

Sampling

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Today's Blueprint

Last Class

- The Normal Curve:
 - Frequency Distributions
 - Probability Distributions
 - The Normal Distribution

Today's Class

- Sampling:
 - The basics of sampling
 - Types of samples

The Basics of Sampling

The Basics of Sampling

- What is Sampling?
- A **sample** is a subset of observations or cases drawn from a specified population

The Basics of Sampling

- Some Terminology:
 - **Population** = All the cases of interest
 - **Sampling Frame** = The population from which a sample is drawn (the "official list" of cases)
 - **Sample** = Subset of sample frame
 - **Element** = One member of the sample

The Basics of Sampling

- What purpose does sampling serve?
- In most studies, it is difficult to obtain data for the entire *population*.
- We rely on *samples* to make inferences related to the *population*

The Basics of Sampling

- A **representative sample** is one that shares relevant characteristics with population
- If the sample is representative of the population, then we can infer things about the population from the sample with some accuracy

The Basics of Sampling

- A **biased sample** is one in which the relevant characteristics differ from that of the population
- Conclusions based on a biased sample are of little scientific value

Types of Samples

Think: Approaches and procedures

Types of Samples

- There are two basic *approaches* to drawing a sample from the sampling frame:
 - Probability Samples
 - Non-Probability Samples

Types of Samples

- There are two basic *procedures* that you can use to draw these samples:

- Sampling with replacement
- Sampling without replacement

Types of Samples

- Non-Probability Samples:
 - There is *no way* of estimating the probability that each element has of being included in the sample
 - There is no assurance that every element *even has some chance* of being included

Types of Samples

- Types of Non-Probability Samples:
 - Accidental samples
 - Quota samples
 - Purposive samples

Types of Samples

- Accidental Samples:
 - Samples based on convenience
 - Example: If you wanna survey shoppers, go to the mall. Problem: not all shoppers are at the mall

Types of Samples

- Quota samples:
 - Samples based on population characteristics
 - Elements are not randomly selected
 - Example: If you wanna survey OSU students, you select the first 10 you see

Types of Samples

- Purposive (Judgmental) Samples:
 - Samples based on researcher's discretion
 - Researcher determines which elements should be included and why these units are representative of the overall population
 - Example: Richard Fenno's *Homestyle* (1978)

Types of Samples

- Probability Samples
 - You can specify for each element the probability that it will be included in the sample
 - Not necessary to be able to say that each element has the *same* chance, but must be able to say *what* chance each element has

Types of Samples

- Random Sample → Representative Sample
 - Probability sampling is the only approach that makes representative sampling possible
 - By taking a random sample, we hope to adequately represent the population

Types of Samples

- Types of Random [Probability] Samples
 - Simple Random Sample
 - Stratified Random Sample
 - Cluster Sample

Types of Samples

- Simple Random Sample:
 - Each element of the sample has an equal chance of being selected from some population. Selection is random

- Example: Thoroughly shuffle a deck of 52 playing cards and deal 2 cards

Types of Samples

- **Stratified Random Sample:**
 - A random sample is selected from each of the identified sub-populations to reflect the composition of the larger population
 - Example: If you wanna sample a diverse group of 100 people, you sample about 70 Whites, 13 Blacks, 13 Latinos, and 4 Asians to reflect their proportions in the American population

Types of Samples

- **Cluster Sample:**
 - The entire population is divided into groups (clusters) and a random sample of these clusters are selected
 - All observations in the selected clusters are included in the sample

Types of Samples

- Example: 3-stage cluster sample:
 - First, you randomly select a sample of election districts from a list
 - Next, within each of the districts, you select blocks at random.
 - Then, you interview every person on these blocks

Types of Samples

- **Sampling with Replacement:**
- Units are sampled from the population one at a time, with each unit being replaced before the next is sampled.
- One outcome does not affect the other outcomes

Types of Samples

- Example: **Calling students out in class**
- The probability of me randomly picking your name from a bag
 - $p(\text{your name}) = 1/25 \approx 0.040$
 - After replacing and reshuffling, the probability of picking someone else's name from the bag ≈ 0.040

Types of Samples

- **Sampling Without Replacement:**
- Units are not replaced after being sampled
- Each outcome depends on all previous outcomes

Types of Samples

- Example: **Calling students out in class**
 - The probability of picking your name from a bag ≈ 0.040
 - **Without replacing and reshuffling**, the probability of picking someone else's name from a bag:
 - $p(\text{someone else's name}) = 1/24 \approx 0.042$
 - Take home point: your odds of being picked increase with each name I take out the bag

Types of Samples

- Whether or not it matters depends on sample size
 - In a finite sample, the distinction between sampling w/ and sampling w/out replacement is important
 - In an infinite sample, the distinction between sampling w/ and sampling w/out replacement is not important
 - However, since most samples are finite, it usually matters

References:

- FYI:
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 - Levin, Jack and James Alan Fox. 2003. *Elementary Statistics In Social Research, 9th Edition*. Boston, MA: Pearson Education Group, Inc.
 - Frankfort-Nachmias, Chava and David Nachmias. 1996. *Research Methods in the Social Sciences, 5th Edition*. New York, NY: St. Martin Press.
 - Steven Gross' Website (Assistant Professor of Linguistics):
http://faculty.etsu.edu/grosss/spring03/socpsych/population_sampling.htm