CRIJ 5331

Chapter 8:

Sampling

Quantitative Methods in Criminology

Maxifield & Babbie Chapter 8 PPT

Learning Objectives

- Understand how the logic of probability sampling makes it possible to represent large populations with small subsets of those populations
- Recognize that the chief criterion of a sample's quality is the degree to which it is representative of the population from which it was selected
- Summarize the chief principle of probability sampling: every member of the population has a known, nonzero probability of being selected into the sample
- Describe how probability sampling methods make it possible to select samples that will be quite representative
- Understand how our ability to estimate population parameters with sample statistics is rooted in the sampling distribution and probability theory
- Recognize how simple random sampling is logically the most fundamental technique in probability sampling

Learning Objectives, cont.

- Recognize how simple random sampling is logically the most fundamental technique in probability sampling
- Distinguish the variety of probability sampling designs that can be used and combined to suit different populations and research purposes: systematic sampling, stratified sampling (proportionate and disproportionate), and multistage cluster sampling
- Understand the basic features of the National Crime Victimization Survey and the British Crime Survey, two national crime surveys based on multistage cluster samples
- Recognize how nonprobability sampling methods are less statistically representative than probability sampling methods, and be able to offer appropriate examples for nonprobability sampling applications
- Distinguish the variety of nonprobability sampling types, including purposive sampling, quota sampling, and snowball sampling. Describe examples of each

Introduction

- Sampling: The process of selecting observations
- Often not possible to collect information from all persons or other units you wish to study
- Often not necessary to collect data from everyone out there
- Allows researcher to make a small subset of observations and then generalize to the rest of the population

The Logic of Probability Sampling

- Enables us to generalize findings from observing cases to a larger unobserved population
- Representative: Each member of the population has a known and equal chance of being selected into the sample
- Since we are not completely homogeneous, our sample must reflect—and be representative of—the variations that exist among us

Conscious and Unconscious Sampling Bias

- What is the proportion of FAU students who have been to an FAU football game?
- Be conscious of bias: When sample is not fully representative of the larger population from which it was selected
- Equal Probability of Selection Method (EPSEM)
  - A sample is representative if its aggregate characteristics closely match the population's aggregate characteristics; basis of probability sampling

Sampling Distribution

- Sample Element: Who or what are we studying (student)
- Population: Whole group (college freshmen)
- Population Parameter: The value for a given variable in a population
- Sample Statistic: The summary description of a given variable in the sample; we use sample statistics to make estimates or inferences of population parameters

Sampling Distribution, cont.

- Purpose of sampling: To select a set of elements from a population in such a way that descriptions of those elements (sample statistics) accurately portray the parameters of the total population from which the elements are selected
  - The key to this process is random selection
- Sampling Distribution: The range of sample statistics we will obtain if we select many samples

Sampling Distribution, slide 3

- Sampling Frame: list of elements in our population
- By increasing the number of samples selected and interviewed, increase the range of estimates provided by the sampling operation

Estimating Sampling Error

- If many independent random samples are selected from a population, then the sample statistics provided by those samples will be distributed around population parameter in a known way
- Probability theory gives us a formula for estimating how closely the sample statistics are clustered around the true value
  - Standard Error: A measure of sampling error
    - Tells us how sample statistics will be dispersed or clustered around a population parameter

Confidence Levels and Intervals

- Two key components of sampling error
- We express the accuracy of our sample statistics in terms of a level of confidence that the statistics fall within a specified interval from the parameter
- The logic of confidence levels and confidence intervals also provides the basis for determining the appropriate sample size for a study

Challenge Question 1

What if someone told you that they were 100% confident in an interpretation of their survey results? How might you reply?

Sampling Distribution Summary

- Random selection permits the researcher to link findings from a sample to the body of probability theory so as to estimate the accuracy of those findings
- All statements of accuracy in sampling must specify both a confidence level and a confidence interval
- The researcher must report that he or she is x percent confident that the population parameter is between two specific values

Populations & Sampling Frames

- Different types of probability sampling designs can be used alone or in combination for different research purposes
- Key feature of all probability sampling designs: the relationship between populations and sampling frames
  - Sampling frame: The quasi-list of elements from which a probability sample is selected

Simple Random Sampling

- Each element in a sampling frame is assigned a number, choices are then made through random number generation as to which elements will be included in your sample
  - Forms the basis of probability theory and the statistical tools we use to estimate population parameters, standard error, and confidence intervals

Systematic Sampling

- Systematic Sampling: Elements in the total list are chosen (systematically) for inclusion in the sample
  - List of 10,000 elements, we want a sample of 1,000, select every tenth element
  - Choose first element randomly
  - Danger: “Periodicity" A periodic arrangement of elements in the list can make systematic sampling unwise

Stratified Sampling

- Stratified sampling: Ensures that appropriate numbers are drawn from homogeneous subsets of that population
  - Method for obtaining a greater degree of representativeness —decreasing the probable sampling error
- Disproportionate stratified sampling: Way of obtaining a sufficient number of rare cases by selecting a disproportionate number
  - To purposively produce samples that are not representative of a population on some variable

Multistage Cluster Sampling

- Compile a stratified group (cluster), sample it, then subsample that set...
- May be used when it is either impossible or impractical to compile an exhaustive list of the elements that compose the target population
  (Ex.: All law enforcement officers in the US)
- Involves the repetition of two basic steps:
  - Listing
  - Sampling

National Crime Victimization Survey

- Seeks to represent the nationwide population of persons 12+ living in households (≈ 42K units, 74K occupants in 2004)
- First defined are primary sampling units (PSUs)
  - Largest are automatically included, smaller ones are stratified by size, population density, reported crimes, and other variables into about 150 strata
- Census enumeration districts are selected (CED)
  - Clusters of four housing units from each CED are selected

British Crime Survey

- First stage: 289 Parliamentary constituencies, stratified by geographic area and population density
- Two sample points were selected, which were divided into four segments with equal #'s of delivery addresses
  - One of these four segments was selected at random, then disproportionate sampling was conducted to obtain a greater number of inner-city respondents
  - Household residents aged 16+ were listed, and one was randomly selected by interviewers (n=37,213 in 2004)

Challenge Question 2

What if you could administer a project such as the NCVS or the British Crime Survey? Which would you choose?

Nonprobability Sampling

- There are situations when it is impossible to select a probability sample
- Nonprobability sampling can be used
- Nonprobability sample is sampling in which the probability that an element will be included in the sample is not known
- Cannot generalize to larger population

Nonprobability Sampling, cont.

- Purposive sampling: Selecting a sample on the basis of your judgment and the purpose of the study
- Quota sampling: Units are selected so that total sample has the same distribution of characteristics as are assumed to exist in the population being studied
- Reliance on available subjects
- Snowball sampling: You interview some individuals, and then ask them to identify others who will participate in the study, who ask others, etc., etc.

Challenge Question 3

What if someone asked you to explain the strengths and weaknesses of snowball sampling? How would you respond?