Statistics 1
Chapter 1
What is Statistics

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Chapter One

What is Statistics?

GOALS

When you have completed this chapter, you will be able to:

ONE

Define what is meant by statistics.

TWO

Explain what is meant by descriptive statistics and inferential statistics.

THREE

Distinguish between a qualitative variable and a quantitative variable.

FOUR

Distinguish between a discrete variable and a continuous variable.

FIVE

Distinguish among the nominal, ordinal, interval, and ratio levels of measurement.

SIX

Define the terms mutually exclusive and exhaustive.

What is Meant by Statistics?

- *Statistics* is the science of collecting, organizing, presenting, analyzing, and interpreting numerical data for the purpose of assisting in making a more effective decision.

Who Uses Statistics?

- Statistical techniques are used extensively by marketing, accounting, quality control, consumers, professional sports people, hospital administrators, educators, politicians, physicians, etc...

Types of Statistics

- Descriptive Statistics: Methods of organizing, summarizing, and presenting data in an informative way.
- EXAMPLE 1: A Gallup poll found that 49% of the people in a survey knew the name of the first book of the Bible. The statistic 49 describes the number out of every 100 persons who knew the answer.
- EXAMPLE 2: According to Consumer Reports, Whirlpool washing machine owners reported 9 problems per 100 machines during 1995. The statistic 9 describes the number of problems out of every 100 machines.

Types of Statistics

- Inferential Statistics: A decision, estimate, prediction, or generalization about a population, based on a sample.
- A population is a collection of all possible individuals, objects, or measurements of interest.
- A sample is a portion, or part, of the population of interest.

Types of Statistics

(examples of inferential statistics)

- EXAMPLE 1: TV networks constantly monitor the popularity of their programs by hiring Nielsen and other organizations to sample the preferences of TV viewers.
- EXAMPLE 2: The accounting department of a large firm will select a sample of the invoices to check for accuracy for all the invoices of the company.
- EXAMPLE 3: Wine tasters sip a few drops of wine to make a decision with respect to all the wine waiting to be released for sale.

Types of Variables

- Qualitative or Attribute variable: the characteristic or variable being studied is nonnumeric.
- EXAMPLES: Gender, religious affiliation, type of automobile owned, state of birth, eye color.

Types of Variables

- Quantitative variable: the variable can be reported numerically.
- EXAMPLE: balance in your checking account, minutes remaining in class, number of children in a family.

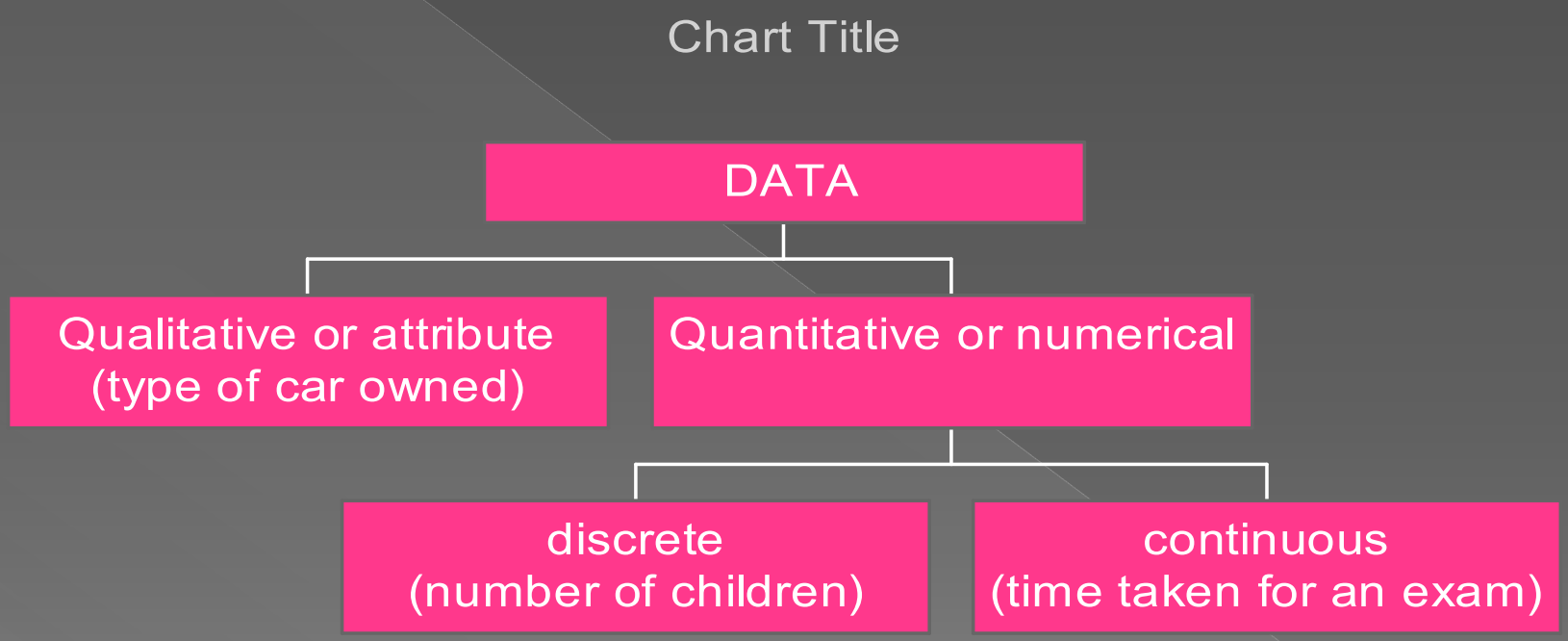
Types of Variables

- Quantitative variables can be classified as either discrete or continuous.
- Discrete variables: can only assume certain values and there are usually "gaps" between values.
- EXAMPLE: the number of bedrooms in a house. (1,2,3,..., etc...).

Types of Variables

- Quantitative Variables can be classified as either discrete or continuous.
- Continuous variables: can assume any value within a specific range.
- EXAMPLE: The time it takes to fly from Toledo to New York.

Summary of Types of Variables



Sources of Statistical Data

- Researching problems usually requires published data. Statistics on these problems can be found in published articles, journals, and magazines.
- Published data is not always available on a given subject. In such cases, information will have to be collected and analyzed.
- One way of collecting data is via questionnaires.

Levels of Measurement

- Nominal level (scaled): Data that can only be classified into categories and cannot be arranged in an ordering scheme.
- EXAMPLES: eye color, gender, religious affiliation.

Levels of Measurement

- Mutually exclusive: An individual or item that, by virtue of being included in one category, must be excluded from any other category.
- EXAMPLE: eye color.
- Exhaustive: each person, object, or item must be classified in at least one category.
- EXAMPLE: religious affiliation.

Levels of Measurement

- Ordinal level: involves data that may be arranged in some order, but differences between data values cannot be determined or are meaningless.
- EXAMPLE: During a taste test of 4 colas, cola C was ranked number 1, cola B was ranked number 2, cola A was ranked number 3, and cola D was ranked number 4.

Levels of Measurement

- Interval level: similar to the ordinal level, with the additional property that meaningful amounts of differences between data values can be determined. There is no natural zero point.
- EXAMPLE: Temperature on the Fahrenheit scale.

Levels of Measurement

- Ratio level: the interval level with an inherent zero starting point. Differences and ratios are meaningful for this level of measurement.
- EXAMPLES: money, heights of NBA players.