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# Documentation of Power for Cross-sectional Studies

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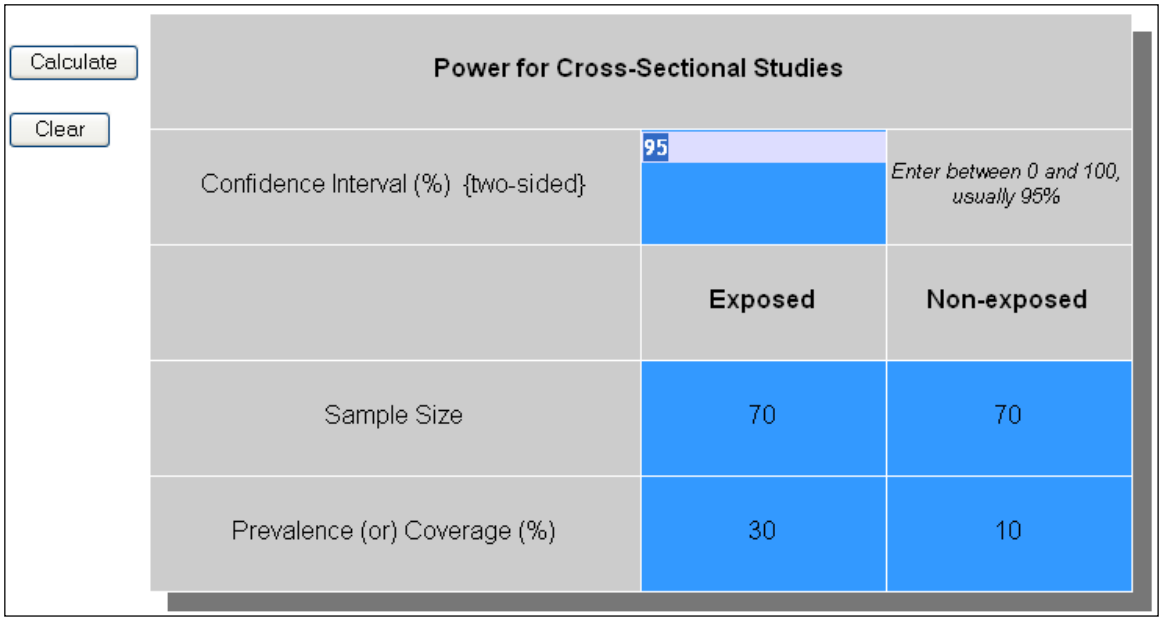
This module estimates power for Cross-Sectional studies. The data input screen is as follows:




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 exposed group and that for non-exposed group are entered.
- The prevalence of disease (or) coverage (eg. vaccination status) among exposed and non-exposed group are entered ranging from 0 to 100%.

The result of the calculation is shown next:

## Power for Cross-Sectional Studies

| | Input Data |
|---|---|
| **Two sided-confidence interval (%)** | 95 |
| **Number of Exposed** | 70 |
| **Prevalence/Coverage among Exposed (%)** | 30 |
| **Number of Non-exposed** | 70 |
| **Prevalence/Coverage among Non-exposed (%)** | 10 |
| **Prevalence/Coverage Ratio** | 3 |
| **Prevalence Difference (%)[1]** | 20 |

| **Power based on:** | |
|---|---|
| Normal approximation | 84.87% |
| Normal approximation with continuity correction | 78.94% |

[1] Prevalence Difference = Prevalence in Exposed - Prevalence in Non-exposed.

**Results from OpenEpi open source calculator--PowerCross**

file:///C:/OpenEpi/July,%202005/Power/PowerCross.htm
Source file last modified on 07/11/2005 15:05:06

The interpretation of power in this cross-sectional study is as follows: If, in truth, exposed group differs from non-exposed group in their prevalence of disease given the above values, this study would have a 67% 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'** = $n_1$ - [( κ +1) / ( κ . Δ)];

- *Prevalence ratio calculation*

PR = ( $p_1/p_2$ );

*The notations for the formulae are:*

Δ = difference of prevalence of disease between exposed group and non-exposed group;

κ = ratio of sample size: non-exposed group / exposed group;

$p_1$= prevalence of disease (coverage) among exposed group;

$p_2$= prevalence of disease (coverage) among non-exposed group;

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

q= 1-p;

$n_1$= available sample size among exposed group;

**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)