Obervational Statistics Formulas

Sample Size Estimation

$$n_o = \frac{Z_{\alpha/2} s^2}{e^2}$$

Sample size estimation 'double check'

$$n = \frac{n_o}{1 + \frac{n_o}{N}}$$

Simple Random Sample

vars ($\bar{y}$) = (1 – f) * s2 / n

95% Confidence Interval:

sd ($\bar{y}$) + 1.96 x $\sqrt{\frac{(1-f)}{n}}\, s$

Coefficient of Variation

$$cv(\bar{y}) = \sqrt{\frac{1-f}{n}} \times \frac{s}{\bar{y}}$$

95% Confidence Interval:

$cv(\bar{y}) \pm 1.96 \times (cv(\bar{y}))^2$

Sample Size Estimation for Proportions

For Differences: $(\bar{y} - \bar{Y})$

$$n = \frac{N Z_{\alpha/2} s^2 PQ}{(N-1) e^2 + z^2_{alpha/2} * PQ}$$

Sample Size Estimation for Proportions

For Relative Differences: $\frac{(\bar{y} - \bar{Y})}{\bar{Y}}$

$$n = \frac{N Z_{\alpha/2} s^2 PQ}{(N-1)(eP)^2 + z^2_{alpha/2} * PQ}$$

Variance of Weighted Samples

Step 1: $\bar{y}_w = \frac{\sum w_i y_i}{\sum w_i}$

Step 2: Calculate '*n.tilde*': $\tilde{n} = \frac{\left(\sum w_i\right)^2}{\sum w_i^2}$

{Used throughout}

Step 2: Calculate 'w star i':

$w.star_i = \tilde{n} \frac{w_i}{\left(\sum w_i\right)}$

Step 3: Calculate: $\frac{FPC}{\tilde{n}} = \frac{(1-f)}{\tilde{n}}$

Step 4: Calculate:

$$\widehat{var}(\bar{y}_w) = \frac{FPC}{\tilde{n}} \left[\frac{\sum w.star_i (y_i - \bar{y}_w)^2}{\sum w.star_i - 1} \right]$$

Fisher's Exact Test

$$P_{\mathrm{cutoff}} = \frac{(R_1!, R_2!, \ldots, R_m!)(C_1!, C_2!, \ldots, C_n!)}{N! \prod_{i,j} a_{i,j}}$$

A1,1	A1,2	R1
A2,1	A2,2	R2
C1	C2	N

Variance of Population Proportions & 95% C.I.

var (p) = $(1-f) \frac{pq}{n-1}$:

p ± 1.96 x $\sqrt{(1-f) \frac{pq}{n-1}}$