

Biostatistics

Introduction

Some Basic Concepts: Statistics, Biostatistics, Variable, Quantitative Variables, Qualitative Variables, Random Variable, Discrete Random Variable vs Continuous Random Variable, Population, Sample.

I. **Measures of Central Tendency:** the mean, the median, the mode

II. **Measures of dispersion:** the range, the variance, standard deviation (SD), coefficient of variation (CV).

Probability →

Some basic probability concepts

Elementary properties of probability

Factorials: permutations, combinations

The union of two conjoint sets

The union of two disjoint sets

Venn diagram

Marginal probabilities, Joint probabilities, Additive Law, Multiplicative Law, Independent events, Conditional probability, Bayes' Theorem.

Probability Distributions

The probability distribution of discrete variables

Cumulative probability distribution

The Binomial distribution

Bernoulli Trials

The Poisson distribution

The Normal Distribution

Approximately Normally Distributed Data

Continuous Probability Distribution

The t Distribution: Student's t tests →

Student's t test for a single small sample

Student's t test for independent samples

Student's t test for Paired samples

Contingency Table and Degrees of Freedom

The Chi-Square Distribution: The Chi-Square tests

Dr. Saleh

Test of goodness of fit

Test of Independence

Test of Homogeneity

Hypothesis Testing

Nine Steps of Hypothesis testing: Data, Assumptions, Hypothesis (the null and the alternative hypothesis), Test Statistic (normal Z, Normal t, Chi-Square Test), Distribution of the test statistic, Decision Rule (acceptance region, and rejection region)

Types of errors in hypothesis testing (Alpha error, Beta error), Power of the test (1-Beta), Level of significance (Alpha), P-value

Testing the difference between two population means

Sampling from normally distributed populations, population variances known ($M=0, G=1$)

Sampling from normally distributed populations, population variances unknown

Sampling from a population that is not normally distributed (Central Limit Theorem)

Correlation analysis: correlation definition, correlation coefficients (Pearson correlation coefficient, Spearman correlation coefficient)

Regression Analysis: regression definition, regression coefficients, regression model, linear regression, the best fit regression line, R-Square, Dependent variable and independent variable.