IOWA

Institute for Public Health
Practice, Research and Policy

Visualize This

Storytelling With Data

2025 Session 3

Visualize This Resources – IHHS

Training Resources

Iowa Public Health Tracking Portal – HPV Workbook

Visit the HPV Workbook page from the Iowa Public Health Tracking Portal to view the HPV data for the training.

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Course Objectives

By the end of this course, participants will be able to:

- Summarize the basics of communication theory
- Select strategies for creating effective messages, charts, and graphs.
- Design basic charts to visualize common epidemiologic data
- Access publicly-available resources that can be used for data visualization

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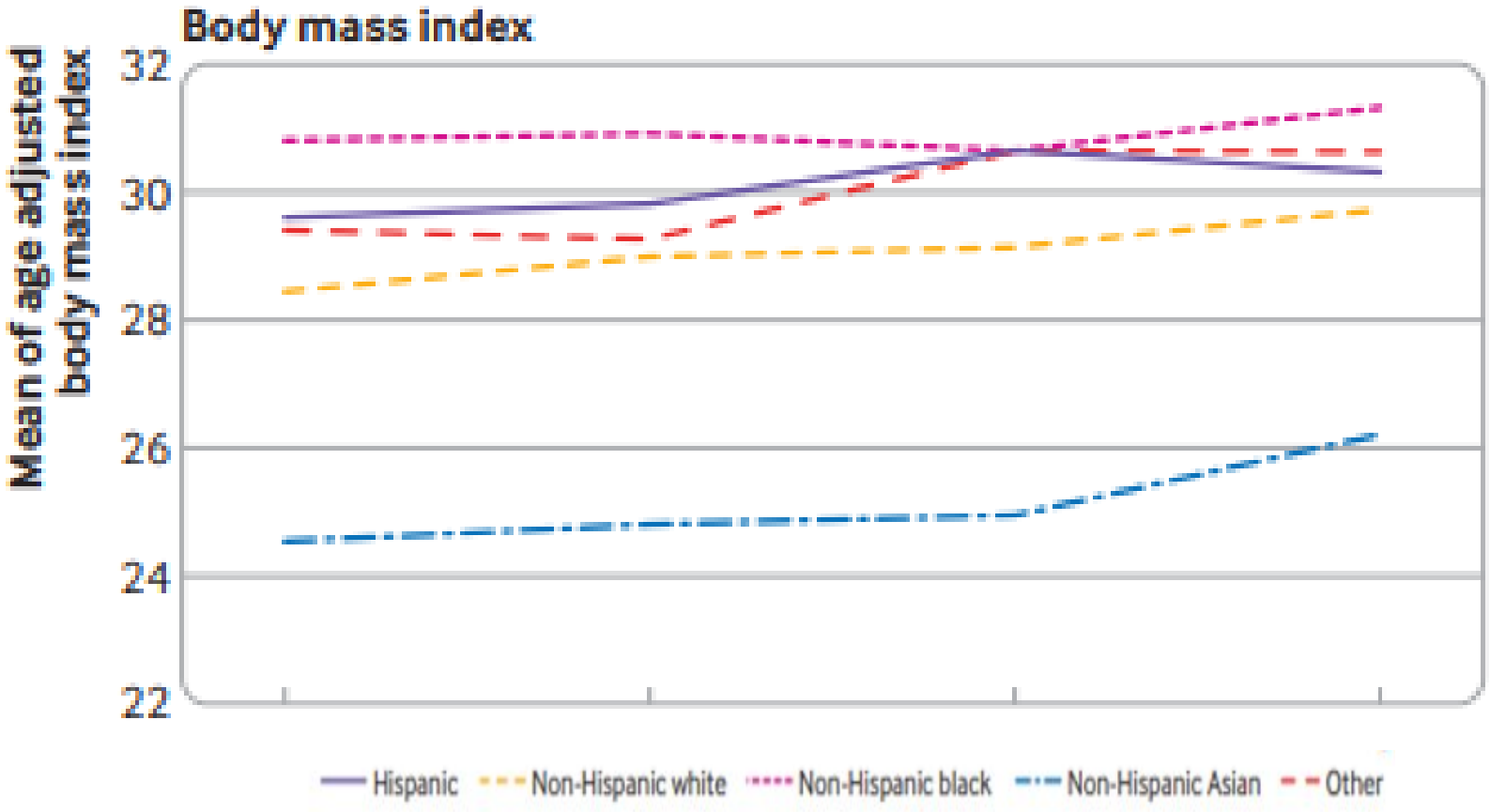
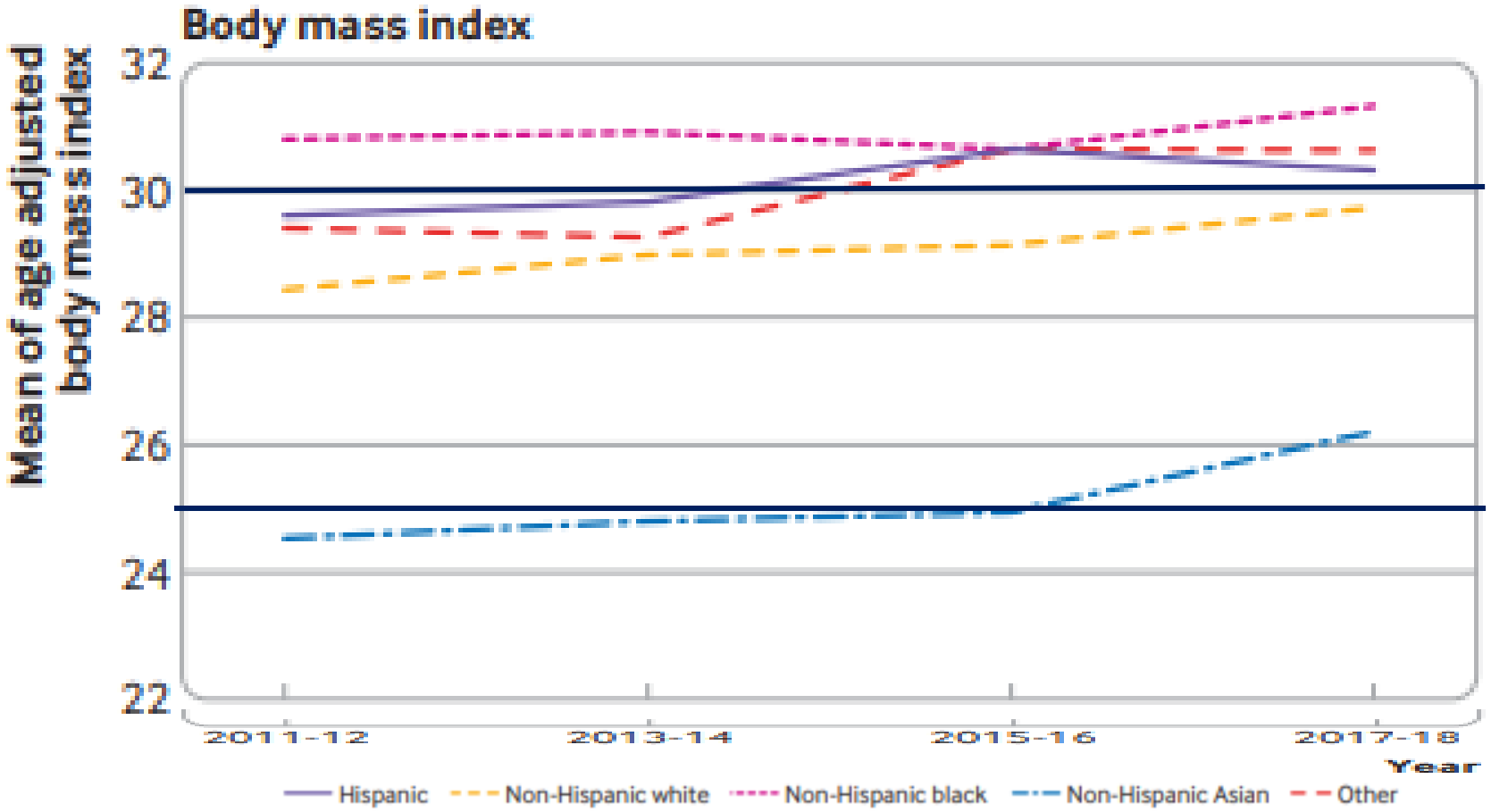
Disaggregating Data by Race/Ethnicity – Watch Out for Stereotypes!



(from "What Can Go Wrong? Racial equity, data viz & deficit thinking" P. Blakely 2022)

Disaggregating Data by Race/Ethnicity

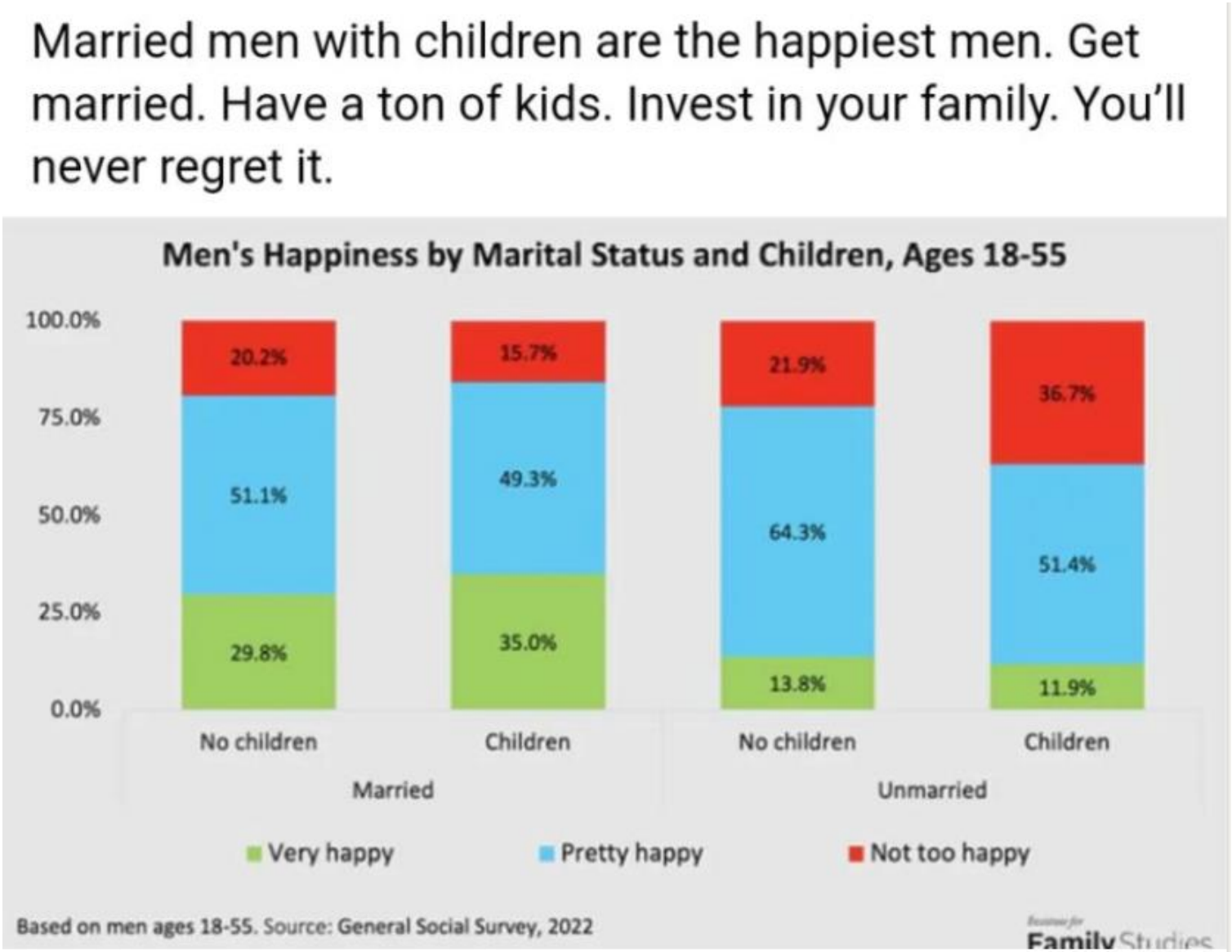


Obese

Overweight

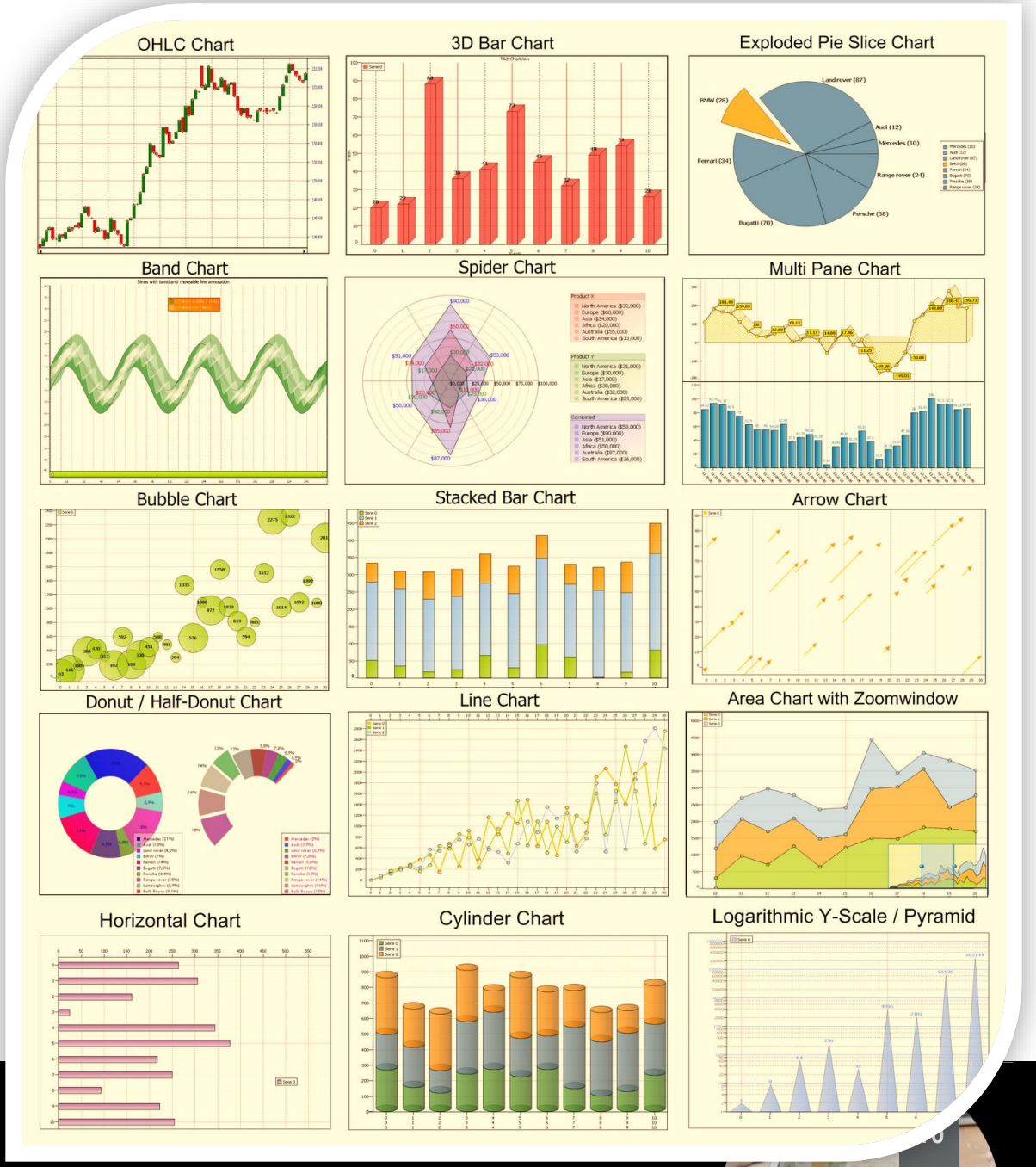
Let’s Practice!

- Storytelling with data is an important piece of the work that we do.
- Any comments on this?



Small Group Activity #1

10 minutes



Small Group Activity – 10 minutes

In your breakout groups,

- Share the rough sketch of your data visualization
- Remind group members of your target audience

Rest of the Group-

- What is the key takeaway from the chart?
- Is the most appropriate chart type being used for this data?

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OVERALL VIZ CONSIDERATIONS

- The chart highlights the most important finding
- Use the most appropriate chart type for the data you have (check out the chart choosers)
- Use the level of precision that your audience requires (only scientists get excited about decimal points)
- Create something meaningful—do not use defaults (EXCEL is your friend)
- Your use of color, text, graphics, arrangement all support what you want to communicate to your audience.
- Bring people centeredness into your visualization!

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Data visualization checklist

- Part of learning how to create your own great charts is learning how to critique other people's charts!

- Let's use Stephanie Evergreen's Data Visualization Checklist to get started! (you can find it on the Course resource page)

DATA VISUALIZATION CHECKLIST

This checklist guides the development of high-quality data visualizations. Rate each aspect of the data visualization by circling the most appropriate number, where 2 points means the guideline was fully met, 1 means it was partially met, and 0 means it was not met at all.

n/a should not be used frequently, but reserved for when the guideline truly does not apply. For example, a pie chart has no axes lines or tick marks to rate. If the guideline has been broken intentionally to make a point, rate it n/a and deduct those points from the total possible. Guidelines particularly helpful for accessibility are marked with 

Refer to the Data Visualization Anatomy Chart on the last page for guidance on vocabulary and the Resources at the end for more assistance.

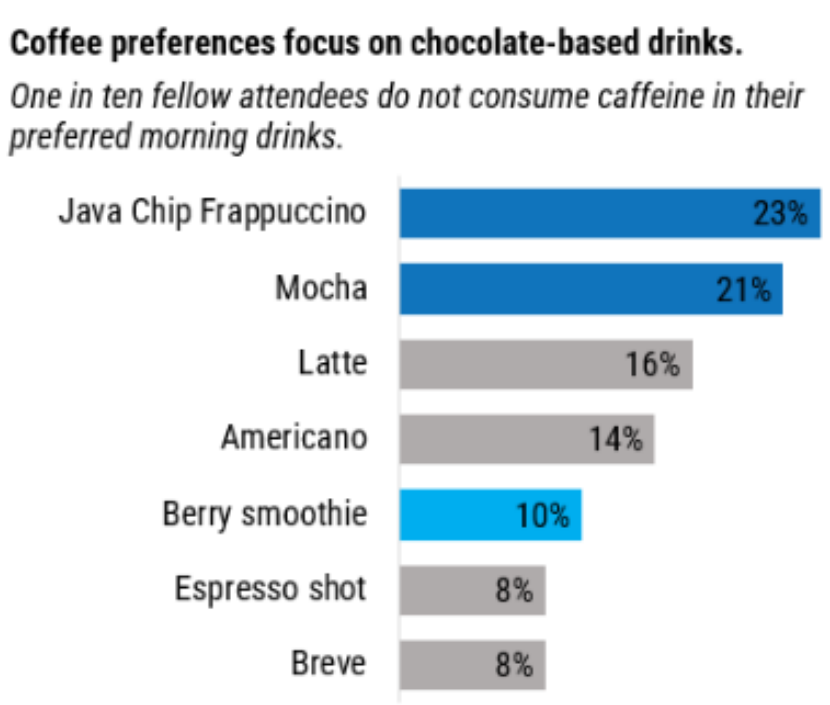
TEXT

Graphs don't contain much text, so existing text must encapsulate your message clearly and concisely.

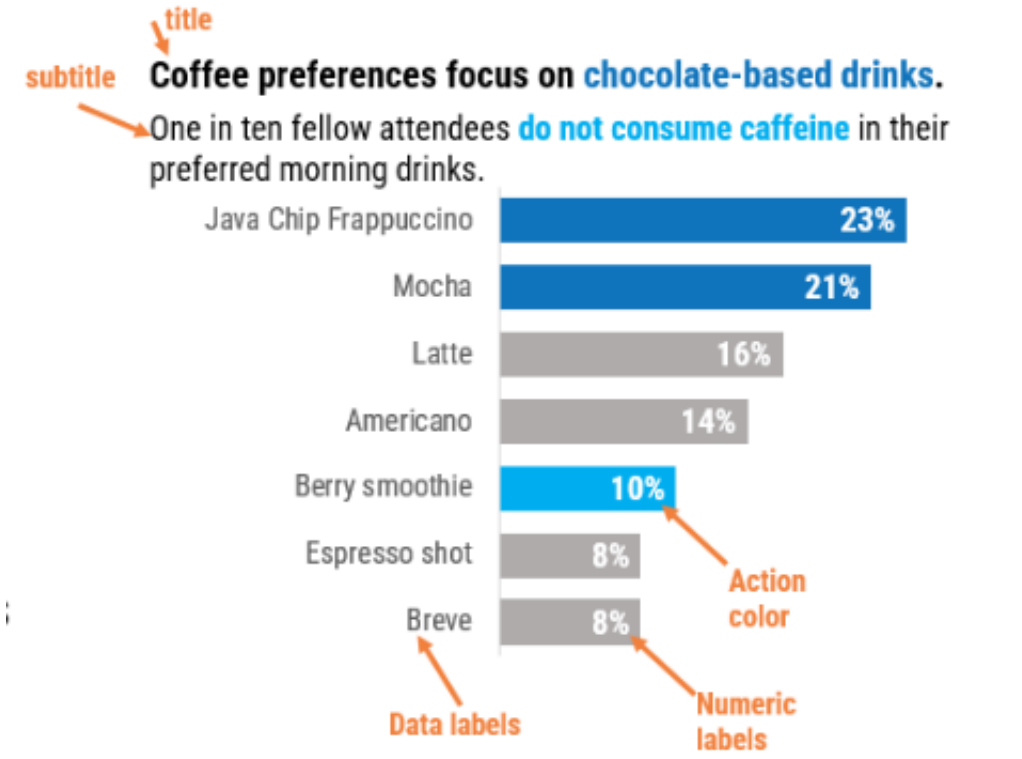
Guideline	Description	Rating
8-20 word descriptive title is a full sentence, left-justified, in upper left	Rather than a generic phrase, use a full, descriptive sentence that encapsulates a takeaway message about the graph's finding or "so what?" When communicating to Western cultures put the title in the upper left. Not centered. 	2 1 0 n/a
Subtitle and/or annotations provide additional information	Subtitles and annotations can add explanatory and interpretive power to a graph. Use them to answer potential viewer questions or to highlight specific data points. Annotations only count if they're within the graph, not in a paragraph around it.	2 1 0 n/a
Text size is hierarchical and readable	Titles are a larger font size than subtitles or annotations, which are larger than labels, which are larger than source information. The smallest text is at least 9-point font size for arm's length reading, at least 20 for large room reading 	2 1 0 n/a

Using the Checklist

Before the Checklist



After the Checklist



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Example – Obesity in Public Health Region 6

		Adult obesity				Population	% below 18 years of age	% 65 and older	% Non-Hispanic Black		% American Indian & Alaska Native		% Asian		% Native Hawaiian/Other Pacific Islander		% Hispanic		% Non-Hispanic White	
Public Health Region	County	% Adults with Obesity	95% CI - Low	95% CI - High	Z-Score	Population	% Less Than 18 Years of Age	% 65 and Over	# Black	% Black	# American Indian & Alaska Native	% American Indian & Alaska Native	# Asian	% Asian	# Native Hawaiian/Other Pacific	% Native Hawaiian/Other Pacific	# Hispanic	% Hispanic	# Non-Hispanic White	% Non-Hispanic White
1	Bremer	35	28	42	-0.05	26234	21.1	19.0	302	1.2										
1	Carroll	37	31	44	0.46	9668	21.3	23.5	228	2.4										
1	Cass	33	26	40	-0.68	20165	24.5	20.7	245	1.2										
1	Davis	31	24	39	-1.02	93453	27.4	12.1	2342	2.5										
1	Grundy	34	27	42	-0.42	8888	22.9	22.5	41	0.5										
1	Guthrie	38	30	46	0.53	12232	22.7	21.2	67	0.5										
1	Hancock	34	26	43	-0.29	14773	22.8	21.0	165	1.1										
1	Harrison	37	30	45	0.31	16846	19.5	22.6	248	1.5										
1	Jefferson	30	24	38	-1.24	37185	22.1	19.5	822	2.2										
1	Mills	31	25	38	-1.02	39369	25.3	18.5	761	1.9										
1	Pottawattami	42	39	46	1.57	490161	24.7	13.5	34140	7.0										
1	Ringgold	32	24	42	-0.80	18504	19.6	21.4	285	1.5										
1	Tama	33	27	41	-0.49	97117	16.5	12.6	2824	2.9										
1	Taylor	34	25	43	-0.32	16854	24.0	19.9	128	0.8										
1	Washington	33	26	39	-0.71	51466	24.6	16.0	456	0.9										
1	Winnebago	40	32	49	1.13	35904	21.6	18.8	1606	4.5										
2	Appanoose	45	35	53	2.22	13687	23.5	23.5	207	1.5										
2	Buchanan	39	32	45	0.75	25062	22.4	19.9	288	1.1										
2	Calhoun	35	28	44	-0.05	14439	22.2	22.9	44	0.3										
2	Cherokee	35	28	43	-0.08	42450	20.8	22.3	819	1.9										
2	Clarke	40	30	50	1.13	11933	23.4	21.2	65	0.5										
2	Fayette	39	32	46	0.75	9208	20.3	21.6	107	1.2										
2	Floyd	43	36	50	1.83	19650	21.0	21.5	296	1.5										
2	Franklin	48	40	57	3.00	15642	22.8	22.2	433	2.8										
2	Fremont	36	28	44	0.17	10070	23.3	21.4	67	0.7										
2	Hardin	41	34	48	1.35	10630	22.0	22.8	89	0.8										
2	Humboldt	32	24	41	-0.75	9158	24.9	20.9	57	0.6										
2	Ida	32	23	41	-0.88	9558	23.4	22.1	71	0.7										
2	Lee	39	33	44	0.75	14813	22.0	24.4	148	1.0										
2	Monona	33	25	42	-0.49	10586	23.7	21.4	56	0.5										
2	Winneshiek	31	25	38	-1.00	10354	21.8	22.0	147	1.4										
2	Woodbury	35	31	39	-0.15	19991	18.5	21.1	157	0.8										
2	Wright	38	31	47	0.72	7381	20.7	20.9	60	0.8										
2						12562	24.4	23.1	107	0.9										
3	Butler	33	27	40	-0.54	19620	25.7	16.7	565	2.9										

		Adult obesity			
Public Health Region	OB	% Adults with Obesity	95% CI - Low	95% CI - High	Z-Score
6	Benton	37	31	43	0.26
6	Black Hawk	31	28	34	-1.07
6	Buchanan	39	32	45	0.75
6	Cedar	41	34	48	1.35
6	Clayton	41	35	48	1.37
6	Clinton	35	30	40	-0.17
6	Delaware	35	28	42	-0.15
6	Dubuque	37	33	42	0.46
6	Iowa	37	30	44	0.26
6	Jackson	34	28	42	-0.25
6	Johnson	27	24	30	-2.04
6	Jones	35	28	42	-0.10
6	Linn	33	31	36	-0.49
6	Scott	34	31	38	-0.32

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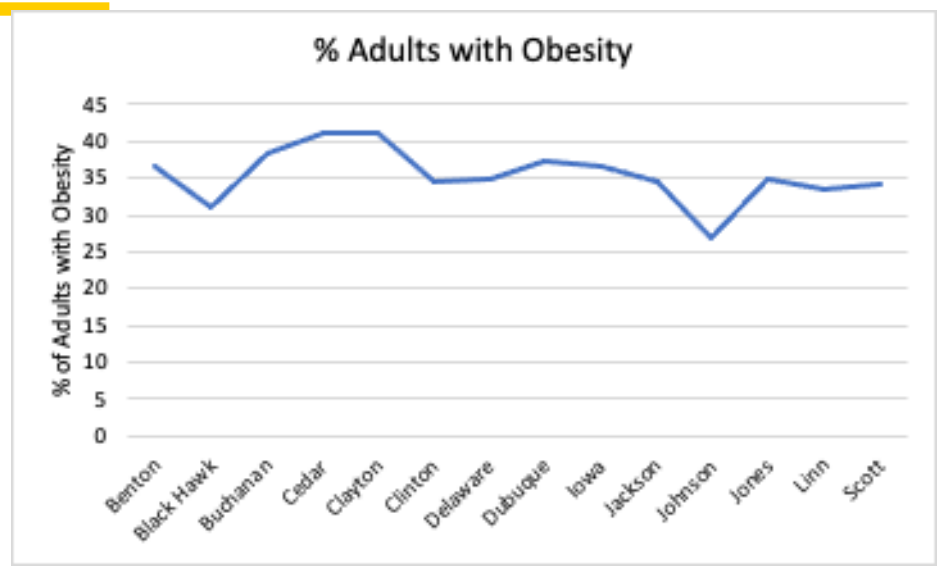
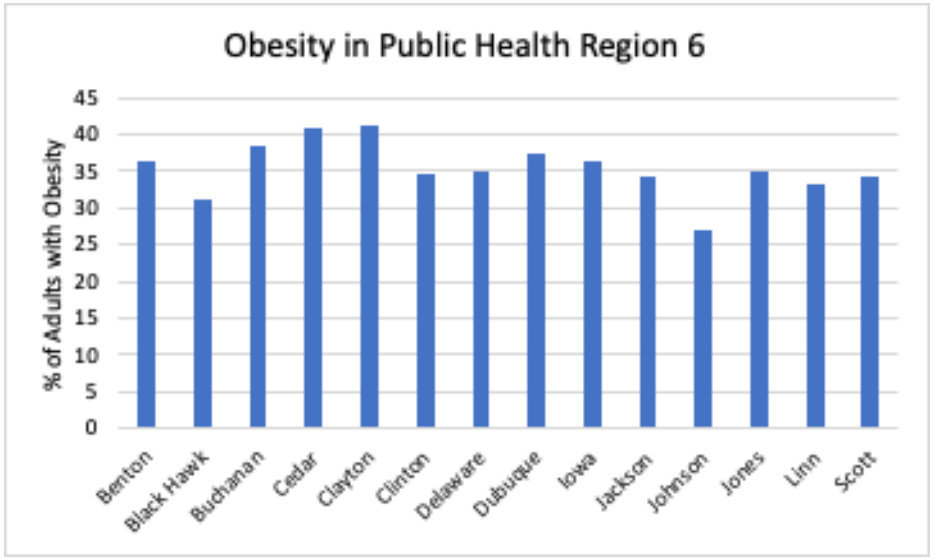
Example – Obesity in Public Health Region 6

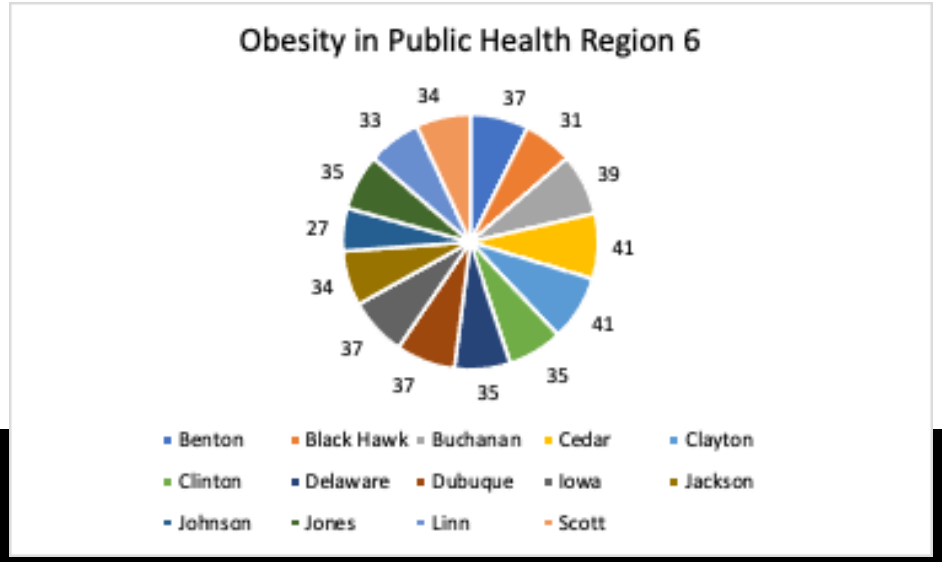
A



B



C



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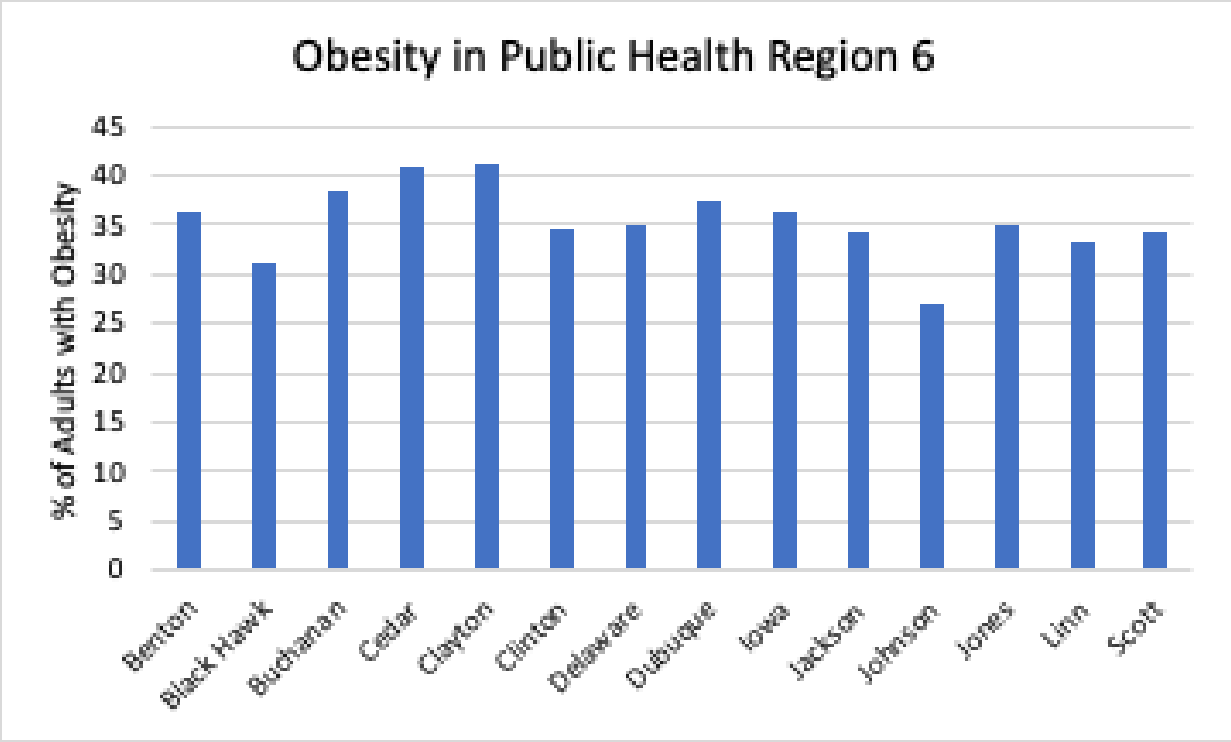
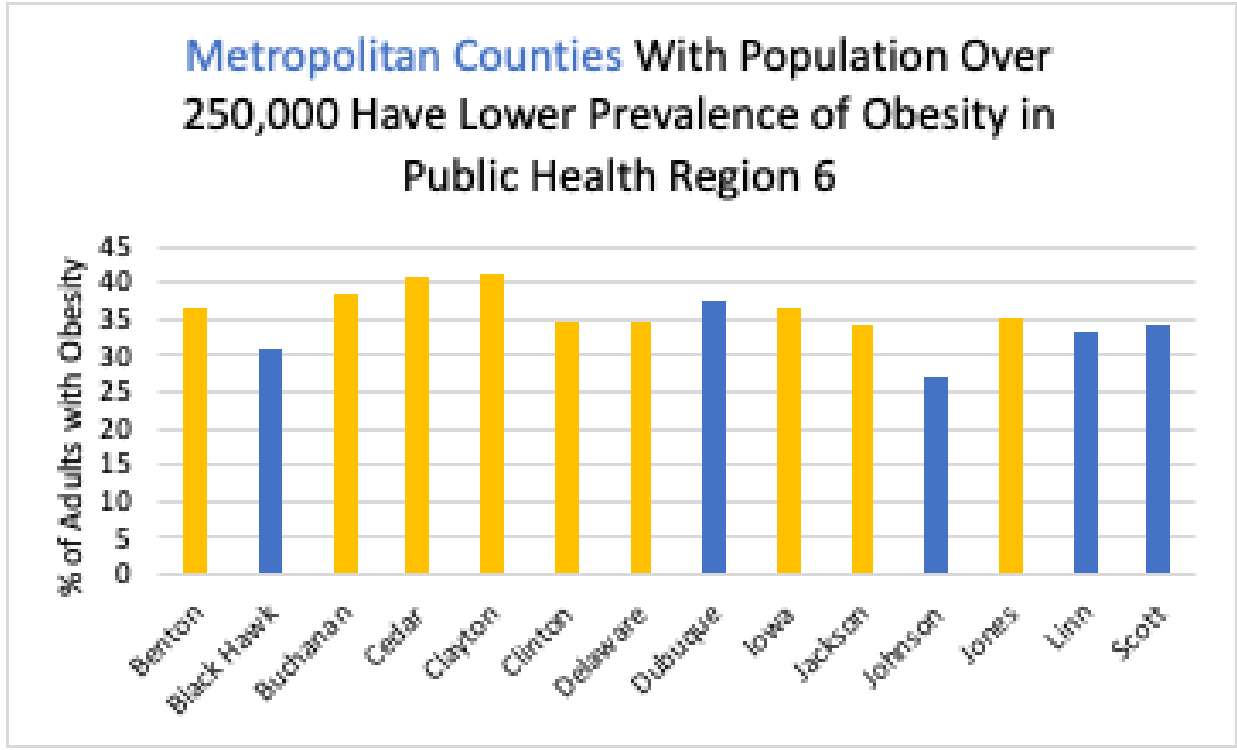
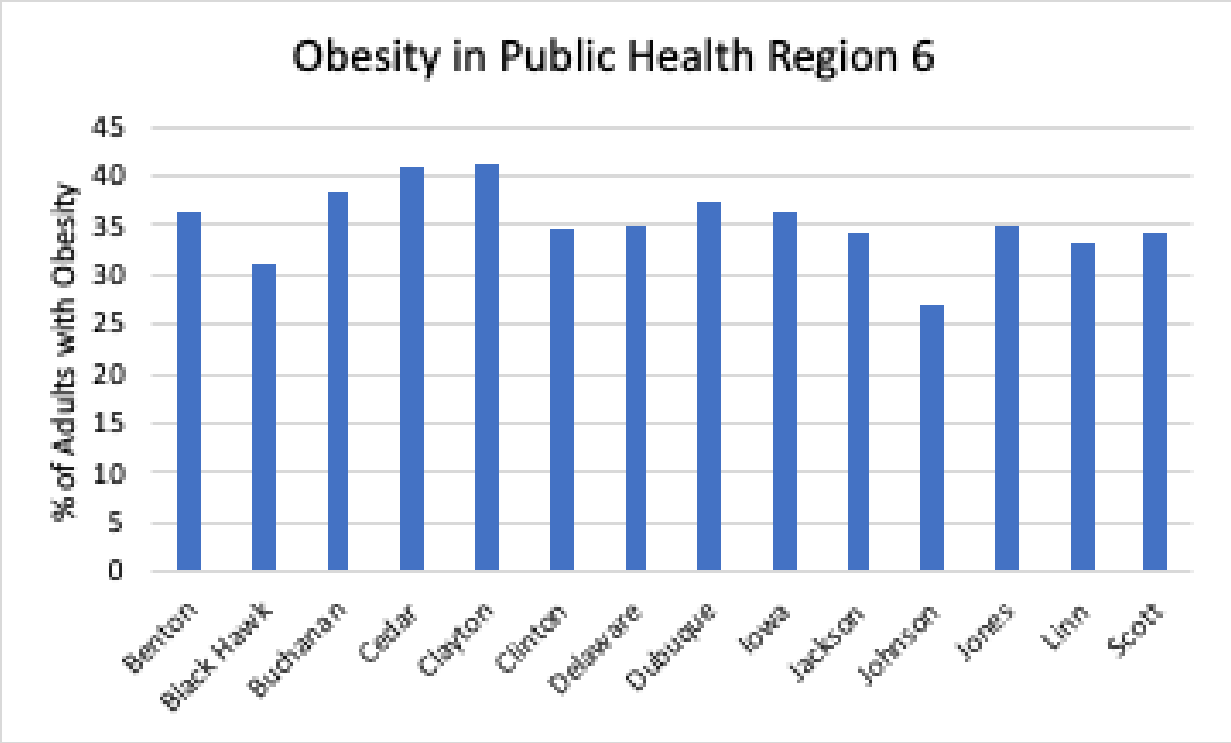
https://www.countyhealthrankings

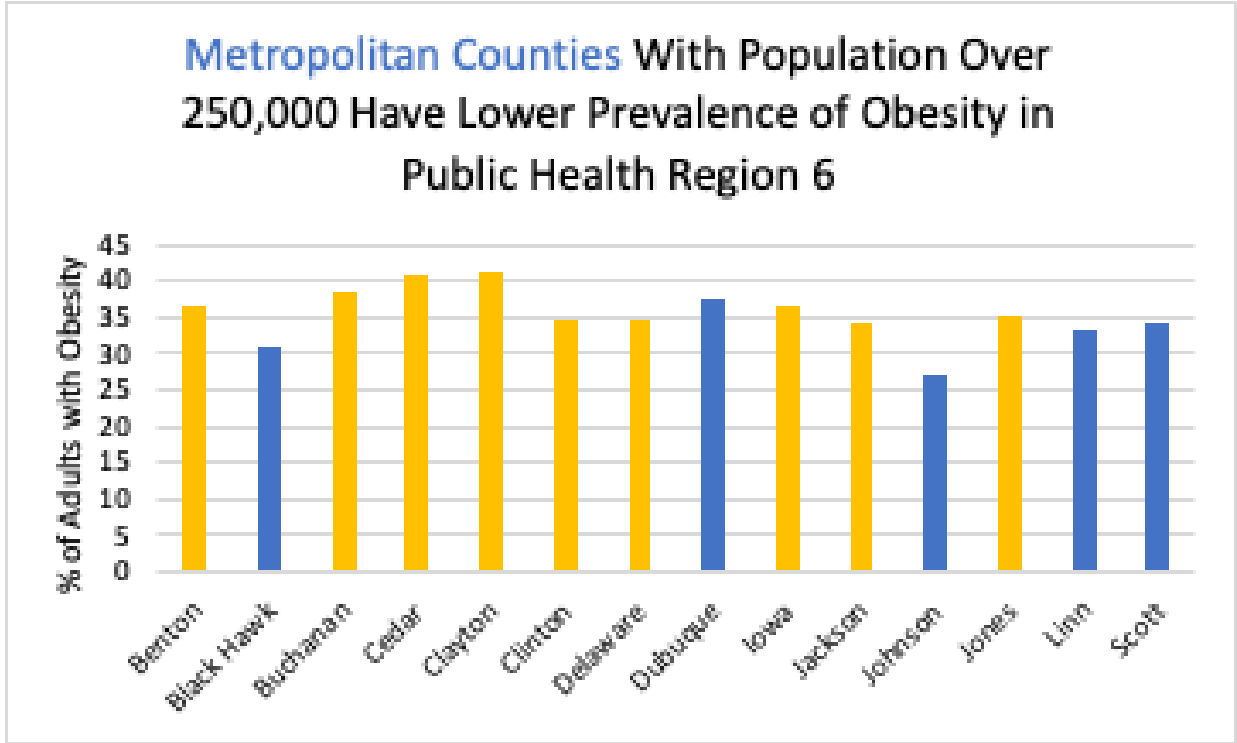
Example – Obesity in Public Health Region 6





Example – Obesity in Public Health Region 6





Source: https://www.countyhealthrankings.org/app/iowa/2020/downloads

HP2030 Reduce the proportion of adults with obesity. Target 36.0%

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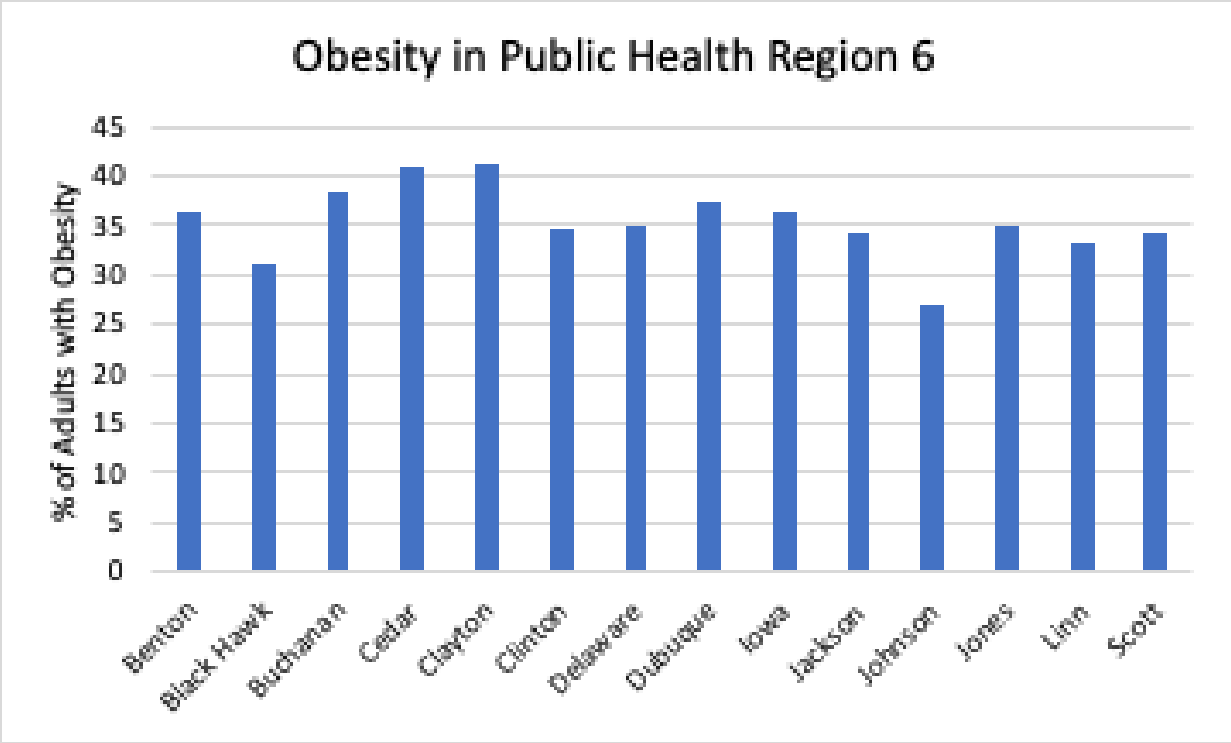
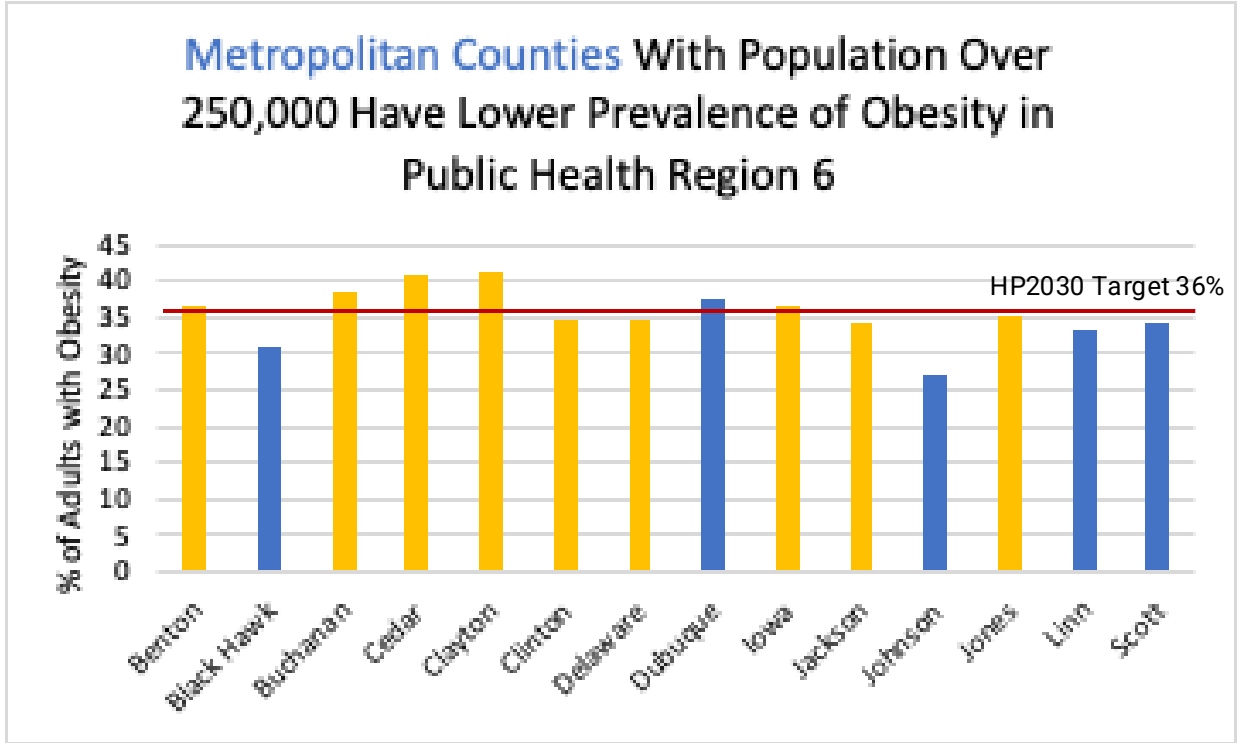
Example – Obesity in Public Health Region 6





Source: https://www.countyhealthrankings.org/app/iowa/2020/downloads

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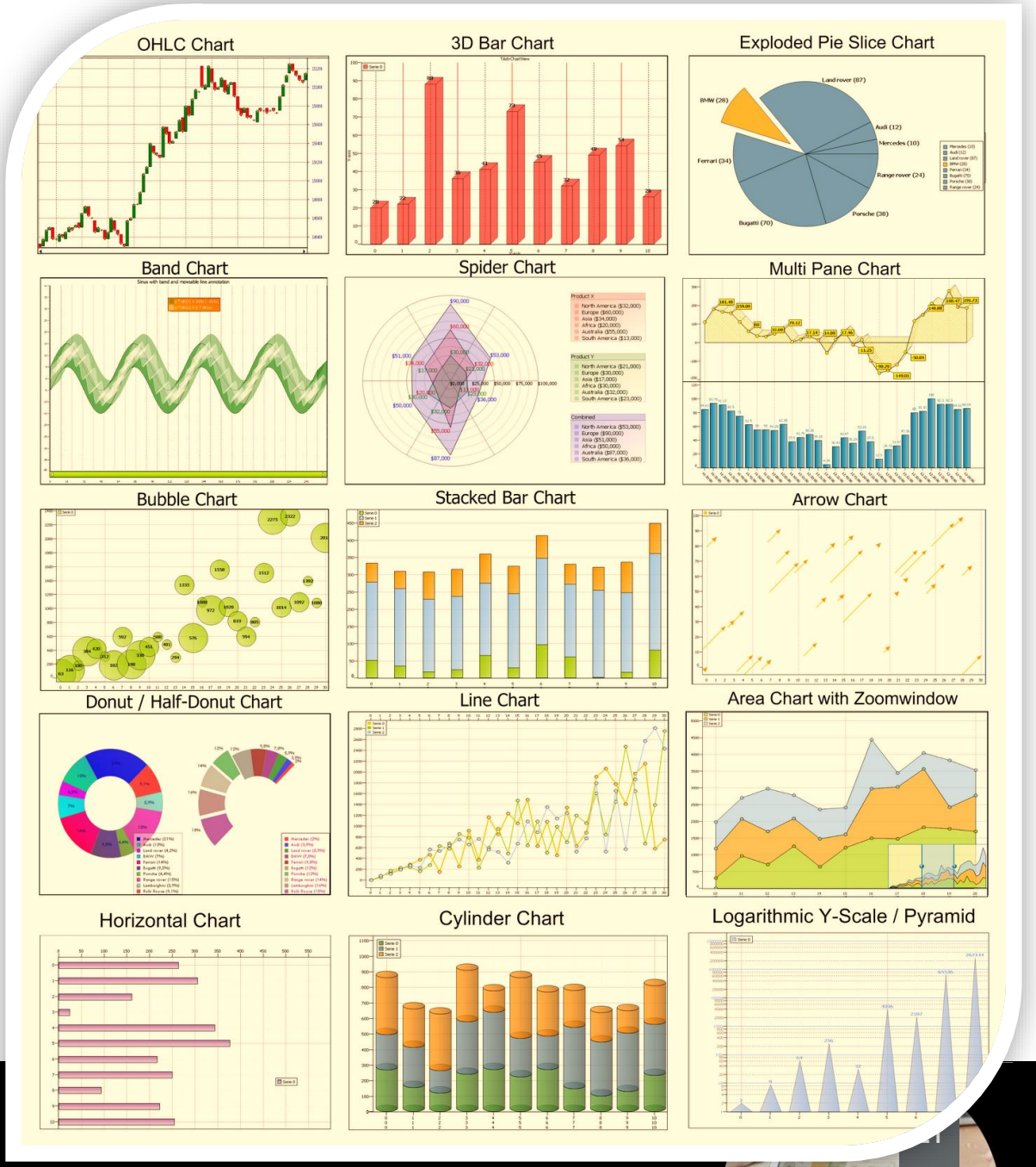
Small Group Activity #2

20 minutes

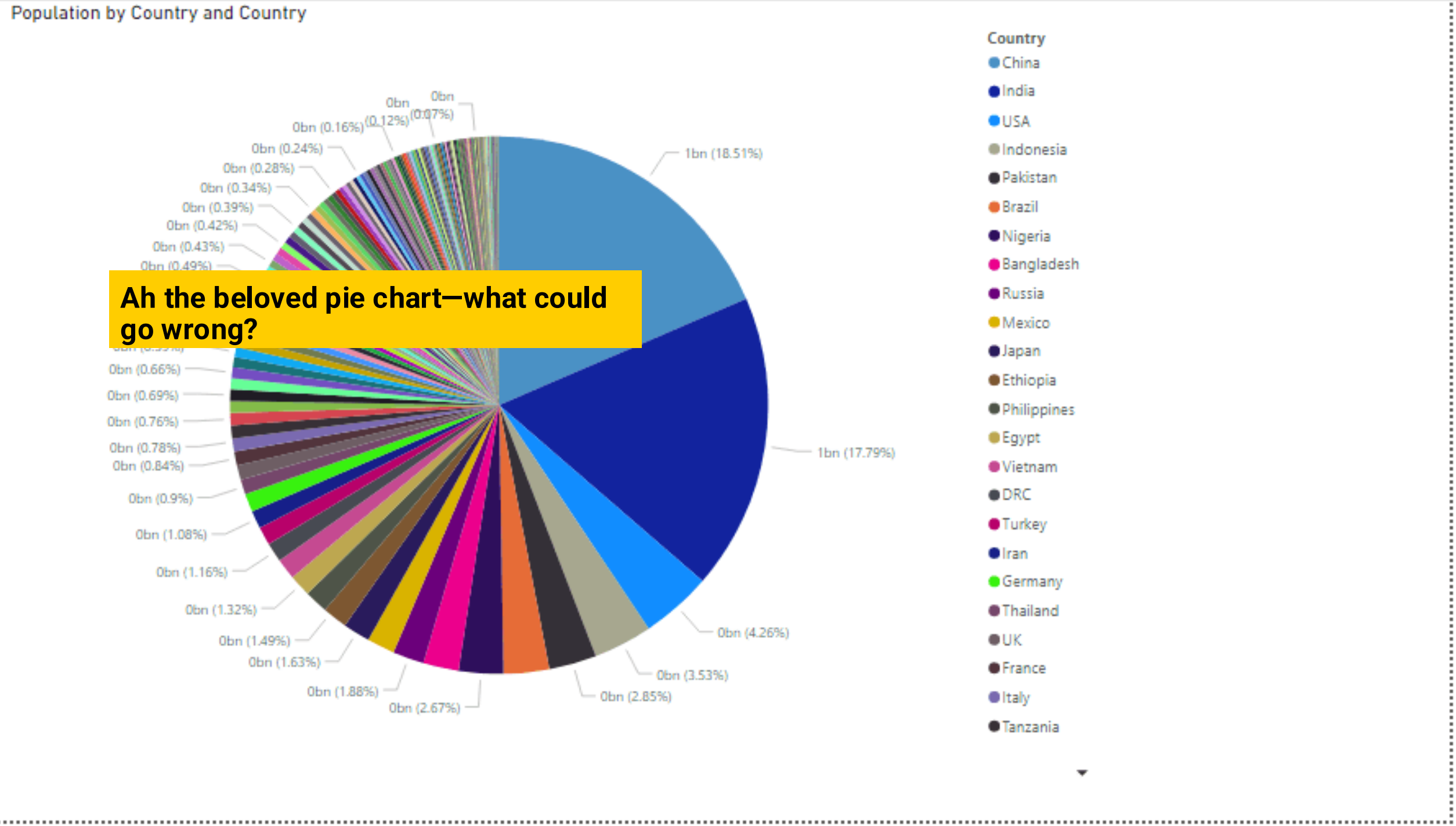


Now use the checklist to evaluate each other’s work

DEBRIEF

- Anything that was new or WOW for you?
- Any common missteps?
- Anything that you can start using in your next data visualization?

Module 3


Population by Country and Country
Ah the beloved pie chart—what could go wrong?
1bn (18.51%)
1bn (17.79%)
0bn (4.26%)
0bn (3.53%)
0bn (2.85%)
0bn (2.67%)
0bn (1.88%)
0bn (1.63%)
0bn (1.49%)
0bn (1.32%)
0bn (1.16%)
0bn (1.08%)
0bn (0.9%)
0bn (0.84%)
0bn (0.78%)
0bn (0.76%)
0bn (0.69%)
0bn (0.66%)
0bn (0.49%)
0bn (0.43%)
0bn (0.42%)
0bn (0.39%)
0bn (0.34%)
0bn (0.28%)
0bn (0.24%)
0bn (0.16%)
0bn (0.12%)
0bn (0.07%)
Country
China
India
USA
Indonesia
Pakistan
Brazil
Nigeria
Bangladesh
Russia
Mexico
Japan
Ethiopia
Philippines
Egypt
Vietnam
DRC
Turkey
Iran
Germany
Thailand
UK
France
Italy
Tanzania

Learning Objectives

1. Evaluate key elements of an effective data visualization
2. Use EXCEL to create a data visualization for your specific question/data
3. Apply a variety of data visualization tools and resources to create audience specific msg

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Once I have chosen the right chart to use—how do I actually make it?

A single number (number of cases; prevalence rate; percentage) Big number [1] Icon array [2] Pie chart Bar/column chart	**Comparison (showing disparities between groups; comparing county rates; showing differences between years)** Side-by-side column chart Slope graph [3] Back-to-back bar chart [4] Dot plot [5] Small multiples [6]
Beating a benchmark (comparing your county to the state rate or to HP2020 objective) Column chart with benchmark line [7] Combo chart [8]	**Survey results (this will depend on the type of question/response categories you are using)** Stacked bar chart Small multiples [6] Back-to-back bar chart [4] Bar/column chart Number and icon Pie chart
Parts of a whole Pie chart Stacked bar chart Histogram [9] Map	**Correlations (you want to visually show how two factors are related)** Scatterplot Diagram Don't visualize
Change over time (comparing rates over time-one group or multiple groups) Line chart Stacked column chart Deviating bar chart (akin to back-to-back) Slope graph [3] Dot plot	**Qualitative data** Word cloud Picture with text

Adapted from Evergreen, S. D. H. (2017). *Effective data visualization: The right chart for the right data.*

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Pivot Charts

Excel

Tableau Public

Resources to create charts, infographics, etc.

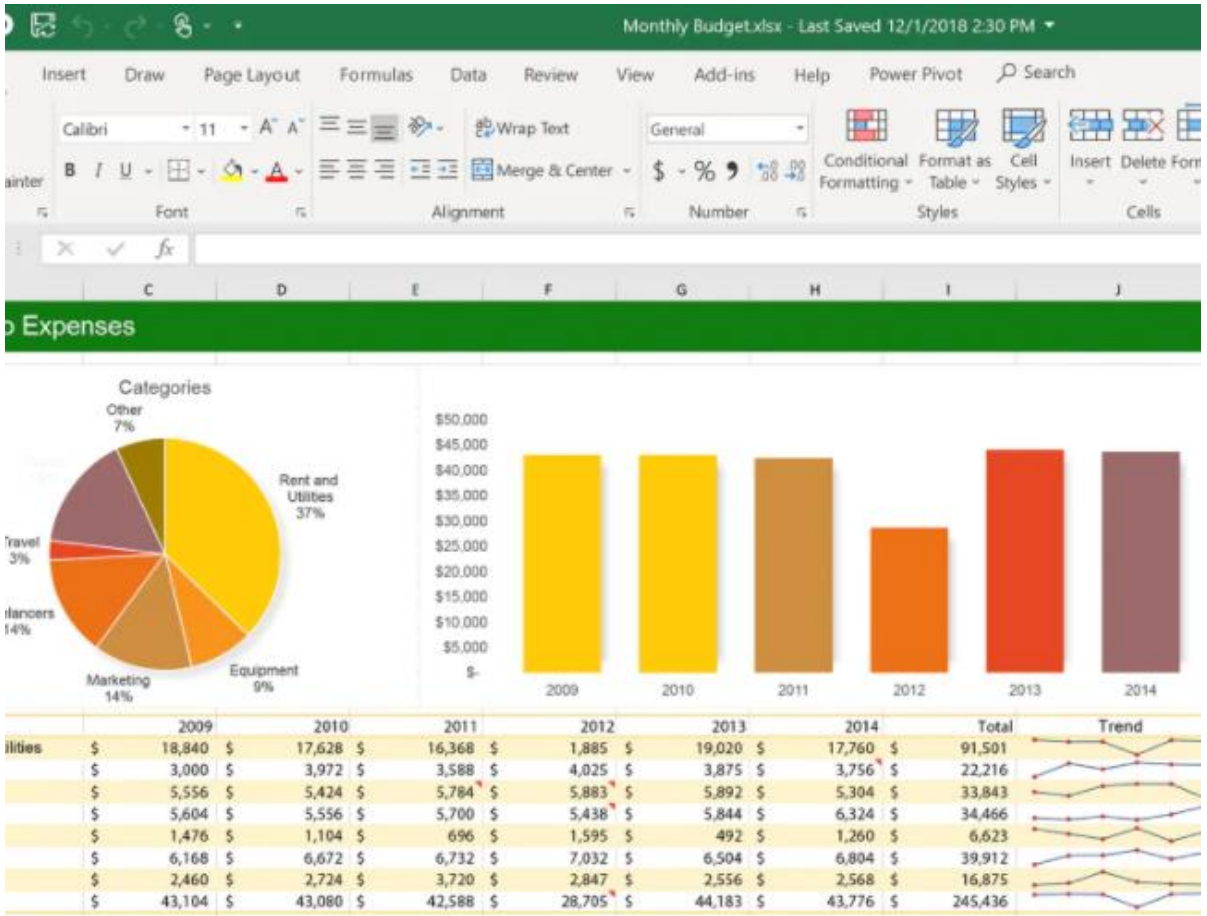
Icon Array

Infogr.am

Google Charts

Piktochart

Why should we use Excel to make charts and graphs?



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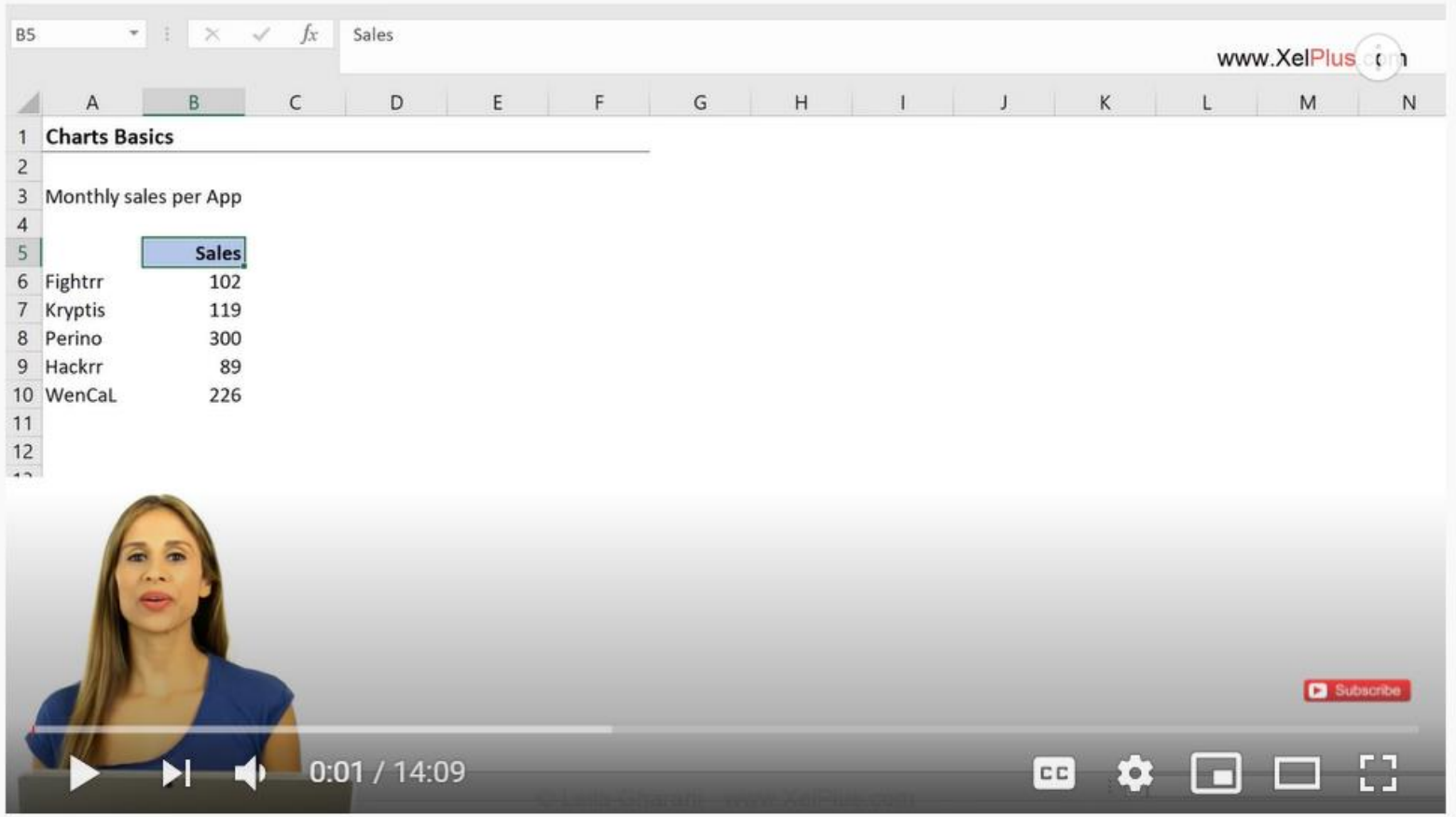
The Excel Spreadsheet

Getting Started Making Charts in Excel



#MsExcel

Excel Charts & Graphs: Learn the Basics for a Quick Start

https://www.youtube.com/watch?v=DAU0qqh_I-A

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And for other “road less taken” charts

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INTENTIONAL REPORTING & DATA VISUALIZATION

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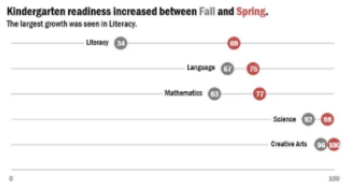
Collection

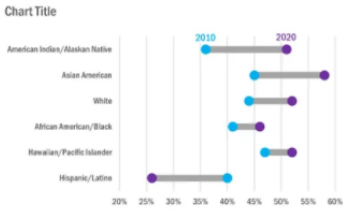
How to Build Data Visualizations in Excel

When I show people a dot plot, the first thing they say is “Cool, but how do I make that?” and this page has all your answers. From time to time I publish blog posts with step-by-step directions on how to make amazing visualizations right inside Excel and I’ve collected those instructions for you right here.

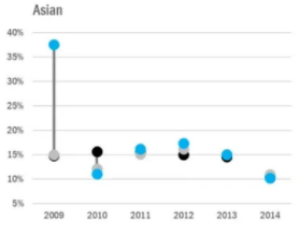
You’ll find more chart choices with updated instructions on how to make them – AND my Quantitative Chart Chooser – in my book, Effective Data Visualization.



Dot Plot



Horizontal Dumbbells



Vertical Dumbbells

https://stephanieevergreen.com/how-to/

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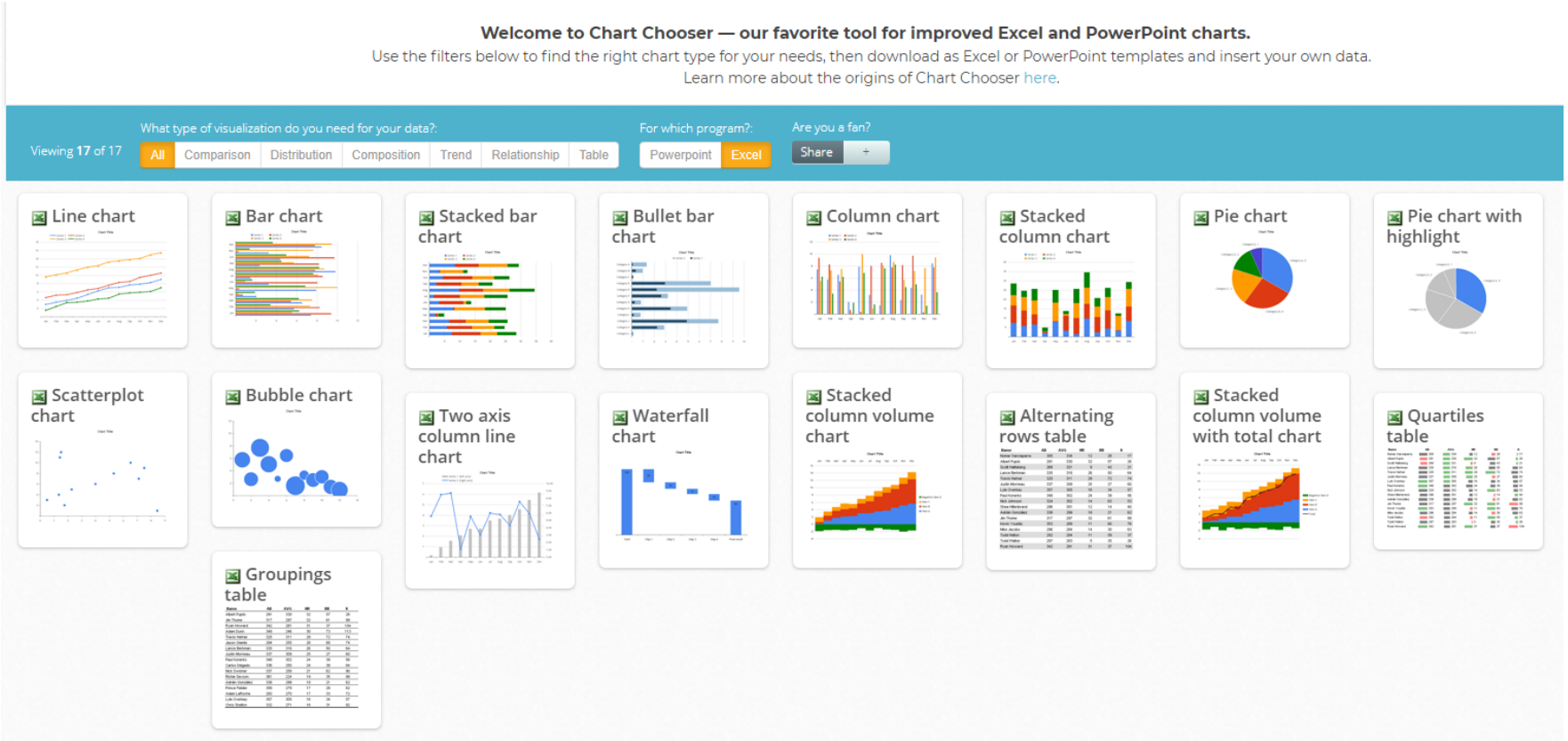
And for those who like “point and click”



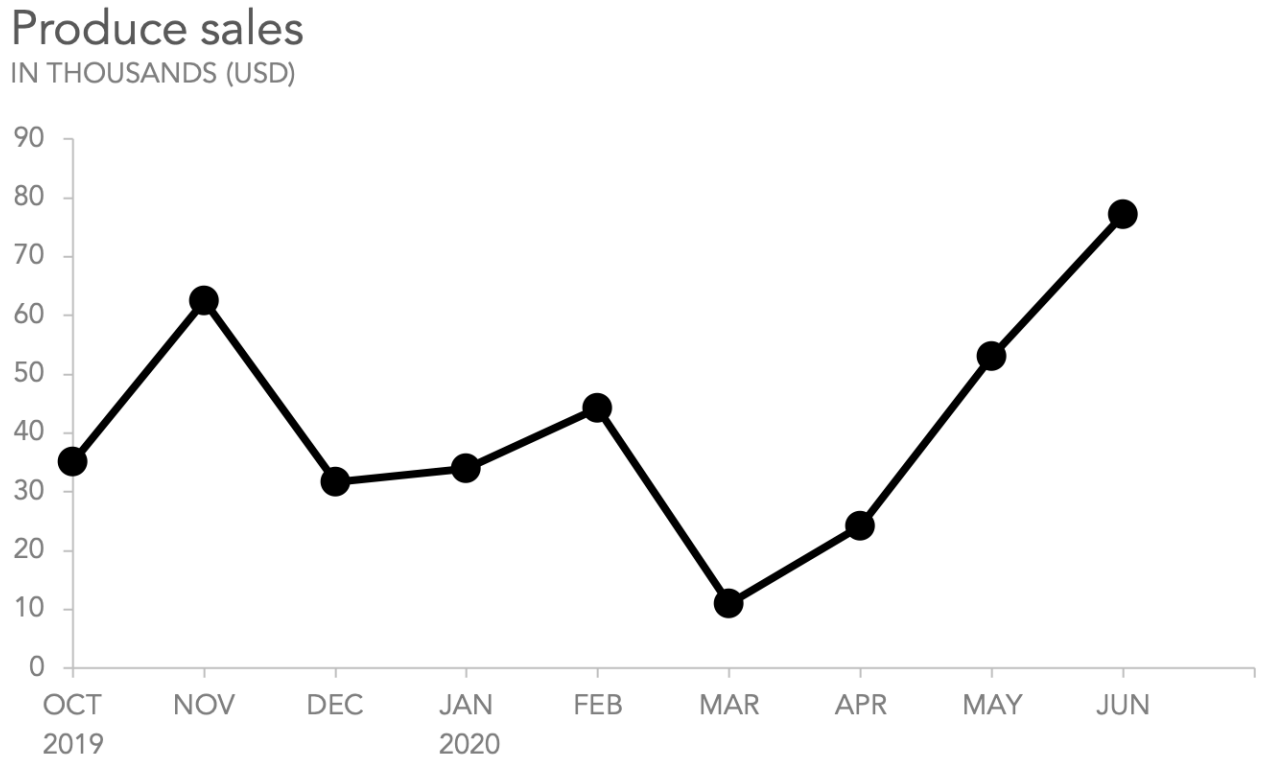
http://labs.juiceanalytics.com/chartchooser/index.html

Let’s Start With Some Basic Charts/Graphs

Line Chart

Ideal for time series data (e.g., trends over time).

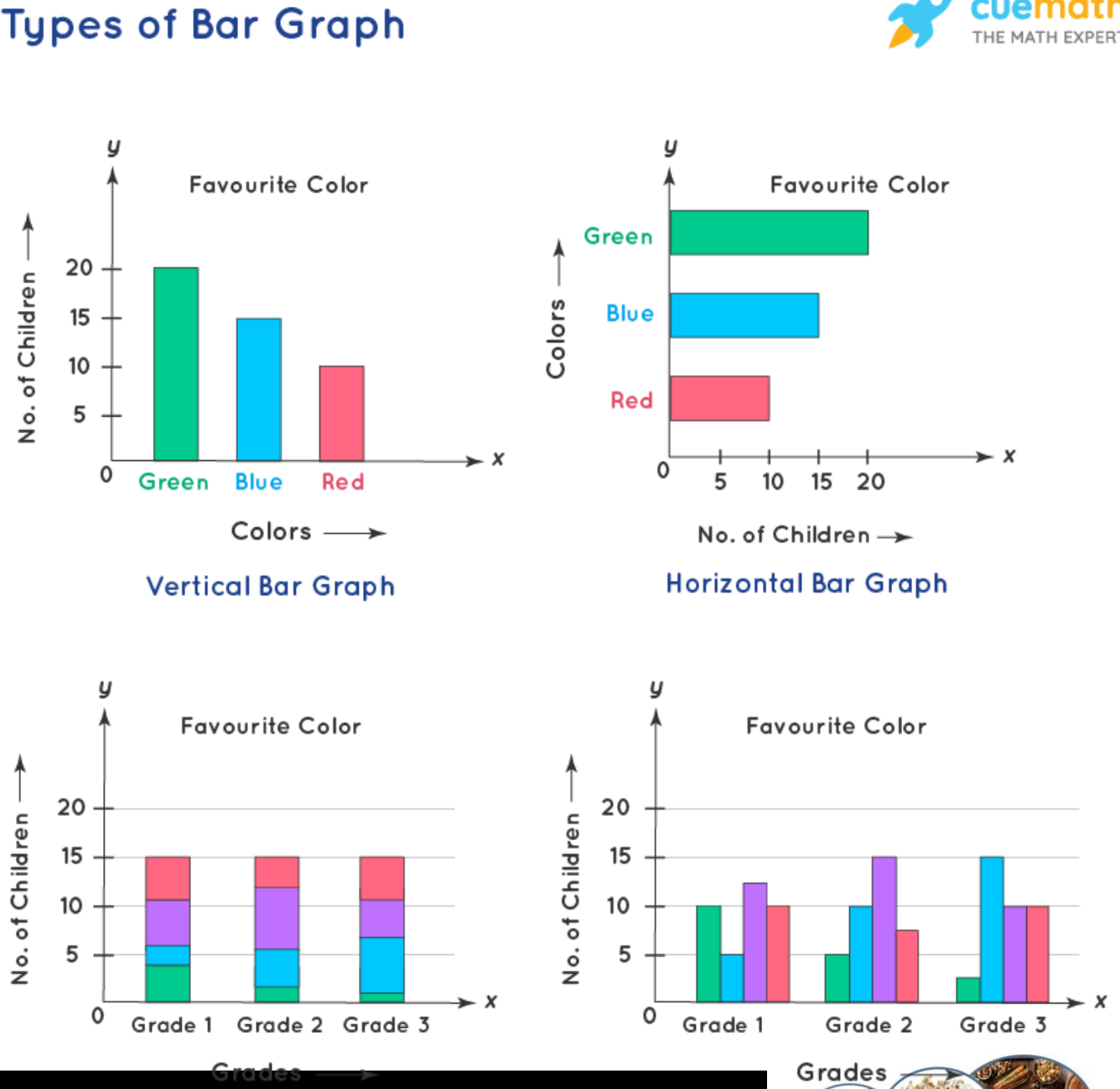
- **Advantages**: Shows trends over time, good for continuous data.
- **Disadvantages**: May not work well for categorical data.



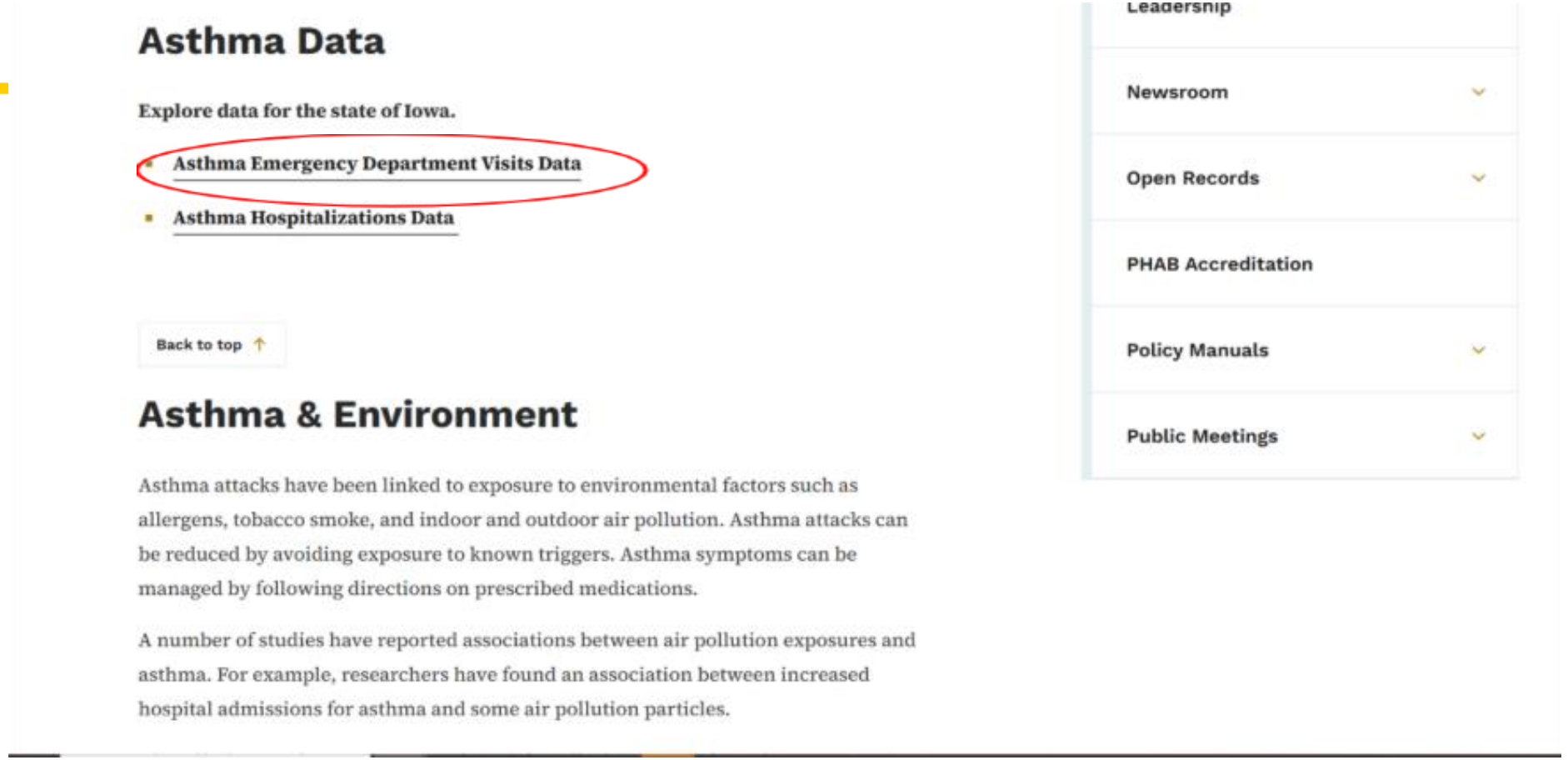
Bar Charts

Great for comparisons between categories.

- **Advantages**: Easy to compare categories, clear representation.
- **Disadvantages**: Can become cluttered with too many categories.



Let's Create Some Common Charts/Graphs



Asthma Data

Explore data for the state of Iowa.

- Asthma Emergency Department Visits Data
- Asthma Hospitalizations Data

Back to top

Asthma & Environment

Asthma attacks have been linked to exposure to environmental factors such as allergens, tobacco smoke, and indoor and outdoor air pollution. Asthma attacks can be reduced by avoiding exposure to known triggers. Asthma symptoms can be managed by following directions on prescribed medications.

A number of studies have reported associations between air pollution exposures and asthma. For example, researchers have found an association between increased hospital admissions for asthma and some air pollution particles.

Leadership

Newsroom

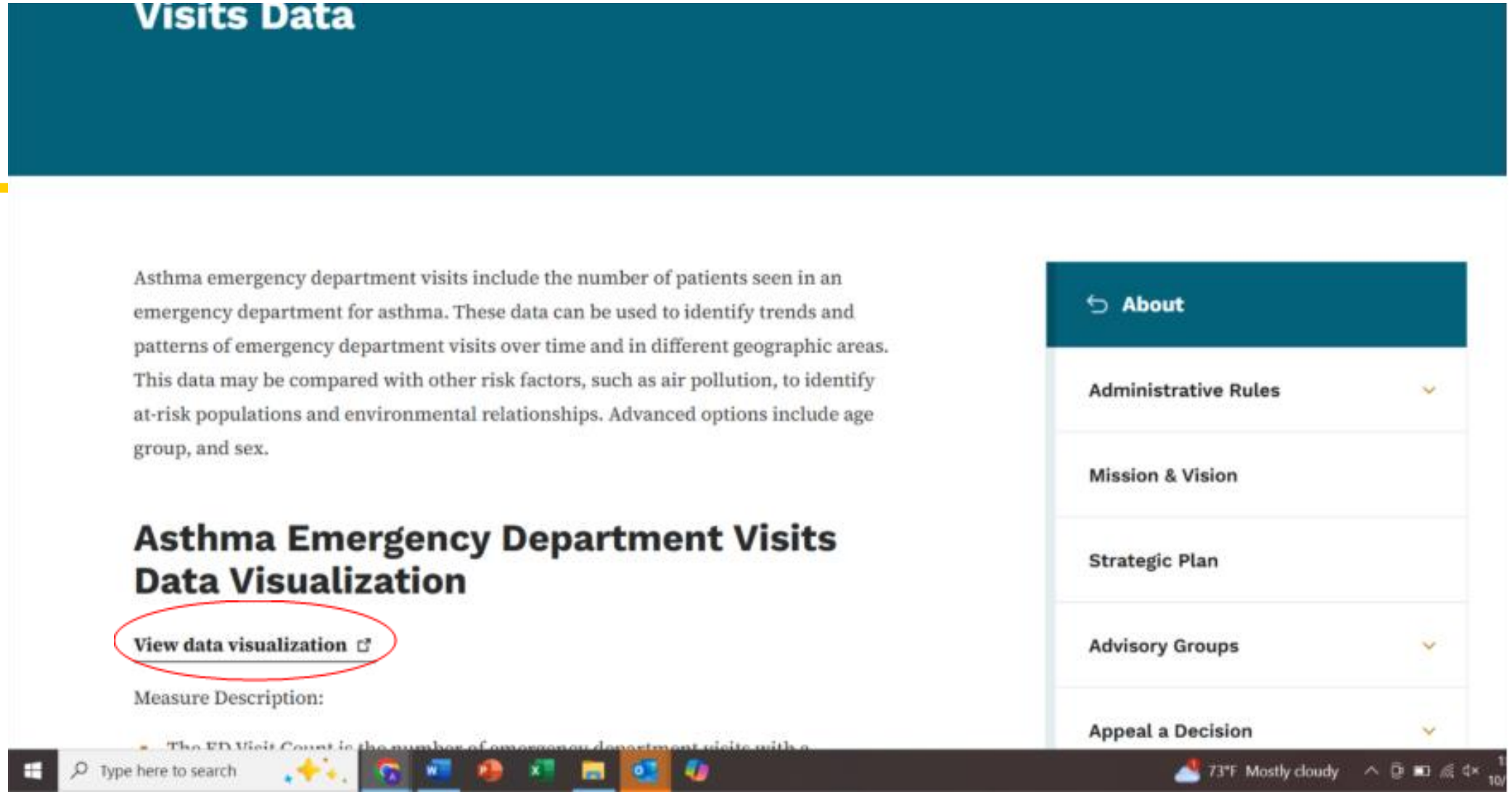
Open Records

PHAB Accreditation

Policy Manuals

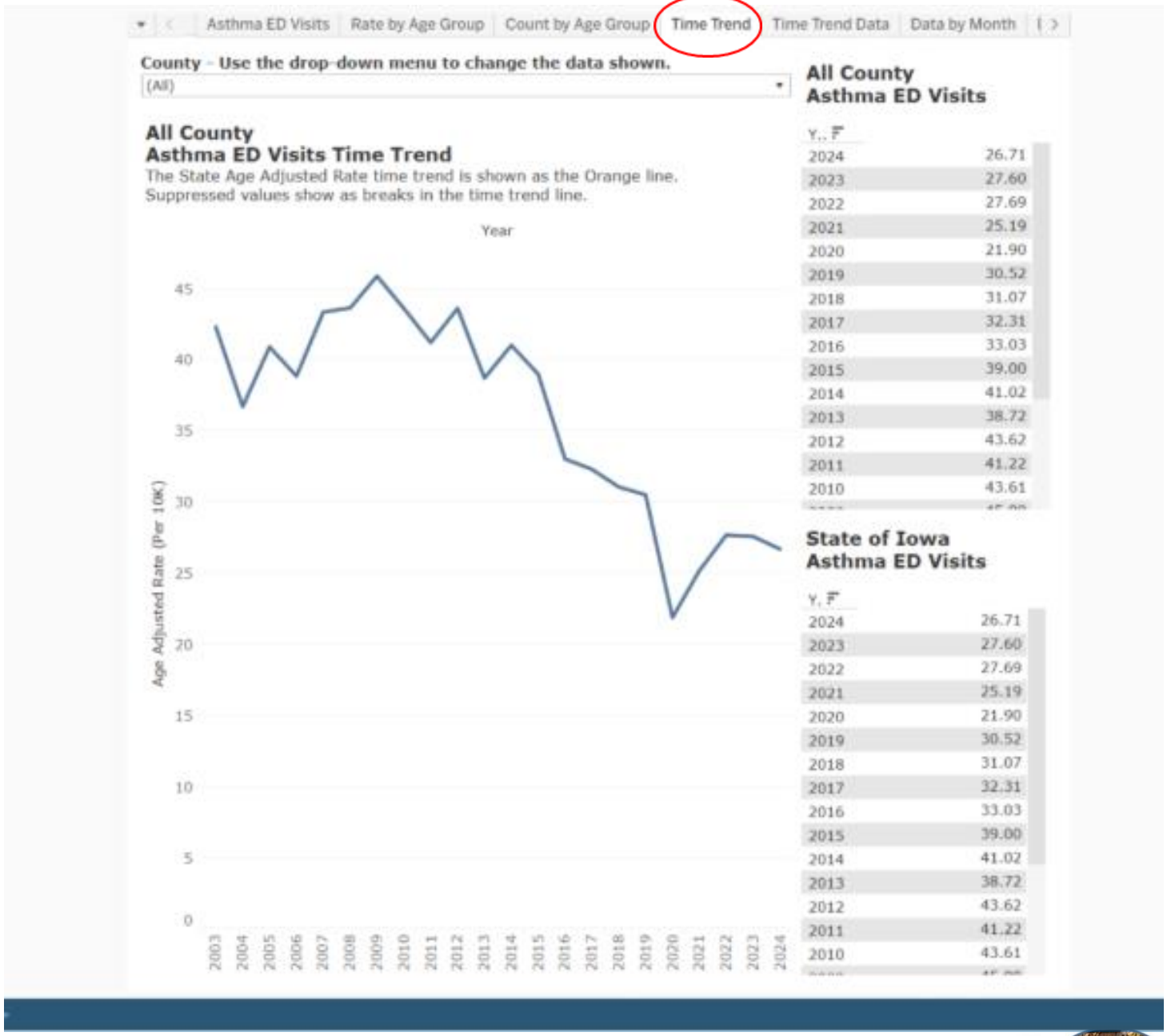
Public Meetings

Iowa Health and Human Services Asthma webpage. Click on "Asthma Emergency Department Visits Data."

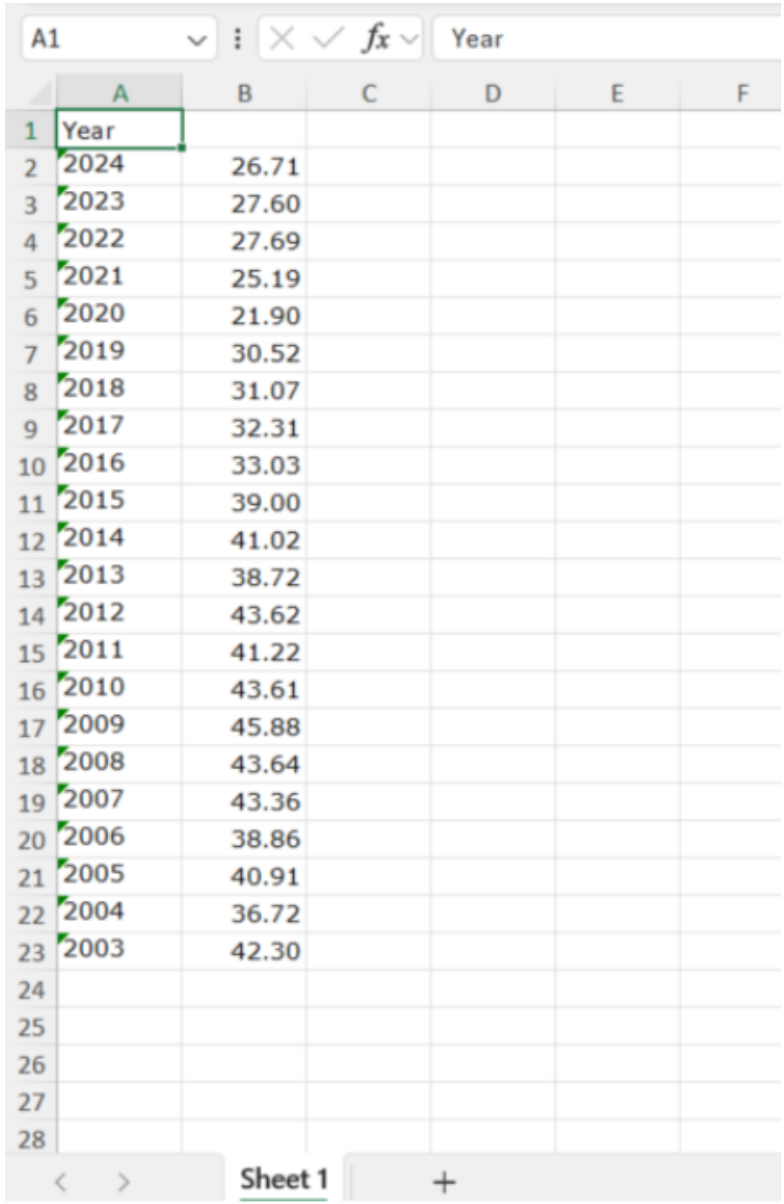


Click on “View data visualization.”

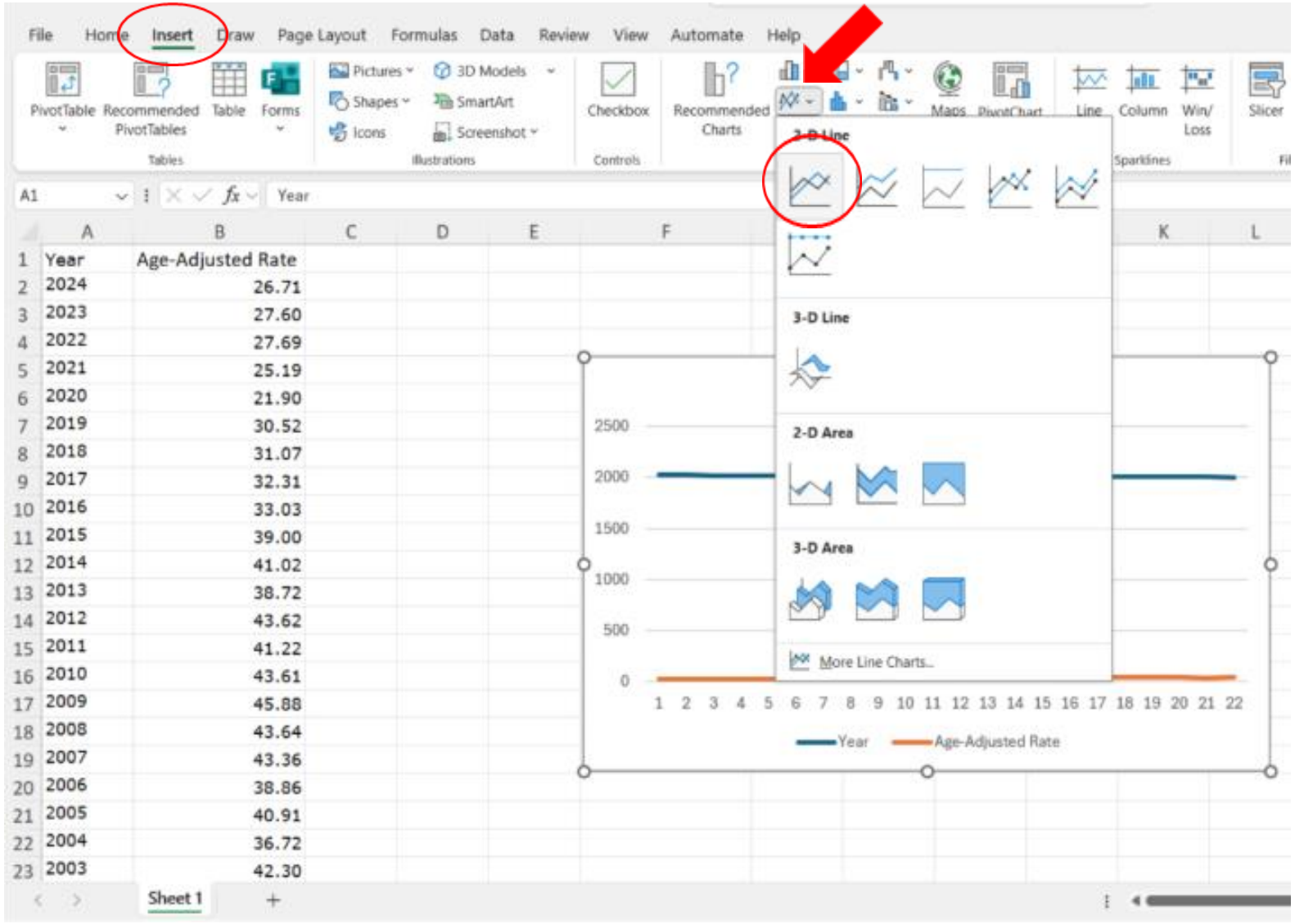
At the top of the page, click on “Time Trend” to see the line chart to the right. At the bottom right hand corner of the page, there is an icon where you can download the Excel data file for this line chart. Download the data and open it in Excel.



This is the data that should be downloaded from the Excel file. Highlight all the years and select “convert to number” from the icon that appears next to the highlighted area.

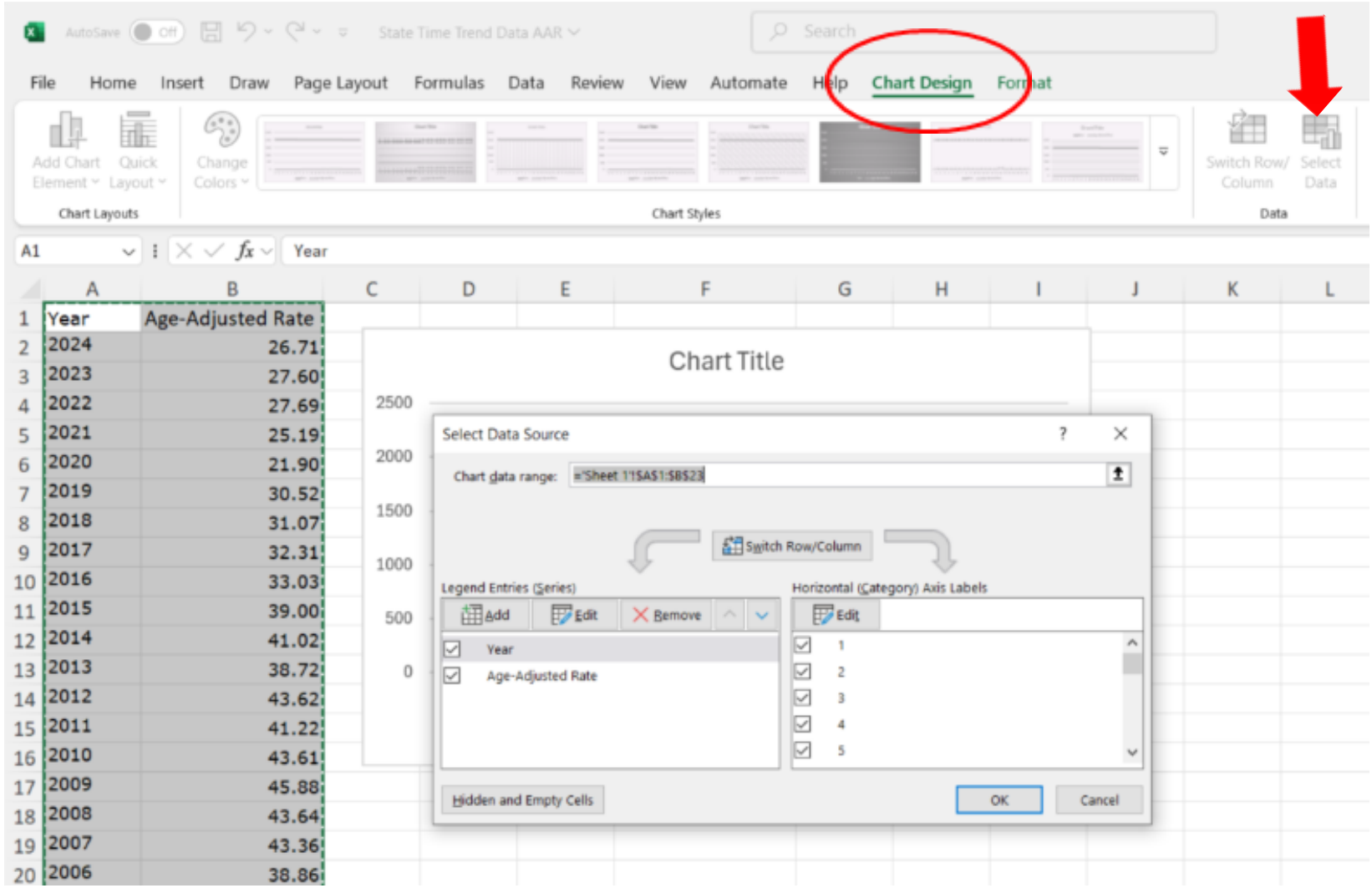


1. Highlight the data, click the “Insert” tab at the top of the Excel document
2. Choose the “line chart” option from the “charts” section.

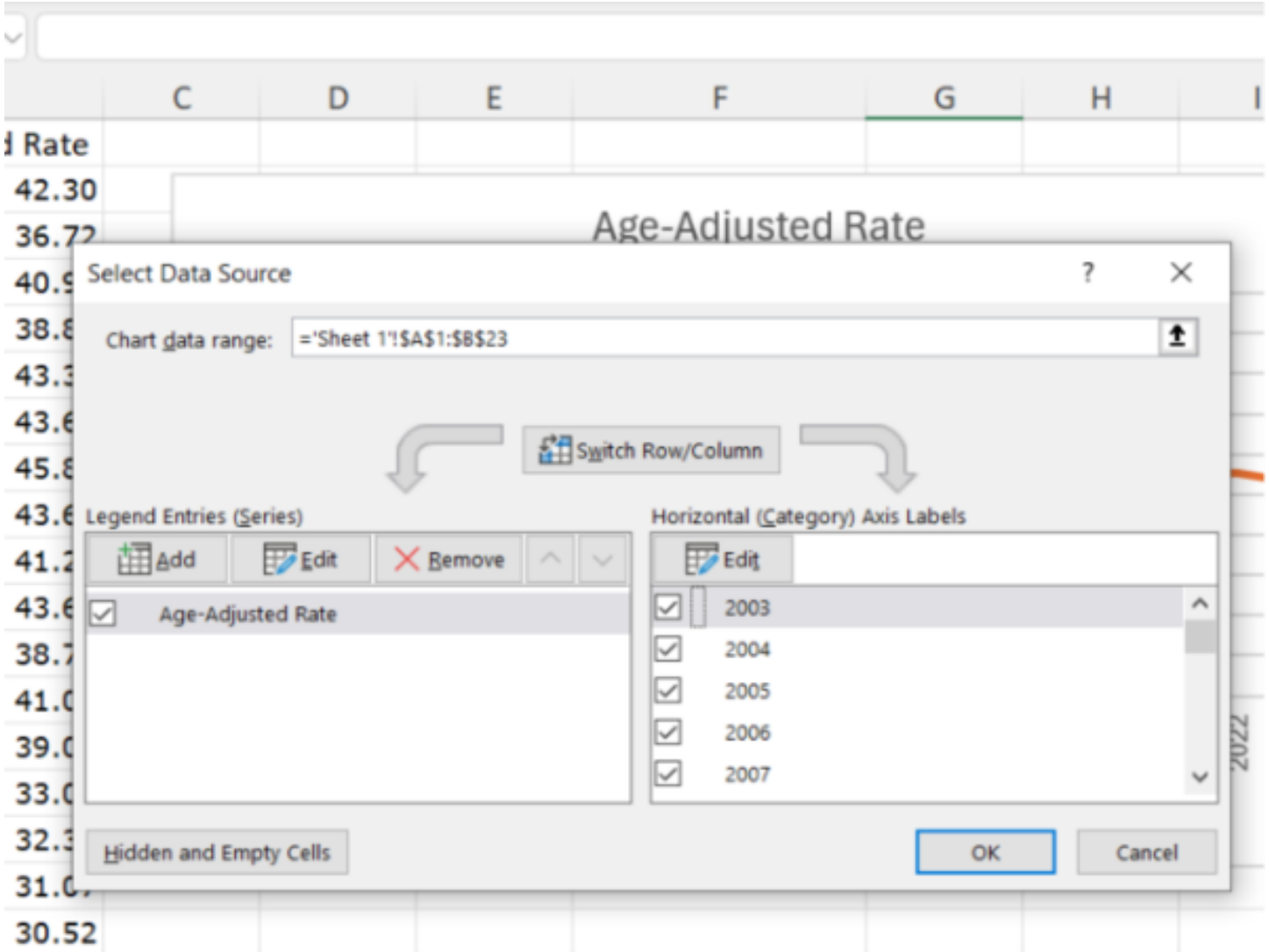


Year	Age-Adjusted Rate
2024	26.71
2023	27.60
2022	27.69
2021	25.19
2020	21.90
2019	30.52
2018	31.07
2017	32.31
2016	33.03
2015	39.00
2014	41.02
2013	38.72
2012	43.62
2011	41.22
2010	43.61
2009	45.88
2008	43.64
2007	43.36
2006	38.86
2005	40.91
2004	36.72
2003	42.30

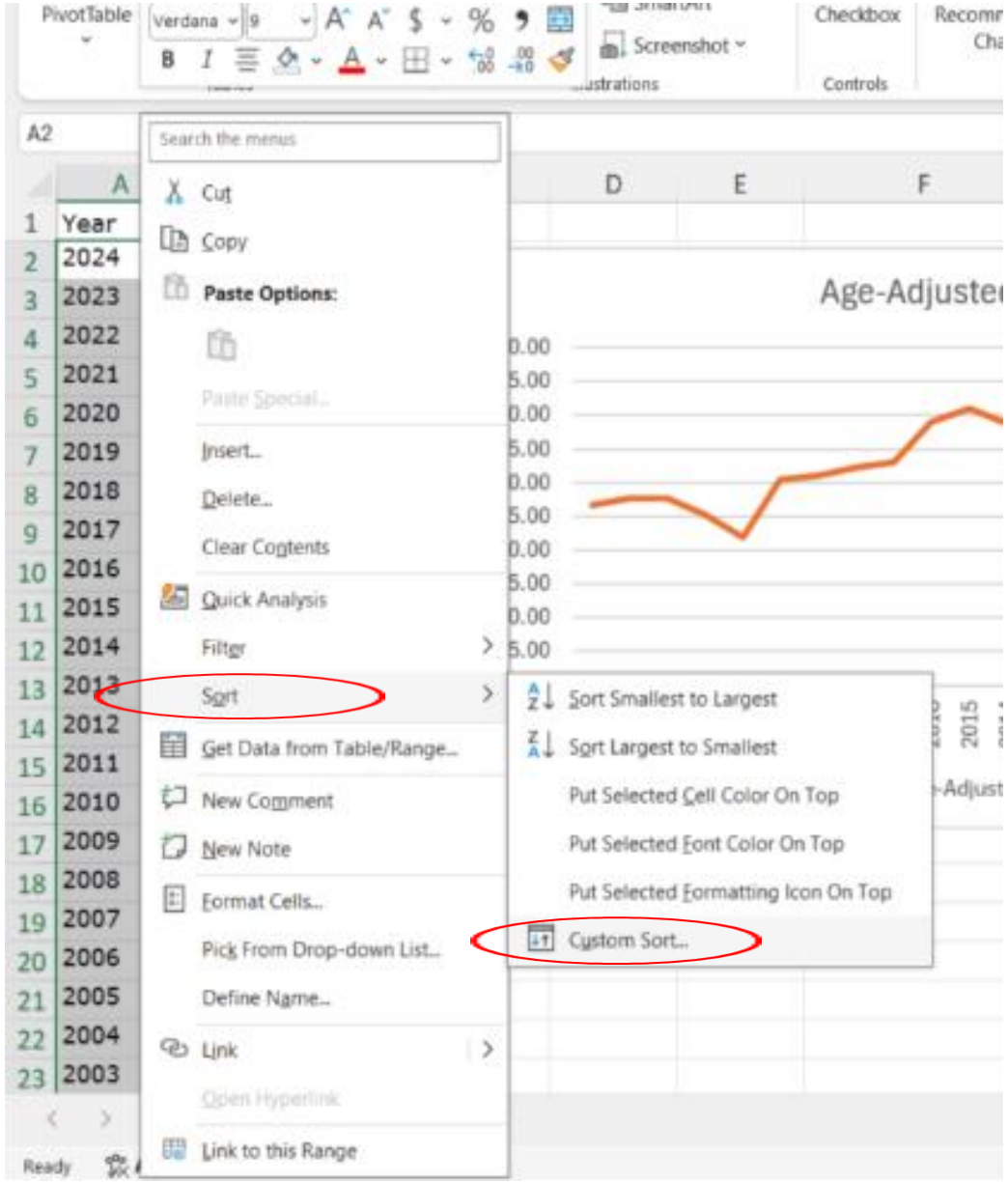
Next, we have to get the data on the correct axis. In the Chart Design tab, click the button that says “Select Data.” The Select Data Source menu will then pop up. From the Legend Entries area, delete the Year column. Then, from the Horizontal (Category) Axis Labels area, select edit and then highlight the Year column in the data table.



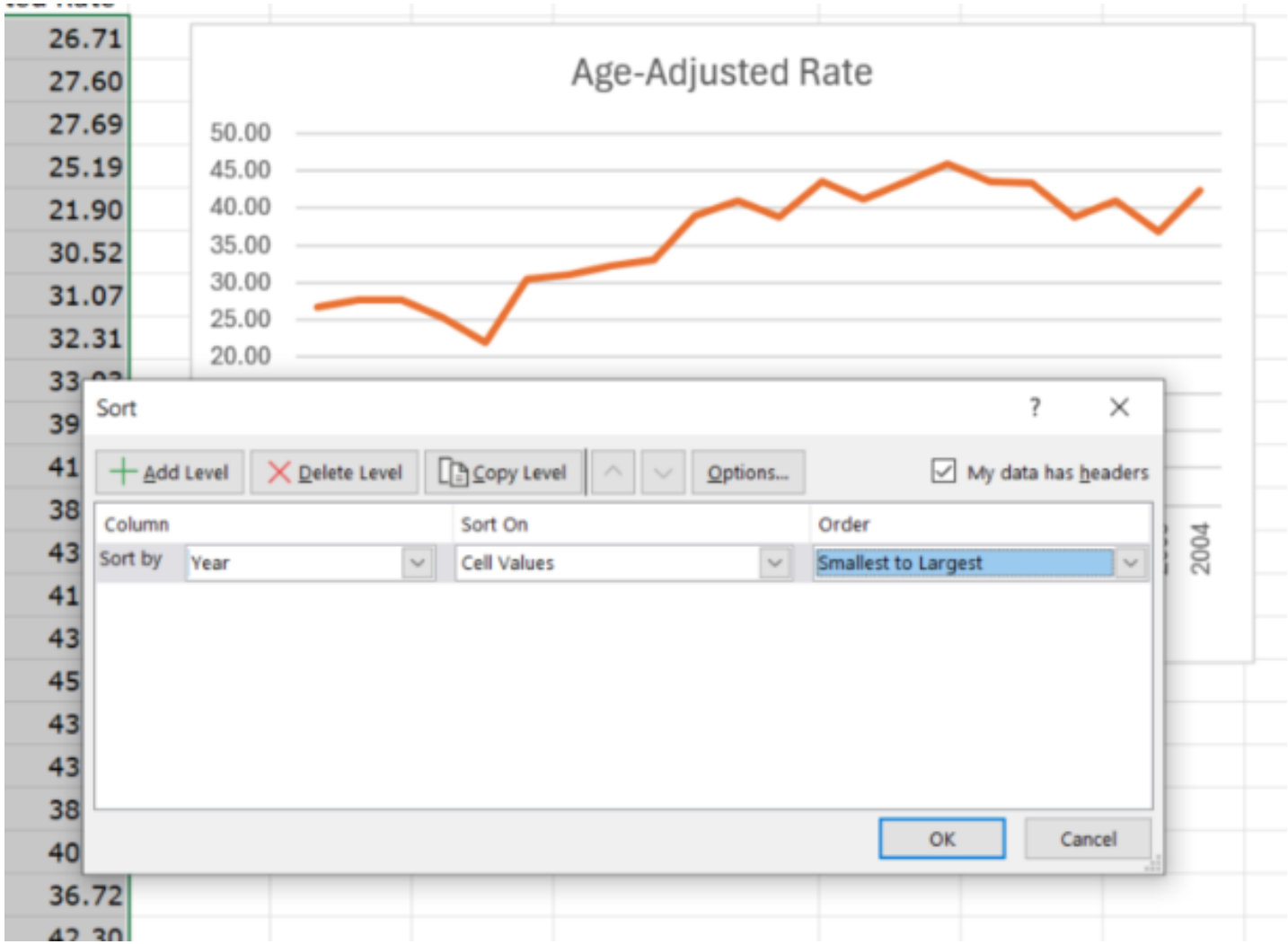
The menu should look like this after changing the settings. Hit OK.



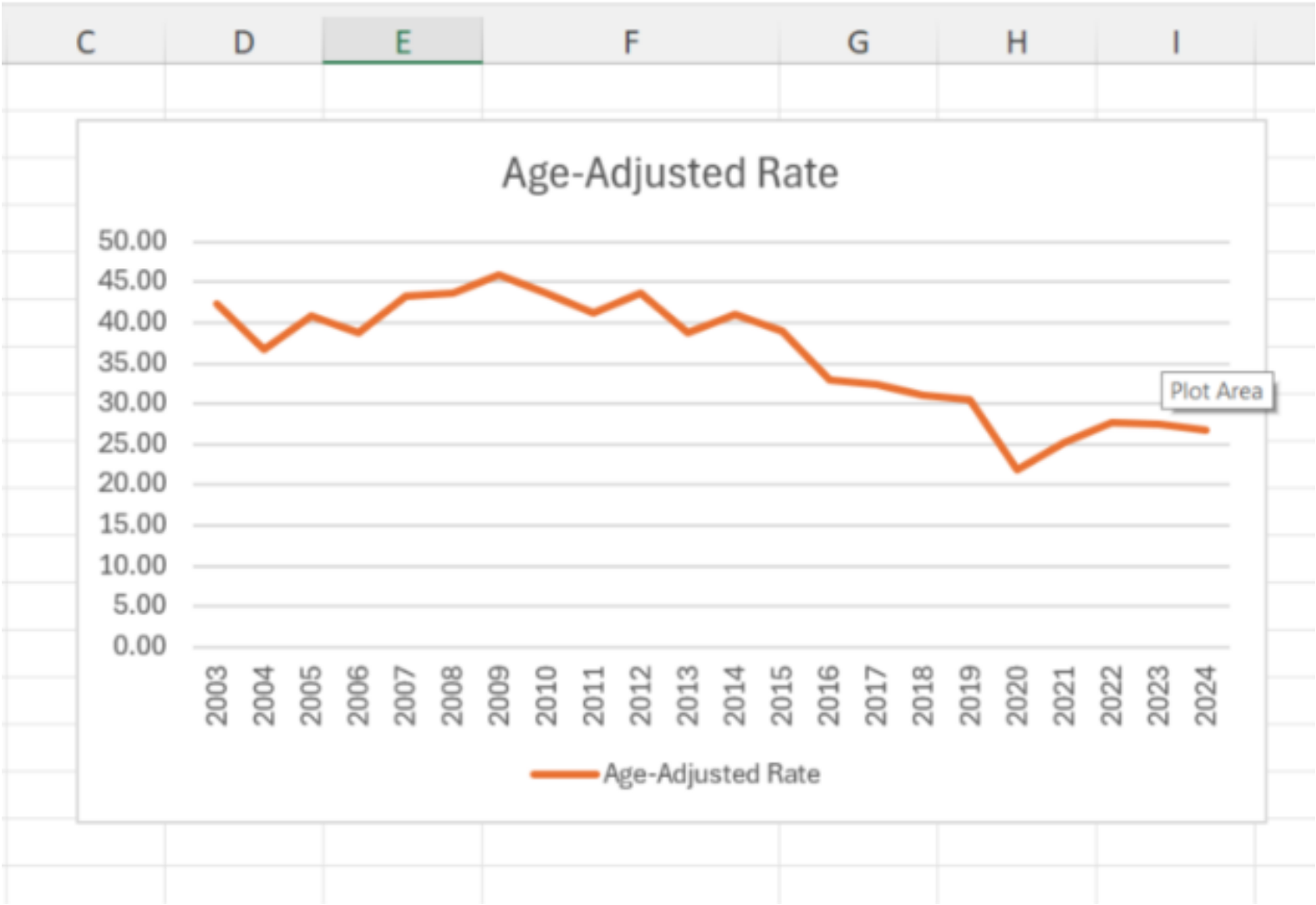
The line chart should now show the yearly age-adjusted rate of ED visits, BUT the x-axis starts at 2024, instead of 2003. We need to reverse this order. Highlight the data in our table and right click to open the menu shown below. Click “Sort” and then “Custom Sort.”



In the Custom Sort menu, select “Year” in the first drop down, and “Smallest to Largest” in the third drop down. Hit OK.

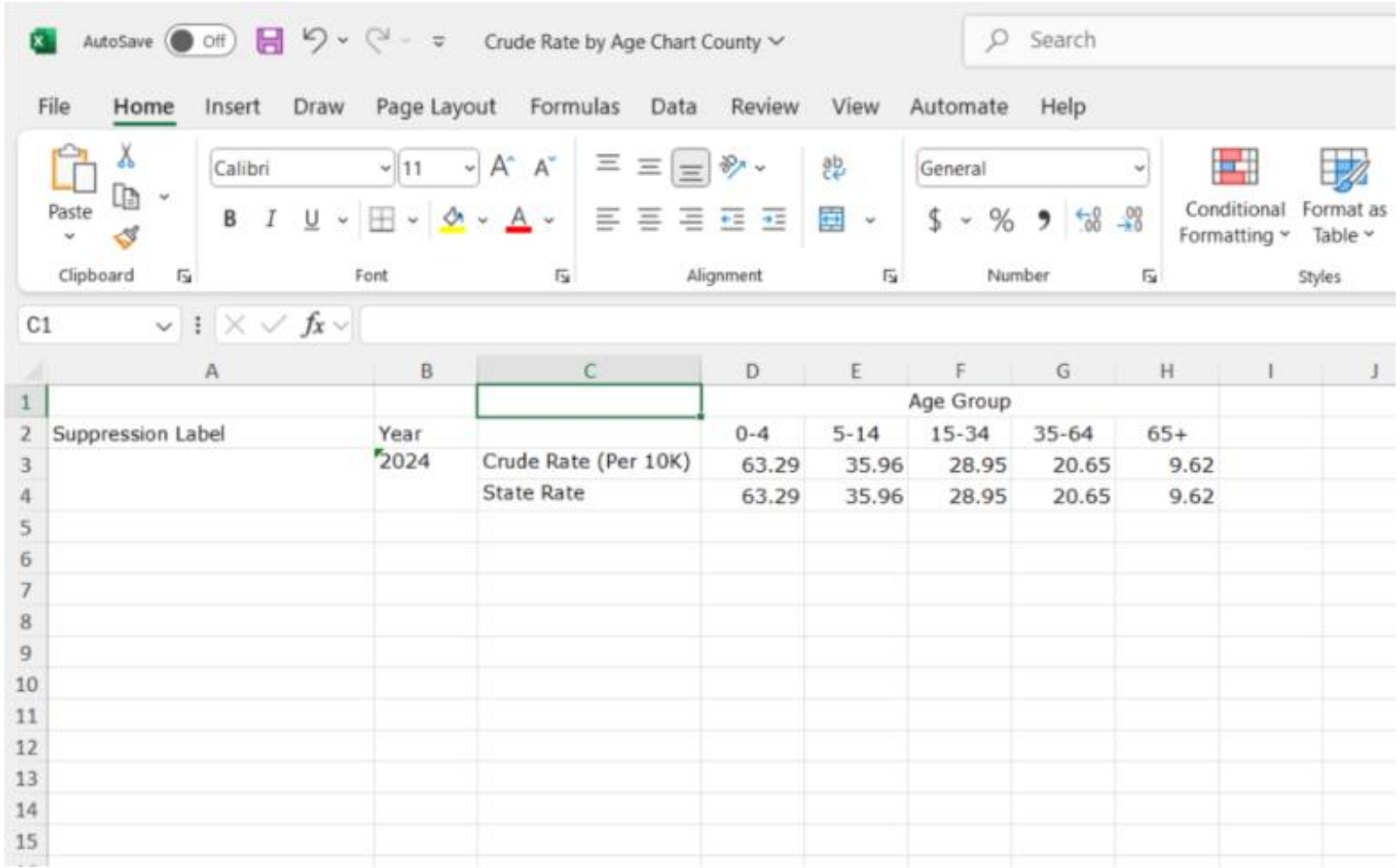


Now the line chart should show the yearly age-adjusted rate of ED visits, with the years in the correct order.



Now, we will recreate this "Rate by Age Group" bar chart. Download the data from the bottom right hand corner, just like we did with the line chart.

The data in the downloaded Excel document should look like this

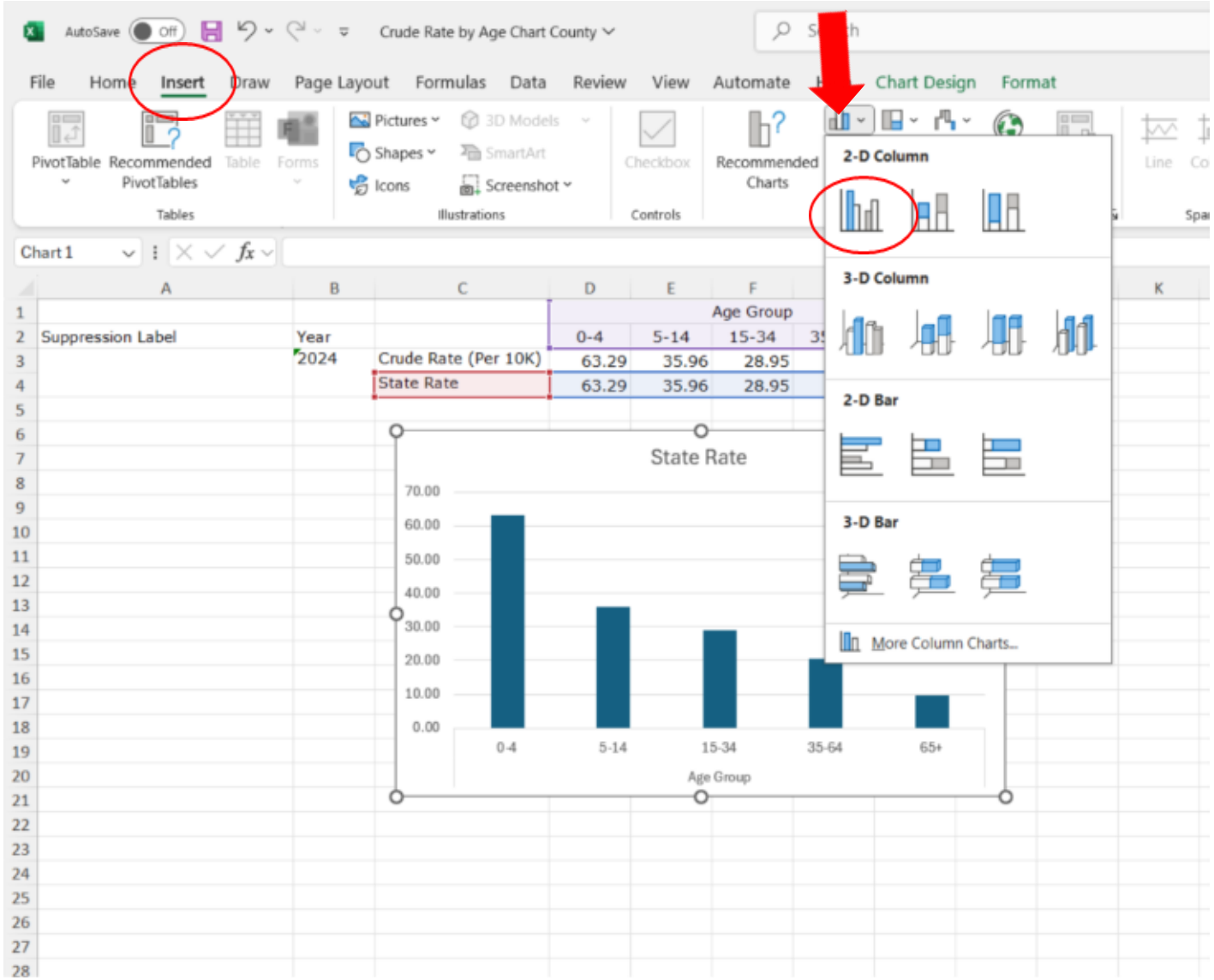


	A	B	C	D	E	F	G	H	I	J
1						Age Group				
2	Suppression Label	Year		0-4	5-14	15-34	35-64	65+		
3		2024	Crude Rate (Per 10K)	63.29	35.96	28.95	20.65	9.62		
4			State Rate	63.29	35.96	28.95	20.65	9.62		
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										

We only need to have the State Rate in this bar chart, so we can ignore the Crude Rate row.

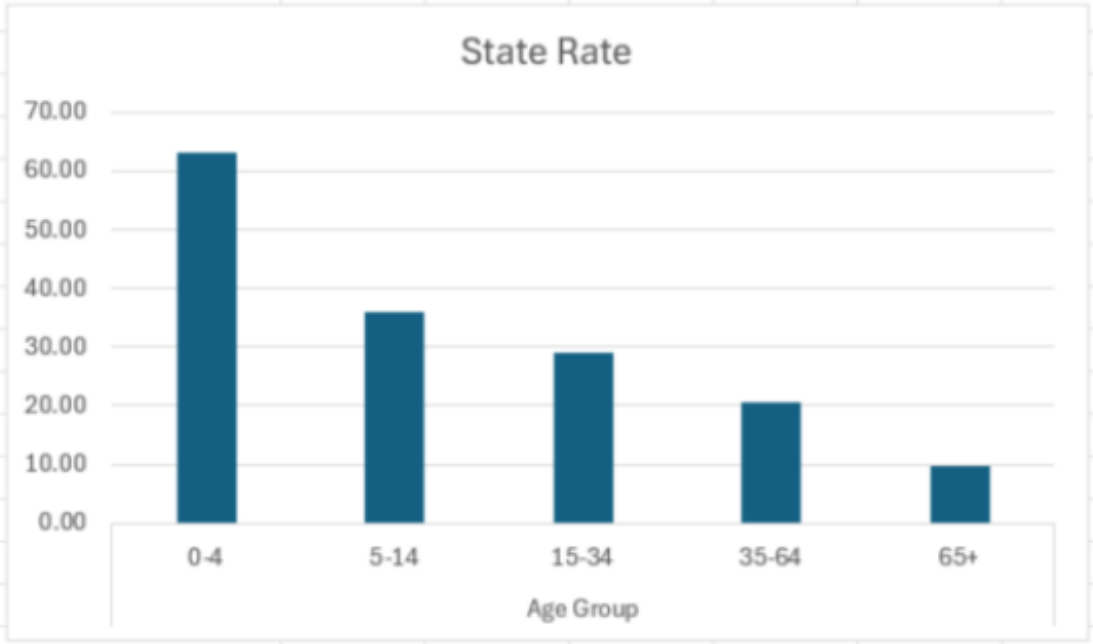
1. Select the data we need for the chart (Age Group and State Rate) by selecting Age Group first, then hit the Ctrl button on your keyboard, and then select the State Rate row.

2. Then on the Insert tab select the first bar chart option under the 2-D column heading.



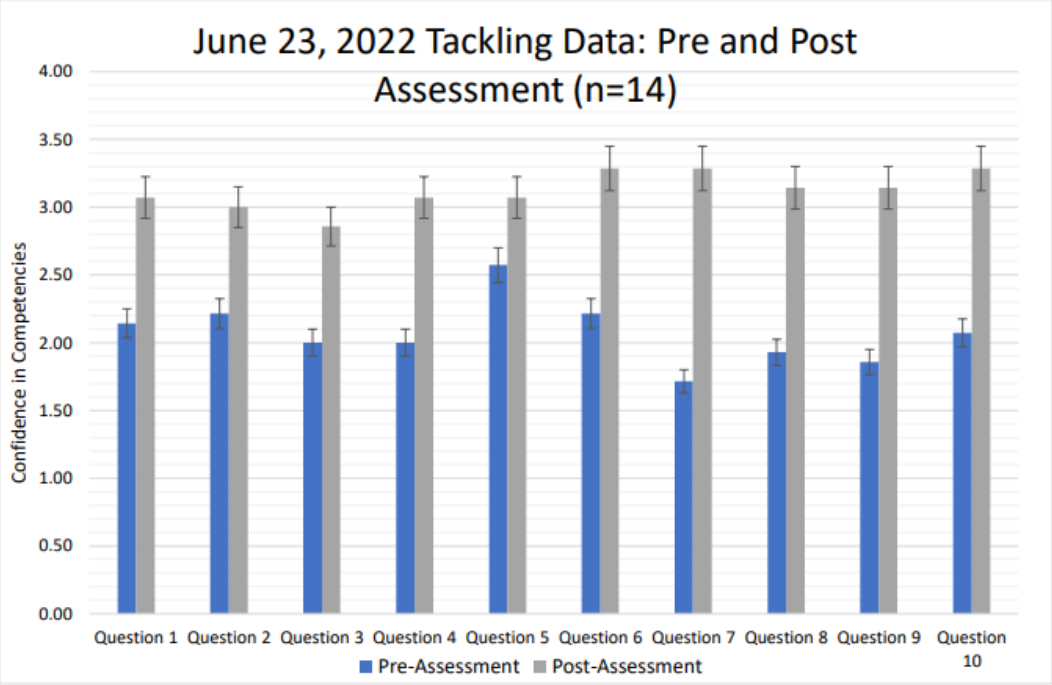
The bar chart will look like this.

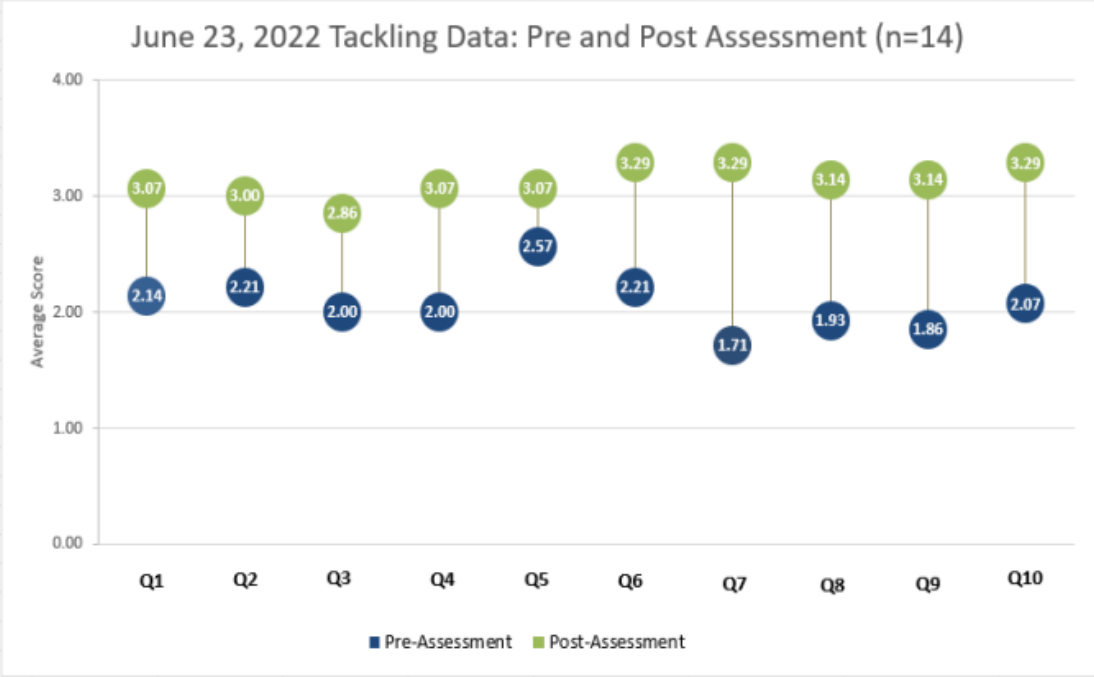
	Age Group				
	0-4	5-14	15-34	35-64	65+
Crude Rate (Per 10K)	63.29	35.96	28.95	20.65	9.62
State Rate	63.29	35.96	28.95	20.65	9.62



Once We've Made a Basic Chart, What Else Should We Do?

Take your visualization to the next level





Icon Arrays

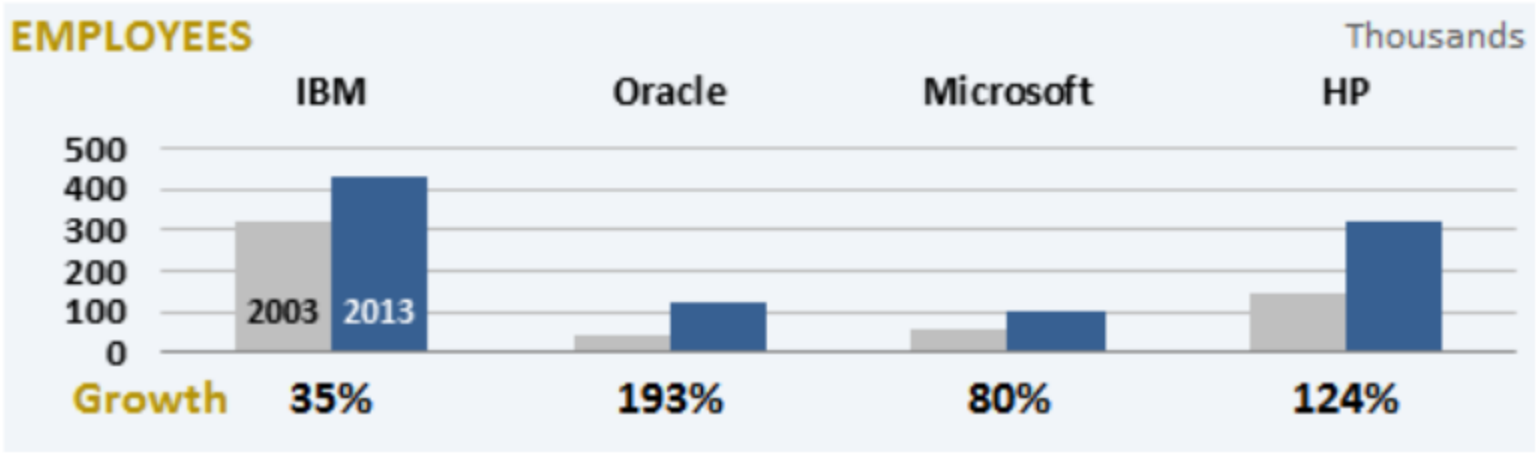
http://www.iconarray.com/

OR https://stephanieevergreen.com/wp-content/uploads/2015/07/How-to-make-icon-arrays-in-excel.pdf

The old KISS principle

The human brain is not good at comparing area.

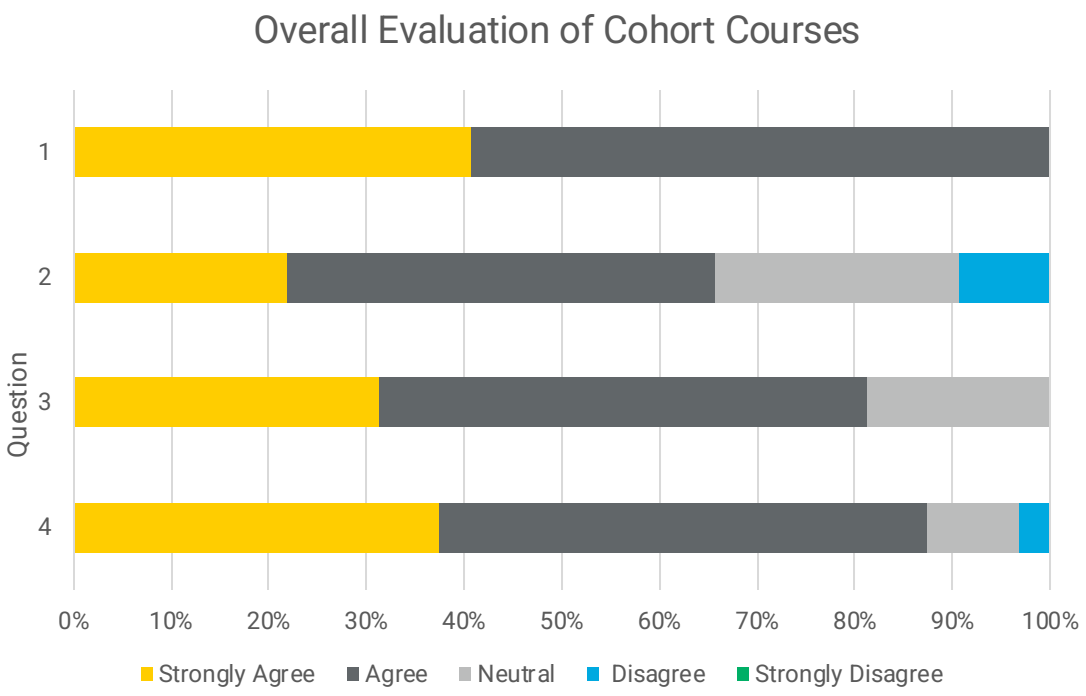
But we are much better at comparing length.

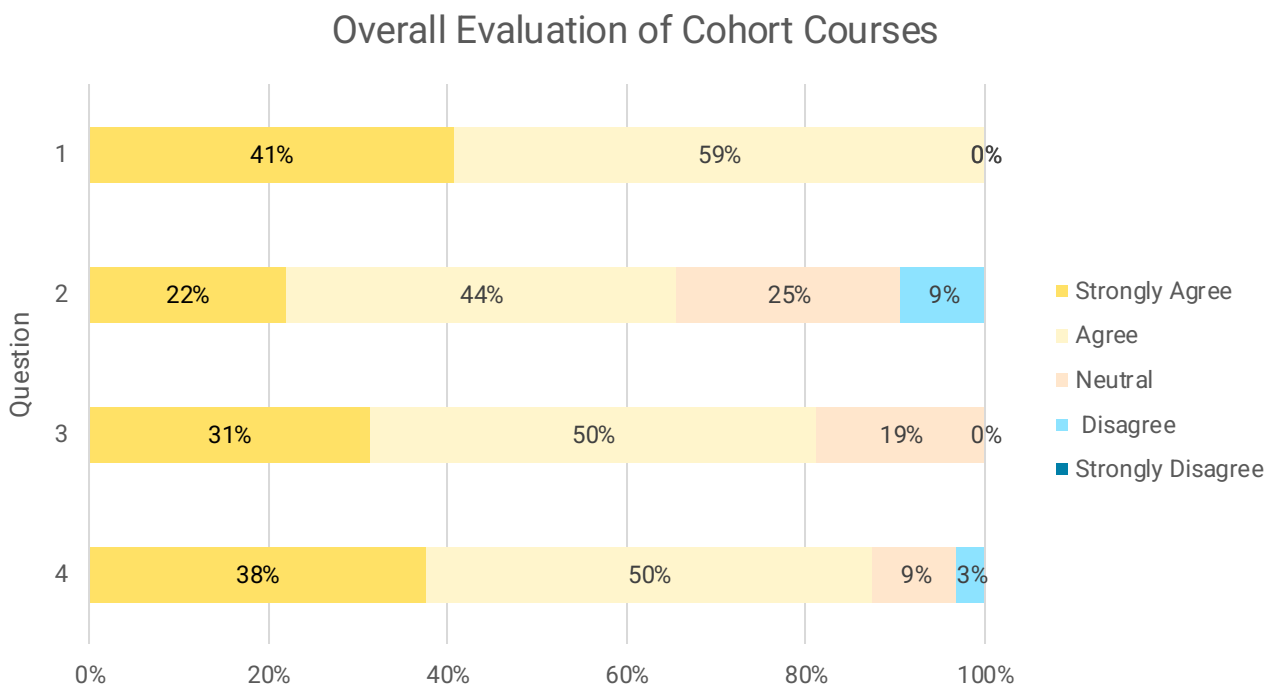


An Excel column chart alternative to bad charts from the Wall Street Journal.

IOWA

Don’t fall for defaults…





Questions?

Resources

- Stephanie D.H. Evergreen, Effective Data Visualization, 2nd edition 2020
- Cole Nussbaumer Knaflic, Storytelling with Data: a data visualization guide for business professionals, Wiley, 2015
- George Mason University Info Guide on Data Visualization https://infoguides.gmu.edu/data-visualization/refine
- Duke University Libraries Excel Chart Recipe Book
  https://guides.library.duke.edu/excel/visualization
- Excel Campus
  https://www.excelcampus.com/

IOWA

Homework Assignment: Create Visualization

Using the feedback that you received from group members on the rough sketch of your data visualization as well as the tools you learned about in module 3, **create your data visualization**

You will share your visualization with your breakout group during live learning session 4 and will later have the opportunity to receive feedback from course instructors.

Thank you!

Institute for Public Health Practice, Research and Policy

anjali-deshpande@uiowa.edu
vickie-miene@uiowa.edu
abigail-stock@uiowa.edu