Infographics at CDC
for a nonscientific audience

A Standards Guide

for creating successful
infographics

Centers for Disease Control and Prevention
Office of the Associate Director for Communication

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Infographics Standards Guide

Welcome to the Centers for Disease Control and Prevention's (CDC) standards guide for creating infographics. Extensive research and planning have gone into developing this guide. It outlines effective techniques for depicting public health data accurately while adhering to current industry standards.

The Purpose

There are common approaches to creating successful infographics, but there are few rules to follow. This guide presents some basic rules to help you create simple, clean graphics that tell a story and convey high-impact, useful public health messages.

What are Infographics?

Information graphics, or infographics, are visual representations of information or data. These graphics present complex information quickly and clearly, such as in maps, technical charts, or medical illustrations. With an infographic, scientists, medical professionals, health communicators, and statisticians depict complicated concepts using a simple image to convey relevant data. In this guide, the terms infographics and graphics are used interchangeably to refer to illustrations that present information.

Why Use Infographics?

Complex charts and graphs are appropriate for conveying data to a scientific audience. But when you communicate with the nonscientific public, you want to follow the lead of The New York Times and USA Today. Both use infographics—the gold standard for illustrating data in an easily digestible way. The graphics in these publications are crisp, simple, and eye-catching.

Infographics work well in today's fast-paced world. The graphics grab the reader's attention and convey the message quickly. Just as Edward Tufte laid a great road map in the '80s for rendering data for scientific audiences, today The New York Times and USA Today set the bar for rendering data for nonscientific audiences. These publications successfully compete with the increased use of the Internet, social media, and electronic devices, which are driving forces behind how data are being displayed. To be equally competitive and get the attention of the nonscientific public, CDC needs to follow the best practices of these widely read consumer publications and use infographics effectively.

The Process

The American public relies on CDC to provide accurate, timely, and useful information about public health issues. We're often depicted as an action-oriented agency of scientists who travel the world in blue biohazard suits responding to deadly outbreaks. CDC strives to make people safer and healthier by controlling infectious disease outbreaks, preventing chronic disease, reducing injuries, and decreasing environmental threats, among other things.

If we provide our data in the clearest way possible, our impact on public health in America will be even greater. By creating and adhering to standard guidelines, we'll maintain consistency within our graphics, and the messages will be effective in advancing CDC's mission.

Everyone involved in producing CDC messages—from the author or researcher to the editor and graphic artist—should accurately present data so that ideas and concepts can be grasped quickly. Graphics should be as simple as possible. Infographics should be constructed using clean, legible fonts. And colors should be carefully considered. For example, you should provide enough contrast to clearly differentiate between each area (consider those who are color blind or who have low visibility).

Resources

Visual Communication, Images with Messages; Paul Martin Lester; 2011
Visualize This, The Flowing Data Guide to Design, Visualization, and Statistics; Nathan Yau; 2011
Visualizing Data; Ben Fry; 2008
Display of Quantitative Information, Envisioning Information, Visual Explanations; Edward Tufte; 1983, 1991
www.eHow.com; Online Resource

STEP 1: Who? What? Where?

Ask yourself "Who? What? Where?" when presenting data, always consider your audience. Familiarize yourself with different types of charts and graphs, and learn how each can best depict data.

Charts and graphs are ways of displaying information in an understandable manner. Through lines, bars, or other visual representations, charts and graphs illustrate relationships between data sets and thereby improve the reader's comprehension. Even though charts and graphs both illustrate data, the two are not interchangeable. Each illustrates relationships between data in different ways.

Graphs, especially line graphs, are best for illustrating a trend over time. For example, you could use a line graph to show the population increase or decrease in a neighborhood over a specified period. Charts cannot show this relationship as well because they use a series of bars rather than data points connected by a line that goes up and down. Graphs are much better at showing trends for a single set of data.

Charts are useful for displaying patterns or information about frequency. The bars on a chart are long or short, depending on the values they represent. For example, a chart can be used to show what ethnic group is at greatest risk of injury. A line graph wouldn't show the relationship between these variables correctly. A chart of various ethnic groups, on the other hand, will quickly allow the reader to discern which group is at greatest risk.

Pie charts illustrate percentages, fractions, and proportions where it wouldn't be possible to use a graph to show the same information. Pie charts compare parts of a whole. For example, pie charts might record the population's opinions on a given issue. A pie chart could show the percentage of people who support an issue, oppose the issue, or are undecided. We recommend that you limit the number of slices to eight or fewer. To make comprehension even quicker, try starting the largest slice at the 12:00 position, followed by the other slices in descending order. The same information could be presented in a bar graph, but the difference between the percentages wouldn't be as easily associated.

Maps are used to display and inform the viewer about spatially or geographically related data. At CDC, we have a group dedicated to this discipline called GRASP (Geospatial Research, Analysis, and Services Program). GRASP is a CDC program that converts public health data to create accurate, data-linked maps using Geographic Information Systems (GIS) technology.

Creating a chart, graph, or map is only the **first step** toward creating an infographic.

Pictographs are shapes or images used in place of the standard bar or line. This approach is another way to convey the information to the viewer using a graphic linked conceptually to the topic of the chart or graph. Pictographs add interest to the graphic and convey the topic instantly.

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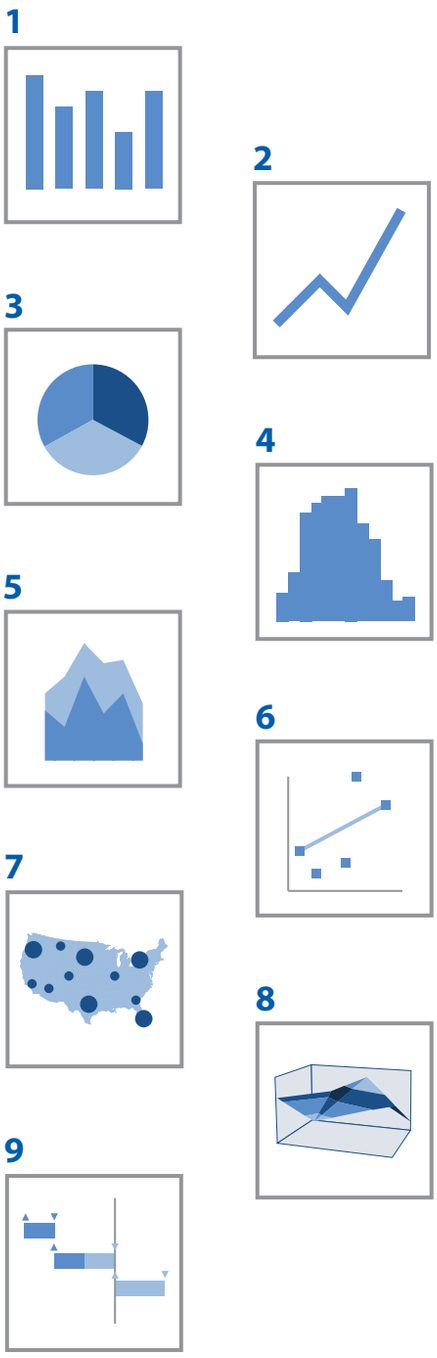
Commonly Used Charts and Graphs



1 Bar charts have rectangular bars with lengths proportional to the values they represent. The bars can be plotted vertically or horizontally and are useful in recording continuous and noncontinuous data.

2 Line graphs display information as a series of data points connected by straight line segments and are often used to visualize a trend over time.

3 Pie charts are circular, and data are represented as percentages of a whole.

4 Histograms are used to plot density of data and estimation of the probability density of the underlying variable. The total area is normalized to 1. These look similar to a bar chart.

5 Area charts display quantitative data (numbers or percentages) over time. This type of chart is based on the line chart but uses shading to distinguish and emphasize data.

6 Scatter plots are mathematical diagrams using coordinates to display values for two variables in a data set.

7 Bubble charts are variations of scatter plots. Each data point represents three distinct numeric parameters.

8 Surface charts show how a variable (Z) changes according to two other variables (X and Y). The three-dimensional surface is useful when you want to find optimum combinations between two sets of data.

9 Gantt charts provide a graphical illustration of a schedule and are often used to plan, coordinate, and track specific tasks in a project.

STEP 2: Laying the Foundation by Plotting the Data

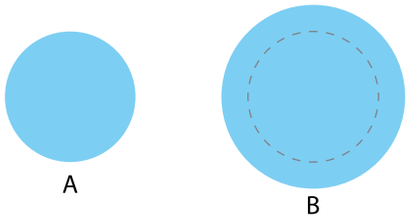
Once you determine the best method to display your data, create your graph or chart using Excel, PowerPoint, or Illustrator. These programs can link data to the graphic.

Plot your data before adding any pictographs or custom illustrations to ensure your data will be accurate, not skewed.

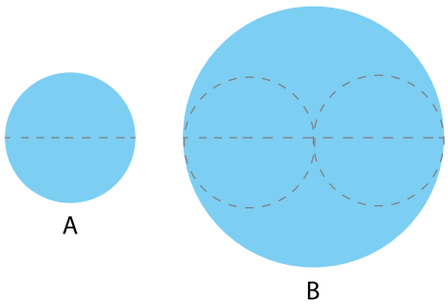
Always begin your y-axis at zero. If you begin with something other than zero, the message could be misleading or misinterpreted. And always consider scalability and proportion when displaying data.

This example demonstrates how incorrect scaling could misrepresent the data.

When you size the circles by area, circle A is half the size of circle B.



However, when you size the circles by diameter, circle A is actually only one-fourth the size of circle B.



The "Lie Factor" is a value that describes the relationship between the size-of-effect shown in a graphic and the size-of-effect shown in the data. Edward Tufte defines the Lie Factor in his book *The Visual Display of Quantitative Information* as "The representation of numbers, as physically measured on the surface of the graphic itself, should be directly proportional to the quantities represented."

STEP 3: Making Your Data, Easy to Understand for the Public

In the first two steps, you determined the best way to present your data and plotted the data, now you are ready to transform your data into an infographic.

The degree to which you customize an infographic should correlate to the complexity of the plotted data. Here is a chart to help simplify and explain this approach.

Data Complexity	Simple	Intermediate	Complex
Graphic Customization	High	Moderate	Minimum

High Customization: simple data set, 1 comparison. Axis optional; use of pictographs and illustrations along with or in place of charting elements.

Moderate Customization: data set with 2 comparisons. Axis required; may use pictographs or accompanying graphic to help tell the story; accompanying graphic would also work well.

Minimum Customization: complex, 3+ comparisons. Axis required; maintain complete chart and only use a graphic outside data set to complement, if desired.

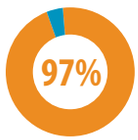
A. If you have a simple comparison, consider eliminating the y-axis altogether once you are certain all pertinent information is included within the graphic. This step will simplify the graphic and make for a straightforward and appealing design.

B. Pie charts may be effectively simplified as well. Consider modifying into a visual with the relevant text or iconic information incorporated in the center. The shape could also be altered from the circle format as shown in this example.

C. Consider incorporating shapes and icons that relate to the data being depicted in your chart. You could also use a horizontal bar chart instead of a vertical one to provide a clean, less-conventional approach. Using grids that contain highlighted objects can quickly present data related to ratios and percentages.

A.

B.



97% REDUCTION IN MINING WASTES

C.

40% REDUCTION IN WATER USE

C.

4 in 5 people who drink and drive are men.

Comparison of Approaches

Always represent the data as accurately as possible while drawing comparisons. The following examples show effective approaches to presenting data as well as some treatments to avoid with specific attention to scaling, proportion, and graphical images used.

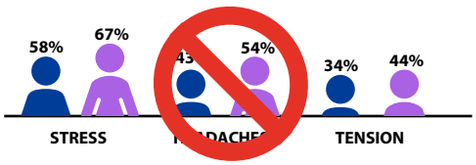
A well designed infographic adds visual interest and reinforces your message.

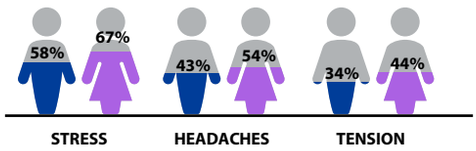
Cropping

Here is an infographic depicting the percentage of people experiencing stress, headaches, and tension by gender.

The first graphic treatment is not a successful infographic because to represent the percentages, the figures have been cropped. The cropping makes it difficult to differentiate between the male and female figures.

Conversely, the second figure is successful because the male and female figures clearly and accurately represent gender. In addition, the figures are equal in size, and the shading and percentages are clearly shown within each figure.



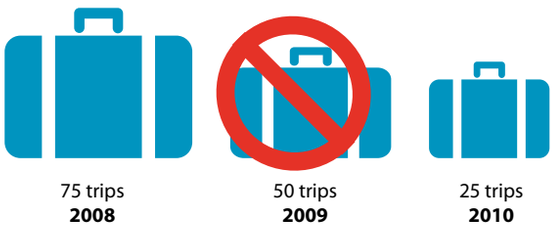


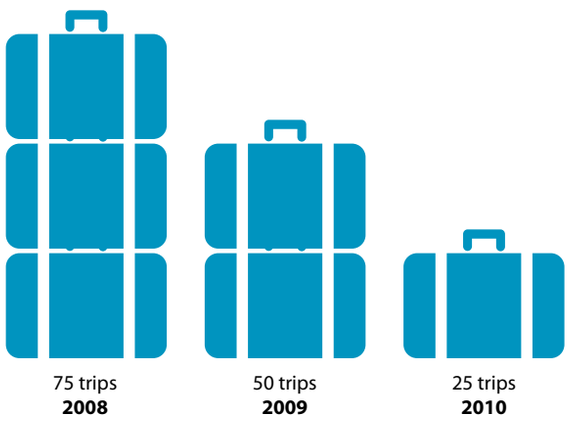
Scaling

This infographic shows a decrease in work-related trips in consecutive years during 2008–2010.

The first graphic uses proportion to represent the reduction of trips each year. This representation can be confusing and does not accurately represent the change.

The second graphic accurately represents this concept by including fewer suitcases each year. This treatment is successful because the luggage is the same size each year.



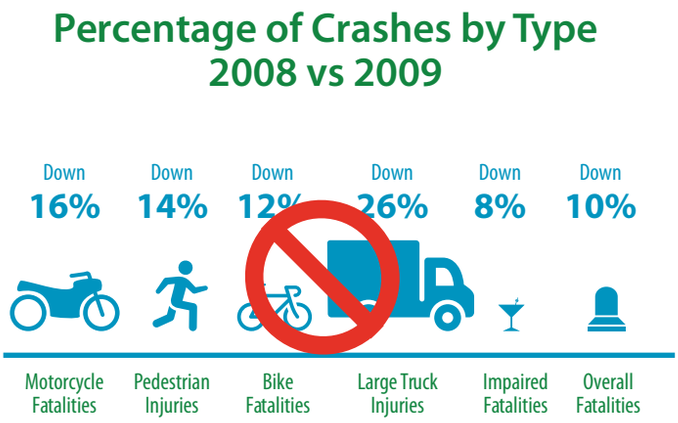


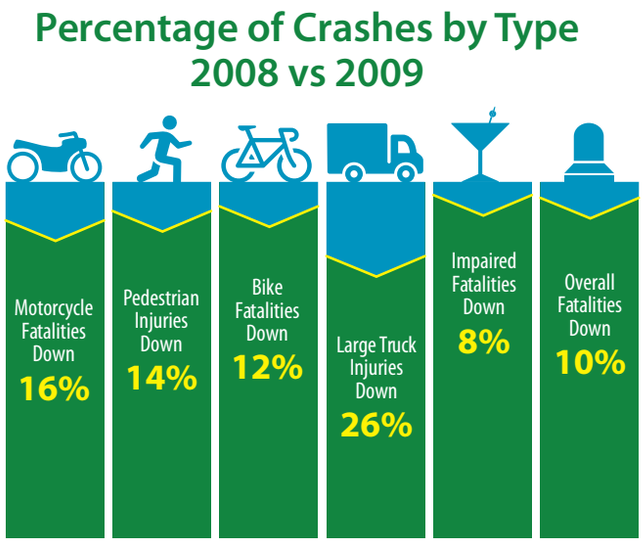
Proportion

Here is an infographic depicting the percentage change of accidents in two consecutive years by type.

The first figure is not successful because it relies on the icons to tell the story. However, the icons depicted here and their size in relation to one another add confusion instead of aiding the viewer in quickly grasping the data.

The second graphic treatment is successful because the icons identifying the type of accident are on top of each bar for quick reference. The percent change and type of accident is clearly written within each bar, and a down arrow equal to the amount of change between years reinforces the concept.





Conclusion

This guide is a set of recommendations for creating effective infographics. Sometimes designers make decisions that relate back to successful approaches; at other times, designers can choose a new direction to make a more memorable impact on the viewer. This guide shouldn't discourage creativity. On the contrary, it should provide a basic set of guidelines for creatively presenting data as accurately as possible.

Ask yourself, "Would this graphic make sense without words?" The answer should be "Yes" because the key to an effective infographic is simplicity.

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A good infographic is worth a thousand words.