

**MEASUREMENT OF HEALTH**

The purpose of this glossary is to provide students with definitions related to the Measurement of Health, so that they can more easily understand the articles in this manual. It includes definitions of indicators commonly used to measure the health status and quality of life of populations. Additional references on this topic are provided at the end of the glossary for those who wish to know more.

**RATE**

A rate is a measure of frequency of a phenomenon. In epidemiology, demography, and vital statistics, a rate is an expression of the frequency with which an event occurs in a defined population; the use of rates rather than raw numbers is essential for comparison of experience between populations at different times, different places, or among different classes of persons. The components of a rate are the numerator, the denominator, the specified time in which events occur, and usually a multiplier, a power of 10, which converts the rate from an awkward fraction or decimal to a whole number.

$$\text{Rate} = \frac{\text{Number of events in specified period}}{\text{Average population during the period}} \times 10$$

**MORTALITY RATE**

An estimate of the proportion of a population that dies during a specified period. The numerator is the number of persons dying during the period; the denominator is the size of the population. The death rate in a population is generally calculated by the formula

$$\frac{\text{Number of deaths during a specified period}}{\text{Number of persons at risk of dying during the period}} \times 10$$

This rate is an estimate of the person time death rate, i.e. the death rate per 10 person-years. If the rate is low, it is also a good estimate of the cumulative death rate. This rate is also called the crude death rate.

Case fatality rate	$\frac{\text{Death from specific disease in given period} \times 100}{\text{Cases of specific disease in given period}}$
Annual death rate	$\frac{\text{Deaths from all causes in calendar year} \times 1,000}{\text{Population of July 1}}$
Annual age specific death rate	$\frac{\text{Death from all causes for given age group in year} \times 1,000}{\text{Population for given age group, July 1}}$
Infant mortality rate	$\frac{\text{Deaths under one year of age in year} \times 1,000}{\text{Live births in year}}$

**INCIDENCE**

The rate at which new events occur in a population. The numerator is the number of new events that occur in a defined period; the denominator is the population at risk of experiencing the event during this period, sometimes expressed as person-time. The incidence rate most often used in public health practice is calculated by the formula

$$\frac{\text{Number of new events in specified period}}{\text{Number of persons exposed to risk during this period}} \times 10$$

In a dynamic population, the denominator is the average size of the population, often the estimated population at the mid-period. If the period is a year, this is the annual incidence rate.

Annual death rate  
from specific cause

$$\frac{\text{Deaths from specific cause in year} \times 100,000}{\text{Population of July 1}}$$

**PREVALENCE**

The number of instances of a given disease or other condition in a given population at a designated time; sometimes used to mean PREVALENCE RATE. When used without qualification the term usually refers to the situation at a specified point in time (point prevalence). The prevalence of a specific condition is approximately equal to the incidence of the condition multiplied by the average duration of the disease.

Prevalence rate

$$\frac{\text{All cases of specified disease at given time} \times 1,000}{\text{Population at given time}}$$

**FREQUENCY**

In epidemiology, a general term describing the frequency of a disease or other attribute or event in a population without distinguishing between INCIDENCE and PREVALENCE.

**MORBIDITY**

Any departure, subjective, or objective, from a state of physiological or psychological well-being. In this sense, sickness, illness, and morbid condition are similarly defined and synonymous.

**LIFE EXPECTANCY**

The average number of years an individual of a given age is expected to live if current mortality rates continue to apply. A statistical abstraction based on existing, age specified death rates.

Life expectancy at birth: Average number years that a newborn baby can be expected to live if current mortality rates continue. Corresponds to the total number of years a given birth cohort can be expected to live, divided by the number of children in the cohort. Life expectancy at birth is partly dependent on mortality in the first year of life, therefore it is lower in poor than in rich countries because of the higher infant and child mortality rates in the former.

Life expectancy at a given age: The average number of additional years a person age x would live if current mortality trends continue to apply, based on the age-specific death rates for a given year. Life expectancy is a hypothetical measure and indicator of current health and mortality conditions.

### **POTENTIAL YEARS OF LIFE LOST**

A measure of the relative impact of various diseases and lethal forces on society. PYLL highlights the loss to society as a result of youthful or early deaths. The figure for potential years of life lost due to a particular cause is the sum, over all persons dying from that cause, of the years that these persons would have lived had they experienced normal life expectation.

### **INTERNATIONAL CLASSIFICATION OF IMPAIRMENTS, DISABILITIES AND HANDICAPS (ICIDH)**

First published by WHO in 1980, this an attempt to produce a systematic taxonomy of the consequences of injury and disease. An impairment is defined in ICIDH as any loss or abnormality of psychological, physiological, or anatomical structure or function. It is concerned with abnormalities of body structure and appearance and with organ or system function resulting from any cause; in principle, impairments represent disturbances at the organ level. A disability is defined in ICIDH as any restriction or lack (resulting from an impairment) of ability to perform an activity in a manner or within the range considered normal for a human being. The term disability reflects the consequences of impairment in terms of functional performance and activity by the individual; disabilities thus represent disturbances at the level of the person. A handicap is defined in ICIDH as a disadvantage for a given individual, resulting from an impairment or a disability, that limits or prevents the fulfilment of a role that is normal (depending on age, sex, and social and cultural practice) for that individual. The term handicap thus reflects interaction with and adaptation to the individual's surroundings.

### **NATURAL HISTORY OF DISEASE**

The course of a disease from onset (inception) to resolution. Many diseases have certain well-defined stages that, taken all together, are referred to as the "natural history of the disease" in question. These stages are as follows:

1. Stage of pathological onset.
2. Presymptomatic stage: from onset to first appearance of symptoms and/or signs. SCREENING tests may lead to earlier detection.
3. Clinically manifest disease, which may progress inexorably to a fatal termination, be subject to remissions and relapses, or regress spontaneously, leading to recovery.

Detection and intervention can alter the natural history of disease.

### **BIAS**

Deviation of results or inferences from the truth, or processes leading to such deviation. Any trend in the collection, analysis, interpretation, publication, or review of data that can lead to conclusions that are systematically different from the truth. Among the ways in which deviation from the truth can occur, are the following:

1. Systematic (one sided) variation of measurements from the true values (syn: systematic error).
2. Variation of statistical summary measures (means, rates, measures of association, etc.) from their true values as a result of systematic variation of measurements, other flaws in data collection, or flaws in study design or analysis.
3. Deviation of inferences from the truth as a result of flaws in study design, data collection, or the analysis or interpretation of results.
4. A tendency of procedures (in study design, data collection, analysis, interpretation, review or publication) to yield results or conclusions that depart from the truth.
5. Prejudice leading to the conscious or unconscious selection of study procedures that depart from the truth in a particular direction, or to one-sidedness in the interpretation of results.

The term "bias" does not necessarily carry an imputation of prejudice or other subjective factor, such as the experimenter's desire for a particular outcome. This differs from conventional usage in which bias refers to a partisan point of view.

## MEASUREMENT VALIDITY

An expression of the degree to which a measurement measures what it purports to measure. Several varieties are distinguished, including construct validity, content validity, and criterion validity (concurrent and predictive validity),

Construct validity: The extent to which the measurement corresponds to theoretical concepts (constructs) concerning the phenomenon under study. For example, if on theoretical grounds, the phenomenon should change with age, a measurement with construct validity would reflect such a change.

Current validity: The extent to which the measurement incorporates the domain of the phenomenon under study. For example, a measurement of functional health status should embrace activities of daily living, occupational family, and social functioning, etc.

Criterion validity: The extent to which the measurement correlates with an external criterion of the phenomenon under study. Two aspects of criterion validity can be distinguished:

- 1) Concurrent validity: The measurement and the criterion refer to the same point in time. An example would be a visual inspection of a wound for evidence of infection validated against bacteriological examination of a specimen taken at the same time.
- 2) Predictive validity: The measurement's validity is expressed in terms of its ability to predict the criterion. An example would be an academic aptitude test that was validated against subsequent academic performance.

## RELIABILITY

The degree of stability exhibited when a measurement is repeated under identical conditions.

Reliability refers to the degree to which the result obtained by a measurement procedure can be repeated. Lack of reliability may arise from divergences between observers or instruments of measurement or instability of the attribute being measured.

### Definitions adapted from:

- 1) Abdallah, F.G., & Levine, E. (1986). Better patients care through nursing research (p. 253). Toronto: McMillan.
- 2) Last, J.M. (1988) (Ed). A Dictionary of Epidemiology (2nd. edition). Oxford University Press. New York.

### Additional References:

Guyatt, G.H., Bocardier, C., & Tugwell, P.(1986). Measuring disease - specific quality of life in clinical trials. Canadian Medical Association Journal, 134, 889-895.

Kirshner, B., & Guyatt, G.H. (1985). A methodological framework for assessing health indices. Journal of Chronic Diseases, 38, 27-36.

Tugwell, P., Bennett, K.J., Sackett, D.L., Haynes, R.B. (1985). The measurement iterative loop: a framework for the clinical appraisal of need, benefits and costs of health interventions. Journal of Chronic Diseases, 38(4), 339-351.