

# Basic Statistics for Development



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## OVERVIEW

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Associate Professor of Statistics, Doctor of Science (KU Leuven), Doctor in Sciences: Statistics (UHasselt), MS (Biostatistics), MS (Statistics), BSc (Hons. in Statistics), R-Package Creator (QBAsyDist)

## APPOINTMENTS

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**Associate Professor of Statistics**

2019- cont.

*Jahangirnagar University, Bangladesh*

- Teaching courses on STAT-509: Advance Biostatistics, STAT-514: Computer Intensive Statistics, PM-ASDS18: Data Mining, MATH-205: Statistics

**Assistant Professor of Statistics**

2013-2019

*Jahangirnagar University, Bangladesh*

# Text Book

- Lind, A. D., Marchal, W. and Wathen, S. (2019): *Statistical Techniques in Business and Economics*, 17<sup>th</sup> Edition, McGraw Hill Inc.

# Reference Book

- Walpole, R E., Myers, R. H. and Ye, K. (2011): *Probability & Statistics for Engineers and Scientists*, 9<sup>th</sup> Edition, Prentice Hall.



# What is Statistics



## Chapter 1

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# GOALS

- Understand why we study statistics.
- Explain what is meant by descriptive statistics and inferential statistics.
- Distinguish between a qualitative variable and a quantitative variable.
- Describe how a discrete variable is different from a continuous variable.
- Distinguish among the nominal, ordinal, interval, and ratio levels of measurement.



# What is Meant by Statistics?

*Statistics* is the science of collecting, organizing, presenting, analyzing, and interpreting numerical data to assist in making more effective decisions.



# 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

**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, General Electric washing machine owners reported 9 problems per 100 machines during 2001. The statistic 9 describes the number of problems out of every 100 machines.

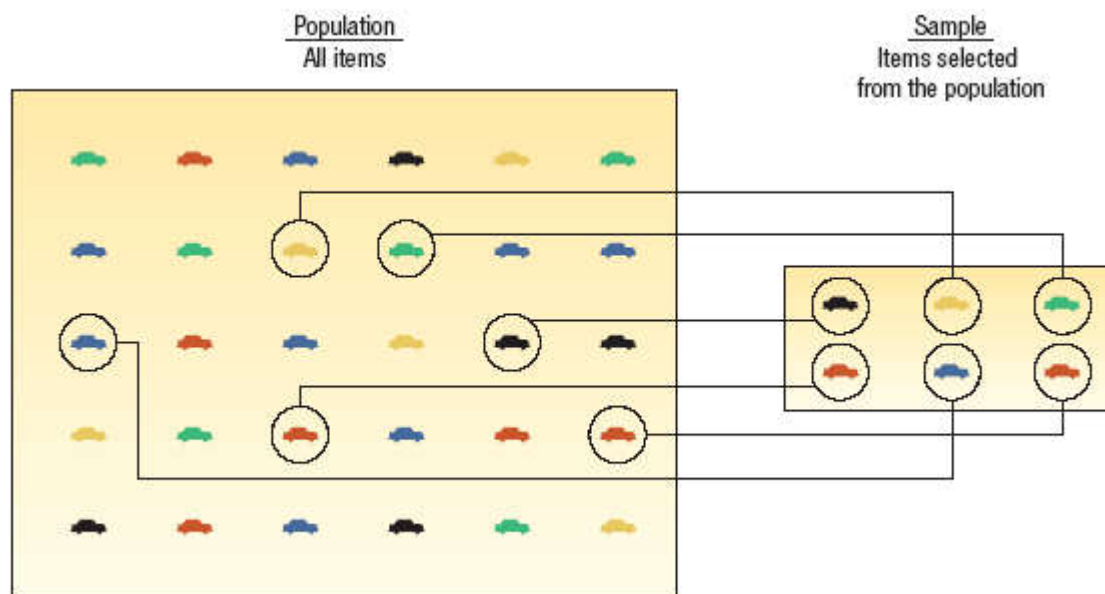
**Inferential Statistics:** A decision, estimate, prediction, or generalization about a population, based on a sample.



# Population versus 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 Variables

A. Qualitative or Attribute variable - the characteristic being studied is nonnumeric.

EXAMPLES: Gender, religious affiliation, type of automobile owned, state of birth, eye color are examples.

B. Quantitative variable - information is reported numerically.

EXAMPLES: balance in your checking account, minutes remaining in class, or number of children in a family.



# Quantitative Variables - Classifications

Quantitative variables can be classified as either **discrete** or **continuous**.

A. **Discrete variables**: can only assume certain values and there are usually “gaps” between values.

**EXAMPLE**: the number of bedrooms in a house, or the number of hammers sold at the local Home Depot (1,2,3,...,etc).

B. **Continuous variable** can assume any value within a specified range.

**EXAMPLE**: The pressure in a tire, the weight of a pork chop, or the height of students in a class.



# Summary of Types of Variables

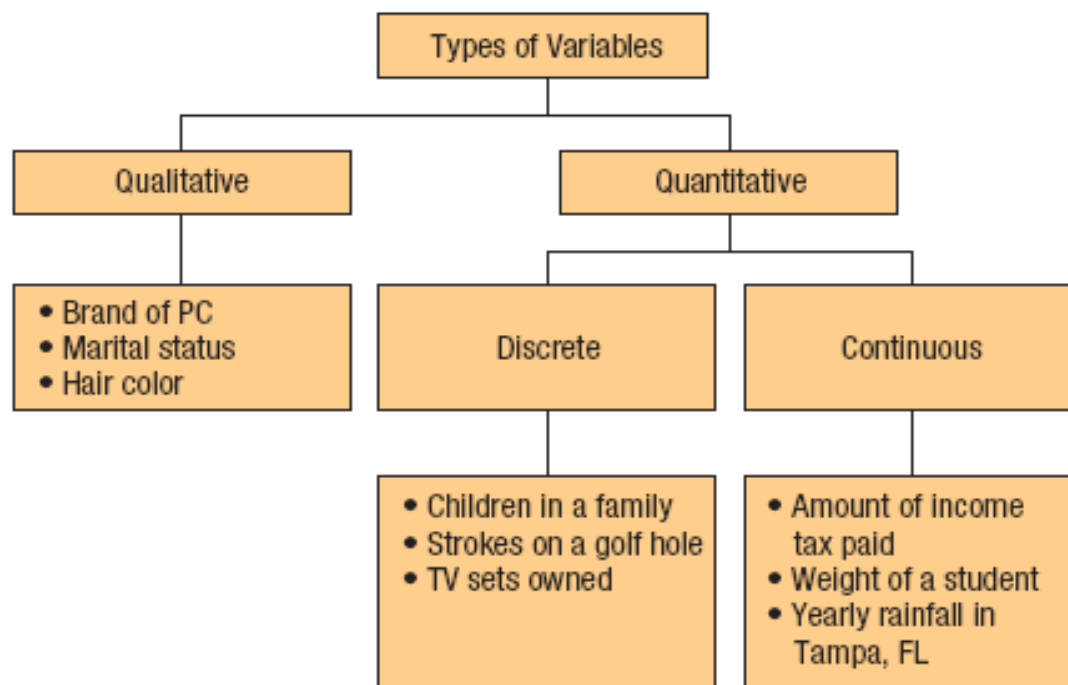


CHART 1-2 Summary of the Types of Variables



# Four Levels of Measurement

**Nominal level** - data that is classified into categories and cannot be arranged in any particular order.

**EXAMPLES:** eye color, gender, religious affiliation.

**Ordinal level** – involves data arranged in some order, but the differences between data values cannot be determined or are meaningless.

**EXAMPLE:** During a taste test of 4 soft drinks, Mellow Yellow was ranked number 1, Sprite number 2, Seven-up number 3, and Orange Crush number 4.

**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.

**Ratio level** - the interval level with an inherent zero starting point. Differences and ratios are meaningful for this level of measurement.

**EXAMPLES:** Monthly income of surgeons, or distance traveled by manufacturer's representatives per month.



# Summary of the Characteristics for Levels of Measurement

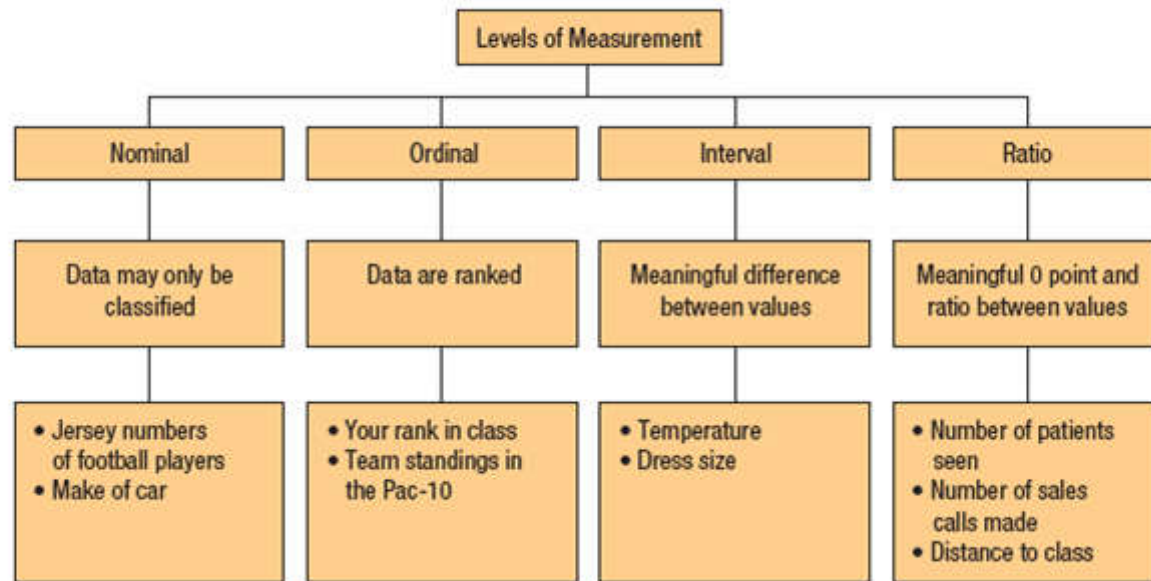


CHART 1-3 Summary of the Characteristics for Levels of Measurement



# End of Chapter 1

