

NIVEDI/Tech. Bull/39/2016



Glossary in Epidemiology

(Revision 1)



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The following are the terms used in epidemiology which has been arranged alphabetically and the important definitions with illustrations are given below:

A

Agent- A factor that is essential for a disease, chronic conditions, or injury to occur. Examples of agents include microorganisms, chemical substances, forms of radiation and in the case of injury, physical force. Agents can cause a health problem by either being introduced or present in excess or at deficient levels.

Antibody- Any of a variety of proteins in the blood that are generated to produce immunity against microorganisms or their toxins.

Antigen- a substance (usually protein) that induces a specific immune response eg. Circulating antibody production.

Association- The statistical relationship between two or more events, characteristics or other variables.

Attack rate- A form of incidence that measures frequency of disease, chronic conditions or injury in a particular population for a limited time, such as during an outbreak. In calculating attack rates, the numerator is the number of new cases of a health problem during an outbreak, and the denominator is the population at the beginning of the period.

$$\text{Attack rate (\%)} = \frac{\text{Number of animals showing the disease from the beginning to end of the outbreak}}{\text{Total number of animals at the beginning of the outbreak}}$$

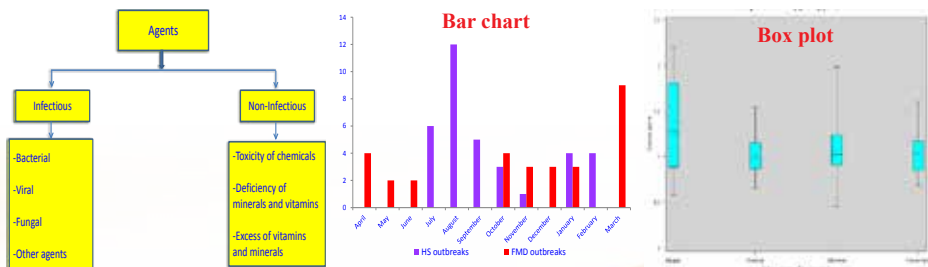
Attack rate, secondary- A measure of the frequency of new cases of a disease, chronic condition or injury among the contacts of known case-patients.

B

Bar chart- A visual display in which each category of a variable is represented by a bar. Bar charts are used to show variations in size among categories.

Bias- A systematic deviation from the truth; any trend in the collection, analysis, interpretation, publication or review of data that can lead to conclusions that are systematically different from the truth.

Box plot- A visual display that summarizes data using a “box and whiskers” format to show the minimum and maximum values (ends of the whiskers), inter quartile range (length of the box), and median (line through the box).



C

Carrier- An animal harboring the infectious agent for a disease and can transmit it to others, but does not show signs of the disease. A carrier may be asymptomatic (never show signs of the disease) or may show signs of the disease only during the incubation period, convalescence, or postconvalescence. The period of being a carrier may be short (a transient carrier) or long (a chronic carrier).

Case- An instance of a particular disease, chronic condition, or type of injury. A variety of criteria may be used to identify cases and the epidemiological definition of a case is not necessarily the same as the ordinary clinical definition.

Case-patient- An animal in a case-control study which has the disease or health condition under investigation.

Case definition- A set of standard criteria for determining whether an animal has a particular disease or health condition. A case definition specifies clinical criteria and details of time, place, and animal.

Case fatality rate- The proportion of animal with a particular condition (case-patients) who die from that condition. In calculating case-fatality rates, the numerator is the number of animal died from the condition and the denominator is the total number of animals with the condition.

Cause of disease- A factor (characteristic, behavior, event, etc.) that directly influences the occurrence of a disease. Reducing such a factor in a population should reduce occurrence of the disease.

Census- The enumeration of an entire population, usually including details on age, breed, sex, etc. eg. Livestock census of India every five years

Chain of infection- A process that begins when an agent leaves its source through a portal of exit, is conveyed by some mode of transmission and then enters through an appropriate portal of entry to infect a susceptible host.

Class- A grouping of observations of values of a variable. Classes are created for convenience in analyzing frequency.

Class boundaries- The values determining the upper and lower limits of a class. Class interval. The span of values of a continuous variable that lies between the class boundaries.

Clinical criteria- The symptoms and features of a disease that would be detected by physician analysis.

Clinical disease- A disease that has been manifested by its symptoms and features.

Cluster- An aggregation of cases of a disease or other health condition that are closely grouped in time and place. The number of cases may or may not exceed the number expected, and frequently the expected number is not known.

Cluster map- a map depicting the clustering of outbreaks occurred in a geographical area during a particular period of time.

Cohort- A well-defined group of animals who have had a common experience or exposure and are then followed up, as in a cohort study or prospective study, to determine the incidence of new diseases or health conditions.

Confidence interval- A range of values for a variable. e.g., seroprevalence of brucellosis is 10.1% (CI at 95% level will be 7.2 - 13.4%).

Confidence level- The proportion of similarly constructed confidence intervals that include the parameter of interest.

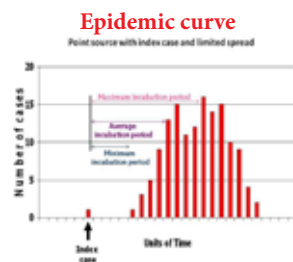
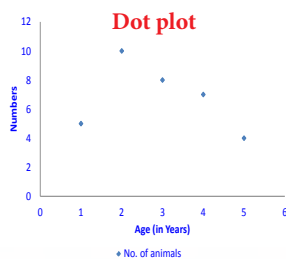
Confidence limits- The end points (i.e., the minimum and maximum values) of a confidence interval.

Contact- Exposure to a source of an infection.

Contagious- Capable of being transmitted from one animal to another animal by contact or close proximity.

Control- The group of animals without the health problem under study in a case-control study; an animal in that group. For controls, investigators choose animals which are as similar as possible to the cases, but without the health problem under study. In a case-control study, the control group is compared with the case group to determine associations between exposures and outcomes and to test hypotheses.

Cumulative frequency- In a frequency distribution, the number or proportion of cases with a particular value or less.



D

Database- a structured collection of data, organized so that it can be accessed easily by a range of computer software

Death-to-case ratio- The number of deaths attributed to a particular disease, chronic condition, or type of injury during a specified period divided by the number of new cases of that disease or injury identified during the same period.

Denominator- The lower portion of a fraction. Epidemiologists use fractions to calculate rates, or ratios. The denominator is usually the population at risk.

Determinant- Any factor that brings about change in a health condition or in other defined characteristics.

Disease- any departure, subjective or objective, from a state of physiological or psychological health and well-being.

Distribution- The complete summary of the frequency and pattern of the values or categories of a measurement. In epidemiology, distribution is the frequency and pattern of health-related characteristics and events in a population.

Dot plot- A visual display of the specific data points of a variable.

Droplet nuclei- The residue of dried droplets that is easily inhaled and exhaled and may remain suspended in air for long periods and be blown over great distances.

Droplet spread- The direct transmission of an infectious agent by means of the aerosols produced in sneezing or coughing.

E, F, G

Endemic health condition- A disease, chronic condition, or type of injury that is constantly present in a given geographic area or population group; may also refer to the usual prevalence of a disease or condition.

Environmental factor- An extrinsic factor, such as geology, climate, insects, sanitation, or health services, that affects an agent and the opportunity for exposure.

Epidemic (Syn: outbreak) - The occurrence of more cases of a particular type of disease, chronic condition, or injury than expected in a given area, or among a specific group of animals, over a particular period of time.

Epidemic curve- A histogram that shows the course of an outbreak or epidemic by plotting the number of cases of a disease, chronic condition, or injury according to time of onset.

Epidemic period- The time span of an epidemic.

Epidemiologic triad- The traditional model of infectious disease causation, which has three components: an external agent, a susceptible host, and an environment that brings the host and agent together so that disease occurs.

Epidemiology- The study of the distribution and determinants of health conditions or events in populations and the application of this study to control health problems.

Epidemiology, veterinary- the investigation of disease, other health related events and production in animal populations and the making of inferences from the investigation in an attempt to improve the health and productivity of the populations

Epidemiology, analytic- The aspect of epidemiology concerned with why and how a health problem occurs. Analytic epidemiology uses comparison groups to provide baseline data so that associations between exposures and outcomes can be quantified and hypotheses about the cause of the problem can be tested. Examples include cohort studies and case-control studies.

Epidemiology, applied (or field) - The application or practice of epidemiology to control and prevent health problems.

Epidemiology, descriptive- The aspect of epidemiology concerned with gathering, organizing, and summarizing data on “animal” (Who is ill?), “time” (When did they become ill?), and “place” (Where could they have been exposed to the illness?). This information is then used to conduct analytic epidemiology.

Evaluation- Systematic and objective examination of activities to determine how relevant and effective they are.

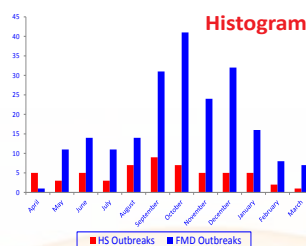
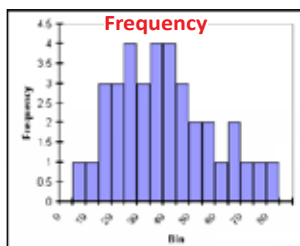
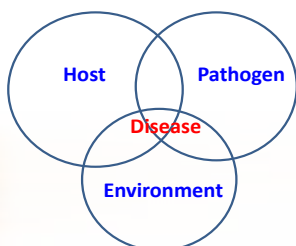
Exposed group- A group whose members have had contact with a cause of or possess a characteristic that is a determinant of, a particular health problem.

Exposure- Coming into contact with a cause of, or possessing a characteristic that is a determinant of, a particular health problem.

Frequency- The amount or number of occurrences, of a disease, chronic condition, injury, or other attribute or event in a population.

Frequency polygon- A graph of a frequency distribution in which values of the variable are plotted on the horizontal axis and the number of observations is plotted on the vertical axis. Data points are plotted at the midpoints of the intervals and are connected with a straight line.

Graph- A visual display of quantitative data arranged on a system of coordinates.



H

Health- A state of complete physical, mental, and social well-being and not merely the absence of disease or other infirmity.

Health indicator- Any of a variety of measures (e.g., mortality rate) that indicate the state of health of animals in a defined population.

Health information system- A combination of health statistics from various sources. Data from these systems is used to learn about health status, health care, provision and use of services and the impact of services and programs on health.

High-risk group- A group of animals whose risk for a particular disease, health condition or type of injury is higher than that of the rest of their community or population.

Histogram- A visual representation of the frequency distribution of a continuous variable. The class intervals of the variable are grouped on a linear scale on the horizontal axis and the class frequencies are on the vertical axis. Rectangles are drawn so that their bases equal the class intervals, and their heights correspond to the class frequencies.

Host- A person or other living organism that is susceptible to an infectious agent under natural conditions.

Host factor- An intrinsic factor (e.g., age, breed, sex and species) that influences an individual's exposure, susceptibility, or response to an agent.

Hypothesis- A supposition arrived at from observation or reflection that leads to refutable predictions; any conjecture cast in a form that will allow it to be tested and refuted.

Hypothesis, alternative- The supposition that an exposure is associated with the health condition under study. The alternative is adopted if the null hypothesis proves implausible.

Hypothesis, null- The supposition that an exposure is not associated with the health condition under study. The null hypothesis is the basis for most parametric tests for statistical significance.

I, J, K, L

Immunity, active- Resistance developed in response to an antigen (infecting agent or vaccine) and usually characterized by the presence of antibody produced by the host.

Immunity, herd- The resistance of a group to an infectious agent. This group resistance exists because a high proportion of animals in the group are immune to the agent. Herd immunity is based on the number of animal who are susceptible and the probability that they will come into contact with an infected

animal. By vaccinating large number of animals in a population, health officials used herd immunity to control and eradicate the disease.

Immunity, passive- Immunity conferred by an antibody produced in another host. This type of immunity can be acquired naturally by young one from its mother or artificially by administration of an antibody-containing preparation (antiserum or immunoglobulin).

Incidence- A rate that measures the frequency with which a health problem, such as a new injury or case of illness, occurs in a population. In calculating incidence, the numerator is the number of new cases occurring in the population during a given period of time and the denominator is the total population at risk during that time.

Incubation period- The period following exposure, when pathologic changes are not apparent, and ending with the onset of symptoms of an infectious disease.

Infectivity- The proportion of animals exposed to an agent and become infected.

Inter quartile range- The central portion of a distribution, calculated as the difference between the third quartile and the first quartile. This range includes the middle one-half of the observations in the set, leaving one-quarter of the observations on each side.

Latency period- The period following exposure, when pathologic changes are not apparent and ending with the onset of symptoms of a chronic disease.

M

Mean, arithmetic- The measure of central location commonly called the average. The arithmetic mean is calculated by adding all the values in a group of measurements and dividing by the number of values in the group.

Mean, geometric- The mean or average of a set of data measured on a logarithmic scale.

Measure of association- A quantified relationship between exposure and a particular health problem. Commonly used measures of association include relative risk, rate ratio and odds ratio.

Measurement scale- The complete range of possible values for a measurement. An example is the set of possible answers to a question in a survey.

Median- The middle value in a set of numbers (or the average of two middle numbers) above and below which lie an equal number of values.

Midrange- The halfway point, or midpoint, in a set of observations. For most types of data, the midrange is calculated by adding the smallest observation and the largest observation and dividing by two. The midrange is usually calculated as an intermediate step in determining other measures.

Mode- The most frequently occurring value in a set of observations.

Monitoring- the routine collection of information on disease, productivity and other characteristics possibly related to them in a population.

Morbidity- the amount of disease in a population (commonly defined in terms of incidence or prevalence).

Mortality rate- A measure of the frequency of occurrence of death in a defined population during a specified time interval. eg., If there were 30 deaths due to classical swine fever in a pig farm that has 300 pigs than the mortality rate due to CSF will be 10% in the farm.

Mortality rate, age-adjusted- A mortality rate that has been statistically modified to account for the effect of different age distributions in different populations in a study.

Mortality rate, age-specific- A mortality rate limited to a particular age group. In calculating age-specific mortality rates, the numerator is the number of deaths in the age group and the denominator is the number of people in that age group.

Mortality rate, cause-specific- The mortality rate from a specified cause. In calculating cause-specific mortality rates, the numerator is the number of deaths attributed to a specific cause during a specified time interval in a population and the denominator is the size of the population at the midpoint of the time interval.

Mortality rate, crude- A population's mortality rate from all causes of death.

Mortality rate, sex-specific- A mortality rate among either males or females.

N

Natural history of disease- The course of a disease from the time it begins until it is resolved.

Necessary cause- A factor that must be present for a disease or other health problem to occur.

Normal curve- A bell-shaped curve, which results when a normal distribution is graphed.

Normal distribution- The symmetrical clustering of values around a central location. A normal distribution 1) is a continuous, symmetrical distribution with both tails extending to infinity; 2) has an identical arithmetic mean, mode, and median; and 3) has a shape that is completely determined by the mean and standard deviation.

Notifiable disease- A disease that, by law, must be reported to public health authorities upon diagnosis.

Numerator- The upper portion of a fraction.

O

Observational study- An epidemiologic study in which there is no intervention and nature is allowed to take its course. Changes or differences in one characteristic are studied in relation to changes or differences in others.

Odds ratio- A measure of association used in comparative studies to quantify the relationship between an exposure and a health outcome; also known as the cross-product ratio.

Ordinal scale- A type of measurement scale. Ordinal scales consist of qualitative categories whose values have a distinct order. The categories are qualitative in that there is no natural distance to be measured between their possible values.

Outbreak (Syn: epidemic) - The occurrence of more cases of disease, injury, or other health condition than expected in a given area or among a specific population of animals during a specific period. Usually, the cases are presumed to have a common cause or to be related to one another in some way. Because the public sometimes perceives “outbreak” as less sensational than “epidemic,” it is sometimes the preferred word. Sometimes the two words are sometimes differentiated, with “outbreak” referring to a localized health problem and “epidemic,” to one that takes in a more general area.

Outbreak, common source- An outbreak in which animals are exposed to a common harmful influence, such as an infectious agent or toxin. The exposure period may be brief, or animals may be exposed over a period of days, weeks, or longer, with the exposure being either intermittent or continuous.

Outbreak, point source- A common source outbreak in which the exposure period is relatively brief so that all cases occur within one incubation period.

Outbreak, propagated- An outbreak that does not have a common source, but instead spreads from animal to animal.

Outcome(s) - Any or all of the possible results that may stem from exposure to a causal factor or from preventive or therapeutic interventions; all identified changes in health status that result from the handling of a health problem.

P, Q, R

Pandemic- An epidemic occurring over a very wide area (several countries or continents) and usually affecting a large proportion of the population.

Pathogen- an organism that produces disease.

Pathogenicity- The proportion of animals infected by an agent and then develops clinical disease.

Percentile- A set of cut points used to divide a distribution or a set of ranked data into 100 parts of equal area with each interval between the points containing 1/100 of the observations. For example, the 5th percentile is a cut point with 5% of the observations below it and the remaining 95% above it.

Pie chart- A circular chart depicting observed data and divided into “slices” that are proportional to the frequency of the categories of the variable assigned to them.

Population- The total number of animals of a given area or country. In sampling, the population may refer to the units from which the sample is drawn, not necessarily the total population of animals. A population can also be a particular group at risk.

Portal of entry- A pathway into the host that gives an agent access to tissue that will allow it to multiply or act.

Portal of exit- A pathway by which an agent can leave its source.

Predictive value positive- A measure of the predictive value of a reported case or epidemic; the proportion of cases reported by a surveillance system or classified by a case definition that are true cases.

Prevalence- The number or proportion of cases or events or conditions in a given population. eg., If there were 25 pigs which found to be positive for classical swine fever in a farm that has total of 300 pigs then the prevalence of CSF in the farm is 8.33%.

Prevalence, period- The amount of a particular disease, chronic condition, or type of injury present in a population over a period of time.

Prevalence, point- The amount of a particular disease, chronic condition, or type of injury present in a population at a single point in time.

Prevalence rate- The proportion of animals in a population having a particular disease, chronic condition, injury, or attribute at a specified point in time or over a specified period of time.

Proportion- A ratio in which the numerator is included in the denominator; the ratio of a part to the whole, expressed as a “decimal fraction” (e.g., 0.2), a fraction (1/5), or a percentage (20%).

Proportion, attributable- A measure of the impact of a causative factor on the public health; the proportion of a disease, chronic condition, or injury that can be attributed to exposure to a particular factor.

Proportionate mortality- The proportion of deaths in a population attributable to a particular cause over a period of time. Each cause of death is expressed as a percentage of all deaths, and the sum of the proportionate mortality for all causes must equal 100%. These proportions are not mortality rates because the denominator is all deaths instead of the population in which the deaths occurred.

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.

Range- In statistics, the difference between the largest and smallest values in a distribution; in common use, the span of values from smallest to largest.

Rate- An expression of the relative frequency with which an event occurs in a defined population.

Rate ratio- A comparison of two groups in terms of incidence rates or mortality rates.

Ratio- The relative size of two quantities. A ratio is expressed by dividing one quantity by the other.

Relative risk- A comparison of the risk of a health problem in two groups.

Reservoir- The habitat in which an infectious agent normally lives, grows and multiplies. Humans, animals and the environment can serve as reservoirs.

Reliability- the degree of stability exhibited when a measurement is repeated under identical conditions, reliability therefore may be demonstrated by repeating a measurement.

Reservoir- an animate or inanimate object on or in which an infectious agent usually lives and which therefore is often a source of infection by the agent.

Risk- The probability that an individual will be affected by, or die from, an illness or injury within a stated time or age span.

Risk factor- An aspect of animal behavior or an environmental exposure or a hereditary characteristic that is associated with an increase in the occurrence of a particular disease, chronic condition, or injury.

Risk ratio- A comparison of the risk of a particular health problem in two groups.

S

Sample- A selected subset of a population. A sample may be random or nonrandom and representative or non-representative.

Sample, random- A sample of individuals chosen in such a way that each one has the same (and known) probability of being selected.

Sample, representative- A sample whose characteristics correspond to those of the original or reference population.

Scatter diagram (or Scattergram) - A graphic display of the relationship between two variables. A dot is plotted on the graph for each set of paired values for two continuous variables, with one variable plotted on the horizontal axis and the other plotted on the vertical axis.

Screening- the identification of unrecognized disease or defect in an apparently health population.

Seasonality- Change in physiological status or in the occurrence of a disease, chronic condition, or type of injury that conforms to a regular seasonal pattern.

Sensitivity- The ability of a system to detect epidemics and other changes in the occurrence of health problems; the proportion of animal with a health problem which are correctly identified by a screening test or case definition.

Skewed- A distribution that is asymmetrical.

Specificity- The proportion of animals without a particular disease, chronic condition, or type of injury who are correctly identified by a screening test or case definition.

Sporadic illness- An illness that occurs infrequently and irregularly.

Spot map- A visual display of the geographic pattern of a health problem. On a map of the area, a marker is placed to indicate where each affected animals' lives or may have been exposed. Spot maps can reveal clusters or patterns that provide clues to the identity and origins of the problem.

Spreadsheet- a computer software package providing a representation of a large rectangular area upon which data tabulation may be displayed and a variety of calculations performed.

Standard deviation- A statistical summary of how dispersed the values of a variable are around its mean. Standard deviation is equal to the positive square root of the variance.

Standard error (of the mean) - The standard deviation of a theoretical distribution of sample means of a variable around the true population mean of that variable. Standard error is computed as the standard deviation of the variable divided by the square root of the sample size.

Statistical inference- Generalizations developed from sample data, usually with calculated degrees of uncertainty.

Study, analytic- A study in which groups are compared to identify and quantify associations, test hypotheses, and identify causes. Two common types are cohort studies and case-control studies.

Study, case-control- An analytic study that compares a group of animals with a certain disease, chronic condition, or type of injury (case-patients) with a group of animals without the health problem (controls) to detect differences in characteristics such as exposure to an agent.

Study, cohort (Syn: follow-up, longitudinal and prospective study) - An observational analytic study in which enrollment is based on status of exposure to a certain factor or membership in a certain group. Populations are followed and disease, death or other health-related outcomes are determined and compared.

Study, experimental- A study in which investigators identify the type of exposure that each individual (clinical trial) or community (community trial) has had and then follows the individuals' or communities' health status to determine the effects of the exposure.

Sufficient cause- A causal factor or collection of factors whose presence is always followed by the occurrence of a particular health problem.

Surveillance- the ongoing systematic collection and collation of useful information about disease, infection, intoxication or welfare in a defined animal population, closely integrated with timely analysis and interpretation of this information and dissemination of relevant results to those requiring them, including those responsible for control measures.

Survival curve- A curve that starts at 100% of the study population and shows the percentage of the population still surviving at successive times for as long as information is available. A survival curve may also be used to depict freedom from a health problem, complication or some other endpoint.

T

Transmission (of infection) - Any mode or mechanism by which an infectious agent is spread to a susceptible host.

Transmission, biologic- Indirect transmission by a vector in which the infectious agent undergoes part of its life cycle inside the vector before it is transmitted to the host.

Transmission, direct- Immediate transfer of an agent from a reservoir to a host by direct contact or droplet spread.

Transmission, indirect- Transfer of an agent from a reservoir to a host either by being suspended in air particles (airborne), carried by an inanimate intermediary (vehicle borne) or carried by an animate intermediary (vector-borne).

Transmission, mechanical- Indirect transmission by a vector in which the infectious agent does not undergo physiologic changes inside the vector.

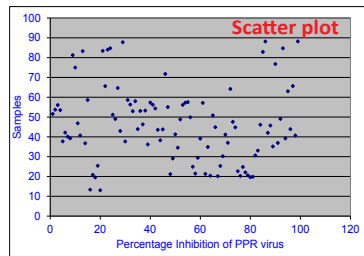
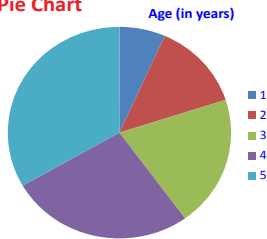
Trend- Movement or change in frequency over time, usually upwards or downwards.

Trend, secular- Changes over a long period of time, generally years or decades.

Trial, clinical- An experimental study using data from individual animals. Investigators identify the type of exposure that each animal has had and then follow the animals' health status to determine the effects of the exposure.

Trial, randomized clinical- A clinical trial in which animals are randomly assigned to exposure or treatment groups.

Pie Chart



Spot map



U, V, W, X, Y, Z

Validity- The degree of accuracy of a measurement. For survey instruments, validity refers to what the questions actually measure in practice, as compared with what they are intended to measure.

Variable- Any characteristic or attribute that can be measured and can have different values.

Variable, continuous- A variable that has the potential for having an infinite number of values along a continuum. Common examples are height and weight.

Variable, dependent- In a statistical analysis, a variable whose values are a function of other variable.

Variable (or data), discrete- A variable that is limited to a finite number of values; data for such a variable.

Variable, independent- An exposure, risk factor, or other characteristic being observed or measured that is hypothesized to influence an event or manifestation (the dependent variable).

Variance- A measure of the dispersion shown by a set of observations, defined by the sum of the squares of deviations from the mean, divided by the number of degrees of freedom in the set of observations.

Vector- In epidemiology, an animate intermediary in the indirect transmission of an agent that carries the agent from a reservoir to a susceptible host.

Vehicle- In epidemiology, an inanimate intermediary in the indirect transmission of an agent that carries the agent from a reservoir to a susceptible host.

Virulence- The measure of severity of a disease, expressed as the proportion of animals with the disease and become extremely ill or dies.

Zoonoses- An infectious disease that is transmissible from animals to humans and vice versa.

Further Reading:

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