age per 1000 live births in a certain locality (or country) and year.

### Children 1-4 years Mortality:

It is age specific mortality of preschool children and so called preschool child mortality. It is the number of death of children aged 1-4 years per 1000 children of the same age group in a given locality or country and year

### Stillbirth Rate:

Stillbirth is a viable fetus delivered after the 28th week of pregnancy without showing any sign of life after being completely expelled from mother.

Stillbirth rate is the number of fetal deaths after the 28th week of pregnancy per 1000 liveborn in a locality and year.

### Perinatal Mortality Rate:

Perinatal period: is the period around labour from 28th week of pregnancy to the end of first week after labour.

Perinatal Mortality Rate: It is the number of death occurring in the perinatal period, from 28th week of pregnancy to the end of first week after labour per 1000 liveborn in a given locality and year.

### Maternal Mortality Rate (MMR):

Maternal mortality mean death of mother due to causes related to pregnancy labour and puerperium .Risk is more with abortion and ectopic pregnancy and during child birth and early puerperium.

Maternal Mortality Rate: Is the number of deaths of mothers due to causes related to pregnancy labour and puerperium per 100000 liveborn in a given locality and year.

**Maternal Mortality Rate (MMR) =**

$$\frac{\text{No. of deaths of mothers due to causes related to pregnancy, labour, and puerperium}}{\text{Total No. of live births in the same locality \& year}} \times 100'000$$

### Case Fatality Rate (CFR):

It is the number of deaths of a particular disease per 100 cases in a certain locality and year.

In outbreaks of a disease in a confined community case fatality rate is the number of deaths per 100 diagnosed cases during a definite period of time (period of outbreak)

**Case Fatality Rate (CFR) =**

$$\frac{\text{All deaths from a certain disease}}{\text{All cases of that disease in a certain period or area}} \times 100'000$$

**Cause Specific Mortality Rate (CSMR):**

It is used for chronic disease for example pulmonary T.B. where accurate number of cases occurring within the year is not available and so case fatality rate can not be obtained.

$$\frac{\text{All deaths from a certain disease}}{\text{Mid Year Population (MYP) of the same year and locality}} \times 1000$$

**Proportionate Mortality Rate (PMR):**

Is the percent or proportion of the number of deaths of a particular disease to total death in a certain locality (or community or group of the population) and year.

**Exercise No.1**

<b>Total midyear population</b>	<b>80000</b>
<b>No. of live births</b>	<b>2000</b>
<b>Population aged 45 years and more</b>	<b>20000</b>
<b>Reported fetal deaths</b>	<b>32</b>
<b>Maternal deaths</b>	<b>1</b>
<b>Total death</b>	<b>648</b>
<b>Death under 1 year</b>	<b>42</b>
<b>Death of person 45+ years</b>	<b>300</b>
<b>Death due to heart disease</b>	<b>98</b>
<b>Death due to cancer</b>	<b>60</b>
<b>Death due to stroke</b>	<b>48</b>
<b>Cases of heart disease</b>	<b>1000</b>
<b>Cases of cancer</b>	<b>1200</b>

**Calculate**

- 1. Crude Birth Rate
- 2. Crude Death Rate
- 3. Infant Mortality Rate
- 4. Maternal Mortality Rate
- 5. Age Specific Mortality Rate 45+
- 6. Proportionate Mortality Rate due to stroke
- 7. Cause Specific Death Rate due to cancer

**Exercise No.2**

**Assume that in a population of 100'000 persons 20 have disease X in 1 year 18% die from that disease what are the mortality rate of that disease? And what are the case fatality rate? And what does this means to you?**