Statistical tests are used to analyze data and make inferences about populations based on sample data. There are various types of statistical tests, each designed for specific types of data and research questions. Here's a list of common statistical tests, along with when to use each type and examples:

1. \*\*T-Test\*\*:

- \*\*When to use:\*\* To compare the means of two groups and determine if they are significantly different.

- \*\*Example:\*\* Comparing the average test scores of students in two different classrooms to see if one group performs significantly better.

2. \*\*Chi-Square Test\*\*:

- \*\*When to use:\*\* To test the independence of two categorical variables or to compare observed and expected frequencies.

- \*\*Example:\*\* Assessing if there is a significant association between smoking habits (smoker/non-smoker) and the incidence of lung cancer (yes/no).

3. \*\*ANOVA (Analysis of Variance)\*\*:

- \*\*When to use:\*\* To compare means across three or more groups to determine if there are significant differences.

- \*\*Example:\*\* Analyzing whether there are significant differences in the average income among people from different educational backgrounds (e.g., high school, bachelor's degree, master's degree).

4. \*\*Regression Analysis\*\*:

- \*\*When to use:\*\* To examine the relationship between one dependent variable and one or more independent variables.

- \*\*Example:\*\* Investigating the relationship between hours spent studying (independent variable) and exam scores (dependent variable), while controlling for other factors like sleep and diet.

5. \*\*Correlation Coefficient (Pearson's or Spearman's)\*\*:

- \*\*When to use:\*\* To measure the strength and direction of a linear relationship between two continuous variables (Pearson) or between two ranked variables (Spearman).

- \*\*Example:\*\* Assessing if there is a significant correlation between the amount of rainfall and crop yield in a region.

6. \*\*Paired T-Test\*\*:

- \*\*When to use:\*\* To compare means of two related groups, often before and after an intervention.

- \*\*Example:\*\* Evaluating whether there is a significant improvement in the blood pressure of patients before and after a new medication is administered.

7. \*\*Mann-Whitney U Test (Wilcoxon Rank-Sum Test)\*\*:

- \*\*When to use:\*\* To compare two independent groups when the data is not normally distributed or when ordinal data is involved.

- \*\*Example:\*\* Comparing the test scores of two groups of students who received different types of coaching (e.g., group vs. individual coaching).

8. \*\*Kruskal-Wallis Test\*\*:

- \*\*When to use:\*\* To compare three or more independent groups when the data is not normally distributed.

- \*\*Example:\*\* Analyzing whether there are significant differences in the pain tolerance levels among participants exposed to different pain relief treatments.

9. \*\*Logistic Regression\*\*:

- \*\*When to use:\*\* To model the relationship between a binary outcome variable and one or more predictor variables.

- \*\*Example:\*\* Predicting whether a customer will make a purchase (yes/no) based on variables like age, gender, and browsing history.

10. \*\*Wilcoxon Signed-Rank Test\*\*:

- \*\*When to use:\*\* To compare two related groups when the data is not normally distributed and the paired T-test assumptions are violated.

- \*\*Example:\*\* Assessing if there is a significant difference in the response times of participants in a before-and-after usability study.

Remember that choosing the right statistical test depends on your research question, the type of data you have, and the assumptions that can be met. It's essential to perform exploratory data analysis and understand the characteristics of your data before selecting a statistical test. Additionally, consulting with a statistician or data analyst can be valuable in making the appropriate choice and interpreting the results correctly.