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Statistics

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Outline

- What is statistics?
- Basic terminologies in statistics
 - Variables
 - Data
 - Sample & Population

What is statistics?

- **Many meanings**
 - Data or numbers (a discipline that concerns itself with numeric data).
 - Process of analyzing data
 - Field of study
- Latin - “**status**” (state), first time used by Ghilini, Girolamo in 1589.
 - Describe state data – employment, birth rate..etc

What is statistics?

Statistics: the science of collecting, organizing, analyzing and Interpreting data.

Statistics can be divided into two main types:

1- Descriptive Statistics: It includes the statistical methods that used to describe a specific set of data. These statistical methods include the methods of collecting data in a standard and numerical measurements. They are collected, tabulated, summarized and then presented using appropriate statistical measurements.

What is statistics?

2- Statistical Inference: It includes statistical methods that aim to make conclusions about the source of the data from which the data was collected. This process proceed by two stages:

A. Estimation.

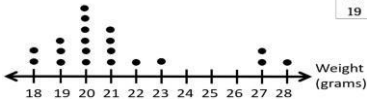
B. Test of Hypotheses.

Statistical question: a question where you expect to get a variety of answers, and you are interested in the distribution and tendency of those answers.

What is statistics?

- Example : Display the data in a dot plot. Identify any clusters, peaks or gaps

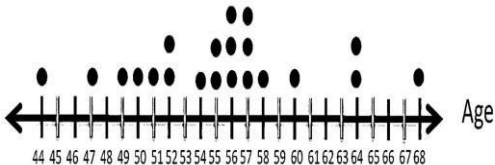
Weights (grams)			
20	19	21	20
18	20	27	21
28	23	20	19
20	21	18	27
19	22	21	20



- There is a clusters around 20.
- There is a peak at 20.
- There is a gap between 23 and 27.

What is statistics?

Example: the dot plot shows the ages of patients exists in the hospital section one?



What is statistics?

Example: the dot plot shows the ages of patients exists in the hospital section one?

- A) How many patients exists in the hospital section one?
- B) Write a statistical question you can answer using the dot plot then answer the question?

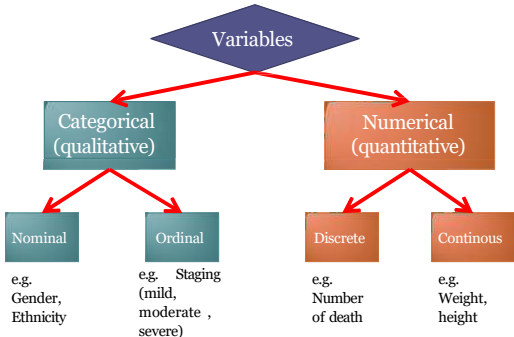
Sol:

- 21 patients.
- **Question :** What is the most ages patients that exists in the hospital section one?
Answer : Most of the patients are about 56 and 57 years old.

Measurement scale of variables

- Any aspect of an individual that is measured and take any value for different individuals or cases, like blood pressure, or records, like age, sex is called a variable.
- It is helpful to divide variables into different types, as different statistical methods are applicable to each.
- The main division is into qualitative (or categorical) or quantitative (or numerical variables).

Type Of Variables



Qualitative variable

1- Qualitative variable: a variable or characteristic which cannot be measured in quantitative form but can only be identified by name or categories, for instance place of birth, ethnic group, type of drug, stages of breast cancer (I, II, III, or IV), degree of pain (minimal, moderate, severe or unbearable).

Qualitative variable

Example:-

Status 28 days after hospital admission	Propranolol-treated patient	Control Patients
Dead	7	17
Alive	38	29
Total Survival rate	45 84%	46 63%

we can see from the above table that 84 percent of the patients treated with propranolol survived, in contrast with only 63% of the control group.

Some other examples:

Eye color - brown, black, etc.

Religion - Christianity, Islam, Hinduism, etc

Sex - male, female

Quantitative variable

2- Quantitative variable: A quantitative variable is one that can be measured and expressed numerically and they can be of two types (discrete or continuous). The values of a discrete variable are usually whole numbers, such as the number of episodes of diarrhoea in the first five years of life. A continuous variable is a measurement on a continuous scale. Examples include weight, height, blood pressure, age, etc.

Quantitative variable

A) Numerical Continuous Variables: Continuous data is the data which can have any value. That means Continuous data can give infinite outcomes so it should be grouped before representing on a graph.

Example: Weights of 60 , 60.3, 60.5 , 70kg so the range will be 60-70 kg

The speed of a vehicle as it passes a checkpoint

The mass of a cooking apple

The time taken by a volunteer to perform a task

Quantitative variable

B) Numerical Discrete Variables: can have certain values. That means only a finite number can be categorized as discrete data.

Example:

Age of 30 , 35, 40 , 50 years old so the range will be 30-50 years old.

Numbers of cars sold at a dealership during a given month

Number of fish caught on a fishing trip.

Number of customers who visit at bank during any given hour.

Independent and Dependent Variables

- **Independent (explanatory) variables**
 - The variables which are considered to influence the dependent variables or to explain the variations of the latter
- **Dependent (response) variables**
 - The variable that is considered to vary depending on the other variables incorporated into the analysis.
- mainly used in regression analysis

Data

- **Datum**
 - A datum is the result of an observation / measurement made on a population or on a sample.
- Data = plural of datum
- The data obtained from observations are related to the variable being studied

Type of data

Quantitative data		Qualitative data	
Parametric test	Non-Parametric test	Independent samples	Matched samples
1 Sample T-test Paired T-test	Wilcoxon Signed Rank test	Chi-Square test/Fisher's Exact test	McNemar test
2 Sample T-test	Mann Whitney U test / Wilcoxon Rank Sum test		
ANOVA	Kruskal Wallis test		

Data Collection

- Data collection

- Primary:-

- Data collected directly from the study subject

- Example: Clinical examination, measurement, interview etc.

- Secondary:-

- Data collected from a secondary sources

- Example: Reports, disease databases, journal articles etc.

Population / Sample

- Population
 - Large Set / collection of items that have something in common (same nature of information)
- Sample
 - Subset of a **population** on which statistical studies are made in order to draw conclusions relative to the **population**.

A *parameter* is a characteristic of the population.

A *statistic* is a characteristic of the sample.

Population / Sample

Population: The number of units that are under one or more attributes and differ in the rest of the total units completely.

Sample: It is part of the population. It is a set of values that have been selected in some way from the population. Consider as the smallest unit from population.

Population / Sample

Example: Find population and sample of the following table?:

No.	Group of students	No. of students in each group
1	A	115
2	B	107
3	C	119
Total	3	341

Thank you