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((Biostatistics))

1st stage

chapter_1

By

Mm. Ali Alawadi



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Chapter One

Introduction to Statistics

It is the science that specializes in scientific methods of data collection, organization, summarization and analysis, in order to reach acceptable results and sound decisions in the light of this analysis. One of the branches of statistics, which is concerned with life, medical or health data and is called (medical statistics or biostatistics) and the most important characteristic of this science is that it gives a true description of the various life phenomena or relationships that link some life variables such as sex, age, height, skin color and eye color..... etc. with diseases that affect humans or animals alike, and through the study of these relationships and others that fall within this science, some right decisions emerge.

Statistics is divided into:

1. Descriptive statistics: It is concerned with organizing and summarizing data, and the purpose of organizing is to help understand data, and descriptive statistics includes frequency distributions, graphs, and methods of calculating central tendency, measures of dispersion and various other measurements.
2. Inferential statistics: It is concerned with the process of making appropriate decisions about the community based on the information obtained from the sample

Variable:

It is any phenomenon, property, or event that you measure and whose value changes from one element to another. Some examples of variables: the weight of a group of children under six, the height of university students, the educational status of a group of married women, and the values that the variable takes are called data, which is the set of observations or observations taken during the study.



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Types of biological variables:

There are three main types of variables: measurement variables, which are expressed as numbers (such as 3.7 mm); nominal variables, which are expressed as names (such as “female”); and ranked variables, which are expressed as positions (such as “third”).

Measurement variables are, as the name implies, things you can measure. An individual observation of a measurement variable is always a number. Examples include length, weight, pH, and bone density. Other names for them include “numeric” or “quantitative” variables.

Nominal variables classify observations into discrete categories. Examples of nominal variables include sex (male or female), genotype (values are AA, Aa, or aa), or ankle condition (values are normal, sprained, torn ligament, or broken). A good rule of thumb is that an individual observation of a nominal variable can be expressed as a word, not a number.

Ranked variables, also called ordinal variables, are those for which the individual observations can be put in order from smallest to largest, even though the exact values are unknown.

Independent and dependent variables:

Another way to classify variables is as independent or dependent variables. An independent variable (also known as a predictor, explanatory, or exposure variable) is a variable that you think may cause a change in a dependent variable (also known as an outcome or response variable). For example, if you grow isopods with 10 different mannose concentrations in their food and measure their growth rate, the mannose concentration is an independent variable and the growth rate is a dependent variable, because you think that different mannose concentrations may cause different growth rates. Any of the three variable types (measurement, nominal or ranked) can be either independent or dependent. For example, if you want to know whether sex affects body temperature in mice, sex would be an independent variable and temperature would be a dependent variable. If you wanted to know whether the incubation temperature of eggs affects sex in turtles, temperature would be the independent variable and sex would be the dependent variable.



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The data is divided into:

1. Descriptive data: These are those data that describe individuals and society and cannot be measured directly by numerical numbers such as hair color, eyes, etc.

Metadata is divided into:

- Descriptive data in which qualities such as educational status and appreciation can be arranged in a subject.
 - Descriptive data in which attributes cannot be arranged, such as the specializations of a group of students.
2. Quantitative or numerical data: These are those data that can be measured directly in numerical numbers such as height, weight or age.

Quantitative data is divided into:

- Continuous or continuous data in which the data takes any numerical value and is of any degree of accuracy and is the result of the use of a measuring device or instrument such as height, weight and temperature.
- Discontinuous or discrete data in which the viewing takes integers resulting from a counting or census process, such as the number of children in a family, the number of fruits on plants, the number of students in the mathematics course... And so on.



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(Statistical population and statistical sample):

Population:

It is all the values or vocabulary that a variable can take, also defined as all the individuals or objects under study. For example, if our study is related to the heights of a university's students, then the community in this case is all the students at that university.

The population is divided into:

1. **Limited:** It is the one in which there is a limited number of individuals, such as the number of 100 students in the first semester of 1432 AH.
2. **Unlimited:** It is the one in which the number of individuals is infinite (unlimited) such as the number of students 100 for the next ten years (assuming the continuation of the course)

Most of the time, it is difficult or impossible to observe the data of all members of society, such as the research conducted to find out the illiteracy rate in a country or city and the research aimed at counting the grains of harvested wheat, and to overcome this, a part of the community called the sample can be chosen.

Sample:

It is defined as a part of the community chosen so that it represents the community well.

Reasons why it is necessary to study the sample instead of the population:

1. Difficulty or impossibility of examining the entire community due to:
 - Its size has grown as in estimating the fish wealth in a society.
 - Inspection may be destructive to the units as in the inspection of the life of bulbs for the production of a particular plant.
 - The examination may be harmful to units such as a patient's blood test.
2. Costs and possibilities) examining the whole community costs a lot of effort and money) in showing results. 3. The accuracy of data and information due to the possibility of using highly qualified and trained people.