

Sos Political Science & Public Administration  
M.A Political science IV Sem  
Research methodology (403)  
UNIT-V

Topic Name-Statistical Methods Their Meaning

# Introduction

- ▶ Statistics is a mathematical body of science that pertains to the collection, analysis, interpretation or explanation, and presentation of data,<sup>[11]</sup> or as a branch of mathematics.<sup>[12]</sup> Some consider statistics to be a distinct mathematical science rather than a branch of mathematics. While many scientific investigations make use of data, statistics is concerned with the use of data in the context of uncertainty and decision making in the face of uncertainty.
- ▶ In applying statistics to a problem, it is common practice to start with a population or process to be studied. Populations can be diverse topics such as "all people living in a country" or "every atom composing a crystal". Ideally, statisticians compile data about the entire population (an operation called census). This may be organized by governmental statistical institutes. *Descriptive statistics* can be used to summarize the population data. Numerical descriptors include mean and standard deviation for continuous data types (like income), while frequency and percentage are more useful in terms of describing categorical data (like education).

# Main ways of statistics

The word “statistics” is used in 3 main ways:

1. Common meaning: factual information involving numbers. A better word for this is data.
2. Precise meaning: quantities which have been derived from sample data, e.g. the mean (or average) of a data set
3. Common meaning: an academic subject which involves reasoning about statistical quantities

# Definition

- ▶ **Statistical methods** are mathematical formulas, models, and **techniques** that are used in **statistical analysis** of raw research data. The application of **statistical methods** extracts information from research data and provides different ways to assess the robustness of research outputs.

# What are statistical tools?

- ▶ **Statistical methods** involved in carrying out a study include planning, designing, collecting data, analysing, drawing meaningful interpretation and reporting of the research findings.  
The **statistical analysis** gives meaning to the meaningless numbers, thereby breathing life into a lifeless data.

# Why do we need statistical tools?

- ▶ The data and the use of **statistics** provide the **tool** to decide. It gives a solid foundation on which to base decision, big or small. It is extremely important for a researcher to know what **statistics** they **want** to use before they collect their data. Otherwise data may be collected that is unusable

# The statistical analysis process

- ▶ Identify the operation to be analyzed.
- ▶ Gather all relevant information about the operation, including tools, materials, and procedures.
- ▶ Talk with employees who use the operation or have used similar operations. They may have suggestions for improving it.
- ▶ Chart the operation, whether you are analyzing an existing operation or a new operation.
- ▶ Evaluate each step in the existing operation or proposed new operation. Does the step add value? Does it only add cost?
- ▶ Revise the existing or new operation as needed. ...

# Basic statistical concepts

- ▶ q Reliability and validity
- ▶ q Bias and precision
- ▶ q Data richness
- ▶ q Populations and samples
- ▶ q Parameters and estimates
- ▶ q Random selection
- ▶ q Robustness



# What are the five main forms of statistical methods?

- ▶ (i) Descriptive methods
- ▶ (ii) Analytical methods
- ▶ (iii) Inductive methods
- ▶ (iv) Inferential methods
- ▶ (v) Applied methods.

# Concepts in Statistics:

- ▶ **Data**
- ▶ **Scores**
- ▶ **Variable**
- ▶ **Measurement Scales:**

# characteristics

- ▶ **Statistics are Aggregate of Facts:**
- ▶ **. Statistics are Affected to a marked Extent by Multiplicity, of Causes:**
- ▶ **Statistics are Numerically Expressed:**
- ▶ **Statistics are Enumerated or estimated according to Reasonable Standards of Accuracy:**
- ▶ **Statistics are Collected in a Systematic Manner:**
- ▶ **Statistics for a Pre-determined Purpose:**
- ▶ **Statistics are Capable of being Placed in Relation to each other**

# statistical methods

## ▶ **Descriptive Methods**

- ▶ This type of method consists of all the preliminary steps to final analysis and interpretation. As such this method includes the method of collection, methods of tabulation, measures of central tendency, measures of dispersion, measures of skewness, and analysis of time series. These methods bring out the various characteristics of data and help in summarising and interpreting the salient features of the data. This method is also otherwise called descriptive statistics.

## ▶ **Analytical Methods**

- ▶ This type of method consists of all those methods which help in the matter of analysis and comparison between any two or more variables. This includes the methods of correlation, regression analysis, association of attributes and the like. This method is also otherwise called analytical statistics.

# statistical methods

## ▶ **Inductive Methods**

- ▶ This type of method consists of all those procedures that help in the generalization or estimation over a phenomenon on the basis of random observation or partial data. This includes the procedure of interpolation, extrapolation, theory of probability and the like. This method is also otherwise called inductive statistics.

## ▶ **Inferential Methods**

- ▶ This type of method consists of those procedures which help in drawing inferences about the characteristics of the population on the basis of samples. As such, this method includes the theory of sampling, different tests of significance, statistical control etc. This method is also otherwise called inferential statistics.

## ▶ **Applied Methods**

- ▶ This type of method consists of those procedures which are applied to the problems of real life. This includes the method of statistical quality control, sample survey, linear programming, inventory control and the like.

# Where do we use statistics?

- ▶ Weather Forecasts
- ▶ Emergency Preparedness
- ▶ Predicting Disease
- ▶ Medical Studies
- ▶ Genetics
- ▶ Political Campaigns
- ▶ Insurance
- ▶ Consumer Goods
- ▶ Quality testing
- ▶ Stock market

# Importance and Scope of Statistics:

- ▶ The fact that in the modern world statistical methods are universally applicable. It is in itself enough to show how important the science of statistics is. As a matter of fact there are millions of people all over the world who have not heard a word about statistics and yet who make a profuse use of statistical methods in their day- to-day decisions. Statistical methods are common ways of thinking and hence are used by all types of persons.
- ▶ Examples can be multiplied to show that human behaviour and statistical methods have much in common. In fact statistical methods are so closely connected with human actions and behaviour that practically all human activity can be explained by statistical methods

THANK YOU