
Measurements
in
Epidemiology

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Objectives

1) Discuss the Tools of measurements in epidemiology (Rate , Ratio , Proportion)
2) Explain the morbidity indicators (Prevalence &incidence rate)
3) Understand the concept of mortality & morbidity,

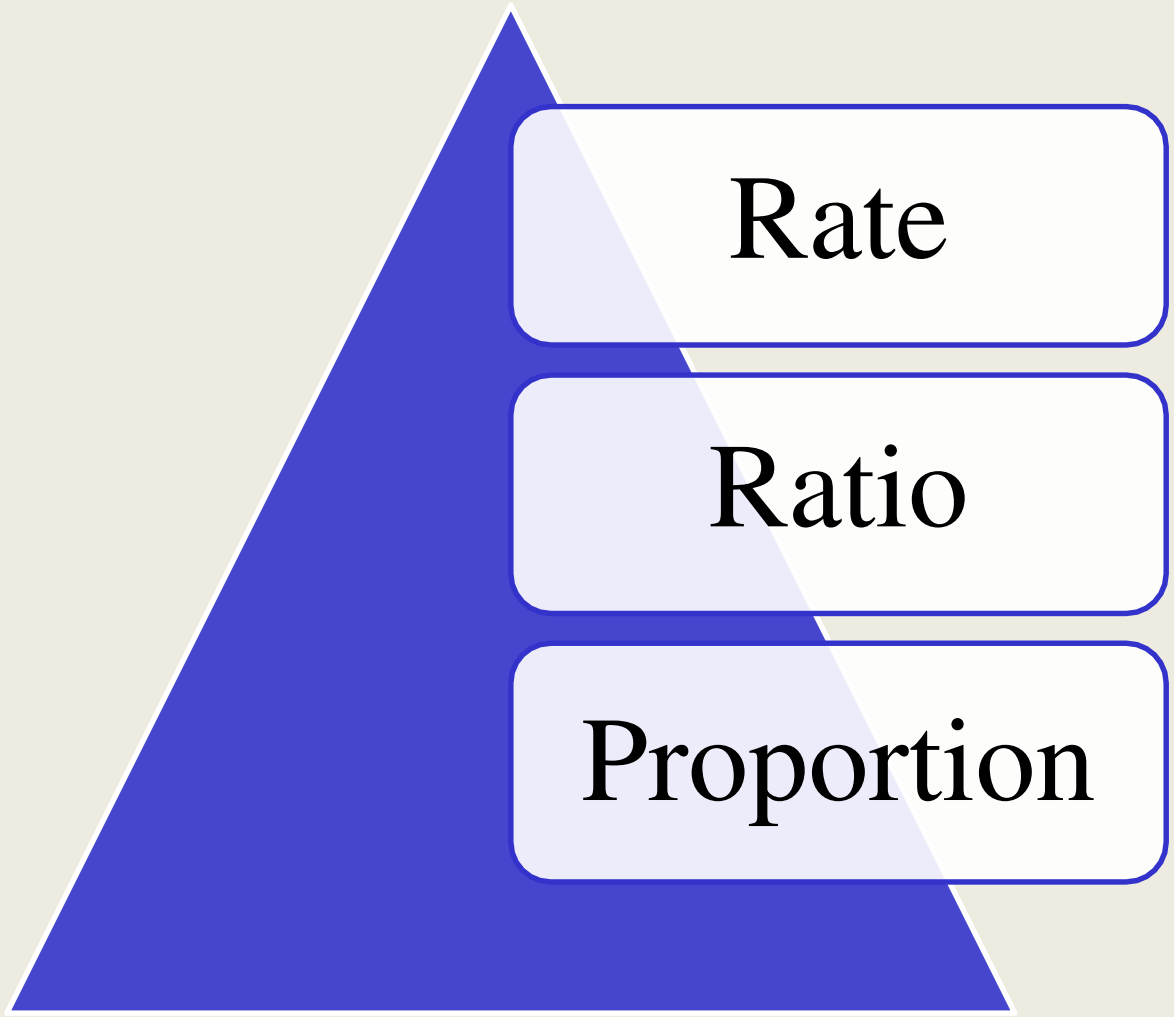
MEASUREMENTS USED IN EPIDEMIOLOGY

- Measurement of mortality
- Measurement of morbidity
- Measurement of disability
- Measurement of natality
- Measurement of disease attributes
- Measurement of health care services
- Measurement of the risk factors
- Measurement of demographic variables

Scope of measurement:-

- Mortality.
- Morbidity.
- Disability.
- Presence &absence or distribution of..
- Medical needs.
- Utilization of health services.
- Demographic variables.

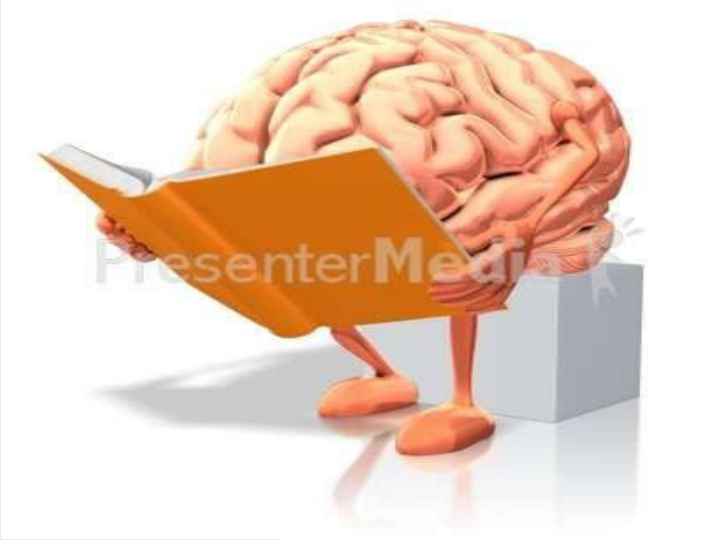
Tools of measurements-



Rate:

"it measures the frequency or occurrence of some particular event (development of disease or the occurrence of death) in a population during a given time period."

$$\text{Death rate} = \frac{\text{No. of deaths in an area during a year}}{\text{Mid year population of the same year.}} \times 1000$$



Types of rates:

1. Crude Rate.
2. Specific Rate.
3. Standardized rate.

Crude Rate:

"These are the actual observed rates such as the birth &death rates."

AS:

Crude death rate : Total no. of deaths in an area during a year / Estimated mid year Population of the same area during a year. ×1000

If:

Total number of deaths is : 1000

Mid- year population at that time =3500.

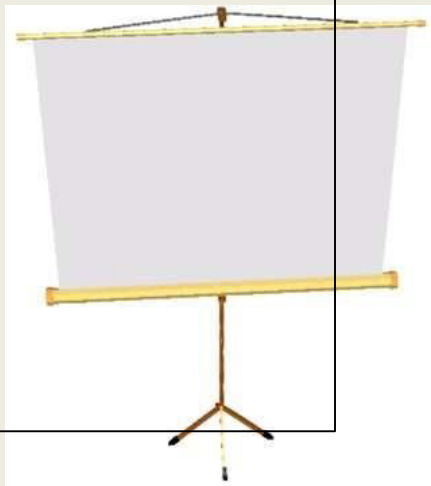
Calculate the crude death rate =???

Specific Rates:

"These are actual observed rates due to specific causes (e.g tuberculosis) , or that is occurring in specific group (e.g age sex groups) , or during specific time periods (e,g annual , monthly or weekly rates).

Cause specific death rate =

$$\frac{\text{No. of deaths from specific cause in an area during a year}}{\text{Estimated mid year population of the same area during the same year.}} \times 1000$$



Total No. of deaths from in an age 20-40 =1500

Mid year population at risk =5,550.

Calculate the specific death rate….??

Other Examples:

1) Cause specific death rate .
2) Age specific death rate.
3) Sex specific death rate.
4) Infant mortality rate.
5) Maternal mortality rate.

Standardized Rates:

"These are obtained by direct or indirect methods or adjustments e.g age or sex standard rates.

Ratios:

"Itexpresses a relation in size between two random quantities , in this numerator is not a component of the denominator" As:

$$x : y \text{ or } \frac{x}{y}$$

Other examples include :Doctor population ratio , mother child ratio

Example Given as:

$$\text{Ratio} = \frac{\text{No. of children with malnutrition at a certain time.}}{\text{No. of normal children at certain time}}$$

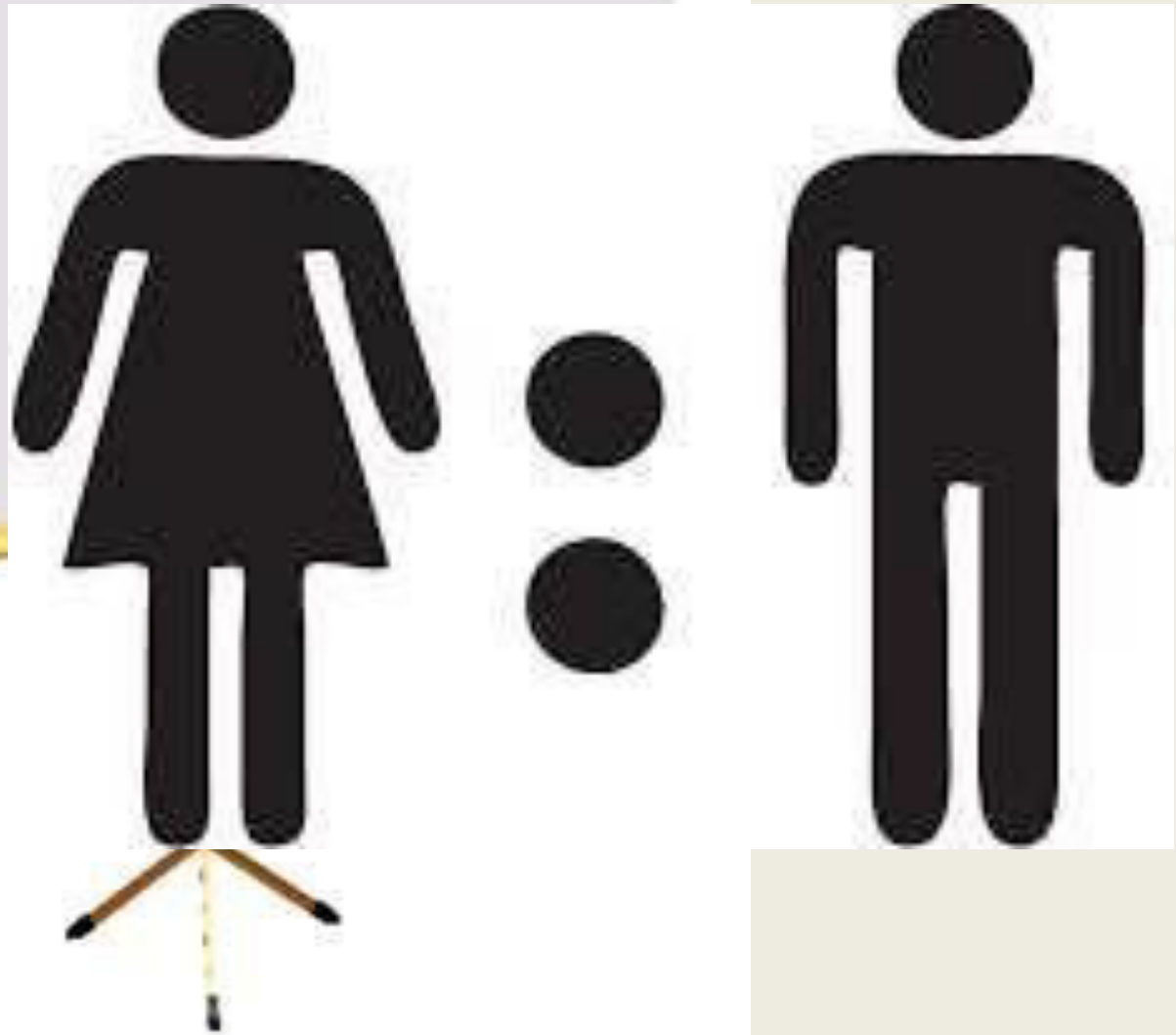
If Acity of

No of Persons = 40,000

No. clinics = 500

Calculate the ratio of clinic per person……???

Ratio – example



Ratio – example

Proportion:

"Ameasure which indicates the relation in magnitude of a part of the whole , numerator is always included in denominator , expressed in percentage"

Example:

$$\frac{\text{The No. of children with scabies at a certain time.}}{\text{total No. of children in village at that time.}} \times 100$$

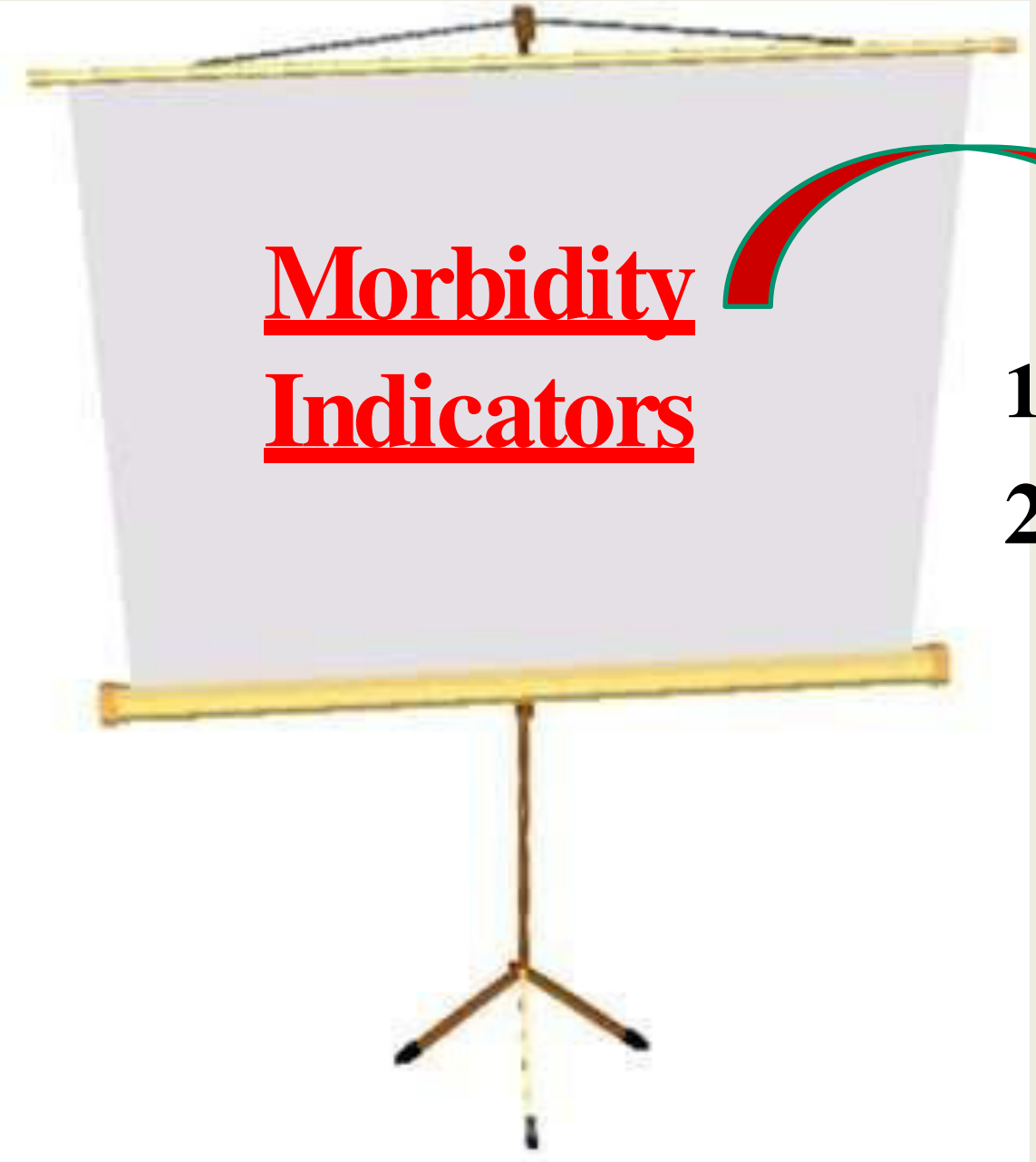
If :

No. of persons with hypertension is = A = 1,400

No of persons without hypertension= B = 9,650

And total study population =A+B= 11050.

Calculate the proportion of people with hypertension ????/



Morbidity Indicators

1. Incidence Rate
2. Prevalence Rate

INCIDENCE RATE:

"The number of NEW cases occurring in a defined population During a specified period of time called as incidence rate" Given as:

$$\text{Incidence Rate} = \frac{\text{Number of new cases of disease in a given time period}}{\text{Total person-time at risk during the study period}} \times 1000$$

Incidence Rate Refers:

a. Only to new cases.
b. During a given period (usually one year)
c. In a specified population or population at risk.
d. It can also refers to the new spells of disease in a given time period of time per 1000 population.

Incidence rate =

(spells of sickness)

$$\frac{\text{No. of spells of sickness starting in a defined population.}}{\text{Mean No. of people exposed to risk in that period.}} \times 1000$$

If

there had been 50 new cases of an illness in a population of 30,000 in a year.

Calculate the incidence rate?

Special Incidence Rates:

1. Attack rate.
2. Secondary attack rate.

Attack Rate:

"An incidence rate used only when the population is exposed to risk for a limited period of time such as in epidemic"

Given as:

Attack rate = No. of NEW cases of a specified disease during specific interval / Total population at risk during the same interval. **×100**

Outbreak of cholera in country Xin 1999,

No. of new cases =490

Population at risk =18,600

Calculate the attack rate ?????????

Secondary Attack rate:

"The number of exposed persons developing the disease within the range of incubation period , following exposure to the primary case"

Given as:

$$SAR = \frac{\text{No. of contacts developing tuberculosis}}{\text{Number of persons-weeks (month or year of exposure.}} \times 100$$

Uses of incidence rate:

It is useful for taking action:

1. to control disease.
2. For research into **etiology &pathogenesis , distribution of disease , and efficacy of therapeutic and preventive measures.**

Prevalence:

"It refers specially to all the cases (old &new) existing in a given point in time or over a period of time in a given population."

It has two types:

1. Point prevalence.
2. Period Prevalence.

Types of prevalence-

Point prevalence

- **Prevalence at any given point of time.**
- **4% TB cases on 1st April**

Period prevalence

- **Prevalence at a given period of time.**
- **Period will be 1year.**

Point Prevalence =No. of all **current cases** of a specified disease existing at a given point in time. / Estimated population at the same point in time. **×100**

Of 10,000 female residents in town Aon 1st January 2006, 1,000 have hypertension.

Calculate the point prevalence of hypertension among women in town Aon this date…..?????

Period Prevalence =No. of **existing cases** of a specified disease during a given period of time. ×100

Estimated mid interval population at risk.

Relationship between INCIDENCE & PREVALENCE.

Prevalence depends upon two factors Given as:

P= I×D

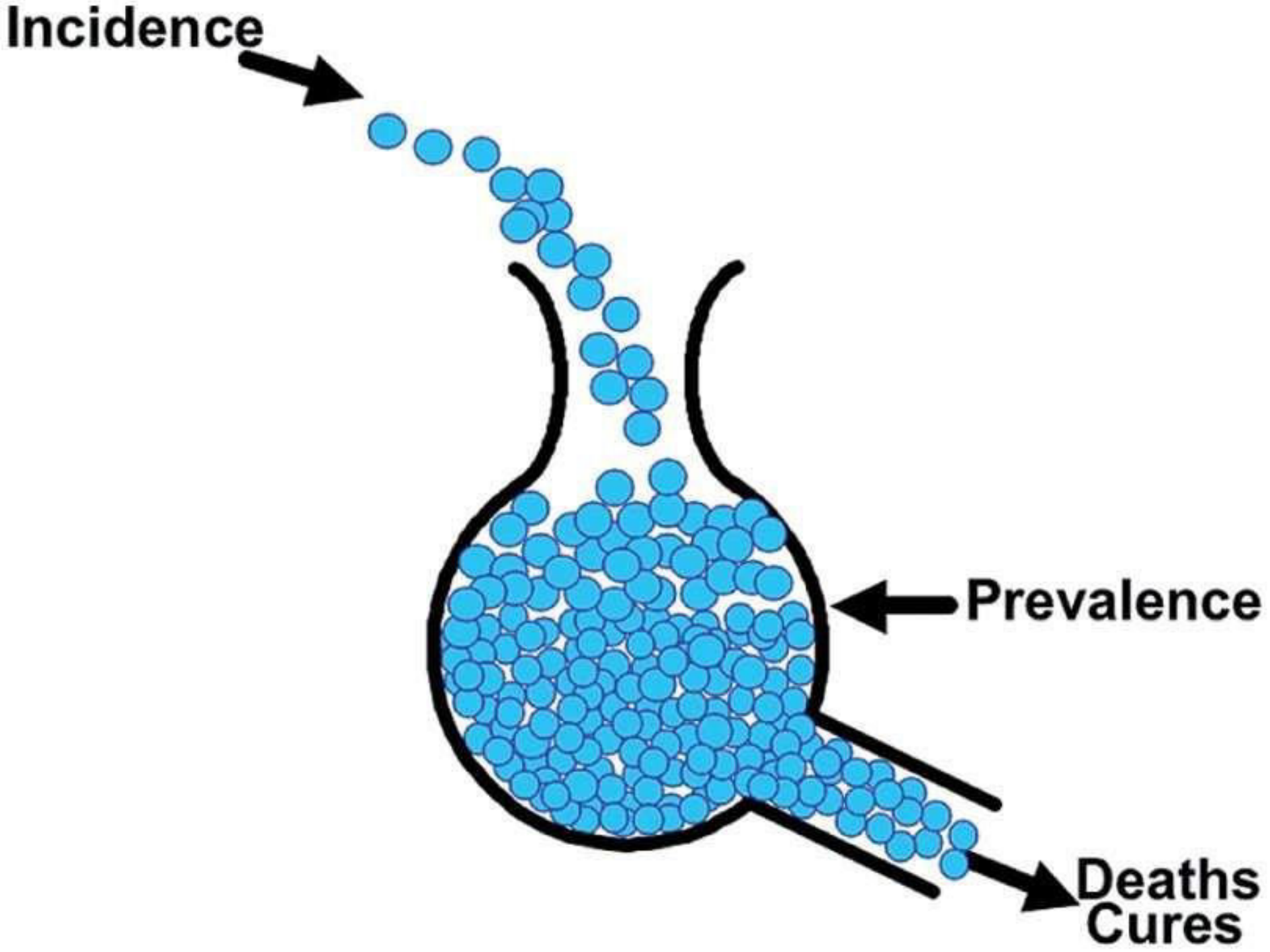
Prevalence= Incidence ×Duration

Or

Incidence =P/D

Duration =P/I

The Relationship Between Incidence and Prevalence.mp4


Incidence
Prevalence
Deaths
Cures

Relationship Between Incidence and Prevalence.

- **Cancer of the pancreas**
  - Incidence low
  - Duration short
  - Prevalence low
- **Adult onset diabetes**
  - Incidence low
  - Duration long
  - Prevalence high
- **Roseola infantum**
  - Incidence high
  - Duration short
  - Prevalence low
- **Essential hypertension**
  - Incidence high
  - Duration long
  - Prevalence high

Summary

PRACTICE QUESTIONS

1.Circle the most appropriate explanation on "Prevalence rate":

a. the number of patients who have the disease at a particular time, divided by the population at risk of having the disease at that time.

b. the number of new cases of a diseased in a population over a period of time.

c. not useful for developing HIV/AIDS control program.

d. useful for developing Avian flu control program.

2- Differentiate b/w incidence &prevalence rate.???

3 If no. of doctors is 1000 and population size is 9500 , calculate the doctor to population ratio.

4 What are the basic tools of measurement in epidemiology???


Thank
You...