Biostatistics
Dr. Gamal R. Elkahlout

Objective of this course:

1- teach the student to organize and summarize data.
2- teach the student how to reach decisions about a large body of data by examining only a small part of the data.
3- using the computer software to carry out the above two objects.

statistics

Statistics is the field of study concerned with:

1- designing of study or experiment,
2- collecting, organizing, summarizing and analyzing data.
3- Drawing inferences about interpreting data and making decisions.

Biostatistics

Using of statistical tools and concepts to data drawn form biological sciences and medicine.

Environmetrics, Econometrics, metrology, actuarial……

Descriptive statistics: إحصاء وصفي

presentation , organization and summarization of data.

Inductive statistics (Inferential statistics): إحصاء استدلالي (استنتاجي)

Tests of hypothesis, parametric and nonparametric distributions. also how to generalized the results of a sample to the population.

Variable: المتغير

An observed characteristic takes different values for different Persons, places, or things observed or measured (e.g. height of adult males, weights of preschool children, ages of patients in dental clinic, heart rate,…..)

Variables can be discrete or continuous.

Discrete variables: متغيرات متقطعة (e.g. number of students, marks of exam, shoes size)

Continuous variables: متغيرات متصلة (e.g. height, weight, room temperature)
Variables can be nominal, scale, ordinal.

Data البيانات

raw material of statistics. It can be defined as numbers either measured or counted.

Measured data: such as 90/130 mmHg measurement of blood pressure or 42^{o} of weather forecast.

Counted data; such as number of patients in a clinic or number of fatalities in car accidents.

Quantitative data or variables متغيرات كمية convey information regarding amount (e.g. height, weight, number of students, marks of exam)
Qualitative data or variables متغيرات وصفية characteristics which can not be measured but can be categorized (e.g. sex, hair color, nationality)

Population and sample
Population: is totality of elements that have one or more common characteristics.
Population can be animated or non-animated.

Sample is a subset of elements drawn from certain population.
Sampling: random samples,

Examples of population: nation, region, students of the university, patients of a hospital for a year, all buildings of a city.
Population of delivered women to a general hospital during a year.
The sample is delivered women to a general hospital on all Saturdays during a year.

Population of diabetic patients living in certain city.
The sample is all diabetic patients who visited the out-patients clinics last year.

Sources of collecting data:
1- Historical data
2- Experimental records.
3- Field data: by interviews, telephone, internet, questionnaire,

Tabulated data بيانات مبوبة ,
non tabulated data (raw data) بيانات غير مبوبة

Frequency distributions or frequency tables:
Ordered array, in ascending or descending order :
e.g.

Statistical software: SPSS, Excel, Minitab, BMDP, SAS, Eviews,…

Programming languages.

Nominal:(إسمي) Data values represent categories with no real order (e.g., job category or company division). Nominal variables can be either string (alphanumeric) or numeric values that represent distinct categories (e.g., 1=Male, 2=Female).

Scale: Data values are numeric values on an interval or ratio scale (e.g., age, income). Scale variables must be numeric.

Ordinal: (ترتيبي) Data values represent categories with some real order (e.g., low, medium, high; strongly agree, agree, disagree, strongly disagree).Ordinal variables can be either string (alphanumeric) or numeric values that represent distinct categories (e.g., 1=low, 2=medium, 3=high).

Sex: 1 : male 2: female
Education level: 1 illiterate 2: read and write 3: elementary and intermediate 4: secondary and diploma 5: bachelor 6: master and doctorate.