Factsheet: Confidence intervals

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Summary

This factsheet summarises key information on constructing and understanding confidence intervals using the normal distribution.

Before reading this factsheet, it is recommended that you read Guide: Introduction to confidence intervals

What is a confidence interval?

A confidence interval is a **range of values** which contains the true estimate with certain confidence, in repeated sampling.

How to construct

$$[\bar{x} \pm Z_{\frac{\alpha}{2}} \frac{\sigma}{n}]$$

- $\bar{x} =$ the sample mean
- $Z_{\frac{\alpha}{2}} =$ the Z value
- $\sigma =$ the standard deviation
- $n =$ population total

Confidence levels

Every CI has a confidence level (CL).

A confidence level (CL) suggests that if you were to repeat the study many times, you would expect the true estimate to fall within CL$\%$ of the results.

Caution!

This does not mean there is a 95% chance the range of values contains the true estimate. Instead, if you were to **repeat the study** many times, with a CL of 95% - you would

expect 95% of the CIs to contain the true estimate.

Z values for commonly used confidence levels

This is a summary table of commonly used CL and their Z values, following a normal distribution.

Confidence level (CL)	$\frac{\alpha}{2}$	$Z_{\frac{\alpha}{2}}$
$0.80 = 80\%$	0.10	1.282
$0.85 = 85\%$	0.075	1.440
$0.90 = 90\%$	0.05	1.645
$0.95 = 95\%$	0.025	1.960
$0.99 = 99\%$	0.005	2.576

Further reading

For more questions on the subject, please go to Questions: Confidence Intervals.

Version history

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