

The objective of this test is to test whether the means of two groups are equivalent, without concern of which group's mean is larger. Suppose we collect a sample from a group 'A' and a group 'B'; that is we collect two samples, and will conduct a two-sample test. For example, we may wish to test whether a new product is equivalent to an existing, industry standard product. Here, the 'burden of proof', so to speak, falls on the new product; that is, equivalence is actually represented by the alternative, rather than the null hypothesis.

$$\begin{aligned} H_0 : |\mu_A - \mu_B| &\geq \delta \\ H_1 : |\mu_A - \mu_B| &< \delta \end{aligned}$$

where δ is the superiority or non-inferiority margin and the ratio between the sample sizes of the two groups is

$$\kappa = \frac{n_1}{n_2}$$

Formulas

This calculator uses the following formulas to compute sample size and power, respectively:

$$n_A = \kappa n_B \text{ and } n_B = \left(1 + \frac{1}{\kappa}\right) \left(\sigma \frac{z_{1-\alpha} + z_{1-\beta/2}}{|\mu_A - \mu_B| - \delta}\right)^2$$

$$1 - \beta = 2 [\Phi(z - z_{1-\alpha}) + \Phi(-z - z_{1-\alpha})] - 1 \quad , \quad z = \frac{|\mu_A - \mu_B| - \delta}{\sigma \sqrt{\frac{1}{n_A} + \frac{1}{n_B}}}$$

where

$\kappa = n_A/n_B$ is the matching ratio

σ is standard deviation

Φ is the [standard Normal distribution function](#)

Φ^{-1} is the [standard Normal quantile function](#)

α is Type I error

β is Type II error, meaning $1 - \beta$ is power

δ is the testing margin

References

Chow S, Shao J, Wang H. 2008. Sample Size Calculations in Clinical Research. 2nd Ed. Chapman & Hall/CRC Biostatistics Series. page 62.