GLOBAL THESIS RESEARCH

Choosing the Right Statistical Test

A Quick-Reference Guide for Medical & Health-Science Researchers

Match your research question and data to the correct test — and know which assumptions to check before you report it.

Prepared by Dr. Dhiren Kumar Panda — Medical Research & Biostatistics Consultant
globalthesisresearch.netlify.app • globalthesisresearch@gmail.com • +91 70081 96685

Step 1 — Start with your question and data

Three questions decide almost every test: **What are you comparing or measuring? What type is your outcome variable? How many groups, and are they independent or paired?** Use the table below as a starting map, then confirm the assumptions in Step 2.

Your goal	Outcome type	Groups / design	Common test
Compare 2 independent groups	Continuous, normal	2, independent	Independent t-test
Compare 2 independent groups	Continuous, skewed / ordinal	2, independent	Mann–Whitney U
Compare 2 paired measures	Continuous, normal	2, paired	Paired t-test
Compare 2 paired measures	Continuous, skewed / ordinal	2, paired	Wilcoxon signed-rank
Compare 3+ groups	Continuous, normal	3+, independent	One-way ANOVA
Compare 3+ groups	Continuous, skewed / ordinal	3+, independent	Kruskal–Wallis
Compare 3+ repeated measures	Continuous, normal	3+, paired	Repeated-measures ANOVA
Association of 2 categorical vars	Categorical	—	Chi-square (Fisher if sparse)
Strength of a linear relationship	Continuous, normal	—	Pearson correlation
Strength of a monotonic relationship	Ordinal / skewed	—	Spearman correlation
Predict a continuous outcome	Continuous	—	Linear regression
Predict a binary outcome	Binary	—	Logistic regression
Time-to-event / survival	Time-to-event	2+ groups	Kaplan–Meier + log-rank / Cox
Diagnostic accuracy / cut-off	Test vs reference	—	ROC / AUC analysis

Step 2 — Check the assumptions before you report

A test is only valid if its assumptions hold. The most common reason a result is challenged in peer review is an unchecked assumption.

Assumption	How to check	If violated
Normality (of residuals)	Shapiro–Wilk test; Q–Q plot; histogram	Use a non-parametric test or transform the data
Equal variances	Levene's test	Use Welch's correction or a robust alternative
Independence	Study design (no repeated / clustered data)	Use paired, mixed, or clustered models
Linearity (regression)	Scatter / residual plots	Transform variables or add polynomial terms
No multicollinearity	Variance inflation factor (VIF < 5)	Drop or combine correlated predictors
Adequate cell counts (chi-square)	Expected count ≥ 5 in most cells	Use Fisher's exact test

Step 3 — Report it properly

Always report an **effect size** and a **95% confidence interval**, not just a p-value. Give **exact p-values** (e.g. p = 0.023) rather than p < 0.05. State the test used and the software. Follow the reporting guideline for your design: **CONSORT** (trials), **STROBE** (observational), **PRISMA** (reviews), **STARD** (diagnostic).

Quick sample-size starting points

For a full calculation use our free online calculator. As rough anchors, with 95% confidence and typical assumptions:

Design	Key inputs	Note
Prevalence (single proportion)	Expected p, margin of error	Cochran's formula + population correction
Compare 2 proportions	p1, p2, power (80–90%)	Larger when the difference is small
Compare 2 means	Difference, SD, power	Needs a plausible effect size + SD
Correlation	Expected r, power	Uses Fisher's z transformation
Case-control	Odds ratio, control exposure	Add a controls-per-case ratio

Need help applying this to your study?

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sharpen the science.

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