Chapter 3

Measurements of disease frequency

Objectives:

By the end of this lecture, students should be able to:

1.Enumerate correctly measurements of disease frequency.

2.Differentiate between morbidity and mortality rates.

3.Recognize difference between rates and ratios.

4.Discuss factors affecting different rates.

5.Identify uses of morbidity and mortality rates

A.Morbidity rates

Morbidity rate: A disease rate, specifically prevalence and incidence rates of diseases In a population in a specified time period.

Morbidity Measures

1. Incidence rate

Incidence: The rate or the development of **new cases** of a condition or disease in a population in **a specified time period**; in previously disease –free or condition –free (**"at risk ")** individuals. It's provides an estimate of the condition/disease risk in that population.

$$\text{Incidence Rate} = \frac{\text{No. Of persons developing a disease (New cases) in a specific time \&locality}}{\text{Total population at risk during that period of time}} \times 1000$$

Incidence is always calculated for a given period of time

An attack rate is an incidence rate calculated for a specific disease for a limited period of time during an epidemic

Attack Rate

An attack rate is a variant of an incidence rate, applied to a narrowly defined population observed for a limited time, such as during an epidemic.

The attack rate is usually expressed as % percent.

- **Special incidence rate**
- **Limited period of risk (epidemic)**
- **Risk restricted to a special age group**

Example

250 persons who attended a picnic, 90 subsequently developed gastroenteritis. Calculate the attack rate of gastroenteritis

Attendees = 250

ILL = 90

Attack rate = (90 ÷ 250) X 100= 36 %

Recovery Rate

$$\frac{\text{No. Of recoveries from a certain disease in a certain Period of time in a certain area}}{\text{No. Of ill person in the same period of time and same area}} \times 100$$

2.Prevalence

Prevalence measures the number of cases (new and old) of the disease (or other health-related phenomenon) at a point or period in time.

Morbidity Measures

$$\text{Prevalence} = \frac{\text{Number of existing events, old and new}}{\text{Population at risk}} \times 1{,}000$$

- **Prevalence is not a rate**
- ***Point prevalence*** **measures the frequency of all current events (old and new) at a given instant in time**
- ***Period prevalence*** **measures the frequency of all current events (old and new) for a prescribed period of time**

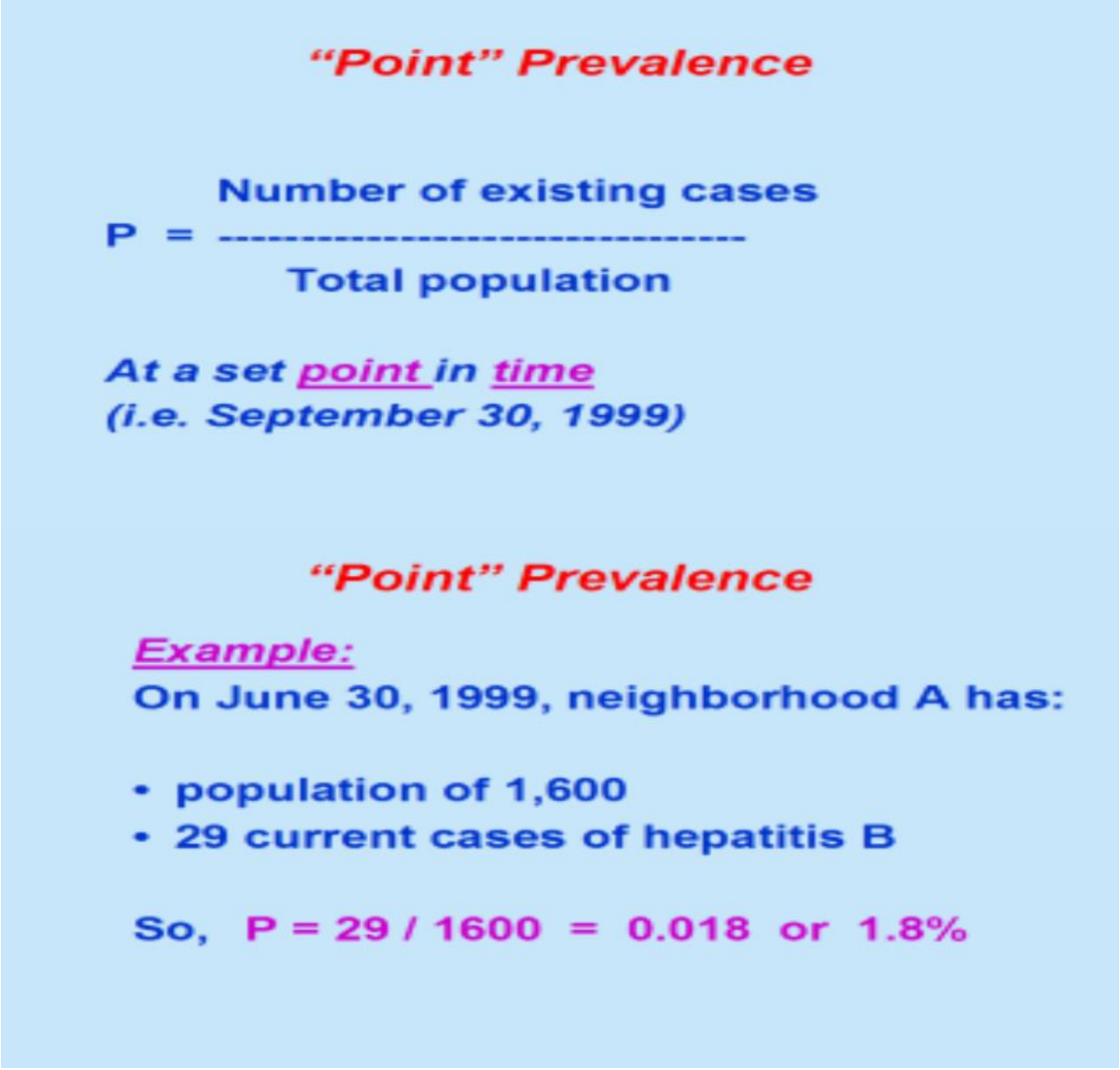
Epidemiology (Schneider)

Prevalence

The presence (proportion) of disease or condition in a population (generally irrespective of the duration of the disease)

Prevalence: Quantifies the "burden" of disease.

- Point Prevalence
- Period Prevalence



NOTES

1-Prevalence rates indicate amount of illness requiring care.

2- Easier to measure than incidence rate.

3- Low incidence diseases become important public health problems due to high prevalence

4- Prevalence rate is unsuitable for short duration diseases (rapid recovery or fatal)

Example 2:

The total population estimate for Jeddah city on March 1, 1987 was 140,600.

*new cases of tuberculosis= 133

*total cases of tuberculosis as of march 1=400

* Total of recovery cases= 100

Calculate the following

1.Point prevalence (pp):

$$PP = \frac{\text{(No. Of current (old+ new) of a specified disease existing at a given Point of time in a locality)}}{\text{(The total number of population at the same point of time in the same locality)}} \times 1000$$

$$= \frac{400}{140{,}600} \times 1000$$

$$= 2.845$$

2.Incidence rate (IR):

$$IR = \frac{\text{No. of persons developing a disease (New cases) in a specific time \&locality}}{\text{Total population at risk during that period of time}} \times 1000$$

$$\frac{133}{}$$

= 133\ 140,600 X 1000 =, 9459

3. Recovery cases (RC):

No. of recoveries from a certain disease in a certain

Period of time in a certain area X100

RC = ----------

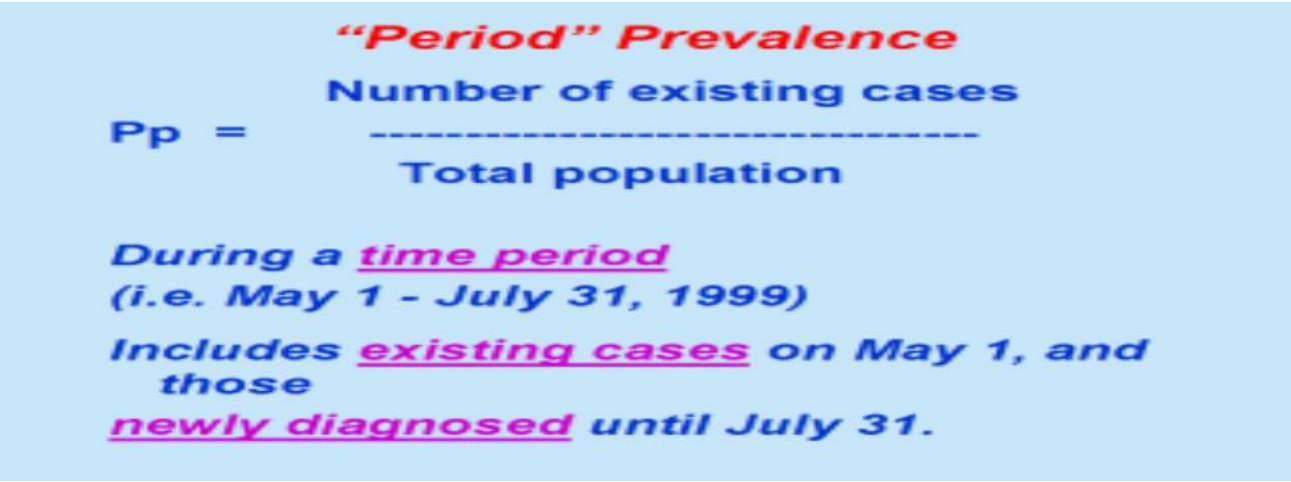
No. of ill person in the same period of time and same area

100

= --------- X 100

400

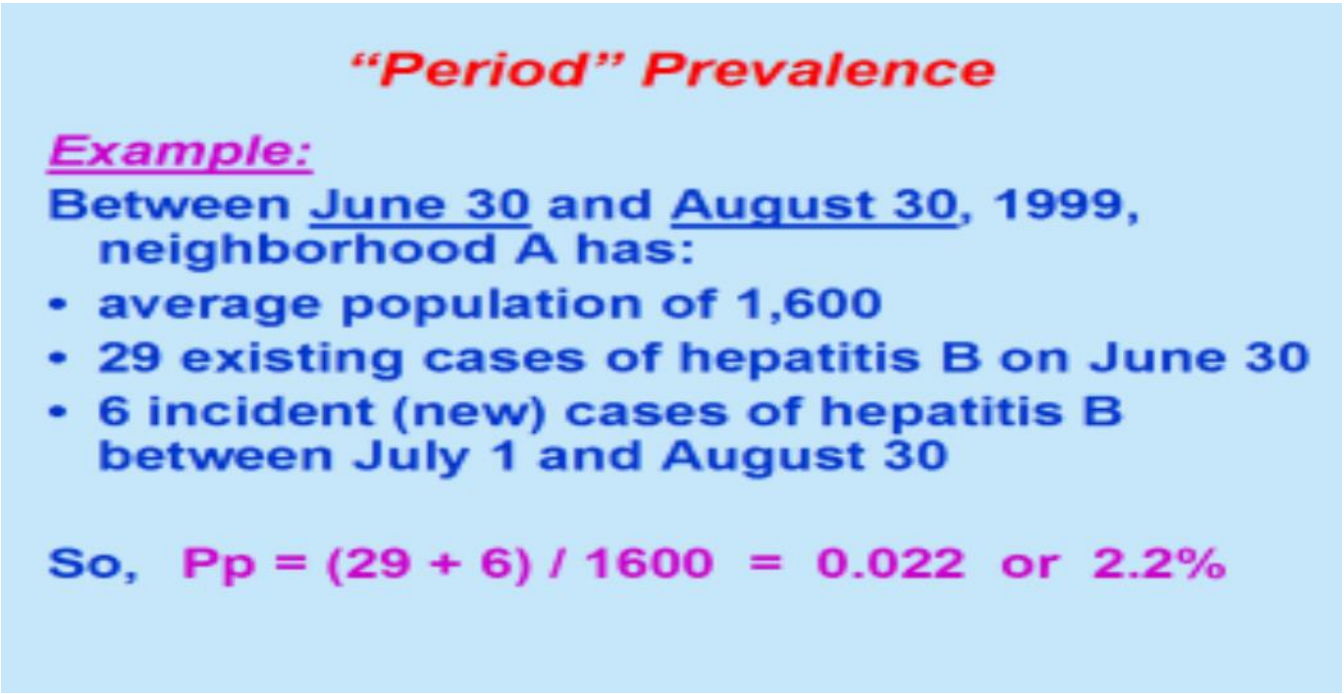
= 25



(Total Number of cases (pre-existing and new) of disease during given time period)

Period prevalence rate = 1000X ----------

Total population at the same time period



Relation between incidence and prevalence:

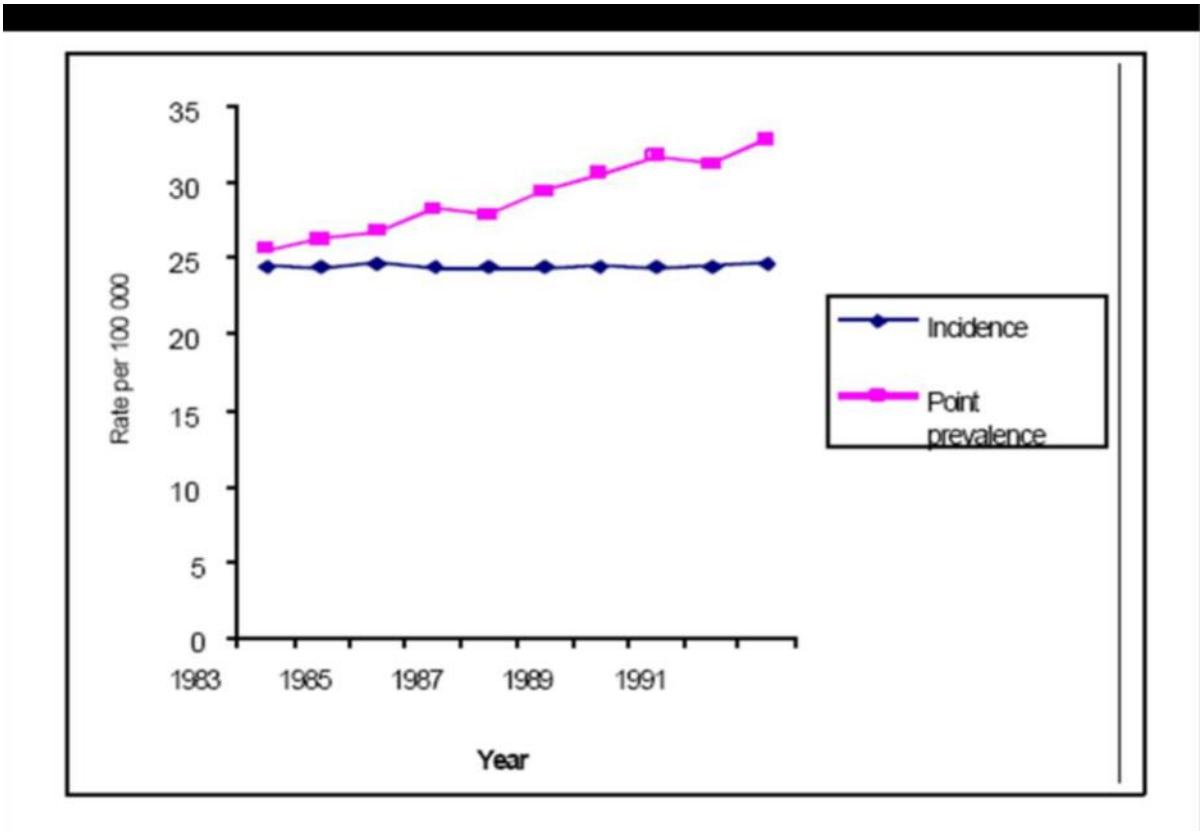
• Prevalence ~ incidence x duration of disease

− Higher incidence results in higher prevalence

− Longer duration results in higher prevalence

Variation in relation between Incidence and prevalence

Disease in which incidence is stable and prevalence is increasing



Factors affecting Prevalence:

- **Changes in incidence**

High incidence produces high prevalence

- **Changes in disease duration and chronicity**

Longer duration of disease, higher prevalence

- **Intervention programs**

Better treatment with high cure rate decrease prevalence

- **Changes in social customs**

Factors affecting incidence rate:

- **New risk factor**

New virus (HIV and AIDS)

· **Changing habits**

· fluoridated water and decrease in dental caries

· **Changing virulence of causative organisms**

· drug-resistant bacteria (TB)

· **Changing of intervention programs**

· Polio eradication campaigns polio

· **Population pattern**

· Aging Degenerative diseases

· **Reporting**

· Increase reporting incidence

· **Screening**

· Early detection of cases incidence

· **New diagnostic tools**

· New diagnostic tools detection of cases

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