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Documentation of Power for Unmatched Case-Control Studies

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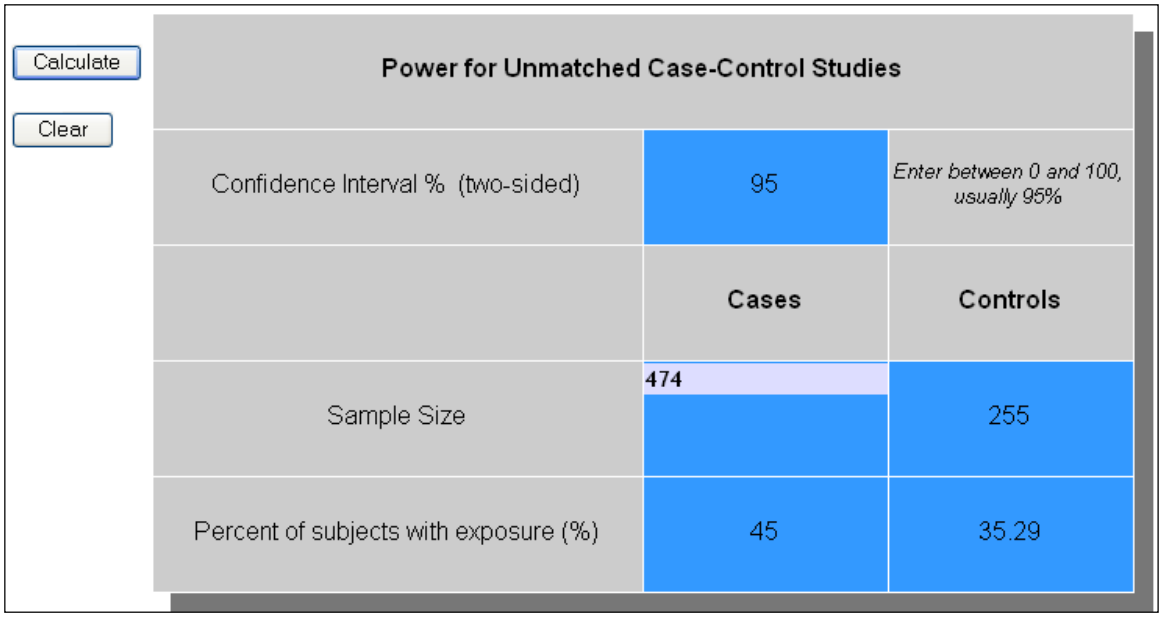
This module estimates power for unmatched case-control studies. The data input screen is as follows:



The input values requested are:

- Two sided confidence intervals (%) that can be chosen are 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 98, 99, 99.5, 99.8, 99.9, 99.95, 99.98 & 99.99.
- The available sample size for cases (disease group) and that for controls (non-disease group) are entered.
- The 'percent of subjects with exposure' among cases and controls are entered ranging from 0 to 100%.

The result of the calculation is shown next:

Power for Unmatched Case-Control Studies

	Input Data
Two-sided confidence interval (%)	95
Number of cases	474
Percent of exposure among cases (%)	45
Number of controls	255
Percent of exposure among controls (%)	35.29
Odds Ratio	1.5

Power based on:	
Normal approximation	72.12%
Normal approximation with continuity correction	69.32%

Results from OpenEpi open source calculator--PowerCC

file:///C:/OpenEpi/July,%202005/Power/PowerCC.htm
Source file last modified on 06/29/2005 16:34:17

Print from the browser, or select all or part of the text and then copy and paste to other programs.
Many browsers have an optional setting to print background colors.

The interpretation of power in this unmatched case-control study is as follows: If, in truth, cases differ from controls in their exposure, given the above values, this study would have a 72% chance of detecting a difference without continuity correction.

The formulae for the estimation of power are as follows:

- *Power with normal approximation:*

$$Power = \Phi\left(\frac{\sqrt{(n_1 * \Delta^2)} - z_{1-\alpha/2}\sqrt{(1+1/\kappa) * p * q}}{\sqrt{(p_1 * q_1) + (p_2 * q_2 / \kappa)}} \right)$$

- *Power with continuity correction:*

$$Power = \Phi\left(\frac{\sqrt{(n'^* \Delta^2)} - z_{1-\alpha/2}\sqrt{(1+1/\kappa) * p * q}}{\sqrt{(p_1 * q_1) + (p_2 * q_2 / \kappa)}} \right)$$

Where **n'** $= n_1 - [(\kappa + 1) / (\kappa . \Delta)]$;

- *Odds ratio calculation*

$OR = p_1 * (1-p_2) / p_2 * (1-p_1)$

The notations for the formulae are:

Δ = difference of proportions of exposure between case and control= $| p_2-p_1|$;

κ = ratio of sample size: controls / cases;

p_1= percent (proportion) of exposure among cases;

p_2= percent (proportion) of exposure among controls;

$p = (p_1*n_1 + p_2*n_2) / (n_1+n_2)$;

$q= 1-p$;

n_1= available sample size among cases;

References:

- James Schlesselman. Case-control studies: Design, Conduct, Analysis (1982). (Formula 6.9 is used for estimation of power)
- Sahai H and KHurshid A. Formulae and tables for the determination of sample sizes and power in clinical trials for testing differences in proportions for the two-sample design: A review. *Statistics in Medicine*, 1996 vol. 15, 1-21. ((In addition to formula 6.9 mentioned above, formula 23 is used to calculate power with continuity correction)

Acknowledgement:

Data in input screen are obtained from table 6.9 in "James Schlesselman. Case-control studies: Design, Conduct, Analysis (1982)".