LEARNING OBJECTIVES

- Compare and contrast the following concepts: epidemic, endemic, pandemic; incidence vs prevalence; morbidity vs mortality; incubation, latency, acute, decline and convalescent periods

Epidemiology, literally meaning “the study of what is upon the people”, is derived from Greek: *epi*, meaning “upon, among”, *demos*, meaning “people, district”, and *logos*, meaning “study, word, discourse”, suggesting that it applies only to human populations. However, the term is widely used in studies of zoological populations (veterinary epidemiology) and of plant populations (botanical or plant disease epidemiology).

*Outbreak* is a term used in epidemiology to describe an occurrence of disease greater than would otherwise be expected at a particular time and place. It may affect a small and localized group or impact upon thousands of people across an entire continent. An *asymptomatic* carrier (healthy carrier or just carrier) is a person or other organism that has contracted an infectious disease, but who displays no symptoms. Although unaffected by the disease themselves, carriers can transmit it to others. A number of animal species act as vectors of human diseases.

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Figure: Mary Mallon: Mary Mallon (1870-1938) was nicknamed “Typhoid Mary,” an asymptomatic carrier of typhoid fever. She worked as a cook for several families in New York City at the beginning of the 20th century and infected many of them with typhoid. Note that in this 1909 newspaper illustration, she casts skulls into the skillet. However, this drawing inaccurately depicts the spread of typhoid, which was not by breathing, but by direct contamination from fecal particles.

EPIDEMIC, ENDEMIC OR PANDEMIC?

The distinction between “epidemic” and “endemic” was first drawn by Hippocrates, to distinguish between diseases that are “visited upon” a population (epidemic) from those that “reside within” a population (endemic). A pandemic is an epidemic of infectious disease that has spread through human populations across a large region; for instance multiple continents, or even worldwide. The term epidemiology is now widely applied to cover the description and causation of not only epidemic disease, but of disease in general, and even many non-disease health-related conditions, such as high blood pressure and obesity.
INCIDENCE VS. PREVALENCE

Incidence is a measure of the risk of developing some new condition within a specified period of time. Although sometimes loosely expressed simply as the number of new cases during a time period, it is better expressed as the incidence rate which is the number of new cases per population in a given time period. Incidence should not be confused with prevalence, which is a measure of the total number of cases of disease in a population rather than the rate of occurrence of new cases. Thus, incidence conveys information about the risk of contracting the disease, whereas prevalence indicates how widespread the disease is. Prevalence is the proportion of the total number of cases to the total population and is more a measure of the burden of the disease on society.

MORBIDITY VS. MORTALITY

Morbidity is a diseased state, disability, or poor health due to any cause. The term may be used to refer to the existence of any form of disease, or to the degree that a health condition affects the patient. In epidemiology, the term morbidity rate can refer to either the incidence rate, or the prevalence of a disease, or medical condition. This measure of sickness is contrasted with the mortality rate of a condition, which is the proportion of people dying during a given time interval.

PHASES OF DISEASES

Epidemiologists are interested in determining the progression of a disease. In an infectious disease, the incubation period is the time between infection and the appearance of symptoms (acute period). The latency period is the time between infection and the ability of the disease to spread to another person, which may precede, follow, or be simultaneous with the appearance of symptoms. In most illnesses, the acute period is followed by the decline period (symptoms get better) and convalescent (or recovery) period.

Some viruses also exhibit a dormant phase, called viral latency, in which the virus hides in the body in an inactive state. For example, varicella zoster virus causes chickenpox in the acute phase; after recovery from chickenpox, the virus may remain dormant in nerve cells for many years, and later cause herpes zoster (shingles).

Key Points

- Outbreak is a term used in epidemiology to describe an occurrence of disease greater than would otherwise be expected at a particular time and place.
- An asymptomatic carrier is a person or other organism that has contracted an infectious disease, but who displays no symptoms.
- Diseases that are “visited upon” a population are epidemic, whereas those that “reside within” a population are endemic. A pandemic is an epidemic of infectious disease that has spread through human populations across a large region.
- Incidence is a measure of the risk of developing some new condition within a specified period of time. Prevalence is a measure of the total number of cases of disease in a population.
- Morbidity is a diseased state, disability, or poor health due to any cause. The mortality rate of a condition is the proportion of people dying from it during a given time interval.
The progression of an infection usually follows these phases: infection, incubation period, acute period, decline period, and convalescent period.

**Key Terms**

- epidemiology: The branch of a science dealing with the spread and control of diseases, computer viruses, concepts, etc., throughout populations or systems.