

Statistical Process

Statistical process:

A four-step process that helps someone collect, organize, display, and analyze data on a given topic.

Steps of the Statistical Process

1. Form a question that can be answered by data.
2. Design and implement a plan that collects the appropriate data.
3. Analyze the data using graphical and numerical methods.
4. Interpret and compare the data.

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Types of Statistics

■ Statistics

- The branch of mathematics that transforms data into useful information for decision makers.



Descriptive Statistics

Collecting, summarizing, and describing data



Inferential Statistics

Drawing conclusions and/or making decisions concerning a population based only on sample data

Qualitative data is data that is not given numerically;

e.g. favourite colour, place of birth, favourite food, type of car.

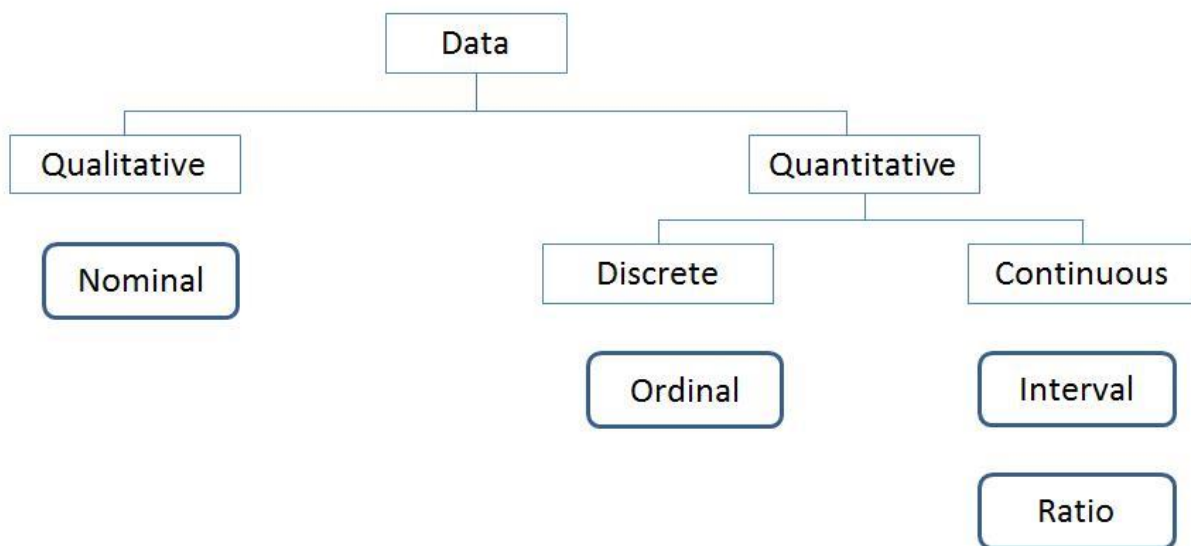
Quantitative data is numerical. There are two types of quantitative data.

Discrete data can only take specific numeric values;

e.g. shoe size, number of brothers, number of cars in a car park.

Continuous data can take any numerical value;

e.g. height, mass, length.

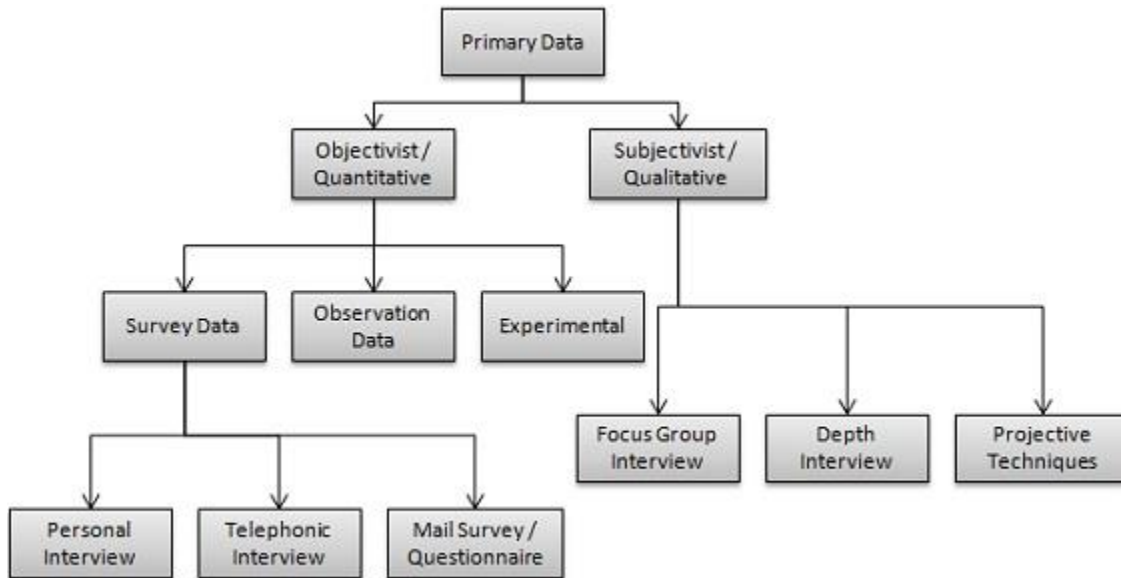


Primary Scales of Measurement

Table 8.1

Scale	Basic Characteristics	Common Examples	Marketing Examples	Permissible Statistics	
				Descriptive	Inferential
Nominal	Numbers identify & classify objects	Social Security nos., numbering of football players	Brand nos., store types	Percentages, mode	Chi-square, binomial test
Ordinal	Nos. indicate the relative positions of objects but not the magnitude of differences between them	Quality rankings, rankings of teams in a tournament	Preference rankings, market position, social class	Percentile, median	Rank-order correlation, Friedman ANOVA
Interval	Differences between objects	Temperature (Fahrenheit)	Attitudes, opinions, index	Range, mean, standard	Product-moment
Ratio	Zero point is fixed, ratios of scale values can be compared	Length, weight	Age, sales, income, costs	Geometric mean, harmonic mean	Coefficient of variation

How to collect Data?



Sampling Techniques

Sampling with Replacement

- When a number is selected for a sample, it is **not removed** from the population.

Stratified Sampling

- Population is divided into **groups**.
- Random samples are drawn from **each group**.

Systematic Sampling

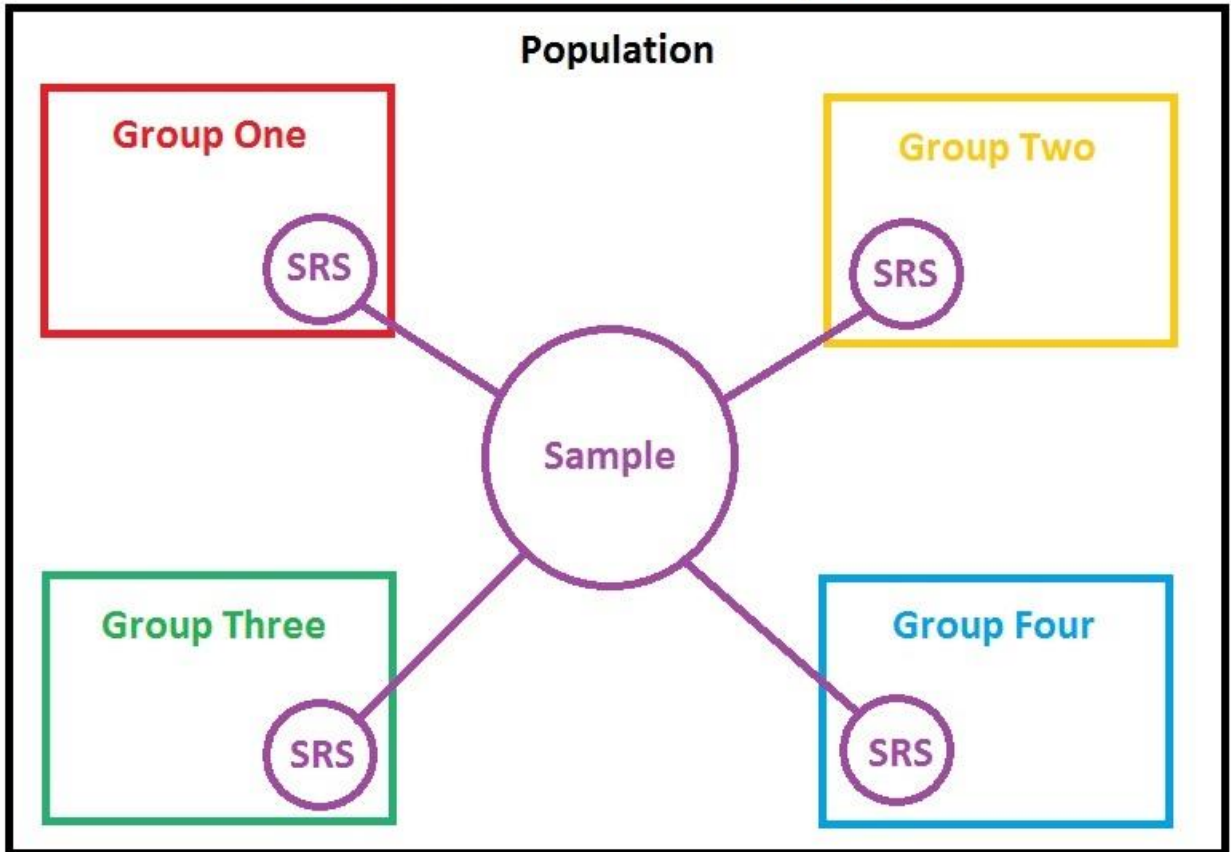
- Population is arranged in **sequential order**.
- Select a **random starting point**.
- Select **every "kth" item**.

Cluster Sampling

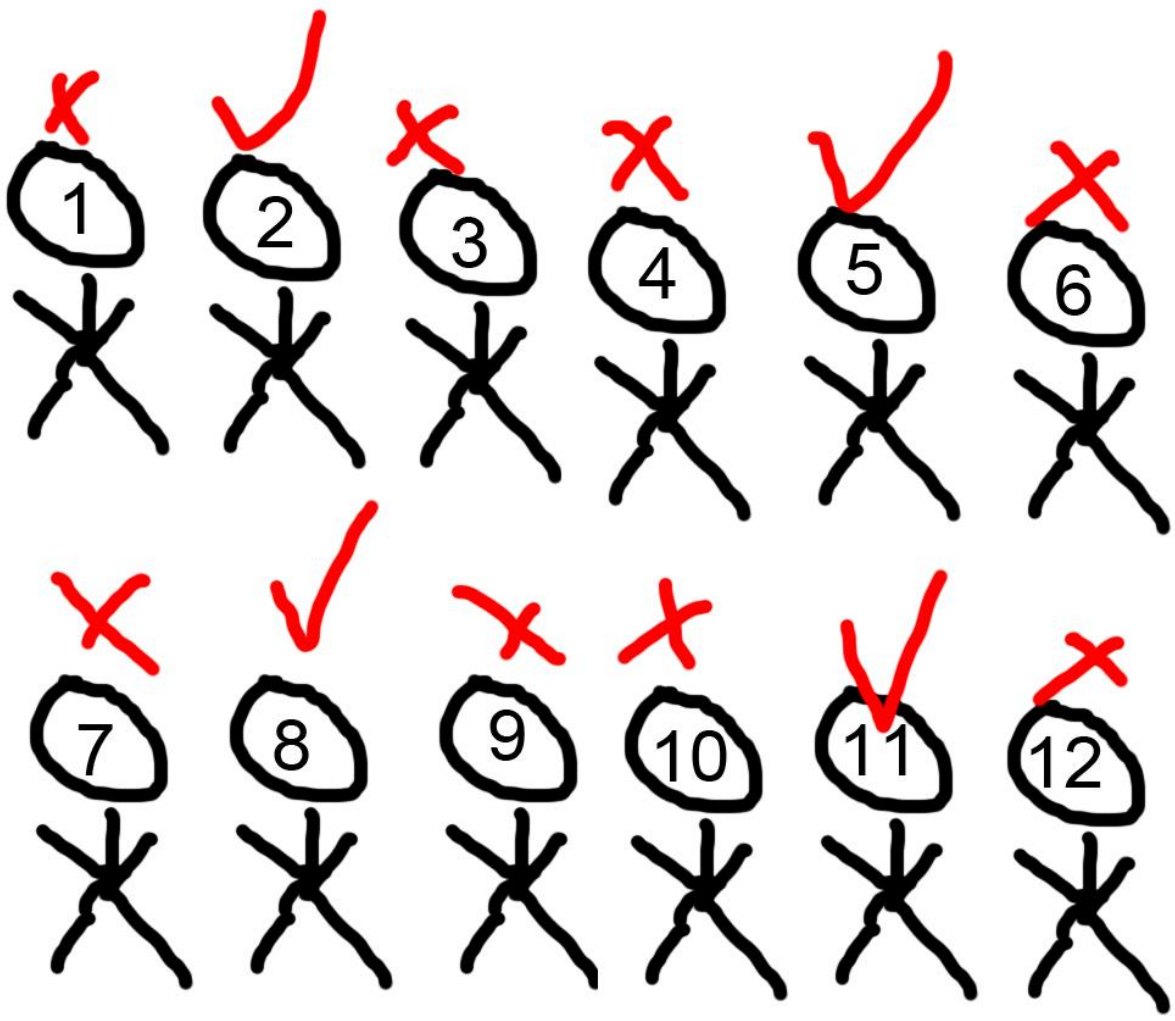
- Population is divided into **sections**.
- Some **sections** are **randomly selected**.
- **Every item in selected sections** is included in sample.

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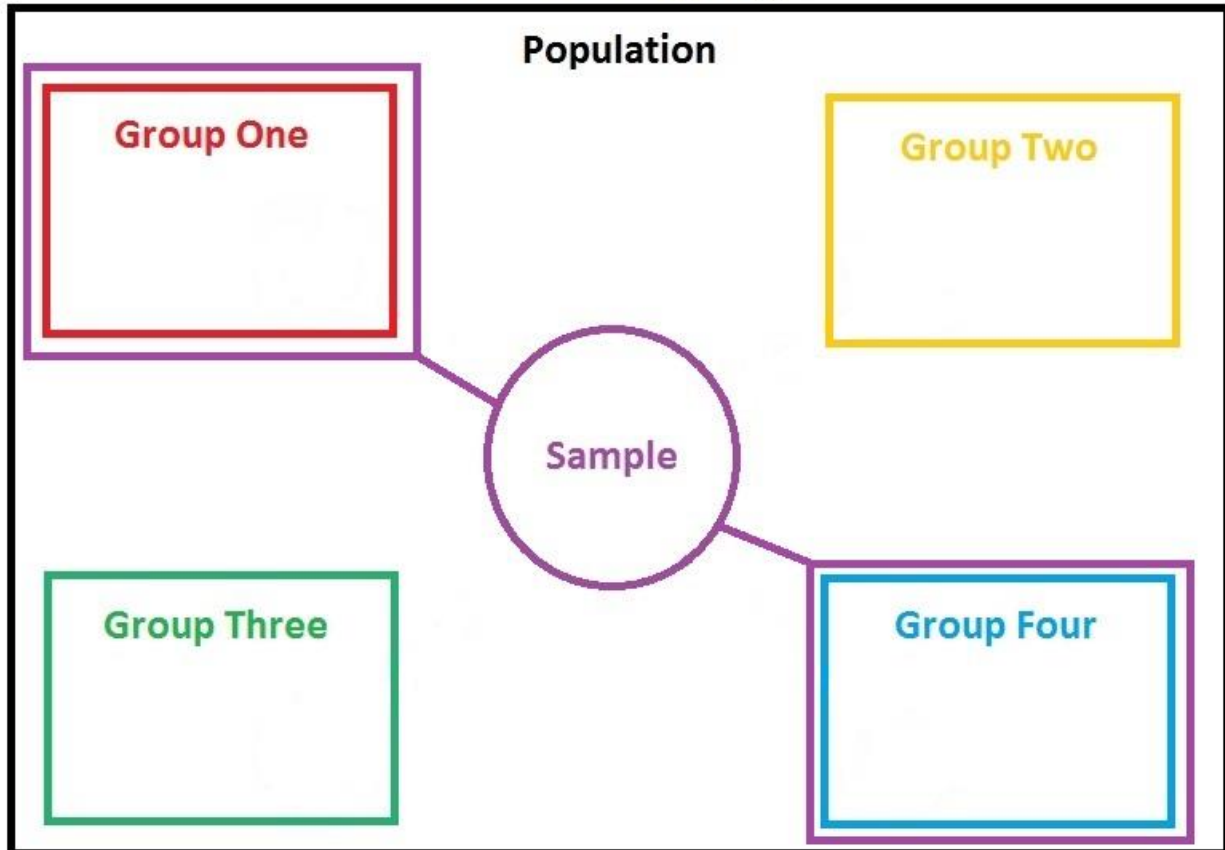
Stratified Random Sampling



Systematic



Cluster Sampling



Bias

- Having a preference to one particular person / group / point of view - “one-sided inclination”
- Prejudice – negative bias
- In statistics, if a **bias** exists it means that the processes involved are not uniformly random and one outcome is favoured over others.

Types of Sampling Bias

Selection Bias

- When the survey doesn't represent the population
 - **Undercoverage**
 - *Literary Digest* polled their readers on who would win US election: FDR vs. Landon. Respondents picked Landon, but non-respondents tended to be lower income workers, who didn't have telephones or a public address that comes with a car registration.
 - **Nonresponse Bias**
 - When large numbers of surveyed people don't respond. Mail surveys often suffer from this.
 - **Voluntary Response Bias**
 - Volunteers on a survey tend to overrepresent people with strong opinions.

Response Bias

- Problems in measurement
 - **Leading Questions**
 - EX. Hillary Clinton voted to go to war in Iraq. Could you see yourself voting for Clinton in the next election?
 - **Social Desirability**
 - People are reluctant to admit illegal activities or attitudes that are not acceptable in society if the results are not confidential.