## Elements of Statistical Investigations

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In this lecture, we will...



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• Review Elements of Statistical Investigations

Every statistical investigation requires the identification of several elements:

## Research Question

- What is the goal of the investigation?
- **2** Variables
- What are the *response* and *explanatory* variables?

## 8 Parameters

• What specific population summary values do we want to estimate?

## Ø Statistics

• What values will compute from the sample to estimate parameters?

Every statistical investigation requires the identification of several elements:

- **6** Inference Tool
- Is a confidence interval or hypothesis test more appropriate?
- **6** Conditions for Inference
- Given the method, does the sample satisfy the conditions for theory-based inference?
- Formula for Standard Error
- What is the specific formula for standard error of the statistic?
- **8** Reference Distribution
- What distribution should be used to calculate critical values and p-values?

- Research Question:
- Ø Variables:
- 8 Parameters:
- 4 Statistics:

- **()** Research Question: What is the prevalence of high levels of radon in Iowa?
- **2** Variables: Radon level (quant.); high-level of radon (binary cat.)
- **8** Parameters: proportion *p* of homes with high level of radon
- **G** Statistics: proportion  $\hat{p}$  of homes in sample with high level of radon

- **6** Inference Tool:
- 6 Conditions for Inference:
- **7** Formula for Standard Error:
- **8** Reference Distribution:

- **6** Inference Tool: Confidence Interval
- 6 Conditions for Inference: At least 10 successes and 10 failures
- **?** Formula for Standard Error:  $SE(\hat{p}) = \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$
- **8** Reference Distribution: N(0, 1), the standard Normal