

Confidence Intervals

In Example 1 below we got a sample percentage of 54% favoring a national health insurance program. The SE was estimated to be about _____%.

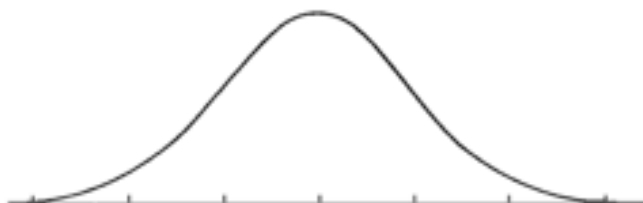
So we estimate that about 54% of all Americans give or take about _____% favor a national health insurance program even if it means raising taxes.

Example 1: Percents

In February of 2019, a CNN Poll of 1,011 adults nationwide asked the following question: “Do you think the government should provide a national health insurance program for all Americans, even if this would require higher taxes?” 54% answered ‘Yes’. The 1,011 adults were chosen as a *simple random sample*.

***How confident are we that our estimate is right?** How sure are we that if we really polled all US adults we’d get $54\% \pm$ _____% saying they favor a national health insurance program?

We can use the normal curve to answer that question because we know the probability histogram for the sample percent follows the normal curve (Central Limit Theorem).



We know that if hundreds of pollsters all took random samples of 1,011 people asking the same question, about 68% of them would get sample percents within 1 SE of the true population percent, and about 95% of them would get sample percents within 2 SE's of the true population percent.

So we can be about 68% sure that our sample percent is within 1 SE of the true population percent and about 95% sure that our sample percent is within 2 SE's of the true population percent.

Example 1 continued (Feb. 2019 random poll of 1,011 adults found 54% in favor of a national health insurance program.)

a) Suppose we wanted to be about 80% sure that the true population % lies in our confidence interval, how many SE's do we need to attach to our estimate of 54% favoring a national health insurance program?

This means:

b) Find the following confidence intervals for the % of all US adults who favor a national health insurance program.

68% confidence interval= $54\% \pm \underline{\hspace{1cm}} * \underline{\hspace{1cm}}\% = (\underline{\hspace{1cm}}\% - \underline{\hspace{1cm}}\%)$

90% confidence interval= $54\% \pm \underline{\hspace{1cm}} * \underline{\hspace{1cm}}\% = (\underline{\hspace{1cm}}\% - \underline{\hspace{1cm}}\%)$

95% confidence interval= $54\% \pm \underline{\hspace{1cm}} * \underline{\hspace{1cm}}\% = (\underline{\hspace{1cm}}\% - \underline{\hspace{1cm}}\%)$

c) Which of the following statements is true?

- i)** Our 95% confidence interval from part b can be applied to all adults worldwide.
- ii)** Our 95% confidence interval from part b can be applied to all adults nationwide.
- iii)** Our 95% confidence interval from part b can be applied to all US females.
- iv)** Our 95% confidence interval from part b can be applied to all US college students.

Example 2: Money! Last week we looked at this example: Thinking of your own situation, how much money per year would you need to make in order to consider yourself rich. A random sample of 1,572 adults nationwide was taken and their average was \$150,000 and the sample SD was \$158,600.

a) What is an 85% confidence interval for the average amount of money all American adults would need to consider themselves rich?

b) Interpret the confidence interval from part a:

Interpretation #1

Interpretation #2:

c) What happens to our interval if we increase and decrease our confidence level?