

WRONG DATA ANALYSIS AND RESULTS LEADING TO DISSEMINATION OF ERRONEOUS INFORMATION: WAY FORWARD IN RESEARCH

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CAPABILITIES FOR DATA MANAGEMENT (COLLECTION, PROCESSING AND DISSEMINATION)

Abstract

There is constant flow of data and information in our society and all aspects of life require data. Recent concerns about inadequate capacity for statistical analysis among researchers have prompted this paper aiming at improving the use of appropriate statistical tools that will yield accurate result and hence dissemination of proper information. Use of wrong or inappropriate statistical tool is a common occurrence observed in agricultural research. Most at times researchers have good data but use wrong analysis tool leading to wrong results. Wrong use of statistics can be found in every stage of agricultural research associated with design of the experiment, data collection, processing, analysis, interpretation and implementation of results. Right data analysis exposes the hidden treasure embedded in data thereby making sense in senseless data hence disseminating the right information. The emphasis of this paper is on data types, appropriate statistic tools and means of disseminating information.

Key Words: Analysis, Data, Dissemination, Information, Processing

Introduction

Research is diverse in nature because it represents a wide variety of discipline both in sciences and social sciences. In the various disciplines, researcher can use a number of different methods to conduct research. Irrespective of the discipline, most research involves data collection and analyses. Nayak and Hazra (2011) stated that statistics provides the basis for inferences in research. There are various statistical analysis methods but choosing the correct statistical analytical approach for a particular research can be a formidable process. An unplanned statistical

analysis process can produce unharmonious outputs and many results that never get discussed or used. Researchers also tend to miss out vital findings in their research due to the unplanned process. Statistical analysis approach should be planned at the onset of any research before data collection. Each statistical method has its own requirement and a carefully planned process enables the researcher to collect the right data and saves time.

In this day and age, researchers constantly want to know the appropriate statistical method to employ in their data processing often focusing on the structure or format of their data, rather than thinking about how the data might answer an important question. But choosing a method based on the data is putting the cart before the horse. Instead, we should start by clearly identifying the question we're trying to answer. A good knowledge in statistics will help the researcher to make the right choice of data but regrettably, statistical training at both the undergraduate and postgraduate levels leaves much to be desired. Subsequent opportunities to learn the basics of statistics are often incompatible with the demands of routine work (Johnson and Karunakaran, 2014). According to Khusainova *et al.*, (2016), inappropriate choice of statistical analysis method can lead to erroneous conclusions, incorrect interpretation of the research results, and thereby distort or even lead to the loss of the scientific value of such research results and the loss of informativity. All kinds of statistical methods are used in various academic fields, depending on the experimental data and the tasks that the researcher has to solve.

There are over 100 types of statistical analysis test but a great majority of research can be tackled through a basket of some 30 tests from over a 100 that are in use (Nayak and Hazra 2011). The statistical test to be used depends on some determining factors embedded in the research. Determination of the most appropriate statistical method to employ is dependent on the knowledge of the type of research, type of data, number of groups or data set and research questions. Knowledge on the type of statistical analysis test to employ in whatever research situation is therefore, an essential skill for all researchers. This paper reviews types of data, statistic analytical tools and means of disseminating information.

Types of Data

The raw material for researches in any field is data. Data is used by scientist to make important decision and for the right decision to be made; it must have two attributes viz accuracy and integrity. Researchers need to know the type of data they are dealing with in order to choose the right statistical analytical method. Data types

can be seen as a part of categorizing different types of variables. There are different types of data and having a good understanding of the different data types, is a crucial prerequisite for Data Analysis since certain statistical test are used only for specific data types. Abdul *et al*/(2012) stated that data which is obtained from a research can generally be classified into two types, quantitative data which defines and qualitative data which describes.

Quantitative data deals with numbers and things you can measure objectively and it is collected in form of numbers e.g. age, height, width, length, temperature, prices, area and volume while qualitative data deals with characteristics and descriptors that can't be easily measured, but can be observed subjectively. Qualitative data are not collected in numerical forms but in other forms like picture, words. Data is this type includes smells, tastes, textures, attractiveness, and color. Generally, when a data is measured and given number value, quantitative data are created but when it is classified then a qualitative data is created. Quantitative and qualitative data can be further classified. Quantitative data could either be continuous or discrete. Counts are usually discrete while measurements are continuous.

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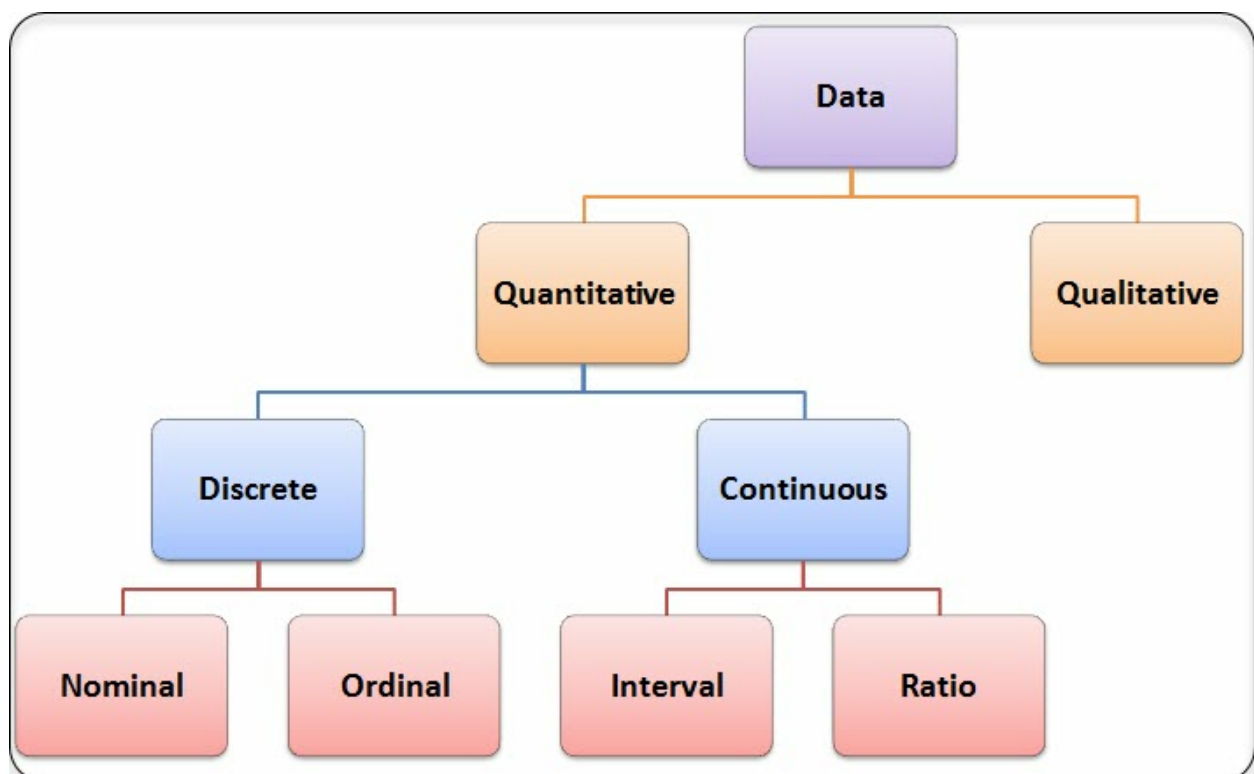


Fig 1: Types of data

Scale of Measurement

Scales of measurement refer to ways in which variables/numbers are defined and categorized. Each scale of measurement has certain properties which in turn determine the appropriateness for use of certain statistical analyses. In order to choose suitable statistical analysis for the data, it is also important for researcher to distinguish between the scales of measurement. There are four scales of measurement namely: nominal, ordinal, interval, and ratio

1. **Nominal/categorical scale.** Data and numbers that are simply used as identifiers or names represent a nominal scale of measurement. Each observation falls into one, two or more categories. Most usually the nominal variables are stated in two categories. Even when the nominal data has more than two categories, the order does not matter e.g. if looking at sex ratio of a species, each individual classified as male, or female. Thus, 1 and 2 will be used to represent each category of data. In this type of measurement, each individual does not have order of magnitude associated with it.
2. **Ordinal scale:** An ordinal scale of measurement represents an ordered series of relationships or rank order. Ordinal data can be counted but they cannot be measured. Ordinal data are similar to nominal data except that they have more than two values and they can be arranged in a natural order. Ordinal data provide more information than nominal data and hence more conclusions can be drawn. Each observation provides a score, and observations within sample can be ranked from low to high. However, the ordinal numbers do not indicate absolute quantities - intervals between numbers on the scale not necessarily equal. For example, plant species can be ranked on the 'DAFOR' scale, whereby they are classified as dominant, abundant, frequent, occasional or rare. No expectation that dominant organism is, say, 2x more common than abundant species. Likert-type scales is a type of ordinal scale representing a rank ordering.
3. **Interval scale.** It is a scale which represents quantity and has equal units but for which zero represents simply an additional point of measurement on the scale. Data can be ranked, but now distances between two adjacent points on scale will be the same. Dates and temperature (o C) are on interval scale. With each of these scales there is direct, measurable quantity with equality of units.
4. **Ratio scale:** the ratio scale of measurement is similar to the interval scale in

that it also represents quantity and has equality of units. However, this scale also has an absolute zero (no numbers exist below the zero). Very often, physical measures will represent ratio data (for example, height and weight). If one is measuring the length of a piece of wood in centimeters, there is quantity, equal units, and that measure cannot go below zero centimeters.

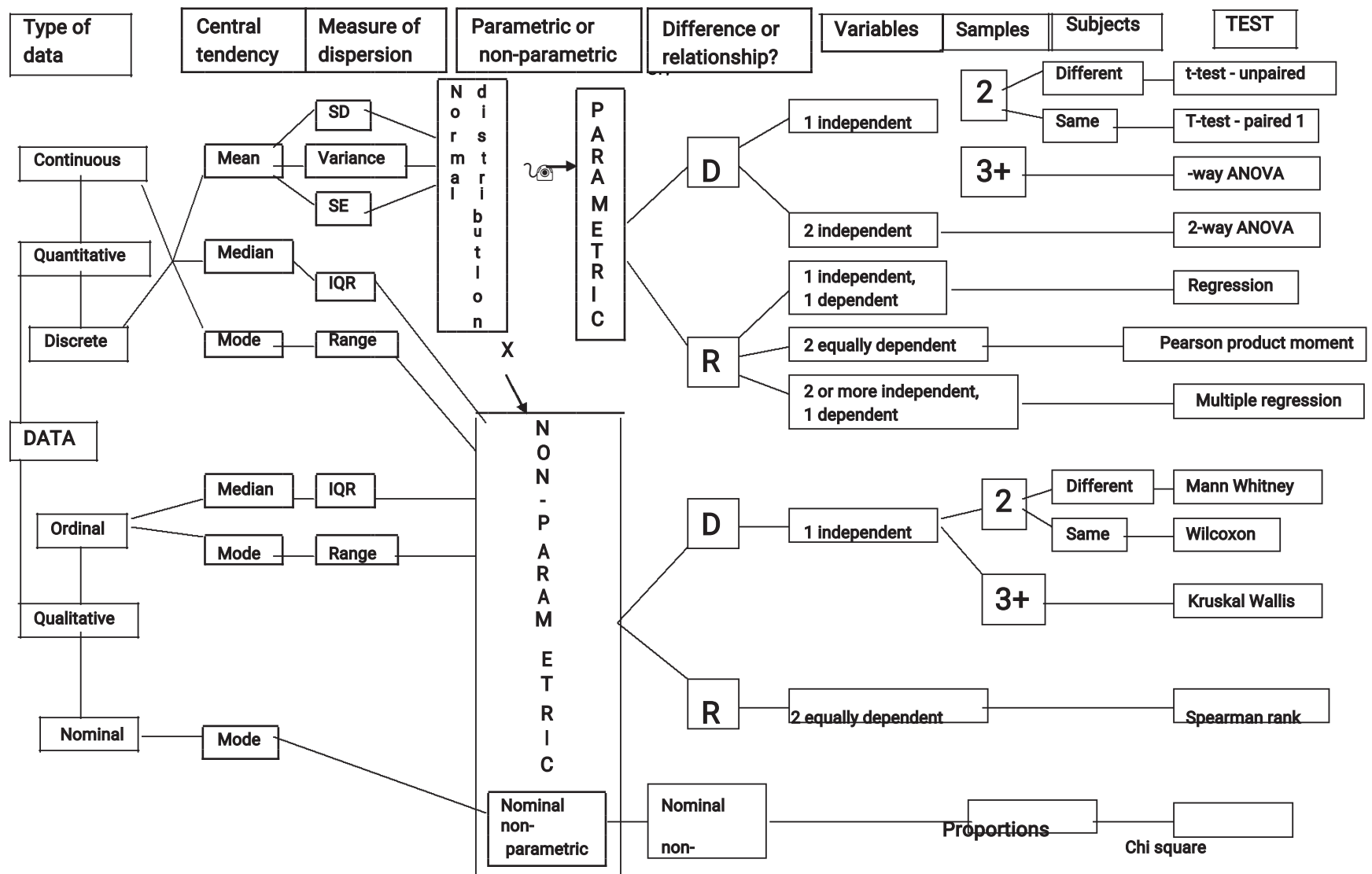
Interval and Ratio scales are termed continuous variables; while Nominal and Ordinal scales are termed categorical variables.

Selecting appropriate statistical analysis

In designing any research, the researcher needs to think about linking the data he/she will collect to the statistical tests he/she will use beforehand. This requires the researcher to select and apply correct statistical tests in order to make correct interpretations of your results and disseminate the right information. Selection of appropriate statistical analytical tool is one of the most crucial skills that must be learnt by researchers. They must know how to select appropriate test from the many available ones. There are four key things to consider when selecting appropriate statistical test tool:

1. Are you looking for relationships or differences?
2. If looking for a relationship, is there dependence of one variable on the other(s)?
3. If comparing, how many groups/categories do you have?
4. What level of measurement (i.e., data type) have you determined/will you deal with?

In research, there are only two types of hypotheses that can be tested statistically. They are either a hypothesis of difference or a hypothesis of association. If the hypothesis of difference is to be tested then the researcher must consider if the samples are dependent or independent. The researcher needs to know if the group of data is paired or unpaired. Groups or data sets are regarded as unpaired if there is no possibility of the values in one data set being related to or being influenced by the values in the other data sets. For numerical data, it is important to decide if they follow the parameters of the normal distribution curve (Gaussian curve), in which case parametric tests are applied. If distribution of the data is not normal or if one is not sure about the distribution, it is safer to use non-parametric tests. Answering the questions correctly will allow the research choose the appropriate statistical tool that can be used in the research.



Dissemination of Information

After getting the right result, it is important to disseminate reliable and relevant information to all stakeholders using appropriate channels. In any development, information is critical because it is a tool for communication between stakeholders and serves as a channel for assessing trends and shaping decisions (Chisita, 2012). There are different channels in which information can be disseminated namely:

1. Telephones and mobile phones: it is not only an essential means of disseminating information but also a basic facility which supports the use of other technologies. Baumuller (2012) stated that businesses, government and non-government agencies are taking advantage of the rapid use of mobile phones in developing countries to disseminate information in areas such as agriculture, health and education. The advantages of this means of disseminating information include portability, wide range of coverage, instantaneous two-way communication, adaptability and competence in transferring voice, text, image and video information at little or no cost (Mangstl, 2008, Munyua *et al.*, 2008). The improvement of the technologies in phones such as built-in global positioning systems (GPS), high-resolution digital cameras and short-length video recorders *e.t.c.* has further improved communication. Some research studies have reported the use of phones in disseminating information (Parikh, 2009; Masuki, *et al.* 2010; Ofosu-Asare, 2012; Baumuller, 2012)
2. Networking and/or the Internet: For geographically remote locations, connectivity through computer networks may be an appropriate way to disseminate information. The Internet's popularity, its efficiency in communication and the reducing price of hardware have resulted in the implementation of Internet connectivity in projects (Sood, 2001, Tiwari, 2008). Sheriff, (2009) reported that using these means to disseminate agricultural information in local languages were more attractive to Internet users. Both private and public networks have been established for use by the agricultural industry.
3. TV/radio: The lack of accessibility to other communication technologies and

funding has led to a combination of broadcasting and narrowcasting media which has been used to disseminate information. These media also work well for people who are not highly literate because they are attractive, easy to understand, especially with visual and animated materials; in addition to needing only modest reading fluency skills. Studies reported that television and radio are mostly used in information dissemination (Tadesse, 2008; Hassan et al., 2008; Munyua, *et al.*, 2008; Parikh, 2009; Apata and Ogunrewo 2010; Muhammad *et al.*, 2011). In Nigeria for instance, English and other local languages (Hausa, Igbo and Yoruba) has been used to disseminate information (Ekoja, 2004).

4. VCD/DVD, magazines and journal: Information can be disseminated through learning modules in offline Compact Disc Read-Only Memory (CD-ROM), magazines and journals (Munyua *et al.*, 2008; Parikh, 2009; Sheriff, 2009). This means of information dissemination stimulates self-learning activities and also reduces dependency on technical staff for learning new knowledge and technologies. Apart from text information, other types of data like pictures, audio and video clips can be included in this means of information dissemination channel (Sujhi et al., 2009). Rao (2007), reported that VCD/DVD, magazines and journal is a solution to the problem of information dissemination in areas where there is no Internet connectivity or the connection is unreliable.

5. Interpersonal communication method: information can be disseminated through one on one communication by an extension agent or co stakeholder.

Effective information dissemination is considered as essential tool for establishing and maintaining good social and working relationship among stakeholders (Agwu *et al.*, 2008). Selection of the right channel is influenced by the size of the target population, age, gender, income level, experience and education. However, the effectiveness of a dissemination channel depends not only on the size of the target population receiving the information but also on how successful that channel influences their decision to adopt a given technology (Murage *et al.*, 2012).

Conclusion

The paper has reviewed appropriateness of different statistical analysis tool

for specific data type. The list of statistical analysis tools is by no means thorough, but this review is enough to help researchers successfully manage most requirements in their researches. Application of the right statistical analysis tool to any research will lead to deriving the right result hence disseminating the right information to stakeholders.

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