Quantitative Surveys in Medical Ethics

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Objectives of the session

By the end of this session, you will be able to;

1. Describe quantitative survey methods
2. Describe different approaches and components of quantitative survey methods
Outline of session

1. Brief Description of Quantitative Surveys
2. Planning a study
3. Survey techniques
4. Writing good questions
5. Levels of measurement
6. Measurement safeguards
7. Pilot testing
8. Protection of human subjects
9. Strengths and weaknesses of surveys
Definition of Quantitative Approach/research

**Quantitative research** is a systematic investigation of phenomena by gathering quantifiable data and performing statistical or mathematical
Quantitative approaches

- Attempts to explain phenomena by collecting and analysing numerical data
- Tells you if there is a “difference” but not necessarily why
- Data collected are always numerical and analysed using statistical methods
- If there are no numbers involved, it's not quantitative
Quantitative Research - Types

- Non intervention
  - Descriptive Research - Surveys
  - Correlational Research
  - Causal-Comparative

- Interventional
  - Experimental
  - Quasi-Experimental

Cross-sectional surveys
Longitudinal
Types of Surveys

1. Cross sectional surveys
   a. Information is drawn from a predetermined population
   b. Information is collected at one point in time
2. **Longitudinal studies**
   a. Information is collected at different points to determine changes over a period of time
   b. Trend studies – typical-changing populations surveyed at different times
   c. Panel study – same population surveyed at different times during course of study
Examples of quantitative surveys

Cross sectional surveys

Trend study

Evaluation of a community-based intervention to improve maternal and neonatal health service coverage in the most rural and remote districts of Zambia

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Objective: Optimal utilization of maternal health-care services is associated with reduction of mortality and morbidity for both mothers and their neonates. However, deficiencies and disparity in the use of key maternal health services within most developing countries still persist. We examined patterns and predictors associated with the utilization of specific indicators for maternal health services among mothers living in the poorest and remote district populations of Zambia.

Methods: A cross-sectional baseline household survey was conducted in May 2012. A total of 551 mothers with children between the ages 0 and 5 months were sampled from 29 catchment areas in four rural and remote districts of Zambia using the lot quality

Abstract

Background

A community-based intervention comprising both men and women, known as Safe Mother-
Purpose of Quantitative Surveys in medical ethics

- Quantitative survey methods are useful for problems in medical ethics
  1. Increased communication and understanding between ethicists and clinicians
  2. Understanding of variability in practice behaviours
  3. Results of some surveys have also helped ethicist reframe old questions
  4. Useful in exploring relationships between attitudes and behaviors.
Major Characteristics of quantitative Surveys

- Information collected to describe some aspects of the population
- Information is collected from a sample representing the target population
- Some distinctive characteristics of quantitative research are:
  - Structured tools
  - Appropriate sampling methods
  - Close-ended questions
  - Generalization of results
Sequential Approach to planning a study

1. Select a researchable question
2. Search and review related work, and then justify the research question again
3. Develop hypotheses
4. Identify instruments and data sources
5. Develop the research protocol
6. Identify the study population and sampling strategy
7. Identify the study limitations
8. Address as many procedural biases as possible
9. Plan the statistical analyses
10. Identify how the results will be reported
1. Select a researchable question

Example:

What factors are associated with physicians ability to administer consent forms prior surgery

A good research question should be .....
Focused on a single problem or issue
Researchable using primary and/or secondary sources
Feasible answered within the timeframe and practical constraints
Specific enough to answer thoroughly
Complex enough to develop the answer over the space of a paper
Relevant to your field of study and/or society more broadly
2. Search and review related work

- Check if proposed question has been answered before, or was done well
- To check for existing gaps
- If study goals are justifiable
- To refine own question
3. Develop a hypothesis

- A quantitative prediction about a relationship between two or more variables
- Suggests an answer to the research question
- Three points are to be included in a hypothesis
  - **Variables**
  - **Population**
  - **Predicted outcome**  
    - E.g.

- **Birth weight** of an adolescent is an independent risk factor for **type II diabetes**

- **Age** of a **surgeon physician** is an independent predictor to **administering a consent form**
4. Identify instruments and data sources

- Based on the methods...in this case a survey
- Based on the data sources – target population
- Resources
- Type of questions
5. Develop the research protocol

- Should answer the following research questions
  - What is your question
  - Why is your study important
  - How are you going to do it
6. Identify study population and sampling strategy

1. Study population
   - Should meet eligibility criteria
   - Should be accessible
   - Able to participate
   - Be able to recruit them

2. Strategy for sampling also important
   - Random sampling – more rigorous – same chance of being selected
   - Systematic sampling – Has a selection system
   - Stratified sampling – proportional representation of key characteristics
   - Disproportionate sampling – oversample a sub population to ensure sufficient responses
7. Identify study limitations

► Address them

Or

► Acknowledge
8. Address procedural biases

- **Selection bias** - may occur during identification of the study population

- **Interviewer bias** - a systematic difference between how information is solicited, recorded, or interpreted. E.g. more likely when a phenomena is well known to the interviewer.

- **Recall bias** – responses may be affected by subjects' recollections of events prior to or during the treatment process
9. Plan for statistical analysis

1. Descriptive Statistics

2. Parametric Statistics - makes an assumption about the population parameters and the distributions that the data came from.
   ▶ Testing relationships e.g. Linear/multiple regression
   ▶ Tests of group differences e.g. Independent t-test
   ▶ Test of repeated measures e.g. Dependent t-test

3. Tests of categorical data
   ▶ Odds Ratio
   ▶ Chi Square
   ▶ Logistic Regression
10. Identify how the results will be reported

► Always start with your research goals

► Make copies of your data and store the master copy away.

► Tabulate the information, i.e., add up the number of ratings, rankings, yes's, no's for each question.

► Consider conveying the range of answers, e.g., 20 people ranked "1", 30 ranked "2", and 20 people ranked "3".
Survey (Questionnaire) Techniques

1. Mode of administration
2. Survey format
# 1. Mode of administration

<table>
<thead>
<tr>
<th>Survey Type</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mail</td>
<td>Large number of participants</td>
<td>Limited response rate</td>
</tr>
<tr>
<td></td>
<td>Geographically unlimited</td>
<td>Risk of incomplete data</td>
</tr>
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<td></td>
<td>Lowest cost</td>
<td>Often requires multiple mailing</td>
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<td></td>
<td>Time convenience for respondents</td>
<td>Reading language barrier</td>
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<tr>
<td></td>
<td>Anonymity with sensitive questions</td>
<td>Respondent identity uncertainty</td>
</tr>
<tr>
<td>Internet</td>
<td>Permits large number of respondents</td>
<td>Requires access to a computer</td>
</tr>
<tr>
<td></td>
<td>Lower costs</td>
<td>Require computer literacy</td>
</tr>
<tr>
<td></td>
<td>Direct data entry</td>
<td>Web designed challenges</td>
</tr>
<tr>
<td></td>
<td>Drop-down boxes permit immediate coding of answers</td>
<td>Reading, language and physical disability barriers</td>
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<tr>
<td></td>
<td>Easily incorporates skip patterns</td>
<td></td>
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<tr>
<td></td>
<td>Allows for pop-up instructions</td>
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</table>
# Survey Methods: Advantages and Disadvantages

<table>
<thead>
<tr>
<th>Survey type</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telephone</td>
<td>Permits large numbers of respondents</td>
<td>Language and hearing barriers</td>
</tr>
<tr>
<td></td>
<td>Geographically limited</td>
<td>Limited to people who have and answer telephones</td>
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<tr>
<td></td>
<td>Respondent identified</td>
<td>Phone number lists often exclude cell phones</td>
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<tr>
<td></td>
<td>Complete data likely</td>
<td>Cell phones may be assigned to respondents not eligible for inclusion (e.g. minors)</td>
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<tr>
<td></td>
<td>Quality assurance possible</td>
<td>Interviewer costs (Training, time, quality assurance)</td>
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<td></td>
<td>Can obtain quick responses to time-sensitive questions</td>
<td>Uncertainty on attention of respondent</td>
</tr>
<tr>
<td>Face to face interviews</td>
<td>Complete data very likely</td>
<td>Often limited by geographic considerations</td>
</tr>
<tr>
<td></td>
<td>Respondent identified</td>
<td>Interviewer costs</td>
</tr>
<tr>
<td></td>
<td>Complex tasks and visual aids possible</td>
<td>Travel costs</td>
</tr>
<tr>
<td></td>
<td>Quality assurance possible</td>
<td>Sensitive questions maybe difficult to address</td>
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<tr>
<td></td>
<td>Good response rate</td>
<td>Smaller number of respondents usually because of costs</td>
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</tbody>
</table>
Survey format

- Ordering of topics
- Response formats
- Use of skip patterns
Ordering of topics - Telephone interviews – Group questions with same introductory clauses/similar responses

Customer Satisfaction Questionnaire

We are constantly striving to provide a good food service. This survey is part of the process. Please help us to do this by completing this questionnaire.

This section is about the food in the staff restaurant. Please tick the appropriate boxes and add your comments where relevant.

1. How many times do you usually eat in the staff restaurant?
   More than three times a week  [ ] to three times a week  [ ] on a week  [ ]
   hardly ever (Please specify why)  [ ]

2. When you eat in the staff restaurant, what type of food do you normally choose? (Tick each one as appropriate)
   starter  [ ] vegetables  [ ] desserts  [ ]
   hot main course  [ ] fried food  [ ] fresh fruit  [ ]
   vegetarian main course  [ ] salads  [ ] sandwiches  [ ]
   other (Please specify)  [ ]

3. Thinking about value for money, how would you describe the food in general?
   Good value for money  [ ] reasonable  [ ] bad  [ ]
   (Please give reasons)

4. How would you describe the variety of foods on offer?
   excellent  [ ] good  [ ] fair  [ ] poor  [ ]
   (Please give reasons)
Survey formats

- Response formats

- Use of skip patterns
  - Common for written mail survey questions
  - Advantageous on web-based surveys due to invisible complicated skip patterns
  - Moderate use on self administered mail surveys to minimise burden and confusion

- Use of vignettes to stimulate clinical decisions
Mail surveys

Leave significant white space on the page

skip pattern
Vignettes

- A method that can elicit perceptions, opinions, beliefs and attitudes from responses or comments to stories depicting scenarios and situations.

- Can be described as stories about individuals and situations which make reference to important points in the study of perceptions, beliefs, and attitudes.

- Generated from a range of sources including previous research findings, in collaboration with other professionals working in the field, or based on real-life case histories.

- Participants are asked to respond to stories with what they would do in a particular situation or how they think a third person would respond.

- Example from word document
Writing good questions

► Use simple words

► Be brief

► Be specific

► Be neutral - Avoid leading questions or promote socially desirable answers

► Provide a full range of possible responses

► Avoid double-barrel questions – questions that ask about more than one issue at a time
Levels of measurements

Typically there are four levels of measurement

1. Nominal data
2. Ordinal data
3. Interval data
4. Ratio Scale
1. Nominal data

- Often referred to categorical scale

- Categorise information without an ordered relationship

- No arithmetic properties and numbers act as only labels

- Maybe be ordered using numbers or text but that does not imply values

- E.g
  - Gender – men as ‘1’ and women as ‘2’
  - Chocolate – Milk as ‘1’, Dark as ‘2’ and Milk as ‘3’
  - Colour – Blue, White, Red and Green

- To summarise nominal data we use frequency or percentage and not mean or average
2. Ordinal

- The order matters but not the difference between values.
- Involves ranking of items according to whether the items have more or less of a characteristic.
- Have logical or ordered relationships.
- Socioeconomic status ("low income", "middle income", "high income"), education level ("high school", "BS", "MS", "PhD"), satisfaction rating ("extremely dislike", "dislike", "neutral", "like", "extremely like").
3. Interval scale

- A scale where there is order

- Interval data – represents intervals of known size

- Gives the ability to quantify and differentiate between options

- Difference between 2 variables is meaningful.

- Examples ...... temperature (Farenheit), temperature (Celcius), Likert scale
Level of measurement in which the attributes composing variables are measured on specific numerical scores that have equal distances between attributes or points along the **scale** and are based on a “true zero” point.

A ratio variable, has all the properties of an interval variable, and also has a clear definition of 0.0.

When the variable equals 0.0, there is none of that variable.

Examples of ratio variables include:

- enzyme activity, reaction rate, flow rate, weight, length, temperature in Kelvin (0.0 Kelvin really does mean “no heat”), survival time.
Measurements safeguards in quantitative surveys

- Methodological rigor is critical in developing quantitative surveys through valid and reliable tools by measuring what is intended to be measured.

- Use surveys/questionnaires that have been shown to have been validated:
  - *Face and content validation* – use of experts etc.
  - *Criterion validity* – shows the relationship between what is measured and other proven measurements.
  - *Construct validity* – shows relationship between two hypothetical assumptions.

- Reliable data are reproducible:
  - Testing-retesting reliability - assesses the degree to which the same sample of respondents provide the same answers to a questionnaire.
  - Interrater reliability - assesses the degree to which two or more investigators ask the same question and obtain the same answers.
Pilot testing

► A small study to test research protocols, data collection instruments (Surveys), sample recruitment strategies, and other research techniques in preparation for a larger study.

► One of the important stages in a research project and is conducted to:

1. Reveal flaws in how questions are understood by respondents.
2. Assess how long it takes.
3. Whether the intended process is working well...e.g. skip pattern.
5. What it takes to get the questionnaire completed.
## Issues Addressed in Pilot Testing of Surveys

<table>
<thead>
<tr>
<th>Questions</th>
<th>Questionnaire and Administrations</th>
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<tr>
<td>► Jargon</td>
<td>► Monitor the time of administer</td>
</tr>
<tr>
<td>► Comprehension/understanding</td>
<td>► Assess reliability; test-retest. Interrater, internal consistency</td>
</tr>
<tr>
<td>► Presence of floor or ceiling effects</td>
<td>► Patterns of responding</td>
</tr>
<tr>
<td>► Repeat item to assess reliability</td>
<td>► Check on validity (content</td>
</tr>
<tr>
<td>► Positive versus negative structure to assess framing effects (Cognitive bias bases on connotations)</td>
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Protection of human subjects

- Prior to initiating research, a protocol should be developed
- Submitted for IRB review
- Consent forms and tools should also be included
- Clearly stating how study will be conducted
## Strengths and weaknesses of survey methodology

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
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<tbody>
<tr>
<td>► Often Simple and Easy to administer</td>
<td>► Limited in answering some research questions beyond description</td>
</tr>
<tr>
<td>► Limited risks to respondents</td>
<td>► Need for adequate training particularly with trainee researchers</td>
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<tr>
<td>► Cost effective</td>
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<tr>
<td>► Can be used to make comparisons between two groups</td>
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<tr>
<td>► Useful for describing attitudes, beliefs and behaviours of populations</td>
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<tr>
<td>► Useful for testing hypotheses and infer generalisability inferences</td>
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Conclusion

- Quantitative surveys are becoming critical in ethics and requires careful consideration of the steps in planning.

- There are many advantages of quantitative research:
  - **Collect reliable and accurate data:** As data is collected, analyzed, and presented in numbers.
  - **Quick data collection:** A group of respondents who represent a population.
  - **Wider scope of data analysis:** Due to the statistics, provides a wide scope of data collection.
  - **Eliminate bias:** Offers no scope for personal comments. The results achieved are numerical.
References
