بسم الله الرحمن الرحيم

# Biostatistics

**Lecture one**

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# Biostatistics

**Statistics** :

is concerned with scientific methods for collection of data summarizing of data ,presentation of collected data and analysis of such data then making a valid conclusion and reasonable decision on the basis of such analysis

**Biostatistics:**

**a application of collection of data, summarizing of data, presentation of collected data and analysis of such data in the field *of biological sciences and medicine*.**

**الاحصاء الحيوى:**

**هو جمع للبيانات ايا كان نوعها و تلخيصها ليتم تقديمها بأسلوب معين قابل للتحليل و تكون هذه المعلومات ضمن المجالين الحيوي و الطبي.**

## Statistical Methods

## A) Methods of Collection of Data

| | |
|---|---|
| Sources of data | 1. - Data collection through a comprehensive survey<br>2. - Data collection through sample survey<br>3. - Data collection through population census<br>4. - Data collection through hospital records<br>5. - Data collection through health office records<br>6. - Data collected through published vital statistics |

Commonly used SI prefixes (there are others).

| Prefix | Meaning | Abbreviation | Exponential Notation |
|---|---|---|---|
| Giga- | billion | G | $10^{9}$ |
| Mega- | million | M | $10^{6}$ |
| kilo- | thousand | k | $10^{3}$ |
| centi- | hundredths of | c | $10^{-2}$ |
| milli- | thousandths of | m | $10^{-3}$ |
| micro- | millionths of | μ | $10^{-6}$ |
| nano- | billionths of | n | $10^{-9}$ |
| pico- | trillionths of | p | $10^{-12}$ |

# Types of data

## A) Constant (number of ( finger , eye , lung , kidney ) , the heart chambers)

## B) Variable

## 1- Quantitative

**A- Continuous (fraction, decimals) as height , weight & age**

**B- Discrete (integer "without fraction") as the number of students**

## 2- Qualitative

**A- Ordinal ( ranked or ordered) as obesity degree and grades of university degree**

**B- Nominal as social status & blood groups**

Examples:

1) Quantitative

a-quantitative continuous:

age , height , weight , Hb%, Income , crowding index, hormone (insulin,testosterone), blood sugar , body mass index (BMI = $kg/m^2$ ).

b-quantitative discrete:

No. of blood transfusions in a series of renal transplant patients , .1 heart rate , respiratory rate , family size , pulse rate ,number of pregnant in the hospital , family member number , X-ray films used in Irbid hospital , blood pressure

**2)Qualitative**

**a-qualitative ordinal:**

**spontaneous bacterial peritonitis sbp , educational level , grades ,**

b-qualitative nominal:

smoking habit , blood group , result of pregnancy test , nationality , religion , residence , sex ,nationality, Residence, Disease outcome,

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cholesterol degree is qualitative ordinal

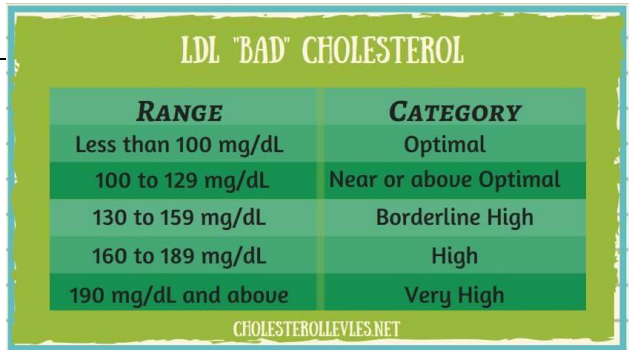
cholesterol % is quantitative continuous

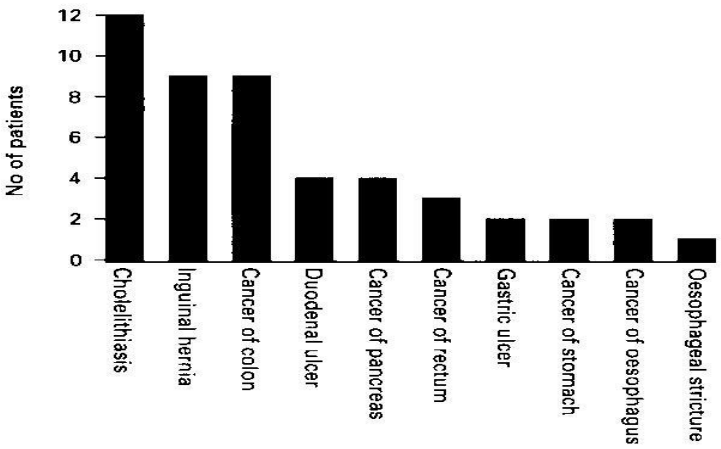
**B) Methods of Summarizing of Data**

**1. Summarising qualitative data**

**Frequency count & Bar chart**

**2. Summarising quantitative data**



- **Measures of central tendency**
  1. Mean = average = $\Sigma x/n$
  2. Median = middle value

نقوم بترتيب المشاهدات تصاعديا

* اذا كان عدد المشاهدات زوجيا ناخذ الوسط الحسابي للقيمتين المتوسطتين

even number:عدد زوجي

Odd number: عدد فردي

  3. Mode = most frequent (used with the qualitative data)
- **Measures of Dispersion ( used with quantitative only )**
  1. Range
  2. Interquartile range ($25^{th}$ -$75^{th}$ )
  3. Standard deviation

## C)Methods of Presentation of Data

## 1- Numerical

**2- Graphical (column bar graphs , line graphs 'the X axis be the time' ,pie charts 'used for all data type ' histogram' quantitative continuous' ,poly polygon graph ……..)**

**3- Mathematical**

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## PRESENTATION OF DATA NUMERICAL

1. **Simple Numerical presentation.**

**(*un- grouped, un- classified*)**

**e.g. The weight of 5 children (8,7,9,4,3,5)**

**the title have to have the answer of 5 WH question (what, why, where , when ,who) . Write the reference(take the permission for the information that you used)**

2. **Tabular presentation of data.**

**The best and most convenient method for summarization of a large mass of data is using a table.**

**a) Simple frequency distribution table**

**1- for qualitative variables.**

**2- for quantitative variables.**

**b) Table of an association**

**Simple frequency distribution table for qualitative variables**

(distribution of 5-10 years children with measles admitted to al-karak hospital during the year 2004 according to sex)

| sex | No. of patient |
|---|---|
| Male | 2550 |
| Female | 1550 |
| total | 4100 |

**To Be Continued**