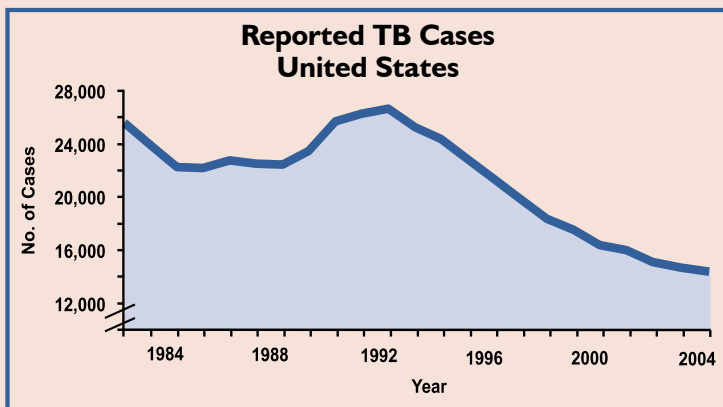


Basic Epidemiology for Tuberculosis Program Staff



New Jersey
Medical School
**National
Tuberculosis
Center**

A Founding Component of the International Center for Public Health

Basic Epidemiology for Tuberculosis Program Staff

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1.0 Introduction – Uses of Statistics and Epidemiology in Tuberculosis Control

Control of tuberculosis (TB) in the United States is an important public health responsibility. Effective TB control requires a complex system that merges elements of laboratory science, investigative work, public health, surveillance, and clinical care.

Epidemiology is the basic science of public health. An understanding of epidemiology is useful for all TB program staff, ranging from health care workers and public health representatives to TB program managers. The epidemiologic concepts presented in this guide will assist in analyzing and making practical use of data, assessing current and evolving trends in TB morbidity, identifying risk groups, and determining where to allocate staff and resources. Although not all TB program staff members are involved with all of these activities, a broad understanding of epidemiologic principles can assist all TB program staff in working toward effective TB control.

The first section of this guide (Chapters 2 through 5) provides a basic background and understanding of epidemiology for TB program staff. This section focuses on specific uses of epidemiology to assess and implement TB programs. The second section of the guide (Chapters 6 and 7) will explain epidemiologic terms and techniques that are used in research studies. This will assist TB program staff in reading and understanding TB-related articles in medical and public health journals. Awareness of new information about the epidemiology of TB and new research in TB transmission, diagnostics, and treatment can be very useful to TB program staff members in working to control TB within their program area.

This guide identifies and defines key concepts and terminology in epidemiology, and provides detailed examples and sample problems. Wherever possible, data and examples are drawn from existing epidemiologic studies related to TB. Further, the guide presents descriptions of how these concepts can be put to practical use by TB program staff. This guide is not intended to be a complete text on TB, but rather a reference that can be used to learn or review key concepts of epidemiology that will be useful in the overall effort to control TB in the United States.

Definitions and examples of selected statistical terms used in epidemiologic studies are underlined in the text and appear in Appendix I. In the online version of the guide, these terms are linked to the definitions in Appendix I.

2.0 What Is Epidemiology?

Definitions of epidemiology vary, but the one used in this guide is utilized by the Centers for Disease Control and Prevention (CDC).

Epidemiology

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

Available at: <http://www.cdc.gov/excite/library/glossary.htm>

A health-related state should be thought of in a very broad context, including the occurrence of infection, symptomatic disease, injury, disability (which are all aspects of [morbidity](#) or illness) and even death (ie, mortality). Epidemiology can also be described as the basic science of public health and is a discipline that helps explore and understand patterns of morbidity and mortality within and between populations, using statistical methods to clarify these patterns.

Epidemiology is an important part of TB control efforts because the information on patterns of infection and disease can assist in identifying people or groups of people at risk for TB, understanding how the disease is transmitted, prioritizing cases, and planning appropriate use of staff and resources.

3.0 Types of Epidemiology

Epidemiology is usually classified as: descriptive or analytic.

Epidemiology

- **Descriptive epidemiology** concentrates on examining the distribution of diseases in the population in terms of person, (who gets the disease), place (where they get the disease) and time (when they get the disease).
- **Analytic epidemiology** is concerned with studying the relationship between risk factors and a disease.

Another way to think about descriptive epidemiology versus analytic epidemiology involves hypotheses, or tentative explanations for observations or scientific problems. Hypotheses are generated through descriptive epidemiology, while analytic epidemiology allows testing of those hypotheses to determine if they are likely to be correct or incorrect.

A. Descriptive Epidemiology

Descriptive epidemiologic data related to TB are collected through public health surveillance activities.

i. Public Health Surveillance

Public Health Surveillance

The systematic, ongoing collection, analysis, interpretation, and dissemination of health data. The purpose of public health surveillance is to gain knowledge of the patterns of disease, injury, and other health problems in a community so that we can work toward controlling and preventing them.

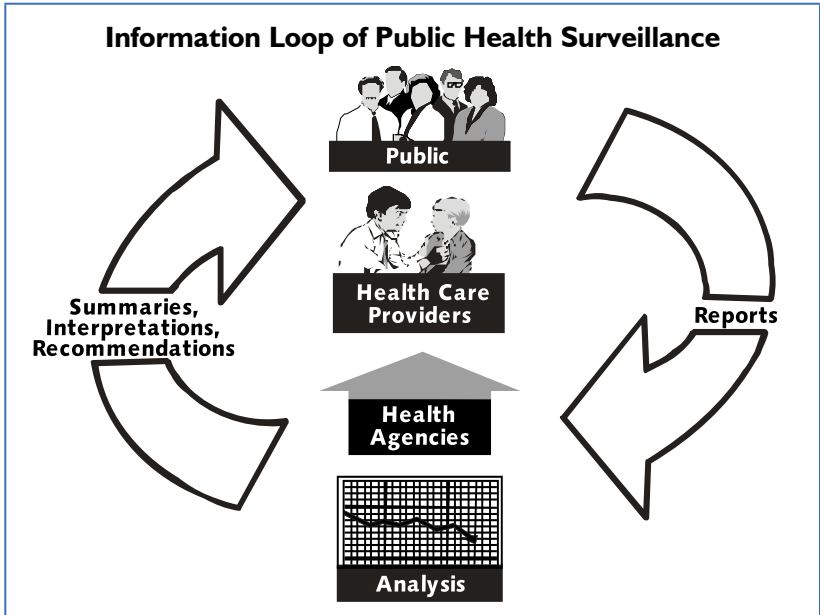
Available at: <http://www.cdc.gov/excite/library/glossary.htm>

Two types of public health surveillance are active and passive surveillance:

Active surveillance is a system in which the health department or other agency initiates the data collection activities. In TB control, targeted tuberculin skin testing (TST) by a health department among certain populations, such as persons living with HIV/AIDS, is an example of active surveillance for TB infection.

Passive surveillance is used when the health care provider is asked or required to report information to the health department. The CDC system for receiving reports of adverse effects associated with treatment is an example of passive surveillance.

Public health surveillance is an important part of an information feedback loop that links the public, health care providers, and health agencies. To complete the information loop detailed on the next page, data collected through both active and passive surveillance mechanisms should be summarized by the official health agency and then sent back to those who can make use of this information at the provider or program level. These data can be useful for public health education and interventions. Information from surveillance systems can also be used to generate public health recommendations that should then be disseminated to the general public. TB surveillance in the United States relies on both passive and active surveillance activities.



Source: Public Health Surveillance – CDC slide set.
 Available at: <http://www.cdc.gov/epo/dphsi/phs/overview.htm>

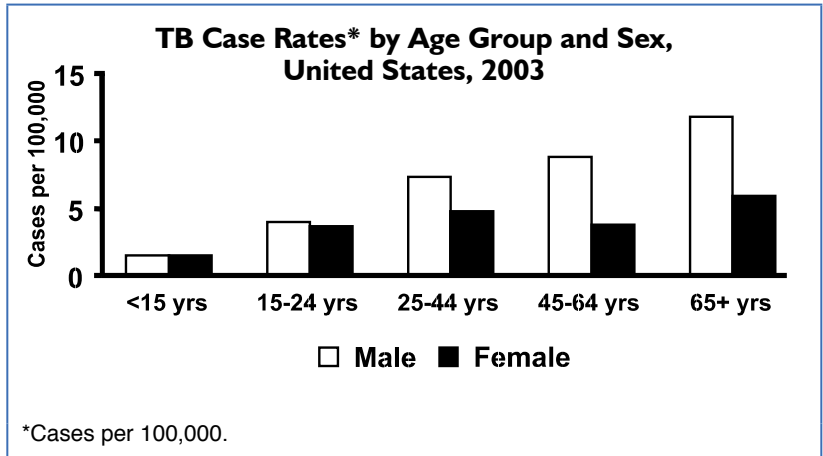
ii. Example of Descriptive Epidemiology: TIMS

The Tuberculosis Information Management System (TIMS) is one example of a public health surveillance system. TIMS is one of the main sources of descriptive data regarding TB in the United States. TIMS includes information on all cases of TB that have been reported to the Division of TB Elimination (DTBE) at the CDC. This information is reported to CDC by 50 states, the District of Columbia, the city of New York, Puerto Rico, and other jurisdictions in the Pacific and Caribbean.

Data on **person**, **place**, and **time** relating to TB in the United States are gathered using TIMS. These data are analyzed and published by the CDC annually and may be accessed through the CDC Website in the form of TB Surveillance Reports (available at: <http://www.cdc.gov/nchstp/tb/surv/Surv.htm>).

Person

The next figure presents the number of TB cases per 100,000 population in the United States that were reported to the CDC in 2003, by 2 characteristics that describe the **person**: age and sex.



Source: 2003 TB Surveillance – CDC slide set. Available at:
<http://www.cdc.gov/nchstp/tb/pubs/slidesets/surv/surv2003/default.htm>

The number of TB cases per 100,000 population is also called the **TB case rate**. In this figure, the TB case rate is higher among men than among women for all age groups 15 years and older. The TB case rate is highest among those 65 and older. These data help to identify groups of people who *may* be at higher risk for developing TB.

Place

TB cases per 100,000 population are reported by state so that states with unusually high rates of TB can be identified. In the following figure, the shading indicates **places** (states) where TB cases per 100,000 people are near the Year 2000 target, as well as those that are above the 2000 target. This descriptive epidemiology can help identify areas where interventions to decrease the number of TB cases might be most valuable.

