This test is useful when we wish to test whether the proportions in two groups are equivalent, without concern of which group's proportion 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.

$$H_0 : |p_A - p_B| \geq \delta$$
$$H_1 : |p_A - p_B| < \delta$$

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

$$\kappa = \frac{n_A}{n_B}$$

Formulas

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

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

$$1 - \beta = 2\left[\Phi\left(z - z_{1-\alpha}\right) + \Phi\left(-z - z_{1-\alpha}\right)\right] - 1 \quad , \quad z = \frac{|p_A - p_B| - \delta}{\sqrt{\frac{p_A(1-p_A)}{n_A} + \frac{p_B(1-p_B)}{n_B}}}$$

where

$\kappa = n_A/n_B$ is the matching ratio
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 91.