National Cancer Institute

Making Data Talk:

A Workbook

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

National Institutes of Health

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A Workbook

How to use this Workbook

This workbook provides an overview of the main points contained in the book *Making Data Talk: Communicating Public Health Data to the Public, Policy Makers, and the Press*, as well as practical exercises for applying the book's concepts and communication principles to your unique situation.

The first three chapters review basic communication concepts, from analyzing your audience to building a storyline. Chapters 4 and 5 shift the focus from conceptual to practical by introducing guidelines for presenting data, as well as the **O**rganize, **P**lan, **T**est, and **In**tegrate (OPT-In) framework developed by the textbook's authors to aid in planning and executing data-related communications. Chapters 6 and 7 focus on the application of concepts and the OPT-In framework to the real world in scenarios, such as crisis situations or advocacy.

The ultimate goal of this workbook—and the book *Making Data Talk: Communicating Public Health Data to the Public, Policy Makers, and the Press*—is to help you select and communicate quantitative data in ways lay audiences can understand. You will gain the most from this workbook by reviewing its contents in concert with the book *Making Data Talk: Communicating Public Health Data to the Public, Policy Makers, and the Press*, making note of the tips and guidelines it presents, and completing the practical exercises beginning in Chapter 3 to ensure your understanding of the concepts and ability to successfully apply them.

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Introduction

Communicating scientific data to lay audiences is difficult. Public health practitioners, researchers, clinicians, and others in the public health field often have the responsibility of communicating "the numbers" to individuals from all walks of life. How do you summarize and convey data so they make sense to someone who may not be familiar with the topic, let alone the basics of epidemiology or statistics? How do you package and present data to answer the question often asked by busy people with competing demands and time constraints: why should I care?

The National Cancer Institute (NCI) is pleased to introduce *Making Data Talk: A Workbook*, which is based on the groundbreaking book *Making Data Talk: Communicating Public Health Data to the Public, Policy Makers, and the Press*.[1] This workbook is designed to be a companion piece that enhances the information presented in the text by Drs. David E. Nelson, Bradford W. Hesse, and Robert T. Croyle, NCI researchers with significant expertise in their own fields. The information presented in *Making Data Talk: Communicating Public Health Data to the Public, Policy Makers, and the Press* reflects a careful synthesis of research from many disciplines, so the principles described in the book can be applied to a variety of public health issues, not just cancer. This workbook complements the various communication and education tools and materials available through the NCI.

The content presented in the following chapters will take you through communication concepts, an easy-to-understand framework for communicating data, and the application of that framework to actual public health situations. Many chapters also include practice exercises that use real-world examples to reinforce key concepts and help you apply what you have learned. We hope this workbook will serve as a guide for those looking to successfully communicate scientific evidence to improve public health.

Office of Communications and Education
National Cancer Institute

CHAPTER ONE:
You CAN Make Data Talk and Be Understood

Sharing information with the public is now one of the standard responsibilities of scientists and public health practitioners, such as epidemiologists, researchers, statisticians, health care providers, public relations officers, and others. Communication is a complex process that involves a series of choices about how to convey what you know or discover in a way that others can understand and, if applicable, use to make decisions about their beliefs, attitudes, or behaviors.

The **O**rganize, **P**lan, **T**est, and **In**tegrate (OPT-In) framework (presented and explained in Chapter 5) helps health communicators organize the communication process. OPT-In relies on a variety of basic communication concepts, including audience analysis. In Chapter 1, audiences are discussed in terms of what they expect when receiving data and how those expectations can be used to craft more effective communication. After reading this chapter, you will be able to:

- Identify some of the differences between health communicators and their audiences.
- Explain some basic strategies for making data more audience-friendly.

You are likely to be successful if you use what is known about your audiences

Effective communication starts with having a strong understanding of your audiences. It is important to note that the people with whom you wish to communicate have their own areas of expertise, but those areas of expertise may fall outside of science or public health. The scientific community shares a common culture, so people outside of that culture may not share the same terminology, beliefs, or interests. See Table 1.1 for more detail on some common differences between scientists and lay audiences.

Table 1.1 Contrasts Between Scientists and Lay Audiences

	Scientists	Lay audiences
Sources and definition of acceptable evidence	Narrow	Broad
Belief in rational decision making	Strong	Variable
Acceptance of uncertainty	High	Low
Level of interest in scientific topic	High	Medium to low[a]
Quantitative and science literacy	High	Low
Ability and interest to review extensive amounts of data	High	Low

[a] *Note:* Except for audience members with high levels of involvement for a specific issue.

Source: Making Data Talk: Communicating Public Health Data to the Public, Policy Makers, and the Press by David E. Nelson, Bradford W. Hesse, and Robert T. Croyle (2009), Table 1.2, p. 14. By permission of Oxford University Press, Inc. (www.oup.com).

Each of the three lay audiences presented in the textbook – the general public, policy makers, and the press – is important to the practice of public health, and each has unique characteristics. See Chapter 2 for more information about these audiences and their characteristics.

No matter the audience, people generally have certain expectations for receiving scientific data:

- They expect to be told why they should believe or do what scientists and other health practitioners recommend.
- They expect to be given the rationale for how these individuals reach their conclusions. Since people are influenced by pre-existing beliefs and other factors, they may not be convinced to change their thinking without a sound and logical rationale for doing so.
- Finally, audiences expect to know what to do with the information they receive. In other words, they want to know what action they or others should take.

In communicating with various audiences, you must acknowledge the role of your own values and ethics. Because many lay audiences inherently trust scientific experts, scientists and other communicators have an important ethical responsibility to maintain that trust. The selection and presentation of information can have a strong influence on people and the way they interpret data. The goal is to lead people to conclusions based on sound data that are well-reasoned and well-presented. To accomplish this, you should avoid emphasizing, minimizing, or ignoring certain themes that would persuade someone to draw inaccurate conclusions from data.

To succeed in effective communication, scientists and other health practitioners must consider these differences and present data in a way that audiences will understand. Table 1.2 provides some basic tips for presenting data in an audience-friendly way. Chapter 4 of this workbook builds on these concepts by providing more practical tips for presenting data to audiences.

Table 1.2 Tips for Presenting Audience-Friendly Data

Tip	Example/Explanation
• Avoid terms not frequently used outside of the scientific community.	Cohort, longitudinal
• Avoid terms with multiple meanings.	Surveillance
• Avoid science and math concepts that can be misunderstood. If these term(s) or concepts must be used, be sure to explain them in an easy-to-understand way.	Proportions, relative risk
• Focus on the main message instead of detailed scientific arguments or outcomes.	When making decisions, many people use heuristics (shortcuts) rather than the rational decision-making model used by most scientists.[2]
• Explain how the data may impact audiences.	Demonstrating impact can help audiences understand why the data are relevant to them.
• Present data in a distinctive way that helps you gain the attention of your audiences.	For a majority of people in the United States, health issues are of moderate-to-low interest.[3] Presenting relevant and interesting information can reduce the likelihood that people will filter it out due to lack of interest.

After reading this chapter, you should be able to recognize that effective communication with audiences outside of the scientific community requires consideration of how those audiences differ from the scientific community and how communication can be modified to account for those differences. For further detail on concepts presented in this chapter, refer to Chapter 1, Introduction, of *Making Data Talk: Communicating Public Health Data to the Public, Policy Makers, and the Press*.

CHAPTER TWO:
Use Communication Fundamentals to Your Advantage

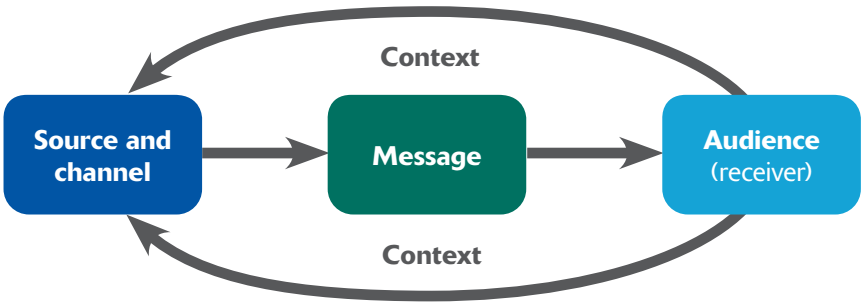
All efforts to share information—whether discussing a simple issue or a complex topic—consist of a few basic communication elements. By understanding these elements and how they work together, you can make informed choices about your communication approach. After reading this chapter, you will be able to:

- Identify and differentiate the four main elements of the basic communication model.
- Name three lay audiences key to public health communication.
- Recognize how messages can be developed to support a storyline.

Consider the basics

A variety of elements are involved in the basic framework of communication. Although many more complex models of communication exist, this workbook uses the basic communication model presented in Figure 2.1 as the foundation for discussion.

Figure 2.1 Basic Communication Model



Source: *Making Data Talk: Communicating Public Health Data to the Public, Policy Makers, and the Press* by David E. Nelson, Bradford W. Hesse, and Robert T. Croyle (2009), Figure 2.1, p. 31. By permission of Oxford University Press, Inc. (www.oup.com). See References for additional sources.

This basic communication model presents four main elements:

1) **Messages,** or **WHAT is used** to convey information (e.g., words, symbols, or pictures).
2) **Sources (or senders),** or **WHO SENDS the message** (e.g., individuals or organizations).
3) **Channels,** or **HOW messages are sent** (e.g., newspapers, conversations, or e-mail).
4) **Audiences (or receivers),** or **WHO RECEIVES the message** and interprets it.

This workbook primarily focuses on helping people who work in public health (the senders) effectively communicate quantitative data as part of the health messages they send to the general public, policy makers, and the press (audiences) using various channels.

In order to make the best decisions about the individual elements of the communication process (e.g., messages, channels, etc.), you should first consider the following:

- **Purpose** (i.e., why the message is being communicated). There are four purposes for communicating public health information: to increase knowledge, to instruct, to facilitate informed decision-making, and to persuade. It is important to know which of these applies to the messages you are sending.
- **Strategy** (i.e., the approach for gaining attention). Some communicators use an active strategy, such as employing a mass media campaign or encouraging word-of-mouth communication. Others use a passive strategy, such as adding information to a Web site and relying on information-seeking audiences to find it. The "push-pull" model combines both strategies by sending messages to audiences (the push: active), while also making information and materials available to interested parties (the pull: passive).
- **Context** (i.e., factors that may influence receipt and/or interpretation of the message). Contextual factors—including other sources of information, personal experience, and competing priorities—are often outside the control of those sending messages. These factors can have influence at various points during the communication process and can even prevent effective communication.

Determining your purpose, planning a strategy, and considering the context are all crucial steps in the communication process. In fact, these elements are three of the five fundamental pieces of the "Plan" step in the OPT-In framework that will be presented in Chapter 5.

Messages

Messages – and the storylines they support – play a critical role in both the basic communication model presented in this chapter and the OPT-In framework presented in Chapter 5.

The term "storyline" must be defined and explained before messages can be developed and communicated to audiences. In this case, the term "storyline" refers to the major conclusion(s) that scientists and other health practitioners want audiences to understand. In other words, the storyline is the science-based bottom line. This differs according to the type of information the story is based on.

Once storylines are determined, messages must be developed. Messages – chunks of information that support the storyline – should be based on scientific knowledge and understanding. Each message should be able to stand alone by communicating a single idea, but, collectively, the messages should provide rationale for the larger theme (i.e., the storyline).

- "Settled science," or science that has received a clear consensus based on many studies over time, makes for the strongest storylines since it provides a clear rationale. As a result, messages supporting settled science storylines can be persuasive or instructive in nature.
- Science that has little supporting knowledge and/or no consensus among scientific experts is more difficult to address. Messages supporting these types of storylines should focus on increasing knowledge or informing the decision-making process.

These concepts are an important part of the OPT-In framework presented in Chapter 5, with storylines being crucial to the "Organize" step and message development being one of the five elements of the "Plan" step.

Sources

As noted in Table 2.1, sources are differentiated based on the intimacy of contact, with interpersonal sources involving one-on-one interaction and mediated sources involving one-to-many interactions. Communication often involves a mix of both interpersonal and mediated sources, such as when health information received from mass media (e.g., a radio talk show host) becomes part of interpersonal communication (e.g., conversations with friends).

Table 2.1 Types of Sources

Type	Description	Example
Interpersonal sources	People who share information through one-on-one interaction	Family members, friends, colleagues, health care providers
Mediated sources	People who share information through one-on-many interaction	Journalists, politicians

Channels

Like sources, channels can also be divided into two main types: interpersonal and mediated (see Table 2.2).

Table 2.2 Types of Channels

Type	Description	Example
Interpersonal channels	Ways of sharing information that involve personal contact	Phone conversations, oral presentations, personal e-mails, doctor visits, text messages, social media/networking
Mediated channels	Ways of sharing information that are more impersonal and typically reach larger numbers of people at a time	Newspapers, newsletters, Web sites, TV

Channel selection is a key component of message development and distribution. Research shows that many health campaigns have failed because only a small percentage of the intended audience was actually exposed to the message(s).[4] To have a better chance of reaching the intended audience, scientists and health practitioners should consider the following factors:

- **Availability,** or whether audiences can access certain sources or channels (e.g., television, Internet, personal health care provider).
- **Preference,** or where and how audiences obtain information, which is closely related to availability.
- **Credibility,** or how believable a source is, based on perceived trustworthiness and expertise.

Audience trends related to these factors change frequently, so you may want to consult the latest research to understand the current habits and behaviors of your intended audiences.

Audiences

The following lay audience segments are important to public health communication:

- **General public:** individuals within the population at large.
- **Policy makers:** administrators and elected officials with the authority to make decisions that affect public health.
- **Press:** print, broadcast, or online journalists who obtain or report news.

Table 2.3 provides descriptions and characteristics of each of the three lay audiences.

Table 2.3 Comparison of Selected Lay Audiences

	Individual characteristics	Occupational and institutional factors	Regular sources of information
General public	Variable by audience subgroup, but common factors include: • Level of interest in and involvement with health issues • Geographic location • Varying levels of education • Socioeconomic status • Health insurance status • Existing health beliefs, social beliefs, and worldviews • Gender • Age • Various social networks and cultures		Variable by audience subgroup, but trusted sources may include: • Healthcare providers • Television news • Internet Web sites • Other people (e.g., friends, relatives, neighbors, co-workers) • Radio/ethnic media
Policy makers	• Ambitious, hard-working, savvy • Attuned to financial implications • Intuitive decision-making is common • Want certainty from experts	• Public vs. private systems • Elected vs. appointed individuals • Formal and informal processes • Public policy typically made by legislators, executives, or administrators • Interpersonal relationships crucial • Rely on gatekeepers • Busy and subject to multiple communication efforts and requests	• Interpersonal sources • Attend to relevant news media coverage
Press	• Usually have progressive "mainstream" values and beliefs • Concerned about individual freedom issues • May be intimidated by scientists or health professionals • General reporters, specialty reporters, and editorialists	• Business considerations: attuned to topics of interest to the public • Short deadlines common • Differences between specific news media (e.g., newspapers, TV) • Certain characteristics make stories more "newsworthy" (e.g., local tie-in) • Prefer personal stories (narratives) • Much competition for news space • Follow news outlet "leaders" (e.g., elite papers such as *The New York Times*)	• Preselected list of trusted experts

Source: Making Data Talk: Communicating Public Health Data to the Public, Policy Makers, and the Press by David E. Nelson, Bradford W. Hesse, and Robert T. Croyle (2009), Table 2.2, p. 49 and Table 2.3, p. 54. By permission of Oxford University Press, Inc. (www.oup.com). See References for additional sources.

Audience segmentation refers to the process of dividing an audience into smaller subgroups based on shared characteristics (e.g., demographic information, geographic location, habits, and behaviors). Segmentation is a part of audience analysis—research that helps you better understand the people with whom you wish to communicate. Audience analysis can aid in planning your communication approach, thus, it is one of the five fundamental pieces of the "Plan" step in the OPT-In framework.

After reading this chapter, you should have a better understanding of the basic model of communication and its four elements: messages, sources, channels, and audiences. For further detail on concepts presented in this chapter, refer to Chapter 2, Communication Fundamentals, of *Making Data Talk: Communicating Public Health Data to the Public, Policy Makers, and the Press*.

CHAPTER THREE:
Help Lay Audiences Understand Your Data

When people receive messages, they process and interpret them based on their own literacy level, tendencies, and biases. As a result, these factors must be considered and addressed when communicating quantitative data to audiences. After reading this chapter, you will be able to:

- Identify audience tendencies that can influence how people receive data.
- Describe biases that audiences can have when interpreting data.
- Recognize techniques to overcome these tendencies and biases.

Be aware of audience tendencies

People are not always well-prepared to receive and process messages containing quantitative data. Quantitative literacy (i.e., the skills required to apply mathematical operations) varies from person to person, and even the most educated audiences may have only a basic or intermediate level of familiarity with mathematical concepts. Common mistakes people make when interpreting numbers include:

- Misunderstanding probability estimates[5] (people may believe that a risk of 1 in 200 is greater than a risk of 1 in 25).
- Misunderstanding percentages.
- Improperly converting proportions to percentages.[6]

To account for differences in quantitative literacy, health communicators should simplify messages, provide additional explanation, or modify their approach to increase audience understanding.

In addition to literacy considerations, health communicators should also be aware of general information processing factors that, although not specific to data or public health topics, can be strongly influential as people process quantitative data. Here is a list of these tendencies along with explanations and examples.

Cognitive processing limits. Individuals have a limited capacity to process large amounts of information at one time and simplify or "chunk" the information to which they are exposed.

- The 7-digit telephone numbering system was based on research suggesting that people can optimally retain only 7 (±2) discrete pieces of information at a time.[7]

Satisficing. People tend to limit the amount of mental energy they spend obtaining information until they believe they have "enough" for their purposes.[8]

- Studies show that visitors will usually leave a Web site within 15 minutes or less if they do not find the information they need.[9]

Expectations of experts and the challenge of uncertainty. Most lay audiences want experts with experience and credentials to provide definitive, prescriptive information.[10]

- To use a non-health example, people look to mechanics to definitively diagnose automobile problems — instead of estimating that there is a 30 percent chance that the alternator is the problem — as well as to recommend specific solutions.

Processing risk information. Many people misunderstand concepts related to risk, such as absolute risk, lifetime risk, and cumulative risk.[11]

- Most people do not recognize that repetition of low-risk behavior — such as failing to wear a seat belt with every car ride — increases a person's cumulative risk of adverse outcomes during their lifetime.

Framing. "Framing" is presenting data in a way that is consistent with common public frames or models.

- Emphasizing the possibility of colon cancer over the minor discomforts of a colonoscopy is an example of a loss frame.
- Associating rewards, such as losing weight and looking fit with exercise, is an example of a gain frame.

Scanning. People often do a quick scan of written or visual material to decide if it interests them, draw conclusions about what the major points might be, and try to identify the bottom line.[12]

- When an Internet search for specific information returns hundreds or thousands of potential Web sites, people scan the first few results before deciding which link to follow.

Use of contextual cues. People tend to look for cues to help them better process and understand information, especially in cases where the data presented is complex, detailed, or in an unfamiliar format.[13]

- Regular reports on breast cancer data can be of more use to audiences by highlighting what has changed since the last report.

Resistance to persuasion. People have a natural resistance to persuasion and often engage in a practice of defensive processing, an approach that blunts messages that are inconsistent with current behavior.

- Smokers may blunt messages emphasizing that smoking is bad since those messages are inconsistent with the smoker's own attitude toward tobacco use.

Role of emotion. Emotions have the potential to be a motivating influence on behavior by heightening arousal, orienting attention, and prompting self-reflection.[14]

- Communicating that 440,000 Americans will die from smoking in a given year may cause a variety of emotional reactions based on the reader's own relationship or attitude towards smoking.

Be aware of audience biases

There are also biases people have when interpreting data, particularly if they are not well-trained in statistical methods. For instance, people can process incoming information by using heuristic shortcuts, or highly ingrained, subconscious patterns that run automatically. These shortcuts can lead to systematic error[15] and illogical reasoning[16] and are summarized in Table 3.1.

Table 3.1 Audience Biases that Influence Quantitative Data Processing

Shortcut	Explanation/Example
Representativeness heuristic	• People can sometimes use their implicit knowledge and stereotypes about an object's category to make judgments about the object itself. – People perceive cancer to be a highly aggressive, lethal disease. As a result, it is difficult to communicate that cancer is a broad set of diseases, that many types are slow-growing and easily detectable, and that early diagnosis may not be a "death sentence."
Anchoring and adjustment bias	• People tend to be "anchored" by the first number they see or have in mind; any adjustments they make are strongly influenced by that initial value or anchor. – Physicians and patients who initially underestimate the chances of side effects only adjust their guess slightly (compared to the original number) once they are told they are incorrect.
Correlation equals causation	• People have a strong tendency to believe that if two types of data are correlated, then one causes the other.[17] – Demographic information may show that as the number of churches in a given geographic area increases so does crime. Although such a correlation could suggest that churches cause crime, demographic information shows that population density—a third variable—accounts for both the increase in churches and in crime.
Failure to consider randomness	• People tend not to consider chance or randomness as explanations for sequences, events, or occurrences. – When clusters of birth defects occur, public speculation may try to attribute these clusters to a single cause (i.e., an environmental factor) when the occurrence may truly happen by chance.

Use strategies to overcome tendencies and biases

Health communicators can use a variety of factors about their audiences, from the characteristics discussed in Chapter 2 of this workbook to the quantitative literacy level, general tendencies, and mental shortcuts discussed in this chapter. Below are several tips that take these factors into consideration and can improve communication about public health data across a wide spectrum of groups:

Determine whether data should be presented. Are there sufficient data to support a science-based storyline? If so, are they appropriate for presentation to intended audiences?

Be brief and concise. Present the "bottom line" and use only a few data points to support it.

Be complete and transparent in portraying statistics. Word choice, as well as the selection or omission of data, can be highly influential in how audiences receive and interpret data. Avoid implication of a causal link between variables that are only associated through correlation.

Identify and counter mistaken health-related lay audience beliefs. Use messages that acknowledge the misconception, diplomatically state why it is inaccurate, and present an alternate explanation.

Use familiar types of data and explain key scientific or mathematical concepts. Choose formats that will likely be familiar (e.g., frequencies and round numbers) and supplement data that has the potential to be misunderstood (e.g., concepts of risk) with explanations or additional materials as needed.

Address uncertainty directly. Be honest about the tentative nature of the science, emphasize why scientists cannot make a definitive explanation, and work to answer questions about what uncertainty means for people.

Ensure usability. Select user-friendly formats (e.g., boxes that highlight key points, upfront summaries of information) so that audiences can process information more accurately and efficiently.

Provide contextual information. Present individual findings within their larger context, using tools such as comparison data and short text phrases that state the key findings as appropriate.

After reading this chapter, you should be more familiar with factors that can influence how people receive and interpret data. For further detail on concepts presented in this chapter, refer to Chapter 3, Overcoming General Audience Tendencies and Biases to Enhance Lay Understanding of Data, of *Making Data Talk: Communicating Public Health Data to the Public, Policy Makers, and the Press*.

Practice Exercise

The following five scenarios describe a situation where a communicator uses a specific communication skill or strategy to overcome an audience tendency or bias. Review the scenarios and select the answer which correctly identifies the tendency or bias that the communicator sought to overcome.

1) A university research department decides not to release findings from a Phase I clinical trial because of concern that the promise of a pharmaceutical treatment showing that 80% of participants had complete resolution of their disease symptoms may create great excitement that will be followed by disappointing results in Phase II. This decision shows a consideration for which of the following:

a. Resistance to persuasion

b. Anchoring and adjustment bias

c. Failure to consider randomness

d. Satisficing

2) To help explain a new report that conveys the latest statistics related to breast cancer incidence, communicators develop a graphic that compares this year's figures to figures from the previous five years. This graphic helps address the following:

a. Processing of risk information

b. Role of emotion

c. Use of contextual cues

d. Satisficing

3) A government health agency publishes a press release about a complex genetics research project. Although many endpoints were involved in the study, the communicator decides to focus only on one or two data points. This strategy is designed to address which of the following:

a. Information framing effects

b. Cognitive processing limits

c. Use of contextual cues

d. Role of emotion

4) During a media interview, a study's lead scientist answers a question related to the brain's role in the development of addiction. After the reporter takes notes, the scientist reiterates that a particular brain area doesn't cause addiction, but that it plays a role in the development of addiction. This shows the scientist's attempt to overcome which of the following:

a. Information framing effects

b. Processing of risk information

c. Failure to consider randomness

d. Correlation equals causation

5) A doctor conducts an interview to discuss health conditions affecting women. During the interview, the doctor acknowledges that many women perceive breast cancer to be the primary killer of women. He provides statistics showing that heart disease kills more women than breast cancer and then reiterates that women should be just as aware of heart disease as breast cancer. This technique helps overcome the following:

a. Resistance to persuasion

b. Scanning

c. Failure to consider randomness

d. Anchoring and adjustment bias

Practice Exercise Answers:

1. B (Anchoring and adjustment bias)
2. C (Use of contextual cues)
3. B (Cognitive processing limits)
4. D (Correlation equals causation)
5. A (Resistance to persuasion)

CHAPTER FOUR:
Present Data Effectively

As a communicator, think more about what you want your audience to understand and less about what you want to say. Your task is to use the tools of scientific communication—words, symbols, and numbers—to help people build knowledge around the issues being communicated. Further, this task has to be accomplished accurately and ethically.

You have heard the expression, "perception is everything." In this case it means that your understanding of the perceptual processes of humans is critical to help appropriately select and effectively use tools for communicating data. While reading this chapter, keep the following research[18] in mind:

- People tend to perceive items that are close to each other in a visual field as being somehow related. You will need to consider how "proximity" of elements within your data presentation can promote understanding.
- Our eyes have a tendency to follow lines and directions implied by separate elements within a visual field. "Continuation" is another critical factor to consider when designing data presentations. For example, the continuation of lines (versus bars) in a graph may help better tell your story. Likewise, effective use of headlines, headings, and sub-headings facilitate a reader's understanding of how information is presented in a document.
- People tend to "fill in" information that is not specific in a presentation to help them make sense of the presentation as a whole. This process of "closure" is effective when the correct details are filled in, but it can be ineffective and even dangerous when people fill in the wrong information. You can use strategies to reduce the chance that people will use closure in a potentially harmful way.

In this chapter, you will learn how to capitalize on or overcome these tendencies as you read about several data presentation formats. The basics of each format – when to use different formats, how to use them effectively, and the do's and don'ts of their application – are summarized in this chapter. After reading this chapter, you will be able to:

- Evaluate graphical presentations to identify features that help audiences understand data and features that could be added to enhance a data presentation.
- Describe how to effectively use pie charts, bar charts, line graphs, arrays, and visual scales to promote the understanding of data.

Communicate health findings with words by using different methods

Text labels. Use words to label parts of your graphs, tables, and charts, and make sure the labels are placed close to the data presented. When possible, use labels next to trend lines or clustered bars instead of further away in a legend. Use language that is familiar to readers. You do not want to detract from the reader's ability to build knowledge or make health-related decisions, so strive to minimize clutter.

Verbal qualifiers. Does your situation lend itself to using everyday terms to describe the relationship between numbers? If so, it may be suitable to use expressions such as "much higher," "low risk," or "most of the time."[19] Keep in mind, however, that your audience may misinterpret the meaning of these phrases. Additionally, individuals may vary in the way they interpret your messages. One way to reduce the possibility of misinterpretation is to ground or anchor verbal qualifiers with the actual numbers of interest. For example, "the chances of X are low; only 5% or 5 in 100 people experience it."

Metaphors. Metaphors can help statistics "come to life."[20] Equate numbers or rates to something your audience can relate to, such as the number of people that can be seated in a sports stadium, the number of children attending the average elementary school, or the number of people that live in an entire city or town. When writing for people in a specific locality/geographic area, consider personalizing the data by naming familiar venues, schools, or communities.

Narratives. Narrative is another tool for bringing data to life. When possible, take your audience to another place by telling the story with words, visual images, or both. Do you want to educate or persuade? Determine when it is best to use a short narrative, such as an anecdote, quotation, specific example, vignette, personal story or testimonial, or case study. Consider using a longer narrative, such as an essay, short story, book, or some type of script. While there are theoretical reasons for using narratives, the practical reasons are people's preference for narratives or stories, the difficulty some have understanding standard data presentation formats, and the way narratives are processed by the mind.

Tips for communicating findings directly with numbers

Numbers are best used to communicate findings when there is a need to be precise and concise. Numbers can be used to show various types of values. Research shows that communicators should remember the following tips and rules when using numbers:

To instruct and inform

- Most people have low levels of quantitative literacy. Keep numbers simple in nature, and give easy-to-understand modifiers to add meaning. Round most decimals to the nearest whole number (e.g., 9.6 is rounded to 10).
- When writing for the Web, use actual numbers (2), versus words (two), even at the beginning of a sentence. Use numbers to the billions (2,000,000,000), but use a combination of numbers and words for higher numbers (2 trillion, not two trillion).
- When possible, pre-test the use of numbers with your audience to ensure that the numbers are clear.

To persuade or motivate

- Limit yourself to communicating three or fewer numbers.
- Present numbers using familiar metrics, such as the number of people affected, a percentage, or dollars. When possible, avoid unnecessary precision by using whole numbers, rounding, and proportions that are easy to understand (e.g., about 1 in 4 people vs. 23%).
- Numbers perceived as especially large can be persuasive because they create a sense of vividness, social pressure, and magnitude of the problem. It is important to consider ethics when using a large number to persuade or motivate.

In tables

- People read data tables to make comparisons and to search for individual numeric values.[21]
- Give cues and organizational clarity to facilitate movement through a table. Make sure that column and row headings are clear and easy to understand; and strategically use white space, shading, and borders to help the eyes know where to go (reading down a column or across a row), or to show that a group of cells present similar data.
- Be consistent in use of places after a decimal point, and present numbered column labels and row labels in sequence.
- Use boldfacing or color to draw attention to significant findings.

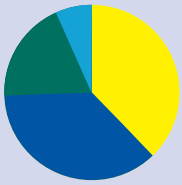
The basics of visual symbols and tips for using them effectively

Pie charts, bar charts, line graphs, icons and icon arrays, visual scales, and data maps can be effective tools for communicating data, but only when they are appropriately selected and properly used. The following information and tips are intended to help you choose the right visual for your situation and maximize the visual's impact and effectiveness. Check your understanding by reviewing the information presented in Table 4.1 to help you complete the practice exercises beginning on page 21.

After reading this chapter, you should better understand how to use words, numbers, and visual symbols to present data more effectively. For further details on concepts presented in this chapter, refer to Chapter 4, Presenting Data, of *Making Data Talk: Communicating Public Health Data to the Public, Policy Makers, and the Press*.

Table 4.1 Basics of Visual Symbols

Pie Charts

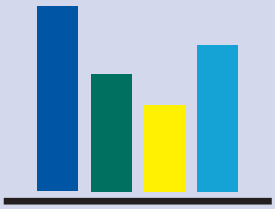


The basics
- Show proportions/percentages, especially their comparison, for a total of 100%
- Display a "whole" with smaller parts and how they relate to each other
- Good for highlighting the largest or smallest piece of something

Do
- Make sure the largest slice is pointed at 12 o'clock
- Display slices clockwise in descending order
- Use short labels and position them horizontally and outside the pie

Do not
- Show more than six slices

Bar Charts

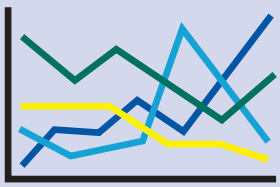


The basics
- Bars represent a group of data with heights/lengths measured using percentages, dollars, etc.
- Axes allow the display of two or more individual numeric values
- Good for displaying magnitude or comparative magnitude between groups of data
- Can show relative differences or patterns between/across groups
- Horizontal orientations allow text labels to be placed in an easy-to-read position
- Vertical orientations are best for showing a comparative rise or fall in counts over levels of one or more variables

Do
- Use six or fewer bars per chart
- Use color/shading with strong contrast
- Use a bar or line to show a baseline value
- Use short and easy-to-understand titles, labels, key messages
- Select beginning and ending values and interval widths for axes that represent patterns in the data without distortion

Do not
- Use segmented or stacked bar charts to demonstrate how proportions compare to the whole
- Overlay line representation on top of the bars to indicate variance estimates or confidence intervals

Line Graphs



The basics

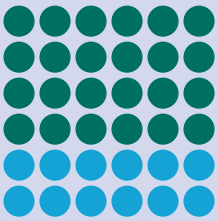
Good for showing:
- A connected sequence of data, such as trends over time
- Before and after differences
- If numbers are going up, down, or remaining stable

Do
- Use arrows or text to highlight key events or data
- Place labels close to their lines
- Include baseline data for comparison purposes
- Use short and easy-to-understand titles, labels, key messages
- Select beginning and ending values and interval widths for axes that faithfully and ethically represent patterns in the data without distortion

Do not
- Add unnecessary labels or symbols
- Use more than four trend lines

Table 4.1 Basics of Visual Symbols continued

Icons/Arrays



The basics
- Individual graphical elements, such as circles, human figures, etc., are used to represent quantitative data
- Good for showing rankings or ratings in tabular display
- Good for displaying probability data representing absolute risk

Do
- Use body-shaped figures to represent humans when it seems fitting
- Place icons representing numerator values contiguously
- Use common denominators between two arrays
- Highlight numerator icons

Do not
- Randomly place icons representing numerator values unless the sole goal of the array is to demonstrate randomness
- Distort data; make sure to carefully increase the height and width of icons when showing change in magnitude

Visual Scales

The basics
- Use where numbers are ordered and there are equal distances between intervals; or where numbers are ordered but the intervals between values may be uneven
- Use scales that are familiar, such as thermometers and meters with meaningful colors and arrows or lines showing a range of values
- Use scales to visually represent risk (probability) data, and absolute risk data and comparisons

Do
- Provide anchoring information (lines or arrows) to give contextual cues and orient the audience to baseline data
- Include short titles and key messages
- Follow conventional approaches for data presentation (e.g., red to indicate higher levels of threat in the United States)

Do not
- Underestimate the role of emotion and perceived inequity if scales are used in involuntary exposure situations
- Include too much information

Data Maps

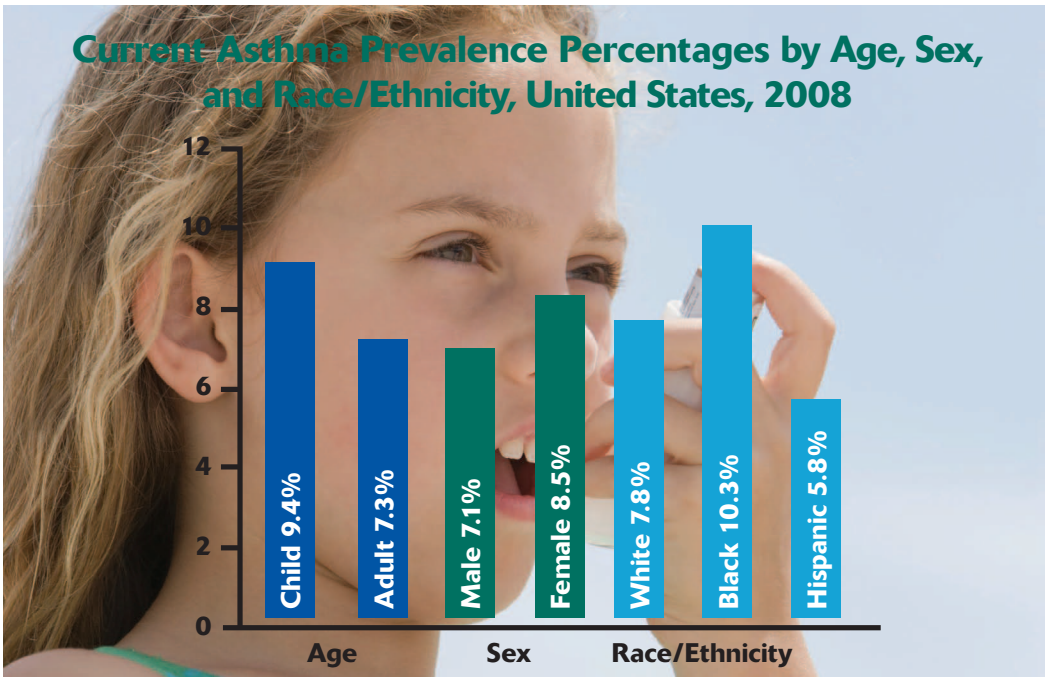
The basics
- Help illustrate how frequencies are distributed geographically
- Support interpretive tasks, such as comparisons
- Use colors or shading to show data ranges

Do
- Use lines to demarcate discrete entities (geographic borders)
- Write clear titles and make labels short and to-the-point but complete
- Use callouts to highlight some regions when necessary
- Use color to enhance attractiveness and illustrate variation in data
- Use a sequential progression of colors from light to dark

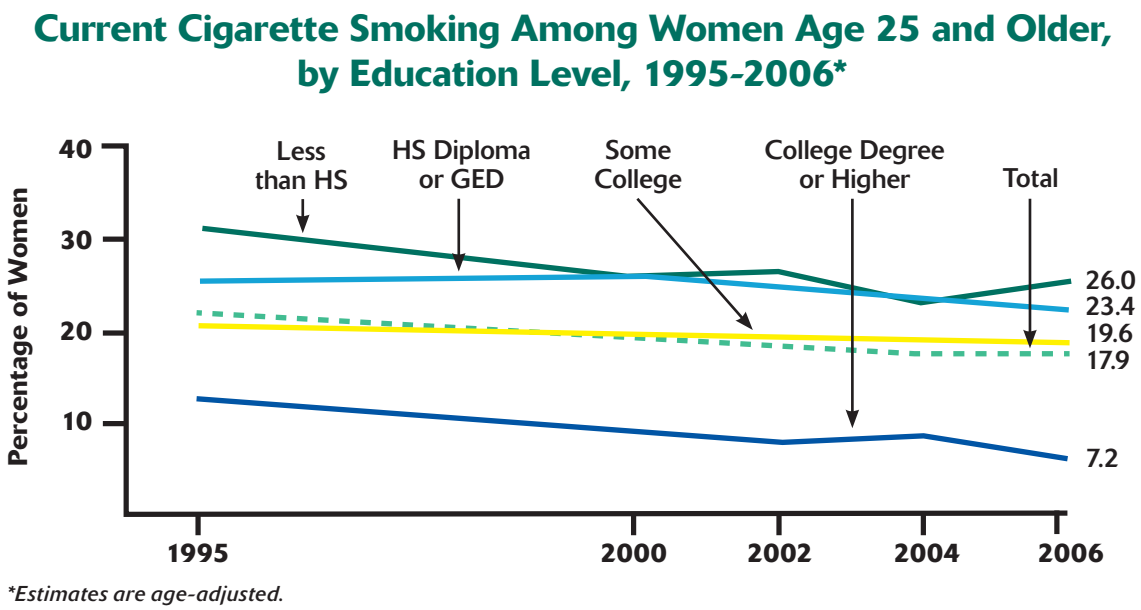
Do not
- Place red and green side by side
- Use more than three to four colors or assume that color schemes displayed on computer monitors will looks the same in print

Practice Exercise

Consider the following visual displays that were found on federal agency Web sites. Demonstrate what you have learned about the optimal design and use of visual displays by evaluating the samples and answering the associated question.

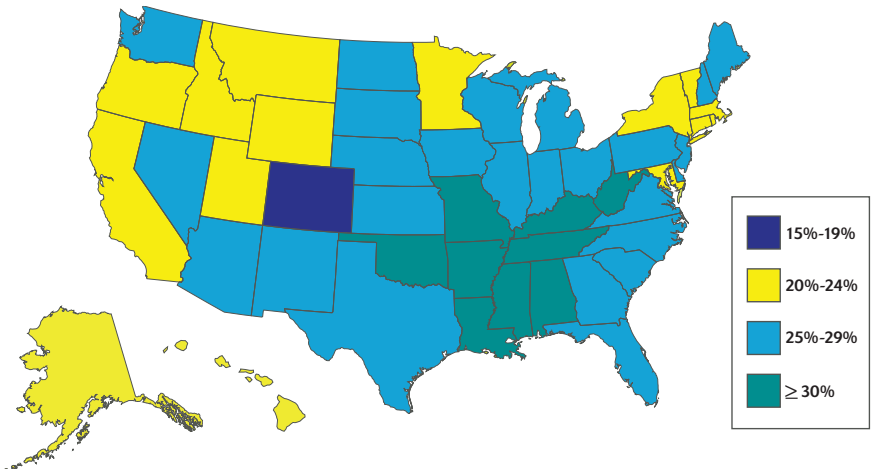


Question 1: How can this bar chart be modified to make it more effective?



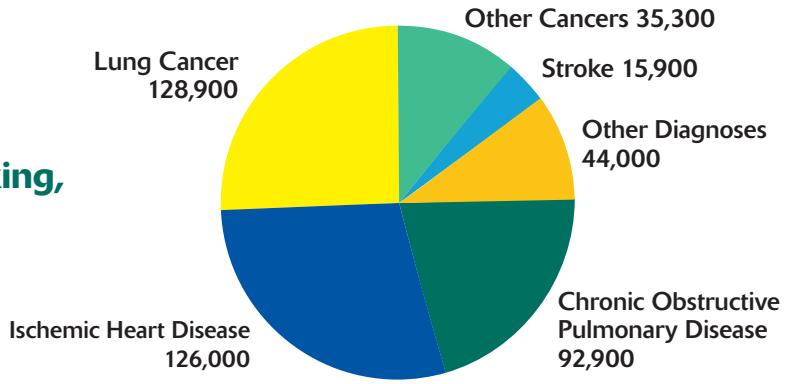
Question 2: Is there a better way to present the data found in this line graph? Explain your answer.

Percentage of Obese (BMI ≥ 30) Adults (U.S., 2009)



Question 3: Why was a map a good visual symbol to use for this data presentation?

Number of Yearly Deaths Caused by Cigarette Smoking, 2000-2004



Question 4: How would you modify this pie chart to make it more effective and/or easier to read or use?

Answers:

Question 1: Eliminate the photo from behind the graph; use a horizontal orientation to make labels easier to read; round percentages to whole numbers; remove space between bars within each grouping.

Question 2: Change positioning of the line labels so the text is horizontal and adjacent to the relative line; change line colors so the darkest color is on top and the lightest color is on the bottom; if available, remove data for 1995 and add data for 1994, 1996, and 1998; move labels closer to the corresponding lines in order to eliminate some of the arrows; and delete the numbers on the graph for 2006.

Question 3: The data map allows the reader to easily observe the similarities and differences in obesity across the U.S., including the differences by region. Color-wise, however, it would be best to: 1) use a lightest/lowest prevalence to darkest/highest prevalence scale and 2) use red to indicate states with highest prevalence.

Question 4: Place slices in descending order beginning at 12 o'clock and going clockwise (e.g., lung cancer, then ischemic heart disease, then chronic obstructive pulmonary disease, etc.); do not stack labels; and use COPD if audience will know what it means. Also, consider changing title to: Number of Yearly Deaths Caused by Cigarette Smoking by Disease, 2000-2004.

CHAPTER FIVE:
Use the OPT-In Framework to Make Your Data Talk

Presenting health data to any lay audience is, in essence, a communication task: most people are capable of increasing their understanding of science and numbers if their involvement levels are high, and if information is communicated using clear definitions and explanations, appropriate analogies, and readily understandable formats. Thus far, this workbook has presented a wealth of information and various exercises to help communicators understand the many aspects of and influences on communication. This chapter, as the title suggests, will help communicators "put it all together" when faced with the task of communicating public health messages that may include the presentation of data. After reading this most practical of all chapters in the workbook — and referring to previous chapters, as needed — communicators will be able to:

- Apply the four components of a framework designed to serve as a guide for planning and implementing a public health communication task.

Before commencing a communication task that may include the presentation of data, you should first recall that data can be used for several purposes. As discussed in Chapter 2, the four purposes of communicating public health information, including data, to lay audiences are: 1) increasing knowledge, 2) instructing, 3) facilitating informed decision-making, and 4) persuading. Also important to consider are the roles of data in communication, which are slightly different from purposes. These roles, along with explanations and examples, are shown in Table 5.1.

Table 5.1 Roles of Data in Communication

Role	Explanation/Example
Raise awareness	• Used to communicate that a problem exists, why it exists, how many are affected, and how it can be addressed. • Data can be simple descriptive statistics, such as X people are affected by Y disease; or X people have diabetes, a major risk factor for chronic kidney disease.
Reduce level of concern	• Used to help people gain perspective about what does and does not constitute a substantial level of health risk. • May be used in clinical settings to help people understand the impact of certain behaviors or exposures or the benefits of a certain treatment.
Explain (cause and effect)	• Used to show or refute association or cause-and-effect relationships and their magnitude or provide a basis as to why certain conclusions were reached. • Causal data, for example, can be used to support a storyline that provides hope: X percentage of people who are treated with Y never experience disease symptoms.
Provide contextual information	• Used to improve understanding of a public health issue, usually with some type of comparison to an overall population value. • May be used to demonstrate how the prevalence of a condition has or has not changed over time or how one state is impacted by an exposure compared to how another state is impacted.
Predict	• Used to communicate projected or expected effects of a policy or program or the ending of one. • Data may be used to estimate how many people are expected to be positively or negatively impacted by a change.
Evaluate	• Used to communicate observed impacts of a policy or program or of their discontinuation. • Data may be used to show how many people were impacted by X program.
Maintain awareness	• Used to remind people of something they already know. • Data may be used to point out how many lives are saved each year by using seat belts or how many viral transmissions are prevented due to the simple act of hand washing.

Source: Making Data Talk: Communicating Public Health Data to the Public, Policy Makers, and the Press by David E. Nelson, Bradford W. Hesse, and Robert T. Croyle (2009), Table 5.1, p. 180. By permission of Oxford University Press, Inc. (www.oup.com). See References for additional sources.

OPT-In: Organize, Plan, Test, Integrate

The authors of *Making Data Talk: Communicating Public Health Data to the Public, Policy Makers, and the Press* have developed a framework to help communicators plan and execute their data-related communications. The framework employs a mnemonic (or memory) device – OPT-In – which stands for **O**rganize, **P**lan, **T**est, and **In**tegrate. A brief overview is provided on the next page and the exercise at the end of this chapter is designed to help you understand and internalize the framework's application.

Organize. During this crucial first step of the framework, communicators must develop a clear understanding of the scientific knowledge and the level of consensus among scientists. If the state of the science is unknown, a formal review of the literature will be needed. Otherwise, a review and synthesis of the consensus among scientists will be adequate. The science will then be used to develop the storyline, which is essentially the major conclusion about the science. It is critical to ensure that the storyline communicates exactly what is intended (about colonoscopy, the HPV vaccine, etc.) without causing confusion or limiting the potential impact of the message—which speaks to the need for testing (see below).

While organizing, the communicator will also determine whether or not data will be included in message development. If data are included, the communicator must take steps to ensure their relevance and clarity. Revisit Chapter 2 of this workbook to review information on storylines and message development.

Plan. The second step focuses on ensuring that the storyline is accurate and strategically presented to audiences. Your plan may be brief or long, depending on the situation. The five planning components covered in Chapters 2 and 3 of this workbook are the focus of the "Plan" step of this chapter's exercise and include:

1) Determining the purpose for communication.

2) Analyzing the audience(s).

3) Considering the context in which communication will occur.

4) Developing a preliminary message (which may or may not include data).

5) Planning a strategy to reach audiences.

Test. The third step of the framework encourages message and usability pre-testing. Extensive testing often is not possible, but even some formative and/or usability testing may mean the difference between succeeding and failing at your communication task.

- **Formative testing** involves getting feedback from people who are part of your target audience while you are developing messages and materials and selecting communication channels before actually starting your communication activities. Examples of testing strategies include conducting interviews or focus groups, implementing surveys, and collecting feedback cards to determine audience preferences and understanding of messages.
- **Usability testing** is conducted to ensure a communication product's ability to support the audience member's task. Testing involves observing anticipated "users" while they try out a decision aid, Web site, or application to identify problems that can be corrected before actual implementation.

Integrate. The fourth and final step focuses on integrating communication efforts and integrating messages within a broader context of current scientific understanding. Communicators must coordinate efforts within and across communication channels for a defined communication effort. It is critical to portray scientific findings and conclusions with accuracy and clarity and in a way that makes them usable and useful to audience members. The Integrate section of this chapter's practical exercise will help you think through this step.

Some other things to consider

- Data should be used sparingly to limit cognitive burden and presented in formats that are familiar to the audience (e.g., pie charts).
- Framing messages as gains/benefits or losses/negative effects can be highly influential. For primary prevention, emphasize the positive effect of the behavior; for secondary prevention (e.g., screening), emphasize the negative consequence of failing to be screened.
- The order or sequence of data will impact how information is remembered. For example, the first and last numbers presented are most likely to be remembered.[22]
- Identify and make numbers 'stand out' by showing how they are unique or novel. Doing so will help demand attention and can promote newsworthiness.
- Integrate words, numbers, and symbols.

After reading this chapter, you should have a general understanding that applying the OPT-In framework to a communication task can result in presentations that promote audience members' understanding of data. For further detail on concepts presented in this chapter, refer to Chapter 5, Putting it All Together: Communicating Data for Public Health Impact, of *Making Data Talk: Communicating Public Health Data to the Public, Policy Makers, and the Press*.

Practice Exercise

The National Cancer Institute administers the Health Information National Trends Survey (HINTS), which is a biennial, cross-sectional survey of a nationally-representative sample of American adults that is used to assess the impact of the health information environment. Specifically, HINTS measures how people access and use health information, how people use information technology to manage health and health information, and the degree to which people are engaged in healthy behaviors.


Health Information National Trends Survey
hintsbriefs
http://hints.cancer.gov
NUMBER 11
Only 28% Know Lung Cancer Is the Leading Cause of Cancer Deaths
84% of Americans Know Smoking Increases Cancer Risk
Over the past several decades, significant progress has been made in reducing overall smoking rates and tobacco-related diseases. Despite these successes, there remain demographic and geographic disparities in smoking prevalence, tobacco-related health outcomes, and knowledge about lung cancer risk factors and mortality.
Much cancer prevention research has demonstrated that knowledge is a central component of effective health promotion, and that gaps in knowledge (e.g. by age, socioeconomic status, geographic region, or race/ethnicity) can create or exacerbate health disparities. While accurate knowledge isn't sufficient to affect behavior change, a baseline of knowledge and awareness is fundamental to the development of attitudes and intentions toward positive, health-enhancing behaviors.
The vast majority of Americans (84%) have received the message that smoking increases cancer risk, and there appears to be only some variation in that knowledge by demographic characteristics or by geographic region. Although lung cancer is the number one cancer killer in the U.S., less than one-third of Americans report that lung cancer is the leading cause of cancer deaths each year. Moreover, differences are pronounced by geographic region, with only 20% of adults in some areas of the country knowing that lung cancer is responsible for more deaths each year than other cancers such as breast, colon, or prostate.
In this HINTS Brief, we explore demographic and geographic factors associated with accurate knowledge about lung cancer mortality, risk factors, and the negative effects of tobacco use.
Geographic Distribution of Smoking and Lung Cancer Knowledge
U.S. Population Percentages, HINTS 2003
Does Smoking Increase Chances of Cancer?
Percent responding "a lot"
High: 96%
Low: 79%
Which Type of Cancer Do You Think Will Cause the Most Deaths this Year in the U.S.?
Percent responding "lung cancer"
High: 35%
Low: 21%
Quick Facts
- Smoking is the leading cause of preventable death in the U.S.
- Tobacco use and tobacco-related diseases are more prevalent in certain geographic areas, and among certain racial/ethnic populations and people with low socioeconomic status.
- Knowledge about the health consequences of tobacco is not evenly distributed. There are social and geographic differences in knowledge about lung cancer risk factors and mortality.
- Among smokers, disadvantaged groups are more likely to endorse myths and misinformation about the negative effects of tobacco.
Among Smokers, Myths Are Persistent and Pronounced
Gender, Race, and Income Associated with Myth Endorsement
While a majority of current smokers know that smoking cessation is a cancer prevention strategy, they also are prone to endorse some smoking-related myths. In a HINTS study, researchers assessed the extent to which current and former smokers agreed with myths about reversing the negative effects of smoking, and how those inaccurate beliefs varied by sociodemographic characteristics.
When current and former smokers were asked whether they believed that exercise could undo most of the negative effects of smoking, males were more likely than females, and African-Americans and Hispanics were more likely than Whites, to endorse the myth. Those with higher incomes generally reported more accurate knowledge, being more likely to disagree with the exercise myth compared to people who earn less than $25,000 per year.
When asked whether they believed that vitamins could undo most of the negative effects of smoking, similar patterns emerged, with males, African-Americans, Hispanics, and those with incomes less than $25,000 per year being more likely to endorse the myth than females, Whites, and those with higher incomes, respectively. College graduates, compared to people with less than a high school education, were more likely to hold accurate knowledge, disagreeing with the vitamin myth.
In this HINTS Brief, we explore factors associated with accurate knowledge about tobacco.

Use the following exercise as an opportunity to apply the OPT-In framework to a real-world communications task. A portion of a HINTS brief, which provides a snapshot of noteworthy, data-driven research findings, is provided here. This brief explores factors associated with accurate knowledge about lung cancer and the negative effects of tobacco use through the analysis of HINTS survey data.

Read the results outlined in the brief. You want to communicate the results to the regional health director to support development of an educational campaign but are unsure about your messaging, your presentation, and how you will integrate your messages in a broader context. Use the questions on the next page to help you prepare to communicate your data. Read the entire brief by visiting: http://hints.cancer.gov/brief_11.aspx.

STEP: Organize

1) What does the science tell us?
2) What is the level of consensus for the findings?
3) What are your possible storylines?
4) Will it be helpful to use data to communicate your message/storyline? If yes, why?
5) What role are the data playing?
6) Why were the data collected?
7) What are the limitations of the data?

Remember:

- Be sure to fully review/synthesize the state of scientific knowledge and consensus.
- Tie data back to broader context of existing scientific knowledge.
- Assess scope and resources needed to support the planned communication effort.

STEP: Plan

1) Why are you communicating findings?
2) What is known about your audience?
3) What is the current communication context?
4) What are your preliminary functional messages?
5) What strategy will you use?

STEP: Test

1) How will you identify and recruit potential candidates to informally and formally test messages, materials, and channels?
2) Exactly how will you test your messages?

STEP: Integrate

1) How will you synchronize your messaging across communication channels and over time?
2) What other resources will you provide to your audiences?
3) What will you do to help your audience understand the data within a broader context?
4) How will you make clear what the audience can or should do with the data?

Additional questions

1) Which audience characteristics will work to your advantage?
   - ☐ High level of involvement
   - ☐ Low level of emotion
   - ☐ High level of education
   - ☐ High mathematical, science, and document literacy
   - ☐ Rational orientation
   - ☐ Agreement with the position advocated
2) What role(s) are the data playing in your messages?
   - ☐ Raising awareness
   - ☐ Reducing level of concern
   - ☐ Explaining cause and effect
   - ☐ Providing contextual information
   - ☐ Predicting
   - ☐ Evaluating
   - ☐ Maintaining awareness

CHAPTER SIX:
Show What You Know: Communicating Data in Acute Public Health Situations

Acute public health situations are diverse in type, as well as the response and emotions they can cause. An infectious disease outbreak, for example, has the ability to cause fear, if not panic; floods can displace people and affect their economic livelihood; and the content of newly released screening guidelines may challenge widely held beliefs and even elicit anger. Acute public health situations are similar, however, with regard to how we should approach communications about them. Outlined below are the defining characteristics and communication requirements of acute public health situations. This information is followed by an exercise that requires you to examine how well an acute public health event was communicated to the public.

After reading this chapter, you will be able to:

- Identify the distinguishing characteristics of acute public health situations.
- Evaluate an article (or other communication product) about an acute public health situation to identify how it may or may not be modified to effectively communicate data to the intended audience.

Defining acute public health situations

Acute public health situations include infectious disease outbreaks, natural disasters, explosions or fires, possible adverse effects from a drug or medical device, possible disease clusters, intentional adverse health events, actual or perceived adverse effects of immunizations, psychological events, and unexpected (study) findings or influential reports. These and other acute public health situations can be characterized by one or more distinguishing characteristics:

1) A discrete event or unexpected, unplanned, or extraordinary discovery.
2) Actual or perceived serious or widespread health problem, or a new understanding or recommendation about a health issue that will likely affect many.
3) Potential to cause fear, anxiety, anger, or other emotions.
4) Likely to receive news media attention.
5) An expectation that public health professionals will quickly identify and resolve the problem.

Various factors increase the chance that an event will become an acute public health situation and can strongly influence communication. Those factors include:

- Dreaded disease, condition, or catastrophic potential
- Irreversibility of effects
- Identifiable victims
- Large magnitude (number of people affected)
- Children involved or at risk
- Uncontrollability

Check for understanding: The March 2011 earthquake in Japan and its aftermath (e.g., a damaged nuclear reactor) is an example of an acute public health event. Review the list again to identify how many of these factors helped define the disaster in Japan as an acute public health event.

Communication process

Responses to acute public health situations are known by several names — crisis, risk, emergency, and disaster communications — and require swift but well-conceived message development and execution. Communicators must consider the following when communicating in such situations:

Communication phases and objectives. When faced with the prospect of communicating about acute public health events, it can be helpful to take a phased approach, such as one that has been effectively applied to many crisis situations. Approach the communication task as steps that can be taken before, during, and after the acute public health situation (crisis). See Table 6.1 for the steps or objectives to be executed during each phase. Consider using this approach in conjunction with the OPT-In framework.

Table 6.1 Acute Public Health Situations: Communication Phases and Objectives

Phase	Objectives
Pre-Crisis[a]	**1.** Be prepared **2.** Foster alliances **3.** Develop consensus recommendations **4.** Test messages
Crisis (Initial)	**1.** Acknowledge event and uncertainty **2.** Explain and inform audiences, in simple terms, about risk(s) **3.** Establish organizational/spokesperson credibility **4.** Provide emergency courses of action (i.e., how and where to get more information) **5.** Commit to providing stakeholders and public with continued communication
Crisis (Maintenance)	**1.** Help people more accurately understand their own risks **2.** Provide background and encompassing information to those who need it (e.g., how it happened, whether it has happened before, how to prevent it in the future, will recovery occur, will there be long-term effects) **3.** Gain understanding and support for response and recovery plans **4.** Listen to stakeholder and audience feedback and correct misinformation **5.** Explain emergency recommendations **6.** Empower risk/benefit decision-making
Post-Crisis (Resolution and evaluation)	**1.** Evaluate communication plan performance **2.** Document lessons learned **3.** Determine specific actions to improve crisis systems or the crisis plan **4.** Consider ways to better educate the public response in the event of future similar emergencies **5.** Honestly examine problems and mishaps and then reinforce what worked in the recovery and response efforts **6.** Encourage support for policies or resource allocation to promote effective responses to future acute situations **7.** Promote activities and capabilities of the organization

[a] *Note.* "Crisis" and "event" are often used interchangeably to describe communication phases.

Source: Making Data Talk: Communicating Public Health Data to the Public, Policy Makers, and the Press by David E. Nelson, Bradford W. Hesse, and Robert T. Croyle (2009), Table 6.3, p. 227. By permission of Oxford University Press, Inc. (www.oup.com). See References for additional sources.

Questions to guide communication. Those responsible for communicating about acute public health situations will need to tailor messages for the public/lay audiences, the media, health professionals, and various other groups. Experts have developed a list of questions (see Table 6.2) that the public may have during acute public health situations. Communicators can use them to guide the development of messages.

Table 6.2 Questions Lay Audiences May Have in Acute Public Health Situations

1. What is the problem and how serious is it (what is happening)?
2. Are my family and I (or community members, friends) safe?
3. Is there a chance that I, or those who matter to me, could be affected?
4. What should I (or others) do to protect myself (themselves)?
5. Who or what caused this problem (how or why did this happen)?
6. What does this information mean (interpretation)?
7. What can we expect will happen?
8. Can the problem be fixed?
9. What is being done to address the problem and why?
10. How are those who are affected getting help?
11. Is the problem being contained (e.g., is the intervention or action working)?
12. When did you begin working on this problem (when were you notified about it, when did you determine that there might be a problem)?
13. Did you have any forewarning that this might happen?
14. Why wasn't this prevented from happening?
15. What else can go wrong ("worst-case" or "what-if" scenarios)?
16. Who is in charge?
17. What is not yet known?
18. What bad (or good) things aren't you telling us?
19. Who can I turn to, or where can I go, to get more information?
20. When will you be providing us with more information?
21. How much will it cost to fix this problem?[a]
22. Who is or will be responsible for paying to fix this problem or compensate those affected for their losses?[a]

[a] *Note:* Primarily from policy makers.

Source: Making Data Talk: Communicating Public Health Data to the Public, Policy Makers, and the Press by David E. Nelson, Bradford W. Hesse, and Robert T. Croyle (2009), Table 6.4, p. 228. By permission of Oxford University Press, Inc. (www.oup.com). See References for additional sources.

Some other things to consider

The following message content and delivery guidelines should also be considered in acute public health situations:

- Provide accurate information about the situation, decisions being made, and actions being taken.
- Use simple and nontechnical language.
- Use consistent messages.
- Provide messages quickly and regularly.
- Demonstrate empathy, caring, honesty, openness, commitment, and dedication.
- Acknowledge the uncertainty of the situation and audience fears or concerns.
- Correct misinformation quickly.
- Do not be overly reassuring.

Controversy Potential

Acute public health situations can be categorized based upon their potential for controversy—a factor that will influence communication decisions. The following factors distinguish lower- and higher-controversy situations from one another.

Potential lower-controversy situations

- Include localized infectious disease outbreaks, natural disasters, or acute chemical exposures. Specific individuals and organizations are often identified as responsible for the situation.
- Usually have a well-defined and identifiable health outcome for which a strong scientific consensus exists. The outcome is occurring at a higher rate than expected and has an identifiable cause with a plausible and strong cause-and-effect relationship. The exposure, outcome, and cause-and-effect relationship are recognized in a relatively short period of time.
- Public health interventions or measures, if employed, fall within the acceptable normative beliefs of the public and policy makers.
- Communicating about lower controversy situations may require no or minimal communication involving data. Rather, recommendations for protecting one's health may be more appropriate in lower-controversy situations.

Potential higher-controversy situations

- Include extended outbreaks, scientific consensus at odds with an audience's strongly-held beliefs, or higher levels of scientific uncertainty with or without adequate or widely accepted resolutions. Table 6.3 identifies how and why higher-controversy potential situations result and the related communication implications and insights.

Table 6.3 Higher-Controversy Situations: Characteristics and Communication Implications

Common causes of higher-controversy situations	Communication implications
Definitive cause of an infectious disease, for example, was not *identified early*. Controversy increases as health effects become more serious, the number of people or geographical area grows, and the situation endures.	Journalists often seek details about scientific methods and analytic approaches to support the "mystery" they're reporting.
A scientific consensus's explanations, conclusions, or recommendations are *unacceptable to various audiences*. This is common for environmental issues, product exposures, and scientific bombshells.	Communications are difficult because messages may contradict previous consensus recommendations from experts. Messages also may challenge strongly held beliefs.
Adequate or widely acceptable resolutions cannot be achieved due to a *high level of scientific uncertainty*. This is common for environmental, occupational, or product safety or consumer protection issues.	Communicators must address anxiety and fear among audiences. Some situations may require extensive and long-term communication efforts (for months to years).

In general, potential higher-controversy situations may generate intense lay audience interest, which may make audience members more motivated to understand data and require relatively more extensive data communication efforts.

Data selection and presentation. The OPT-In framework, discussed earlier in this workbook and more extensively in *Making Data Talk: Communicating Public Health Data to the Public, Policy Makers, and the Press*, can be used for acute public health situations. Specifically, selection of data will be based on whether or not data are needed to support the storyline, the purpose of the communication, and analysis of the audience. Once again, anticipating or learning questions that audiences may have can be used to guide communication. Audiences may want to know what is happening, how and/or why it is happening, what it means, what is being done about it and why, and whether or not the action is working. These audience concerns can help determine which types of data measures to use.

Data presentation modalities in acute situations can range from verbally providing one or two numbers to using more complex icon displays of absolute risk data. Remember that Chapter 4 of this workbook can be used to identify data presentations that may be most ideal.

After reading this chapter, you should have a general understanding about the communication implications for acute public health situations. For further detail on concepts presented in this chapter, refer to Chapter 6, Communicating Data in Acute Public Health Situations, of *Making Data Talk: Communicating Public Health Data to the Public, Policy Makers, and the Press*.

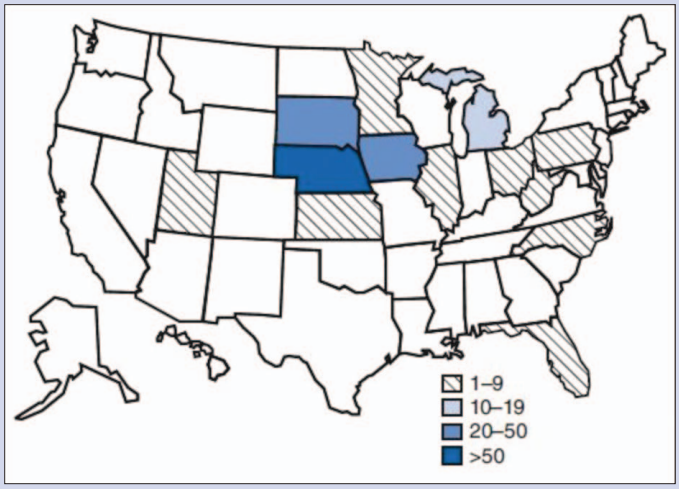
Practice Exercise

Below you will find a mock news article. Has the author effectively covered the acute public health event using the key concepts outlined in this chapter? Use the questions below to help guide your decision.

Alfalfa Sprouts May Be Cause of Salmonella Outbreaks

May 15, 2009—Alfalfa sprouts produced at several facilities using seeds from a common grower is the likely source of the salmonella outbreak that has sickened at least 228 individuals across 13 states earlier this year. Health officials determined that almost half of the salmonella cases were linked to restaurants and retail outlets that had received alfalfa sprouts from a specific producer-distributor. Those affected ranged in age from less than 1 year old to 85 years old. Over two-thirds (69%) were female. No deaths were reported, however, 4% of people reported being hospitalized.

In April, the Food and Drug Administration and the Centers for Disease Control and Prevention (CDC) recommended that consumers not eat raw alfalfa sprouts, including sprout blends containing alfalfa sprouts, until further notice. Symptoms from salmonella poisoning include diarrhea, fever, and abdominal cramps. According to the CDC, there are an estimated 1.4 million cases of salmonella poisoning each year.



Number of salmonella cases associated with eating alfalfa sprouts, by state (as of May 1, 2009)

Source: Centers for Disease Control and Prevention. Outbreak of Salmonella Serotype Saintpaul Infections Associated with Eating Alfalfa Sprouts—United States, 2009. MMWR 2009; 58(18):500-503. Accessed from the World Wide Web on July 8, 2011 (www.cdc.gov/mmwr/pdf/wk/mm5818.pdf). Centers for Disease Control and Prevention. Technical information: Salmonella. Accessed from the World Wide Web on July 8, 2011 (www.cdc.gov/salmonella/general/technical.html).

1) What criteria help define a public health problem as acute, and which message content and delivery essentials were met?
2) What is the article's storyline? Why is it effective or ineffective? If you think it's ineffective, what storyline would you have written?
3) For what purpose was the article written (to increase awareness or knowledge, instruct, facilitate informed decision-making, or persuade)?
4) Describe the audience(s) for whom the author wrote the article. Think in terms of their levels of involvement, emotion, and education; mathematical, science, and document literacy; rational orientation; and level of agreement when a persuasive argument is presented.
5) What data measures (if any) were used by the author?
6) Describe the data's presentation and level of effectiveness and how you would have used or presented data similarly or differently. Include your assessment of whether or not the format was consistent with recommendations for potential lower- or higher-controversy situations.
7) What audience concerns or questions were addressed by the author's use of data?

CHAPTER SEVEN:
Show What You Know: Communicating Data in Health Policy or Program Advocacy Situations

Public health is often influenced by efforts of individuals (advocates) and organizations that either *support or oppose* specific policies or programs that affect the public's health. Advocacy activities can be short- or long-term and may involve laws, regulations, or resources allocation. Advocacy distinguishes itself from other public health situations in two ways: 1) persuasion is the primary purpose for communicating information, including data, and 2) policy makers are usually the primary audience, with the press and public being secondary.

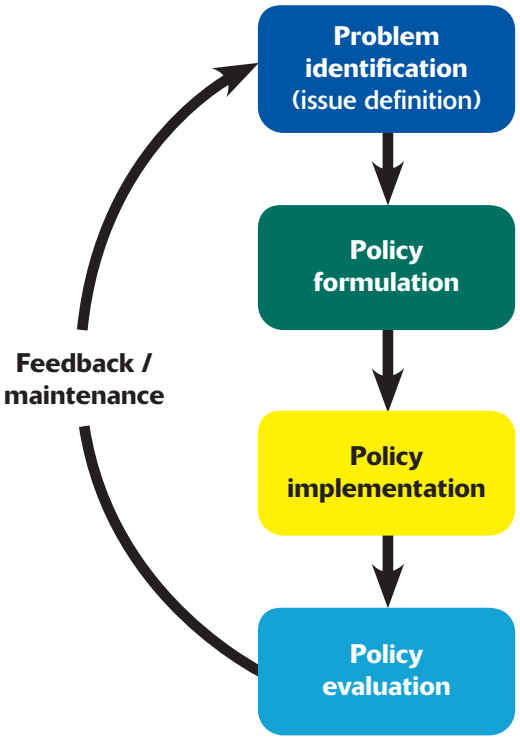
This chapter provides a brief overview of the policy development process, the advocacy communication process, and considerations for using data in advocacy situations. This information is followed by an opportunity to apply what you learn.

After reading this chapter, you will be able to:

- Describe the steps in the public policy cycle and the advocacy communication process.
- Prepare to communicate support for a new local law that will impact public health.

To understand the communication process in advocacy situations, one must first understand the public policy cycle, which includes four interdependent phases. During the *problem identification* phase, policy makers recognize that a particular problem or issue must be addressed. Policy makers then shift into the *policy formulation* phase, where they consider potential options and decisions about how to address the problem. Next is the *policy implementation* phase, where those responsible for carrying out the policy interpret and make decisions about the policy. Once enacted, the policy enters the *policy evaluation* phase, where a formal or informal assessment of the policy is carried out. The four phases are shown below in Figure 7.1, along with examples of what may take place during each phase if a community were to address local obesity rates.

Figure 7.1 Public Policy Cycle



- Obesity is on the rise in Anytown, USA
- A diet high in calories and/or fat appears to be an important factor in obesity, along with a sedentary lifestyle

- Merchants and citizens have an opportunity to advocate for and oppose enactment of a law requiring restaurants to post calorie information on their menus
- Elected officials vote to enact the law

- City leaders inform restaurant owners of the new law's requirements/timing
- Restaurants comply with the law and are spot-checked by local officials

- Local government officials receive and discuss feedback from community members on an ongoing basis
- The health department tracks impact on obesity rates over time

Source: Making Data Talk: Communicating Public Health Data to the Public, Policy Makers, and the Press by David E. Nelson, Bradford W. Hesse, and Robert T. Croyle (2009), Figure 7.1, p. 268. By permission of Oxford University Press, Inc. (www.oup.com). See References for additional sources.

Communication process in advocacy situations

Effective advocacy requires attention to the communication process. Steps include the following:

- **Conduct research to learn about policy makers (and their gatekeepers), as well as their information sources and preferences.** Use Web sites of elected representatives, and talk with their staff members.
- **Understand formal and informal communication processes.** These include processes for presenting at committee hearings (formal), and how policy makers' gatekeepers can make decisions that promote or derail your efforts (informal).
- **Consider timing.** Use common sense to guide decisions about when to communicate or not to communicate with policy makers. Capitalize on the use of focusing events (e.g., legislative hearings), and avoid communicating with policy makers when they are distracted by other events.
- **Coordinate with allies.** Work with like-minded individuals or organizations to collaboratively communicate your message to, and with, advocacy organizations.
- **Select best sources for information and message delivery.** People's opinions are often based on their perception of the source, so individuals or organizations who deliver messages must be considered trustworthy and not self-serving.
- **Gain media attention.** Policy makers will attend to issues, policies, and programs that are getting media attention.
- **Follow up.** Provide needed or requested information, and express appreciation for the individual's time and consideration.

Message delivery in advocacy situations

Similar to other situations, advocacy-related communication requires attention to message delivery. When possible:

- Be brief and quickly get to the main point.
- Be definitive and avoid technical jargon.
- Use real-world examples and localize data and narratives.
- Anticipate opposition arguments, be prepared with responses, and provide short handouts with key points and contact information.

Scientific data and advocacy

While scientific data are not the only factor that can impact policy makers, data can indeed be used by scientists to effectively influence and persuade policy makers and the public. Refer again to the OPT-In framework, presented in Chapter 5, which is useful for planning and implementing communications in advocacy situations. During the planning process, determine whether or not the presentation of data will support identified themes and messages.

Previous chapters in this workbook outlined how data can serve various roles, depending on the situation and the communicator's needs. In policy advocacy, public health data can be used to:

- **Raise awareness.** Surveillance or trend data can be used to define a problem or issue, to demonstrate that a problem exists, that it is important or serious, and/or that it impacts a large number of people. *Gloom* (negative message framing) is a theme often used to raise awareness, particularly when communicators want to shame policy makers into action.
- **Show cause and effect.** Data that are typically derived from research are used to show that situations previously thought to be inevitable or random can now be controlled in some way (e.g., through a new program, policy, screening, diet). *Control and hope* (positive message framing) is a theme that can be used for cause and effect communications.
- **Support a prediction.** Similar to cause and effect, data can be used to communicate the expected positive impact of a changed or new program or policy, particularly when the program's or policy's magnitude will be large. The control and hope theme, therefore, also is useful to support predictions.
- **Evaluate.** Evaluation and other types of data can be used to communicate the success or failure of a program or policy. The *success* theme (positive message framing) is used when positive trends and changes result from a particular program or policy.
- **Maintain awareness.** Use "tried and true" data items for the given situation. When possible, however, provide new data or reformulate existing data. An established public health issue or intervention can be refreshed on important anniversaries or when new relevant reports or studies are published.

Data presentation

As with any public health situation, data – if selected for use – must support the storyline while being presented accurately and without misleading audiences. The latter may be especially problematic, however, for advocacy situations because they require the communicator to be persuasive. The nature of advocacy situations also requires data to be described and interpreted clearly. Data presentation formats considered to be most effective for advocacy situations include the following:

- **Stating or reporting only one or two numbers.** When possible, use rounded numbers, and choose numbers that testing has identified as easy-to-understand and meaningful.
- **Verbal qualifiers,** such as "small decreases" or "great risk," as they help contextualize the data.
- **Metaphors,** which can help gain audience attention and improve comprehension, especially when the data are related to something the audience knows, such as the size of a local school. Auditory (spoken) metaphors are best.
- **Narratives,** which can influence emotions, but only when they can be integrated easily and support advocacy themes.
- **Visual presentations,** which can be readily used to demonstrate magnitude, highlight changes, and make comparisons for the goals of enhancing understanding and interpretation by the audience. Specifically:
  - Pie charts are good for demonstrating magnitude by showing how small or large something is in relation to the total.
  - Bar charts also are good for demonstrating magnitude and comparative changes over time.
  - Line graphs can help show cause and effect and can easily be used to show increases, decreases, or how things are remaining the same.
  - Maps can be used to show geographic areas that are at highest risk for experiencing an adverse health outcome (or already experiencing one).

After reading this chapter, you should have a general understanding about the public policy cycle and how to effectively communicate data in health policy or program advocacy situations. For further detail on concepts presented in this chapter, refer to Chapter 7, Communicating Data for Policy or Program Advocacy, of *Making Data Talk: Communicating Public Health Data to the Public, Policy Makers, and the Press*.

Practice Exercise

In November, 2009 the Howard County Board of Health in Maryland ("the Board") voted unanimously to ban individuals under the age of 18 from using indoor tanning devices—the first jurisdiction in the United States to do so. The vote took place after a large public hearing, where noted dermatologists, county leaders, and members of the public, including a former Miss Maryland who developed skin cancer at a young age, testified before the Board. Testimony was presented both in support of and in opposition to the proposed regulations. Proponents came out on top by building a strong case for the dangers of skin cancer and indoor tanning beds based on the following data and facts:

Is skin cancer common?

- Skin cancer is the most common of all types of cancer and accounts for almost half of all cancers in the U.S.
- In 2009, the American Cancer Society predicted that there would be more than 11,000 deaths from skin cancer.
- Melanoma – the more serious and aggressive type of skin cancer – is on the rise in the U.S. and in Maryland. The rate of new melanoma cases in the state is 18 per every 100,000 people.
- Howard County's incidence rate is similar to the state of Maryland, at 21 per every 100,000 people.

What are the health risks of tanning beds?

- The International Agency for Research on Cancer (IARC) has classified tanning beds as cancer causing agents.
- Using a tanning bed before age 35 increases your risk of developing skin cancer by 75%.
- Exposure to UV radiation during indoor tanning increases the risk of melanoma and non-melanoma skin cancers, especially when a user is exposed at an early age.
- The World Health Organization recommends restricting the use of tanning beds by anyone under the age of 18.

Who uses tanning beds?

- On an average day, more than 1 million Americans tan in tanning salons.
- The majority of tanning bed users (70%) are young women between 16 and 29 years of age.
- Close to 40% of teenage girls report having used a tanning bed within the past 12 months.

What types of laws have states passed on indoor tanning and are these laws effective?

- At least 29 states and four counties regulate the use of tanning beds by minors.
- The majority of regulations require parental consent for the teen to use a tanning bed.

Source: Howard County Seeks to Ban Indoor Tanning for Youth Under Age 18: Press Packet. Press Conference September 22, 2009. Howard County Health Department, Howard County, MD.

The fact sheets included in the press packet were developed based on information obtained from the American Cancer Society (www.cancer.org), the American Academy of Dermatology (www.aad.org), the World Health Organization (www.who.int/en/), and the National Conference of State Legislatures (www.ncsl.org).

Imagine that you represent a community health organization in Howard County and have been asked to testify in front of the Board in favor of the new indoor tanning regulations.

- Give a brief synopsis of the situation.
- What data would you use to raise awareness, show cause and effect, predict, evaluate, or maintain awareness for advocacy efforts?
- What theme(s) would you use to present your argument?
- Which data (if any) would you choose to display visually? What format would you use?

CONCLUSION

Summary

Communicating health data is a vital component of the process of disseminating scientific findings to lay audiences. As we better understand the role of data in communication, the challenge becomes how to select and present data in ways that lay audiences can understand and use. This workbook presented an overview of the key findings and recommendations on how to better select and present data to lay audiences—the public, press, and policy makers. As noted previously, effective communication starts with having a clear story-line, a communication purpose, and a strong understanding of your audience. Knowing the characteristics of the audience, the factors that influence communication about health, and audiences' expectations for receiving data, are critical to knowing how to communicate data. Having an understanding of audience tendencies and biases is important as those factors influence how and when to interpret data. Audience research will help you decide to what extent, if any, data should be used to convey the message with your specific audience.

Defining the communication requirements for specific situations, such as unexpected events or policy planning, and understanding the context or circumstances surrounding the issue is essential, as this will influence how the data are presented. These contextual factors will help guide the approach for communicating the data (e.g., to educate or to persuade) and will help determine the selection of data elements to present to your audience. When presenting data in a visual format, features such as graphs, charts, and maps can be added to enhance a data presentation. Conversely, there are ways of communicating data without using numbers or graphics. Knowing the benefits and limitations of each approach and when to use such visualization or narrative techniques depends not only on the type of data that are available, but also on your audience and your purpose for communicating the data.

Future trends and challenges

Access to more health data, especially at the community level, has its benefits. It can enable communities to identify and observe what is currently occurring with respect to health indicators, and empowers them to advocate for improvements. Further, additional data can satisfy those who need more information to make key decisions or conclusions, such as local policy makers.

However, challenges arise about how all of these data are synthesized and interpreted. With the quantity of health data becoming more widely available, the presentation quality of these data becomes even more important. The variety of forms in which data are available today can be misused, misinterpreted, or poorly understood. Moreover, questions may arise about how much data are needed to convey a message, or when too much or too little data are being used, given the large amount of health data that are available for some health issues.

Innovations in computer and other technological interfaces reflect the new wave of opportunities for data to impact health. Patient health data in electronic medical records can prompt clinicians to recommend screenings, support decision-making on treatment, and monitor adherence to treatment protocols. At the population level, data from health systems, coupled with other surveillance systems, can uncover health disparities and further prompt action toward achieving health equity. With these innovations in health information technology, communicating data effectively that will enable lay audiences to understand and be empowered may be the biggest challenge confronting researchers and practitioners.

Closing

Communicating health data to lay audiences is a complex process, especially when taking into account the context and other considerations associated with the data, health topic, or environment. You must carefully consider all of these factors before deciding whether data should be used in key messages, what data to communicate, and how to present selected data effectively. For public health professionals, it is always helpful to have an approach like the OPT-In framework that helps guide the planning and implementation of communication tasks. This framework can be readily used to communicate data and other health information across settings and in a variety of different situations. We hope this framework, along with the content and the practical exercises, helps promote your understanding of the concepts outlined in this workbook and can increase your ability to successfully apply them in your work.

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Notes:

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