

NCES Glossary

Analysis of Variance: Analysis of variance (ANOVA) is a collection of statistical models and their associated estimation procedures (such as the "variation" among and between groups) used to test or analyze the differences among group means in a sample.

This technique is operated by modeling the value of the dependent variable Y as a function of an overall mean " μ ", related independent variables $X_1 \dots X_n$, and a residual "e" that is an independent normally distributed random variable.

Bias (due to nonresponse): The difference that occurs when respondents differ as a group from non-respondents on a characteristic being studied.

Bias (of an estimate): The difference between the expected value of a sample estimate and the corresponding true value for the population.

Bootstrap: See Replication techniques.

CAPI: Computer Assisted Personal Interviewing enables data collection staff to use portable microcomputers to administer a data collection form while viewing the form on the computer screen. As responses are entered directly into the computer, they are used to guide the interview and are automatically checked for specified range, format, and consistency edits.

CATI: Computer Assisted Telephone Interviewing uses a computer system that allows a telephone interviewer to administer a data collection form over the phone while viewing the form on a computer screen. As the interviewer enters responses directly into the computer, the responses are used to guide the interview and are automatically checked for specified range, format, and consistency edits.

Cluster: a group of similar people, things or objects positioned or occurring closely together.

Cluster Design: Cluster Design refers to a type of sampling method in which the researcher divides the population into separate groups, of similarities - called clusters. A random sample of clusters is selected from the population. The researcher then conducts analysis on data from the sampled clusters (which usually involves further subsampling within clusters).

Cohort: A group of individuals who have a statistical factor in common (e.g., year of birth, grade in school, year of high school graduation).

Community college: typically, only refers to 2-year public, where 2-year allows for any type of control.

Composite variables: Variables constructed through the combination of two or more variables (e.g., socioeconomic status) or through calculation by applying a mathematical function to a variable. Composite variables are also referred to as derived, constructed, or classification variables.

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Concatenating: Concatenating combines two or more data sets in one by placing each one after the other.

Correlation Analysis: Correlation analysis is a statistical evaluation tool used to study the strength of a relationship between two, numerically measured, continuous variables. The value of the correlation can be either positive or negative.

Correlation Coefficient: correlation coefficient is represented by “r” where $-1 \leq r \leq +1$ is a value that measures the strength and direction of a linear relationship between two variables.

Design effect: The cumulative effect of the various design factors affecting the precision of statistics is often modeled as the sample design effect. The design effect, DEFF, is defined as the ratio of the sampling variance of the statistic (e.g., a mean or a proportion) under the actual sampling design divided by the variance that would be expected for a simple random sample of the same size. Hence, the design effect is equal to one, by definition, for simple random samples. For clustered multistage sampling designs, the design effect is greater than unity, reflecting that the precision is less than could be achieved with a simple random sample of the same size (if that were the sampling design). The size of the design effect depends largely on the intraclass correlation of the survey observations within the primary sampling units. Hence, statistics that are based on observations that are highly correlated within units will have higher design effects.

Logical imputation: Logical imputation can be applied in situations where a missing response can be inferred with certainty (or high degree of probability) from other information in the data record.

Poststratum averages: In the use of poststratum averages, a record with missing data is assigned the mean value of those cases in the same “poststratum” for which information on the item is available.

Proc Impute: This is an advanced software package that performs three steps for each target variable to be imputed:

- 1) Uses stepwise regression analysis to find the best combination of predictors among all variables included in the imputation model;
- 2) Creates homogeneous cells of records which have close predicted regression values; and
- 3) Imputes each missing record in a given cell with a weighted average of two donors, one from its own cell and the other from an adjacent cell.

Regression and other modeling techniques: These techniques operate by modeling the variable to be imputed, Y as a function of related independent variables, X1, X2, ..., Xp. To preserve the variability of the Y's at specific values of X1, ..., Xp, a residual, $\hat{\epsilon}$, is sometimes added to the predicted value determined from the model.

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Independent variable: In regression analysis, when a random variable, y , is expressed as a function of variables X_1, X_2, \dots , plus a stochastic term, the X 's are known as "independent variables."

Disproportionate stratification: a type of stratified sampling in which the sample size of each stratum is not proportionate to the population size of the stratum. In this type of sampling two or more strata may have different sampling fractions.

Item nonresponse: An item on a data collection form that is missing when a response was expected.

Jackknife method: A method of replication that creates replicates (subsets) by excluding one unit at a time from the sample.

Key items or critical items: Items deemed crucial to the methodological or analytical objectives of the study.

Keyfitz approach: A method of probability selection that maximizes the selected units from a past sample.

Logic edit: See Edits.

Logical imputation: See Imputation.

Match-merge: A match-merge combines observations based on the values of one or more variables. Data files can also be matched by a unique identifying variable, a value or group.

Measurement error: Measurement error refers to errors in estimates resulting from incorrect responses gathered during the data collection phase of a survey. Measurement errors result, for instance, when the respondent gives (intentionally or unintentionally) incorrect answers, the interviewer misunderstands or records answers incorrectly, the interviewer influences the responses, the questionnaire is misinterpreted, etc.

Median: Median is a value or quantity lying at the midpoint of a frequency distribution of observed values or quantities, such that there is an equal probability of falling above or below it.

Median Household Income: Median Household Income is the gross household income distribution divided into two equal parts where one-half of the income falls below the median income value and one-half above the median income value.

Nonresponse: Cases in data collection activities in which potential data providers are contacted but refuse to reply or are unable to do so for reasons such as deafness or illness.

Nonresponse bias: This occurs when respondents as a group differ from nonrespondents in their answers to questions on a data collection form.

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Nonsampling error: This term is used to describe variations in the estimates that may be caused by population coverage limitations, as well as data collection, processing, and reporting procedures. The sources of nonsampling errors are typically problems like unit and item nonresponse, the differences in respondents' interpretations of the meaning of the questions, response differences related to the particular time the survey was conducted, and mistakes in data preparation.

One-to-Many matching: One-to-many matching uses a unique identifying variable to match multiple observations across data sets. In other words, the variable that is unique in one data set is matched with multiple records/rows in the second data set.

One-to-one merge: A one-to-one merge combines observations from one or more data sets into one data set according to the position of the observations in the data sets.

Open-ended: A type of interview question that does not limit the potential response to predetermined alternatives.

Ordinary least squares (OLS): The estimator that minimizes the sum of squared residuals.

Out-of-range response: A response that is outside of the predetermined range of values considered acceptable for a particular item.

Oversampling: Deliberately sampling a portion of the population at a higher rate than the remainder of the population.

Population: All individuals in the group to which conclusions from a data collection activity are to be applied.

Population variance: A measure of dispersion defined as the average of the squared deviations between the observed values of the elements of a population and the corresponding mean of those values. MS Prefers use of "target population" – do not use "sample population."

Poststratification: An estimation method that adjusts the sampling weights so that they sum to specified population totals corresponding to the levels of a particular response variable.

Poststratification adjustment: A weight adjustment that forces survey estimates to match independent population totals within selected poststrata (adjustment cells).

Precision: The difference between a sample-based estimate and its expected value. Precision is measured by the sampling error (or standard error) of an estimate.

Pretest: A test to determine performance prior to the administration of a data collection activity.

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Probability sample: A sample selected by a method such that each unit has a fixed and determined probability of selection.

Proportionate stratification: a type of stratified sampling in which the sample size of each stratum is proportionate to the population size of the stratum. In this type of sampling each stratum has the same sampling fraction.

Psychometrics: the field of study that is concerned with the theory and technique of psychological measurement, which includes the measurement of knowledge, abilities, attitudes, personality traits and the differences between individuals.

Psychomotor domains: Psychomotor domain includes physical movement, coordination, and the use of motor-skill areas. It ranges from simple repetitive tasks to such task as operating a complex equipment.

Regression analysis: A statistical technique for investigating and modeling the relationship between variables.

Replicate estimate: An estimate of the population quantity based on the replicate subsample using the same estimation methods used to compute the full sample estimate.

Replicate sample: One of a set of subsamples, each obtained by deleting a number of observations in the original sample for the purpose of computing the appropriate variance based on the complex design of the survey.

Replicate weight: The weight assigned to an observation for a particular replicate subsample.

Replicates: A term often used to refer to either the replicate sample or the replicate estimate, depending on context.

Replication techniques: Methods of estimating sampling errors that involve repeated estimation of the same statistic using various subsets of data providers. The major methods are balanced repeated replication (BRR), bootstrap, and the jackknife technique.

Sample: A subgroup selected from the entire population.

Rounding convention: typical system for rounding decimals.

Sampling error: When a sample rather than the entire population is surveyed, estimates can differ from the true population values that they represent. This difference, or sampling error, occurs by chance, and its variability is measured by the standard error of the estimate. Sample estimates from a given survey design are unbiased when an average of the estimates from all possible samples would yield, hypothetically, the true population value. In this case, the sample estimate and its standard error can be used to construct approximate confidence intervals, or ranges of values, that include the true population value with known probabilities.

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Sampling variance: A measure of dispersion of values of a statistic that would occur if the survey were repeated a large number of times using the same sample design, instrument, and data collection methodology. The square root of the sampling variance is the standard error.

Sampling weights: See Weighted estimates.

Scaling (item response theory): Item response theory (IRT) scaling assumes some uniformity in response patterns when items require similar skills. Such uniformity can be used to characterize both examinees and items in terms of a common scale attached to the skills, even when all examinees do not take identical sets of items. Comparisons of items and examinees can then be made in reference to a scale, rather than to the percent correct. IRT scaling also allows the distributions of examinee groups to be compared.

This is accomplished by modeling the probability of answering a question in a certain way as a mathematical function of proficiency or skill. The underlying principle of IRT is that, when a number of items require similar skills, the regularities observed across patterns of response can often be used to characterize both respondents and tasks in terms of a relatively small number of variables. When aggregated through appropriate mathematical formulas, these variables capture the dominant features of the data. IRT enables the assessment of a sample of students in a subject area or subarea on a common scale even if different students have been administered different exercises.

Skip pattern check: See Edits.

Special population: A subset of the total population distinguishable by unique needs, characteristics, or interests (e.g., disadvantaged students, gifted students, physically or mentally handicapped students, vocational education students).

Spiraling: See Balanced Incomplete Block (BIB) spiraling.

Socioemotional Functioning: Social-emotional functioning is the experience, expression, and management of emotions and the ability to establish positive and rewarding relationships with others. It includes both intra- and interpersonal processes.

Standard deviation: The most widely used measure of dispersion of a set of values. It is equal to the positive square root of the population variance.

Standard error: The positive square root of the sampling variance. It is a measure of the dispersion of the sampling distribution of a statistic. Standard errors are used to establish confidence intervals for the statistics being analyzed.

Statistically significant: There is a low probability that the result is attributable to chance alone.

Stratification: In statistics the term stratification is the act of dividing the (study) population into subsets (called strata) from which an independent (or probability) sample is randomly selected.

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Systematic sampling: is a probability sampling method in which sample elements are selected from a targeted population frame (usually stratified by important subsets) by selecting a random starting point and a fixed, periodic interval. The interval is called the sampling interval and is calculated by dividing the targeted population size by the desired sample size.

Taylor Series: The Taylor Series variance estimation procedure is a technique to estimate the variances of nonlinear statistics. The procedure takes the first-order Taylor Series approximation of the nonlinear statistic and then substitutes the linear representation into the appropriate variance formula based on the sample design. For stratified multistage surveys such as the National Postsecondary Student Aid Study (NPSAS), the Taylor Series procedure requires analysis strata and analysis replicates defined from the sampling strata and primary sampling units (PSUs) used in the first stage of sampling.

Target Population: target population is the total group of individuals or units from which the sample is to be drawn and it defines the population for which the findings of the survey are meant to be generalized.

Time series: A set of ordered observations on a quantitative characteristic of an individual or collective phenomenon taken at different points in time. Usually the observations are successive and equally spaced in time.

Unit nonresponse: The failure of a survey respondent to provide any information.

Variable: A quantity that may assume any one of a set of values.

Updating: Updating replaces the values of variables in one data set with non-missing values from another data set.

Variance: See Population variance and Sampling variance.

Weighted estimates: Estimates from a sample survey in which the sample data are weighted (multiplied) by factors reflecting the sample design. The weights (referred to as sampling weights) are typically equal to the reciprocals of the overall selection probabilities, multiplied by a nonresponse or poststratification adjustment.