Exercise 1: Planning and Analyzing Single Samples

Item 1. Planning Your Sample, Based on Number of Inspections You Can Do.

Hampsachusetts, a participating State, has a population of 500 facilities. Use the Sample Planner to estimate the margin of error (at 95% confidence level) associated with each of these numbers of inspections:

Number of Inspections	Max. Margin of Error	Max. Width of Confidence Interval (i.e., MoE X 2)
30	+/- 16.4%	32.8%
50	+/- 12.7%	25.4%
100	+/- 8.6%	17.2%
150	+/- 6.6%	13.2%
200	+/- 5.4%	10.8%

Anything interesting about these results? Is there a point at which the confidence interval is too large to be of practical use? The usefulness of each confidence interval will be determined by your own purposes. Perhaps think about how wide is too wide for whatever decisions you might need to make. One interesting thing about this table is that it shows that, for each additional 50 inspections, the decrease in margin of error gets incrementally smaller. *Another way to think about it: to cut the margin error associated with a sample of 30 in half, the sample size must be tripled.*

Item 2. Planning Your Sample, Based on Desired Margin of Error.

Connectimont, a participating State, has a population of 500 facilities. Use the Sample Planner to:

1. Identify the number of inspections required for achieving a margin of error of+/- 7.5%, at 95% confidence level.
Answer: 127 inspections

2. Connectimont decides that's too many inspections. They'd like to consider a 90% confidence level, same margin of error. How many inspections do they need?
Answer: 97 inspections.

3. Taking the answer from #2, what's the margin of error they would get with a 95% confidence level?
Answer: +/-8.8%

Anything interesting about these results? If they had to choose between #2 and #3, what would you recommend? Interesting: It's much easier to achieve desired margins of error with lower confidence levels. The question is whether these confidence levels are sufficient for your purposes. *What chance of error are you willing to live with? 1 in 10? 1 in 20?*

Item 3. Calculating Results.

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Using the information in the gray part of the table, use the Results Analyzer to calculate results for each of four participating states, then report what's interesting about the results. Hint: think about what you calculated in Item 1 and 2, and think about what's happening to the half-width of the confidence interval here below.

State	Pop. Size	Conf. Level	Indicator #	Overall Sample Size	Effective Sample Size[1]	# Meeting Criterion (Positive Hits)	% of Positive Hits in the Sample	Conf. Interval (Lower Bound)	Conf. Interval (Upper Bound)	Width Of Confidence Interval	What's Interesting About This Result?
Hampsachusetts	500	95%	1	100	100	50	50%	41.4%	58.6%	**17.2%**	Same as Sample Planner.
			2	100	100	10	10%	6.1%	16.9%	**10.8%**	MoE decreased for same sample size.
			3	100	50	5	10%	4.7%	21.0%	**16.3%**	MoE increases substantially relative to indicator 2 with decrease in effective sample size. Margin of error still less than estimated, because of low observed proportion.
Connectimont	500	95%	1	50	50	25	50%	37.3%	62.7%	**25.4%**	MoE jumps substantially relative to Hampsachusetts #1, because of sample size. MoE jumps substantially relative to Hampsachusetts #3: Same sample size, but p=50%.
Vermaine	500	95%	1	200	200	100	50%	44.6%	55.4%	**10.8%**	MoE drops somewhat relative to Hampsachusetts #1 because sample size doubled.
Jerserado	1000	95%	1	100	100	50	50%	40.9%	59.1%	**18.2%**	MoE increases somewhat relative to Hampsachusetts #1 because population size doubled.

[1] "Effective sample size" reflects the number of facilities in the sample for which the indicator is relevant. For instance, if you sample 100 facilities and the indicator is only applicable to 75 of those, your effective sample size is 75.