

Data Analysis and Communicating Findings

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Data analysis is the process through which researcher manages the collected data to identify the key pattern or features that are important when answering or attempt to answer the research question.

Data analysis is a process for obtaining raw data and converting it into information useful for decision-making by users. Data is collected and analyzed to answer questions, test hypotheses or disprove theories.

Procedures for analyzing data, techniques for interpreting the results of such procedures, ways of planning the gathering of data to make its analysis easier, more precise or more accurate, and all the machinery and results of (mathematical) statistics which apply to analyzing data.

Data analysis has multiple, approaches, techniques under a variety of names, in different business, science, and social science domains.

Data:

Observations those are not interpreted organized or structured (age, blood pressure, weight).

Information:

Data that has been interpreted organized or structured to provide meaning to the data.

Knowledge:

The synthesis of information to identify relationships that provide further insight to an issue or subject area.

Analysis

Breaking a whole into its separate components for individual examination.

Definition of Data analysis:

Is a process of inspecting, cleaning, transforming, and modeling [data](#) with the goal of discovering useful [information](#), suggesting conclusions, and supporting decision making.

OR

Is the process of systematically applying statistical and/or logical techniques to describe, illustrate, condense, recap, and evaluate data

Purpose of data analysis:

- To identify pattern or trends emerging from the data.
- To ensure that these pattern or trends are both reliable and valid findings.
- Is to obtain usable and useful information.
- The analysis, regardless of whether the data is qualitative or quantitative, may:
 - ❖ - Describe and summarize the data.
 - ❖ -Identify relationships between variables.
 - ❖ -Compare variables.
 - ❖ -Identify the difference between variables.
 - ❖ Forecast outcomes.

Process of data analysis:

1- Data requirements

The data is necessary as inputs to the analysis are specified based upon the requirements of those directing the analysis or customers who will use the finished product of the analysis. The general type of entity upon which the data will be collected is referred to as an experimental unit (e.g., a person or population of people). Specific variables regarding a population (e.g., age and income) may be specified and obtained. Data may be numerical or categorical (i.e., a text label for numbers).

2- Data collection

Data is collected from a variety of sources. The requirements may be communicated by analysts to custodians of the data, such as information technology personnel within an organization. The data may also be collected from sensors in the environment, such as traffic cameras, satellites, recording devices, etc. It may also be obtained through interviews, downloads from online sources, or reading documentation.

3- Data processing

Data initially obtained must be processed or organized for analysis. For instance, these may involve placing data into rows and columns in a table format (i.e., [structured data](#)) for further analysis, such as within a spreadsheet or statistical software..

4- Data cleaning

- Once processed and organized, the data may be incomplete, contain duplicates, or contain errors. The need for data cleaning will arise from problems in the way that data is entered and stored.
- Data cleaning is the process of preventing and correcting these errors.
- Common tasks include record matching, identifying inaccuracy of data, overall quality of existing data, deduplication, and column segmentation.
- Such data problems can also be identified through a variety of analytical techniques..

There are several types of data cleaning that depend on the type of data such as phone numbers, email addresses, employers etc. Quantitative data methods for outlier detection can be used to get rid of likely incorrectly entered data. Textual data spell checkers can be used to lessen the amount of mistyped words, but it is harder to tell if the words themselves are correct.

5- Exploratory data analysis

- Once the data is cleaned, it can be analyzed. Analysts may apply a variety of techniques referred to as [exploratory data analysis](#) to begin understanding the messages contained in the data.
- The process of exploration may result in additional data cleaning or additional requests for data, so these activities may be iterative in nature.
- [Descriptive statistics](#) such as the average or median may be generated to help understand the data.

6- Modeling and algorithms

- Mathematical formulas or models called [algorithms](#) may be applied to the data to identify relationships among the variables, such as [correlation](#) or [causation](#). In general terms, models may be developed to evaluate a particular variable in the data based on other variable(s) in the data, with some residual error depending on model accuracy.

7- Data product

- A data product is a computer application that takes data inputs and generates outputs, feeding them back into the environment. It may be based on a model or algorithm.

8-Communication

- Once the data is analyzed, it may be reported in many formats to the users of the analysis to support their requirements. The users may have feedback, which results in additional analysis. As such, much of the analytical cycle is iterative.

When determining how to communicate the results, the analyst may consider [data visualization](#) techniques to help clearly and efficiently communicate the message to the audience. Data visualization uses

information such as tables and charts to help communicate key messages contained in the data. Tables are helpful to a user who might lookup specific numbers, while charts (e.g., bar charts or line charts) may help explain the quantitative messages contained in the data.

Types of Data

➤ **Nominal scale:**

- It is quantitative variables or qualifications are given for purpose of quantitative analysis as gender, blood group. Each participant in the study belongs in one of the categories; data would comprise the labels associated with each category .EX, male or female in case of gender.

➤ **Ordinal level:**

- It's different from a nominal scale that the numbers signify the order or hierarchy of these variables. Like pain scale range from “non” ,”mild” ,”moderate” ,”sever” to “intolerable” .it could be said that someone who respond that they had moderate pain reported higher degree of pain than person who responded using mild categories.
- -categorical data are often coded prior to data analysis especially when using computer software. EX, for the variable gender “male” might be represented by 0 and female by 1.

➤ **Interval scale:**

- It's more precise ordinal scale, with known distances between the numbers on the scale.
- EX. The thermometer, the degree is numbered in such a way that the distance between 5 degree and 10 degree is the same as between 75 degree and 80 degree.

➤ **Ratio scale:**

- Its interval scale with absolute zero like weighing scale.
- The absolute zero enables us to compare relative size of scores as well as differences in scores and order of scores, this make the ratio

the highest level of measurement. Ex, considering situation of 3 people who weigh 80kg, 60kg, 40 kg, we can report that the first person is heavier than the second, who is heavier than the third. And that the difference between the first and second persons is the same between the second and third. Also it can be reported as the first person is twice the weight of the third person.

- **The choice of statistical tests depends, among others on:**

- 1-sample size
- 2-sampling method (random or not)
- 3-Level of measurement (nominal, ordinal)
- 4-the variables to be measured in the sample are normally disturbed in the population.

Criteria of choosing statistical method for data analysis:

- **Accuracy:**

Is the data collected correct and complete?

Are the data entry procedures reliable?

- **Efficiency:**

are the resources used to collect data the most economical available to achieve those objectives?

- **Effectiveness:**

Have the objectives been achieved ?

Have the specific results planned been achieved?

To what extent are partners maximizing their comparative advantage?

- **Feasibility & timeliness:**

Can data be collected and analyzed cost effectively?

Can it provide current information in a timely manner?

- **Relevance:**

what is the relevance of the data /information /evidence to primary stake holders eg: national authorities to vet providers strategic objectives to employer's needs to trainee needs and satisfaction?

Is data collection compatible with other efforts?

Does it complement duplicate or compete?

- **Security:**

Is the confidentiality of the learner and the records ensured?

- **Utility:**

Does data provide the right information to answer the question posed?

- **Concise.**

- **Honest.**

- **Validity & reliability**

Ethical Considerations

Ethical Considerations can be specified as one of the most important parts of the research. Dissertations may even be doomed to failure if this part is missing.

the following ten principles of ethical considerations have been compiled as a result of analyzing the ethical guidelines of the professional social sciences research associations:

- 1-Research participants should not be subjected to harm in any ways whatsoever.
- 2-Respect for the dignity of research participants should be prioritized.
- 3-Full consent should be obtained from the participants prior to the study.
- 4-The protection of the privacy of research participants has to be ensured.
- 5-Adequate level of confidentiality of the research data should be ensured
- 6-Anonymity of individuals and organizations participating in the research has to be ensured.
- 7-Any deception or exaggeration about the aims and objectives of the research must be avoided.
- 8-Affiliations in any forms, sources of funding, as well as any possible conflicts of interests have to be declared.
- 9-Any type of communication in relation to the research should be done with honesty and transparency.
- 10-Any type of misleading information, as well as representation of primary data findings in a biased way must be avoided.

Communicating Findings

Communicating findings can increase community awareness and knowledge of a health issue, especially when there are new and unexpected findings.

Effective and successful uses of communication approaches can increase knowledge and awareness, as well as provide avenues for demonstrating the values of programs and policies that work.

Definition of Communication of research findings

- Is the final step in the Research Process, Involves developing research report and disseminating research report and disseminating it through Presentation and Publication to audience of Nurses Health Care Professionals and Health care consumers.

The Following Are The Purpose of Writing Research Report.

- To Re-establish The Topic of the Research.
- To Give The Research Problem and Main objective of The Research.
- To Indicate the Methodology Used in The study.
- To Present The Main Findings of The Study.
- To Present the Main conclusions of The Study.
- **Characteristics of a Good Research Report:**

- **Research report is written or oral summary of study . It should be characterized by:**

- 1-Clarity of thought.
- 2-Conceptual clarity.
- 3-Explicit statement of research problem.
- 4-Simple and appropriate language.
- 5-Detailed and orderly presentation.
- 6-Size.
- 7-Chapterization.
- 8-Quotations and footnotes.
- 9-Summary.
- 10-Limitations.
- 11-Acknowledgement

TYPES OF COMMUNICATING RESEARCH FINDINGS

There are Three Types of Reports as Follows:

1-Technical reports:-

- These are Reports with an Applied Focus Such as Engineering, Information, Technology ,Commerce ,Accounts ,and Finance, will Set Report Writing Assignments that Simulate The Process of Report Writing In Industry.

2-Field Reports:-

- These are Reports, Which are Common In Disciplines Such as Law, Psychology ,Nursing, History and Education. These Types of Reports require the student to Analyze his or her Observations of Phenomena or events in the real World In Light of Theories Studied in the Course.

3-Scientific Reports:-

- Scientific or Laboratory Reports are another Kind of Report. They are Common In All the Sciences and Social Sciences. These Reports Use a Standard Scientific Report Format Describing Methods, Results And Conclusions To Report Upon An Empirical Investigation.

Process of publishing journal articles:

1-Title:

- It should attract readers and inform them with purpose of the study.
- It concise of no longer than 15 words and identify key words from the study.

2-Abstract :

- It is a brief summary of research study. It consists of only 100 to 300 words.
- Reader should be able through abstract to decide whether the study meets their needs or interested.
- It is provide the reader with an over review of report.

3-Introduction.

- It includes the purpose of the study, it is important and the related to literature review.

4-Literature review.

- It identifies what is currently known about the subject under study and reflects relevant background information necessary to support justification.

5-Methods.

- It includes the research design, sample, setting and data collection procedure or instruments . Also includes the specific statistical techniques.

6-Result.

- It focus on the findings and answer the research question or test hypothesis (tables, graphs, figures) are used to present the findings in this section and they simplify large amounts of research.

7-Discussion.

- Researchers will use discussion to explain what the result means in relation to the purpose of the study.

8-Conclusion.

- Summarization of the research findings and generalization of the findings.

9-Recommendation.

- These recommendations entail the overall researcher goals and his points of view according the result and findings and what he want to implement from his study.

10-References.

Provide the reader with the related literature related to the particular topic

Research critique:-

Definition of research critique:-

It is critical evaluation, appraisal of research report.

Systematic, unbiased, careful examination of all aspects of study to judge the merits, limitation, meaning and significance based on previous research experience and knowledge of the topics.

Purpose of research critique:-

- to assess students methodological and analytical skills (identify, limitation, strength)
- Seasoned researcher to help journal editions.
- written critique is a guide to researcher.
- to advance nursing knowledge, profession .

Elements of a research critique:-

- Purpose of study.
- Design o of research .
- Literature review .
- Research questions .
- Sample .
- Data collection process .