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Survey Research: Choice of Instrument, Sample

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Section A

Sample

Survey Research Methods

- What makes a survey a survey?
  - Scientific methodology
  - Data collection from an individual
  - Usually samples from a large population
  - Conducted for the purpose of . . .
    - Description
    - Exploration
    - Explanation

Characteristics of Good Survey Research

- Quantitative
- Self-monitoring
- Contemporary
- Replicable
- Systematic
- Impartial
- Representative
- Theory-based

Types of Surveys

- Cross sectional
- Longitudinal
- Trend
- Time cohort
- Panel

General Sampling Issues

- Basic rule—all individuals must have equal chance of being selected
- May be more accurate data than a census
- If all members of a population were identical, sampling would not be necessary
- Aim for a sample that is generalizable to total population of interest

Some Sampling Definitions

- Element—unit from which data are collected
- Universe—aggregation of all elements
- Survey population—population from which you are drawing sample
- Sampling frame—actual list or “hat” from which you select elements

Probability Sampling Approaches

- Simple random sample
  - Random number generator
  - Draw number out of a “hat”

Probability Sampling Approaches

- Systematic sample
  - Every element of list
  - Select every “kth” element
  - Make sure list isn’t “periodic”

Probability Sampling Approaches

- Stratified sample
  - Same as for simple random sample
  - However, select from within specific pre-determined groupings
  - Insures heterogeneity

Probability Sampling Approaches

- Multi-stage sample
  - Select cluster of elements first, for example, physicians
  - Then select elements, for example, patients

Non-Probability Sampling Approaches

- Purposive or judgmental
  - Educated guess of representative unit

Non-Probability Sampling Approaches

- Purposive or judgmental
  - Educated guess of representative unit
- Quota sampling
  - Select any way you want following a pre-set quota pattern
- Available subject sampling
  - Use whomever is available

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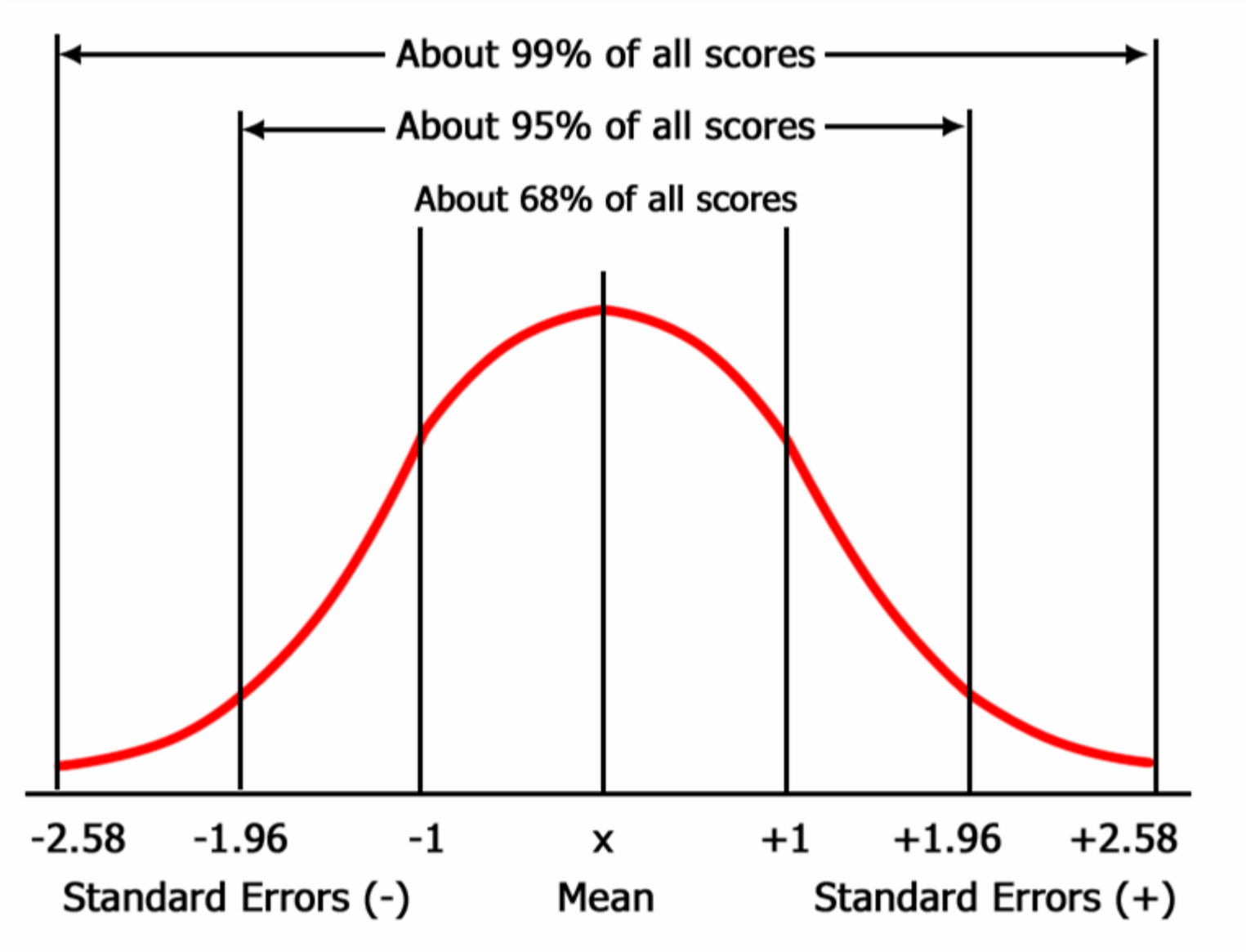
Section B: Sample Size Considerations

Based on chapter seven of *Designing and Conducting Health Surveys* (2nd. ed.); Aday, LuAnn. San Francisco: Jossey-Bass Publishers

Key Concepts in Determining Sample Size

- From a sampling point of view, the key concern is having a large enough number of cases to minimize the variable sampling (standard) error in the estimates
- Sampling error can be reduced by increasing the sample size (denominator) or minimizing the random errors in the data collection process

Normal Sampling Distribution



What Differences Do You Expect?

- In experimental designs, there is a particular interest in determining the effect (or difference) between experimental and control groups
- The effect size, which essentially reflects the hypothesized difference between groups, provides a basis for calculating the sample size for these types of designs

Type I and II Errors

- A Type I error results from falsely rejecting the null hypothesis when the hypothesis is actually true (alpha)
- A Type II error refers to the reverse error—failing to reject the null hypothesis when it is actually false
- The probability of Type I and Type II errors decreases as the sample size increases, primarily because the estimates obtained from larger samples are more reliable (have less random sampling variation)

Criteria for Estimating Sample Size Based on the Study Design: Aday

- Objective—to test a hypothesis
- Framework—power analysis
- Steps
  1. Identify the major study hypotheses
  2. Determine the statistical tests for the study hypotheses, such as a t-test, F-test, or chi-square

Criteria for Estimating Sample Size Based on the Study Design: Aday

- Steps
  3. Select the population or subgroups of interest (based on study hypotheses and design)
  4. Step 4
     a. Indicate what you expect the hypothesized difference to be
     b. Estimate the standard deviation of the difference

Criteria for Estimating Sample Size Based on the Study Design: Aday

- Steps
  4. Step 4
     c. Compute the effect size
  5. Decide on a tolerable level of error in rejecting the null hypothesis when it is true (alpha) (this is usually set at .05.)

Criteria for Estimating Sample Size Based on the Study Design: Aday

- Steps
  6. Decide on a desired level of power for rejecting the null hypothesis when it is false (power) (this is usually set at .80.)
  7. Compute sample size, based on study assumption

Example of a Major Study Hypothesis

- Proportion of patients (improving in health [by a global health index measure] and who received the treatment) will not differ from the proportion who improve and did not receive the treatment (null hypothesis)
  - Ho P1 - P2 = 0
- Alternative hypothesis
  - Ha P1 - P2 ne 0

Determine Statistical Test

- Calculation of sample size depends on the study design and what statistical test you will be using to test the hypotheses
- It is possible that you will have several outcomes, each of which will be determined using a different statistical test
- Different sample sizes will be required, depending on the outcome

Weighting the Sample Data to Reflect the Population

- You may want to sample some sub groups in the population at different rates to ensure that there will be enough of these individuals without having to increase the overall size of the sample
- The sample can be weighted so that it resembles the population from which it was drawn
- Weighting literally involves a process of statistically assigning more, or less, weight to some groups than others so that their distribution in the sample corresponds more closely to their actual distributions in the population as a whole