Sampling Procedures

Y520

Strategies for Educational Inquiry

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Terms

- Population (or universe) – The group to which inferences are made based on a sample drawn from the population.
- Sample – A representative subset of the population from which generalizations are made about the population.
Why Sample?

- All members of a population may not be available.
- Cheaper
- Less time consuming

Sampling Procedures

- Probability samples – Randomness is the bases for sample selection and insures that the sample is representative of the population.
- Non-probability samples – Randomness is not the basis for selecting the sample.
Sampling Procedures (continued)

- Probability samples – Generalizations from sample to population are possible because sample is representative of the population.
- Non-probability samples – Generalization is not possible because the sample is not representative of population.

Probability Sampling is:

- “Equal and independent”
- Every member of a population has an equal chance of being selected.
- Selection of one individual has no influence on the selection of the next individual.
- Humans cannot generate random numbers; a mechanism (such as a random number table) must be used.
## Probability Sampling Procedures

- Simple random sampling
- Stratified sampling
- Cluster sampling
- Systematic sampling

### Simple Random Sampling

- The preferred method – probability is highest that sample is representative of population than for any other sampling method.
- Every member of a population has an equal chance of being selected.
- Least chance of sample bias
Proportional Stratified Sampling

- Proportion of subgroups in sample represent proportion of subgroups (strata) in population.
- Every member within the subgroup has an equal chance of being selected.
- Used when size of population subgroups is discrepant.

Cluster Sampling

- Conceptually similar to simple random sampling except:
  - Unit of analysis is a group (aka, cluster), not an individual.
  - Examples: classrooms, schools, districts, families, census tract.
Systematic Sampling

- Example: Select every tenth student from a randomly ordered school roster.
- Principle of independence is violated, for selection of first student determines selection all others.

Remember

- Random procedures do not guarantee that the sample is representative, but they do increase the probability.
- Sampling variation – Random differences between sample and population. Decreased by increasing sample size.
- Sampling bias – Non-random difference due to flawed procedures.
The Big Question:

- How large should the sample be?
- Too small a sample increases the likelihood of sampling error.
- Too large a sample reduces efficiency.

For Comparison Groups & Correlations:

- Use power analysis – where power is the probability of detecting differences when, indeed, a true difference exists.
- Power analysis uses: power, alpha, and the directionality of the statistical test.
For Comparison … (continued):

- Knowledge of these three facts was well as desired effect size enables us to compute the sample size.
- For multiple regression – sample should include at least 10 for each group; 20 per variable is preferred (“rule of thumb).

Caution:

- What can happen with improper sampling?
- Incorrect conclusions can be drawn, such as . . .
Caution: (continued)

- 1936 Presidential election. *Literary Digest* poll incorrectly predicted Alf Landon the winner because the sample (people with telephones) was not representative of voters. An example of sampling bias.

Caution: (continued)

- 1936 Presidential election, *Literary Digest* poll: An additional problem was voters for one candidate were more likely to express their preference. This is an example of response bias; i.e., non-responders had a differing opinion.
Caution: (continued)

- 1948 Presidential election. Newspapers used quota sampling and erroneously predicted Dewey to defeat Truman.
- From this point on, random sampling became the preferred procedure.

Caution: (continued)

- 1970 Lottery – Selection for military service based on drawing names from a hat.
- Names were not randomized. Too many draftees were born in December.
Caution: (continued)

■ Terman’s study of gifted students:
■ Teachers nominated students whom they felt met criteria for “genius.”

Caution: (continued)

■ Kohlberg’s study of moral development:
■ Concluded that girls lag behind in moral thinking.
■ All his studies were conducted only with boys (it was later reported).
Rule:

- If you wish to make inferences to the population from which the sample was drawn, a random sampling procedure must be used.

Statistics to Describe Samples:

- Measures of central tendency:
  - Mean
  - Median
  - Mode
Statistics to Describe Samples:

- Measures of variability:
  - Range
  - Standard deviation
  - Quartile deviation

Statistics to Describe Samples:

- Use of effect size:
- Calculation
  - Difference = (Mt − Mc) / sd c
# Statistics to Describe Samples:

- **Use of effect size:**
- **Interpretation:** Describes the difference between “treatment” and comparison group means expressed as standard deviation units. Convert to a percentile shift using the z-distribution for normal curve.

# Non-Random Sampling

- **Limitation:** Cannot generalize from sample to population because:
  - Each member of population did not have equal chance of being selected
  - Independence principle violated
  - No random process used.
  - Sample is biased in unknown ways.
Non-Random “Sampling” Procedures

- Convenience “sampling” (aka, accidental, haphazard)
- Purposive / judgment “sampling”
- Quota “sampling”
- Note: All of these procedures violate the principles of “equal and independent”
- No “randomness mechanism”
- Generalization not logically defensible.

Non-Random “Sampling” Procedures

- Convenience samples – Consists of individuals readily available (e.g., students in a classroom).
- Purposive sample – Inquirer substitutes “judgment” for randomness – Sample non-representativeness virtually guaranteed
Non-Random “Sampling” Procedures

- Convenience “sampling” (aka, accidental, haphazard)
- Purposive / judgment “sampling”
- Quota “sampling”

“Samples” in Qualitative Studies

- Qualitative sampling procedures are based on non-random processes.
- Qualitative samples are typically small.
- These are the conditions that maximize the likelihood of sampling variation and sampling bias.
- Drawing inferences about a population from such samples is not logically defensible.
# Qualitative Sampling Procedures

- Intensity sampling
- Homogeneous sampling
- Criterion sampling
- Snowball sampling
- Random purposive sampling