

Glossary

The definitions given are valid as they are used in this publication but different definitions may be used in other contexts. *A Dictionary of Epidemiology*, Second Edition, edited by J.M. Last for the International Epidemiological Association and published by Oxford University Press, 1988, was helpful in providing a number of the definitions.

A

ABSOLUTE RISK. The attack rate or risk of developing a disease in a given population.

ACCEPTABILITY. One of the nine basic attributes of a surveillance system. Acceptability is the willingness of individuals and organizations to participate in the surveillance system as demonstrated by their provision of accurate, complete, and timely information.

ACUTE GASTROENTERITIS. The general term commonly applied to an illness that affects the stomach, small intestine, or large intestine that is short-lived but relatively severe in nature. Symptoms of gastro- intestinal illness vary, depending on the causative agent, but typically include nausea or vomiting, diarrhea, and abdominal pain. Non-specific symptoms (e.g., weakness, fatigue, fever, and headache) might accompany the gastrointestinal symptoms

ACUTE GASTROINTESTINAL ILLNESS. The general term commonly applied to an illness that affects the stomach, small intestine, and/or large intestine that is short-lived but relatively severe in nature. Symptoms of gastrointestinal illness vary, depending on the causative agent, but typically include nausea or vomiting, diarrhea, abdominal pain. Non-specific symptoms (e.g., weakness, fatigue, fever, and headache) can accompany the gastrointestinal symptoms. In addition, for certain agents, effects can move beyond the gastrointestinal tract (e.g., kidney failure with *E. coli* O157:H7 infection). Acute gastrointestinal illness can be caused by infections, preformed toxins, and psychogenic illness.

ADVISORY COMMITTEE ON IMMUNIZATION PRACTICES (ACIP). A group of 15 experts in fields associated with immunization who have been selected to provide advice and guidance to the Secretary of U.S. Department of Health and Human Services, the Assistant Secretary for Health, and the Centers for Disease Control and Prevention (CDC) on the most effective means to prevent vaccine-preventable diseases. The Committee develops written recommendations for the routine administration of vaccines to the pediatric and adult populations, along with schedules regarding the appropriate periodicity, dosage, and contraindications applicable to the vaccines.

AGAR. A gelatinous material prepared from certain marine algae and used as a base for bacterial cultures.

AGAR-LIKE. A material similar to agar that is used as a base for bacterial cultures.

AGAROSE. A gel made from agar that is used as a supporting medium in electrophoresis.

AGENT. A factor, such as a microorganism, chemical substance, or form of radiation, whose presence, excessive presence, or (in deficiency diseases) relative absence is essential for the occurrence of a disease.

AIDS. (Acquired Immunodeficiency Syndrome) AIDS is a collection of symptoms and infections in humans resulting from damage to the immune system caused by a retrovirus, the human immunodeficiency virus (HIV). The late stage of the condition leaves individuals prone to opportunistic infections and tumors. Although treatments can slow the progression of HIV and related symptoms, there is no known cure.

ALGORITHM. A set of rules for selecting which cases are reported to the surveillance system. The rules are based on electronic information included in the record such as the diagnostic code or laboratory test result.

ANALYTIC EPIDEMIOLOGY. The aspect of epidemiology concerned with the search for health-related causes and effects. Analytic epidemiology uses comparison groups, which provide baseline data, to quantify the association between exposures and outcomes, and test hypotheses about causal relationships.

ANALYTIC STUDY. A comparative study intended to identify and quantify associations, test hypotheses, and identify causes. Two common types are cohort study and case-control study.

ANIMAL SCIENCES. Knowledge and practices as relating to efficient domestic animal production. Animal sciences includes studies of animal growth and development, physiology, behavior, breeding, genetics, and nutrition in beef and dairy cattle, horses, sheep and goats, poultry, and swine.

ANTHRAX. An acute disease caused by the bacterium, *Bacillus anthracis*. Three forms of the disease occur: cutaneous anthrax (the most common), inhalational anthrax, and intestinal anthrax (rare). An oropharyngeal form has also been described. Signs and symptoms of anthrax depend on the form of the disease, but fatality rates are high among persons with inhalational and intestinal anthrax. The incubation period for anthrax is usually 1 to 7 days but incubation periods of up to 60 days have been reported.

ANTIGEN. A substance (usually a carbohydrate or protein) that is capable of stimulating an immune response.

ANTIMICROBIAL SUSCEPTIBILITY TESTING. Laboratory determination of the effectiveness of selected antimicrobial agents (i.e., antibiotics) against a bacterial species at levels that can be attained in body fluid after standard therapeutic doses.

ANTIMOTILITY AGENTS. Medications that alter the intestinal motility, reducing the frequency and volume of stool. Antimotility agents include loperamide, codeine, and tincture

of opium. Antimotility agents are contraindicated with invasive pathogens and in patients with bloody diarrhea or high fever.

ANTISECRETORY DRUGS. Medications that reduce or suppress intestinal fluid secretion (caused by bacterial toxins and other etiologies) that can lead to diarrhea. An example of an antisecretory drug is bismuth subsalicylate (Pepto-Bismol®).

APPLIED FOOD RESEARCH. Multidisciplinary, science-based research that provides information to enhance the safety and quality of food. Applied food research helps develop methods for controlling and detecting harmful microorganisms and enhancing quality and storage stability of foods through alterations in food processing approaches or modifications in the chemical and physical properties of the foods themselves.

APPROPRIATE TEMPERATURES. Temperatures necessary to limit proliferation of bacterial pathogens present in foods. Temperature guidelines for cold storage of foods are 41° F (5°C) for refrigerators and 32°F (0°C) for freezers.

ARBOVIRAL ENCEPHALITIS. An infection of the central nervous system (i.e., brain and spinal cord) caused by one of several viruses transmitted by blood feeding mosquitoes. The majority of human infections are asymptomatic or result in a nonspecific flu-like syndrome. Onset may be insidious or sudden with fever, headache, muscle pain, malaise and occasionally prostration and may lead to encephalitis (i.e., inflammation of the brain), with a fatal outcome or permanent neurologic sequelae. The incubation period is usually 5-15 days.

ASSOCIATION. Statistical relationship between two or more events, characteristics, or other variables.

ATLAS OF EXPOSURES. The results of a population-based survey undertaken at eight sites in the U.S. (CA, CT, GA, MD, MN, NY, OR, and TN). The survey collects information on exposures that might be associated with foodborne illnesses and the occurrence and severity of gastrointestinal illnesses.

ATTACK RATE. A variant of an incident rate, applied to a narrowly defined population observed for a limited period of time, such as during an epidemic.

ATTENUATED. To reduce the virulence of a pathogenic organisms. Attenuated strains of disease-causing bacteria and viruses are often used in vaccines because they stimulate a protective immune response while causing no disease or only mild disease in the person receiving the vaccine.

ATTRIBUTES OF A SURVEILLANCE SYSTEM. The nine basic characteristics that affect the operation and usefulness of a surveillance system including simplicity, flexibility, data quality, acceptability, sensitivity, predictive value positive, representativeness, timeliness, and stability. These attributes frequently are competing and inversely related, (i.e., as one attribute becomes stronger, others become weaker).

B

BACTEREMIA. The presence of live bacteria in the bloodstream. Bacteremia can be transient following trauma such as a dental procedure or persistent or recurrent as a result of infection.

BAR CHART. A visual display of data for a variable that can take on only a finite number of values (e.g., sex, race/ethnicity) or a continuous variable (e.g., age) that is presented as discrete categories (e.g., age groups). Each value or category of the variable is represented by a bar. The length of the bar is proportional to the number of observations in the category. The bars are separated by space. Best use: To compare size or frequency of different categories of a variable.

BIAS. Deviation of results or inferences from the truth, or processes leading to such systematic deviations. Any trend in the design or execution of the study or collection, analysis, interpretation, publication, or review of data that can lead to conclusions that are systematically different from the truth.

BOTULISM. A rare but serious paralytic illness caused by a nerve toxin produced by the bacterium *Clostridium botulinum*. The classic symptoms of botulism include double vision, blurred vision, drooping eyelids, slurred speech, difficulty swallowing, dry mouth, and muscle weakness. If untreated, these symptoms may progress to paralysis of the arms, legs, trunk and respiratory muscles. In foodborne botulism, symptoms generally begin 18 to 36 hours after eating a contaminated food, but they can occur as early as 6 hours or as late as 10 days.

BRAT DIET. A once favored diet following acute gastroenteritis that included bananas, rice, applesauce, and toast. This diet is now thought to be unnecessarily restrictive and provide suboptimal nutrition for the patient's nourishment and recovering gut and is no longer recommended.

BREEDER FLOCK. Specialized breeds of hens that produce eggs that are allowed to hatch and become laying hens or broiler chickens. The hens in breeder flocks are the progeny of so-called grandparent flocks. There are only a handful of grandparent flocks in the United States,

BROOD HEN. A domestic chicken that is ready to lay eggs. Brood hens are the progeny of so-called grandparent flocks. Only a handful of grandparent flocks currently exist in the U.S. (This point is important when considering the potential for transovarian transmission of *Salmonella* infection from parent to offspring and the need to keep grandparent flocks *Salmonella*-free.)

C

CALICIVIRIDAE. Name of a family of small round structured viruses. Name derives from the Latin "chalice" (calix) and refers to the cup-like indentations on the virus surface.

CARIBBEAN EPIDEMIOLOGY CENTRE. (CAREC) A public health organization that provides epidemiology and reference laboratory services to 21 member countries (i.e., Anguilla; Antigua and Barbuda; Aruba; Bahamas; Barbados; Belize; Bermuda; British Virgin Islands; Cayman Islands; Dominica; Grenada; Guyana; Jamaica; Montserrat; Netherlands Antilles; St. Kitts and Nevis; St. Lucia; St. Vincent and the Grenadines; Suriname; Trinidad and Tobago; Turks and Caicos). CAREC is based in Port of Spain, the capital of Trinidad and Tobago.

CASE. In epidemiology, a countable instance in the population or study group of a particular disease, health disorder, or condition under investigation. Sometimes, an individual with the particular disease.

CASE-CONTROL STUDY. A type of observational analytic study. Enrollment into the study is based on presence ("being a case-patient") or absence ("being a control") of disease. Characteristics (e.g., previous exposures) are then compared between cases and controls.

CASE DEFINITION. A set of standard criteria for deciding whether a person has a particular disease or health-related condition. A case definition specifies both clinical criteria and limitations on the time, place, and person.

CASE-FATALITY RATE. The proportion of persons with a particular condition (cases) who die from that condition. The denominator is the number of incident cases; the numerator is the number of cause-specific deaths among those cases.

CASE-FINDING EFFORTS. Methods used to identify additional patients who have the disease under investigation. Case-finding efforts include review of passive surveillance and laboratory reports, employee or school absentee records, patient charts from hospitals or physician's offices, and death certificates. Cases can also be found through special requests to health care providers, surveys of known cases or the population affected, and requests to the public through the local media.

CASE-PATIENT. In a case-control study, a person with disease that meets the case definition.

CAUSE OF DISEASE. A factor (e.g., characteristic, behavior, event) that directly influences the occurrence of disease. A reduction of the factor in the population should lead to a reduction in the occurrence of disease.

CDC FORM 52.13. ("Investigation of a Foodborne Outbreak") A standard report form for foodborne outbreaks that describes the illness, number and characteristics of individuals affected, etiologic agent, foods implicated, and contributing factors. The Centers for Disease Control and Prevention (CDC) requests that health departments complete a CDC 52.13 for each foodborne outbreak investigated and submit it to CDC as soon as possible. Timely submission of these reports can help identify potentially related outbreaks occurring in several places at the same time and facilitate further investigation. Periodically, CDC summarizes the information in these reports to assess trends in foodborne outbreaks nationally. As of 2005, the CDC 52.13 can be completed on-line via the electronic Foodborne Outbreak Reporting

System (eFORS).

CENTER FOR FOOD SAFETY AND QUALITY ENHANCEMENT. A nationally recognized applied food research program based at the University of Georgia that assists the food industry in maintaining or improving the safety of foods.

CENTRAL NERVOUS SYSTEM. The part of human nervous system consisting of the brain and spinal cord.

CHAIN-OF-CUSTODY. Standards and procedures where evidentiary documentation and strict record keeping are indicated or required. The chain-of-custody establishes the proof that the items of evidence collected during an investigation are the same as those being presented in a court of law. The chain-of-custody requires direct interviews and collection of supporting documentation (e.g., invoices, bills of lading, import documents) during the investigation. The chain-of-custody also establishes who had contact with the evidence, the date and time the evidence was handled, the circumstances for the evidence being handled, and what changes, if any, were made in the evidence.

CHI-SQUARE TEST. A test of statistical significance that is used to determine how likely it is that an observed association between an exposure and a disease could have occurred due to chance alone, if the exposure was not actually related to the disease. The chi-square test is based on the cells and row and column totals of the two-by-two table and is the test of choice when the expected values for each cell in the two-by-two table are at least 5. There are at least three different formulas for the chi-square for a two-by-two table. They include the Pearson uncorrected chi-square, the Yates corrected chi-square, and the Mantel-Haenzel chi-square. After calculating the chi-square, one must look up the resulting number in a chi-square table to determine the corresponding p-value.

CHLAMYDIAL INFECTION. A common sexually transmitted disease caused by the bacterium, *Chlamydia trachomatis*. About half of infected men and three quarters of infected women have no signs or symptoms. Men with symptoms might have a discharge from their penis or a burning sensation when urinating. Women who have symptoms might have an abnormal vaginal discharge or a burning sensation when urinating. If the infection spreads to the fallopian tubes, the woman might have lower abdominal pain, low back pain, nausea, fever, pain during intercourse, or bleeding between menstrual periods. Even though symptoms of chlamydial infection are usually mild or absent, serious complications that cause irreversible damage can occur in women, including infertility. The incubation period for chlamydial infection is poorly defined but is probably 7-14 days or longer.

CHOLERA. An acute infectious disease caused by the bacterium, *Vibrio cholerae*. Cholera is characterized by a sudden onset, profuse painless watery stools (often referred to as rice water stools), nausea, and profuse vomiting early in the course of the illness. In most cases, infection is asymptomatic or causes a mild diarrhea. In severe cases accompanied by untreated dehydration, death may occur within a few hours and the death rate may exceed 50%. With proper and timely rehydration, however, the case-fatality rate can be less than 1%. The

average incubation period for cholera is 2-3 days but can range from a few hours to up to 5 days.

CLINICAL CRITERIA. A combination of symptoms and signs and/or results of laboratory tests that suggests that an individual has a disease of interest.

CLINICAL LABORATORY. Laboratories which test or examine materials derived from the human body to provide information for the diagnosis, prevention, or treatment of any disease or health condition in an individual patient. Clinical laboratory testing includes hematology, urinalysis, blood chemistry, bacteriology, parasitology, serology, and immunology.

CLINICIAN. A health professional, such as a physician, psychiatrist, psychologist, physician's assistant, nurse, or nurse practitioner, involved in the treatment of patients, as opposed to other areas such as research.

CLINICIAN-BASED SURVEILLANCE. The reporting of the diagnosis of specific diseases by health care providers (e.g., physicians, nurses, and infection control practitioners) to the local health department.

CLINICIAN SUSPICION. A diagnosis based on the patient's medical history, presentation, or physical examination but not confirmed by laboratory or other special testing.

CLUSTER. An aggregation of cases of a disease or other health-related condition, particularly cancer and birth defects, which are closely grouped in time and place. The number of cases may or may not exceed the expected number; frequently the expected number is not known.

COHORT. A well-defined group of people who have had a common experience or exposure, who are then followed up for the incidence of new diseases or events, as in a cohort or prospective study. A group of people born during a particular period or year is called a birth cohort.

COHORT STUDY. A type of observational analytic study. Enrollment into the study is based on exposure characteristics or membership in a group. Disease, death, or other health-related outcomes are then ascertained and compared.

COLIFORMS. The most common form of bacteria found in untreated water. The presence of this group of non-pathogenic bacteria in water or food is an indication that the item may be contaminated by sewage and/or other similar material and should not be ingested.

COMMON SOURCE OUTBREAK. An outbreak that results from a group of persons being exposed to a common noxious influence, such as an infectious agent or toxin. If the group is exposed over a relatively brief period of time, so that all cases occur within one incubation period, then the common source outbreak is further classified as a point source outbreak. In some common source outbreaks, persons may be exposed over a period of days, weeks, or longer, with the exposure being either intermittent or continuous.

COMMUNITY. A source of controls for an analytic study in which controls are randomly selected by the investigators from the community through door-to-door surveys, mailings, and telephone calls.

COMPLETE BLOOD COUNT. (Also known as a CBC.) A determination of the number of red blood cells, white blood cells, and platelets in a cubic millimeter of blood along with a measurement of the hemoglobin and hematocrit values, and distribution of white blood cell types.

COMPLETENESS OF REPORTING. The proportion of patients diagnosed with the disease or health condition of interest that are reported to the surveillance system.

CONFIDENCE INTERVAL. A range of values for the measure of association (e.g., the odds ratio) that is consistent with the observed data and has a specified probability (e.g., 95%) of including the "true value" of the measure of association.

CONFIDENCE LIMIT. The minimum or maximum value of a confidence interval.

CONFIDENTIALLY. With the assurance that information that can be used to identify an individual (including unique demographic characteristics) will not be made available or disclosed without legal authority.

CONFOUNDER. A factor that is independently associated with both the exposure of interest and the disease of interest and, thereby, may distort the exposure-disease relationship.

CONTACT. Exposure to a source of an infection, or a person so exposed.

CONTAGIOUS. Capable of being transmitted from one person to another by contact or close proximity.

CONTINGENCY TABLE. A two-variable table with cross-tabulated data.

CONTINUOUS COMMON SOURCE OUTBREAK. An outbreak in which persons are exposed to the same source of infection but exposure is prolonged over a period of days, weeks, or longer.

CONTINUOUS VARIABLE. A variable that may take on many values (e.g., age, year of occurrence, number of cases).

CONTROL. In a case-control study, comparison group of persons without disease.

CONTRIBUTING FACTORS. Food safety problems that cause or contribute to the occurrence of an outbreak in a particular setting at a particular time. Contributing factors are usually classified into three categories:

- contamination of the food with microorganisms or toxins (e.g. contaminated raw food, cross contamination, unclean equipment)

- survival of microorganisms in the food or lack of inactivation of toxins (e.g., inadequate cooking or reheating, inadequate acidification) and
- growth of microorganisms in the food or toxin production (e.g., inadequate refrigeration, inadequate hot-holding)

An outbreak may have more than one contributing factor.

CORROBORATING EVIDENCE. Independent evidence that strengthens or confirms the conclusions based on the original evidence.

CRITERIA FOR CAUSATION. The conditions needed to establish a causal relationship between two items. The criteria include strength of the association, biological plausibility, consistency with other studies, temporality (i.e., exposure precedes disease) and dose-response effect. Criteria for causality were originally presented by Austin Bradford Hill (1897-1991), a British medical statistician, as a way of determining the causal link between a specific factor and a disease.

CROSS-CONTAMINATION. The transfer of microorganisms or toxins from foods, hands, utensils, or food preparation surfaces to a food. This transfer can be a particular problem with liquids from raw meat, poultry, and seafood because harmful pathogens can easily be transmitted to previously uncontaminated foods or surfaces.

CYCLOSPORA. A protozoan parasite that causes an illness in humans characterized by watery diarrhea, nausea, loss of appetite, abdominal cramping, fatigue, and weight loss. Diarrhea can be prolonged lasting from 9-43 days. The median incubation period for cyclosporiasis is 1 week.

CYCLOSPORIASIS. A diarrheal disease caused by the protozoan parasite, *Cyclospora cayetanensis*. Symptoms include watery diarrhea, nausea, loss of appetite, abdominal cramping, fatigue, and weight loss. Diarrhea can be prolonged lasting from 9-43 days. The median incubation period for cyclosporiasis is 1 week.

D

DATA QUALITY. One of the nine basic attributes of a surveillance system. Data quality reflects the completeness and validity of the data recorded in the public health surveillance system.

DEFINITIVE DIAGNOSIS. The “person” characteristics--age, sex, race, and occupation--of descriptive epidemiology used to characterize the populations at risk.

DEMOGRAPHIC INFORMATION. The “person” characteristics--age, sex, race, and occupation--of descriptive epidemiology used to characterize populations at risk.

DENOMINATOR. The lower portion of a fraction used to calculate a rate or ratio. In a rate, the denominator is usually the population (or population experience, as in person-years, etc.) at risk.

DEPENDENT VARIABLE. In a statistical analysis, the outcome variable(s) or the variable(s) whose values are a function of other variable(s) (called independent variables in the relationship under study).

DESCRIPTIVE EPIDEMIOLOGY. The aspect of epidemiology concerned with organizing and summarizing health-related data according to time, place, and person.

DISCRETE VARIABLE. A variable that can take on only a finite number of values (e.g., age group, race).

DISEASE TRENDS. The general tendency in the occurrence of a disease by time, place, and person.

DIRECT COSTS. Resources expended to maintain all phases of a surveillance system including efforts by local health care providers and health department staff at the local, state, or federal level. Direct costs usually include costs resulting from personnel, supplies, equipment, services (e.g., mail, telephone, computer time), travel, and training.

DIRECT TRANSMISSION. The immediate transfer of an agent from a reservoir to a susceptible host by direct contact or droplet spread.

DISTORT. To cause the observed findings to deviate from or misrepresent the truth.

DISTRIBUTION. In epidemiology, the frequency and pattern of health-related characteristics and events in a population. In statistics, the observed or theoretical frequency of values of a variable.

DISTRIBUTOR/IMPORTER. The entity in the chain of production and distribution of a food item that supplied the implicated shipments of the food. Distributors usually store and/or transport the product or work with other entities to accomplish these activities. Distributors include brokers and importers and may involve multiple levels.

DRAG-AND-DROP. To drag and drop an item of information, point to the item with your mouse. Hold down the left mouse button as you drag the item to the destination. Drop the item by releasing the mouse button.

DROPS. Apples collected from the ground.

E

***E. COLI* O157:H7 INFECTION.** Infection with a special serotype of the bacterium, *Escherichia coli*. Infection with *E. coli* O157:H7 is characterized by abdominal cramps and diarrhea. The diarrhea is initially watery but can become grossly bloody. Fever is uncommon. About 5-10 days after the onset of diarrhea, other manifestations of *E. coli* O157:H7 infection can occur,

including kidney failure, hemolytic anemia, and a low platelet count. When a patient has kidney failure and hemolytic anemia, it is called hemolytic uremic syndrome (HUS). HUS occurs in about 2-7% of persons with *E. coli* O157:H7 infection. The average incubation period for illness due to *E. coli* O157:H7 infection is 3-4 days (range: 2-10 days).

ELECTRONIC FOODBORNE OUTBREAK REPORTING SYSTEM (eFORS). A secure web-based reporting system that allows state health departments to report foodborne disease outbreaks to the Centers for Disease Control and Prevention electronically. eFORS includes all information collected through the paper-based CDC Form 52.13 but eliminates the need for time-consuming coding and reclassification of data.

ELECTROLYTE. One of the ionized salts in blood or tissue fluids required for basic body functions. (Ions are atoms or molecules that carry an electrical charge.) Electrolytes include sodium, potassium, magnesium, calcium, chloride and bicarbonate.

ENTERIC BACTERIA. A large group of rod-shaped, gram-negative bacteria that occur normally or pathogenically in the intestines of humans and other animals.

ENVIRONMENTAL FACTOR. An extrinsic factor (e.g., geology, climate, insects, sanitation, health services) which affects the agent and the opportunity for exposure.

ENVIRONMENTAL HEALTH ASSESSMENT. A focused investigation of a food or meal implicated in a foodborne disease outbreak. (If a specific vehicle has not been implicated in an outbreak, the assessment might focus on the setting in which the problem occurred or is suspected to have occurred.) By identifying opportunities for contamination, survival, and growth or toxin production by the causative agent, the environmental health assessment helps determine how the causative agent, the host, and environmental conditions interacted to result in a foodborne disease.

ENZYME. One of a number of proteins that initiate specific biochemical reactions.

EOSINOPHILIA MYALGIA SYNDROME. An acute illness marked by muscle and joint pain, weakness, fever, and an increased number of eosinophils (i.e., a particular type of white blood cell) with no infection or cancer that can account for the symptoms.

EPIDEMIC. The occurrence of more cases of disease than expected in a given area or among a specific group of people over a particular period of time.

EPIDEMIC CURVE. A histogram that shows the course of a disease outbreak or epidemic by plotting the number of cases by time of onset.

EPIDEMIC PERIOD. A time period when the number of cases of disease reported is greater than expected.

EPIDEMIOLOGIC LINKAGE. Similarities between cases of a disease based on time, place, or person.

EPIDEMIOLOGIC TRACEBACK. The process of determining the distribution and production chain for a food that has been implicated during an epidemiologic investigation of a foodborne illness. A traceback usually begins with information available at the time of purchase of the implicated food item and extends back to the very beginning of its production. All production steps, from harvest to consumption, are examined.

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

ETIOLOGIC AGENT. The microorganism, toxin, or other factor that causes an illness.

ETIOLOGIC CLUES. Clues as to the origin of a disease or health problem such as the source, modes of transmission, or risk factors.

EVALUATION. A process that attempts to determine as systematically and objectively as possible the relevance, effectiveness, and impact of activities in the light of their objectives.

EXPECTED VALUE. The value of a cell in a 2-by-2 table that is calculated by multiplying the row total by the column total and dividing by the table total.

EXPECTED NUMBER OF CASES. The number of cases of a disease that usually occurs in a particular population and time period based on the previous few weeks or months or a comparable period in previous years. The expected number of cases of the disease is compared with the observed number of cases of the disease to determine if an increase in cases represents an outbreak.

EXPOSED (GROUP). A group whose members have been exposed to a supposed cause of disease or health state of interest, or possess a characteristic that is a determinant of the health outcome of interest.

EXTRANEIOUS REPORTS. Reports not desired by the surveillance system including reports of nonreportable conditions, unnecessary negative reports, or duplicate reports on the same case due to preliminary test results followed by confirmatory tests. Extraneous reports can result in an overestimate of disease incidence or increased efforts by surveillance staff to determine which reports represent true, previously unreported cases and which do not.

F

FACE-TO-FACE INTERVIEWS. Collection of information for a study in which a trained interviewer reads the study questionnaire and instructions to the survey participant in person and records the responses. Face-to-face interviews typically result in higher response rates from subjects and more accurate recording of responses compared with other methods of data collection. However, face-to-face interviews are subject to interviewer bias, are more costly,

and because they are perceived as being less anonymous than other methods of data collection, might result in less honest responses from subjects.

FALSE-POSITIVES. People who do not have the disease in question but, nonetheless, meet the case definition.

FALSE-NEGATIVES. People who have the disease of interest but do not meet the case definition. False-negatives tend to be those cases with less severe manifestations of the disease, cases that were not seen by a health care provider, or cases that did not undergo laboratory testing.

FAMILY. A biological classification between order and genus, consisting of a group of related genera.

FARM-TO-TABLE APPROACH. An effort that includes all steps in the chain of production of a food item including growing, raising, or manufacturing the item; processing and packaging the item for distribution and sale; transporting and storing the item; and final preparation of the item for consumption.

FECAL COLIFORMS. The most common form of bacteria found in untreated water. The presence of this group of non-pathogenic bacteria in water or food is an indication that the item may be contaminated by sewage and/or other similar material and should not be ingested.

FECAL LEUKOCYTES. White blood cells in the stool that can be detected by microscopic examination or chemical tests. Fecal leukocytes indicate inflammation of the colon and may suggest a bacterial or viral infection. However, fecal leukocytes are not always present in these infections and can occur in noninfectious diseases (e.g., inflammatory bowel disease).

FECAL OCCULT BLOOD. Blood in the stool in amounts too small to be seen with the naked eye but detectable by chemical tests or microscopic examination. Blood in the stool may suggest a bacterial or viral infection. However, it is not always present in these infections and can also occur in noninfectious diseases (e.g., colon cancer).

FISHER EXACT TEST. A test of statistical significance that is used to determine how likely it is that an observed association between an exposure and a disease could have occurred due to chance alone, if the exposure was not actually related to the disease. The Fisher exact test is based on factorials of the cells and row and column totals of the two-by-two table and is the test of choice when the expected values in a two-by-two table are less than 5. In calculating a Fisher exact, one computes the probability (i.e., p-value) directly.

FLAGELLA. (Plural of flagellum) A long whip-like structure embedded in the cell membrane of some bacteria, fungi, and protozoa that is used for locomotion.

FLEXIBILITY. One of the nine basic attributes of a surveillance system. Flexibility is the ability of the system to adapt to changing information needs and operating conditions with little additional cost in time, personnel, or allocated funds.

FOOD HISTORY. Foods and beverages consumed during the period of interest and date and time of consumption. A food history includes foods and beverages consumed at home, restaurants, fast food establishments, delicatessens, and the homes of friends and family. If the causative agent is known, the period of interest covers the incubation period for the agent. If the causative agent is unknown, a 72-hour food history is usually obtained. If the causative agent is unknown but diarrhea is a predominant symptom, a 5-day food history is usually obtained.

FOOD POISONING. The traditional term used for illness caused by eating contaminated food. The term "foodborne illness" is more commonly used by food safety experts.

FOODNET. (Foodborne Disease Active Surveillance Network) A collaborative project between the Centers for Disease Control and Prevention (CDC) and ten sites (California, Colorado, Connecticut, Georgia, Maryland, Minnesota, New Mexico, New York, Oregon, and Tennessee), the U.S. Department of Agriculture (USDA), and the Food and Drug Administration (FDA). The project consists of active surveillance for foodborne diseases and related epidemiologic studies designed to help public health officials better understand the epidemiology of foodborne diseases in the United States.

FOOD SAFETY AND INSPECTION SERVICE (FSIS). A public health regulatory agency of the U.S. Department of Agriculture that protects consumers by ensuring that meat, poultry, and egg products are safe, wholesome, and accurately labeled. FSIS has the regulatory authority to request a voluntary recall of meat, poultry, and pasteurized processed egg products linked to outbreaks of foodborne disease. If illnesses are associated with meat, poultry, or egg products, health department officials should contact the nearest FSIS District Office.

FREE-RANGE SYSTEM. Egg-producing system in which laying hens are permitted to roam freely within the farmyard and are only kept in sheds or henhouses at night. Not all countries (including the U.S.), however, have legal standards defining what free range means. Therefore, actual conditions to which the hens are exposed is likely to vary widely from producer to producer.

FREQUENCY DISTRIBUTION. A complete summary of the frequencies of the values or categories of a variable; often displayed in a two-column table: the left column lists the individual values or categories, the right column indicates the number of observations in each category.

FREQUENCY-MATCHED. Selection of controls for a case-control study based on the number of case-patients in a particular category of the matching variable (e.g., age group). Frequency matching differs from pairwise matching in which controls are selected individually for each case-patient based on the matching variable.

FRIENDS, RELATIVES, AND NEIGHBORS. A source of controls in which controls are identified by asking cases to name possible controls from their friends, neighbors, or relatives.

G

GASTROINTESTINAL SYMPTOMS. Symptoms suggestive of an illness affecting the stomach, small intestine, or large intestine. Gastrointestinal symptoms typically include at least one of the following: nausea, vomiting, diarrhea, and abdominal pain.

GENERA. (the plural of genus) A biological classification between family and species, consisting of a group of closely related species. The genus is the first name in the scientific name of an organism. The second name is the species. Examples of genus and species names include *Staphylococcus aureus*, *Bacillus cereus*, and *Escherichia coli*.

GENERALIZED RASH. A rash that involves the whole body.

GIARDIASIS. A diarrheal illness caused by a one-celled, microscopic parasite, *Giardia intestinalis* (also known as *Giardia lamblia*). Giardiasis can cause a variety of intestinal symptoms, including diarrhea, flatulence, nausea, stomach cramps, greasy stools that tend to float, and weight loss. Some people with giardiasis, however, have no symptoms at all. The average incubation period for giardiasis is 7 days (range: 1-2 weeks).

GLOMERULI. The plural of glomerulus. A microscopic structure in the kidney that is composed of tufts of capillaries and plays a pivotal role in blood filtration.

GRADED. Meeting certain standards based on the interior quality of the egg and the appearance and condition of the eggshell. Eggs of any quality grade may differ in weight (size). There are three consumer grades for eggs:

- U.S. Grade AA eggs have whites that are thick and firm; yolks that are high, round, and practically free from defects; and clean, unbroken shells. Grade AA and Grade A eggs are best for frying and poaching where appearance is important, and for any other purpose.
- U.S. Grade A eggs have characteristics of Grade AA eggs except that the whites are "reasonably" firm. This is the quality most often sold in stores.
- U.S. Grade B eggs have whites that may be thinner and yolks that may be wider and flatter than eggs of higher grades. The shells must be unbroken, but may show slight stains. This quality is seldom found in retail stores because they are usually used to make liquid, frozen, and dried egg products.

GRAPH. A way to show quantitative data visually, using a system of coordinates.

GROUPED BAR CHART. A special type of bar chart used to illustrate data from two-variable or three-variable tables.

H

H ANTIGEN. A substance on the surface of the Salmonella cell capable of stimulating an immune response. The H antigen is a protein in the bacterium's flagella. Note: "H" derives

from the German word “hauch” (=breath) referring to the filmy sheen on the agar that is caused by a motile organism swarming over the surface, looking like the condensate film that forms if you breathe on the agar. Organisms are able to move across the agar because they have flagella.

HAND SANITIZER. Waterless alcohol gel products containing high concentrations of alcohol (60%-65% ethyl alcohol) that are used to clean hands. They work by stripping away the outer layer of oil on the skin, thereby destroying any “transient” microorganisms present on the surface of the hands. They do not require water or towel drying. A small amount of the gel is applied to the hands which are then rubbed together briskly until dry.

HEALTH EVENT. The occurrence of 1) morbidity and mortality due to a disease or health condition, 2) markers for the disease or health condition, or 3) risk factors for the disease or health condition. Health events can relate to infectious diseases, chronic diseases and conditions, injuries, and toxic exposures. Of note: Surveillance is typically limited to health events that can substantially impact the public as measured by frequency, severity, disparities or inequities associated with the health event, costs associated with the health event, preventability, potential course in the absence of an intervention, and public interest.

HEALTH INSURANCE PORTABILITY AND ACCOUNTABILITY ACT (HIPAA). A federal law that establishes national standards for the electronic exchange, privacy, and security of certain health information. HIPAA limits the use and disclosure of individually identifiable health information without authorization by the individual. The act recognizes, however, the need for authorities responsible for ensuring public health and safety to have access to protected health information to carry out their public health mission. As a result, collection of health data by public health officials for the purpose of investigating threats to the health and safety of the public is permitted under HIPAA rules without an individual’s authorization.

HEMOLYTIC ANEMIA. A lower than normal red blood cell count due to destruction of the red blood cells. If severe enough, hemolytic anemia can lead to paleness of the skin and mucous membranes, shortness of breath, palpitations of the heart, lack of energy, and fatigue.

HEMOLYTIC UREMIC SYNDROME. A life-threatening complication seen in about 2-7% of patients with *E. coli* O157:H7 infection in which the red blood cells are destroyed (i.e., hemolysis) and the kidneys fail leading to uremia. Treatment often requires blood transfusions and kidney dialysis. Even with this care, the case-fatality rate is 3-5%.

HEPATITIS A VIRUS INFECTION. A liver disease caused by the hepatitis A virus. Persons with hepatitis A virus infection may not have any signs or symptoms of the disease. If symptoms are present, they usually occur abruptly and may include fever, tiredness, loss of appetite, nausea, abdominal discomfort, dark urine, and jaundice (i.e., yellowing of the skin and eyes). The average incubation period for hepatitis A is 28 days (range: 15–50 days).

HEPATITIS B VIRUS INFECTION. A liver disease caused by the hepatitis B virus. Persons with hepatitis B virus infection may not have any signs or symptoms of the disease. If symptoms are present, they usually have an insidious onset and may include loss of appetite,

abdominal discomfort, nausea and vomiting, often progressing to jaundice. Fever may be absent or mild. Severity ranges from inapparent cases detectable only by liver function tests, to fulminating fatal cases. The average incubation period for hepatitis B is 60-90 days (range: 45–180 days).

HIGH-RISK GROUP. A group in the community with an elevated risk of disease.

HISTOGRAM. A graphic representation of the frequency distribution of a continuous variable (e.g., time). Rectangles of varying height are used to represent occurrences of the continuous variable and are drawn so that their bases lie on a linear scale representing intervals of the continuous variable. There are no spaces between adjacent rectangles. The heights of the rectangles are proportional to the frequencies of the values within each of the intervals. Best use: To display the number of cases during an epidemic (i.e., an epidemic curve) or the frequency distribution of a continuous variable.

HOST. A person or other living organism that can be infected by an infectious agent under natural conditions.

HOST FACTOR. An intrinsic factor (e.g., age, race, sex, behaviors) which influences an individual's exposure, susceptibility, or response to a causative agent.

HYPONATREMIA. A deficiency of sodium in the blood. Clinical signs of mild hyponatremia are often vague and non-specific and include loss of appetite, nausea, muscle cramps, and exhaustion. In severe hyponatremia, central nervous system symptoms predominate and include drowsiness, apathy, disorientation, agitation, delirium, seizures, decreased response to stimuli, coma, and respiratory arrest.

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-GENERATING INTERVIEWS. Interviews undertaken with a limited number of cases in an outbreak that explore all potential sources of exposure to the causative agent in great detail. The interviews include both open-ended and close-ended questions.

Commonalities or suspicious exposures among these cases are used to develop hypotheses about the source of the outbreak that can then be tested with all cases and a comparison group.

I

IgM. (Immunoglobulin M) One of five major classes of antibodies found in the blood and tissue fluids that are involved in fighting infection. IgM antibodies are usually the first antibodies produced in response to an infectious agent and are later replaced by other types of antibodies. As a result, the presence of IgM suggests a relatively recent exposure to an infectious agent.

ILEUS. Partial or complete blockage of the large or small intestine that prevents the contents of the intestine from passing to the lower bowel. Ileus can be due to a mechanical obstruction,

paralysis of the bowel wall, or a spastic contraction of a segment of the bowel. Symptoms of ileus include severe abdominal pain, abdominal distention, vomiting, and lack of bowel movements.

INCIDENCE RATE. A measure of the frequency with which an event (e.g., new cases of an illness), occurs in a population over time. The denominator is the population at risk; the numerator is the number of new cases occurring during a given period. Incidence rates are used instead of raw numbers when comparing disease occurrence between different populations (or in the same population over time) because rates adjust for differences in population sizes.

INDEPENDENT. Not relating to or influenced by. For example, the other system is not routinely used to find cases for the surveillance system.

INCUBATION PERIOD. The time period between exposure to an infectious agent or toxin and the first appearance of symptoms of infection or intoxication.

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

INDIRECT COSTS. Costs resulting from surveillance efforts that are not directly related to operation of the system. Indirect costs include costs of follow-up laboratory testing or treatment of the patient or his/her contacts that result when a case is reported through the surveillance system.

INDIRECT TRANSMISSION. The transmission of an agent carried from a reservoir to a susceptible host by suspended air particles or by animate (vector) or inanimate (vehicle) intermediaries.

INDISTINGUISHABLE. Pulsed field gel electrophoresis (PFGE) banding patterns that match each other using current standards for comparison. Typically, “indistinguishable” patterns have all bands in common.

INFECTIOUS DOSE. The number of organisms that must be consumed to give rise to the symptoms of a foodborne illness. The infectious dose varies according to the agent. For example, relatively small numbers of *Campylobacter* (as few as 500) can cause infection; whereas, larger numbers of *Salmonella* (more than 100,000) are required to cause infection. The infectious dose also varies with the patient’s age, overall health, and other conditions (e.g., the acidity of the stomach).

INHALATIONAL ANTHRAX. An acute infectious disease caused by the spore-forming bacterium *Bacillus anthracis*. Initial symptoms may resemble a common cold. After several days, the symptoms may progress to severe breathing problems and shock. Inhalational anthrax is usually fatal. The incubation period for inhalational anthrax is a few hours to 7 days; however, most cases occur within 48 hours of exposure.

INOCULATE. To implant microorganisms or infectious material into a culture medium.

INOCULUM. Microorganisms or other materials introduced into the body.

INTER-AMERICAN INSTITUTE FOR COOPERATION ON AGRICULTURE. A specialized agency of the Organization of American States. Its purpose is to encourage and support efforts by its member states to foster agricultural development and rural well-being.

INTERNATIONAL HEALTH REGULATIONS. Regulations, adopted by the World Health Assembly, for which the purpose is to prevent, protect against, and control the international spread of disease. The regulations determine which health events constitute a public health emergency of international concern and, therefore, must be reported to the World Health Organization (WHO). Under the 2005 revision of the International Health Regulations, health events that are always reported to WHO include cases of smallpox, poliomyelitis attributable to wild-type poliovirus, human influenza caused by a new subtype, and severe acute respiratory syndrome (SARS). Health events that might require notification depending on the circumstances include cholera, pneumonic plague, yellow fever, viral hemorrhagic fevers, and West Nile fever.

INTESTINAL MUCOSA. The innermost layer of the intestinal wall. The mucosa includes finger-like projections, called villi, that extend into the lumen of the intestines and house secretory cells, endocrine cells, and absorptive epithelial cells which take up nutrients from the lumen and transport them into blood.

INTRAVENOUS FLUIDS. Liquid substances that are administered directly into a vein. Compared with other routes of administration, intravenous fluids are the fastest way to rehydrate the body and deliver medications throughout the body.

INTRAVENOUS THERAPY. The administration of liquid substances directly into a vein. Compared with other routes of administration, the intravenous route is the fastest way to deliver fluids and medications throughout the body.

ISOLATE. A pure culture of a microorganism from a laboratory specimen.

ISOLATED. Separated from other microorganisms in a specimen for the purpose of identifying or characterizing it.

K

KERATITIS. Inflammation of the cornea (i.e., the outer transparent membrane covering the iris and the lens of the eye).

L

LABORATORY-BASED SURVEILLANCE. The reporting of the laboratory diagnosis of specific diseases by laboratory staff to the appropriate health department. Laboratory-based surveillance might include specialized testing to better characterize a pathogen (e.g., serotyping and antimicrobial susceptibility testing) or referral of the specimen to the public health laboratory or other reference laboratory for more detailed studies.

LABORATORY-CONFIRMATION. Diagnosis of a disease on the basis of conclusive laboratory testing. Laboratory confirmation can be based on microscopic examination of a patient specimen, isolation of the pathogen through culture, molecular detection (e.g., polymerase chain reaction or antigen testing), or finding serologic evidence in the patient of recent infection with the pathogen.

LACTOFERRITIN. A chemical marker for fecal leukocytes that is detected by an immunoassay.

LATENCY PERIOD. A period of subclinical or inapparent pathologic changes following exposure to the disease-causing agent, ending with the onset of symptoms of a chronic disease.

LEVEL OF SIGNIFICANCE. The probability that if a difference is found, it is due to chance alone.

LINE GRAPH. A visual display of data that illustrates the relationship between two continuous variables (e.g., number of cases and time). A two coordinate system (i.e., a horizontal and a vertical axis that intersect at right angles) is used for a line graph. Datapoints are plotted on the graph using the intervals on the two coordinates and are connected by a line to highlight the trends. Best use: To display trends in numbers or rates over time.

LINE LIST. A list of selected information about each case in an epidemiologic investigation. Each column represents an important variable (e.g., patient identifier, age, sex) while each row represents a different case.

LISTERIOSIS. An infection caused by the bacteria *Listeria monocytogenes*. In a normal host, the infection usually causes only influenza-like symptoms (e.g., fever, muscle aches, nausea, and diarrhea). In high-risk patients, it can cause meningoenzephalitis and/or septicemia. The diagnosis is confirmed by isolation of the infectious agent from normally sterile body sites such as cerebrospinal fluid, blood, and amniotic fluid.

LONG-TERM CONTROL MEASURES. Interventions that will prevent the recurrence of a problem and will take longer to implement and/or see results. Long-term control measures include such things as modifying food production processes and educating the public or food workers.

LYMPHOID TISSUE. A part of the body's immune system that helps protect it from bacteria and other foreign entities. Lymphoid tissue is rich in lymphocytes). Lymphoid tissue can be

diffuse or aggregated. Examples of the latter include the lymph nodes, spleen, tonsils and adenoids and the thymus.

M

MAGNITUDE OF ASSOCIATION. The size of the quantified association between an exposure and a disease.

MASS PSYCHOGENIC ILLNESS. The occurrence of symptoms suggestive of organic illness among two or more people who share beliefs related to the source of the illness, but without an identifiable cause. Mass psychogenic illness is a diagnosis of exclusion. As there are likely to be many organic causes of illness that are yet to be recognized, this diagnosis should be made with caution.

MATCH. To intentionally select controls to be similar to cases on one or more characteristics (e.g., age, gender). By matching on selected characteristics, the distribution of these characteristics will be identical among cases and controls and will eliminate the characteristics from being confounders in the study.

MATCHED ANALYSIS. Data analysis in which cases and controls are not considered individually but rather as matched sets. The exposure status of a case is compared only with the control(s) matched to it.

MATCHED ODDS RATIO. The measure of association which quantifies the relationship between an exposure and health outcome for a matched case-control study. The matched odds ratio is based only on discordant case-control sets (i.e., sets where the case has a different exposure status from the matched control).

MEAN, ARITHMETIC. The measure of central location commonly called the average. It is calculated by adding together all the individual values in a group of measurements and dividing by the number of values in the group.

MEASLES. An acute highly communicable viral disease characterized by a rash, high fever, cough, runny nose, and red, watery eyes. Symptoms typically begin to appear about 10 to 12 days after exposure to the virus and last about a week. Approximately 20% of reported measles cases experience one or more complications including diarrhea, ear infections, pneumonia, encephalitis, seizures, and death.

MEASURE OF ASSOCIATION. A quantified relationship between exposure and disease. Measures of association include the relative risk, rate ratio, and odds ratio.

MEDIAN. The measure of central location which divides a set of data into two equal parts.

MENINGES. The collective term for the three membranes that cover the brain and spinal cord.

MIDDLE INCOME. A World Bank classification of country economies based on gross national

income per capita. The gross national income for middle income countries is US\$745 - \$9,205 per capita. Middle income is sometimes divided into lower middle income and upper middle income with gross national incomes of \$745-\$2,975 per capita and \$2,976 - \$9,205 per capita, respectively.

MODE OF SPREAD. The means by which a disease agent is transmitted to a susceptible host. Modes of spread include direct (e.g., direct contact, droplet spread) and indirect (e.g., airborne, vehicleborne, and vectorborne) transmission.

MOLECULAR WEIGHT. The sum of the atomic weights of the atoms in the molecules that form these compounds.

MORE ABOUT LESSONS. Lessons covering basic epidemiologic and public health concepts that must be mastered for successful completion of the case study. The lessons include optional exercises (with feedback) that allow the student to practice applying the concepts. “More About” lessons can be accessed by selecting Course Resources from the Menu Bar and clicking on “More About Lessons”.

MORBIDITY. Any departure, subjective or objective, from a state of physiological or psychological well-being.

MORTALITY RATE. A measure of the frequency of occurrence of death in a defined population during a specified interval of time.

MULTIPLE-LINE GRAPH. A special type of line graph in which the relationship between three variables, at least two of which are continuous (e.g., number of cases, time, and serotype), is displayed on a two coordinate system.

N

NON-TYPHOIDAL SALMONELLOSIS. A gastrointestinal illness caused by serotypes of *Salmonella* other than *Salmonella* Typhi. Non-typhoidal salmonellosis is characterized by the sudden onset of headache, abdominal pain, diarrhea, nausea, and vomiting. Fever is almost always present. The incubation period for salmonellosis is usually 12-72 hours, but can be longer. The illness typically lasts 4 to 7 days and most patients recover without treatment. Deaths due to non-typhoidal salmonellosis are uncommon, except among the very young, the very old, the debilitated, and the immunosuppressed.

NORMALIZE. Using computer software, adjust the PFGE patterns in a run based on the banding pattern of known control specimens run at the same time.

NOROVIRUS. Previously known as Norwalk or Norwalk-like virus. A small round structured RNA virus in the *Caliciviridae* family. Symptoms of norovirus infection usually last 1-3 days and include nausea, vomiting, non-bloody diarrhea, and abdominal cramps. The incubation period is usually 24-48 hours (range: 10-50 hours). Norovirus can be spread by consuming contaminated foods or liquids, touching contaminated surfaces or objects and then placing hands in mouth, having direct contact with an infected person, or aerosols of contaminated vomitus.

NOTBREAK. An increase in cases of a disease that at the outset appears to represent an outbreak but on further investigation is due to reporting artifact, laboratory error, error in data entry, changes in population size or characteristics, or a random variation in incidence. An apparent notbreak requires some investigation, however, to rule out the occurrence of a true outbreak and explore the source of any laboratory or reporting problems.

NOTIFIABLE DISEASES. One of the diseases, based on state laws or regulations, that must be reported by health care practitioners (e.g., physicians, laboratories, hospitals) to the local or state health department. The list of notifiable diseases differs from state to state and country to country, reflecting variations in public health priorities.

NOT STATISTICALLY SIGNIFICANT. The probability that the observed association is due to chance alone is higher than a predetermined value. "Not statistically significant" does not mean there is no association between the exposure and the disease, only that chance is a likely explanation for the observed association.

NUCLEIC ACID. A substance found in animal and plant cells that holds the genetic information.

Nucleic acids are large molecules composed of many smaller molecules, referred to as nucleotides. Two classes of nucleic acids are ribonucleic acid and deoxyribonucleic acid.

NUMERATOR. The upper portion of a fraction used to calculate a rate or ratio. In a rate, the numerator is usually the number of health events or cases of a disease.

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O

O ANTIGEN. A substance on the surface of the Salmonella cell capable of stimulating an immune response. The O antigen specificity is determined by the repeating sugar units in the lipopolysaccharide of a bacterium's outer cell membrane. Note: "O" derives from the German term "ohne (= without) hauch (=breath)". This is because the O antigen is still present on the cell surface even in bacterial isolates that have lost their flagella (hauch).

OBJECTIVE. Based on conclusive evidence and uninfluenced by emotion or personal opinion.

OBJECTIVES OF A SURVEILLANCE SYSTEM. How the data from a public health surveillance system will be used. Surveillance system objectives typically fall into two general categories: (1) monitoring the health status of the community and (2) taking public health action. For example, information from surveillance systems can be used to monitor the burden of a disease over time, determine risk factors for the disease and populations at greatest risk, guide immediate public health actions for individual patients or the community, guide programs to prevent and control disease, and evaluate those programs.

ODDS OF EXPOSURE. The number of persons in the group of interest who were exposed divided by the number of persons in the group of interest who were not exposed.

ODDS RATIO. The measure of association for a case-control study that quantifies the relationship between an exposure and a disease. The odds ratio compares the odds of exposure to a factor among cases to the odds of exposure to the factor among controls. An odds ratio of:

- 1.0 (or close to 1.0) means that the odds of exposure among case-patients is the same as (or similar to) the odds of exposure among controls. The exposure is not associated with the disease.

- Greater than 1.0 means that the odds of exposure among case-patients is higher than the odds of exposure among controls. The exposure might be a risk factor for the disease.

- Less than 1.0 means that the odds of exposure among case-patients is lower than the odds of exposure among controls. The exposure might be protective against the disease.

ONE-TAILED TEST. A test of statistical significance for the measure of association between an exposure and a disease in which there is interest in determining only if the exposure increases the risk of disease or decreases the risk of disease, but not both. Researchers argue that it is rarely appropriate to use a one-tailed test; however, there are proper uses for this test. For example, in comparing a medical treatment with a placebo, there is only interest in

determining whether the treatment is better than the placebo not worse.

ORAL REHYDRATION. The process of replacing by mouth essential body fluids and salts that are lost due to diarrhea. Oral rehydration involves using a solution with a specific electrolyte content and osmolality. Oral rehydration is less painful, safer, and less costly than intravenous therapy and is appropriate for patients with mild to moderate dehydration (classically defined as 3-9% of body weight).

OSMOLALITY. A measure of the concentration of particles in a solution. A highly concentrated solution will have a high osmolality (I.e., more particles per unit of solvent than a solution with a low osmolality.)

OTHER PATIENTS. A source of controls in which controls are selected by the health care provider or investigator from other patients seen at the health care facility at which the case was diagnosed using a predetermined selection process (such as review of medical records or next patient seen in facility).

OUTBREAK. Synonymous with epidemic. Sometimes the preferred word, as it may escape sensationalism associated with the word epidemic. Alternatively, a localized as opposed to generalized epidemic.

OUTBREAK INVESTIGATION TEAM. The small group of people in an outbreak responsible for coordinating all activities conducted to investigate and control the outbreak. At a minimum, the outbreak investigation team should include an epidemiologist, a microbiologist, and a sanitarian/environmental health specialist. Based on the specifics of the outbreak, the team might also include local health authorities, a clinician, a veterinarian, a food scientist, a media relations liaison, and others.

P

PAN AMERICAN HEALTH ORGANIZATION (PAHO). A regional office of the World Health Organization whose work focuses on the health and living standards of the countries of the Americas. The headquarters of PAHO are located in Washington, D.C.

PASTEURIZED. The processing of a liquid or food to kill pathogenic bacteria to make a food safe to eat. Most foods are heat processed to kill pathogenic bacteria, but some foods can be pasteurized using gamma radiation. Heat pasteurization is based on a temperature and time relationship: the higher the heat the shorter the time necessary for pasteurization. In addition, the process will be influenced by the type of food and the desired result (e.g., retaining a food's nutrients, color, texture, and flavor and the temperature and time necessary to kill pathogenic bacteria). Louis Pasteur, a chemist, developed pasteurization while researching the cause of beer and wine spoilage.

PATIENT IDENTIFIERS. Unique information about a patient that can be used to distinguish one patient from another such as name, medical record number, date of birth, address, and

telephone number.

PERCENTILE. The set of numbers from 0 to 100 that divide a distribution into 100 parts of equal area, or divide a set of ranked data into 100 class intervals with each interval containing 1/100 of the observations. A particular percentile, say the 5th percentile, is a cut point with 5 percent of the observations below it and the remaining 95% of the observations above it.

PETRI DISH. A shallow glass or plastic circular dish with a loose-fitting cover, used to culture bacteria or other microorganisms. The Petri dish was named after the German bacteriologist Julius Richard Petri (1852–1921) who invented it in 1877.

PHAGE-TYPING. A method of subtyping bacteria on the basis of viruses (i.e., phages) that infect them. Each bacterial strain will exhibit resistance to certain phages and susceptibility to others. The profile of resistance and susceptibility to a standardized battery of phages is called the phage type. Phage-typing can be used to distinguish among bacteria within a particular serotype.

PIE CHART. A circular chart in which the size of each “slice” is proportional to the frequency of each category of a variable. Best use: To show components of a whole.

PLASMID. Extrachromosomal genetic material that occurs in many bacterial strains. Plasmids are circular deoxyribonucleic acid (DNA) molecules that replicate independently of the bacterial chromosome. Plasmids are not essential for the bacterium but may confer a selective advantage. The “R factor plasmid” encodes resistance to multiple antimicrobial agents.

PLATELET. Cells circulating in the blood that normally contribute to clotting of blood.

PLUG. A small portion or section of the material.

POINT OF SERVICE ESTABLISHMENT. The entity in the chain of production and distribution of a food item that served or sold the implicated product to the cases. Point of service establishments include restaurants, delis, grocery stores, institutional dining facilities, and caterers.

POINT SOURCE OUTBREAK. An outbreak in which persons are exposed to the same source of infection over a brief period (e.g., through a single meal or an event). In a point source outbreak, the number of cases increases rapidly to a peak and decreases gradually. The majority of cases occur within one incubation period of the disease.

POLICIES TO ASSURE SAFE FOOD PREPARATION. Policies that assure safe food preparation in a commercial food service establishment include the following:

- a safe, clean environment with adequately functioning equipment
- facilities which promote good food preparation practices (e.g., conveniently placed sinks with adequate soap and clean towels)
- safe sources for foods and ingredients
- training of employees in proper food preparation procedures

- monitoring (and correction) of employee practices and behaviors

POLYMERASE CHAIN REACTION. (PCR) A technique used to detect the presence of specific sequences of DNA in a sample. In PCR, the DNA in the sample is separated into two strands and incubated with an oligonucleotide primer and DNA polymerase. If the specific DNA sequence is present in the sample, it will be amplified many (i.e., as much as one billion) times, allowing for easy detection of small amounts of the DNA sequence in the original sample.

POOLED EGGS. A practice common in restaurants and commercial or institutional kitchens, in which the contents of many raw, unpasteurized eggs are combined together and then used to cook individual servings of eggs. The concern about using pooled eggs is two-fold: 1) the potential cross-contamination of many servings of eggs from only one or a few contaminated eggs and 2) the holding of large numbers of egg servings at room temperature while using up the mixture, allowing for growth of any bacterial agent present.

POOR PERSONAL HYGIENE. Behaviors that may increase the likelihood that a person is the source of the causative agent in an outbreak. Poor personal hygiene includes inadequate washing of hands after using the toilet, changing diapers, or helping a child at the toilet; wearing soiled or contaminated clothing; inadequate covering of open sores; eating or smoking around food preparation/serving areas; and improper use of gloves.

POTASSIUM SORBATE. A preservative commonly used in food processing.

POWER. The probability that if a real difference exists between cases and controls it is detected.

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 which are true cases. With regards to surveillance systems, predictive value positive is one of the nine basic attributes of a surveillance system. Predictive value positive is the proportion of cases reported through the surveillance system that actually have the health-related event under surveillance.

PRIMARY PREVENTION. Efforts to prevent the occurrence of a disease or health condition. Examples of primary prevention include immune globulin for hepatitis A contacts, partner notification for sexually transmitted diseases, and anti-smoking campaigns.

PRINCIPLES OF EPIDEMIOLOGY. An introduction to applied epidemiology and biostatistics published by the Centers for Disease Control and Prevention. This self-study course is an excellent reference covering basic epidemiologic principles and practices that are used in the surveillance and investigation of health-related events. Lesson 1 (Introduction to Epidemiology) and Lesson 6 (Investigating an Outbreak) of “Principles of Epidemiology” can be accessed through the case study by selecting References on the Menu Bar and then clicking on “Principles of Epidemiology”.

PRODUCER/PROCESSOR. The initial entity in the chain of production of a food item that

produced the item. The source may grow or raise the food item, harvest it, manufacture it, and/or package it for sale and includes establishments such as farms, ranches, factories, and slaughterhouses.

PROPAGATED OUTBREAK. An outbreak that does not have a common source, but instead spreads from person to person.

PROPORTION. A type of 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), as a fraction (1/5), or, loosely, as a percentage (20%).

PROSPECTIVELY. As they occur in the future.

PROTECTIVE FACTOR. An aspect of personal behavior or lifestyle, an environmental exposure, or an inborn or inherited characteristic that is associated with a decreased occurrence of disease or other health-related event or condition. To be a protective factor, an exposure must have a measure of association (i.e., relative risk or odds ratio) less than 1.0. Tests of statistical significance must then be used to determine if the observed measure of association might have occurred due to chance alone.

PULLET. A young domestic hen, usually less than one year.

PULSED FIELD GEL ELECTROPHORESIS (PFGE). A method for subtyping microorganisms based on their DNA composition. (Identification of bacteria with the same PFGE pattern suggests that the isolates have a common ancestry, that is, arose from the same parent and could represent an outbreak.) In pulsed field gel electrophoresis, the DNA is cut into pieces. The pieces are separated by placing them in a jelly-like substance (i.e., the gel) to which a pulsing electric field is applied. The electric field separates the DNA pieces across the gel based on size. The resulting DNA bands are made to fluoresce and are read under ultraviolet illumination.

PULSENET. An international network of public health laboratories that perform PFGE. PulseNet includes all state and some local public health laboratories and the food safety laboratories at the U.S. Food and Drug Administration and the Food Safety and Inspection Service of the U.S. Department of Agriculture. The purpose of PulseNet is to compare PFGE patterns from bacteria isolated at different geographic locations and find matches that could represent an outbreak.

PUNCH A CRÉME. A traditional Christmas drink from Trinidad and Tobago made from raw eggs, evaporated and condensed milk, and rum.

p-VALUE. The probability that an observed association between an exposure and a disease could have occurred due to chance alone, if the exposure was not actually related to the disease.

R

RANDOM. Having no specific pattern; determined solely by chance.

RANDOM DIGIT DIALING. A method to identify subjects for an epidemiologic study using the telephone. Investigators randomly select seven digits to create a potential telephone number and call the number to determine if an appropriate (and willing) study subject is available.

RANDOMLY SELECT. Use a method of selection so that each individual has the same probability of selection.

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 frequency with which an event occurs in a defined population.

RATIO. The value obtained by dividing one quantity by another.

REACTIVE ARTHRITIS. A disorder that causes three seemingly unrelated symptoms: pains in the joints, irritation of the eyes, and painful urination. Symptoms can last for months or years, and can lead to chronic arthritis which is difficult to treat. Reactive arthritis, sometimes referred to as Reiter's syndrome, occurs as a "reaction" to an infection that started elsewhere in the body. Antibiotic treatment of the infection does not influence the occurrence of this syndrome.

RECTANGULAR COORDINATE SYSTEM. A frame used to establish the position of points on a graph that uses two lines, a horizontal and a vertical line, that intersect at a right angle.

REHYDRATION. The process of restoring lost water to the body tissues and fluids. Prompt rehydration is imperative whenever dehydration occurs from diarrhea, exposure, lack of drinking water, or medication use. Rehydration can be undertaken by the oral or intravenous administration of fluids.

RELATIVE RISK. A comparison of the risk of some health-related event such as disease or death between two groups. The relative risk is the measure of association for a cohort study. It tells us how much more likely people exposed to a factor of interest (e.g., eating some food item) are likely to become ill than people who were not exposed to the factor.

REPORTING DELAY. The amount of time between the diagnosis of a health-related event by a health care provider or clinical laboratory and the reporting of that event to the public health agency responsible for instituting control and prevention measures.

REPRESENTATIVE. The extent to which reported cases accurately describe the occurrence of a health event by time, place, and person.

REPRESENTATIVENESS. One of the nine basic attributes of a surveillance system.

Representativeness is the extent to which a surveillance system accurately describes the occurrence of a health event over time and its distribution in the population by place and person.

RESERVOIR. A site in which an infectious agent can survive and maintain its ability to carry out its life cycle. A reservoir may or may not be the source from which an agent is transferred to the host. An intermediary (or intermediaries), such as an insect vector or inanimate object, may play some role in getting the agent from the reservoir to the host.

RESTRICTING. Excluding potential cases and controls from participating in a study if they do not have a particular characteristic(s).

REVERSE TRANSCRIPTION-POLYMERASE CHAIN REACTION. A highly sensitive technique for the detection and quantification of a particular messenger RNA (mRNA) in a sample. The technique consists of synthesis of DNA complementary to viral RNA by reverse transcription (RT) and amplification of the DNA by the polymerase chain reaction (PCR). This technique is used to detect and quantify RNA viruses such as HIV, measles, mumps, and norovirus.

RISK. The probability that an event will occur, e.g. that an individual will become ill or die within a stated period of time or age.

RISK FACTOR. An aspect of personal behavior or lifestyle, an environmental exposure, or an inborn or inherited characteristic that is associated with an increased occurrence of disease or other health-related event or condition. To be a risk factor, an exposure must have a measure of association (i.e., relative risk or odds ratio) greater than 1.0. Tests of statistical significance must then be used to determine if the observed measure of association might have occurred due to chance alone.

ROUTINE STOOL CULTURES. Cultures typically undertaken by laboratories when processing stool specimens, unless otherwise instructed. In most laboratories, routine cultures are limited to screening for the following bacteria: *Salmonella*, *Shigella*, and *Campylobacter*. In most instances, cultures for other bacteria (e.g., *Vibrio* and *Yersinia* species, and *E. coli* O157:H7) or testing for nonbacterial pathogens must specifically be requested.

S

SARS. (Severe acute respiratory syndrome) SARS is a viral respiratory illness caused by a coronavirus. The illness usually begins with a high fever which is sometimes associated with chills or other symptoms, including headache, general feeling of discomfort, and body aches. Some people also experience mild respiratory symptoms at the outset. Diarrhea is seen in approximately 10 percent to 20 percent of patients. After 2 to 7 days, SARS patients may develop a dry, nonproductive cough that might be accompanied by or progress to a condition in which the oxygen levels in the blood are low (hypoxia). In 10 percent to 20 percent of cases, patients require mechanical ventilation. Most patients develop pneumonia.

SALMONELLA. The genus of bacteria that causes salmonellosis.

SALMONELLOSIS. A gastrointestinal illness caused by serotypes of *Salmonella* other than *Salmonella* Typhi. Non-typhoidal salmonellosis is characterized by the sudden onset of headache, abdominal pain, diarrhea, nausea, and vomiting. Fever is almost always present. The incubation period for salmonellosis is usually 12-72 hours, but can be longer. The illness typically lasts 4-7 days and the majority of patients recover without treatment. Deaths attributable to non-typhoidal salmonellosis are uncommon, except among the very young, the very old, the debilitated, and the immunosuppressed.

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

SAMPLE SIZE. The number of subjects (e.g., number of cases and controls) included in a study. The sample size is a primary determinant of the precision with which we can estimate an effect in a study (e.g., the confidence interval for an odds ratio): the smaller the sample size, the wider the confidence interval and the larger the sample size, the narrower the confidence interval.

SCATTER DIAGRAM. A graph in which each dot represents paired values for two continuous variables, with the x-axis representing one variable and the y-axis representing the other. Best use: To plot the association between two variables.

SEASONALITY. A characteristic distribution of occurrence that differs throughout the year. Seasonality might indicate hypotheses about the mode of transmission, behavioral factors that increase risk, or other contributors to the disease or condition.

SECONDARY ATTACK RATE. A measure of the frequency of new cases of a disease among the contacts of known cases.

SECONDARY PREVENTION. Efforts to reverse, halt, or slow progression of a disease or health condition. Examples of secondary prevention include prophylactic treatment for tuberculosis skin test converters, treatment of glaucoma, and treatment of diabetes.

SECONDARY SPREAD. Spread of disease from case-patients exposed through the original source of infection to others (e.g., household members, roommates, health care providers) by direct and indirect transmission (e.g., airborne, vehicleborne, and vectorborne transmission).

SENSITIVE. Able to detect cases of the disease under surveillance or outbreaks.

SENSITIVITY. The proportion of persons with disease who are correctly identified by a screening test or case definition as having disease. With regards to surveillance systems, sensitivity is one of the nine basic attributes of a surveillance system. Sensitivity is the ability of the system to detect cases and outbreaks.

SEQUELAE. (singular is sequela) A disability or complication following as a consequence of a disease.

SEQUENCE OF THE AMPLIFIED PRODUCT. The nucleotide composition of DNA synthesized from viral RNA during the reverse transcription-polymerase chain reaction process.

SEQUENTIAL DIGIT DIALING. A method to identify controls for a case-control study using the telephone. Investigators add "1" to the last digit of the case's telephone number and call the number to determine if an appropriate (and willing) control is available. Sequential digit dialing increases the likelihood that a household (as opposed to a business or non-working number) is reached during a telephone call and that the resulting control is from the same neighborhood as the matching case.

SERA. (plural of serum) The portion of animal blood that contains antibodies. For serotyping, the serum contains antibodies to a particular antigen(s). The antibodies in the serum result from immunizing the animal by injection of the desired antigen into the body or by infection with a microorganism containing the antigen.

SEROLOGIC EVIDENCE. Evidence of infection, recent or past, based on the presence of IgG and IgM antibodies to the infectious agent and their concentrations.

SEROTYPE. A group of bacterial isolates of the same genus and species that are related based on selected cell surface antigens.

SEROTYPING. Determination of the subgroup of bacterial isolates of the same genus and species that are related on the basis of the presence of selected antigens.

SHELL EGGS. Eggs that are in the shell and uncooked and unpasteurized when purchased.

SHIGA TOXIN. Toxin that resembles toxins produced by *Shigella dysenteriae*, another cause of bloody diarrhea.

SHORT-TERM CONTROL MEASURES. Interventions that can be implemented quickly and will result in immediate removal of the current problem. Short-term control measures include such things as recall of the implicated food item or closure of a food service establishment.

SIGNIFICANTLY ASSOCIATED. The probability that the observed association could have occurred due to chance alone is equal to or lower than the predetermined cut-off value.

SIGNS. Objective physical findings related to an illness (e.g., elevated temperature, vomiting).

SIGNS OF DEHYDRATION. Objective physical findings related to excessive loss of body water. Signs of dehydration vary with the severity of water loss and include a drop in blood pressure after sitting up or standing up, an increased heart rate, sunken eyes, absent tears, dry mouth and tongue, cool extremities, and decreased urine output.

SIMPLICITY. One of the nine basic attributes of a surveillance system. Simplicity refers to the surveillance system's structure and ease of operation.

SINGLE-STRANDED RNA. One form of the genomic nucleic acid found in animal viruses. Other forms include double-stranded DNA, single stranded DNA, and double stranded RNA. Viruses with double-stranded DNA or single-stranded RNA are most abundant.

SODIUM BENZOATE. A preservative commonly used in food processing.

SPECIES. A group of organisms that is genetically related and bears a close resemblance to one another with respect to their essential features. The species is the second name in the scientific name of an organism. The first name is the genus. Examples of genus and species include *Staphylococcus aureus*, *Bacillus cereus*, and *Escherichia coli*.

SPECIFICITY. The proportion of persons without disease who are correctly identified by a screening test or case definition as not having disease.

SPORADIC. Cases that occur infrequently and irregularly with no apparent clustering by time, place, or person.

SPOT MAP. A map that indicates the location of each case of a rare disease or each case in an outbreak by a place that is potentially relevant to the disease being investigated, such as where each case lived or worked. Best use: To show the location of cases.

STABILITY. One of the nine basic attributes of a surveillance system. Stability refers to the ability of a surveillance system to collect, manage, and provide data properly without failure and be operational when it is needed.

STATISTICAL SIGNIFICANCE. The probability that the observed association could have occurred due to chance alone is equal to or less than a predetermined cut-off value set by the investigator (usually 0.05). "Statistical significance" does not mean that a true association between an exposure and a disease exists, it only means that chance is an unlikely (although not impossible) explanation for the association.

STAPHYLOCOCCAL FOOD POISONING. A foodborne disease caused by the toxin produced by the bacterium *Staphylococcus aureus*. The incubation period is 1-6 hours. Symptoms of staphylococcal food poisoning include severe nausea, vomiting, abdominal cramps, and diarrhea. Fever is sometimes present. Although the diagnosis can be confirmed by isolation of *S. aureus* in the vomitus or stool of patients, these tests are rarely performed.

STOOL HAT. A hat-shaped plastic lid that is placed over the toilet bowl and is used to collect stool specimens. Using this catching device can prevent contamination of the stool by water and dirt.

STOUT AND EGGS. A drink that combines a dark, strong beer or ale with eggs.

STRATIFICATION. Analyzing the exposure-disease association within different categories of a third factor (i.e., creating a three-way table). This analytic approach is used to assess confounding and effect modification.

STRATIFIED ANALYSIS. Analysis in which the exposure-disease association is examined within different categories of a third factor. Stratified analysis is an effective method for looking at the effects of two different exposures on a disease to assess for confounding and effect modification.

SUBTYPING. Categorizing bacteria below the species level on the basis of phenotypic or genetic characteristics that are stable in the individual organism and might be passed to offspring. Subtyping (e.g., serotyping and bacteriophage typing), augments epidemiologic investigations that attempt to link cases of a disease with each other or with potential sources of infection.

SURVEILLANCE. The systematic collection, analysis, interpretation, and dissemination of health data on an ongoing basis. The purpose of surveillance is to gain knowledge of the pattern of disease occurrence and potential in a community, in order to control and prevent disease in the community.

SURVEILLANCE SYSTEM. The means by which health data are collected, analyzed, interpreted, and disseminated on an ongoing basis to control and prevent disease in the community. Surveillance systems take multiple forms. They vary from simple systems that collect data from a single source to electronic systems that receive data from multiple sources to complex, multistage surveys.

SWINE PLAGUE. (also known as hog cholera) A highly contagious and often fatal disease of pigs that is actually caused by a virus. The bacterium isolated by Salmon and Smith was not the cause of swine plague. The true cause of swine plague was not established until the early 20th century.

SYMPTOMS. Subjective complaints related to an illness (e.g., fever, nausea).

SYNDROME. A group of signs and symptoms that tend to occur together and reflect the presence of a particular disease or health condition.

T

TABLE. A set of data arranged in rows and columns.

TABLE SHELL. A table that is complete except for the data.

TEMPERATURE SENSATION REVERSAL. A neurologic condition in which hot surfaces feel cold to the touch and cold surfaces feel hot.

TENESMUS. A painful spasm of the anal sphincter (i.e., muscle that encircles the anus) that is accompanied by the urgent desire to evacuate the bowel or bladder.

TERTIARY PREVENTION. Efforts to minimize the effects of disease and disability among those already ill. An example of tertiary prevention is rehabilitation of stroke victims.

TEST OF STATISTICAL SIGNIFICANCE. A calculation based on the study outcome that is used to determine the probability that an observed measure of association occurred due to chance. Tests of statistical significance include the chi-square and Fisher exact tests.

THALIDOMIDE. A drug first introduced in Europe in the 1950s as a sedative that was prescribed for nausea and insomnia in pregnant women. It was found to be the cause of severe birth defects in children whose mothers had taken the drug in their first trimester of pregnancy and was never approved for distribution in the United States.

THROMBOCYTOPENIC PURPURA. A potentially serious illness due to a low platelet count that is characterized by hemorrhages in the skin, mucous membranes, and internal organs. It can last from a few weeks to several months and can be fatal.

THYROTOXICOSIS. An illness that results from excessive amounts of thyroid hormone. Symptoms include sleeplessness, nervousness, headaches, increased heart rate or palpitations, shortness of breath, fatigue, excessive sweating, tremor, heat intolerance, and weight loss. Thyrotoxicosis can be caused by excessive production of thyroid hormone by the body itself or introduction of thyroid hormone from an outside source.

TIMELINESS. One of the nine basic attributes of a surveillance system. Timeliness reflects the delay between steps in a surveillance system. It is best assessed by determining the availability of information for the control of the disease or health event, including immediate interventions, long-term prevention efforts, and program planning. Four points in time are usually considered when measuring timeliness and the delay between steps of a surveillance system: 1) time of onset of the disease or health event, 2) time of diagnosis, 3) time of receipt of the case report by the health department, and 4) time of implementation of control activities. Usually one of the first two points of time is used as the starting point and each of the other two points is used as an endpoint.

TIMELY. Able to provide information for the control of the disease under surveillance within the necessary time frame, including immediate interventions, long-term prevention efforts, or program planning.

TRACEBACK INVESTIGATION. The process of determining the distribution and production chain for a food that has been implicated during an epidemiologic investigation of a foodborne illness. A traceback usually begins with information available at the time of purchase of the implicated food item and extends back to the beginning of its production. All production steps, from harvest to consumption, are examined.

TRANSMISSION OF INFECTION. Any mode or mechanism by which an infectious agent is spread through the environment or to another person.

TRANSOVARIAN TRANSMISSION. Transmission that occurs when the hen laying the egg has an ovarian infection and the contents of the egg are contaminated with the pathogen before the eggshell is formed. Through transovarian transmission, an egg that is intact, unbroken, and normal-looking can be colonized with the pathogen.

TREND. A long-term movement or change in frequency, usually upwards or downwards.

TRUE BURDEN OF DISEASE. An estimate, based on the best available information, of all cases of a disease that occur in the community, including not only those detected and reported to the appropriate public health agency but an estimate of those that are not detected and those that are detected but not reported.

TUBULES. Microscopic structures in the kidney that reabsorb sodium and water from the urine as well as glucose, potassium, phosphate, amino acids, and proteins.

TWO-TAILED TEST. A test of statistical significance for the measure of association between an exposure and a disease in which there is interest in determining whether the exposure either increases or decreases the risk of disease. (In other words, the effect can be either positive or negative and still be statistically significant.) For example, in studying environmental exposures and cancer, there might be interest both in determining if an exposure increases the risk of disease (i.e., is a risk factor) or decreases the risk of disease (i.e., is protective).

TYPHOID FEVER. An illness caused by the bacterium *Salmonella Typhi* that is characterized by a sustained fever as high as 103° to 104° F (39° to 40° C), severe headache, weakness, stomach pains, and loss of appetite. In about 25% of cases, rose-colored spots appear on the skin. The incubation period depends on the size of the infecting dose but usually ranges from 8-14 days. With the use of antibiotics, the case-fatality rate is about 1%. However, persons who do not get treatment may continue to have fever for weeks or months, and as many as 20% may die from complications of the infection.

U

UREMIA. An excess of urea and other nitrogenous wastes in the blood due to kidney failure.

UNENVELOPED. Lacking an outer membrane (i.e., consisting of a lipid bilayer and associated glycoproteins) that surrounds the viral nucleic acid. Viruses that have an envelope include the human immunodeficiency virus, the Ebola virus, and the measles virus.

UNKNOWN AGENT. The agent causing the outbreak could not be determined. This may be due to a lack of specimen collection, inappropriate collection procedures, or lack of testing for the specific agent. It is likely that a high proportion of outbreaks for which a causative agent is not identified are due to viruses (e.g., norovirus) due to lack of routine testing (or available testing procedures) for viruses.

V

VALIDITY. The degree to which a measurement actually measures or detects what it is supposed to measure.

VARIABLE. Any characteristic or attribute that can be measured.

VARICELLA. (chickenpox) A febrile rash illness resulting from primary infection with the varicella-zoster virus. Varicella is highly infectious. While mostly a mild disorder in childhood, varicella tends to be more severe in adults. It may be fatal, especially in neonates and in immunocompromised persons. The incubation period for varicella is 2 to 3 weeks, most commonly 14-16 days.

VEHICLE. Item that indirectly transmits a disease agent such as food, water, biological products (e.g., blood), and fomites (e.g., handkerchiefs, bedding, or surgical equipment). The vehicle may passively carry the agent or provide an environment in which the agent grows, multiplies, or produces toxin.

VENN DIAGRAM. A graphical representation of the relationship(s) between two or more sets or groups of items that share something in common. Each set is represented by an oval, rectangle, or other geometric shape. The items common to more than one set are represented by the overlap of the geometric shapes. Venn diagrams are used in scientific and engineering presentations, theoretical mathematics, computer applications, and statistics. Venn diagrams are used by teachers in the classroom as a mechanism to help students compare and contrast two items. A British philosopher and mathematician, John Venn, introduced the Venn diagram in 1881, although it is believed that this method of representing the overlap in sets originated much earlier.

VEROTOXIN. Toxins that affect Vero cell cultures in the laboratory. Vero cells are a continuous line of cells grown in the laboratory that are derived from the kidney of the green monkey and are commonly used in viral assays.

VIRAL GASTROENTERITIS. An illness potentially caused by several viruses including rotavirus, enteric adenoviruses, caliciviruses, astroviruses, and noroviruses. The main symptoms of viral gastroenteritis are watery diarrhea and vomiting; however, affected persons may also have headache, fever, and abdominal cramps.

VIRULENCE. The extent to which a pathogen harms its host.

VOLUNTARY RECALL. Actions taken by a business establishment on its own initiative to remove a product from the market.

W

WHITE BLOOD CELLS. Also known as leukocytes. Cells in the blood that defend the body against infections and foreign substances. Types of white blood cells include neutrophils, eosinophils, basophils, lymphocytes, and monocytes. Like all blood cells, white blood cells are produced in the bone marrow. When an infection is present, the production of selected types of white blood cells usually increases. A normal white blood cell count is 4.8-10.8 per cubic mm.

WORLD HEALTH ORGANIZATION (WHO). The health agency of the United Nations, established in 1948, whose primary objective is the attainment of the health by all peoples in all countries. WHO is governed by its 192 Member States through the World Health Assembly.