

I) MQC

Question 1: A survey is conducted in a population of 7,500 subjects of whom 653 have been diagnosed with breast cancer. The proportion 653/7,500 represents:

- a. The incidence
- b. Prevalence**
- c. Lethality
- d. None of the above

Question 2: The standard deviation of a series of values:

- a. Is a central measurement parameter**
- b. Is expressed in the same units as the values in the series**
- c. Has a different value if measured on a sample or in a population**
- d. Is calculated from the variance**
- e. Is small when values are scattered

Question 3: The variance of a series of values:

- a. Is a parameter used to measure the dispersion of values**
- b. Is expressed in the same units as the values in the series
- c. Is independent of the standard deviation
- d. Is obtained by calculating the average of the squares of the deviations from the mean**
- e. Is high when the values of the series are widely dispersed**

Question 4: In a case-control survey, the confidence interval (CI) of the odds ratio (OR) is [0.7-0.9]. Which of the following statements are correct? This result means that the factor studied:

- a. Does not play a role in the occurrence of the disease** [technically, a protective factor plays a role in the (non)-occurrence of the disease]
- b. Is a risk factor with a weak effect
- c. Is a protective factor**
- d. May be a protective factor but is not significant
- e. Invalidates the study as it lacks power

Question 5: In a study comparing the effectiveness of two types of dressings for skin wounds, the authors concluded that the performance (healing speed) of dressings A was superior to that of dressings B with a risk of error of less than 2%.

Question: Which of the following statements are correct? This figure of 2% corresponds:

- f. An alpha risk
- g. A beta risk**
- h. A significance level p

II) Exercises of application

Exercise 1:

During 2010, 2,346 cases of angina were identified in children under 10 years of age. The population of children under 10 years of age was 16,745 on January 1, 2010 and 21,345 on January 1, 2011.

What is the incidence of measles in 2010 in children under 10 years of age?

Taking into account time spent in the population, we calculate the **average population over 2010**:

$$(16745 + 21345) / 2 = \mathbf{19045}$$

$$2346 : 19045 = x : 100000$$

$$2346 * 100000 / 19045 = \mathbf{12318.19}$$

Incidence rate was 12318.19 per 100000 people

Exercise 2: Confidence interval of percentage

To know the frequency of scabies in a region of 250 000 inhabitants, a survey was carried out on a representative sample of 4 327 persons. Among them, 913 people were found to have scabies. Calculate the estimated frequency of scabies in this region and its 95% confidence interval.

Formula for easy by-hand calculation = $p \pm z \cdot (\sqrt{p(1-p)} / \sqrt{n})$

where:

p: sample proportion

z: the chosen z-value

n: sample size

Else, R can take care of it all for us.

```
``{r}
library(DescTools)

n = 4327
p = 913/4327

BinomCI(913, 4327,
        conf.level = 0.95,
        method = "clopper-pearson")

      est   lwr.ci   upr.ci
[1,] 0.2110007 0.1989261 0.2234666
```

Exercise 3:

The following table shows the distribution of a population in 2021 by age and gender.

Category age (years)	Women	Men	Total
	n	n	N
0-14	5347	5123	10470
15-29	3236	4276	7512
30-44	6239	5349	11588
45-59	3459	5302	8761
60-74	4302	3999	8301
>74	3290	3333	6623
Total	25873	27382	53255

- 1) What is the frequency of women? **48.58%**
- 2) What is the frequency of subjects over 74 years old? **12.44%**
- 3) What is the frequency of men among 30-44 year olds? **46.16%**
- 4) What is the frequency of 15-29 year olds among women? **12.51%**
- 5) What is the ratio of females/males among subjects over 45 years old? **1 : 1.143245**