

Lina Clifford (did not work with other students)  
ECO 602 – Analysis of Environmental Data  
Week 7 Reading Questions  
Due 10/23/2022

**Q1 (1 pt.): Explain the effect, if any, of the population mean on the width of CIs for a population that is normally-distributed. If population mean does not affect the widths of CIs explain why not.**

The population mean does not directly affect the width of CIs for a normally-distributed population because CI width is determined by standard error, which is affected by sample size. Population mean does not effect standard error or sample size.

**Q2 (1 pt.): Explain the effect, if any, of the population standard deviation on the width of CIs. If population standard deviation does not affect the widths of CIs explain why not.**

Population standard deviation does not affect the widths of CIs, though sample standard deviation does have an effect. The population standard deviation may influence the sample standard deviation if the sample is well representative of the population but this is not a guarantee. For this reason, population standard deviation does not necessarily affect the widths of CIs.

**Q3 (1 pt.): Explain the effect, if any, of the population size on the width of CIs. If population size does not affect the widths of CIs explain why not.**

The population size does not necessarily affect the width of CIs. However, CIs are calculated from standard errors which are impacted by sample size. One could argue that if you are to well represent a larger population, you'd need a larger sample size and to well represent a smaller population, you could draw a smaller sample size. In this indirect way, population size could have some impact on CI width but ultimately population size does directly affect CI width.

**Q4 (1 pt.): Explain the effect, if any, of the sample size on the width of CIs. If sample size does not affect the widths of CIs explain why not.**

Sample size does have an effect on the width of CIs. As sample size increases, the CI width decreases and vice versa. With more samples, the standard error gets smaller which allows the sample standard deviation to stabilize. Since CIs are calculated from standard errors, this means that the CIs get narrower with smaller standard errors and larger sample sizes.

**Q5 (4 pts.): Interpreting a CI. Use a narrative example of a real (or made up) dataset to describe what a Frequentist 95% confidence interval really means. Make sure you cover any relevant assumptions of the Frequentist paradigm. Your answer must be in non-technical language. Imagine you were explaining confidence intervals to an audience of teenagers, or perhaps a family member who doesn't have training in statistics.**

A Frequentist 95% confidence interval means that if you were to conduct your experiments many, many more times, 95% of the confidence intervals I calculate would contain the true value 95% of the time. Within a Frequentist framework, we assume there is an infinitely large and unknowable population with true characteristics or parameters that are unknown. We take samples of this infinitely large and unknowable population to try to learn about the broader population through study of the sample. This is where the confidence interval comes in. Say, for example, we measured white oak diameter at breast height (DBH) at various forest plots (these would be the samples) at State Forest X to learn about the white oak population of the property. Perhaps we found that mean white oak DBH was 23.2 with a confidence interval of 95%. This would mean that if we were to continue to sample numerous forest plots at State Forest X, 95% of the confidence intervals I would calculate would contain the true DBH of white oaks at State Forest X.