

Statistical Facts in Human Physiology and Health

Statistics · Practice Test · 16 Questions

1. In a large-scale epidemiological study investigating the incidence of a specific type of cancer, what is the most appropriate statistical measure to describe the rate at which new cases occur in a defined population over a specific time period?

- A) Prevalence
- B) Sensitivity
- C) Incidence Rate
- D) Positive Predictive Value

2. When analyzing the results of a clinical trial for a new medication designed to lower blood pressure, a statistically significant p-value (e.g., $p < 0.05$) typically indicates:

- A) The treatment is definitely effective.
- B) There is strong evidence against the null hypothesis.
- C) The observed effect is solely due to chance.
- D) The sample size was too small.

3. A meta-analysis combining data from multiple randomized controlled trials on a new vaccine's efficacy found a pooled odds ratio of 0.30 (95% CI: 0.20-0.45). What does this statistically significant result suggest about the vaccine?

- A) The vaccine increases the risk of the disease.
- B) The vaccine is associated with a reduced risk of the disease.
- C) There is no discernible effect of the vaccine.
- D) The studies included were too heterogeneous to draw conclusions.

4. In medical diagnostics, the area under the Receiver Operating Characteristic (ROC) curve (AUC) is a measure of a diagnostic test's ability to discriminate between:

- A) Two groups of healthy individuals.
- B) Two groups of individuals with the same disease.
- C) Individuals with and without a specific condition.
- D) Different stages of the same disease.

5. Survival analysis, commonly used in oncology, estimates the probability of an event (like death) occurring over time. The Kaplan-Meier estimator is a non-parametric statistic used to estimate:

- A) The incidence of new cases.
- B) The prevalence of existing cases.
- C) The survival function.
- D) The hazard ratio.

6. When assessing the reliability of a diagnostic test, a high specificity indicates that the test is good at:

- A) Correctly identifying individuals with the disease.
- B) Correctly identifying individuals without the disease.
- C) Minimizing false positive results.
- D) Minimizing false negative results.

7. In a study examining the relationship between exercise frequency and cardiovascular health, a Pearson correlation coefficient of -0.75 was calculated. This indicates:

- A) A weak positive linear relationship.
- B) A strong negative linear relationship.
- C) No linear relationship.
- D) A weak negative linear relationship.

8. The standard deviation is a statistical measure that quantifies:

- A) The average of a dataset.
- B) The central tendency of a dataset.
- C) The spread or dispersion of data points around the mean.
- D) The difference between the maximum and minimum values.

9. In pharmacokinetics, the concept of bioavailability, often expressed as a percentage, refers to the fraction of an administered dose of an unchanged drug that reaches:

- A) The liver.
- B) The stomach.
- C) The systemic circulation.
- D) The site of action.

10. When comparing the average blood glucose levels of two groups of patients (diabetic vs. non-diabetic), an independent samples t-test is a common statistical tool used to determine:

- A) If the variances of the two groups are equal.
- B) If there is a statistically significant difference between the means of the two groups.
- C) The correlation between glucose levels and age.
- D) The proportion of patients in each group.

11. The Poisson distribution is a discrete probability distribution that is often used to model the number of events occurring within a fixed interval of time or space. In a health context, it could be used to model:

- A) The height of individuals in a population.
- B) The number of births in a hospital ward per day.
- C) The distribution of blood pressure values.
- D) The weight of newborns.

12. In genetic epidemiology, linkage disequilibrium (LD) refers to the non-random association of alleles at different loci. High LD in a population suggests:

- A) Alleles are inherited independently.
- B) Alleles are often inherited together due to proximity on a chromosome or selective forces.
- C) There are no genetic mutations.
- D) The population is in Hardy-Weinberg equilibrium.

13. When a confidence interval for the mean difference between two groups does not include zero, it generally implies:

- A) There is no statistically significant difference between the group means.
- B) There is a statistically significant difference between the group means.
- C) The sample size was insufficient.
- D) The data are not normally distributed.

14. The concept of 'effect size' in statistical analysis is important because it quantifies:

- A) The probability of rejecting a false null hypothesis.
- B) The magnitude of the difference or relationship observed, independent of sample size.
- C) The variability of the data within a group.
- D) The proportion of variance explained by a statistical model.

15. In studies of chronic diseases, the 'hazard function' (or hazard rate) in survival analysis represents:

- A) The probability of surviving up to a certain time point.
- B) The cumulative probability of an event occurring by a specific time.
- C) The instantaneous rate of an event occurring at a specific time, given survival up to that time.
- D) The proportion of the population that has experienced the event.

16. When a statistical model is used to predict the risk of developing a disease based on multiple predictor variables (e.g., age, BMI, smoking status), the coefficients (often denoted as beta coefficients) in logistic regression represent:

- A) The absolute change in risk for a one-unit increase in the predictor.
- B) The change in the log-odds of the outcome for a one-unit increase in the predictor.
- C) The probability of the outcome occurring.
- D) The correlation between the predictor and the outcome.