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Survey Methods for Health Services Research: Theory & Application

Lusine Abrahamyan MD MPH PhD

CCHE Seminar Series, October 2017

Please show of hands:

- How many of you were happy with the TTC service today morning?
- Who thinks this summer was not very warm?
- On a scale from 1 to 5 how would you rate the service from your primary care provider with 1 being *not satisfied* and 5 being *extremely satisfied*?

Outline

Part I

- Survey as a health service research method
- Study designs & surveys
- Survey sampling strategies
  - *Survey errors*
- Survey modes/techniques

Part II (preliminary)

- Design and implementation of survey tools
- Survey planning and monitoring
- Analyzing survey data
- Examples of surveys
  - Public surveys
  - Patient surveys

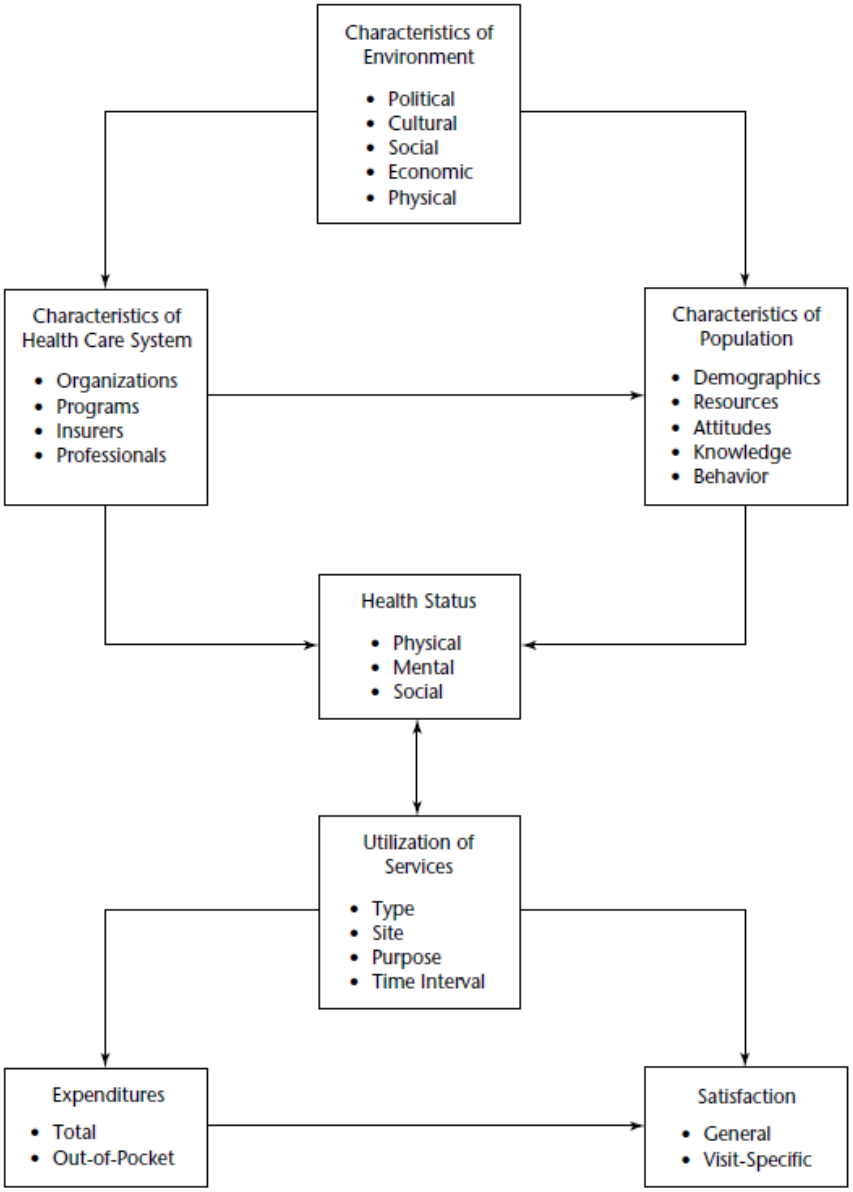
Defining Survey as a Research Method

- A survey is a systematic method of collecting data from a population of interest.
- Information is gathered by asking individuals questions, using structured and standardized questionnaire.
- Surveys are quantitative in nature.
- Surveys aim to collect information from a sample population that is representative of the overall population, within a certain degree of error.

Why Survey?

- Evaluate population knowledge, beliefs, attitudes about …
- Evaluate healthcare services, processes of care, outcomes
- Evaluate client/patient satisfaction, etc…

FIGURE 1.1. FRAMEWORK FOR CLASSIFYING TOPICS IN HEALTH SURVEYS.



Aday LU, Cornelius JC. *Designing and conducting health surveys: A comprehensive guide.* Third Edition. San Francisco: Jossey-Bass, 2006

Advantages of Surveys

- Collect a lot of information from a large group of stakeholders, within a short period of time, and over a wide geographical area
- Data collection is standardized and can be conducted in several ways
  - Phone, in-person, mail, email/web
- If sampled appropriately, can represent the total population
- Quantitative data more straightforward to analyze than qualitative
- May analyze relationships between variables to explain study findings

Disadvantages of Surveys

- Difficult to gather in-depth information on perspectives & experiences
  - Qualitative studies are preferred in such cases
- Can become expensive and time consuming if intends to cover large population
- May require higher level statistical skills depending on the level of complexity of the design
  - e.g., cluster designs, multi-level modelling

Framework for Conducting a Survey	
Clarify the Purpose	Why survey? Who are the stakeholders? Who is the population of interest? What are the research questions and hypothesis?
Assess Resources	What resources will you need?
Decide on Methods	Which method is the most appropriate given the purpose and constrains? Mail/email/phone???
Write Questionnaire	What questions need to be asked? What response formats should be used? What should be be overall layout of the questionnaire?
Pilot test/Revise Questionnaire	
Prepare Sample	What is the size of the target population? What sampling frame should be used?
Train Interviewers	
Collect Data	
Process Data	What methods should be used for data coding, data entry and cleaning?
Analyze the Results	
Interpret & Disseminate Results	How to disseminate findings among knowledge users?
Take Action	What policy changes should be made after the survey?

Clarifying Purpose of the Survey

- Why have you chosen to conduct a survey?
  - E.g., evaluate peoples' perceptions, opinions, knowledge, attitudes, behaviors, exposures to risk factors, experiences of care, needs
  - Is there any alternative way to obtain this information?
- Who are the stakeholders?
  - People who will be interested in the results of the survey and who will take actions based on the results
  - Engage them early to clarify what issues need to be explored
- What resources you can rely on?
  - People (internal and external), money, time

PICO Framework for Research Questions

P	**P**atient, Population, or Problem	What specific patient population are you interested in and what are their important characteristics? (e.g., disease/health status, complains, age, sex, medications, etc)
I	**I**ntervention, Prognostic Factor, or Exposure	What is your investigational intervention? (e.g., a specific diagnostic test, treatment, prophylaxis, risk behavior, prognostic factor)
C	**C**omparison (if there is a control group)	What is the main alternative to compare with the intervention?
O	**O**utcome of interest	What do you intend to accomplish, measure, improve or affect? (e.g., specific symptoms, functional outcomes, disease incidence, rate of complications, knowledge)
T	**T**ime	How long it will take to demonstrate an outcome?
S*	**S**tudy design	What would be the best study design/methodology? (e.g., case-control, cohort, RCT, cross-sectional)
What type of question are you asking?		Diagnosis, Etiology/Harm, Therapy, Prognosis, Prevention

**When the framework is used for systematic reviews (PICOS).*

Study Designs & Surveys

Study Designs & Surveys

- **In some studies, survey is only a part (tool) of the general research strategy and is used to collect data for study purposes**
  - In a cohort study, for example, collect data on baseline risk factors and changes in risk factors over time
  - In a randomized controlled trial, collect data on baseline characteristics, and, after follow-up, collect data on outcomes

- **In some other studies, survey is the main research strategy**
  - A cross-sectional survey to evaluate population knowledge, beliefs, and attitudes about...
  - A population census

Study Designs

Experimental study designs

- True experimental, randomized trials
- Quasi-experimental trials

Observational study designs

- Cross-sectional study
  - Repeated cross-sectional versus panel surveys
- Cohort study
- Case-control study

True Experimental Designs with Randomization

Pretest-Posttest Control Group Design

R	O	X	O
R	O		O

Posttest-Only Control Group Design

R	X	O
R		O

Threats to Validity

Internal validity:
can be controlled

External validity:
- Interaction of selection bias and intervention

- Reactive effects of testing and experimental arrangements

DT Campbell & J Stanley. Experimental and Quasi-Experimental Designs for Research. 1963

Example: Whiplash Intervention Trial

- **Objective**: determine which of physician care or two rehabilitation programs of care is most effective in improving recovery of patients with recent whiplash disorder.
- **Study design:** a pragmatic randomized clinical trial

Table 3 Outcomes and variables measured at baseline and follow-up interviews

Measures	Baseline	6 Weeks	3 Months	6 Months	9 Months	12 Months
Socio-demographic characteristics	x					
Accident information	x					
Past history of neck pain and whiplash	x					
Health care after accident	x					
Co-morbidity questionnaire	x					
Neck pain intensity	x	x	x	x	x	X
Whiplash disability questionnaire	x	x	x	x	x	X
SF-36 (acute, v2)	x	x	x	x	x	x
CES - Depression scale	x	x	x	x	x	x
Health state preference (rating scale)	x	x	x	x	x	x
Expectation of recovery	x	x	x	x	x	x
Global self-perceived recovery question	x	x	x	x	x	x
Work status	x	x	x	x	x	x
Lawyer or paralegal involvement	x	x	x	x	x	x
Satisfaction with care		x	x	x	x	x
Co-interventions		x	x	x	x	x

CES = Center of Epidemiological Studies; SF-36 (acute, v2) = Medical Outcomes Study 36-item Short-Form health survey (acute, v2)

Côté et al. *Protocol of a randomized controlled trial of the effectiveness of physician education and activation versus two rehabilitation programs for the treatment of Whiplash-associated Disorders: The University Health Network Whiplash Intervention Trial.* Trials. 2008; 9: 75.

Quasi-Experimental Designs

Nonequivalent Control, Posttest only

O X O

O

Nonequivalent Control, Pretest-Posttest

O X O

O O

Threats to Validity

Internal validity:
Regression to the mean
Selection bias
Confounding
History
Maturation

External validity:
-Interaction effect of testing

Pre-Experimental Designs

One-Shot Case Study

X O

One-Group Pretest-Posttest Design

O X O

Static-Group Comparison

X O

O

Threats to Internal Validity

History
Maturation
Testing
Selection bias
Attrition bias

All have weak external validity.

Example 3: Evaluation of Value Demonstrating Initiative on COPD

Objective

- To evaluate the impact of the program on patient clinical, economic & humanistic outcomes at 1 yr of follow-up, using self-administered patient surveys

Collected information	Time
Economic outcomes	
Health services utilization (including COPD-related hospital visits) & costs	1 year before, at 3, 6, and 2 months after enrollment
Humanistic outcomes	
Quality of life (generic & disease specific)	baseline, 3, 6 , 12 months
Self-efficacy	baseline, 12 months
Medication adherence	baseline, 12 months
COPD knowledge	baseline, 12 months
Anxiety	baseline, 12 months

Observational Study Designs

- Characterize the population under the study (e.g., risk factors, behaviors) and the occurrence of the diseases (place, time)
  - Epidemiological triad: *Who? Where? When?*
- May generate hypotheses about exposure → disease
  - Cross-sectional, case-control studies
- May provide evidence for exposure → disease
  - Cohort studies

Cross-Sectional Study

- Perhaps the most popular design for surveys
- Provides a snapshot of the population at one point in time
  - Establishes the prevalence (absence/presence of the disease)
  - Describes current health and exposure status (i.e. risk factors)
  - Describes attitudes, knowledge, behavior
- For unbiased population estimates, need to utilize a strong sampling strategy

Cross-Sectional Study

Strengths

- Relatively inexpensive and takes up little time to conduct
- Can estimate ***prevalence*** of a disease/outcome of interest if the sample is taken from a representative sample of the whole population
- Several outcomes and risk factors can be assessed simultaneously
- There is no loss to follow-up!

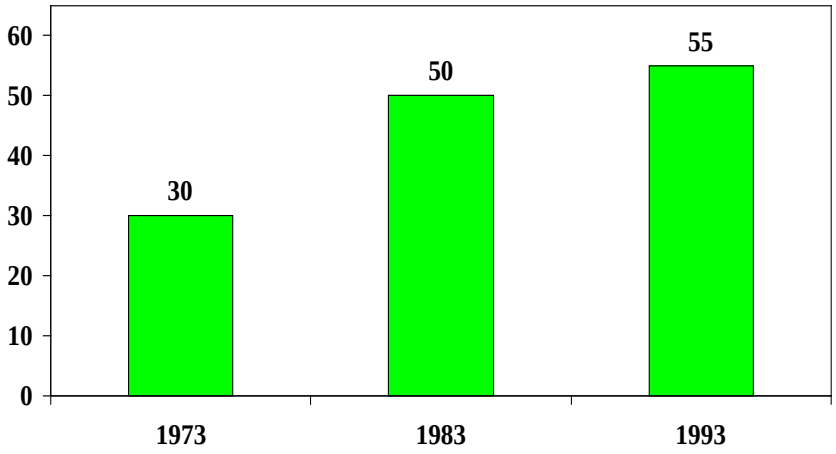
Weaknesses

- Surveys prone to non-response bias and recall bias
- The temporal relationship between exposure and disease is unclear
  - cannot make causal inferences about exposure→ disease (correlation does not imply causation!!!)
- Only a snapshot
  - the study may provide differing results if another time-frame or sample had been chosen

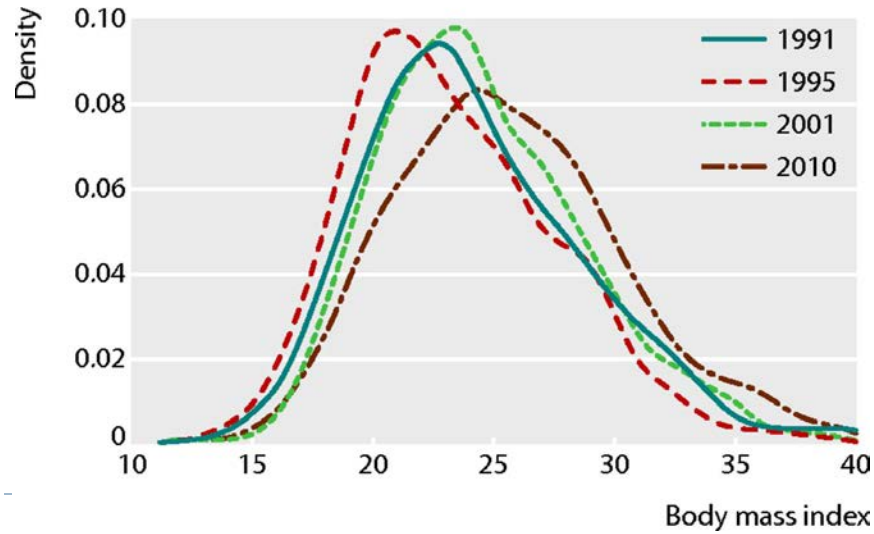
Repeated Cross-Sectional Survey

- The same cross-sectional survey is repeated over time
- Uses the same sampling frame but each time (randomly) **samples different individuals**
- Provides data on population-level changes over survey periods

Percent caries free among 5 year olds (UK)



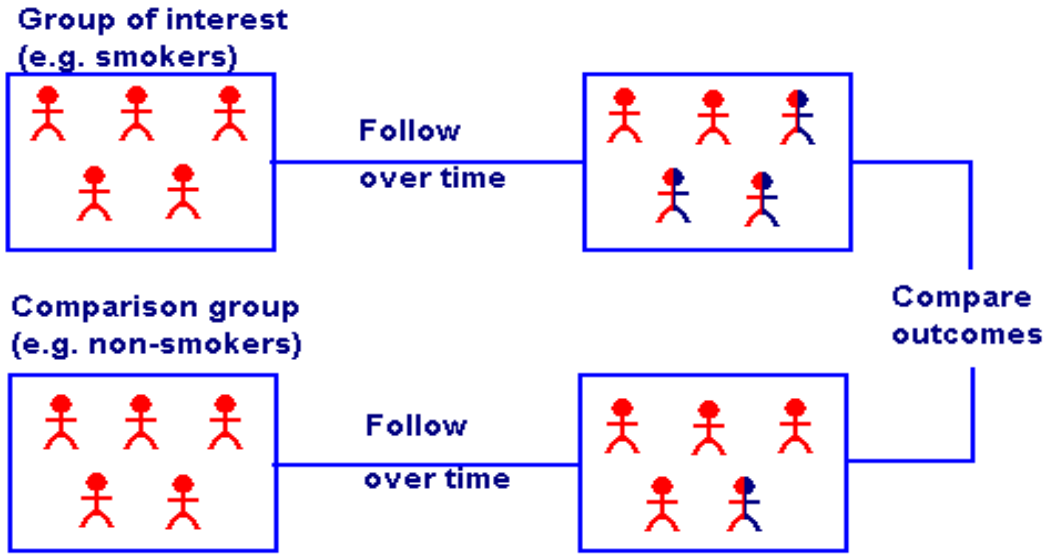
Changes in population BMI, Cuba



Panel Surveys

- Is a type of longitudinal survey
- Designed specifically to evaluate changes over time at the individual level
- Selects a cross-sectional sample and follows the initial sample over several waves, even if respondents move location
- High cost and complexity
- High risk of attrition and multiple testing bias
- Examples:
  - National Longitudinal Survey of Children and Youth (Canada)
  - British Household Panel Survey
  - Socio-economic panel (Germany)

Cohort Study



- Estimates show potential risk factors relate to → outcomes
  - ***Establishes cause → effect relationship***
- Designed to estimate ***the incidence*** of the diseases
- Can be done prospectively or retrospectively

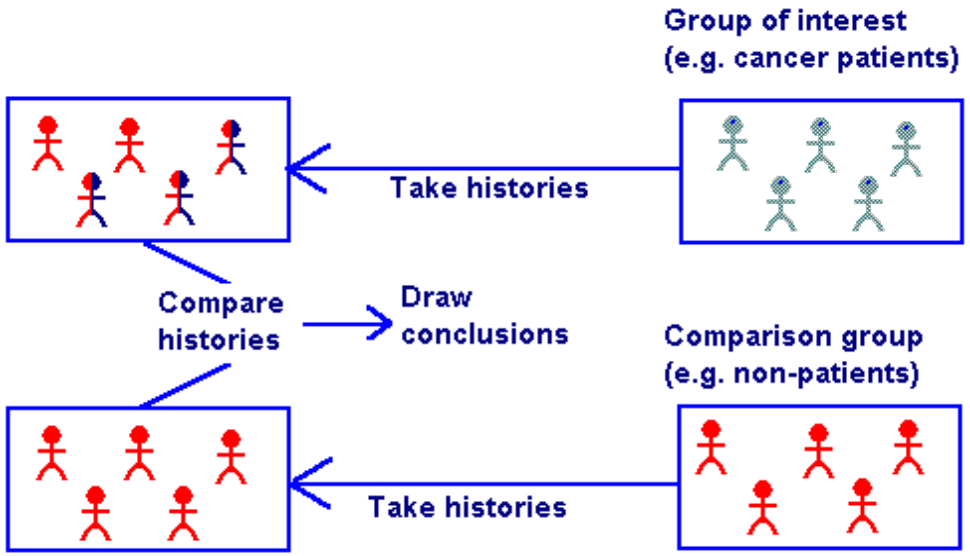
Framingham Heart Study

- Commenced in 1948, under the direction of the National Heart, Lung and Blood Institute (USA)

- **Objective**
  - to identify the common factors or characteristics that contribute to cardiovascular disease (CVD)
- **Methods**
  - The original cohort recruited 5,209 men and women between the ages of 30 and 62 from the town of *Framingham, Massachusetts*, who had not yet developed overt symptoms of CV disease or suffered a heart attack or stroke
  - Investigators conducted extensive physical examinations and lifestyle interviews that they would later analyze for common patterns related to CVD development.
  - Followed CVD development over a long period of time in three generations of participants.

http://www.framinghamheartstudy.org/about/index.html

Case-Control Study Design



- The design is retrospective in nature
- Identify a group of ***cases*** (people with disease) and a group of ***controls*** (people without disease)
- Use interviews and/or search the records to obtain information on prior exposure to the factor(s) of interest
- Measure strength of the association (odds ratio (OR))

Example

45 -75 years old women with endometrial cancer (***cases***) registered at the National Oncology Center of Armenia from 2000 to 2006 (n=177).

45-75 years old women without endometrial cancer (***controls***) residing in Yerevan and recruited through Random Digit Dialing (n=232).

Interviewer-administered phone interviews

- ✓demographic characteristics
- ✓menstrual and reproductive history
- ✓breastfeeding experiences
- ✓contraceptive history
- ✓family history of cancer
- ✓ use of hormonal medications
- ✓height and weight
- ✓smoking status
- ✓other comorbidities (diabetes)

Calculate odds of developing cancer for each risk factor

Survey Sampling


RECEPTION
ACCORDING TO SOME WEBSITES I'VE FOUND I'VE GOT ALL THESE DISEASES! HOW MANY TRIALS CAN YOU GET ME ON ?
PCT

Defining the Sampling Strategy

- The sampling strategy should aim to obtain a representative sample of the target population within allocated timeline and budget
- The sample size should be large enough to allow for reliable and valid conclusions from the survey
- Some important questions in selecting the sample include:
  - *How many responders will be included?*
  - *How the survey respondents will be selected?*
  - *What is the size of the target population?*
  - *What can the budget allow?*
  - *How confident do you need to be with the results?*
  - *Do you need to look at any subgroups?*

Selecting Study Population

- Survey (target) population – all of the units (individuals, households, organizations) to which one desires to generalize survey results.
- Sampling frame – the list from which a sample will be drawn (using a pre-specified sampling strategy) in order to represent the survey target population
  - Ideally, sampling frame is the list of the target population.
  - Who will be included? Where they can be located? When the data will be collected?
- Sample population – all units of population that are drawn for inclusion in the survey.
  - Sampling element/unit - the ultimate unit from whom information will be collected in the survey and who will be the focus of the analysis (e.g., individual, household, hospital, province, country).
- Study population – all the units that return completed surveys.

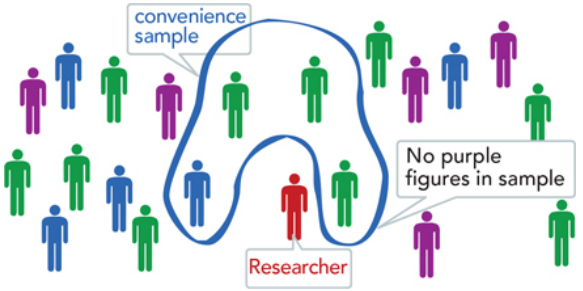
Sources to Obtain Sample Frames

- To survey general public:
  - Telephone surveys: phone books that provide phone numbers for all listed telephones by area code
  - Mail surveys: the list of addresses and, ideally, first and last names
  - Household surveys: the list of addresses; respondents can be selected when in-person visit is made.
- To survey professionals (e.g., doctors, nurses):
  - Professional directories
- To survey patients:
  - Clinic databases (may contain both demographic and clinical information)
- To conduct intercept surveys (surveying when people enter/exit a specified location):
  - Listing of all representative locations obtained from municipal offices/professional organizations (e.g., list of all pharmacies by area code).

Sampling Strategies

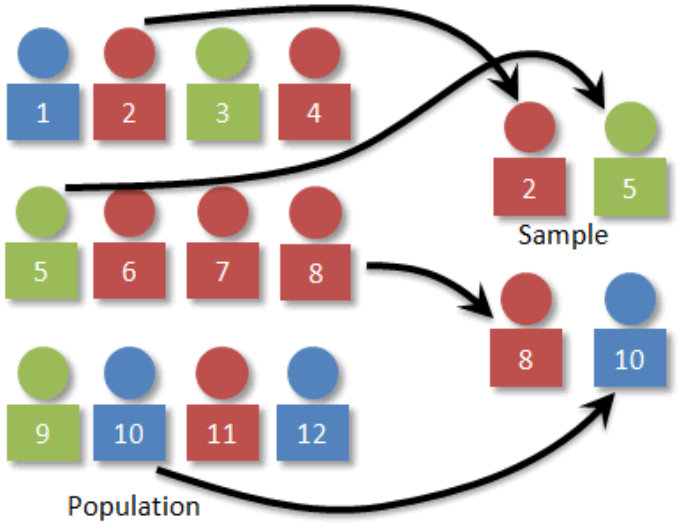
- Census – gathering information from every individual in a population
  - Ideal but not always practical!

- Probability & Non-probability sampling methods
  - Non-probability sampling methods
    - E.g., convenience sampling, snowball sampling
  - Probability sampling methods
    - Simple random sampling
    - Systematic random sampling
    - Stratified random sampling
    - Cluster sampling
    - *Combination of probability sampling methods*



Simple Random Sampling

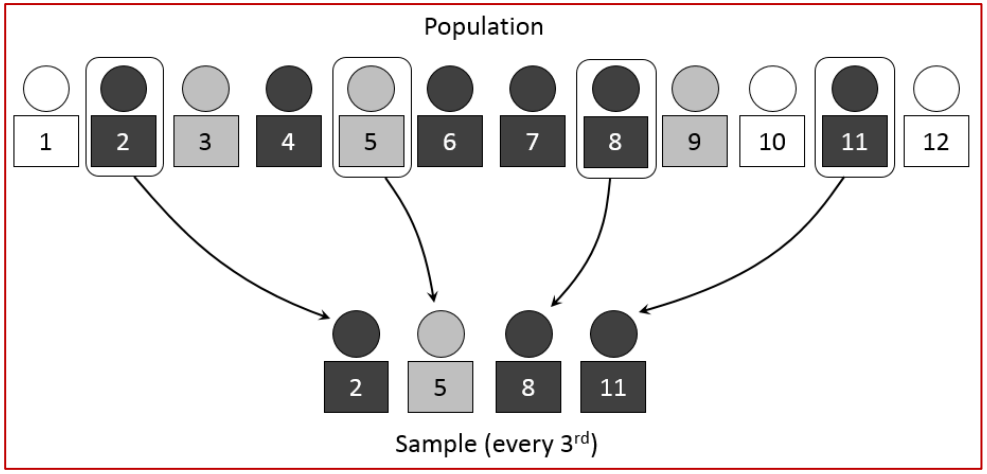
- Gives every sampling unit in the sampling frame a **known, nonzero and equal** chance be selected for survey, with no constraints on random selection.
- **Method:**
  - Assign a number to each sampling unit in the sampling frame
  - Use a random number generator software or a table of random numbers to draw the sample (e.g., 2, 5, 8 &10 in the picture)



Total population sample = 12
Survey sample = 4
Sampling prob. = 4/12*100=33%

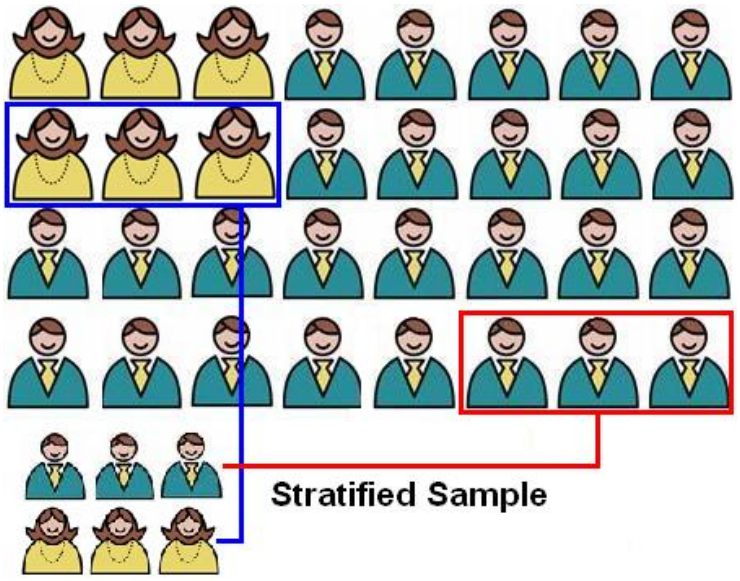
Systematic Random Sampling

- Similar to simple random sampling but uses a systematic approach for selection
- **Method**:
  - Define the sampling frame and number sequentially (1-12)
  - Randomly select a starting point (2 in the picture)
  - Calculate the sampling interval (#sampling frame/sample size = 12/4 =3) and add to the starting point to get each next sample unit (2, 5, 8 &11)



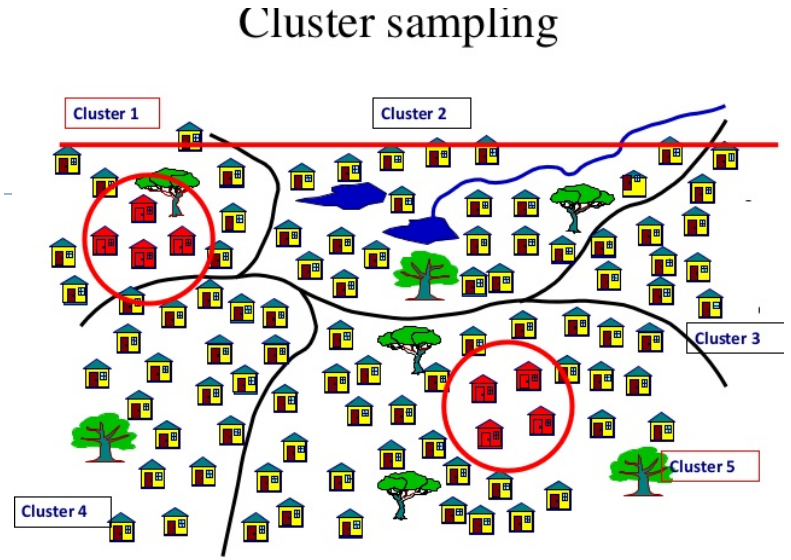
Stratified Random Sampling

- Decide which population sub-groups are less likely to be selected but are important for your survey (e.g., females, elderly, living in remote areas)
- Based on that information decide on the type and number of strata
- Apply simple or systematic random sampling within each stratum to select the number of survey participants as needed using proportionate (same sampling fraction per stratum) or disproportionate sampling (different sampling fractions per stratum)



Total sample = 38
Prob. that a randomly selected person is:
a male = 26/38 = 68%
a female = 12/38 = 32%

Cluster Sampling



- Samples within naturally occurring clusters:
  - Schools, primary care units, city blocks, cities, provinces, etc
- Need stronger data support for complete sampling frame
- **Pros:** Reduces interviewer travel time and costs
- **Cons**: Homogeneity within the clusters but heterogeneity between them → higher sampling error than in simple or stratified random sampling
- Usually combined sampling methods are applied (multi-stage, probability proportionate to size (PPS) sampling)

TABLE 6.1. ADVANTAGES AND DISADVANTAGES OF DIFFERENT PROBABILITY SAMPLE DESIGNS.

Design	Advantages	Disadvantages
Simple random	• Requires little knowledge of population in advance.	• May not capture certain groups of interest. • May not be very efficient.
Systematic	• Easy to analyze data and compute sampling (standard) errors. • High precision.	• Periodic ordering of elements in sample frame may create biases in the data. • May not capture certain groups of interest. • May not be very efficient.
Stratified	• Enables certain groups of interest to be captured. • Enables disproportionate sampling and optimal allocation within strata. • Highest precision.	• Requires knowledge of population in advance. • May introduce more complexity in analyzing data and computing sampling (standard) errors.
Cluster	• Lowers field costs. • Enables sampling of *groups* of individuals for which detail on individuals themselves may not be available.	• Introduces more complexity in analyzing data and computing sampling (standard) errors. • Lowest precision.

Aday 2006

EXHIBIT 7.1. CRITERIA FOR ESTIMATING THE SAMPLE SIZE BASED ON THE STUDY DESIGN.

Design: Descriptive	Design: Analytical or Experimental
Objective: To estimate a parameter.	Objective: To test a hypothesis.
Framework: Sampling distribution	Framework: Power analysis
Steps:	Steps:
1. Identify the major study variables.	1. Identify the major study hypotheses.
2. Determine the types of estimates of study variables, such as means or proportions.	2. Determine the statistical tests for the study hypotheses, such as a *t*-test, *F*-test, or chi-square test.
3. Select the population or subgroups of interest (based on study objectives and design).	3. Select the population or subgroups of interest (based on study hypotheses and design).
4a. Indicate what you expect the population value to be.	4a. Indicate what you expect the hypothesized difference (Δ) to be.
4b. Estimate the standard deviation of the estimate.	4b. Estimate the standard deviation (σ) of the difference.
	4c. Compute the effect size (Δ/σ).
5. Decide on a desired level of confidence in the estimate (confidence interval).	5. Decide on a tolerable level of error in rejecting the null hypothesis when it is *true* (alpha).
6. Decide on a tolerable range of error in the estimate (precision).	6. Decide on a desired level of power for rejecting the null hypothesis when it is *false* (power).
7. Compute sample size, based on study assumptions.	7. Compute sample size, based on study assumptions.

Aday 2006

How many should be in your sample: some practical issues

		Adjusted sample size
Originally calculated sample size	450	
Design effect for cluster sampling*	1.4 (medium)	450*1.4 = 630
Expected response rate	80%	630/0.80 = 788
Expected proportion meeting eligibility criteria	90%	788/0.9 = 876

** The extent to which the sampling error for a complex sample design differs from that of a simple random sample of the same size (Aday 2006).*

Survey Errors (by Dillman)

Type	Description
Non-coverage error	When not allowing all members of the survey population to have an equal or known, nonzero chance of survey participation *(relates to sampling frame that is not full/accurate)*.
Sampling error	When surveying only a sub-set, and not all, elements of the survey target population. Difficult to avoid as it is difficult to survey the whole target population *(relates to sampling procedures applied)*.
Non-response error	When people who respond to survey are different from non-responders who were sampled for the survey.
Measurement error	Errors generated because of poor overall questionnaire design, poor wording or inappropriate data collection method.

Example: A cross-sectional survey about the educational experiences of 2012-2016 IHPME students

- You decide to apply a simple random sampling to select 60 students from the existing email list (sampling frame) of all students in those years. This introduces a *sampling error* (e.g., the estimates obtained from this sample may/may not be representative of the 'true' population estimate). Sample estimates should always be presented with their 95% CI.
- When you obtain the email list from the Registrar's office they notify you that about 30% of these email addresses are not currently active/accurate. You exclude these email addresses and apply random sampling to the remaining 70% (without giving a chance to 30% to participate → your sampling frame is not complete). If these 30% are different from the 70% in the sampling frame (e.g., age, year of study, PAS), you may introduce a *non-coverage* error.
- Now imagine that as you email the selected 60 students, only half of them respond to the survey. If there are differences between responders and non responders (e.g., age, year of study, PAS), this introduces a *non-response error.*
- And, finally, if the survey instrument was poorly developed or has not been tested in this population there is a clear chance of a *measurement error*.

Example: Dealing with survey errors

Objective: To evaluate satisfaction with in-hospital care in patients with acute myocardial infarction(AMI) in Ontario.

Target population	Population to which the results are generalized	Patients with AMI treated in Ontario hospitals
Sample frame	Population from which eligible subjects are drawn	The list of all AMI patients (n = 50,000) in 2016 obtained from discharge databases of all acute hospitals in Ontario
Sample population	Number of patients drawn from the list (sampling unit = patient)	Use simple random sampling to select 500 patients as per sample size calculation and contact for the survey *(additional eligibility criteria may be applied)*
Study population	Those who respond to survey	n = 250 completed the survey *(response rate 50%)*

Selecting Study Population: Survey Errors

Objective: Evaluate satisfaction with in-hospital care in patients with AMI in Ontario		
Target population	Patients with AMI treated in Ontario hospitals	
Sample frame	The list of all AMI patients (n = 50,000) in 2016 obtained discharge databases of all acute hospitals in Ontario	***Non-coverage error:*** not all hospitals in Ontario have accurate discharge databases, especially those in remote areas (some patients had no chance to be selected) – think of strategies to obtain a more complete sample frame
Sample population	Use simple random sampling to select 500 patients as per sample size calculation and contact for the survey	***Sampling error (random error):*** the estimates have wide 95% confidence intervals, poorly representing the 'true' population values – increase sample size
Study population	n = 250 completed the survey *(response rate 50%)*	***Non-response error:*** non-responders were on average 60 years old, 60% males, 45% had diabetes; responders were on average 50 years old, 60% females, 30% had diabetes – strategies to decrease non-response; weighting adjustment

Survey Techniques

What factors define the method?

- Study population (literacy, residency, completeness of sampling frame, location)
- Research question(s) - explanatory, exploratory
- Target response rate
- Budget
- Staffing & other resources (Internet, phone, training)
- Timelines

The key to successful survey is the successful planning!!! ☺

After fifty years of careful research and planning, Ernest, Leonard, and Victor were ecstatic about finishing their strategy for winning triathlon competitions.

www.FieldstoneAlliance.org

Main Survey Techniques

- **Interviewer administered**
  - Face-to-face survey
  - Telephone survey (real time or automated)
- **Self-administered**
  - Mailed survey
  - Group survey
  - Internet or email survey
- **Mixed-mode surveys**
  - For example, mail survey with telephone survey follow-up

Face-to-face survey

- Allows for face-to-face social interaction between interviewer and responder
  - more personable, creates trust and cooperation from respondents.
- Higher response rate than in any other design
  - both to survey and individual survey questions.
- Higher chance to administer longer surveys with complex questions.
- Can document demographic characteristics of non-responders and reasons for refusal.
- Interviewer can control the sequence of questions and can probe and clarify questions if needed.

Face-to-face survey

Disadvantages

- Social desirability bias may affect the accuracy of responses

- Time and money to recruit and train interviewers is high.
  - Need to ensure the interviewer asks the same questions in the same way to all responders.
  - Might be difficult to find interviewers willing to travel to remote areas or to areas with unfavorable conditions.
  - Cost per interview is high (interviewer salary plus transportation costs).

Social desirability bias

- Generated if the responder gives not truthful but 'socially acceptable' answers to survey questions to appear in a different social role or to gain prestige.
  - Examples:
    - Exaggerating healthy eating and exercise habits
    - Undermining dangerous/illegal or non healthy behaviors
    - Downplaying prejudice against religion or race

- Methods to check for this type of response bias:
  - Ask few indirect questions on the topic rather than a single direct
  - Ask follow-up questions on the topic
  - Repeat the same question later within the same survey

Telephone survey

- A very popular method in countries where phone coverage is high.
- Method of choice for short surveys of general population.

Advantages

- Possible to achieve high response rates (often >80%).
- Can document demographic characteristics of non-responders and reasons for refusal.
- Chance to explain complex questions to responders, if needed and reduce non-response to individual questions.
- Able to obtain results quickly.
- Less costly than face-to-face interviews (and can be more/less expensive than mail surveys).

Telephone survey

Disadvantages

- Difficult to administer long questions with several available categories
- Technical difficulties to reach the respondent
- Multiple callbacks may be needed, up to 20 per responder
- Prone to non-coverage error especially with the increasing use of cell phones
  - Cell phones not listed in directories.
  - In some countries law prohibits automated dialers to call cell phones.
  - Under-representation of certain groups – e.g., young people.
- Telemarketing made phone surveys increasingly difficult!!!

Telephone survey

- Some phone surveys use phone directories as sampling frame
- Most phone surveys, however, apply a type of random digit dialing
- Random digit dialing (RDD):
  - Generate a list of possible phone numbers:
    - The number of possible combinations can be high!
    - Not all the numbers are real phone numbers (e.g. 000001) → *not efficient*
  - Use area codes first
    - If you know area codes (and assign the sample size per area code), first select the area codes and then generate the remaining numbers
    - E.g., **416 - *xxx xxxx*** where 416 is a district/area code in Toronto and ***'xxx xxxx'*** is a randomly generated number between 0 and 9999999
    - More efficient as the likelihood of an existing phone number is higher.

Telephone survey

Other variants

- **Computer-assisted telephone interviewing (CATI)**
  - A telephone survey where the interviewer reads the interview script from the screen and enters answers directly into the computer *(more efficient)*
  - In some cases the software can accommodate RDD, personalize questions, perform logic and range checks as the interviewer enters data *(more accurate)*

- **Automated computer telephone interviewing (ACTI)**
  - A telephone survey that uses an interactive voice response – a pre-recorded voice that replaces the interviewer
  - Data is collected either by the respondent's key strokes or machine-recognizable words and phrases *(more accurate and efficient)*

Mailed Survey

Advantages

- Social desirability bias minimized.
- Administrative costs and cost/respondent are less than in face-to-face surveys.

Disadvantages

- The demographics of non-responders and reasons for refusals not always easy to establish.
- High potential for missing responses in returned questionnaires.
- Longer time required to mail and collect questionnaires, especially if there are follow-up mails sent to non responders.

Mailed Survey: Dillman's method

- Few days before mailing the questionnaire, send a brief letter that notifies sample members of the importance of the survey.
- Send out the 1st mailing and include a personalized cover letter and self-addressed, stamped return envelope with the questionnaire (usually results in a 40% response)
- Send a reminder card 10-14 days after the 1st mailing to thank those participants who have already responded and to remind those who have not of the importance of the study. The card should also indicate *where* people can obtain another copy of the questionnaire if they have mislaid their original copy.
- 3 to 4 weeks later, send a second mailing with a new cover letter emphasizing the importance of receiving responses. Also include a new questionnaire and return envelope (has been found to increase response rate by an additional 20%). You can repeat this once more after 6 to 8 weeks.
- Recently added: send a token financial incentive with the survey request.

Ref: Dillman, D.A. (2000) *Mail and Internet Surveys: The Tailored Design Method*. 2nd Edition. New York, NY: John Wiley & Sons, Inc.

Somewhere, at this very moment...

Follow-up Plan

- ~~Send invitation~~
- ~~1st Reminder~~
- ~~2nd Reminder~~
- ~~1st Call~~
- ~~2nd Call~~
- Send silly cartoon
- Beg
- Hire goons
- Release hounds

freshspectrum.com

Group administered survey

- Completed by individual respondents gathered together in one location
  - E.g., hospital or clinic-based survey of providers, patients
- Need to emphasize and secure both anonymity & confidentiality

Advantages

- Higher response rate

Disadvantages

- Less feasible overall
- Participants may feel coerced to participate and may give not very truthful answers

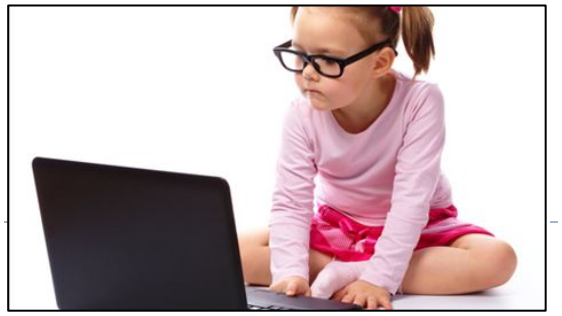
Internet survey

- E-mail survey:
  - the survey is sent to responder's email who sends it back to the researcher upon completion.
- Web survey:
  - responders are asked or directed to a website where they fill the questionnaire. The researcher has access to the server that hosts the compiled data.

Advantages

- The least expensive survey technique.
- Short time to complete the survey – to set up, send, and analyze.
- More flexibility to questionnaire design
  - visual graphics, audio components, interactive screens and tailored questions, added links for clarifications in complex questions
- Reduces errors from coding or entry – already coded when filled
- Reduces or eliminates social desirability bias compared to in-person or phone interviewers

Internet survey



Disadvantages

- Non-coverage error: the sample frame is not representative of target population (e.g., all university students *versus* all university students with Internet/email)
- Non-response bias: those who answer are generally more educated, have higher income and are younger; sometimes even difficult to estimate (unknown who is answering to the survey)
- Self-selection bias
- Technological expertise needed to conduct Web surveys.
- Ethical considerations:
  - If not informed, perceive as violation of privacy
  - Decreasing popularity with increasing market surveys
  - Requirements for data security to ensure anonymity and confidentiality

Comparing Survey Methods (Aday 2006)

Design Characteristics	Mail	Phone	Face-to-face	Web
Opportunity for representative sample for listed population	High	High	High	Medium
Opportunity to control sampling unit (e.g., specific household member)	Medium	High	High	Low
Allowable length of questionnaire	Medium	Medium	High	Medium
Allowable complexity of questions	Medium	Low	High	High
Ability to control question sequence	Low	High	High	High
Ability to ensure questionnaire completion	Medium	High	High	Low
Risk of social desirability bias	Low	Medium	High	Low
Risk of interviewer bias	Low	Medium	High	Low
Personnel requirements	Low	Low	High	Low
Overall time requirement	High	Low	High	Low
Overall costs	Low	Medium	High	Low

Calculating a Response Rate

Response rate = number completed the survey / number selected/eligible for the survey

- Example from MPH 2015 report:
- *"Overall 3,319 phone call attempts were done, out of which 978 respondents were found to be eligible to participate in the study. Out of the eligible respondents 589 refused to participate. Overall 389 respondents completed the survey, which corresponded to the 100% predetermined sample size. Following the survey the actual response rate was calculated, which was 39.78%."*
  - If some of the interviews were discarded for different reasons (non-complete, non-valid answers, etc), then another response rate can be calculated.

- Always try to document the reasons for non-response: refusal, language problem, illness, partially filled questionnaire, non-eligibility, etc.
- Example from an Armenian household survey (http://aua.am/chsr/PDF/2006/HHS2006_final_eng.pdf):
  - *"The primary reason for non-response was the absence of all household members (35.1%), followed by the refusal by the household to participate (8.2%), the absence of the selected respondent (7.0%), the absence of any eligible respondent (2.9%), or an unoccupied house (5.0%)."*

Is there an 'Acceptable' Response Rate?

- There is no agreed-upon standard for acceptable response rates
  - Recommended 'acceptable' levels in the literature vary from ***50 -75%***
- The Canadian Medical Association Journal's editorial policy states:
  - *"Except for in unusual circumstances, surveys are not considered for publication if the response rate is less than 60% of eligible participants."*
- The lower the response rate, the higher the likelihood of non-response error
- To be credible, published survey research must meet acceptable levels of scientific rigor, particularly in regard to response rate, transparency and the representativeness or generalizability of the study's results.

Draugalis et al. *Best Practices for Survey Research Reports: A Synopsis for Authors and Reviewers*. Am J Pharm Educ. Feb 15, 2008; 72(1): 11.

Response rates & survey modes

- People have preferences for survey modes that affects response rates
  - ***Personal interview > Telephone > Self-administered mail > Internet surveys***
- Starting with one method and then switching to another for non-responders *(sequential strategy of mixed-modes)* increases response rates
  - American Community Survey, a large national demographic survey conducted by the US Bureau of the Census
  - 56.2% response rate via a mail survey, 63.5% after a telephone interview follow-up, and finally a 95.4% after face-to-face interviews

(Griffin and Obenski, 2002).

Edwards et al. ***Methods to increase response to postal and electronic questionnaires.*** Cochrane Database Syst Rev. 2009 Jul 8;(3):MR000008.

Postal: 481 eligible RCTs evaluated 110 methods	**Electronic:** 32 eligible RCTs evaluated 27 methods
Factors increasing the response (Odds Ratio)	
• using monetary incentives: 1.87 • recorded delivery: 1.76 • teaser on the envelope - e.g. a comment suggesting to participants that they may benefit if they open it: 3.08 • pre-notification: 1.45 • follow-up contact: 1.35 • unconditional incentives: 1.61 • shorter questionnaires: 1.64 • 2nd copy of the questionnaire at follow up: 1.46 • mentioning an obligation to respond: 1.61 • university sponsorship: 1.32 • non-monetary incentives: 1.15 • personalised questionnaires: 1.14 • use of hand-written addresses: 1.25 • an assurance of confidentiality: 1.33 • first class outward mailing: 1.11	• using non-monetary incentives: 1.72 • shorter e-questionnaires: 1.73 • including a statement that others had responded: 1.52 • a more interesting topic: 1.85 • using a lottery with immediate notification of results: 1.37 • an offer of survey results: 1.36 • using a white background: 1.31 • personalised e-questionnaires: 1.24 • using a simple header: 1.23 • using textual representation of response categories: 1.19 • giving a deadline: 1.18 • a picture included in an e-mail: 3.05;
Factors decreasing the response (Odds Ratio)	
• included questions of a sensitive nature: 0.94	• when "Survey" was mentioned in the e-mail subject line: 0.81 • when the e-mail included a male signature: 0.55