Types of statistical tests and when to use each type with examples.

There are various types of statistical tests, each designed to answer different research questions and analyze different types of data. Here are some commonly used statistical tests and scenarios when they are appropriate:

1. t-test:

- Independent Samples t-test: Used to compare means between two independent groups. For example, comparing the mean test scores of students who received a new teaching method versus those who received the traditional method.

- Paired Samples t-test: Used to compare means of related samples, such as pre-test and post-test measurements within the same group. For example, comparing the mean blood pressure before and after a treatment intervention.

2. Analysis of Variance (ANOVA):

- One-Way ANOVA: Used to compare means between two or more independent groups. For example, comparing the mean scores of three different treatment groups in a clinical trial.

- Two-Way ANOVA: Used to analyze the effects of two categorical independent variables on a continuous dependent variable. For example, studying the effects of both gender and age group on test scores.

3. Chi-Square Test:

- Chi-Square Goodness of Fit Test: Used to determine whether observed categorical data differs significantly from expected frequencies. For example, examining whether the observed distribution of blood types in a population matches the expected distribution.

- Chi-Square Test of Independence: Used to assess the association between two categorical variables. For example, investigating whether there is a relationship between smoking status and lung cancer development.

4. Pearson's Correlation:

- Pearson's Correlation Coefficient: Used to measure the strength and direction of the linear relationship between two continuous variables. For example, examining the correlation between age and income.

5. Regression Analysis:

- Simple Linear Regression: Used to model the linear relationship between one dependent variable and one independent variable. For example, predicting the sales of a product based on advertising expenditure.

- Multiple Linear Regression: Used to model the linear relationship between a dependent variable and multiple independent variables. For example, predicting house prices based on variables like size, location, and number of rooms.

6. Mann-Whitney U Test:

- Used to compare the distributions of a continuous variable between two independent groups when the assumptions of normality and equal variances are violated. For example, comparing the median income of males and females.

7. Kruskal-Wallis Test:

- Used to compare the distributions of a continuous variable among two or more independent groups when the assumptions of normality and equal variances are violated. For example, comparing the median pain scores among three different treatment groups.

These are just a few examples of statistical tests and their appropriate usage scenarios. The choice of test depends on the research question, the type of data being analyzed, and the study design. It is important to select the correct statistical test to ensure accurate and meaningful analysis.