

Epidemiological studies

1. Descriptive Epidemiologic studies

Learning objectives:

- List the key features of descriptive epidemiology
- Describe the uses of descriptive epidemiology
- Organize and summarize descriptive epidemiologic information into a presentation/report
- Recognize the characteristics, strength, and limitations of ecologic (aggregate) studies, case reports, and series
- Characterize the major dimensions of descriptive epidemiology: person, place, and time.
- Recognize how measurement and quantification of health outcomes by person, place, and time can assist in planning health services.
- Recognize how measurement and quantification of health outcomes by person, place, and time can provide clues to etiology of health –related events.

Outline:

- ✓ Features (characteristics of descriptive epidemiology)
- ✓ Purpose of descriptive epidemiology
- ✓ Characteristics of the major dimensions of descriptive epidemiology
 - Person
 - Place
 - Time

Introduction

A simple description of the health status of a community, based on routinely available data or on data obtained in special surveys, is often the first step in an epidemiological investigation. In many countries this type of study is undertaken by a national centre for health statistics. Pure descriptive studies make no attempt to analyze the links between exposure and effect. They are usually based on mortality statistics and may examine patterns of death by age, sex or ethnicity during specified time periods or in various countries.

The more fully **a descriptive epidemiologist** can describe person, place and time, and any correlations between the three, the more likely patterns emerge which may be considered as risk factors for certain kinds of health issues. **The primary considerations for descriptive epidemiology are frequency and pattern.**

Features

- Study and observe a new emerging disease (**What**)
- Describe the characteristics of disease occurrence in relation to person, place, and time, hence they answer the questions: **Who, Where, When.**
- Provide knowledge of which population or subgroups are most or least affected by disease. This allows the allocation of resources for preventive and control programs.
- Constitute an important first step in research for determinants that cause, reduce or prevent diseases (**Why**).
- Provide information about the characteristics of the disease. This leads to formulation **of new hypothesis** (cause- effect or etiological hypothesis).
- Generally speaking descriptive studies are less expensive and less time consuming than analytical studies.

Descriptive studies obtain information that is routinely collected and readily available. Data can be obtained from health records, routine surveillance, national figures on consumption of food, or other products as well as from clinical examination. Also, information can be obtained by surveys.

-Relatively inexpensive and less time-consuming than analytic studies.

-Data provided are useful for,

- Public health administrators (for allocation of resources)
- Epidemiologists (first step in risk factor determination)

In person: descriptive epidemiology examines factors like age, education, and socioeconomic status, availability of health services, race, and gender. Person evaluations may also include gathering information on behaviors like drug abuse, shift work, eating and exercise patterns. For example, in some studies, examinations of person behavior established a correlation between people who work night shifts and high blood pressure. Not every person who works the night shift will have high blood pressure, but shift work has been shown to increase the risk for developing the condition.

place. Place can have different meanings depending upon individual descriptive epidemiology studies. It might mean the geographic borders of a town, or the geographic features of an area. Place evaluation might lead one to suggest that people who live near lakes teeming with mosquitoes are at higher risk for developing West Nile Virus. Evaluation of place might also include where people work, the population numbers of a place (density), and the environments in which people live, work or attend school.

Time, to descriptive epidemiology, might refer to the time of year, or things that happen at a specific time each day or each hour. People are more prone to getting the flu during the late fall and early winter months. Prevalence of the flu during this period allows physicians to predict the most effective time to offer vaccinations. Time considerations in descriptive epidemiology have also led to interesting studies on when health events are more likely. The incidence of drunk driving accidents tends to

increase around certain holidays, like Christmas, increasing the risk of being injured or dying in a car crash at these times.

Descriptive epidemiology may also evaluate the connection of person to place and time. If the crime rate in a city increases dramatically in a given year, it impacts certain health factors and is taken into consideration. Any person living in the city has a higher probability of being the victim of crime during a year when crime levels rocket. Periods of war in a geographical area affect person and place statistics as well. The relationship between person, place and time helps create a more descriptive picture of certain health risks and must be considered in order to develop better patterns of health risks. The more fully a descriptive epidemiologist can describe person, place and time, and any correlations between the three, the more likely patterns emerge which may be considered as risk factors for certain kinds of health issues. The analytical epidemiologist then uses this data as an information source for people or to influence public policy.

Descriptive epidemiology

Purpose: To characterize the amount and distribution of disease within a population.

In other words To identify health problems and patterns of disease that exist.

Descriptive studies generally precede analytic studies designed to investigate determinants of disease.

Thus, descriptive studies often help to generate research hypotheses.

Person

Age – the most fundamental factor to consider when describing disease occurrence.

- The incidence of most chronic diseases increases with age.
- However, the incidence of many infectious diseases is highest in childhood.
- Some disorders show bi-modal (two peak) distributions (i.e. Hodgkin's disease). This may reflect different underlying etiologies.

Person

Gender – biological and non-biological factors related to gender may impact disease risk.

- In all developed countries, life expectancy is higher in females and males – principally due to lower heart disease mortality.
- However, many chronic diseases occur more frequently in women (depression, lupus, etc.)
- As lifestyles continue to become more similar, a question is whether mortality rates will become more similar (i.e. environment vs. biology).

Person

Social class – summarizing variable (SES), unreliably measured, that links:

- Occupation
- Education
- Area of residence
- Income
- Lifestyle

Despite its unreliability, SES is consistently associated with mortality in a gradient fashion.

Place

Since disease not does occur at random:

Where is the disease especially common or rare, and what is different about those places?

Investigation by place includes:

- Across countries (international)
- Within country variation
- Urban/rural differences
- Localized areas

Place

- Some localized differences in disease occurrence may be attributed to:
 - Carcinogenic exposure (i.e. radon)
 - Geologic formations (i.e. water hardness)
 - Lifestyle

Place

- Some differences in disease occurrence between urban and rural locations may be attributed to:

- Diet
- Physical activity
- Housing conditions (i.e. lead paint)
- Crowding (i.e. spread of infection)
- Pollution

Place

- Infectious and chronic diseases also show considerable variation within a country (i.e. multiple sclerosis varies by latitude in the U.S.).
- Some differences may be attributed to:
 - Climate
 - Geology
 - Latitude
 - Environmental pollution
 - Race/ethnicity

Place

- Infectious and chronic diseases show great variation from one country to another.
- Some differences may be attributed to:
 - Climate
 - Cultural factors
 - Diet
 - Genetics

Time

- Secular trends refer to gradual changes in disease occurrence over long periods of calendar time.
 - Example: In the U.S., mortality from heart disease has been gradually declining, whereas cancer mortality has been gradually increasing.

Time

- Point epidemic refers to increased disease occurrence among a group of people exposed almost simultaneously to an etiologic factor (i.e. pathogen, contaminant).
 - Despite exposure at a common point in time, the actual time of disease onset may vary.

Time

- Cyclic fluctuations refer to shorter-term increases and decreases in disease occurrence over a period of years, or within a year.
 - Fluctuations in respiratory infection deaths over a few years
 - Seasonal variation of infections, heart attacks, etc.