**Survey Design and Implementation**

**PRESENTER**
Brian Robertson, PhD.
Research Director
Market Decisions

---

**Our Goals for Today**

- Learn how to formulate research objectives.
- Know the steps of survey research from research design to analysis.
- Understand the types of data collection.
- Understand measures and question types.
- Understand basic techniques used for analyzing survey data.
- Develop a survey research strategy that is tied to the strategies and outcomes developed in a logic model, an evaluation plan, or other research need.
What is a Survey?

- “A survey is a system for collecting information to describe, compare, or explain knowledge, attitudes, and behavior. Surveys involve setting objectives for information collection, designing research, preparing a reliable and valid data collection instrument, administering and scoring the instrument, analyzing data, and reporting results.” – Arlene Fink

- Surveys are not tests.

- Polls are not surveys.

Should I Conduct a Survey?

- Is a survey the right tool for my needs?
  - Can a survey gather the type of information that I need?
  - Is a survey the best method of gathering this information?
  - Is there already existing data that would meet my needs?
  - Has another group already conducted a survey that can answer my questions?
DEFINING YOUR SURVEY OBJECTIVES

Survey Objectives

- Before starting, it is important to have specific goals for your survey.
  - The objectives for a survey are typically developed from a defined need for information.
  - The survey objectives define the purpose of the survey.
  - In simple terms objectives will outline the goals that you hope to accomplish by conducting the survey.
  - The objectives of the survey will guide all aspects of its design and implementation.
Survey Objectives

- First think about…
  - What is the overall objective or objectives for the study?
  - To whom are the results to be communicated?
  - What general topics will the survey address, what research questions will the survey answer?

- Remember surveys are designed to gather new information from or about a population for which existing information is unavailable or insufficient.

- Surveys should not be used as a tool to arrive at predetermined results nor used as a tool for marketing or changing people's minds.

- Surveys objectives should be as specific as possible.

- Survey objectives should also be clear and unambiguous.
  - In cases of ambiguity, make sure and define terms.
The “Environmental Indicator” tracking project was developed in 2001 by the Program Managers at the (then called) Maine Bureau of Health to institute a means to track progress on local health promotion indicators through a systematic statewide measure of key local policies and environments. The initial effort was designed to have the local HMPs collect information on 6 indicators covering 4 health promotion topics:

- municipal tobacco policies,
- community access to public buildings for physical activity,
- access to locally grown fruits and vegetables, and
- community committees addressing walking and biking.

The Environmental indicator Survey is intended to serve multiple purposes:

- provide data to track the health outcomes over the previous 7 years (2004 – 2011),
- provide baseline data for the new grant cycle (2011-2016),
- provide local coalitions with an assessment of their current service area,
- provide feedback for the HMP Initiative and its component programs, and
- provide state programs with an assessment of the current environment and need.
Survey Objectives - Example

- Data collection is proposed to measure the current services, policies, and environments of Maine's municipalities.
- The survey of municipalities will provide quantifiable feedback on the current status of policies and environments that support healthy lifestyles in Maine communities and make healthy options the default choice of individuals.
- The environmental indicator survey will focus on municipalities' current experience with:
  - Tobacco policies and environments,
  - Policies and environments to improve physical activity and nutrition,
  - Coordination of emergency medical services,
  - Employee health: chronic disease prevention, early identification and self management policies and environments,
  - Residents health: chronic disease prevention, early identification and self management environments / activities, and
  - Municipal structure and demographics

SURVEY SAMPLING
What is Sampling?

- Sampling is “the act, process, or technique of selecting a suitable sample, or a representative part of a population for the purpose of determining parameters or characteristics of the whole population.”

- The goal of sampling is to “determine a population’s characteristics by directly observing only a portion of the population.”

- The goal is **not** to describe those selected to participate in a survey but to use those selected to describe the larger population of which they are a part.

- Sampling is (generally) a random process through which every member of the population has a known chance of being selected.

Sampling Stages

- Define your target population
- Determine the sampling frame
  - Also important in deciding on an appropriate data collection strategy
- Determine the extent of coverage for your sampling frame
- Determine sample size
- Determine the type of sampling procedure that will be used
- Prepare your sample list
- Draw your sample and prepare for data collection
Your Target Population

- Your target population is the WHOLE of the group that will be the focus of your survey.
- It is the group to which the results of your survey will be generalized.

- Target populations can be defined by any number of characteristics:
  - The general public
  - Adults in Maine
  - Participants in a workshop or conference
  - Patients involved in an intervention

- Your research should clearly define the target population of the survey so that results are only generalized to this group and not to others.

Your Sampling Frame

- Is the list from which the sample will be drawn.
- It includes information on how to reach those selected to participate in the survey (their address, telephone number, email).

- It should be inclusive of the entire target population (if possible).

- In cases where it is not inclusive, any exceptions should be noted:
  - The target population for this study were all participants of the Summing it Up Conference.
  - The sampling frame consisted of all participants with a valid email address.

- It is important to note such exceptions since they can impact data quality and precision due to coverage error or bias.
Sample Size

- The size of your sample is determined by the level of precision you require for your results. Things to consider are:

  - What level of precision do you require (the sampling error)?
  - The sample power which is probability of correctly rejecting the null hypothesis when it is false. In other words, power is the likelihood that you will identify a significant effect when one exists.
  - The homogeneity of the target population. Are they all alike, is it anticipated their responses to questions will be the same?
  - The level of analysis: Will you examine the responses for all respondents or will you also look at the results for sub-populations.
  - The type of analysis: Do you need to know general trends, are measures of statistical significance required to evaluate differences between groups? Are you planning on using more powerful multivariate techniques like linear regression which can examine the relationship between numerous survey questions?

There are no absolute rules for sample size but...

- For large populations such as the general public, most public policy surveys attempt to include a minimum of 400 to 500 respondents.
- If you are surveying a small population you will have to survey a large percentage in order to have a high level of precision.
  - A survey of 400 members of the general public has a margin of error of plus or minus 5%.
  - Among a target population of 1,000 you would need to complete 275 surveys for the same margin of error.
  - Among a target population of 100 you would need to complete 80 surveys for the same margin of error.
- In conducting analysis of sub-populations, it's good to have at least 20-25 in each group (though more always gets you better precision) for tests of significance though a chi-square test can actually be done with cell sizes as small as 5.
Sample Size

- And Finally….  

  - **What types of funding and cost constraints exist?**

    - This will often determine the size of your sample (and your data collection strategy).

Sampling Terminology

- **Sampling** is the process of selecting respondents from your target population. It can be done using random (probability based) techniques or techniques that do not rely on probability.

- A **sample** is the total number of eligible respondents (randomly) selected from the sampling frame of the total population in the survey.

- A **census** is a complete enumeration of the population. The goal of a census is to collect information from all members of a target population.

- **Random Sampling** is the result of a process whereby a selection of respondents is made from a larger population and each respondent is chosen by chance. It is based on a known probability that each respondent will be chosen and is used to estimate the values among the target population with (known) accuracy.
Sampling Terminology

- **Simple random sampling** is a probability sample in which every respondent has an equal and known chance of selection.

- **Stratified Sampling** involves breaking the target population into separate sampling strata based on a characteristic and then sampling within each group.
  - For example, sampling adults in each Maine county. It is considered random if the groups are independent of one another (there is no overlap). Stratification is often used to ensure that sub-populations are sufficiently represented in the survey (for example, rural Maine residents).

- **Cluster sampling** involves the random selection of groups or clusters within the population.
  - For example, randomly selecting high schools and surveying the students within the selected high schools.

- **Multi-stage sampling** involves the use of several sampling procedures within the same survey. A typical two-stage sample design would involve the selection of primary sampling units (PSU) and then sampling within each PSU.
  - For example, the YRBS randomly selects high schools as their primary sampling unit and then classrooms are selected within each school to participate with all eligible students in the classroom answering the survey. The process can combine various types of sampling (stratification, clustering, simple random sampling) and can have as many stages as needed to meet the goals of the survey.
Sampling Terminology (non-random)

- **Non-Probability sampling** includes convenience sampling, quota based samples, snowball sampling and is a procedures where respondents are not chosen on a random basis and thus results of the survey are limited in their ability to make statements about a target population. These are often used in pilot studies, case studies, or qualitative research.

- **Convenience sampling** simply selects whoever is readily available or convenient.

- **Quota based sampling** relies on obtaining a number of respondents within defined categories.
  - For example, surveying 100 men and 100 women. They are not considered random because not all potential respondents may have a (known) probability of selection. For example, after achieving your goal of 100 male respondents males, any further males would be excluded.

- **Systematic sampling** is a non-probability sampling technique whereby a starting point is determined and then respondents selected based on a set interval (interviewing every 5th customer).

- **Snowball sampling** relies on current respondents or others to identify additional respondents to contact (a doctor distributing the survey to other physicians within the practice).
Sampling Terminology (other strategies)

- **Longitudinal sampling** is a process whereby a group of respondents is recruited (randomly or via non-random techniques) and asked to participate is a series of surveys occurring over time. For example, tracking the incidence of cancer in a population over time.

- **Survey panels** are a common method of sampling used by internet survey companies and is often used in surveys of experts or professionals such as health care providers. A survey panel is a group of respondents recruited prior to a survey project and then asked to participate in a survey at a later date. Depending on the survey, one may select a random sample from a panel, select potential respondents based on their characteristics or profiles (current smokers), and/or use quotas to obtain a sufficient number of respondents within defined categories (such as 100 cardiologists and 100 general practitioners).

- **Dual frame sampling** is a process that involves the use of two or more random samples. Dual frame sampling designs are typically used where one sampling frame does not provide complete coverage of a target population. The two frames may or may not overlap.
  - **Address Based Sampling** draws a random sample based on address which is then divided into a telephone sample (in cases where a telephone number can be identified) and a mail sample.

- **Random Digit Dial (RDD) dual frame designs** involve random sampling of land line telephone numbers and cell phone numbers.

Sampling Example

An example from the Environmental Indicators Survey conducted as a part of the HMP evaluation

- **TARGET POPULATION**: All municipalities in the state of Maine.
- **SAMPLING FRAME**: In this case, the same as the target population.
- **EXTENT OF COVERAGE**: 100%. The sample was obtained from the Maine Municipal Association which maintains a list of contacts for all Maine Municipalities.
- **SAMPLE SIZE**: 492 (all municipalities). In this case, the goal was to obtain data from all towns rather than a representative sample. Thus, the survey was done as a census.
  - **BUT** the sampling did rely on a clustered sampling technique. In many cases it was necessary to speak with more than one person (the Town Clerk, Code Enforcement, Planning Board, etc.).
- **FUNDING** was sufficient to conduct a census.
SURVEY DESIGN

A couple of questions...

A guiding principle of the development of questions is that respondents should understand the question and be able to answer it reliably, that is, answer the question in the same way if asked the question again. Surveys should also be valid, that is, they should provide accurate information.

As you may know, the United States Supreme Court recently ruled that the Patient Protection and Affordable Care Act is constitutional under the taxing authority of congress. This act, also known as Obamacare, includes an individual mandate requiring the purchase of health insurance, establishes the guidelines for the establishment of health insurance exchanges through which those without health insurance can purchase health insurance, subsidizes low income people to assist in purchasing health insurance, requires businesses with 50 or more employees to provide health insurance to their employees or face penalties, and provides expanded Medicaid reimbursements to the state to cover residents earning less than 133% of Federal Poverty Level. Do you support the Patient Protection and Affordable Care Act?

Looking ahead, which would you say is more likely - that in the COUNTRY AS A WHOLE we'll have continuous GOOD TIMES during the NEXT FIVE YEARS or so, or that we will have periods of widespread UNEMPLOYMENT or DEPRESSION or what?
Survey Design Process

- Develop an outline based on your survey objectives
- Develop simple research questions that relate to your objectives
- Group research questions and link to your objectives
- Develop the actual survey questions for your survey instrument
- Evaluate the survey questions
- Organize the survey questions into an actual survey instrument
- Develop a survey introduction
- If practical, pre-test the survey

Question Basics

- **Open ended questions**: The respondent answers the question in his or her own terms.
- **Close ended questions**: The respondent is provided a list and he or she selects a response.
- **Discrete Variable**: A question with two or more categories that have no meaningful order (what type of car). These are also commonly referred to as categorical variables.
- **Ordinal Variable**: An ordinal variable is similar to a discrete variable but there is a clear and meaningful ordering of responses (level of education).
- **Interval variable**: Is an ordinal variable where the differences between categories are evenly spaced (education - grade 1, 2, 3, 4, etc.). In addition there is no meaningful zero point (i.e. age).
- **Ratio Variable**: Is similar to an interval variable with the difference that it can have a meaningful zero point (income).
- **Continuous Variable**: Is a variable that can be thought of as having an infinite number of categories (weight).
Question Basics

- **Dichotomous Question**: A closed ended question with two response categories (yes/no).
- **Likert Scale**: A question using a response format that allows for measuring typically qualitative attitudes using more quantitative categories (satisfied/dissatisfied; agree/disagree).
- **Performance Based Measures**: Are designed to assess the quality of a construct and relate this to a standard or to past measures (JD Power and Associates).
- **Quality Improvement Measures**: Are designed to identify problems or areas for improvement.
- **Trend questions**: Are questions asked over time and answers compared to determine differences (Is satisfaction increasing or decreasing?).

How does one answer a question?

- I’ll acknowledge Roger Tourangeau of the University of Michigan and Jon Krosnik of Stanford University whose class materials and publications have done much to highlight the need to factor in the “thinking process” of respondents in survey design and whose work is the basis of this section.

**ANSWERING SURVEY QUESTIONS IS A COGNITIVE PROCESS**

**BEFORE THE SURVEY:**
- Respondents receive and encode information.
- Information is then stored in long term memory.
How does one answer a question?

- **ANSWERING A QUESTION RESPONDENTS WILL GO THROUGH STAGES:**
  - Understanding the task and the intent of the question.
  - Search their memory for information.
  - Retrieve the information (recall from memory).
  - Combine information, perform estimations, supplement or combine with other information in memory.
  - Integrate information into a summary judgment.
  - Revise the judgment according to situational demands.
  - Translate judgment into response or response alternatives and provide an overt response.

**Why is this important?**

- Errors in answering a survey question come about because of problems at one or more of these stages. Survey questions must be designed to help minimize such problems.

- Failure to notice key information or to encode it correctly.
- New information woven into representation of an event while it’s in storage.
- The question is not understood.
- Information is forgotten.
- Information is poorly reconstructed from memory; process of estimation is done poorly.
- Respondent simply provides false information.
Types of Comprehension Problems

- Ambiguity and conceptual variability
  - Ambiguity - *The best way to prevent cancer is to catch it early.*
  - Conceptual variability (concepts have more than one meaning) - *have you ever smoked?*
- Excessive complexity
- Vague concepts
- Faulty presupposition
  - *Family life often suffers because men concentrate too much on their work.*
- Vague quantifiers
  - Many, frequent, few, some, large versus small scales
- Unfamiliar terms
- False inferences

Memory Problems

- Mismatches – Questions do not match context of research.
  - Are housekeeping chores exercise?
- Distortions over time due to retrieval failure – interference of similar events occurring during the time frame.
- Decay – memories will fade away after time.
- Reconstruction errors – telescoping – moving events forward or backward in time.
  - The commonality or uniqueness of events will influence.
- Estimation problems (Types of estimation include recall and count, rate based, and impression based).
- Formatting problems - A vague idea of a number may lead to rounding.
- Judgment problems – predispositions, specific beliefs, ideologies, stereotypes.
Developing Survey Questions – Simple Guidelines

- Use conventional wisdom
  - If a tested and validated question already exists – use it!
- Use language that is simple, direct, and comprehensible
- Avoid the use of jargon
- Be specific
- Avoid ambiguous words
- Avoid double barred questions
- Avoid leading questions
- Include screening questions if needed
- Avoid emotionally charged words
- Avoid name dropping, appeals to authority
- Allow for all possible responses

Survey Instrument Design Guidelines

- The introduction should provide a clear but brief view of the purpose of the survey.
- Make the early questions easy to answer to build rapport.
- Try to put open ended questions early (if relevant).
- Make sure early questions directly relate to the survey topic communicated in the introduction.
- Group like with like.
- Ask general questions before asking more specific questions on a topic.
- Ask questions on sensitive topics towards the end of the survey.
Question Problems

Double Negative

- The wording confuses the respondent as to the exact question.
- When I go through the drive thru, I can't not help but think about donuts.

Question Problems

Double Barreled

- A question that contains two or more implicit questions.
- Please tell me whether you would vote for or against a candidate who supports reducing federal spending on education and the military?
- Did you vote in the 2008 presidential election and the 2010 congressional election?
Question Problems

Leading or Loaded Questions

- The phrasing of the question suggests the answer to the question or an appeal to authority suggests that one answer might be correct.

- Many economists have said that cutting government spending will spur economic growth. Knowing this, would you support the federal government reducing its budget to the level of spending in 2008?

- Do you support President Obama’s decision to send additional troops to Afghanistan?

Question Problems

Balanced Questions and Balanced Response Categories

- Balanced questions equally represent both sides. Similarly balanced categories with have an equal number of options on both sides.

- Do you support the Affordable Care Act? Would you say you…
  - Strongly Support
  - Somewhat Support
  - Oppose
Question Problems

Jargon or Complex Language

- Questions should not use terminology that may be unfamiliar to a respondent or rely on complex wordings.
- My example on the affordable care act at the beginning of the survey.
- Would you support or oppose the federal government providing cost reimbursement to states for Medicaid using block grants?

Question Problems

Question Order

- The order of the survey questions may lead the respondent to an answer.
- Previous questions can define the context in which a question is answered.
Question Problems

Question Order

- The next few questions ask about how people are getting along financially these days. Would you say that you (and your family living there) are BETTER OFF or WORSE OFF financially than you were A YEAR AGO?
- Now looking ahead do you think that A YEAR FROM NOW you (and your family living there) will be BETTER OFF financially or WORSE OFF or just about the same as now?
- Now turning to BUSINESS CONDITIONS in the COUNTRY as a whole – do you think that during the NEXT 12 MONTHS we'll have GOOD TIMES financially or BAD TIMES or what?

- What is the most important issue facing the country today?

Another Concern...

Satisficing

- Is a respondents taking short cuts or looking for ways to confirm the statement inherent the question.

- Weak satisficing is the result of memory retrieval problems.

- Strong satisficing means the respondent may simply not retrieve information at all but look to question and situation for clues pointing to easy answers that would be easy to justify without thinking.

- In general satisficing is influenced by the difficulty of the task and respondent motivation.
One More Concern...

Satisficing

- Types include:
  - Selecting the first response or first reasonable response (primacy effect).
  - Selecting the last response (recency effect).
  - Simply agreeing with any assertions.
  - If offered, selecting the option for Unsure or Don’t Know even if they have an opinion.
  - Non differentiation in ratings across multiple questions.
  - Mental coin flipping – just picking random answers.

A Final Concern...

Social Desirability

- The desire to give what may be consider the right response to a survey question.
- Done as a process to manage the impression others, or
- The possibly for self deception.

- Are you registered to vote?
- Did you vote in the 2010 election?
- I always treat my co-workers fairly.
The final touch – Your Survey Introduction

- The survey introduction is your introduction to the respondent and the way to motivate the respondent to complete the survey.

- The introduction should provide a description of the survey in brief terms, its purpose and goals.

- If possible include a description of how it will benefit the respondent in particular or society at large.

- It should include a statement insuring anonymity for the respondent and confidentiality of their responses.

- Indicate the sponsor of the survey if at all possible.

- Include the name of the researchers and a way to get in touch in case the respondent needs to verify the legitimacy of the survey.

- Indicate the approximate time required to complete the survey.

Putting it all together, an exercise

The Question Appraisal System

- I was first introduced to this in 2001 at an AAPOR conference.
- Developed the Census Bureau, RTI, and Westat.
- While involved, I believe it provides a useful tool for evaluating questions.
- While one may not have the time to use it every time you write a survey, it is good to keep these concepts in the back of your mind when developing questions.
- It involves 8 steps which have you evaluate your question and answer a series of yes/no questions.

- Note that not all questions may be relevant to each survey question.
Putting it all together, an exercise

- **STEP 1. READING**: Is it difficult for the interviewer or respondent to determine what parts of the question to read?
- **STEP 2. INSTRUCTIONS**: Are there any problems with any introductions, instructions, or explanations from the respondent's point of view?
- **STEP 3. CLARITY**: Are there problems related to communicating the intent or meaning of the question to the respondent?
- **STEP 4. ASSUMPTIONS**: Are there problems with the assumptions made or the underlying logic of the question?
- **STEP 5. KNOWLEDGE AND MEMORY**: Is a respondent not likely to know or have difficulty remembering information needed to answer the question?
- **STEP 6. SENSITIVITY AND BIAS**: Are the question asking about something respondent may think of as sensitive, use insensitive wording or introduce potential bias?
- **STEP 7. RESPONSE AND CATEGORIES**: Are the response options adequate and appropriate for the question?
- **STEP 8. OTHER PROBLEMS NOT IDENTIFIED**

You should have a copy of the question appraisal form in your packet.

If you have your own survey question, please feel free to use it.

If not, I’ve included a few examples you can use.

Feel free to work together in groups.
LET’S TAKE A BREAK!

DATA COLLECTION
Data Collection Process

- Review your sampling frame to determine the type of contact information available for respondents.
- Based on your sampling frame, identify potential data collection strategies.
- Evaluating the pros and cons, identify the best data collection strategy.
- Remember cost is a pro/con you will need to consider.
- Format/program your survey.
- Test your survey.
- Begin collecting data.

Types of Data Collection

- Surveys can involve either qualitative or quantitative research.

  - Qualitative methods include:
    - Focus Groups
    - In depth or key informant interviews

  - Quantitative methods include:
    - Telephone surveys
    - Mail surveys
    - Internet surveys
    - Mixed mode surveys
    - Qualitative surveys can of course also use these techniques
Picking a Mode of Data Collection

- Your mode of data collection is governed by your sampling frame, information needs, and funds.

- The type of contact information you have will determine what methods you can potentially use.

- The research questions may also determine the strategy.
  - Do you need to present information in order for the respondent to answer questions?
  - Does the survey require the respondent to evaluate visual materials?

- Your available funding may also be a key influence in the decision as some methods are more costly than others.

- Pick the method that best balances these needs,

- Or the decision may be made for you if you only have one method of contacting respondents.

Telephone Surveys

- Are one of the most common modes of data collection used in research.

- Telephone surveys have been around for decades and have established protocols that have been thoroughly tested.
Telephone Surveys

- Can reach virtually everyone.
- Provides a social mechanism for asking survey questions since there is a social interaction between the interviewer and the respondent.
- Provides the opportunity to persuade a reluctant respondent to participate.
- Provides more in-depth answers to questions since the interviewer is available to prompt the respondent for additional information or for a more complete response.
- Allows the interviewer to intervene in cases where the respondent may have difficulty understanding the question.
- The use of Computer Assisted Telephone Interviewing (CATI) provides excellent sample management. This is particularly useful since you can use callback scheduling to contact a respondent at the time they wish to complete the survey.
- CATI also minimizes errors that might result from complex survey designs; skip patterns can be programmed into the survey and data verification can be built directly into the survey itself for data quality.
- Data collection can be done fairly quickly.

Telephone Surveys

- The accuracy of your data is based on the quality of the interviewer.
- The time one can keep a respondent on the telephone is limited meaning survey length is a factor that must be examined.
- Telephone surveys are not appropriate when it is necessary to provide information to a respondent to evaluate when answering survey questions.
- One cannot present visual information.
- Respondents are becoming harder to reach as they “take control” of their telephone and as technology is in place to screen calls.
- The traditional land line survey is becoming a thing of the past as most people now have cell phones and use their land line less frequently or not at all;
- A growing percentage of people no longer have a traditional landline (25% and growing!).
Mail Surveys

- Mail surveys are still surprisingly common mode of data collection and are actually becoming more popular with mixed mode data collection strategies.

- As with telephone survey, there are firmly established protocols for mail survey design and administration.

- Are less intrusive than a telephone survey since the respondent can open the survey and complete it at their convenience.
- Respondents can generally read and complete a mail survey quickly (depending on the of questions) which means that a mail survey can often include more questions than a telephone survey.
- Can present information that might be required for a respondent to answer survey questions.
- Can provide visual information.
- Can more effectively “brand” the survey to your organization through design of the mailing envelope which can mean a greater interest on the part of respondents to participate.
- Can easily provide incentives to respondents (if desired or needed).
- Tend for be a less expensive mode of data collection compared to phone surveys.
Mail Surveys

- Answers to questions may not be complete or the respondent may not provide all information since one cannot probe responses.
- If the respondent does not understand a question or its context they may answer incorrectly or not at all.
- Are not appropriate for surveys with complex designs such as those involving numerous skip patterns or cases where information from prior questions is needed to answer later questions.
- Can result in poor data quality since one cannot verify information in cases where answers to questions are inconsistent.
- Some respondents have tendency to put off answering a survey with the intent of getting around to it later, delaying data collection or simply not completing the survey.
- Data collection period is generally longer than that for telephone or Internet surveys.
- Response rates are typically lower than telephone surveys.

Internet Surveys

- The advent of surveying via the Internet, while it has been around for years, does not have the established history of telephone and mail surveys.
- The methodology for Internet surveys is to some degree still in flux, researchers are sill working on the protocols.
- That said, Internet surveys have the potential to combine many of the strengths of telephone and mail surveys.
- But is also suffer from some of their weaknesses along with others.
Internet Surveys

- TELEPHONE: Has the same advantages in sample management.
- TELEPHONE: Has the same advantages in minimizing problem with complex surveys.
- MAIL: Can provide information or visuals.
- MAIL: Less intrusive than telephone surveys.
- MAIL: Can complete the survey at their own pace, at their convenience.
- Individuals can now design and field their own surveys (though not always a positive!).
- An effective tool for reaching a generation that is used to technology, techniques of surveying via smart phones and other portable devices is only expanding its reach.
- Perhaps the fastest mode of data collection.
- Can be one of the most cost effective modes of data collection.
- Effective in reaching certain low incidence populations.

Internet Surveys

- TELEPHONE: Respondents are hard to reach as they often ignore invitations.
- MAIL: Answers to questions may not be complete or the respondent may not provide all information since one cannot probe responses.
- MAIL: If the respondent does not understand a question or its context they may answer incorrectly or not at all.
- Are not an effective methodology for studies of the general public as they are not considered generalizable.
- You can rely on Internet Panels for respondents but these are people who volunteer (opt-in) to complete surveys, are asked to complete a number of surveys, and often do so for rewards (the professional respondent).
- Response rates are notoriously low.
- The spread of technology actually impedes effective Internet surveys as they must be designed for various browsers and platforms.
Mixed Mode Surveys

- This is becoming a much more common strategy in survey administration especially in population based surveys.
- They combine two or more modes of data collection to reach the population more effectively than any individual method.
- Some common methods include:
  - **Land-Line /Cell phone surveys**: They have the advantage of providing complete coverage but there are unique data collection challenges in cell phone surveys and issues related to data analysis.
  - **Address Based Sampling**: Uses a person’s address as the unit of sampling and surveys are completed either by telephone or by mail (and may include an Internet survey option). They again have the advantage of complete coverage but there are issues related to mode effects (does the mode of data collection effect the way respondents answer questions?) and differences in response rates between the modes.

Mixed Mode Surveys

- Mixed mode surveys are more expensive than relying on a single data collection mode.
- Typically they take more time to collect data.
- Analysis requires more in depth knowledge of probability and statistics as one needs to merge sampling frames together that may potentially overlap
  - Without appropriate weighting, the results cannot be generalized to a population.
DATA COLLECTION STRATEGIES

Telephone Surveys

- Questions should use conversational language.
- Keep the introduction to the survey as short as possible, something that can be read in perhaps 10-15 seconds or 2-5 sentences.
- BUT also include in the survey instrument other information to provide more detail about the study that can be used as needed (program in persuader statements or information screens that can be easily accessed).
  - Include the goals, survey length, how the respondent was selected, and a contact to verify the survey.
- Include a statement of consent that indicates the survey is voluntary, the information provided is confidential and the respondent will not be identified, and that results will be reported in combined form only.
- IF for some reason you need to report individual results you must get explicit permission from the respondent to do so.
Telephone Surveys

- Data collection will likely require multiple contacts with respondents to complete the survey. Most call attempts will likely be answering machines or no answers.
- Persuader statements can help convince reluctant respondents.
- A minimum of 5 attempts should be made to reach a respondent but 10 is better (most CDC studies make 15 attempts).
- Rotate call attempts across various days of the week and times of day based on the nature of your target population.
  - Weekdays during business hours for professionals and businesses.
  - Primarily weekday evenings and weekends for the general public.
- Allow the respondent to determine the time to complete the survey, schedule appointments that are convenient to the respondent.
- Many telephone surveys also leave a brief voice mail message that informs the respondents who is calling and the purpose of the survey.

Mail Surveys

- Design a good looking survey!
- Use spacing between questions, don’t try and fit too many questions on a page; it’s better to use more pages that have a lot of space than few pages where the questions are crowded together.
- Use a large enough font size, 12 point is typically an easily read size.
- Include all of the appropriate survey introductory material (discussed above) on the first page of a survey or as a separate cover letter.
- Design a mailing envelope that doesn’t look like junk mail, clearly identify the survey on the mailing envelope.
- Bigger envelopes are better. When practical use a 9x12 envelope rather than a letter size envelope.
- Provide a way for respondents to return the survey; a pre-stamped envelope or business reply mail envelope with your return address. It doesn’t hurt to mention the address in the survey as well.
Mail Surveys

- Given them enough time to receive and complete the survey BUT NOT TOO MUCH TIME; 2 weeks is generally sufficient and make sure that the return by date is displayed prominently.
- As with phone surveys expect the need for multiple contacts.
- The typical mail survey data collection protocols will include:
  - An initial mailing of the survey,
  - A reminder card or reminder letter (typically mailed out a week after the survey), and
  - A second mailing of the survey sent to those that have not responded (typically sent approximately a week after the return by date for the initial mailing).
- NOTE: You will need to modify the survey introduction for this second mailing (recently we sent you a survey regarding…..).
- More rigorous data collection protocols may add to this a pre-notification letter and/or telephone follow-up calls.

Internet Surveys

- Many of the rules that apply to mail surveys also apply to Internet surveys.
- Design a good looking survey.
- Use appropriate spacing between questions.
- Use a large enough font size.
- Make sure the use of scrolling down to answer questions versus clicking through page by page to answer questions is appropriate. One can keep items of related context on a page (scroll down) if not too excessive. If the context changes it’s best to start on a new page.
- **Test your survey:** If possible test the look and functionality of the survey using different browsers; what works and looks good in IE may not in Google or Firefox.
Internet Surveys

- Expect to have to make several attempts to get respondents to respond to the survey. If contacting them by email:
  - Send out an initial email invitation, and
  - Make sure the email is clear and short.
- Optimally, embed a hyperlink that takes them directly to the survey rather than having them cut and past the link into their browser (Internet survey software programs typically have a system to allow you to do this).
- Plan on sending out several reminders (2-3) depending on initial response and how fast you need the data. An initial reminder about one week out and additional reminders on a shorter time frame.
- If they are accessing the web survey through some other means (such as responding to a letter invitation) make the link to the survey as simple as possible to minimize the possibility they enter an incorrect address.

And Finally...

- Thank respondents for their time!
- For those interested in a little more detail, I’ve put together a list of guiding principles for mail and internet surveys from materials and short courses I’ve taken over the years.
  - These should be included in your packet
  - These were developed by Dr. Don Dillman
  - I’d also highly recommend his book which is listed in the references sheet included in your packet.
DATA ANALYSIS AND REPORTING

Steps in Analysis

- Prepare your data set by doing all needed verification and consistency checks.
- These are needed in cases where there might be potential errors in the raw data from the data collection phase.
  - For example, respondents to a mail survey may not have followed skip patterns correctly and answered questions they were not supposed to answer.
- Decide on a strategy to use in cleaning data and apply it consistently (remove inappropriate response, set out of range responses as missing).
- Determine how you will treat Don’t Know and Refuse response in your analysis (to include or exclude them).
- If a population based study, develop a strategy for weighting the data.
- Decide the appropriate type of analysis, whether you will look at answers by different groups, and whether you need statistical tests of significance.
Sources of Error

- Most surveys and polls report the error associated with the survey, but this actually represents only one source of error:

  - Sampling Error or Margin of Error

- There are others:
  - Coverage Error
  - Measurement Error
  - Non-response Error

Sampling Error

- The sampling error is the result of the survey process.

- It is the error due to randomly sampling a segment of the population rather than the entire population.

- The sampling error provides an estimate of how much the results of your survey may differ due to chance compare to what the “true” value is among the entire population.

- The sampling error is what is commonly reported for surveys.

- In most cases, the sampling error is the only error that can actually be quantified.
Sampling Error

- It is comprised of two elements:

- The margin of error generally expressed as a percentage (such as plus or minus 5%).

- The level of confidence that is associated with this percentage (such as 95% confidence).
  - This is a measure of the probability that repeated surveys will fall within the same sampling error range.
  - For example 95% confidence means that if you conducted 20 surveys you would expect that results for 19 of the 20 surveys would fall within the range of the sampling error.

Other Sources of Error

- **Coverage Error** is associated with the ability to contact all members of a target population. If there are particular or unique groups that you cannot contact, then a survey will experience coverage error.
  - In traditional land line telephone surveys, a source of coverage error are those that only use cell phones.
  - But coverage error may not be a problem if those you cannot contact are randomly distributed throughout the population

- **Measurement Error** is an error associated with poor survey design.
  - It occurs when a survey or survey question does not actually measure what is intended.
  - In such cases, the research and respondent are not interpreting the context or the question is the same manner.
Other Sources of Error

- **Non-response Error** is associated with not reaching respondents for which contact information is available, but who cannot be reached or choose not to participate in the survey.

- This can result in bias in the survey results if there are differences between those who respond to the survey and those that do not respond.
  - For example, older adults are more likely than younger adults to respond to surveys; women are more likely than men to respond to surveys.

- Again, if non-response is randomly distributed among a target population, this may not be a significant problem.
- Weighting is often used as an analytical strategy to correct for non-response error.

Types of Variables

- **Continuous Variable**: A continuous variable is a variable that can be expressed by an infinite number of measures.

- **Discrete or Categorical Variable**: Is one that has two or more categories with no intrinsic order.

- **Ordinal Variable**: Is one where there is a clear ordering of the variables from low to high.

- **Interval Variable**: Is similar to an ordinal variable except that the intervals between the values of the categories are equidistant, or equally spaced; there is no meaningful "zero" point. For example, Age.

- **Ratio Variable**: Has all the properties of an interval variable. In addition, it has a zero point.
Some Terms

- **Mean**: Is the average of all responses calculated by adding up all the values and dividing by the total number of responses.
- **Median**: Is the middle score among the set of all responses. It is set at the point where 50% of the responses are above and below.
- **Mode**: Is the most common response to the question.
- **Standard Deviation**: Shows the dispersion of scores across the distribution of all responses. It is a measure of the average amount the scores in a distribution deviate from the mean. The more widely spread out the scores are, the larger the standard deviation will be.
- **Variance**: Is a measure of how far a set of numbers is spread out.
- **Standard Error** (of the Mean): Is a statistic indicating how much the score of a single sample is likely to differ from the score of the population and is calculated from the variance.

Categories of Analysis

- **Univariate analysis**: Is the analysis of a single variable that describes the variable in some fashion (a mean, the percentage of each response categories).
- **Bivariate analysis**: Is analysis that examines the relationship between two variables (a cross tabulation, a correlation).
- **Multivariate analysis**: Is the analysis of more than two variables simultaneously (multi tiered cross tabulations, regression analysis).
- **Descriptive analysis**: Is used to define the characteristics of responses to a question. They summarize the results and include analysis such as frequencies (the % mentioning each response), the mean, or the median.
- **Inferential analysis**: Is used to draw conclusions of make statements about your target population based on the responses to a question. It must factor in the statistical properties of your survey in determining the estimate of the value for the population.
Common types of analysis you may use

**Frequencies**

- Frequency Tables (One-way Tables) is a simple way of examining a variable.

- It provides a summary of the counts and percentages of responses to each response category.

- One can look at frequency tables to examine the relationship in responses between categories.

- It is a procedure used for those variables with defined categories or ordinal variables.

**Cross Tabulations**

- Cross tabulations shows the relationship between two variables.

- It is a combination of frequency tables that show the counts and percents for a variable broken out by the categories of another variable or variables.

- It can show the influence of one variable on another. It is also used in calculating a common test of statistical significance, the Chi-square.

- It is a procedure used for those variables with defined categories.
Common types of analysis you may use

Correlations

- Correlation is the measure of the relationship between two or more variables.
- It determines the degree to which two variables are proportional to each other.
- The values range from minus 1 which indicates a perfect negative correlation to positive 1 which indicates a perfect positive correlation.
- This is a procedure uses with continuous variables, interval variables, ratio variables, and sometimes ordinal variables.

Testing Differences

- Tests of statistical significance are used to determine how confident we can about associations observed in our data.
- Are there differences? Are there similarities?
- Further, how confident are we that any observed differences or similarities truly reflect what we might see in the target population.
- Confidence intervals, chi square tests and t-tests are common methods used in testing statistical significance .
- These are probability based statistics that determine, with a known level of confidence, that differences observed between groups in our survey results would be also occur among the target population.
A common term you will see in testing differences

- The **p-value** is “the probability of obtaining a statistic at least as extreme as the one that was actually observed, assuming that the null hypothesis is true.”

- In simple terms, if the p-value for your test is less than a set significance level (typically .05 or .01), then one might infer that any differences observed in your survey data would also be observed in the population.

- One can think of the significance level in the same terms as the level of confidence: A significance level of .05 is similar to saying that the level of confidence is 95%.

Common tests that are used

- **Confidence interval** is an “interval estimate of a population parameter and is used to indicate the reliability of an estimate.”

  - The confidence interval gives a range of values (upper and lower) around a value from your analysis such as the mean or the percent of respondents giving a response category.

  - It is in this range one would expect the actual value for the entire population to fall.

  - As with other statistics we assign a level of confidence, most often 95% confidence is used.

  - They are calculated from the standard error.

  - For use in comparing results, if there is an overlap in the confidence intervals of two groups we would not consider their responses to be different, if there is no overlap we would consider that to be a statistically significant difference.
Common tests that are used

- One of the purposes of the **chi-square test** is used to assess whether there are differences in categorical variables when grouped by another categorical variable.
- Are the values observed in the frequency distribution on two or more groups different?
- It compares the expected values for each cell in the cross-tabulation table to the actual values in the cell.
- It calculates the chi-square statistics and a level of significance attributed to the statistic.
- There is a statistically significant difference if the p-value is less than a set value (again most commonly .05).
- The chi-square will tell you that there is a difference but it won’t tell you the nature of the difference.

Common tests that are used

- A **t-test** is “any statistical hypothesis test in which the test statistic follows a Student’s t distribution if the null hypothesis is supported.”
- It is used to test differences between the mean values for groups.
- A two sample test of the null hypothesis that the means of two normally distributed populations are equal.
- Or in simpler terms if the if the p-value for your t-test is less than a set significance level (typically .05 or .01), then one might infer that any differences observed in your survey data would also be observed in the population.
- It can also be used to test the mean value of variable against a set standard.
Some Examples of Analysis

Frequency Table

<table>
<thead>
<tr>
<th>Size of the Household</th>
<th>Mean</th>
<th>Variance</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 45</td>
<td>4290.28</td>
<td>18.9</td>
<td>17.0</td>
<td>272.9</td>
</tr>
<tr>
<td>3 60</td>
<td>3931.77</td>
<td>18.7</td>
<td>16.7</td>
<td>257.9</td>
</tr>
<tr>
<td>4 80</td>
<td>3931.77</td>
<td>17.9</td>
<td>15.9</td>
<td>251.9</td>
</tr>
<tr>
<td>5 100</td>
<td>3931.77</td>
<td>15.9</td>
<td>14.9</td>
<td>245.9</td>
</tr>
<tr>
<td>6 120</td>
<td>3931.77</td>
<td>13.9</td>
<td>13.9</td>
<td>239.9</td>
</tr>
<tr>
<td>7 140</td>
<td>3931.77</td>
<td>11.9</td>
<td>11.9</td>
<td>233.9</td>
</tr>
<tr>
<td>8 160</td>
<td>3931.77</td>
<td>9.9</td>
<td>9.9</td>
<td>228.9</td>
</tr>
<tr>
<td>9 180</td>
<td>3931.77</td>
<td>7.9</td>
<td>7.9</td>
<td>223.9</td>
</tr>
<tr>
<td>10 200</td>
<td>3931.77</td>
<td>5.9</td>
<td>5.9</td>
<td>218.9</td>
</tr>
<tr>
<td>11 220</td>
<td>3931.77</td>
<td>3.9</td>
<td>3.9</td>
<td>213.9</td>
</tr>
<tr>
<td>12 240</td>
<td>3931.77</td>
<td>1.9</td>
<td>1.9</td>
<td>208.9</td>
</tr>
<tr>
<td>Total</td>
<td>3931.77</td>
<td>0.0</td>
<td>0.0</td>
<td>203.9</td>
</tr>
</tbody>
</table>

Statistics

<table>
<thead>
<tr>
<th>Size of the Household</th>
<th>UMD</th>
<th>Mining</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>3931.77</td>
<td>0.0</td>
</tr>
<tr>
<td>Median</td>
<td>3931.77</td>
<td>0.0</td>
</tr>
<tr>
<td>Mode</td>
<td>3931.77</td>
<td>0.0</td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>18.9</td>
<td>0.0</td>
</tr>
</tbody>
</table>
### Cross Tabulation

**C10: Has a doctor, nurse, or other health professional ever told you that you have Asthma?**

<table>
<thead>
<tr>
<th>Smoking Status</th>
<th>Current Smoker</th>
<th>Former Smoker</th>
<th>Never Smoker</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>10331</td>
<td>20672</td>
<td>56730</td>
<td>130725</td>
</tr>
<tr>
<td>No</td>
<td>205012</td>
<td>478222</td>
<td>122920</td>
<td>753954</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>206243</strong></td>
<td><strong>498894</strong></td>
<td><strong>186283</strong></td>
<td><strong>245401</strong></td>
</tr>
</tbody>
</table>

#### Chi-Square Tests

<table>
<thead>
<tr>
<th>Value</th>
<th>Degrees of Freedom</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>2852.422</td>
<td>.000</td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>2853.991</td>
<td>.000</td>
</tr>
<tr>
<td>Linear-by-Linear</td>
<td>2853.991</td>
<td>.000</td>
</tr>
<tr>
<td>R of Chi-Cross</td>
<td>.18971</td>
<td></td>
</tr>
</tbody>
</table>

* Pearson Chi-Square reported only if less than 5. The minimum expected count is 2797.47.

### Correlation

#### Correlations

<table>
<thead>
<tr>
<th>Number of Adults in the Household</th>
<th>Number of Children</th>
<th>Number of Adults in the Household</th>
<th>Number of Children</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearsons Correlation Sig. (2-tailed)</td>
<td>1.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>R</td>
<td>0.45775</td>
<td>0.45775</td>
<td>0.45775</td>
</tr>
<tr>
<td><strong>Note:</strong> Correlation is significant at the 0.01 level (2-tailed).</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Weighting is a technique used to normalize the characteristics of respondents to the characteristics of the population.

It is often used to help minimize non-response error.

Weighting relies on comparing the demographic characteristics of the survey respondents to that of the population (such as age, gender, race, income) and computing an adjustment.

Most population based surveys use weighting and require it in order to generalize the results of the survey to the population.

If the survey respondents over-represent a group (such as older adults) each case will be weighted to a fraction less than one. Each case will then represent less than “one person.”

If the survey respondents under-represent a group (such as younger adults) each case will be weighted to a value greater than one. Each case will then represent more than “one person.”
Weighting Your Data

- Most often, weighing will adjust the number of survey respondents to the actual survey population; in these cases each respondent will have a weight that is a large number. They would be said to “represent” this number of people.
- After weighting the survey respondents can be said to represent the population as a whole.
- Weighting is a complex process includes probabilistic adjustments, adjustments for non-response, adjustments based on population characteristics.
- It is also influenced by your sampling and data collection strategies.
- For those without prior experience, look to someone with the appropriate expertise!

For More Info:

This is a great online resource for statistics and data analysis


- http://www.statsoft.com/textbook/
Since most are familiar with writing reports, I’ll add just a few comments

- Before reporting, identify the target audience for the report or for any survey results and write the report or reporting elements to the needs of these audiences.
- When drawing conclusions or interpreting, don’t overstate the results of the survey.
- When reporting statistical differences, report the test used and the level of confidence associated with the statistic.
- When reporting population estimates, it is best to also provide a measure of precision, such as confidence intervals.
But one important aspect is providing information about your survey

Standards for Minimal Disclosure

“Good professional practice imposes the obligation upon all survey and public opinion researchers to disclose certain essential information about how the research was conducted. When conducting publicly released research studies, full and complete disclosure to the public is best made at the time results are released, although some information may not be immediately available. When undertaking work for a private client, the same essential information should be made available to the client when the client is provided with the results.”

-----American Association for Public Opinion Research

These Standards Include:

- Who sponsored the research study, who conducted it, and who funded it, including, to the extent known, all original funding sources.

- The exact wording and presentation of questions and responses whose results are reported.

- A definition of the population under study and a description of the sampling frame used to identify this population.
  - If the sampling frame was provided by a third party, the supplier shall be named.
  - If no frame or list was utilized, this shall be indicated.
These Standards Include:

- A description of the sample design, giving a clear indication of the method by which the respondents were selected (or self-selected) and recruited.
  - Also identify any quotas or additional sample selection criteria applied within the survey instrument or post-fielding.
  - The description of the sampling frame and sample design should include sufficient detail to determine whether the respondents were selected using probability or non-probability methods.

- Sample sizes and a discussion of the precision of the findings, including estimates of sampling error for probability samples and a description of the variables used in any weighting or estimating procedures.
  - The discussion of the precision of the findings should state whether or not the reported margins of sampling error or statistical analyses have been adjusted for the design effect due to clustering and weighting, if any.

- Which results are based on parts of the sample, rather than on the total sample, and the size of such parts.

- Method and dates of data collection.

- Survey response rates calculated using standard and recognized formulas. The specific formula used in calculating response rates should be disclosed.

- Optimally, a full disclosure of all case outcomes; total number of sample elements contacted, those not assigned or reached, refusals, terminations, non-eligibles, and completed interviews or surveys.
Designing Your Survey Project

- The next step is to actually develop your survey based on the needs of your evaluation plan, logic model, or just the need for more information.

- I’ve put together a survey planning sheet you can use to outline a survey project you may have

- As a final exercise, you can use this to outline any survey projects you might have
  - Or simply think of something you would like to do!

- There should be a copy in your packet.
FOR THOSE WANTING TO LEARN MORE

I’ve included references to some very useful sources of information in your packet.

Survey Design and Implementation

THANK YOU

Presentation by:
Brian Robertson, Ph.D.