

Chapter 2

The Basic Concept of epidemiology

Chapter Objectives:

- 1.Explain the components of epidemiology.
- 2.Recognize the sources of information in epidemiology.
- 3.Identify the epidemiological approach to study health problems.
- 4.Identify the relation between incidence and prevalence rates.
- 5.Recognize the factors affecting prevalence and incidence rate.
- 6.Calculate different types of rates.

Components of epidemiology

1. Measuring Disease Frequency

- Quantify disease using rates and ratios

2. Descriptive epidemiology

- Describe Distribution of disease
- Who is getting the disease? Person
- When is the disease occurring? Time
- Where is the disease occurring? Place
- Formulation of hypotheses concerning causal and preventive factors

3. Analytic epidemiology

Identify determinants of disease

- Using epidemiologic studies (why and how the disease is occurring.)
- Test hypothesis and identify causes or risk factors

SOURCES OF INFORMATION

- o Census : size, composition and distribution of a population
- o Disease Records : major public problems
- o Personal Medical Records
- o Hospital records : inpatient and outpatient records.
- o Notification of infectious diseases
- o Morbidity surveys
- O Special subgroup records (school students, industrial workers|)
- o Disease Registries
- o Death Certificates
- O Birth Certificates
- O Population estimates: population in inter-censal years.
 - a) Planning of health services.
 - b) Computing morbidity & mortality rates
- O Notification of infectious diseases:
 - fluctuation of occurrence of diseases.
 - planning and evaluation of the control or preventive measures.

The Epidemiologic Approach

As with all scientific endeavors, the practice of epidemiology relies on a systematic approach. In very simple terms, the epidemiologist:

- Counts cases or health events, and describes them in terms of time, place, and person
- Divides the number of cases by an appropriate denominator to calculate rates; and ratio.

- Compares these rates over time or for different groups of people.

Before counting cases, however, the epidemiologist must decide what a case is. This is done by developing a case definition. Then, using this case definition.

Cases classified to:

- Confirmed case: Signs and symptoms plus laboratory confirmation.
- Probable case: Acute onset of at least three of the four features.
- Possible case: Acute onset of two of the four features plus a physician diagnosis.
- Suspect case: Unexplained.
- Not a case: Failure to fulfill the criteria for a confirmed, probable, possible, or suspect case.
- Recently there are newer branches of epidemiology such as: infectious disease epidemiology, chronic disease epidemiology, clinical epidemiology, cancer epidemiology, genetic epidemiology, neuro epidemiology, occupational epidemiology

What is clinical epidemiology?

The science of making predictions about individual patients by counting clinical events in similar patients, using strong scientific methods for studies of groups of patients to ensure that the predictions are accurate. It is used as an aid to clinical decision making as well.

In epidemiology various terms are used to describe the frequency with which disease occur.

(1) Counting the number of cases:

(2) Rates:

A rate is defined as the number of persons with a disease per unit of population per unit of time. If "X" is the number of diseased people in certain area and year and "Y" is the number of those who do not have it in the same area and year. So:

The rate of the disease in certain area and year per 1000 population

$$\frac{\text{"X"}}{\text{X+Y}} \times 1000$$

Quantitative Measures of Health Status

Measures of health status convey information about the occurrence of disease. They include:

- Counts
- Proportions
- Ratios
- Rates



Counts

- Simplest/most frequently performed measure in epidemiology
- Refers to the number of cases of a disease or other health phenomenon being studied
 - i.e. cases of influenza in Allegheny county in January, 2002
 - i.e. Number of persons involuntarily referred for psychiatric crisis intervention
- Useful for allocation of health resources
- Limited usefulness for epidemiologic purposes without knowing size of the source population

Counts – Limited Interpretation

<u>Location</u>	<u>New Cases of Disease</u>	<u>Reporting Period</u>	<u>Reporting Population</u>
City A	20	1998	100
City B	100	1998	1000
<u>Annual Rate of Occurrence</u>			
City A:	$20 / 100 = 1 / 5$		
City B:	$100 / 1000 = 1 / 10$		

Ratios

- Like a proportion, is a fraction, **BUT** without a specified relationship between the numerator and denominator
- Example: Occurrence of Major Depression

$$\begin{array}{rcl}
 \text{Female cases} = 240 & & 240 \\
 \hline & = & \text{---} \quad \text{2:1 female to male} \\
 \text{Male cases} = 120 & & 120 \\
 \\
 \hline & = & \text{---} \quad \text{2:1 female to male} \\
 \text{Male cases} = 120 & & 120
 \end{array}$$

Rates

- A ratio in which TIME forms part of the denominator
- Epidemiologic rates contain the following elements:
 - disease frequency (in the numerator)
 - unit size of population
 - time period during which an event occurs

