Chapter 18
Quantitative Data Analysis for Information Science Professionals

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ABSTRACT

The chapter presents general aspects of quantitative data analysis as they relate to information sciences. The chapter is based on a literature review. It begins with explaining the meaning of data and quantitative data. Kinds of quantitative data are presented. The meaning of data analysis and the reasons for data analysis are also discussed. Reasons for quantitative data analysis are also discussed. The 'what' and 'why' of statistics in general and for information science researchers in particular is also presented. The chapter also presents the main issues of quantitative data analysis. Steps in quantitative data analysis are also presented. Preparation of quantitative data analysis is followed by a presentation on quantitative data analysis methods. The chapter highlights the popular quantitative data analysis software. A brief presentation on how quantitative data are presented and interpreted is given. The chapter ends with a discussion on the advantages and disadvantages of quantitative data analysis.

INTRODUCTION

The chapter discusses basic aspects of quantitative data analysis as they relate to information sciences. It is based on the presentation and analysis of what is in the literature. It presents the following: background; the what and why of quantitative data analysis; fundamental concepts germane to quantitative data analysis; preparation of quantitative data analysis; quantitative data analysis methods; popular quantitative data analysis softwares; presentation of quantitative data; interpretation of quantitative data and advantages and disadvantages of quantitative data.

Quantitative data analysis skills are very necessary for an information science professional. The skills are necessary because the amount of information based on quantitative or statistical analysis is growing in our society (Geers, 2000) cited in Murtonen, Olkinuora, Tynjala, & Lehtinen (2008). Unfortunately,

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social science students in colleges or universities tend to have challenges in comprehending quantitative methods and statistics courses (Gal et al., 1997) cited in Murtonen et al. (2008). The challenges may be attributed to previous bad experiences with mathematics leading to anxiety towards statistics. The social science students will struggle with quantitative data when they finally join the world of work. For example, Goertzen (2017) states that librarians face a challenge of making sense of all the wealth quantitative data sources available to them and use them (data sources) in a way that supports effective decision making. They thus, together with other information science professionals, need some exposure to the basic quantitative data analysis aspects presented in this chapter. Take note that a more detailed justification of the chapter is presented under the sub section on the what and why of quantitative data analysis as well as one on statistics you will encounter later in the chapter.

After reading this chapter, you should be able to:

- Appreciate the nature and place of quantitative data analysis in information science research;
- Appreciate the value of statistics in information science research;
- Differentiate between descriptive and inferential statistics;
- Carry out simple quantitative data analysis; and
- Present and interpret quantitative data.

BACKGROUND

Data is a general term with several meanings (Kerlinger, 1986). AED/TAC-12 Spring (2006) defines data as short hand for information or numbers, characters, images or other methods of recording, in a form which can be assessed to make a determination or decision about a specification. Data on its own has no meaning. It has meaning when interpreted and becomes information. There are two types of data, quantitative and qualitative data. The focus of this chapter is on quantitative data analysis.

Quantitative data are numbers, percentages and measurable figures. In other words, in the quantitative domain, data is used to describe things by assigning a value to them (Albers, 2017). Similarly, Bhat (2019) defines quantitative data as the value of data in the form of counts or numbers. Thus, quantitative data is data expressed in numbers (Chireshe, 2015). The data can be counted or expressed numerically. The data can be put into categories, measured or ranked. There are two main types of quantitative data namely, categorical data and continuous data. Categorical data is type of quantitative data that involves grouping things. Data must be placed into groups. An item cannot belong to more than one group at a time. Examples of categorical data are race and gender. We can have people categorised as blacks, whites or coloureds or as males or females. One cannot be both male and female. We can have categories of female and male library and information science (LIS) students. Goertzen (2017) talks of stakeholder groups to be served by a library, collection resources, financial resources, library personnel and facilities and equipment as examples of categories of information that a librarian can have. Continuous data is type of quantitative data where the values fall in a continuum and it is possible to have fractions or decimals. The numerical data is measured on a continuous range or scale. That is, values fall along a continuous scale. In continuous data, all values are possible with no gaps in between. Continuous data is usually a physical measurement (Albers, 2017). Examples of continuous data may include measurement of age, height or distance. In LIS one may measure library readership pattern on the basis of age.