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## **PUBLIC WEATHER**

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### **Summary Guide to Survey Design and Delivery**

**Based on the “Introduction to Survey Design and Delivery”  
produced by the National Oceanic and Atmospheric  
Administration’s (NOAA) Coastal Services Centre**

## About this Summary Guide

This "Summary Guide to Survey Design and Delivery", which is based on the publication "*Introduction to Survey Design and Delivery*" by NOAA Coastal Services Centre, has been produced as the result of the work of the Public Weather Services Expert Team on Services and Products Improvement (ET/SPI) mandated to provide guidance for National Meteorological and Hydrological Services (NMHSs) on developing user surveys and interpreting their results. It reflects attributes of a successful survey. The full text of the above publication can be viewed at the PWS Website: <http://www.wmo.int/pages/prog/amp/pwsp/surveys.htm> or [www.csc.noaa.gov/cms/human\\_dimensions/focus\\_socialsci.html](http://www.csc.noaa.gov/cms/human_dimensions/focus_socialsci.html).

## Introduction

Often, the public's attitudes, perceptions, and beliefs strongly influence management decision making. Surveys are a method of collecting data via telephone, mail, or the Internet, as well as in person, using an ordered list of questions to gather important information in a systematic fashion. This technique allows for the collection of information and opinions from a representative sample of individuals related to specific issues. This "Summary Guide" provides an overview of the various types and methods of survey research.

Conducting a survey is much more complex than just asking a group of people a series of questions to try to solve a problem or better understand an issue. Rather, a survey is a systematic examination of a population by means of a series of specific, targeted questions. These questions should possess direct application in solving an identified problem or issue. Research within any academic discipline must follow specific, methodical protocols. Once information has been collected, specific statistical data testing methods must be employed to produce usable information. The intent of this "Summary Guide" is to provide insight into the various methodological components of survey research. The document also serves as an overview of survey-related techniques.

## Population and Sample Size

Determining an adequate sample size is critical in generating usable survey results. The size of a sample, however, is not nearly as important as the sample design. If you are conducting a survey, it is more important to obtain a representative sample than a large sample. It is more useful to identify the population of interest and make efforts to achieve a high response rate rather than administer vast numbers of surveys.

The following is a general example to show how sampling works with a large population. If you survey 500 people, statistically your results are equally significant whether the total population is 10,000 or 100,000. For this example, where a large population whose exact number is unknown, an appropriate minimum sample size is 384. By sampling this number of people (with a 100 percent response rate) you are ensuring a 95 percent confidence level with a confidence interval or margin of error of five (5). This confidence level and margin of error is the standard desired level of significance for most survey research. The confidence level reflects how certain you can be that the survey results are accurate. In this instance, the results would prove to be 95 percent accurate, and the five (5) percent margin of error is commonly sought. You could therefore state that results of your survey are 95 percent accurate, plus or minus five (5) percent of people surveyed. Please remember that this sampling scenario is a general example and is not applicable to all situations.

**Main Points:**

- There is much greater benefit in obtaining a representative sample than in obtaining an exceedingly large sample;
- If you have the time, contacts, and resources to be more rigorous about a sampling scheme, try to ensure that your responses possess a 95 percent confidence level; and,
- Determining an adequate sample size is best done by someone professionally trained in survey techniques.

**Survey delivery Mechanisms**

Surveys can be administered in many different ways, which are commonly divided into two categories: interview-based and self-completed. Common interview-based mechanisms include: face-to-face interviews and telephone surveys. Self-completed survey instruments commonly include: mail-back surveys, hand-delivered questionnaires and Web surveys. The following table is a brief synopsis of each survey type and various positive and negative aspects of each.

	<b>Description:</b>	<b>Positives:</b>	<b>Negatives:</b>
<b>Face-to-Face Interview</b>	A directed, one-on-one conversation ranging from casual to highly structured	+Obtain great level of detail +Ability to observe non-verbal communication along with verbal responses	-Analysis of results can be cumbersome and time consuming -Limited generalization to a greater population
<b>Telephone Survey</b>	A directed one-on-one telephone interview ranging from casual to highly structured	+Highly effective in generating timely responses +Large numbers of surveys can be acquired in a short time period	-Skilled interviewer is needed to help guide respondents through the survey -A representative sample can be a challenge -Respondents can end the call at will
<b>Mail-Back Questionnaire</b>	A collection of questions presented on paper in a sequential, systematic order that is received by mail, completed, and then mailed back to the researcher	+generally less expensive than telephone surveys +Participants have a greater understanding of the questions since they are read firsthand	-Potential low response rate -No opportunity for clarification if a respondent doesn't understand a question
<b>Hand-Delivered Questionnaire</b>	Method where surveys are hand-delivered to respondents and mailed back to the researcher following completion	+Generally greater response rate compared to mail back +Provides an opportunity for face-to-face interaction with respondents	-Limited opportunity for clarification if a respondent doesn't understand an item -High-level of engagement required from the researcher
<b>Web Survey</b>	A collection of questions presented in a sequential, systematic order completed via the Internet	+Allows great speed and flexibility to respondents +Little-to-no cost and minimal supplies required	-Requires technical expertise by researcher – Respondents can easily terminate the survey before completion -Can be confused as SPAM

## **Sampling techniques**

A sample is a relatively small group of individuals selected to represent one or more specific attributes of a greater population. Survey-related research must use a truly representative sample for questioning, and there are many strategies for acquiring a representative sample. Applying the appropriate sampling technique to a particular issue or research question will strengthen the validity of acquired information. Several commonly used sampling techniques are briefly discussed below.

### ***Simple Random Sampling***

This is a relatively simple, yet effective technique to use. With this sampling strategy, every member of an identified population has an equal and independent chance of being selected to the sample.

Many software programs are useful in generating random numbers as well. One such number-generating tool is located on the GraphPad Software Website at the following Web address: [www.graphpad.com/quickcalcs/randomN1.cfm](http://www.graphpad.com/quickcalcs/randomN1.cfm).

### ***Stratified Random Sampling***

This sampling technique (sometimes referred to as quota sampling) requires a bit more effort from the researcher. Its intended purpose is for the sample to possess the same proportion as the entire population based on one or more attributes, for example when sampling a population of males and females in a town.

### ***Systematic Sampling***

This sampling strategy is useful in an instance where the total population is unknown. The first step in this sampling strategy is to determine a desired sample size. Next, a random number should be selected. This number is the interval in selecting potential respondents. For example, if the number three (3) were selected, every third person in the sample population (e.g., visitors to a beach) encountered would be surveyed. This strategy should be continued until the desired number of respondents is obtained.

## **Constructing Survey Questionnaires**

### ***The Survey Purpose***

An important element of a successful survey is conveying necessary background information to the respondent through a lead-in statement. This lead-in should consist of one or two brief paragraphs. Elements such as the survey purpose and goals should be addressed to help respondents in understanding their purpose for participating. Additionally, respondents should be informed of the typical time requirement for completion and a statement identifying measures taken to ensure confidentiality of individual responses. It is also important to thank the respondent for participating in this lead-in statement.

### ***Consider the Level of Respondent Knowledge***

When creating a survey, you should consider the level of knowledge respondents possess about the topic. Respondents may be highly informed about an issue or have little to no knowledge about the subject issue. Being aware of potential knowledge gaps will assist in constructing questions to accommodate a broad range of respondents and aid in interpretation of the study findings.

**Simple Wording**

Construct survey questions as simply as possible. Select vocabulary and sentence structure that will maximize the understanding of what is being asked. The greater a respondent understands what is being asked, the greater the chance that a confident response will be made.

**Minimize Questions**

Consider the amount of time it will take a respondent to complete a survey. Generally, the shorter the survey, the more accurate and complete the resulting information.

**Sequential Questioning**

All survey questions should follow a logical and sequential order.

**Write Neutral, Non-leading Questions**

Consider the language used to construct questions. While the purpose of the survey may be to gather information on identifying and improving particular issues, the respondent should have the role of actually determining which specific problems (if any) are present and need to be addressed.

**Determine Appropriate Question Format**

There are two basic types of questions: open-ended and close-ended. Open-ended responses are referred to as qualitative information and provide in-depth information and explore subject matter in an extensive manner not limited by specific answer choices. Questions that are answered by selecting a numeric, categorical, or other pre-constructed response could be thought of as close-ended. When using a multiple-choice question format, it is useful to have a choice for *No Opinion* or *Not Sure*, as well as an *Other* category in which the respondent can identify an area outside of the menu choices. Overall, it is important to consider the format of a question (open-ended or closed-ended) according to the type of response it will produce.

**Using Rating Scales**

Rating scales are a commonly used means of measuring attributes such as quality, satisfaction, or level of agreement. Consider the following example: *Please rank on a scale of 1 to 5 how satisfied you are with the number of parking spaces at beach access areas on the main island. (Please circle the number of your response).*

1	2	3	4	5
Very Satisfied	Somewhat Satisfied	Neutral	Somewhat Dissatisfied	Very Dissatisfied

Rating scales should be made up of an odd number of selection choices. By having an odd number, a neutral mid-point can be established.

**Avoid Combined Questions**

Combining two questions into one confuses a participant's response. Essentially they're not sure what they're answering. Consider this question: *Do you visit the city beach or do you visit the regional county beach accesses?* It is possible to get different responses for this question with the same intended answer. It is best to ask as two separate questions:

*Do you visit the city beach?*  
*Do you visit the regional county beach accesses?*

Or, to combine them:

*Where do you visit the beach? Please check all that apply.*

*city beach*  
 *county beach accesses*

### ***Demographic and Sensitive Information***

Generally, demographic attributes (gender, age, income, etc.) should be placed at the end of a survey. This information requires minimal thought of the respondent. Only place a demographic item at the beginning of a survey if it directly relates to the research question. Avoid requesting any information that could be considered sensitive unless absolutely necessary. Examples of potentially sensitive information are:

- *Age;*
- *Race;*
- *Gender;*
- *Income;*
- *Physical or mental limitations; and,*
- *Taboo topics such as frequency of drug use or sexual orientation.*

Respondents should be provided with a written statement that all responses are voluntary and measures have been put in place to ensure confidentiality and anonymity.

### ***Pilot Testing***

It is of great benefit to pilot or pre-test a survey among a small group of individuals who are as similar as possible to those being sampled, before initiating a full study. The pilot helps find out if respondents do not understand the directions or are misinterpreting a question, and serves as a means of quality assurance for grammar, sentence structure and clarity.

### ***The Report***

The final survey report should be as comprehensive as possible while maintaining clarity and order. A survey report should include the following sections:

- *Executive summary* – describes the essence of the entire document in a single page;
  - *Study purpose* – describes the research question or problem trying to be solved by the study;
  - *Methods* – identifies the population of interest, desired sample size, sampling strategy, data collection methods, and steps to be taken to ensure an adequate response rate. This section should also identify proposed data analysis methods;
  - *Results* – presents the study outcomes or findings, usually using tables and graphs in conjunction with narrative text; and,
  - *Discussion and management implications* – interpretation of results and discussion on the possible implications of the newly acquired knowledge.
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