

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

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

- \bar{x} = the sample mean
- $Z_{\frac{\alpha}{2}}$ = the Z value
- σ = 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.

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