

## MAT 161 - DESCRIPTIVE STATISTICS

### LECTURE 1: THE MEANING OF STATISTICS

**LECTURE C24-1-1 :: WED., JAN. 31, 2024 12:00 PM (WAT) - WED., JAN. 31, 2024 2:00 PM (WAT)**



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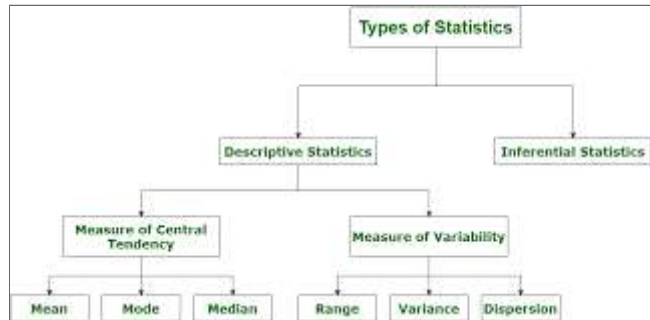
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## What is Statistics?

Statistics is the science of **Gathering, Organizing, Interpreting, Presenting, and Analyzing** data. It provides a systematic framework for making inferences and decisions in the face of uncertainty.

### Types of Statistics



**Descriptive Statistics:** Summarizes and describes essential features of a dataset, such as mean, median, mode, and measures of variability.

**Inferential Statistics:** Involves making predictions or inferences about a population based on a sample of data.

### **Uses of Statistics in Science, Technology and Business:**

**1) Finance:** Usually, fiscal and monetary policies are arrived at with the aid of Statistics - taxation policies, cost of capital determination

#### **2) Marketing**

Statistics is brought to bear in Market Research, for the determination and development of consumer preferences, vis-a-vis product quality, and price, where needed and by whom.

#### **3) Management**

Be it governments, industries or individuals, decisions are always required for future events (that is, money, men, materials and machines) which are characterized by uncertainties.

#### 4) Demography

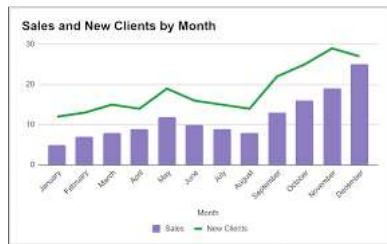
Statistics is used widely in the areas of data for mineral explorations, and in urban and regional planning.

- **Actuarial science** is the discipline that applies mathematical and statistical methods to assess risk in the insurance and finance industries.

- **Astrostatistics** is the discipline that applies statistical analysis to the understanding of astronomical data.

- **Biostatistics** is a branch of biology that studies biological phenomena and observations by means of statistical analysis, and includes medical statistics.

**Geostatistics** is a branch of geography that deals with the analysis of data from disciplines such as petroleum geology, hydrogeology, hydrology, meteorology, oceanography, geochemistry, geography.



- **Machine learning** is the subfield of computer science that formulates algorithms to make predictions from data.
- **The use of R** has grown particularly in academic circles for statistical computing is a well-sought skill and proficiency in R or Python is now desired by many employers, especially for those who are pursuing careers in STEM

**Operations research** (or operational research) is an interdisciplinary branch of applied mathematics and formal science that uses methods such as mathematical modeling, statistics, and algorithms to arrive at optimal or near-optimal solutions to complex problems; Management science focuses on problems in the business world.

### **Classification of Data by Source of Data**

**The two main sources of are: primary and secondary data.**

## **Primary Data**

Primary data are data in which an individual or group is/are involved in its design phase.

These include data obtained through observation, experimentation, interviews (personal or group), and questionnaires (self-administered, posted, or Internet).

If well executed, and with no limitations to funds and time, these data produce reliable information.



## **Secondary Data**

Secondary data are already collected and documented data, for some purposes, by an individual or group, and to be re-used by another individual or group who was/were not involved in its design phase. These include data obtained through: the Bureau of Statistics, Federal and State Research Institute, magazines and journals, and the Internet.

For example, the Nigeria Bureau of Statistics (NBS).

# Classification of Data by Scale of Measurement Used

Examples	
Quantitative Data ("Numerical")	Qualitative Data ("Categorical")
<ul style="list-style-type: none"><li>• Height of 1<sup>st</sup> graders</li><li>• Weight of sumo wrestlers</li><li>• Duration of red lights</li><li>• Age of Olympians</li><li>• Distance of planets</li><li>• Money in 401k plans</li><li>• Temperature of coffee (200 F)</li></ul>	<ul style="list-style-type: none"><li>• Happiness rating</li><li>• Gender</li><li>• Pass/Fail</li><li>• Eye Color</li><li>• Interview transcript</li><li>• Categories of plants</li><li>• Descriptive temperature of coffee ("very hot")</li></ul>

## Qualitative Data

A measure is qualitative if it represents some attributes or categories. For example, the maximum attainable educational background or the profession of community members.

The scale of measurement for data arising from these measures is referred to as the nominal scale, they are unordered number representations of the different categories. in other words, these numbers are mere labels and do not represent meaningful numbers.

**Numerical computations can not and must not be performed on them.** For example, the codes given the flats in a building of 16 flats.

## Quantitative Data

A measure is quantitative if it represents counts or measurements. For example, the number of people in distress, after watching a football match (count) and the weights of weight lifters in a weight lifting competition (measurement).

Quantitative data can further be divided into Discrete (count data and are said to be in an interval scale). In contrast, Continuous (measurement data, and are said to be on the ratio scale ).

## **Summary**

**Statistics is the systematic method of transforming data into useful information.  
Data are basic numerical facts necessary for any statistical inquiry**