MUESTREO ALEATORIO SIMPLE (MAS)

Parametros	Estimadores	Intervalos de confianza $(1-\alpha)$
μ	$\frac{1}{n}\sum_{i=1}^{n} y_i = \bar{y} = \hat{\mu}$	$\bar{y} \pm B_\mu$
$\tau = N\mu$	$\hat{\tau} = N\hat{\mu} = N\bar{y}$	$\hat{\tau} \pm B_\tau$
P	$\hat{P} = \bar{y} = \frac{a_i}{n}$	$\hat{P} \pm B_P$
$A = NP$	$\hat{A} = N\hat{P}$	$\hat{A} \pm B_A$

$$Var[\bar{y}] = \frac{\sigma^2}{n} \frac{N-n}{N-1}$$

$$\hat{Var}[\bar{y}] = \frac{S^2}{n}\left(\frac{N-n}{N}\right)$$

$$S^2 = \frac{1}{n-1}\sum_{i=1}^{n}(y_i - \bar{y})^2$$

S: Desviacion estandar

$$B_\mu = \begin{cases} z_{\frac{\alpha}{2}} \sqrt{\hat{Var}[\bar{y}]} & n > 30 \\ t_{\frac{\alpha}{2}, n-1} \sqrt{\hat{Var}[\bar{y}]} & n \leq 30 \end{cases}$$

$$\hat{Var}[\hat{\tau}] = N^2 \frac{S^2}{n}\left(\frac{N-n}{N}\right)$$

$$B_\tau = \begin{cases} z_{\frac{\alpha}{2}} \sqrt{\hat{Var}[\hat{\tau}]} \\ t_{\frac{\alpha}{2}, n-1} \sqrt{\hat{Var}[\hat{\tau}]} \end{cases}$$

$$\hat{\tau} \pm B_\tau = N(\bar{y} \pm B_\mu)$$

$$\hat{Var}[\hat{P}] = \frac{\hat{P}(1-\hat{P})}{n-1}\left(\frac{N-n}{N}\right)$$

$$B_P = \begin{cases} z_{\frac{\alpha}{2}} \sqrt{\hat{Var}[\hat{P}]} & n \geq 100 \\ t_{\frac{\alpha}{n}, n-1} \sqrt{\hat{Var}[\hat{P}]} & n < 100 \end{cases}$$

$$\hat{Var}[\hat{A}] = N^2 \frac{\hat{P}(1-\hat{P})}{n-1}\left(\frac{N-n}{N}\right)$$

$$B_A = \begin{cases} z_{\frac{\alpha}{2}} \sqrt{\hat{Var}[\hat{A}]} \\ t_{\frac{\alpha}{2}, n-1} \sqrt{\hat{Var}[\hat{A}]} \end{cases}$$

$$\hat{A} \pm B_A = N(\hat{P} \pm B_P)$$

TAMAÑO DE MUESTRA MAS

$$n = \frac{\sigma^2 N}{(N-1)\frac{B^2}{Z^2_{\alpha/2}} + \sigma^2}$$ (Promedio)

$$n = \frac{1}{\frac{1}{N} + \frac{N-1}{N} \cdot \frac{1}{n_0}}$$

$$n_0 = \frac{Z^2_{\alpha/2} \cdot \sigma^2}{B^2}$$ → Tamaño de muestra para poblaciones infinitas

$$n = \frac{N\sigma^2}{(N-1)\frac{B_\tau^2}{Z^2_{\alpha/2} \cdot N^2} + \sigma^2}$$ (Total)

En proporciones lo único que cambia es que

$$\sigma^2 = p(1-p)$$

Por lo que

$$n = \frac{p(1-p)N}{(N-1)\frac{B_p^2}{Z^2_{\alpha/2}} + p(1-p)}$$ (Promedio)

$$n = \frac{p(1-p)}{(N-1)\frac{B_\tau^2}{Z^2_{\alpha/2} \cdot N^2} + p(1-p)}$$ (Total)

MUESTREO ALEATORIO ESTRATIFICADO (MAE)

Parametros	Estimadores	Intervalo de confianza
N	$\sum^L N_i$	----
n	$\sum^L n_i$	----
$\hat{\tau}_{st}$	$\hat{\tau}_{st} = \sum^L \hat{\tau}_i = \sum^L N_i \bar{y}_i$	$\hat{\tau}_{st} \pm B_{\tau_{st}}$
μ_{st}	$\bar{y}_{st} = \frac{1}{N}\sum^L N_i \bar{y}_i = \frac{\hat{\tau}_{st}}{N}$	$\bar{y}_{st} \pm B_{\mu_{st}}$
A_{st}	$\hat{A}_{st} = \sum^L N_i \hat{P}_i = \sum^L \hat{A}_i$	$\hat{A}_{st} \pm B_{A_{st}}$
P_{st}	$\hat{P}_{st} = \frac{1}{N}\sum^L N_i \hat{P}_i = \frac{\hat{A}_{st}}{N}$	$\hat{P}_{st} \pm B_{P_{st}}$

$$Var[\hat{\tau}_{st}] = \sum^L N_i^2 \cdot Var[\bar{y}_i] = \sum^L N_i^2 \frac{s_i^2}{n_i}\left(\frac{N_i - n_i}{N_i}\right)$$

$$Var[\hat{A}_{st}] = \sum^L N_i^2 \cdot Var[\hat{P}_i] = \sum^L N_i^2 \frac{\hat{P}_i(1-\hat{P}_i)}{n_i - 1}\left(\frac{N_i - n_i}{N_i}\right)$$

$$B_{\tau st} = \begin{cases} Z_{\frac{\alpha}{2}} \sqrt{\sum^{L} N_i^2 \cdot \frac{S_i^2}{n_i} \cdot \left(\frac{N_i - n_i}{N_i}\right)} & n>30 \\ t_{\frac{\alpha}{2}, n-L} \sqrt{\sum^{L} N_i \cdot \frac{S_i^2}{n_i} \cdot \left(\frac{N_i - n_i}{N_i}\right)} & n \le 30 \end{cases}$$

$$B_{Ast} = \begin{cases} Z_{\frac{\alpha}{2}} \sqrt{\sum^{L} N_i^2 \, \frac{\hat{P}_i(1-\hat{P}_i)}{n_i - 1} \left(\frac{N_i - n_i}{N_i}\right)} & n>30 \\ t_{\frac{\alpha}{2}, n-L} \sqrt{\sum^{L} N_i^2 \, \frac{\hat{P}_i(1-\hat{P}_i)}{n_i - 1} \left(\frac{N_i - n_i}{N_i}\right)} & n \le 30 \end{cases}$$

$$Var[\bar{y}_{st}] = \frac{1}{N^2} \cdot \hat{V}ar[\hat{\tau}_{st}]$$

$$= \sum^{L} \frac{N_i^2}{N^2} \cdot \frac{S_i^2}{n_i} \left(\frac{N_i - n_i}{N_i}\right)$$

$$Var[\hat{P}_{st}] = \frac{1}{N^2} \cdot Var[\hat{A}_{st}]$$

$$= \sum^{L} \frac{N_i^2}{N^2} \cdot \frac{\hat{P}_i(1-\hat{P}_i)}{n-1} \left(\frac{N_i - n_i}{N_i}\right)$$

$$B_{M_{st}} = \begin{cases} Z_{\frac{\alpha}{2}} \sqrt{\sum^{L} \frac{N_i^2}{N^2} \frac{S_i^2}{n_i} \left(\frac{N_i - n_i}{N_i}\right)} & n>30 \\ t_{\frac{\alpha}{2}, n-L} \sqrt{\sum^{L} \frac{N_i^2}{N^2} \frac{S_i^2}{n_i} \left(\frac{N_i - n_i}{N_i}\right)} & n \le 30 \end{cases}$$

$$B_{P_{st}} = \begin{cases} Z_{\frac{\alpha}{2}} \sqrt{\sum^{L} \frac{N_i^2}{N^2} \cdot \frac{\hat{P}_i(1-\hat{P}_i)}{n-1} \left(\frac{N_i - n_i}{N_i}\right)} & n>30 \\ t_{\frac{\alpha}{2}, n-L} \sqrt{\sum^{L} \frac{N_i^2}{N^2} \frac{\hat{P}_i(1-\hat{P}_i)}{n-1} \left(\frac{N_i - n_i}{N_i}\right)} & n \le 30 \end{cases}$$

$$\bar{y} \pm B_M = \frac{1}{N} \left(\hat{\tau}_{st} \pm B_{\tau st}\right)$$

$$\hat{P} \pm B_{P_{st}} = \frac{1}{N} \left(\hat{A}_{st} \pm B_{Ast}\right)$$

TAMAÑO DE MUESTRA MAE

$$n = \frac{\sum^{L} N_i^2 * \sigma_i^2 / w_i}{DN^2 + \sum^{L} N_i \sigma_i^2} \; ; \; D = \frac{B^2}{Z^2_{\frac{\alpha}{2}}}$$

Donde w_i depende de la afijación

- Para M
  $\sigma^2 = S^2$
  $\sigma = (y_{i\,max} - y_{i\,min})/6$

- Para P
  $\sigma^2 = \hat{P}(1-\hat{P})$

- Para totales el cambio es en D

$$D = \frac{B^2}{Z^2_{\frac{\alpha}{2}} \cdot N^2}$$

- Asignación Óptima con Costos Variables

C_i = diferentes ; σ_i = diferentes
$w_i \propto \sigma_i$; $w_i \propto 1/\sqrt{c_i}$; $w_i \propto N_i$

$$C = C_0 + \sum^{L} C_i n_i$$

$$w_i = \frac{N_i * \sigma_i / \sqrt{c_i}}{\sum^{L} N_K * \sigma_K / \sqrt{C_K}}$$

- Asignación de Neyman

$C_i = C_2 = C_3 = C_n$; σ_i = diferentes

$$w_i = \frac{N_i * \sigma_i}{\sum N_K * \sigma_K}$$

- Asignación Proporcional

$C_1 = C_2 = C_3 = C_n$; σ_i = Iguales

$$w_i = \frac{N_i}{N}$$