

# STAT2361

## ملاحظات المحاضرات

### من إعداد موقع

## BZU-HUB



# Chapter 7

ملاحظة: المحاضرات من شرح الدكتور محمد مضية

### Definitions and Concepts

- ✓ **Sampled population:** The population from which the sample is taken.
- ✓ A **parameter** is a numerical descriptive measure of a **population**. It is calculated from the observations in the population.
- ✓ A **sample statistic** is a numerical descriptive measure of a sample. It is calculated from the observations in the sample.
- ✓ A **point estimate** of a population parameter is a rule or a formula that tells us how to use the sample data to calculate a single number that can be used as an **estimate** of the population parameter.
- ✓ A **finite population** is a population with a known number of members (can be listed in a list or a roster).
- ✓ **Target population:** The population for which statistical inferences such as point estimates are made. It is important for the target population to correspond as closely as possible to the sampled population.
- ✓ **Frame:** A listing of the elements the sample will be selected from.
- ✓ The population that is **infinitely large** or the elements of the population are being generated by an **ongoing process** for which there is no limit on the number of elements that can be generated. Thus, it is not possible to develop a list of all the elements in the population. This is considered as an **infinite population**.

Hypothesis  
Testing

### Sampling Methods → to make conclusion about population

#### Probability Sampling

In a **probability sample** all members of a population have a *chance* of being selected for the sample. There is several probability sampling methods:

فرصة اختيار عينة  
من الـ population

1. **Simple Random Sample:** All members of the population have the same chance of being selected for the sample.  
← نستخدمها في ch8+ch9  
كل الاحتمالات متساوية  
في الزمان
2. **Systematic Random Sample:** A random starting point is selected, and then every kth item thereafter is selected for the sample.  
← اختيار البدء عشوائي  
بعد ذلك منتظم
3. **Stratified Sample:** The population is divided into several subgroups (strata), and then a random sample is selected from each stratum.  
← من كل حروب بنختار  
حسب نسبته
4. **Cluster Sample:** The population is divided into smaller groups (using naturally occurring geographic or other boundaries) known as clusters.  
← العينة العنقودية

# of Sample :

$$5 \text{ out of } 30 \rightarrow 30C5$$

$$\# \text{ of Sample} = \frac{1}{10} = \frac{1}{30C5}$$

$$\leftarrow N \underline{C} n \rightarrow \text{Combination}$$



عن طريق القرعة

### SIMPLE RANDOM SAMPLE (FINITE POPULATION)

A simple random sample of size  $n$  from a finite population  $N$  is a sample selected such that each possible sample of size  $n$  has the same probability of being selected.

### RANDOM SAMPLE (INFINITE POPULATION)

A random sample of size  $n$  from an infinite population is a sample selected such that the following conditions are satisfied:

- 1) Each element selected comes from the same population.
- 2) Each element is selected independently.

Non Probability Samples → Some elements have no chance of being selected

الطريقة الملائمة

Convenience sampling is used in exploratory research where the researcher is interested in getting an inexpensive approximation of the truth. As the name implies, the sample is selected because they are convenient.

بختارها بناء على معيار معين

Judgment sampling is a common nonprobability method. The researcher selects the sample based on judgment. This is usually an extension of convenience sampling. For example, a researcher may decide to draw the entire sample from one "representative" city, even though the population includes all cities. When using this method, the researcher must be confident that the chosen sample is truly representative of the entire population.

### EXAMPLE

A population consists of the four following values: A, B, C, D and E

1. How many simple random sample of size 3 can be selected?

$$5C3 = 10.$$

2. List all samples.

ABC ABD ABE ACD ACE ADE BCD BCE BDE CDE

3. What is the probability of each sample?

The samples are equally likely, so the probability of each sample is  $1/10$

### EXAMPLE

The following data are from a simple random sample:

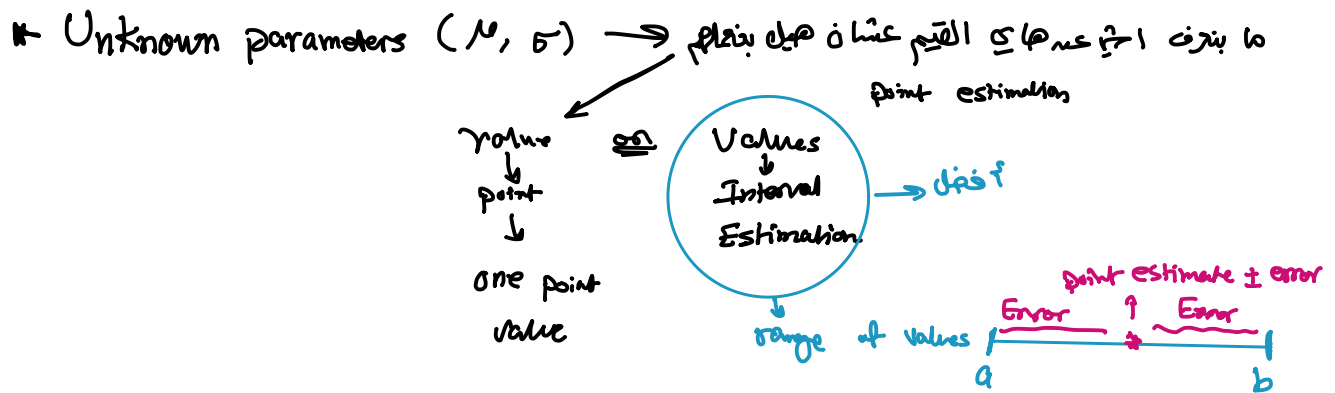
6 10 15 16 18

1. What is the point estimate of the population mean?
2. What is the point estimate of the population standard deviation?

| STAT2361\_STAT2311\_1222\_MMADIAH2

1  $\bar{X} = 13$  is a point estimate for  $\mu$

2  $S_x = 4.898$  is a point estimate for  $\sigma$

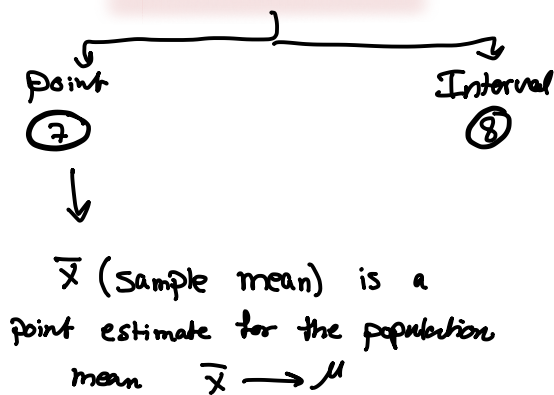


\* population: All elements  $\Rightarrow$  Census  
\* Sample: Subset of the population  $\Rightarrow$  Survey

\* Finite population = Frame  
\* Infinite population

\* Inferential Statistics : الإحصاء الاستنتاجي  
\* Target population

### \* Estimation



Ex: The average daily expenditure of a sample of 1,000 BZU Students is 50 \$ :

$\bar{X} = 50$  is a point estimate for  $\mu$  (Average expenditure for all BZU student)

$S$  (sample S.D)  $\rightarrow \sigma$