Principles of Survey Design

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Outline

- Introduction
- Basic survey designs
- Selection of participants
- Mode of administration
- Instrument design
- Concluding remarks
A survey is a systematic method of collecting data from a population of interest. It tends to be quantitative in nature and aims to collect information from a sample of the population such that the results are representative of the population within a certain degree of error.

Why do a survey?

- Information not available from other sources
- Unbiased representation of population of interest
- Standardization of measurement
Steps in conducting a survey

**Goals**
What you want to learn?

**Sample**
Who will you interview?

**Questionnaire**
What will you ask?

**Interview**
How will you interview?

**Conduct**
Who will administer the survey? Cost, ...

**Data**
Collect and analyze
Produce reports
Steps in conducting a survey

❖ Goals

✓ Clarify the purpose of the survey
✓ Stakeholders, issues to be explored, ...

❖ Sample

✓ Study design

✓ Characteristic of your target population
✓ Census, sample, sub-groups, ...
✓ Sampling scheme and sample size
Steps in conducting a survey

❖ Questionnaire

✓ Decide on what questions to ask
✓ Set the types of response formats
✓ Set the layout of the questionnaire
✓ Pilot testing – if possible

❖ Interview

✓ What is the best method of communication?
✓ Interviews (face-to-face, telephone)
✓ Self-administered (web, mail) survey
✓ Paper-and-pencil vs computer-assisted
Steps in conducting a survey

❖ Conduct

 ✓ Design the survey, select the sample,
 ✓ Administer the questionnaire *(trained interviewer, mail)*
 ✓ Collect the data

❖ Data

 ✓ Code the responses in a standardized form
 ✓ Analyze the data & describe the sample
 ✓ Generalize the results to the target population
 ✓ Write a report/article/presentation
Before you plan to do a survey...

- Think about who is going to ...
  - Design and administer the survey
  - Enter, analyze and interpret the data
  - Write up and present the results/findings
  - Use the findings
  - Pay for it all...

- Is there an existing survey collecting similar data?
- Does the survey require approval (ethical, …)?
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### Objectives

<table>
<thead>
<tr>
<th>Descriptive</th>
<th>Analytical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimates (exploratory)</td>
<td>Explains (explanatory)</td>
</tr>
<tr>
<td><strong>What?</strong></td>
<td><strong>Why?</strong></td>
</tr>
<tr>
<td>Profiles characteristics of group</td>
<td>Analyzes why group has characteristics</td>
</tr>
<tr>
<td><strong>No statistical hypothesis:</strong></td>
<td><strong>Assumes a statistical hypothesis:</strong></td>
</tr>
<tr>
<td>Does not require comparisons between groups or over time</td>
<td>Requires comparisons between groups or over time</td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td><strong>Example:</strong></td>
</tr>
<tr>
<td>What is the prevalence of diabetes among adults in Singapore?</td>
<td>Are adult diabetic more likely (than adult non-diabetics) to have hypertension?</td>
</tr>
</tbody>
</table>
Basic survey designs

- Study Design

- Cross-Sectional Surveys
  - Data are collected at one point in time from a sample selected to represent a larger population.

Population
Adult hypertensive patients in Singapore in 2011

Sample
200 Hypertensive patients
Basic survey designs

- **Study Design**

  ➢ **Longitudinal Surveys: Trends**

  ✓ A series of cross-sectional surveys

  ✓ Different samples of comparable population over time

  ✓ Provides rich data source of health care over time

<table>
<thead>
<tr>
<th>Year</th>
<th>Population</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>Adult hypertensive patients</td>
<td>Sample 1</td>
</tr>
<tr>
<td>2012</td>
<td>Adult hypertensive patients</td>
<td>Sample 2</td>
</tr>
<tr>
<td>2013</td>
<td>Adult hypertensive patients</td>
<td>Sample 3</td>
</tr>
</tbody>
</table>
Basic survey designs

❖ Study Design

❖ Longitudinal Surveys: Panel

✓ Study the same sample of respondents at different times

Population
Adult hypertensive patients

Sample 2011
Sample 2013
Sample 2015
Basic survey designs

Selection of an appropriate survey design requires a good understanding of the survey objectives (descriptive or analytic) and matching it with an appropriate study design.

Example

Is the incidence of myocardial infarction greater in adult patients with both hypertension and diabetes compared to adult patients with hypertension alone?

Longitudinal (Panel) + Analytical hypothesis = Cohort Study
<table>
<thead>
<tr>
<th></th>
<th>Descriptive</th>
<th>Analytic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cross-sectional</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Longitudinal [Panel]</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

What is the prevalence of adult cigarette smokers in Singapore in 2011?

Are adult cigarette smokers in Singapore in 2011 more likely than nonsmokers to be alcoholics?

What is the incidence of adult cigarette smokers in Singapore between 2011 and 2013?

Is the incidence of adult cigarette smokers in Singapore between 2011 and 2013 greater among alcoholics?
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Selection of participants

❖ Who will be in the sample?

➢ Target population
  ✓ The group about which information is desired
  ✓ Sample eligibility criteria are reflective of this population
    ▪ Adults patients with persistent hypertension

➢ Sampling element
  ✓ Ultimate unit providing information e.g. patient, hospital
  ✓ Complex designs require several stages of sampling
    ▪ Hospitals, wards, eligible patients
Selection of participants

How is the sample selected?

- Simple random sample
  - Every element has equal chance of being selected
  - Requires little knowledge of the population in advance
  - May not be very efficient
Selection of participants

How is the sample selected?

- Systematic random sample
  - An approximate of the simple random sample
  - High precision and easy analysis
  - May be inefficient and induced bias
Selection of participants

- How is the sample selected?

  - **Stratified sample**
    - Ensures that *certain groups* are included e.g. Race
    - Highest precision
    - Prior knowledge of the population & *complex analysis*

![Diagram of Population and Sample selection](image)
Selection of participants

- How is the sample selected?

- **Cluster sample**
  - Used when target population is spread over large area
  - *Lowest cost* and ensures certain groups are included
  - *Lowest precision* and complex analysis
Selection of participants

- How many will be in the sample?
  - Study objectives and design
  - Level of precision and confidence

- Adjustments
  - Finite population correction
  - Expected response rate
  - Expected proportion of eligibles (screening required)

Survey Costs
Outline

- Introduction
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Choosing the Method of Data Collection

❖ Considerations

➢ Study objective and target population
  ✓ Types of questions
  ✓ Response rate

➢ Cost

➢ Time

➢ Readily available methods
Choosing the Method of Data Collection

Methods

1. Personal (Face-to-Face) interview
2. Telephone interview
3. Self-administered (Mail)

- Paper and pencil

- Computer-assisted interview (CAI)
  1. CAPI: computer-assisted personal interview
  2. CATI: computer-assisted telephone interview
  3. CASI: computer-assisted Self-interviewing
# Choosing the Method of Data Collection

## Comparison

<table>
<thead>
<tr>
<th>Variable</th>
<th>Face-to-Face</th>
<th>Phone</th>
<th>Mail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>Costly</td>
<td>Moderate</td>
<td>Cheapest</td>
</tr>
<tr>
<td>Speed</td>
<td>Slow</td>
<td>Fast</td>
<td>Moderate</td>
</tr>
<tr>
<td>Response rate</td>
<td>High</td>
<td>Moderate</td>
<td>Low to moderate</td>
</tr>
<tr>
<td>Burden on respondent</td>
<td>Low</td>
<td>Moderate</td>
<td>High</td>
</tr>
<tr>
<td>Length of Questionnaire</td>
<td>Long</td>
<td>Moderate</td>
<td>Short</td>
</tr>
<tr>
<td>Sensitive questions</td>
<td>Poor</td>
<td>Moderate</td>
<td>Best</td>
</tr>
<tr>
<td>Lengthy answer choices</td>
<td>Best</td>
<td>Good</td>
<td>Poor</td>
</tr>
<tr>
<td>Open-ended responses</td>
<td>Best</td>
<td>Good</td>
<td>Poor</td>
</tr>
<tr>
<td>Complexity of Questionnaire</td>
<td>Best</td>
<td>Good</td>
<td>Poor</td>
</tr>
<tr>
<td>Possibility of interviewer bias</td>
<td>High</td>
<td>Moderate</td>
<td>None</td>
</tr>
</tbody>
</table>
Choosing the Method of Data Collection

- **Advantages** of CAI
  - Operational issues and cost
  - Time to complete
  - Reduction in interviewer errors (branching, editing, ...)
  - Data available faster after collection

- **Disadvantages** of CAI
  - Increase front-up cost
  - Only a subset of the target population own computers
  - Differences in capabilities of peoples computers
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Designing Survey Questionnaires

❖ Considerations

➢ Objectives → outcome (list)
➢ Borrow questions/questionnaires
➢ Develop your own questionnaire

❖ Elements of survey questionnaire

➢ The questions
➢ The response formats or categories
➢ Any special instructions
Designing Survey Questionnaires

- **Questions**
  - Words → **clarity** (concept, respondent)
  - Phrase → **balance** (leading?, ambiguity?)
  - Sentence → **length**

- **Tips**
  - Questions must be **reliable** and **valid**
  - **Specific**, clear and concise using **simple** language
  - Do not use emotional, **negatives**, or leading questions
  - Avoid **two questions in one**
  - **Unnecessary** questions should not be included
Designing Survey Questionnaires

Questions

- Don’t you agree that AIDS can be transmitted by shaking hands with an AIDS patient or any other physical contact?

- Do you agree or disagree that HIV/AIDS can be transmitted by shaking hands with a HIV/AIDS patient?
Designing Survey Questionnaires

❖ Responses

✓ Open-ended questions → salience
✓ Closed-end questions → multiple choice, rating, ranking

➢ Tips

✓ Allow enough space for the response (open-ended)
✓ Options should reflect concept being measured
✓ Options should be mutually exclusive
✓ Include all options (don’t know, not applicable, …)
Designing Survey Questionnaires

❖ Format of the questionnaire

✓ Account for the mode of data collection

✓ Short, simple, relevant and interesting

✓ Start with easy, non-threatening but necessary questions

✓ Keep questions dealing with the same topic together
AND THEN …

- Data entry
- Data analysis and interpretation
- Report writing / presentation

Use the results....
Remarks

- Understand the goals of the project
- Use clear, concise, and relevant questions
- Include mutually exclusive & exhaustive options
- Simple, short, organized & easy to answer survey
- Mode of administration: cost, time, response rate
- Pilot-test your survey
- Introduce your survey & how long it will take
- Analyze the data, publish and use the results
Questions...

Thank You

Questions You...