

Measures of Disease and Disability

Although mortality figures are useful in the study of disease, they would give us a very distorted view of the frequency of many diseases if they were the only measures available. Fortunately, we have a number of useful statistics with which to measure disease and disability. These are referred to as *morbidity measures*. The most important of these are measures of the *prevalence* and *incidence* of disease.

Prevalence Measures

Prevalence—the proportion of the population suffering a disease—has already been introduced in the Prolog. This useful statistic may be categorized temporally into point prevalence, period prevalence, and lifetime prevalence.

Point prevalence is the proportion of persons suffering from a particular disease in a population at a given time. The most common use of point prevalence is as an estimate of the need for services in a community. It is also useful for identifying groups at high risk for having a disorder, and as an outcome measure for the evaluation of the effectiveness of prevention programs in reducing the burden of disease on the community.

Period prevalence is the proportion of the population suffering from a particular disease during a specified period of time. The numerator is

arrived at by adding the number of prevalent cases at the beginning of the defined period to the incident cases (first or recurrent) that developed during the period. The denominator is the average population size during the period.

The average population as the denominator seems a simple thing to say but it is seldom possible to obtain. To calculate the average daily population for a period, it is necessary to have a record of the population on each day of that period. The daily population figures are then summed and divided by the total number of days in the period. There are very few populations for which daily population figures are available—populations such as schools, hospitals, or prisons. For other populations it is simply not possible to calculate an average population size to use as a denominator.

The standard textbook solution to this problem is to use the midinterval (usually midyear) population figure. Thus, the denominator for an annual prevalence rate would be the population on July 1. Unfortunately, populations are not much more likely to undergo a census on July 1 of each year than they are to undergo a daily census. In reality—no matter what most textbooks may say—the denominator for most period rates is simply the most recent decennial census figure.

Lifetime prevalence is the proportion of individuals in a population on a given day who have ever suffered from the disease of interest. Because those who die are not included in either the numerator or the denominator of the lifetime prevalence rate, it is sometimes called the proportion of survivors affected (PSA).

Lifetime prevalence differs from lifetime risk, which measures the probability of the disease occurring during the entire lifetime of a birth cohort; and includes those deceased at the time of the study. Proportion of cohort affected (PCA) is a similar measure that takes as its numerator all members of a given cohort, living or dead, who have ever suffered the disease under study by the study date. The morbidity risk ratio (MRR) is an adjusted form of the PCA that has been corrected to adjust for mortality due to other causes in the cohort. Although these measures have some advantages over lifetime prevalence, they are more troublesome to calculate, requiring that the numbers of deceased be determined, that their medical history be ascertained in relation to the disease under study, and that their age at death be determined. Furthermore, these alternatives to lifetime prevalence often rely on doubtful sources of information—most often relying on the memories of relatives or friends.

Incidence Measures

Incidence is a dynamic or time-dependent quantity. Incidence can be expressed as an instantaneous rate—the rate of new cases on a given day—but is more often expressed with a unit of time attached—as in an annual incidence rate.

Incidence may also be differentiated into first incidence and total incidence. First incidence refers only to cases that are new cases, in the sense of being the first occurrence of the disorder in the lifetime of the subject. Total incidence includes those new cases plus new recurrences in individuals who have recovered from previous attacks.

The accuracy of incidence rates is obviously highly reliant on the prompt identification of new cases. If new cases occurring during the interval under study are not diagnosed during that interval, they cannot be included in the numerator. On the other hand, if diagnosis is delayed, cases that actually had their onset before the interval under study may be inappropriately included in the numerator.

It might be hoped that these two sources of error would roughly cancel each other out, but, when the rates are based on self-reports or reports by family members, the problem of telescoping arises. Telescoping is the tendency to add events into the inquired-about time period that actually occurred earlier. This common error of human memory often results in incidence being overestimated where self-report data is used. On the other hand, self-report data may result in the inclusion of cases that were self-medicated and would not otherwise have been recognized and included in the incidence rates.

Incidence represents a measure of the spread to new persons of the disease or condition under study. As such it is particularly relevant to the planning of primary and secondary prevention programs. In the search for causes, it is the correlation between incidence rates and suspected causal factors that is usually most indicative of causation.

Measures of Disability

A taxonomy of the consequences of disease or injury, known as the International Classification of Impairments, Disabilities, and Handicaps (ICIDH), has been developed by the World Health Organization. An impairment is defined in ICIDH as any loss or abnormality of

psychological, physiological, or anatomical structure or function. Impairments thus represent disturbances at the organ level.

Disability, according to the ICIDH, is any restriction or lack of ability to perform an activity in the manner or within the range considered normal for a human being. Such a restriction or lack of ability may be either an acute or a chronic condition. A disability is the consequence of an impairment. The term *disability* represents disturbances at the person level.

It is often useful to measure the extent to which illness is restricting the daily lives of the population. Commonly used as measures of the levels of acute disability are rates of restricted-activity days and bed-disability days experienced during some time period (usually 1 year).

Restricted-activity days are those days on which an individual does not carry on all of his or her normal activities because of an illness. These are days when an individual may go to work but may avoid the more strenuous demands of the job and return home early. These are days when an individual attends classes but does not devote extra time to studying at the library, and so on. Bed-disability days are those days when an individual stays home sick in bed.

The ICIDH defines a handicap as a disadvantage for a given individual, resulting from a disability, that limits or prevents the fulfillment of a role that would be considered normal for that individual (given the individual's age, sex, social status, and so forth) in that individual's culture. The term *handicap* thus reflects interaction with and adaptation to the person's surroundings. It might be said to represent disturbance at the social level.

Recommended Reading

- Ferrara, C. P. (1980). *Vitaland health statistics: Techniques of community health analysis*. Atlanta, GA: Centers for Disease Control.
- Kramer, M., von Korff, M., & Kessler, L. (1980). The lifetime prevalence of mental disorders: Estimation, uses and limitations. *Psychological Medicine*, 10, 429–439.