

Factsheet: Simple random sampling

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Summary

This factsheet summarises simple random sampling {srs} and defines its expectation and variance.

Before reading this factsheet, it is recommended that you read [Guide: Introduction to sampling]

Simple random sampling {srs; \bar{y} }

In simple random sampling, everything in the population has **equal probability** of being chosen. Also, every possible sample has **equal probability** of being chosen.

i Definition: Probability of selecting a particular sample under srs

If a population has N individuals and you take a sample size of n , then:

$P(\text{Selecting a particular sample})$ is

$$\frac{1}{\binom{N}{n}}$$

or

$$\binom{n}{N}$$

where:

$$\binom{n}{N} = \frac{n!}{N!(n-N)!}$$

In srs, \bar{y} is the sample mean of y , such that $\bar{y} = \frac{1}{n} \sum_{i=1}^n y_i$ and it is an unbiased estimator for the population mean μ .

This table contains key properties of \bar{y} for srs:

Expectation = $E[\bar{y}]$

μ

Variance = $\text{Var}[\bar{y}]$	$(1 - f) \frac{S^2}{n}$
Confidence interval (CI)	$\bar{y} \pm Z_{\frac{\alpha}{2}} \frac{s}{\sqrt{n}} \sqrt{(1 - f)}$

where,

- S^2 = Finite population variance of $y = \frac{1}{(N-1)} \sum_{i=1}^n (y_i - \mu)^2$
- f = Sampling fraction = $\frac{n}{N}$

Further reading

Version history

v1.0: initial version created 12/06 by Millie Harris as part of a University of St Andrews VIP project.

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