

Statistics in Evidence Based Medicine II

Lecture 5: Survey Research

Rizwana Rehman, PhD

Regional Statistician

Southeast Epilepsy Centers of Excellence

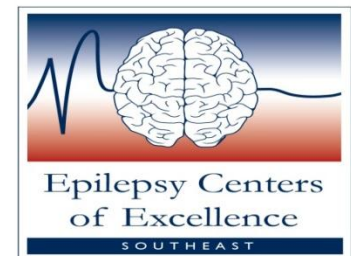
Durham VA Medical Center, Durham NC

Rizwana.Rehman@va.gov

(919)286-0411 ext: 5024



Audio Information: Dial 1-855-767-1051
Conference ID 61304911





Text Book

- **Basic and Clinical Biostatistics (2004)**

Beth Dawson, Robert G. Trapp

<http://www.accessmedicine.com/resourceTOC.aspx?resourceID=62>

- For more information, program materials, and to complete evaluation for CME credit visit

www.epilepsy.va.gov/Statistics

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Overview

- Stages of survey research
- Types of surveys
- Questionnaire bias
- Measurement data types
- Reliability & validity
- Sampling and sample size
- Analysis of survey data



Stages of the Survey Research Process

1. Identifying the focus of the study and method of research
2. Determining the research schedule and budget
3. Establishing an information base
4. Determining the sampling frame
5. Determining the sample size and sample selection procedures



Stages of the Survey Research Process

6. Designing the survey instrument
7. Pretesting the survey instrument
8. Selecting and training interviewers
9. Implementing the survey
10. Coding the completed questionnaires and computerizing the data
11. Analyzing the data and preparing the final report



Types of Sample Survey Research

- Mail out surveys
- Web based surveys
- The telephone survey
- In-person interviews
- Intercept surveys



Open-ended vs. Closed Questions

Table 11-2. Open versus Closed Questions.

	Use Open	Use Closed
Purpose	Actual words or quotes	Most common answers
Respondents	Capable of providing answers in their words	Willing to answer only if easy and quick; may write illegibly
Asking the question	Choices are unknown	Choices can be anticipated
Analyzing results	Content analysis; time-consuming	Counting or scoring
Reporting results	Individual or grouped responses	Statistical data



Questionnaire Bias

- Effect of varying question wording
- Different interpretation of respondents from the questioner
- Respondents don't understand the question
- Setting in which question is asked



Levels of Measurement

- Nominal
- Ordinal
 - Likert scales
- Interval



Likert Scale

- Likert scales use fixed choice response formats.
- Designed to measure attitudes or opinion
- A Likert type scale assumes that the strength/intensity of experience is linear.
- Most often five to seven choices including a neutral choice are offered.
- Common parametric tests are generally used but analysis should depend upon the research question



Reliability of a Survey

Reliability is a statistical measure of how reproducible the survey instrument data are.

Two survey instruments with same outcome of interest may have different reliabilities.



Types of Reliabilities

- Test retest
- Alternate form
- Internal consistency
- Intra-observer
- Inter-observer



Test-retest Reliability

Test-retest reliability is measured by having the same respondents complete a survey at two different points in time.

Test-retest reliability is measured **by intra-class correlation coefficient.**

$$ICC = \frac{S_{Between}^2}{S_{within}^2 + S_{Between}^2}$$

S_{within} and $S_{Between}$ are the within and between subject standard deviations



Example of Test-retest Reliability

Juniper et al (1996) evaluated the pediatric Asthma Quality of Life Questionnaire (PAQLQ) by examining reliability in children aged 7 to 17 who had stable asthma.

Item	Within subject SD	Between subject SD	ICC
Overall QoL	0.17	0.73	0.95
Symptoms	0.22	0.84	0.93
Activities	0.42	0.96	0.84
Emotions	0.23	0.64	0.89

Medical Statistics A Text Book for the Health Sciences
Michael Campbell, David Machin & Stephen Walters



Internal Consistency Reliability

- A set of questions measure different aspects of one concept.
- Cronbach's coefficient alpha ($\alpha_{\text{Chronbach}}$) measures internal consistency reliability among a group of items to form a single scale.

$$\alpha_{\text{Chronbach}} = \frac{k}{k-1} \left[1 - \frac{\sum s_i^2}{s_T^2} \right]$$

k =number of items, s_i =standard deviation of the i th item, s_T = standard deviation of the sum score T of all the items



Example of Internal Consistency

McKinley et al (1997) used a questionnaire to measure patient satisfaction with out-of-hours calls made to general practitioners. They measured aspects such as satisfaction, management and the doctor's attitude. They found values of $\alpha_{\text{Chronbach}}$ for each score ranging from 0.61 to 0.88. They concluded their questionnaire had satisfactory internal consistency



Inter-observer(Inter-rater) Reliability

Inter-observer reliability provides a measure of how well two or more evaluators agree in their assessment of a variable. A survey can be compared with a gold standard by using Cohen's Kappa (k)

$$K = \frac{P_{Agree} - P_{Chance}}{1 - P_{Chance}}$$

P_{Agree} = Estimated Probability the observer's agree, P_{Chance} = Proportion expected to show agreement by chance



Example of Inter-observer Reliability

Clamp and Kendrick (1998) used a telephone survey asking about safety to 165 families with children under age 5 years who had been involved in randomized trial concerning safety advice. They chose a random sample of 20 families from the survey who then received a home visit 2 weeks later to measure the consistency of the response to the questions posed. The investigators found that, for most questions, a **high kappa value** (>0.59) was obtained.



Validity of a Survey

- A survey is valid when it measures what it is supposed to measure.
 - Content
 - Face
 - Criterion
 - Construct



Use of Correlation Coefficient for Reliability and Validity

- Pearson correlation coefficients r are commonly used as measures of test-retest reliability, inter-observer reliability and concurrent validity.
- Results could be misleading due to systematic biases.



Determining the Sample Size

Survey should have enough power to find an effect if there exists one.

Q. What sample size would be enough to generalize results?

Ans. Determination of sample size depends upon study outcomes.

Researcher must consider

- Level of confidence
- Margin of error



Survey Sampling Methods

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



Analyzing Survey Data

- Descriptive Statistics
 - Measure of central tendency
 - Measure of dispersion
- Inferential Statistics
 - Parametric & non-parametric tests
 - Chi square
 - ANOVA
 - Regression & correlation
 - More advanced techniques



Openstat: A free software

- Download

<http://www.statprograms4u.com/OpenStatMain.htm>

- Tutorial

<http://mmc2.geofisica.unam.mx/cursos/geoest/Software/OpenStat/ATextBook.pdf>

- Youtube tutorials



Some Interesting Articles

- Approaches to the Analysis of Survey Data

<http://www.ilri.org/biometrics/TrainingResources/Documents/University%20of%20Reading/Guides/Guides%20on%20Analysis/ApprochAnalysis.pdf>

- Likert scales, levels of measurement and the “laws” of statistics

<http://www.fammed.ouhsc.edu/research/FMSRE%20Orientation%20&%20Handout%20Materials/Handouts%205%20Science/Likert%20Scales.pdf>

- Likert scales: how to (ab)use them

http://www.google.com/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=1&ved=0CCoQFjAA&url=http%3A%2F%2Fxa.yimg.com%2Fkq%2Fgroups%2F18751725%2F128169439%2Fname%2F1likertscales.pdf&ei=LU8mUrGblMfD2QWe5YHwAQ&usg=AFQjCNFQEMmMQbMzNc2go5XL-Cj-wo_rDg&sig2=HhUUy6KVsqgLqqXVxvLkdQ&bvm=bv.51495398,d.b2l

- Essential elements of questionnaire design and development

http://www.brighamandwomens.org/medical_professionals/career/cfdd/Mentoring%20Resources/surveydesign.pdf



Thank you!

Questions/Comments

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For more information, program materials,
and to complete evaluation for CME
credit visit

www.epilepsy.va.gov/Statistics