Free Resource: Statistical Analysis Decision-Making Handout

The Statistical Analysis Decision Table is a practical reference tool designed to help researchers, educators, analysts, and students select the most appropriate statistical test or analysis based on the structure and purpose of their data. The table organizes statistical methods by analytical goal, number and type of variables, and test type, enabling users to quickly identify the most suitable approach for their specific research question. Whether comparing groups, exploring relationships, or predicting outcomes, this tool simplifies the decision-making process and promotes sound, evidence-based analysis.

- Always check **assumptions** (normality, homogeneity, independence, etc.) before selecting a parametric test.
- Use **non-parametric** tests when assumptions are violated or with ordinal/ranked data.
- **DV** = Dependent Variable; **IV** = Independent Variable

Goal / Question	# of Variables	Data Type(s)	Test / Analysis Type	When to Use
Compare means between two groups	1 DV, 1 IV	DV: Quantitative, IV: Categorical (2)	Independent Samples **t-test**	Comparing 2 independent groups (e.g., treatment vs. control)
Compare means within the same group	1 DV, 1 IV	DV: Quantitative, IV: Categorical (2)	Paired Samples **t-test**	Same group tested twice (e.g., pre- vs post-test)
Compare means across 3+ groups	1 DV, 1 IV	DV: Quantitative, IV: Categorical (≥3)	**One-Way ANOVA**	Comparing multiple group means (e.g., different diet types)
Compare means with multiple factors	1 DV, 2+ IVs	DV: Quantitative, IVs: Categorical	**Two-Way ANOVA**, **MANOVA**	Use MANOVA if there are multiple dependent variables
Assess relationship between two variables	2	Both Quantitative	**Pearson Correlation**	Both variables are continuous and normally distributed
Predict a quantitative outcome	2+	DV: Quantitative, IVs: Mixed	**Linear Regression**	Predicting continuous DV from 1+ IVs

Predict a categorical outcome	2+	DV: Categorical, IVs: Mixed	**Logistic Regression**	Binary or multinomial outcomes (e.g., pass/fail)
Test association between categorical variables	2	Both Categorical	**Chi-Square Test of Independence**	Frequency data in contingency tables
Assess differences in distributions	1	Quantitative or Ordinal	**Mann-Whitney U, Kruskal-Wallis, Wilcoxon**	Non-parametric alternatives to t-tests and ANOVA
Compare proportions	2	Categorical	**Z-test for Proportions**, **Chi-Square**	Comparing proportions across groups
Analyze time-to-event data	2+	Time, Event status	**Survival Analysis (Kaplan-Meier, Cox Regression)**	Useful in medical studies, engineering failure times
Examine repeated measures over time	1 DV, 1+ IV	DV: Quantitative	**Repeated Measures ANOVA, Mixed Models**	Same subjects measured at multiple time points
Reduce dimensionality / visualize structure	Many	Quantitative	**Principal Component Analysis (PCA), Cluster Analysis**	Use PCA to reduce variables; Cluster to group similar cases
Check for normality of data	1	Quantitative	**Shapiro-Wilk, Kolmogorov-Smirnov**	Always check before parametric tests
Test homogeneity of variances	1	Quantitative	**Levene's Test, Bartlett's Test**	Required assumption for ANOVA or t-tests