Appendix 11.4 What Type of Chart or Graph Should I Use?

Research illuminating human perceptions of graphical representations offers us clues as to how to select the best representation for a given type of data. Below we present examples of the most common types of graphs and charts, along with suggestions on when they might be used.

Pie charts can be effective for communicating simple proportions (see Figure A11.4-1). When comparing several proportions, convention dictates that none of the radii should be at the "12 o'clock" position (Hollands, 2003). Pie charts do not need legends, instead the series name and percentage should be positioned next to the appropriate slice.

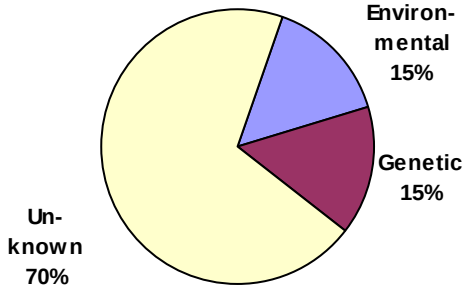


Figure A11.4-1 What causes birth defects?

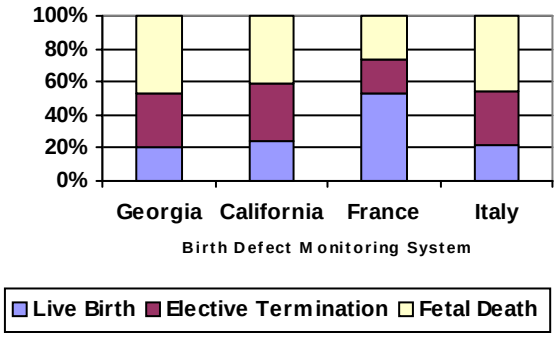
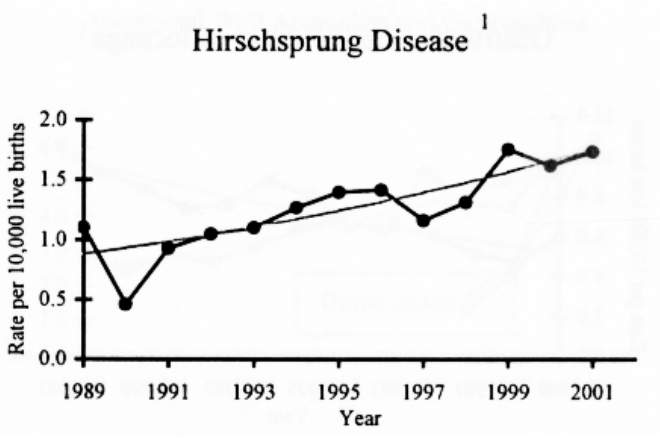


Figure A11.4-2 Pregnancy Outcomes, Down Syndrome

A 100% stacked bar chart can be used to compare proportions between two or more data sets (see Figure A11.4-2). However, be careful about presenting too many data points as the graph may become too busy to convey information effectively. An alternative would be a series of several pie charts, although 100% stacked bars allow for more consistent comparisons.



[1]**Trend is significant; details are given in Table 3**

Time series are nearly always demonstrated using a *line chart*, with a marker at each year. Figure A11.4-3 includes a regression line indicating that the change in rates is indeed statistically significant, thereby adding important information to this chart.

Figure A11.4-3 Rates of Hirschsprung disease 1989–2001

Certainly the most common need for graphical representations of birth defects data is the comparison of rates of cases among persons and places. *Bar charts* are an ideal choice for this because they give an impression of relative differences but, unlike line charts, do not give the impression that moving left-to-right is a time progression (see Figure A11.4-4). (Note: This chart also demonstrates the use of white breaks in the bars in lieu of gridlines across the whole plot area.)

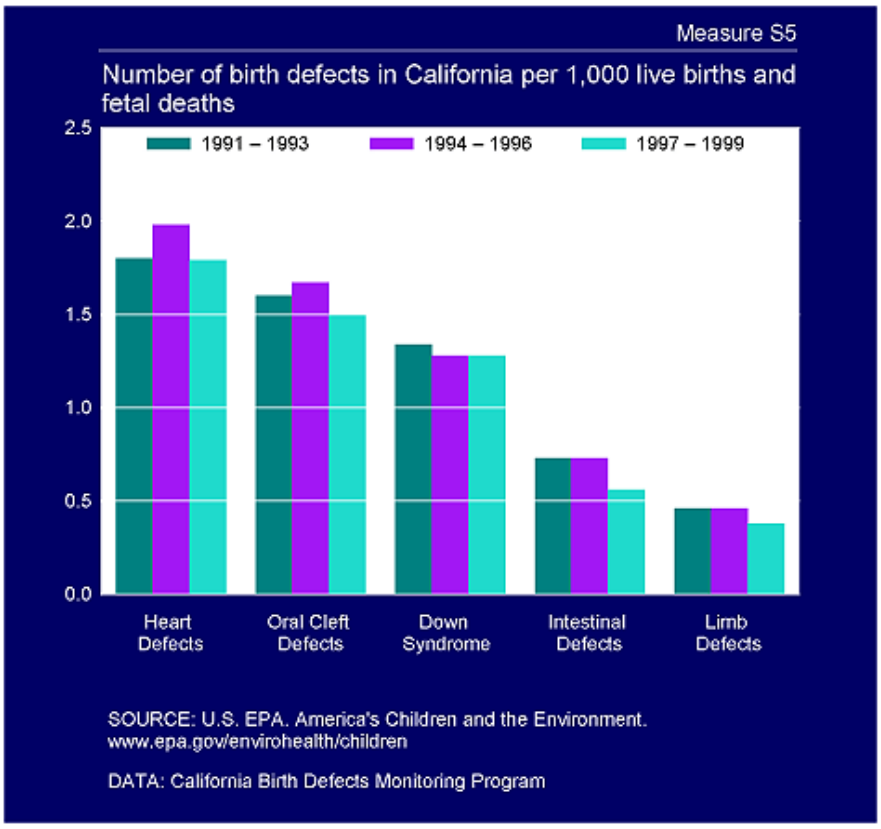


Figure A11.4-4 Bar chart demonstrating cases per 1,000 live births

Bar charts can also be used to convey information about the statistical significance of rates by using drop lines to represent confidence limits, as in Figure A11.4-5. Note: the best way to ensure that confidence limits are represented correctly is to import the results directly into your graphic software from your analysis software. However, it is also possible to produce the irregular confidence limits found when using Poisson regression in Microsoft Office products (see the document "Plotting Irregular 95% Confidence Intervals" on the Members Only section of the NBDPN website).

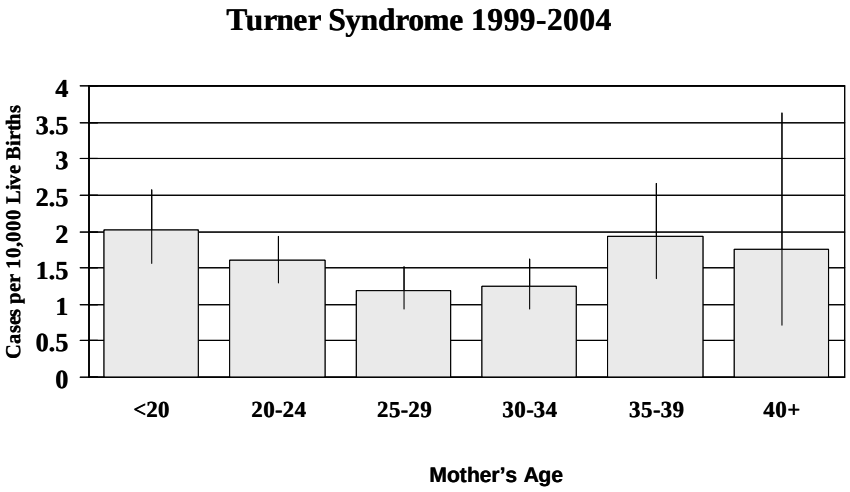


Figure A11.4-5 Bar chart with confidence limits

Figures A11.4-6 and A11.4-7 below, respectively, present examples of maps of epidemiological data. For further detail on the use of Geographic Information Systems see Appendix 11.2.

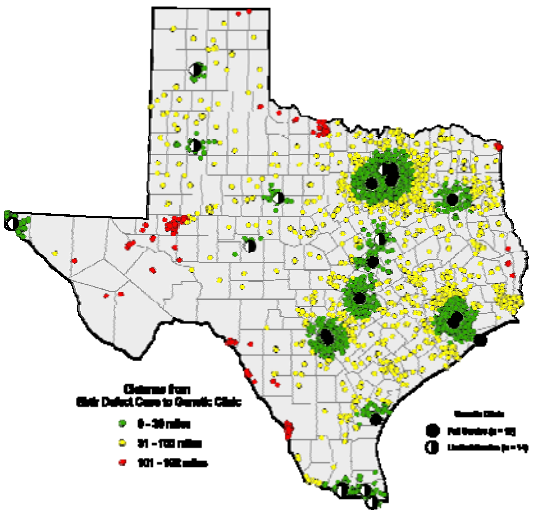


Figure A11.4-6 Spot Map

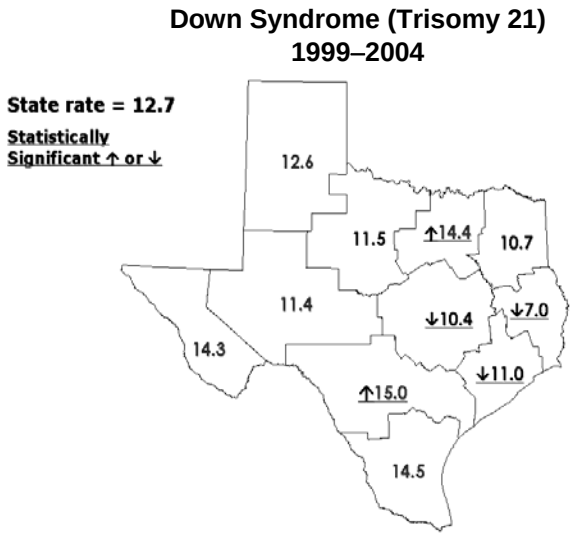


Figure A11.4-7 Area Map

When places are not contiguous or for some other reason would be difficult to display on a map, a bar chart such as Figure A11.4-8 would be suitable.

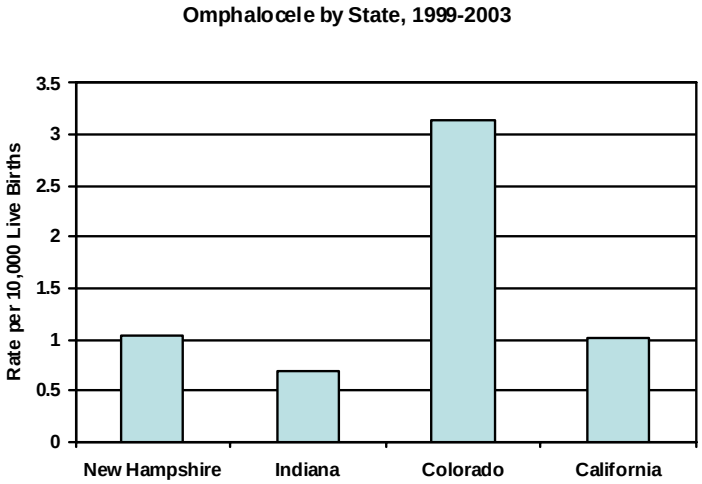


Figure A11.4-8 Displaying geographic data with a bar chart

When only the general place rather than a specific site is relevant (e.g., entire state versus specific regions or locales within the state), it is possible to use an area map (see Figure A11.4-9).

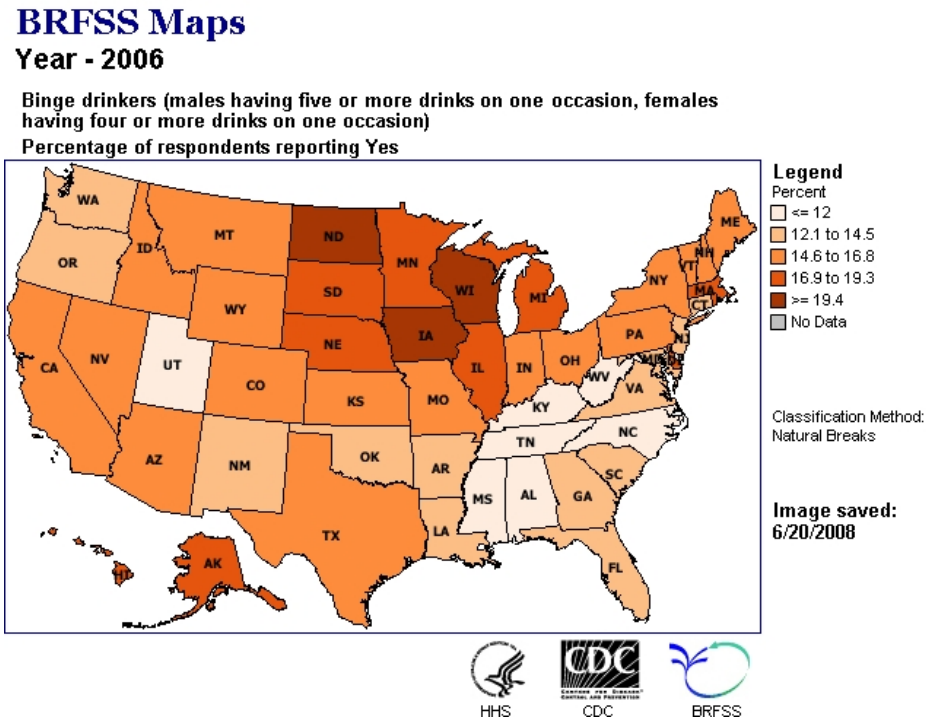


Figure A11.4-9 Displaying geographic data in an area map

In Table A11.4-1 below you will find one scheme for selecting the appropriate graphic representation given the type of data you will be presenting.

Before making your final decision, however, you should also ask yourself two questions that relate less to the nature of your data and more to your own personal preferences and the needs/interests of your audience:

- *Am I comfortable explaining this graph?* If the answer is no, find an alternative format with which you are more comfortable.

- *Given my audience, should I sacrifice detail for clarity, or clarity for detail?* For example, an audience of foster parents would probably benefit from clarity, whereas an audience of epidemiologists will readily comprehend your meaning and will rather be looking for additional detail about methods or sample characteristics.

Table A11.4-1 Selecting a method of illustrating epidemiologic data (adapted from *Principles of Epidemiology*, 3rd edition, U.S. Department of Health and Human Services).

If Data Are:		And These Conditions Apply:		Then Choose:
Proportions		< 6 data points	1 series	Pie chart (Sample Figure 4)
			>1 series	100% stacked bars (Sample Figure 5)
		6+ data points	1+ series	Consider combining data point categories or table. (Sample Figure 5)
Time Series		Numbers of Cases		Line chart (Sample Figure 6)
Data with discrete categories				Bar chart (Sample Figures 7, 8)
Place	Number of cases	Not readily identified on map		Bar chart (Sample Figure 11)
		Readily identified on map	Specific site important	Spot map (Sample Figure 9)
			Specific site unimportant	Area map (Sample Figure 10)
	Rates			Area map (Sample Figure 12)

Cited References on Graphic Presentation

Hollands JG. The classification of graphical elements. *Canadian Journal of Experimental Psychology.* 2003;57(1):38-47.

Centers for Disease Control and Prevention, Office of Workforce and Career Development. *Principles of Epidemiology: An Introduction to Applied Epidemiology and Biostatistics.* 3rd edition. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention; n.d.