Why Study Statistics?

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Goals

- Explain how decisions are often based on incomplete information
- Explain key definitions:
  - Population vs. Sample
  - Parameter vs. Statistic
  - Descriptive vs. Inferential Statistics
- Describe random sampling
- Explain the difference between Descriptive and Inferential statistics

Dealing with Uncertainty

Everyday decisions are based on incomplete information

Consider:

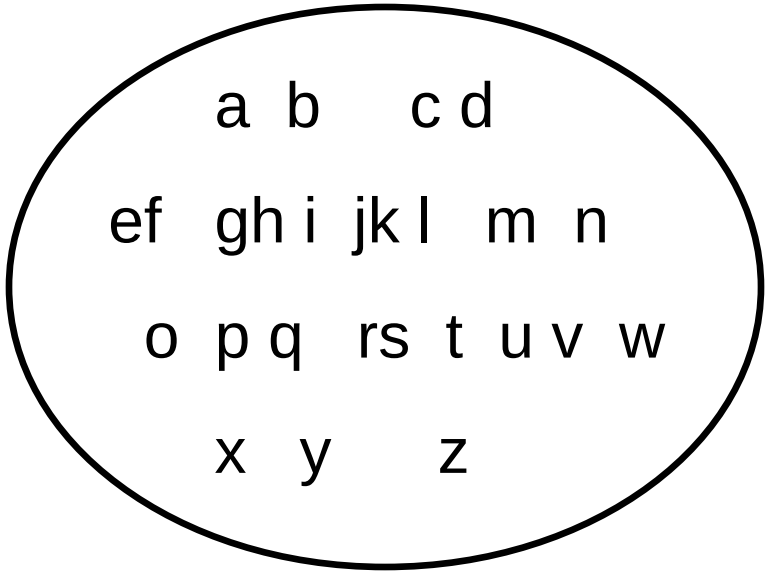
- The price of DSE stock *will* be higher in six months than it is now.
- An infectious disease *will* outbreak in summer.

Key Definitions

- A population is the collection of all items of interest or under investigation
  - N represents the population size
- A sample is an observed representative subset of the population
  - n represents the sample size
- A parameter is a specific characteristic of a population
- A statistic is a specific characteristic of a sample

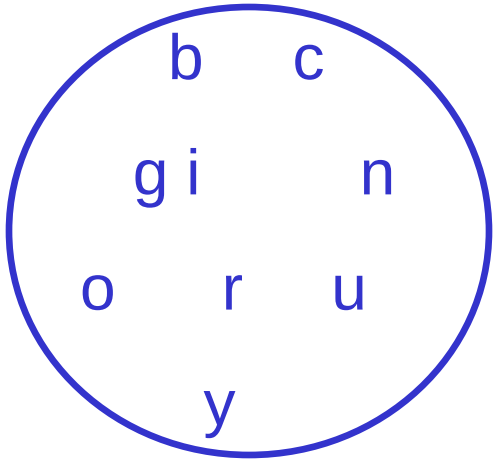
Population vs. Sample

Population



Values calculated using population data are called parameters

Sample



Values computed from sample data are called statistics

Examples of Populations

- Names of all registered voters in Bangladesh
- Incomes of all families living in Dhaka city
- Grade point averages of all the students in the North South University

Descriptive and Inferential Statistics

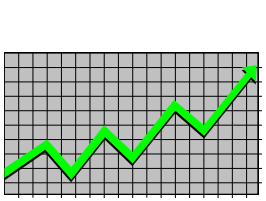
Two branches of statistics:

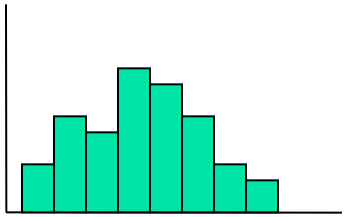
- Descriptive statistics
  - Collecting, summarizing, and processing data to transform data into information
- Inferential statistics
  - provide the bases for predictions, forecasts, and estimates that are used to transform information into knowledge

Descriptive Statistics

- Collect data
  - e.g., Survey

- Present data
  - e.g., Tables and graphs





- Summarize data
  - e.g., Sample mean = $\frac{\sum X_i}{n}$

Inferential Statistics

- Estimation
  - e.g., Estimate the population mean weight using the sample mean weight
- Hypothesis testing
  - e.g., Test the claim that the population mean weight is 120 pounds

Inference is the process of drawing conclusions or making decisions about a population based on sample results

Thank you