# Epidemiology

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Epidemiology NUR404

Fall semester

2nd week

# Outline

- History.
- Definition.
- Objectives.
- Source of epidemiological data.
- Measurements in epidemiology.
- Tools of measurements ( count , rate , ratio , proportion)
- References

# Objectives

- To identify different sources of epidemiological data.

- To understand epidemiological measurement & different tools of measurement.

# History of epidemiology

- **Hippocrates**, considered the father of modern medicine, first suggested in the 5<sup>th</sup> century B.C that the development of human disease might be related to the external as well as personal environment of an individual.

- In 1662, in London, **John Graunt** published the nature and political observations made upon the bills of mortality.

# History of epidemiology(Cont.)

- William far, in the 19<sup>th</sup> century, was interested in vital statistics.

- In 1854, John Snow, formulated and tested a hypothesis concerning the origin of an epidemic of cholera in London. He was perhaps the first investigator to draw together all 3 components of the definition of epidemiology.

# Definition

- epi=upon, demos=people, logos=study

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

# Epidemiology key words: Study

- Epidemiology is the basic science of public health.

- It's a highly based on principles of statistics and research methodologies.

# Epidemiology key words:
# Distribution

- Epidemiologists study the distribution of frequencies and patterns of health events within groups in a population.

- They use descriptive epidemiology, which characterizes health events in terms of time, place, and person.

  - Questions:  who, where, when

# Epidemiology key words: Determinants

- Epidemiologists also attempt to search for causes or factors that are associated with increased risk or probability of disease.

- What factors cause the problem or are associated with the problem

- Questions: how and why

# Epidemiology key words: Health-related states

- Epidemiology is applied to the whole spectrum of health-related events:
    - Chronic diseases,
    - Environmental problems,
    - Behavioral problems,
    - Injuries,
    - Infectious diseases.

# Epidemiology key words: Population

- One of the most important distinguishing characteristics of epidemiology is that it deals with groups of people rather than with individual patients.

# Epidemiology key words: Application

- Epidemiological data aids in developing and evaluating interventions to control and prevent health problems.

# Objectives of epidemiology :

- To identify the etiology or the cause of a disease and the risk factor.

- To determine the extent of disease found in the community.

- To study the natural history and prognosis of disease.

# Objectives ( Cont.)

- To evaluate new preventive and therapeutic measures and new modes of health care delivery.

- To provide the foundation for developing public policy and regulatory decisions relating to environmental problems.

# Source of epidemiological data

- Hospital , health centers and clinical records.
- Disease reporting – Communicable disease & Cancer registries.
- Absentism records ( Industry & schools).
- Pre employment and periodic physical examination in industry and schools.
- Case finding program.
- Morbidity surveys on population samples e.g national cancer survey.
- Research

# Measurements in Epidemiology

- Measurment of mortality

- Measurements of morbidity

- Measurement of the presence ,absence , or distribution of the characteristics or attributes of the diseases.

- Measurement of medical needs , health care facilities , utilization of health services and other health related events.

# Measurement in epidemiology( Cont.)

- Measurement of the presence , absence or distribution of the environmental and other factors suspected of causing diseases.

- Measurement of demographic variables.

# Tools of measurement

- Count

- Ratio

- Proportion

- Rate

# Count

- Simple counting

- No. of affected individuals.

- It is limited use.

# Count( Cont.)

Why is a simple count not enough?

- 3 cases of cancer per year from a city of 1,000 people is very different than 3 cases per year from a city of 100,000 people

# Count( Cont.)

So, in epidemiology we must know:

• The size of the population from which the affected individuals come, and the time period the information was collected.

# Ratio

- Obtained by simply dividing one quantity by another without implying any specific relationship between them.

- Expressed as X : Y
  - Ex:  male: female ratio in this class?
  - Faculty: student

# Proportion

- Relation of a part of the whole.
- The numerator is always included in the denominator (part to all).
- Usually expressed as %.
  - Ex: proportion of males and female in this class?

# Example of proportion:

$$= \frac{Number\ of\ white\ blood\ cells\ at\ a\ certain\ time}{Total\ number\ of\ blood\ cells\ at\ the\ same\ time} \times 100$$

# Rate

- Measure the occurrence of some particular event ( development of disease or the occurrence of death) in a population during a given time period.

- It indicate the change in some event that takes place in a population over a period of time.
  - Example of typical rate is the death rate

# Rate elements

- Numerator (number of deaths)
- Denominator (total population at risk)
- Time period (one year)
- Multiplier : the rate expressed per 1000 or some other round figure ( 10,000 or 100,000)selected according to convenience to avoid fraction.

$$= \frac{\text{Number of deaths in one year}}{\text{Mid - year population}} \times 1000$$

# Exercise 1

In a health center, there were 341 total attendees recorded in one day, if the number of females attendees was 179,

1. Calculate proportion of female attendees.
2. Calculate male: female ratio.

# Exercise ( Cont.)

In a health center, there were 341 total attendees recorded in one day, if the number of females attendees was 179,
1.  Calculate proportion of female attendees.
2.  Calculate male: female ratio.

Answer:
1.  179/341*100= 52%.
2.  Male attendees=(341-179)= 162.
3.  M/F= 162/179= 0.9
    male: female ratio is 0.9:1

# References

- **Control of communicable diseases manual**, by Heymann DL, American Public Health Association, 19th edition, 2008.

- **Park's textbook of preventive and social medicine**, by Park K, Banarsidas Bhanot Publishers, 21st edition, 2011.