As a library, NLM provides access to scientific literature. Inclusion in an NLM database does not imply endorsement of, or agreement with, the contents by NLM or the National Institutes of Health. Learn more: PMC Disclaimer | PMC Copyright Notice Identification and description of variables used in any study is a necessary component in biomedical research. Statistical analyses rely on the type of variables that are involved in the study. In this short article, we introduce the different types of biological variables. A researcher has to be familiar with the type of variable he/she is dealing with in his/her research to decide about appropriate graphs/diagrams, summary measures and statistical analysis.Keywords: Biological variables, discrete variables, continuous variables, categorical variablesResearch question is the initial and integral step in any research work. Depending on the research questions to be answered and the data available, researchers decide about the statistical tests for the analysis of data.Information collected about a sample of subjects (often patients) comprises characteristics which vary among the subjects. Any characteristic, which varies from individual to individual is called a variable (1). The characteristics such as age, sex, height, weight, body mass index (BMI), blood group, body temperature, blood glucose level, blood pressure, heart rate, number of teeth, severity of disease (mild, moderate, severe) etc. are some of the examples for biological variables. A basic distinction in the nature between these variables is their quantitative or qualitative (categorical) measurements (1,2).Quantitative variables are those characteristics which can be a count or measured numerically. They can be continuous or discrete. Continuous variable can theoretically take infinitely many values in a given range. This means that, we can always find an intermediate value between any two values, however close they are. For example, in a given range of 510 cm length one can write infinitely many values like 5, 5.1, 5.12, 5.01, 5.003 cm etc. depending on the extent of accuracy decided by the researcher. Height of a person, weight, age, arm length, blood pressure, temperature, glucose level are some of the examples for continuous variable. Here the obtained measurements can take any value in a given range.Discrete variable (discontinuous variable) can take only specified number of values in a given range. For example, number of children per family in a given range of 05 can be 0, 1, 2, 3, 4 and 5. No more values in this range can be written. Number of visits to hospital in a year, number of children in a family, number of admitted patients in a hospital ward, number of missing teeth etc. are some of the examples for discrete variables. Discrete variables are usually counts.Qualitative (categorical) variables are those characteristics which are not numerically measurable. These variables are either nominal (no natural ordering) or ordinal (ordered categories). Usually, for the purpose of data entry and analysis using software, categories are coded assigning numerical values.Nominal variables are for only classification or categorization based on some distinctively different characteristic, but we cannot rank order these categories. Typical examples of nominal variables are sex, religion, blood group, symptoms of disease, cause of death etc. Numerical values assigned to different categories are useful for the purpose of identification only (e.g., 1= male, 2= female). When a qualitative variable has only two categories (alive/dead, male/female, diabetic/non-diabetic), it is called a binary or dichotomous variable. Nominal variables are summarized through counting (frequency) and expressing proportion of each category (percentage).Ordinal variables allow us to rank order the categories in terms of which category has less and which category has more of the quality represented by the variable, but the distances between categories are not known. A typical example of an ordinal variable in medicine is the stages of a diseases (stage I to stage IV). For example, we know that stage I is less severe than stage II of a disease but we cannot tell the exact difference between the two values. Socioeconomic status of families (low, middle and high socio-economic status), BMI category (underweight, normal, overweight, obese), disease condition (deteriorated, same, improved), Pain score etc. are a few examples for ordinal variables. Numerical values assigned for various categories are useful for identification as well as rank ordering (e.g., 1= low, 2= middle and 3= high income group). Ordinal variables are summarized through counting (frequency) and expressing proportion of each category (percentage).Quantitative variables are often converted to categorical ones using Cut-points. Instead of presenting the mean fasting glucose level of male and female subjects, one may prefer to present the proportion of diabetics in male and female population using a fasting glucose level of 110 mg/dl, as the cut-point to categorize the subjects as diabetic/non-diabetic. However, categorizing a continuous variable leads to loss of information (3). For example, while categorizing, subjects with fasting glucose level of 85 and 109 mg/dL are treated alike and classified as non-diabetic. Similarly, subjects with glucose level 111 and 150 mg/dL are classified as diabetic. The difference in the values will not be noticed while presenting only the number of diabetic and non-diabetic cases.Likert scale is developed with a principle of measuring attitudes by asking people to respond to a series of statements about a topic, in terms of the extent to which they agree with them (4). A statement (Likert item) such as: Its important for all biologists to learn statistics can be asked to be rated as 1= strongly disagree, 2= disagree, 3= neither agree nor disagree, 4= agree, or 5= strongly agree or sometimes on seven values instead of five, including very strongly disagree and very strongly agree. Variables measured on Likert item are a type of ordinal variables. Likert scale is the result of adding together the scores on several Likert items. Likert scale may be treated as a continuous variable. Descriptive and inferential statistics depend on the distribution of scores, symmetric or skewed.Qualitative data (nominal or ordinal) can be presented in the form of frequency tables. We count the number of subjects/units in each category of the variable along with percentage and present the numbers and percentages in a table. E.g., we summarize Blood group distribution of 100 subjects in the form of a table showing blood group and corresponding frequency along with percentages. If we have the data for two categorical variables, data may be presented in the form of a contingency table showing frequency and percentages.As ordinal variables are also categorical variables with a pre-determined order, the descriptive measures such as frequency and percentage has to be reported when the number of categories are few. In addition, median, inter-quartile range along with maximum and the minimum value is considered appropriate for summarizing ordinal variables.Nominal data and ordinal data with limited number of categories can also be presented in a diagrammatic form, such as a bar chart and pie chart. In a bar chart, length of the bars represents the frequency or relative frequency of each category of the variable. Usually the bars are of equal width and there is a space between them. A pie chart is essentially a circle divided into segments with the area of each proportional to the observed frequency in each category of the variable. Total area represents the total frequency.Mean and standard deviation are appropriate summary measures for continuous variables with symmetrical distributions. Median and inter-quartile range are to be computed to summarize quantitative variables with skewed distributions. Range is informative if used as a supplement to standard deviation or inter quartile range. Discrete variables may be summarized and analyzed either as a continuous variable or as an ordinal variable depending on the number of distinct values.Quantitative data can be represented graphically by means of a histogram. Histogram is useful to decide about the shape of the distribution, symmetrical or skewed. But, with small samples, histogram may not be useful to identify the shape. As a rule of thumb, if the mean is smaller than twice the standard deviation the data are likely to be skewed for variable with positive values (5). Quantitative data can also be displayed as stem & leaf plots, dot plots, box & whisker plots and scatterplots, depending on the situation (6).Type of the variables decides the type of statistical analyses to be performed, parametric or non-parametric. Parametric methods, such as t-tests, analysis of variance (ANOVA, Pearsons correlation, and regression, require the assumption that the data follow a normal distribution and that variances of the distributions are equal. Frequently used nonparametric methods are Mann-Whitney or Wilcoxon rank sum test, Wilcoxon signed rank test and rank correlation. Non-parametric methods, make no assumptions about the distribution of the data; they use the rank order of observations rather than actual measurements (7). Chi-square test for Fishers exact test if the numbers are very small is the most often used method to compare categorical data. Failure to pay attention to assumptions and their implications can lead to increase in type I or type II errors.We analyze data from similar studies, completely differently depending on the type of variable involved. For example, let us say that our target population is 50+ age group in a certain population and we have measured the variable systolic blood pressure in a sample of 40 male and 40 female subjects, and our null hypothesis is Male and female population have the same systolic blood pressure. We would compare the mean blood pressure in males and females with a two-sample t-test (parametric test). If the variable is converted to hypertension status (hypertensive/normal), it is a nominal variable, and we would compare the hypertension frequencies in males and females with a chi-square test (non-parametric test). We find smaller P value for t-test compared to chi-square test. As important message that we try to convey here is that, quantitative tests will have more power for a continuous variable than the corresponding nominal or ordinal variable (8). In other words, to achieve the same power as that of a parametric test, non-parametric tests require larger sample size than a parametric test. Therefore, one may categorize the data for the purpose of presentation (e.g., hypertensive/normal), but not for statistical analysis.(3).Detailed discussion of various tests is out of the scope of this article. Campbell & Swinscow (2) have summarized the tests suitable for various types of variables in a single table. For computation procedure and more details about various parametric tests, researchers may refer some standard text books (1,3,8). For a good discussion of a number of nonparametric tests readers may refer Siegel and Castellan (9) and Conover (10).The type of descriptive and analytical measures to be used in data summarization and analysis, all depend on the type of variables. Therefore, to obtain the relevant measures for dataset at hand, we recommend the researchers to study the characteristics of data (categorical, quantitative) and shape of the frequency distribution (symmetrical bell shaped, skewed) before deciding about the descriptive measures, graphs and diagrams, and statistical tests suitable for the presentation and analysis of data.None.1.Daniel WW. editor. Biostatistics: A foundation for analysis in the health sciences. 6th ed. New York: John Wiley & Sons, 1995. [Google Scholar]2.Campbell MJ, Swinscow TD. editors. Statistics at Square One. 11th ed. Oxford: Wiley-Blackwell, 2009. 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[Google Scholar]Articles from Journal of Thoracic Disease are provided here courtesy of AME Publications How can financial brands set themselves apart through visual storytelling? Our experts explainHow can financial brands set themselves apart through visual storytelling? Our experts explainLearn MoreThe Motorsport Images Collections captures events from 1895 to todays most recentcoverage.Discover The CollectionCurated, compelling, and worth your time. Explore our latest gallery of EditorsPicks.Browse Editors' FavoritesHow can financial brands set themselves apart through visual storytelling? Our experts explainLearn MoreThe Motorsport Images Collections captures events from 1895 to todays most recentcoverage.Discover The CollectionCurated, compelling, and worth your time. Explore our latest gallery of EditorsPicks.Browse Editors' FavoritesHow can financial brands set themselves apart through visual storytelling? Our experts explainLearn MoreThe Motorsport Images Collections captures events from 1895 to todays most recentcoverage.Discover The CollectionCurated, compelling, and worth your time. Explore our latest gallery of EditorsPicks.Browse Editors' FavoritesThe biggest ethical dilemma in qualitative research is the researchers responsibility for disclosure of information. The decision on whether to disclose information to any interested party to research or even to conceal information from concerned individuals and groups forms the basis of the dilemma. Every research in itself, be it finding solutions and researchers interest will be to find the necessary information. As a result, there may be a need to conceal some information to ensure a smooth research process. Similarly, the results of the research might be of public interest and prompt for disclosure, to the compromise of a groups interest. Get a custom coursework on Qualitative Research: Strengths and Weakness Concealing information or even the researchers identity has in the past been to the success of major research activities. Similarly, participants in research are supposed to be informed of the nature of the research before they can consent to be part of such activities. Further, the guarantee of privacy should be offered to the participants before the extent of confidentiality should also be made before the commencement of the research. A researcher is therefore expected either to consider the success of the research at the expense of ethics of disclosure or to prioritize ethics (Berg and Lune, 2011).Primary reasons for using qualitative research and questions addressed by qualitative researchQualitative research is aimed at investigations on relationships. Every research initiative will, therefore, be based on goals and reasons for making conclusions and recommendations. As Flick and Steinke explain, the major reasons for qualitative research are description, a test of hypothesis and theory development (2004, p. 150). This is because qualitative research activities are exploratory. They, as a result, seek to develop relationships, investigate the significance of such relationships, and develop a basis for explaining the identified or existing relationships.A research initiative to investigate trends in the prevalence of AIDS takes across age groups may, for example, be undertaken with the objective of exploring descriptive statistics such as mean, mode, and median across the considered age groups. Similarly, investigating trends among or within the groups may call for a test of hypothesis for establishing confidence through tests of significance on investigated trends. Qualitative research, through qualitative hypothesis, is also used as a basis for establishing theory (Flick and Steinke, 2004).Since research questions often directions to exploring research objectives, they are supposed to be aligned to the objectives and reasons for the particular research. Qualitative research, therefore, addresses questions on descriptive statistics, tests of significance and theory development (Flick and Steinke, 2004)Triangulation of methods and their benefitsTriangulation of methods refers to the application of many approaches towards establishing findings of the research. The method is based on the concept that the application of many methods yields more accurate conclusions. The triangulation concept is derived from surveying methods in which many lines are used in the estimation of points. The concept is therefore mapped onto statistical research to use different approaches such as sampling techniques, analytical approaches, and diversification of samples in research. Triangulation of methods may also be understood in its literal meaning as the use of a variety of methods in research activity (Berg and Lune, 2011).Then exist a variety of classes of triangulation. Data triangulation, for instance, refers to the use of approaches such as time, space, and person (Berg and Lune, 2011, p. 7). While time triangulation refers to the consideration of data from different time frames, space triangulation refers to physical or geographical consideration and person triangulations consider the nature and type of sample used in research. Other classes include investigator, theory, and methodological triangulation (Berg and Lune, 2011, p. 7). The benefits of triangulations are therefore its broader scope of research and a resultant accuracy in results and conclusions (Berg and Lune, 2011). 1 hour! The minimum time our certified writers need to deliver a 100% original paper! Sampling strategies for qualitative researchSampling strategies form one of the distinctions between qualitative and quantitative research approaches. The most commonly used sampling strategies in qualitative research are criterion-based sampling and theoretical sampling (Ritchie and Lewis, 2003, p. 78, 80). Criterion, as a basis for sampling, is used in cases where the participants in the research posses defined properties that are relevant to the research. The main objective of this strategy is to obtain adequate representation through the selected sample. An element will, for example, be selected to represent a particular geographical area, group, or a behavioral characteristic. Criterion based sampling is further divided into several classes which include homogenous sampling, heterogeneous sampling, extreme case sampling, intensity sampling, typical case sampling, stratified purposive sampling, and critical case sampling (Ritchie and Lewis, 2003, p. 79, 80).Since criterion-based sampling relies on the purpose of the research, the particular sampling approach to be used is identified before the commencement of the research, and the decision is usually based on the objectives of the research. The theoretical sampling strategy is on the other hand based on the capacity of the participants to make significant contributions to the research (Ritchie and Lewis, 2003)Strengths and weakness of qualitative researchQualitative research has both strengths and weaknesses. One of the strengths is its extensive understanding of its field of study. The explorative nature of qualitative research that involves extensive analysis of background information as well as collected data offers a basis for understanding. Further, a summary of the research results through descriptive statistics facilitates a deeper understanding.The nature of the research that induces confidence through the reliable test of hypothesis also draws interest for closer attention and understanding. Another advantage of qualitative research is its flexible nature. The numerous strategies and techniques at different stages of research are easily interchangeable. As a result, approaches and methods can be substituted at any stage of the research (Rubbin and Babbie, 2009).Weaknesses that have been associated with qualitative research include generalization in presentation and biasness due to formed opinion or conflict of interest on the part of a researcher. Generalization of reports, for instance, leads to loss of precision especially in cases where varying opinions exist across samples. Similarly, a researcher may be biased at any point in the research to influence an outcome. Biasness can be induced during sample selection or data collection stages (Rubbin and Babbie, 2009).Possible problems faced in qualitative researchThere are several problems faced in qualitative research. These problems range from the research process to the research environment. One of the already identified problems is the researchers ability to adopt and adapt to different research strategies and data collection methods (Barbour, 2007). The main reason why the availability of many options is a challenge to many researchers is a challenge to many researchers to identify the most suitable approach to use. Remember! This is just a sample You can get your custom paper by one of our expert writers Another significant problem in qualitative research is a conflict of interest in which a researchers motive shifts to exalting himself instead of paying attention to the subject of research. When attention is shifted, the chances of biasness become higher. There are also problems in the process of collecting qualitative research. This is particularly encountered in sponsored research activities where a researcher is dependent on and is subjected to forces from other interested parties. As a result, a researcher may be influenced by compromising and being biased to favor the parties. Researchers are therefore expected to be strong enough and independent to shun down such forces leading to biasness (Barbour, 2007).ReferencesBarbour, R. (2007). Introducing Qualitative Research: A Students Guide to the Craft of Doing Qualitative Research. London, UK: SAGE.Berg, B., and Lune, H. (2011). Qualitative Research Methods for the Social Sciences. New York, NY: Allyn & Bacon.Flick, U., Kardorff, E. and Steinke, I. (2004). A companion to qualitative research. London, UK: SAGE.Ritchie, J. and Lewis, J. (2003). Qualitative research practice: a guide for social science students and researchers. London, UK: SAGE.Rubbin, A. and Babbie, R. (2009). Essential Research Methods for Social Work. Belmont, CA: Cengage Learning. Qualitative research is the process of natural inquisitiveness which wants to find an in-depth understanding of specific social phenomena within a regular setting. It is a process that seeks to find out why people act the way that they do in specific situations. By relying on the direct experiences that each person has every day, it becomes possible to define the meaning of a choice or even a life.Researchers who use the qualitative process are looking at multiple methods of inquiry to review human-related activities. This process is a way to measure the very existence of humanity. Multiple options are available to complete the work, including discourse analysis, biographies, case studies, and various other theories.This review is then primary areas of focus, which are individual actions, overall communication, and cultural influence. Each option must make the common assumption that knowledge is subjective instead of objective, which means the researchers must learn from their participants what is valuable and what is not in effective. Although there are research studies that require an extensive period of observation to produce results, using a group interview session can produce usable information in under an hour. That means you can proceed faster with the ideas you wish to pursue when compared to other research methods.2. Qualitative research provides a predictive element. The data which researchers gather when using the qualitative research process provides a predictive element to the project. This advantage occurs even though the experiences or perspectives of the individuals participating in the research can vary substantially from person-to-person. The goal of this work is not to apply the information to the general public, but to understand how specific demographics react in situations where there are challenges to face. It is a process which allows for product development to occur because the pain points of the population have been identified.3. Qualitative research focuses on the details of personal choice. The qualitative research process is at the purpose of the decision that an individual makes as the primary information requiring collection. It does not take a look at the reasons why someone would decide to make the choices that they do in the first place. Other research methods preferred to look at the bigger story behind each individual choice so that the entire population or society can benefit from the process.4. Qualitative research uses fluid operational structures. The qualitative research process relies on data gathering based on situations that researchers are watching and experiencing personally. Instead of relying on a specific framework to collect and preserve information under rigid guidelines, this process finds value in the human experience. This method makes it possible to include the intricacies of the human experience with the structures required to find conclusions that are useful to the demographics involved and to the rest of society as well.5. Qualitative research uses individual choices as workable data. When we have an understanding of why individual choices occurred, then we can benefit from the diversity that the human experience provides. Each unique perspective makes it possible for every other person to gather more knowledge about a situation because there are differences to examine. It is a process which allows us to discover more potential outcomes because there is more information present from a variety of sources. Researchers can then take the perspectives to create generalizable results.6. Qualitative research is an open-ended process. One of the most significant advantages of qualitative research is that it does not rely on specific deadlines, formats, or questions to create a successful outcome. This process allows researchers to ask open-ended questions whenever they feel it is appropriate because there may be more data to collect. There are not the same time elements involved in this process either, as qualitative research can continue indefinitely until those working on the project feel like there is nothing more to glean from the individuals participating.Because of this unique structure, researchers can look for data points that other methods might overlook because a greater emphasis is often placed on the interview or observational process with firm deadlines.7. Qualitative research works to remove bias from its collected information. Unconscious bias is a significant factor in every research project because it relies on the ability of the individuals involved to control their thoughts, emotions, and reactions. Everyone has preconceived notions and stereotypes about specific demographics and nationalities which can influence the data collected. No one is 100% immune to this process. The format of qualitative research allows for these judgments to be set aside because it prefers to look at the specific structures behind each choice of person makes.This research method also collects information about the events which lead up to a specific decision instead of trying to examine what happens after the fact. Thats why this advantage allows the data to be more accurate compared to the other research methods which are in use.8. Qualitative research provides specific insight development. The average person tends to make a choice based on comfort, convenience, or both. We might love to move forward in our circumstances based on what we feel is comfortable to our spiritual, moral, or ethical stances. Every form of communication that we use becomes a potential foundation for researchers to understand the demographics of humanity in better ways. By looking at the problems we face in everyday situations, it becomes possible to discover new insights that can help us to solve do you need problems which can come up. It is a way for researchers to understand the context of what happens in society instead of only looking at the outcomes.9. Qualitative research requires a smaller sample size. Qualitative research studies wrap up faster that other methods because a smaller sample size is possible for data collection with this method. Participants can answer questions immediately, creating usable and actionable information that can lead to new ideas. This advantage makes it possible to move forward with confidence in future decisions because there is added predictability to the results which are possible.10. Qualitative research provides more useful content. Authenticity is highly demanded in todays world because there is no better way to understand who we are as an individual, a community, or a society. Qualitative research works hard to understand the core concepts of how each participant defines themselves without the influence of outside perspectives. It wants to see how people structure their lives, and than take that data to help solve whatever problems they might have. Although no research method can provide guaranteed results, there is always some type of actionable information present with this approach.List of the Cons of Qualitative Research1. Qualitative research creates limited information points. The quality of the information collected using the qualitative research process can sometimes be questionable. This approach requires the researchers to connect all of the data points which they gather to find the answers to their questions. That means the results are dependent upon the skills of those involved to read the non-verbal cues of each participant, understand when and where follow-up questions are necessary, and remember to document each response. Because individuals can interpret this data in many different ways, there can sometimes be differences in the conclusion because each researcher has a different take on what they receive.2. Qualitative research can involve significant levels of repetition. Although the smaller sample sizes found in qualitative research can be an advantage, this structure can also be a problem when researchers are trying to collect a complete data profile for a specific demographic. Multiple interviews and discovery sessions become necessary to discover what the potential consequences of a future choice will be. When you only bring in a handful of people to discuss a situation, then these individuals may not offer a complete representation of the group being studied. Without multiple follow-up sessions with other participants, there is no way to prove the authenticity of the information collected.3. Qualitative research is difficult to replicate. The only way that research can turn into fact is through a process of replication. Other researchers must be able to come to the similar conclusions after the initial project publishes the results. Because the nature of this work is subjective, finding opportunities to duplicate the results are quite rare. The scope of information which a project collects is often limited, which means there is always some potential bias found in the data. That is why you will often see a margin of error percentage associated with qualitative research. Another issue that qualitative research involves is the knowledge of the researchers. The only reason why opportunities are available in the first place when using qualitative research is because there are researchers involved which have expertise that relates to the subject matter being studied. When interviewers are unfamiliar with industry concepts, then it is much more challenging to identify follow-up opportunities that would be if the individual conducting the session was familiar with the ideas under discussion. There is no way to correctly interpret the data if the perspective of the researcher is skewed by a lack of knowledge.5. Qualitative research does not offer statistics. The goal of qualitative research is to seek out moments of commonality. That means you will not find statistical data within the results. It looks to find specific areas of concern or pain points that are usable to the organization funding to research in the first place. The amount of data collected using this process can be extreme, but there is no guarantee that it will ever be usable. You do not have the same opportunities to compare information as you would with other research methods.6. Qualitative research still requires a significant time investment. It is true that there are times when the qualitative research process is significantly faster than other methods. There is also the disadvantage in the fact that the amount of time necessary to collect accurate data can be unpredictable using this option. It may take months, years, or even decades to complete a research project if there is a massive amount of data to review. That means the researcher involved must make a long-term commitment to the process to ensure the results can be as accurate as possible.These qualitative research pros and cons review how all of us come to the choices that we make each day. When researchers understand why we come to specific conclusions, then it becomes possible to create new goods and services that can make our lives easier. This process then concludes with solutions which can benefit a significant majority of the people, leading to better best practices in the future. Author Bio Natalie Regoli is a child of God, devoted wife, and mother of two boys. She has a Master's Degree in Law from The University of Texas. Natalie has been published in several national journals and has been practicing law for 18 years. This centralBookshelves are in this LibreTexts Library holds texts that are curated by the LibreTexts Development team and can be used either directly or as foundation customized remixes (i.e., texts that are generated from existing content often with customized editing and/or content interspersed) for use in Course Shells housed in Campus Bookshelves. For details on how to have a text added to the bookshelves or how to remix content into your own contact us at info@libretexts.org. Add and describe your task. We'll connect you to an academic expert within 10 minutes. You get help with your assignment in 1-2 hours Get help with your assignment in 1 hourLearn More Check out our study materials designed in a fun and entertaining way$1,500 Essay Writing ScholarshipFor creative high school, college, or university students who want to be heard.$1,500 Essay Writing ScholarshipFor talented school, college, or uni students who demonstrate mastery of essay writing. Each $100 that we earn finances the planting of one tree Qualitative data describes, while quantitative data is expressed using numbers. (dirkcuys)There are two types of data. Qualitative data is descriptive information about characteristics that are difficult to define or measure or cannot be expressed numerically. Quantitative QualitiesQuantitative QuantiesExamples of Qualitative DataEmotions and emotionstexturesflavorvorcolor colorsit can be written as a specific wavelength of lightexpressions of more/less, ugly/beautiful, fat/thin, healthy/sicklyExamples of Quantitative DataQuantitative data can be expressed as numbers. If you can measure it, it can be expressed as a quantity.Negligtweightnumber of objectsvolumetemperaturespicespeedpercentagesUsing Both Types of DataWhile quantitative data is easier to analyze, qualitative data is also important.If you are conducting an experiment using the scientific method, for example, you want to record your observations and data as thoroughly as possible.Lets say you want to describe a cat. You would use both types of data.Qualitative data could include its fur color and eye color, whether its fur is soft or rough, the sounds it makes, how it smells, whether it seems affectionate or aloof, its health, whether it is young or old. Quantitative data could include its height, weight, number of toes on each paw, how high it can jump, how many ounces of food it eats each data, and its body temperature.Related Posts Recent advancements in biological research underscore the importance of qualitative approaches. Unlike quantitative methods that focus on numerical data, qualitative approaches emphasize understanding complex processes and behaviors through detailed observation and analysis.These methods offer nuanced insights into various biological phenomena, capturing subtleties often missed by purely quantitative techniques. By integrating qualitative perspectives, researchers can develop a holistic understanding of subjects ranging from genetics to ecology and beyond.Qualitative Traits in GeneticsIn genetics, qualitative traits refer to characteristics that can be distinctly categorized, either showing a small number of discrete phenotypes or a small number of genes. These traits, such as blood type or flower color, are typically not influenced by environmental factors, making them relatively straightforward to study. The simplicity of qualitative traits allows researchers to trace inheritance patterns and understand the genetic mechanisms underlying these characteristics.One classic example of qualitative traits is Mendels pea plant experiments, where he observed traits like seed shape and flower color. These traits followed clear patterns of inheritance, leading to the formulation of Mendels laws of inheritance. Such traits are often used in genetic studies to map genes and understand their functions. For instance, the ABO blood group system in humans is a well-known qualitative trait that has been extensively studied to understand genetic linkage and inheritance.Modern genetic research continues to leverage qualitative traits to explore more complex genetic phenomena. Techniques such as genome-wide association studies (GWAS) often begin with the identification of qualitative traits to pinpoint specific genetic variations associated with diseases or other conditions. These studies have been instrumental in identifying genetic markers for various hereditary diseases, providing a foundation for personalized medicine.In the context of plant and animal breeding, qualitative traits are crucial for selecting desirable characteristics. Breeders often focus on traits like coat color in animals or disease resistance in plants, which can be easily categorized and selected for. This selective breeding has led to significant advancements in agriculture and animal husbandry, improving yields and quality.Qualitative Analysis in EcologyQualitative analysis in ecology serves as a lens through which intricate interactions within ecosystems can be thoroughly understood. By focusing on descriptive data rather than numerical values, ecologists can capture the complexity of relationships among organisms and their environments. This approach is particularly useful in understanding phenomena that are difficult to quantify, such as behavioral patterns, species interactions, and habitat use.One effective method in qualitative ecological research is participant observation, where researchers immerse themselves in the environment they are studying. This technique allows for a detailed understanding of the interactions and behaviors of species within their natural habitats. For instance, observing predator-prey dynamics often rely on qualitative observations to document the strategies and adaptations of both predators and prey. These observations can reveal subtle behaviors and interactions that might not be apparent through quantitative data alone.Case studies also play a vital role in qualitative ecological research. By focusing in-depth on a particular ecosystem or species, researchers can gather comprehensive data that provides insights into broader ecological principles. Long-term studies of specific habitats, such as coral reefs or rainforests, have yielded valuable information about biodiversity, species resilience, and the impact of environmental changes. These case studies often involve direct observation, interviews with local communities, and historical data analysis, offering a holistic view of the ecosystem in question.Moreover, qualitative methods are invaluable in conservation efforts. Understanding the cultural and social aspects of human-wildlife interactions can inform more effective and sustainable conservation strategies. For instance, community-based conservation projects often incorporate qualitative research to gauge local perceptions, knowledge, and attitudes towards wildlife and natural resources. This information is crucial for developing conservation plans that are culturally sensitive and more likely to gain local support.Qualitative Methods in EthologyEthology, the study of animal behavior in natural settings, heavily relies on qualitative methods to unravel the complexities of how animals interact with their environment and each other. These methods enable researchers to capture the richness and diversity of behaviors that might otherwise be overlooked in controlled laboratory settings. By observing animals in their natural habitats, ethologists can gain insights into social structures, communication methods, and survival strategies.One of the primary qualitative techniques in ethology is ethograms, detailed catalogs of behaviors exhibited by a species. Ethograms serve as comprehensive behavioral inventories that researchers use to document and analyze various actions and behaviors. For example, in studying primates, an ethogram might include behaviors such as grooming, foraging, and vocalizing. These detailed observations help ethologists understand the social dynamics within a group, such as hierarchy, bonding, and conflict resolution.Narrative descriptions are another vital tool in ethological research. By providing rich, contextual accounts of animal behavior, researchers can identify patterns and make inferences about the underlying motivations and environmental influences. For instance, Jane Goodalls groundbreaking work with chimpanzees in Gombe Stream National Park relied heavily on narrative descriptions. Her detailed observations revealed complex social behaviors, such as tool use and emotional expressions, which challenged previous assumptions about the cognitive abilities of non-human animals.Video recordings have also revolutionized ethological research. By monitoring allow for the capture of subtle behaviors that might be missed during live observation. These recordings can be analyzed repeatedly, providing a robust data set for studying temporal changes and rare behaviors. Additionally, video analysis software can assist in systematically coding and categorizing behaviors, enhancing the accuracy and depth of qualitative studies.Qualitative Data in MicrobiologyQualitative data in microbiology offers a unique lens to explore the microscopic world, facilitating a deeper understanding of microbial behavior, structure, and interactions. Unlike quantitative approaches that focus on measuring cell counts or growth rates, qualitative methods emphasize the detailed characterization of microorganisms and their complex ecological niches. This approach is particularly valuable in uncovering the intricate ways microbes influence their environments and interact with other organisms.Microscopy remains a cornerstone of qualitative microbiology, providing visual insights into microbial morphology and interactions. Advanced techniques such as fluorescence microscopy and electron microscopy allow researchers to observe the fine details of microbial cells, biofilms, and communities. For instance, fluorescence in situ hybridization (FISH) enables the identification of specific microbial species within a complex community, revealing spatial organization and interactions that are not discernible through quantitative methods alone.Narrative case studies are another powerful tool in qualitative microbiology. By focusing on specific microbial communities or environmental samples, researchers can document detailed observations that highlight unique behaviors and adaptations. For example, studying extremophiles in harsh environments like deep-sea hydrothermal vents can provide insights into microbial survival strategies under extreme conditions. These narratives often include rich descriptions of microbial interactions with their surroundings, offering a holistic view of their ecological roles.Qualitative Research in Developmental BiologyQualitative research in developmental biology provides a profound understanding of the processes that shape the growth and development of organisms. By focusing on detailed descriptions and observations, researchers can explore the dynamic changes that occur from embryogenesis to adulthood. This approach allows for the identification of patterns and anomalies in developmental stages, offering insights that are often missed by quantitative techniques.Embryonic DevelopmentEmbryonic development is a complex and highly regulated process that can be meticulously studied through qualitative methods. Researchers often employ time-lapse imaging to observe the sequential stages of embryogenesis in real-time. This method captures the intricate morphogenetic movements and cell differentiation pathways, revealing how cells and tissues interact to form the basic body plan of an organism. For instance, the use of confocal microscopy has allowed researchers to visualize the formation of neural networks in zebrafish embryos, providing a detailed map of neural development.Cell Lineage TracingQualitative approaches such as cell lineage tracing are instrumental in understanding how specific cell types arise and differentiate during development. By using this method, researchers can construct lineage trees that depict the relationships between different cell types. A classic example is the use of genetic markers in fruit flies to trace the development of sensory organs, elucidating the pathways that lead to the formation of complex structures. These insights are invaluable for understanding developmental disorders and potential regenerative therapies.Difference between Qualitative Analysis and Quantitative Analysis. Difference between Qualitative Analysis and Quantitative Analysis Difference between Qualitative and quantitative analysis are two fundamental methods of collecting and interpreting data in research. The methods can be used independently or concurrently since they all have the same objectives. They have some differences, and so using them concurrently can compensate for the errors each has and then produce quality results. Moreover, there are overlaps (Qualitative analysis is concerned with the analysis of data that cannot be quantified. This type of data is about the understanding and insights into the properties and attributes of objects (participants). Qualitative analysis can get a deeper understanding of why a certain phenomenon occurs. The analysis can be used in conjunction with quantitative analysis or descriptive analysis.Definition of qualitative and quantitative analysisResearch findingsMethod of data collectionPurpose of qualitative and quantitative analysisQualitative analysis Vs. Quantitative analysis: Comparison chartVideo advice: CER (Claim, Evidence, Reasoning) in BiologyThe CER framework is a useful framework for developing a scientific explanation. In this video, the Amoeba Sisters use this framework after a biology investigation. As mentioned, there are many ways to use this framework. Also, as we point out in the video, CER uses several models such as CERR, ERC, and more.What is a quantitative analysis?Quantitative analysis with numerical analysis where data is collected, classified, and then computed for certain findings using a set of statistical methods. Data is chosen randomly in large samples and then analyzed. The advantage of quantitative analysis the findings can be applied in a general population using research patterns developed in the sample. This is a shortcoming of qualitative data analysis because of limited generalization of findings.The Difference Between Qualitative & Quantitative Traits in GeneticsDNA codes for our genes. These genes determine our phenotypic traits, which are the traits that make up our observable being. For example, hair color is a trait that is determined by our genetic make-up. Traits can be divided into two distinct groups: qualitative and quantitative traits.Examples of Qualitative Traits in Animals and Plants Our DNA is exactly what codes for all those genes which are essential for us to operate. These genes also determine our phenotypic traits, what are traits that comprise our observable being. For instance, in humans, our hair color and bloodstream type are generally traits which are based on our genetic make-up. Just about all traits could be split into two distinct types or groups: qualitative and quantitative traits. Trait Definition (Biology) Within the general language and vernacular, a trait means any kind of quality that somebody has, like a personality trait or what sort of person functions. However, the trait definition biology-we may not. In biology, a trait is really a characteristic based on our genes. Hair color, the color of eyes, size, bloodstream type and hairline are types of biological traits in people. Qualitative Trait In Genetics Qualitative and Quantitative Data. Qualitative data are anything that can be expressed as a number, orquantified. Examples of quantitative data are scores on achievement tests,number of hours of study, or weight of a subject. Qualitative data cannot be expressed as a number.Descriptions from the dependent variable, for example color, or seem. Qualitative data are statistical measurements from the dependent variable. Quantitative means calculating a value to something. For instance, you may appraise the height of the person, and also the duration of your finger nails. Qualitative information is details about characteristics information which cant really be measured. A few examples of qualitative data would be the gentleness of the epidermis, the elegance that you take, and also the colour of your vision. Thereof, whats the distinction between qualitative and quantitative data in biology?Qualitative vs Quantitative FlashcardsWhat is the difference between a qualitative and quantitative observation? Learn with flashcards, games, and more for free.Terms in this set (10)Qualitative vs QuantitativeBiology Chapter 7Biology Chapter 2 Parts 2,3/2.4Physical Changes vs. CScience Vocabulary 2.2SOL 3.1 Scientific InvestigationThe Scientific Method and Metric SystemPECT Mod 3 2022 No Pics Photosynthesis and Chemosynthesis Bas 2022 Photosynthesis and Chemosynthesis B 2022 Autotroph and Heterotroph Terms andUpgrade to remove adsOnly RUB2,325/yearSTUDYFlashcardsLearnWriteSpellTestPLAYMatchGravityWhat is the difference between a qualitative and quantitative observation? Terms in this set (10)quantitativeObservations that give a quantity or amount. Information is something that can be counted or measured. qualitativeAn observation that does not have a quantity. It describes the qualitative of something. quantitativeExamples are amounts, temperature, length, qualitativeExamples are colors, smells, taste. qualitativeMy hair is brown and curly. quantitativeThe boy wears size 11 sneakers. qualitativeThe room is very cold. quantitativeIt is 66 degrees Fahrenheit outside. qualitativeThere is a GIANT SPIDER crawling on your desk. quantitativeThere are 12 centimeters.Related questionsQUESTIONThe hidden benefit of a Web site in propaganda is. . . answersQUESTIONIf renal failure is confirmed as being acute, codes from the N20 category are used.Model-Based Analysis for Qualitative Data: An Application in Drosophila Germline Stem Cell RegulationAuthor Summary We developed a process to quantitatively fit mathematical models using qualitative data, and applied it in the study of how stem cells are regulated in the fruit fly ovary. The available qualitative data were collected are fluorescent images of protein and mRNA expression from genetic manipulations. Despite lacking quantitative data, the process makes available quantitative model analysis techniques to reliably compare different models and guide future experiments. We found that the current consensus regulatory model is supported, but that the data are indeed insufficient to address more complex hypotheses. With the quantitatively fit models, we evaluated hypothetical experiments and estimated which future experiments are most likely to produce the best refined or test models. The model fitting process we have developed is applicable to many biological studies where qualitative data are common, and can accelerate progress through more efficient experimentation.Video advice: The Qualitative Characteristics of Useful Information 2022This playlist contains videos of the Tabaldi Conceptual Framework video series. For more information on our products, visit www.tabaldi.orgThis study integrates research in three primary areas: (1) optimization with qualitative data and the Optimal Scaling procedure, (2) the problem of using multiple disparate datasets, and multi-objective optimization as a robust solution, and (3) modeling of stem cell regulation in the Drosophila germarium. The remainder of this introduction is dedicated to introducing these three areas.Optimization and qualitative data: Optimal ScalingUsing disparate datasets: Multi-objective optimizationCompiled protein expression dataRepresentative parameter estimation procedureGermarium Core network performanceNetwork inference supports the core structureData do not discriminate more complex hypothesized networksAnalysis of hypothetical networks for future developmentFew data remain poorly fit. Regulatory parameters exert the greatest effect.Experiment design for qualitative data emphasizes double mutants.Results/DiscussionMathDiscovery in developmental biology is often driven by intuition that relies on the integration of multiple types of data such as fluorescent images, phenotypes, and the outcomes of biochemical assays. Mathematical modeling helps elucidate the biological mechanisms at play as the networks become increasingly large and complex. However, the available data is frequently under-utilized due to incompatibility with standard modeling tools. Many modeling techniques require quantitative measurements, such as protein concentration or cell-lineage trees, or the use of gene expression measured over time. This is the case for stem cell regulation mechanisms explored in the Drosophila germarium through fluorescent immunohistochemistry. To enable better integration of biological data with modeling in this and similar situations, we have developed a general parameter estimation process to quantitatively optimize models with qualitative data. The process employs a modified version of the Optimal Scaling method from social and behavioral sciences, and multi-objective optimization to evaluate the trade-off between fitting different datasets (e.Qualitative Vs Quantitative: Whats the Difference?Qualitative vs quantitative are two words of English that are extremely different from each other. However, people sometimes confuse the two words. Furthermore, the use of these two words takes place in two contexts data and research.In order to better understand the difference between qualitative and quantitative, let us explore the matter further by going into more details. Qualitative data involves representing or measuring different aspects where the expression of data is not in the form of numbers. In contrast, quantitative data is a type of data that is useful in the construction of graphs and tables pertaining to raw data.Qualitative AnalysisQualitative Analysis is the determination of non-numerical information about a chemical species, a reaction, etc. Examples would be observing that a reaction is creating gas that is bubbling out of solution or observing that a reaction results in a color change. Qualitative analysis is not as reliable as quantitative analysis but is often easier, faster and cheaper to perform. This chapter discusses how to perform a systematic analysis on inorganic material to ascertain its composition.Theres two kinds of data. Qualitative information is descriptive details about characteristics which are hard to define or measure or cant be expressed.By one definition, quantitative reasoning (QR) is the application of basic mathematics skills, such as algebra, to the analysis and interpretation of real-world quantitative information in the context of a discipline or an interdisciplinary problem to draw conclusions that are relevant to students in their daily lives.Contents1 What Does Quantitative Mean In Biology?2 What is qualitative in biology? 3 What does qualitative and quantitative mean in science for kids?4 What does qualitative mean in science for kids? 5 What does qualitative mean in chemistry? 6 What is quantitative science? 7 What does quantitative mean in science for kids? 8 What is quantitative and qualitative for kids? 9 What is qualitative in physics? 10 What is quantitative in physics? 11 What does qualitative and quantitative mean in research? 12 What is quantitative test in biochemistry? 13 What are examples of qualitative? 14 What is the difference between qualitative and quantitative in science? 15 Why qualitative is important in humanities? 16 What are quantitative terms? 17 What is quantitative reasoning? 18 What does quantitative mean in chemistry? 19 What does quantitative observation mean? 20 What does qualitative mean in research? 21 What does qualitative mean in science example? 22 What does qualitative mean in physics? 23 What is the meaning of qualitative idea only?What does qualitative data mean in biology?Quantitative research uses subjective judgment based on one sample or population information, such as management expertise, industry cycles, strength of research and development and labor relations. Qualitative analysis contrasts with quantitative analysis, which focuses on numbers found in reports such as balance sheets.Xenia ForthCarinxa SchwareSinn ZhernevskyAdolfo BarwolffIfri Tanujozaz SerrataAlberio PrivatConception OcchiuzziBharata WatbledOlay CusoAntone ClothDhaminder PortellanQualitative data is defined as the data that approximates and characterizes. This data type is non-numerical in nature. This type of data is collected through methods of observations, one-to-one interview, conducting focus groups and similar methods. Qualitative data in statistics is also known as categorical data. Qualitative data are descriptions of the dependent variable, such as color, or sound. Qualitative data can also be a simple yes-or-no observation about whether something happens, such as whether a plant grows. Qualitative data are numerical measurements of the dependent variable. One may also ask, what is an example of qualitative data? Qualitative data is information about qualities; information that cant actually be measured. Some examples of qualitative data are the softness of your skin, the grace with which you run, and the color of your eyes. However, try telling Photoshop you cant measure color with numbers. One may also ask, what is the difference between qualitative and quantitative data in biology?Qualitative and mixed methods researchQualitative methods offer a way to check your assumptions or biases before starting a quantitative study.Step 1: Collecting qualitative data In an enormous amount of big data and advanced record techniques, mental scientists are naturally likely to develop and keep a strong quantitative toolkit, possibly more now than in the past. Without treading carefully, however, researchers may become involved in a glorified procedure for plug-n using some numeric mental constructs into statistical results. When interpreting what individuals figures mean when it comes to human cognition, affect and behavior, how confident are you able to be that you simply adequately described your construct of great interest? Although theres a whole field of psychology chiefly worried about the utility and proper conduct of quantitative research methods (Society for Quantitative Inquiry in Psychology), many mental scientists having a preference for (or even more in-depth learning) quantitative methods may ignore or overlook such qualitative approaches. Additionally to supplying their very own group of research advantages, qualitative studies can lend critical support for any quantitative study.Understanding Qualitative and Quantitative analysisData collection in qualitative research is critical to use both quantitative and qualitative thinking. However, the two are often confused. Andrew we understand the numbers and math, we switch back to qualitative to ask why. Why did we receive the results we did in the quantitative research? Why did people make the choices they made? We would survey or interview a representative, random sample of our quantitatively-analyzed audience to understand why.Video advice: Qualitative Vs Quantitative TraitsThe classical Mendelian traits encountered in the previous chapters have been qualitative in nature; i.e., traits that are easily classified into distinct phenotypic categories. These discrete phenotypes are under the genetic control of only one or a very few genes with little or no environmental modification to obscure the gene effects. In contrast, the variability exhibited by many traits fails to fit into discrete phenotypic classes (discontinuous variability), but instead forms a spectrum of phenotypes that blend imperceptibly (continuous variability).Economically important traits such as body weight gains, in livestock mature plant heights, egg or milk production, and yield of grain per acre are quantitative or complex traits with continuous variability. The basic differences between qualitative and quantitative traits involve the number of genes contributing to the phenotypic variability and the degree to which the phenotype can be recognized.Qualitative traits are governed by many genes (perhaps 10-100 or more), each contributing a small amount to the phenotype. Hair color, the color of eyes, size, bloodstream type and hairline are types of biological traits in people. For this reason, quantitative traits are also referred to as polygenic traits. Stretches of DNA with closely linked genes responsible for phenotypes associated with quantitative traits are called quantitative trait loci or QTLs.[FAQ] Differences in a Nutshell Qualitative research generates non-numerical data while quantitative research generates numerical data or information that can be converted into numbers. Quantitative biology is an umbrella term encompassing the use of mathematical, statistical or computational techniques to study life and living organisms. ... The subfields of biology that employ quantitative approaches include: Mathematical and theoretical biology Quantitative biology is a scientific method of observation to gather non-numerical data. This type of research "refers to the meanings, concepts definitions, characteristics, metaphors, symbols, and description of things" and not to their "counts or measures". Definition of qualitative : of, relating to, or involving quality or kind. What are Qualitative Observations? ... A qualitative observation involves the use of five sensory organs, sight, smell, taste, touch, and hearing, and their function to examine the attributes. Being subjective in nature, it focuses on the characteristics and qualities of the variables rather than the numeric value. Qualitative data usually includes descriptions that do not mention numbers. Notice the word qualitative has "quality" embedded in it. Qualitative data tends to be subjective impressions such as how school lunches compared to another one. As you can see, qualitative data consists of observable things that can be described and recorded in ways other than numerically. Now, let's talk about quantitative data. Unlike qualitative data, quantitative data contains numbers obtained by counting or measuring. Notice the word quantitative has "quantity" embedded in it. For example, recording students test scores can be as simple as counting specific things such as the number of boys in your class compared to the number of girls.Quantitative data can also be measurements of length, height, volume, as well as mass, or temperature. Sometimes scientists will breakdown quantitative data into two specific types called discrete data and continuous data. Discrete data can only have a certain exact value which can't be subdivided. For example, if you roll a typical pair of dice, you can roll a two or a three, but it's impossible to roll a two and a half. You can only roll a whole number between 2 and 12. Likewise, the number of protons in an atom is also an example of discrete data because you can't have half a proton. In contrast, continuous data can have almost any value. For example, measurements such as height come in a range of continuous data. Why? Because measurements can have any value in fractions of a unit, in this case, meters. In review, qualitative data contains descriptions that don't use numbers, while quantitative data contains numbers obtained by counting or measuring. Both discrete and continuous data are types of quantitative data. Discrete data can only contain certain specific values that can have almost any value. [music] Variations Keywords continuous, data, definition, descriptions, discrete, height, impressions, length, mass, measurements, numbers, numeric, observation, qualitative, quantitative, sensory, speed, subjective, temperature, values, volume, width