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Institute for Public Health
Practice, Research and Policy

Visualize This

Storytelling With Data

Session 3

Institute for Public Health Practice, Research and Policy

Visualize This Resources – MN

Training Resources

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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.

- Develop clear and memorable stories from data.

- Create basic chart types using Excel.

- Access publicly-available resources that can be used for data visualization.

Learning Objectives

1. Create an effective data visualization

2. Use a data visualization checklist to create/evaluate effective data visualizations.

3. Understand how to incorporate health equity in creating your visualization.

Module 3 Part 1

Creating and Evaluating Charts

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!

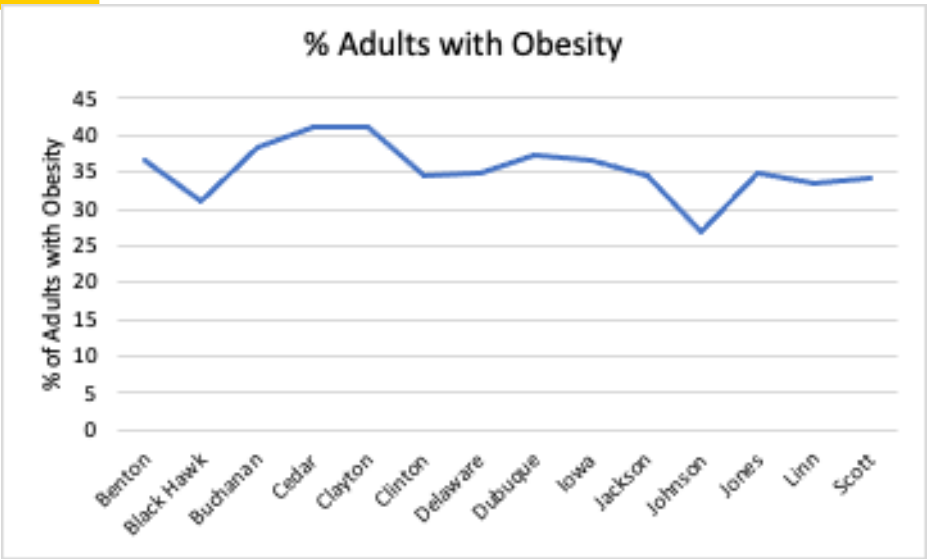# Example – Obesity in Public Health Region 6

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
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

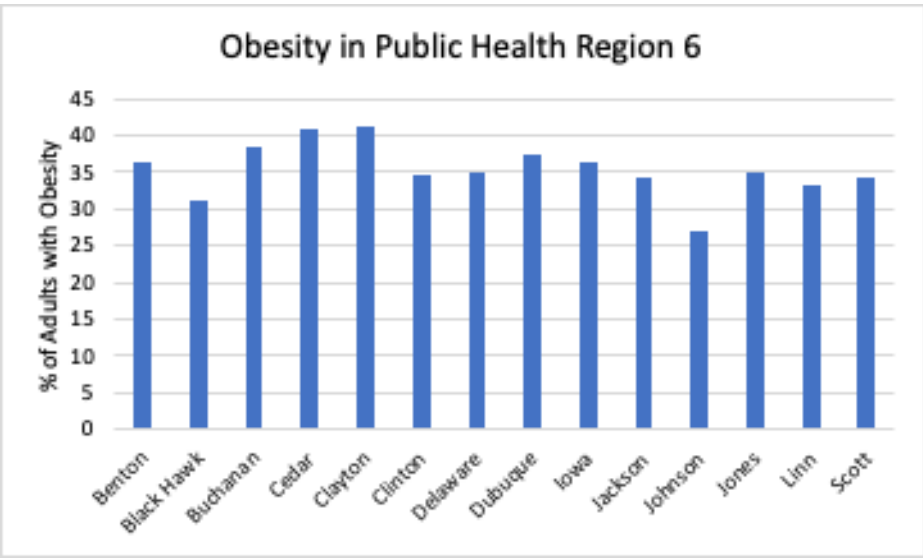| Public Health Region	OB	% Adults with Obesity	95% CI - Low	95% CI - High	Z-Score
6	Benton	37	31	43	0.26
6	Black Hawk	31	28	34	-1.07
6	Buchanan	39	32	45	0.75
6	Cedar	41	34	48	1.35
6	Clayton	41	35	48	1.37
6	Clinton	35	30	40	-0.17
6	Delaware	35	28	42	-0.15
6	Dubuque	37	33	42	0.46
6	Iowa	37	30	44	0.26
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

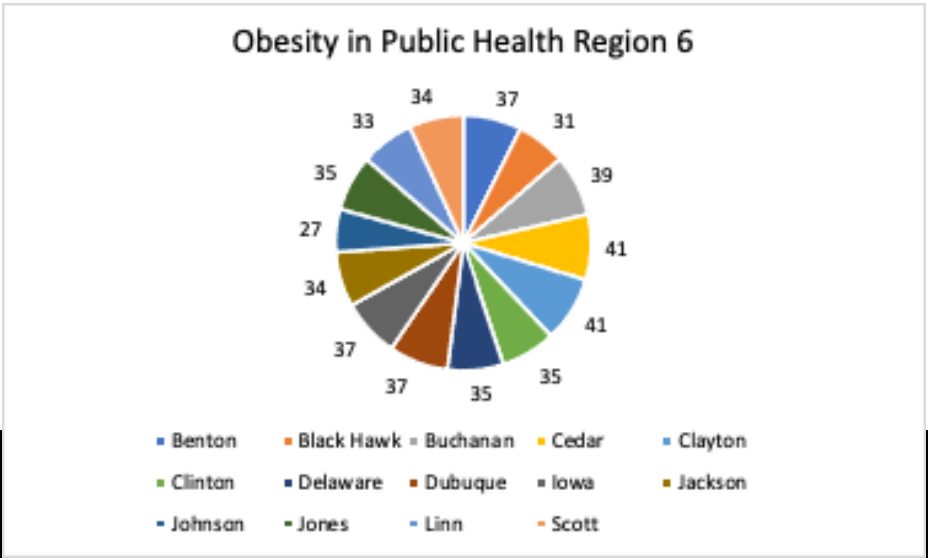# Example – Obesity in Public Health Region 6

A

B

C
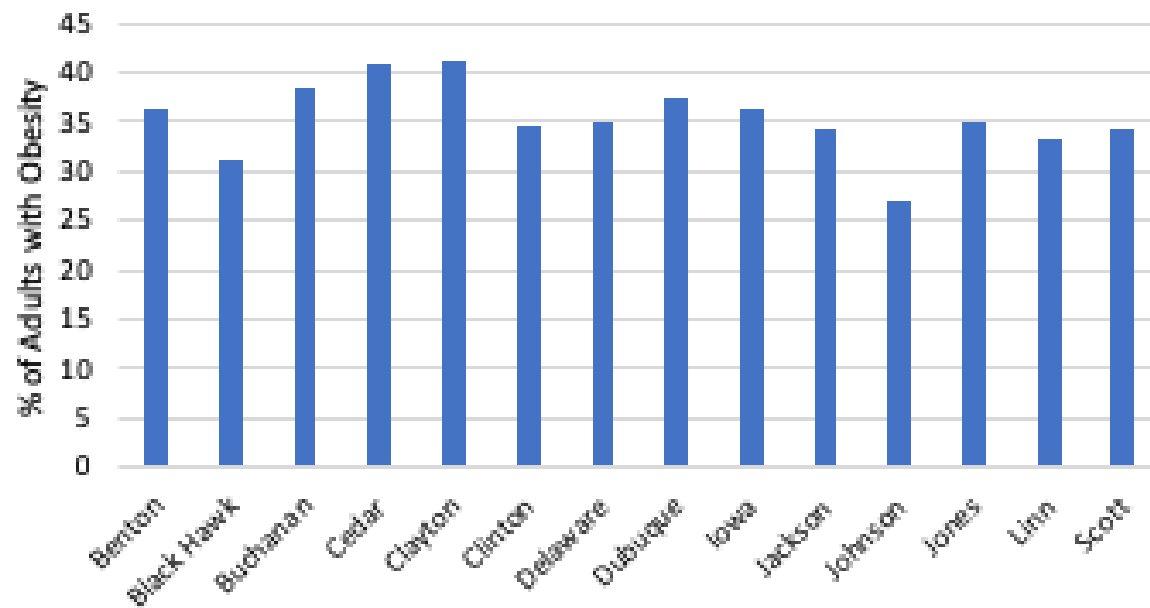
Example – Obesity in Public Health Region 6
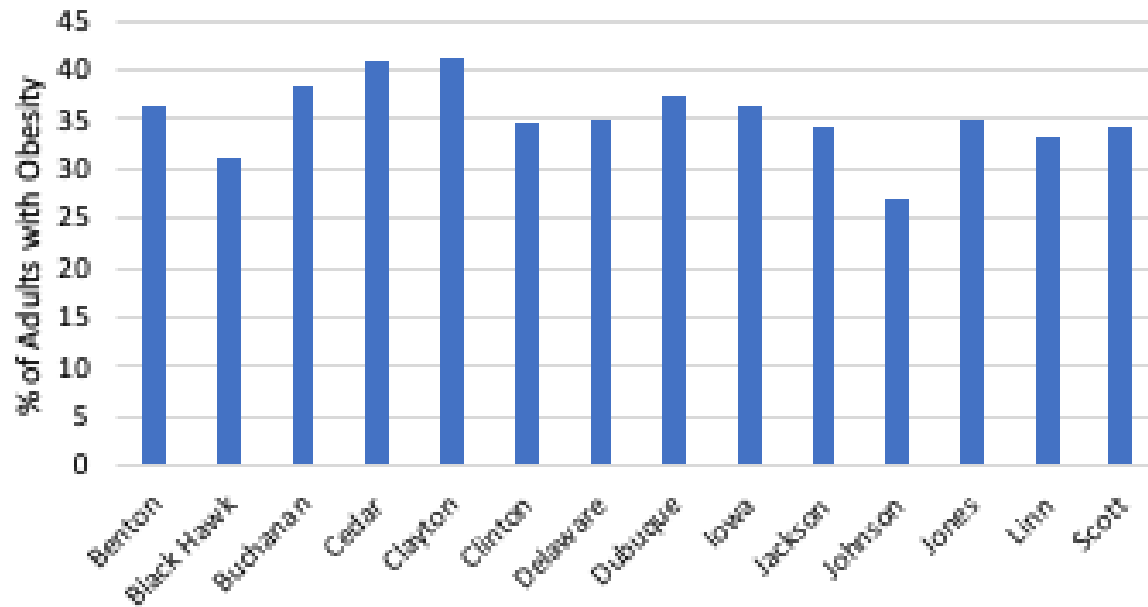
Example − Obesity in Public Health Region 6

Source: https://www.countyhealthrankings.org/app/iowa/2020/downloads
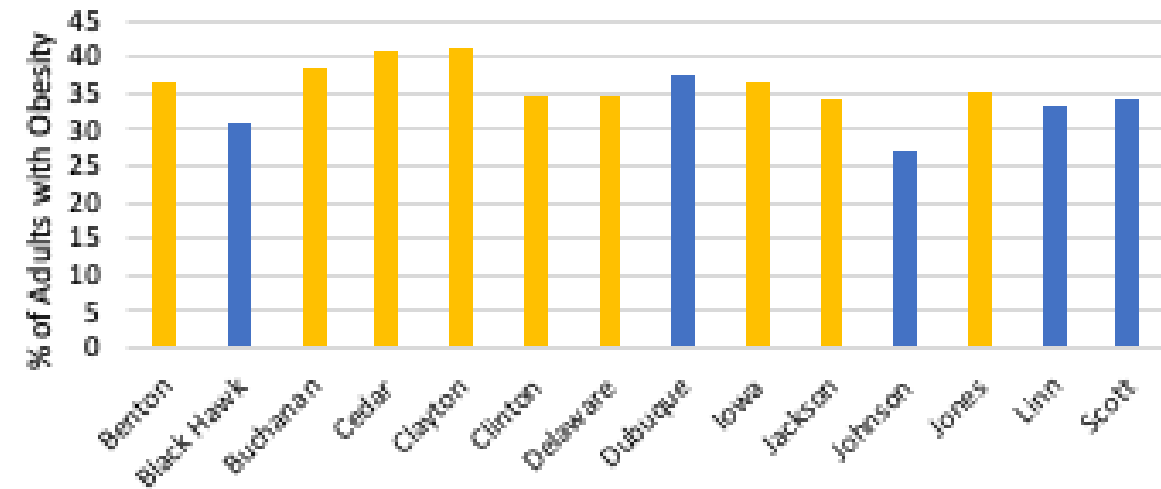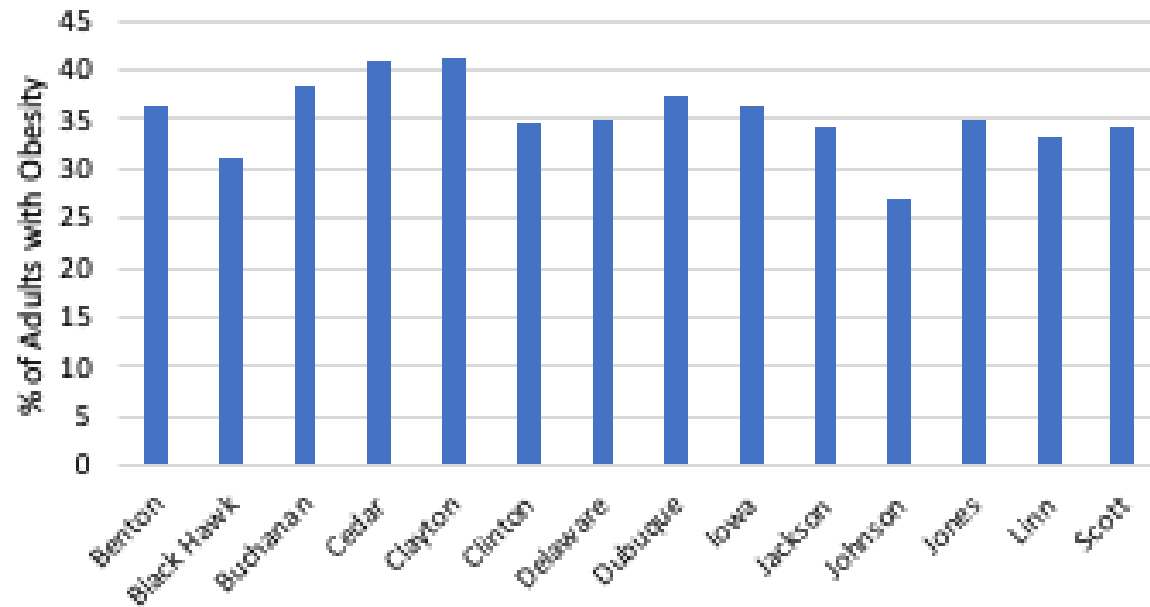
HP2030 Reduce the proportion of adults with obesity. Target 36.0%

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Example – Obesity in Public Health Region 6

Source: https://www.countyhealthrankings.org/app/iowa/2020/downloads
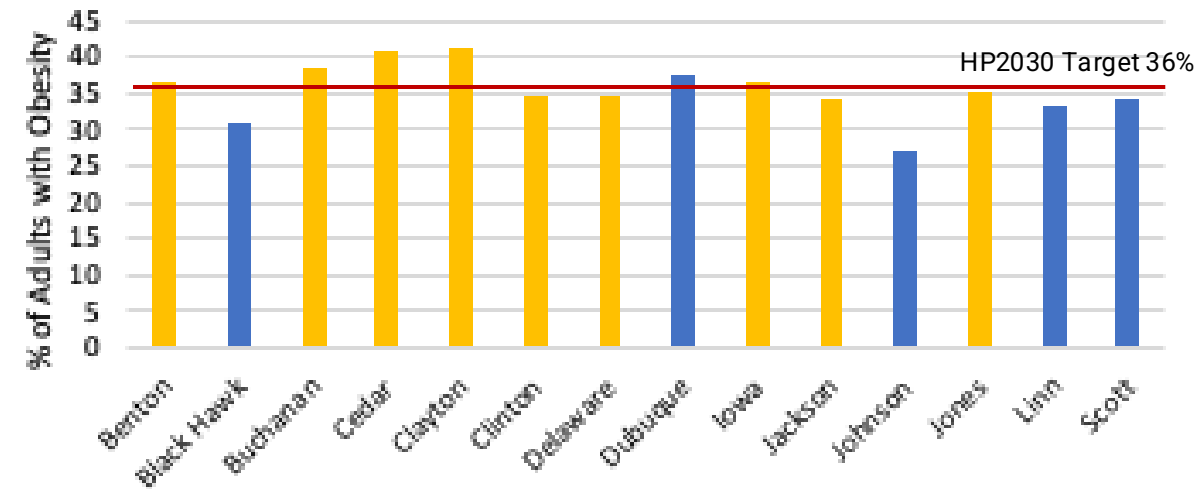
Small Group Activity – 20 minutes

In your breakout groups,

- Share the rough sketch of your data visualization
- Remind group members of your target audience and the message you want to convey
- What is the key takeaway from the chart?
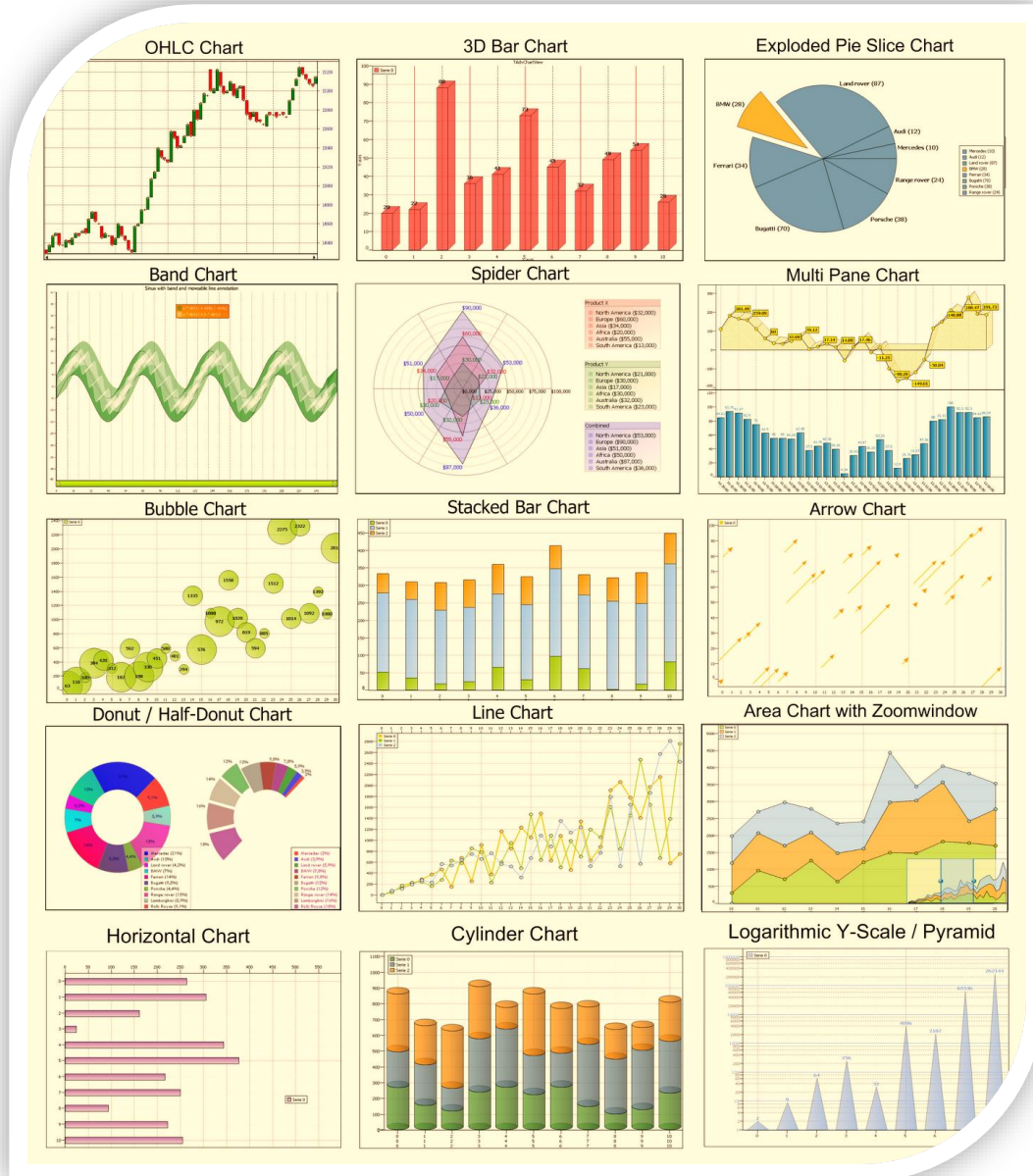- What else can you do to make your chart effective?

DEBRIEF

- Anything that was new or WOW for you?

- Any common missteps?

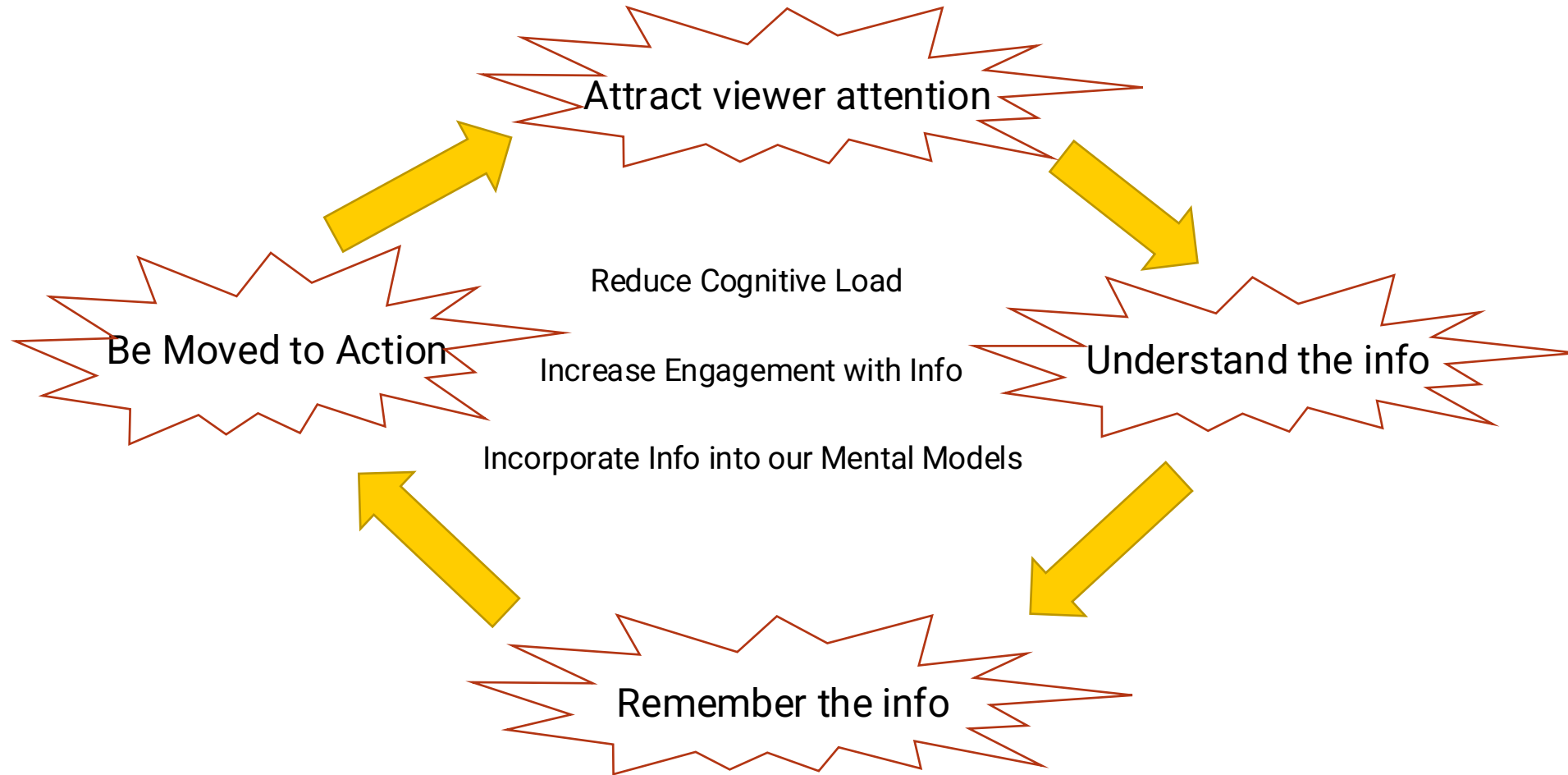- Anything that you can start using in your next data visualization?

Module 3 Part 2

Creating Effective Data Visualizations

Data visualization – the representation of information in the form of a chart, graph, picture, etc.

What does it mean to be effective?

Attract viewer attention

Be Moved to Action

Reduce Cognitive Load

Increase Engagement with Info

Incorporate Info into our Mental Models

Understand the info

Remember the info

What do you want your
audience to FEEL?

https://www.cnn.com/videos/us/2019/09/10/toddlers-running-hug-each-other-new-york-dnt-vpx.wpix

Good charts vs. Bad charts
The Elements of Chart Design

- Text

- Arrangement

- Color

- Lines

- Overall attributes

TEXT

- Use a descriptive title – <u>What is the takeaway?</u>

- You can use subtitles/annotations to bring attention to a particular point.

- Label the data directly—do not assume people read the legend (or place the legend at the top so people know what they are looking at right away)

- Unclutter your graphic

- Be aware of the **font** you are using

This is what we usually do --
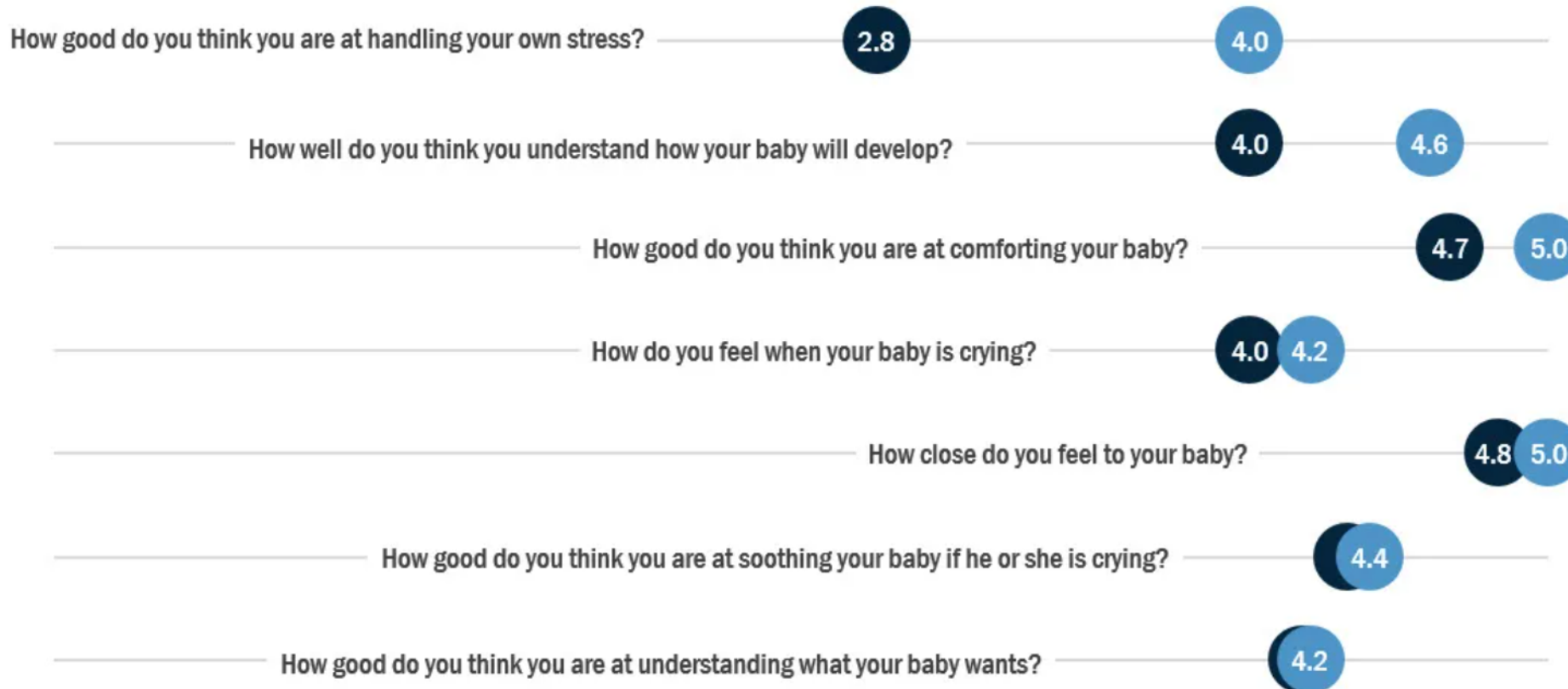
Parenting Program Pretest and Posttest Scores

How good do you think you are at handling your own stress? — 2.8 — 4.0

How well do you think you understand how your baby will develop? — 4.0 — 4.6

How good do you think you are at comforting your baby? — 4.7 — 5.0

How do you feel when your baby is crying? — 4.0 — 4.2

How close do you feel to your baby? — 4.8 — 5.0

How good do you think you are at soothing your baby if he or she is crying? — 4.4

How good do you think you are at understanding what your baby wants? — 4.2

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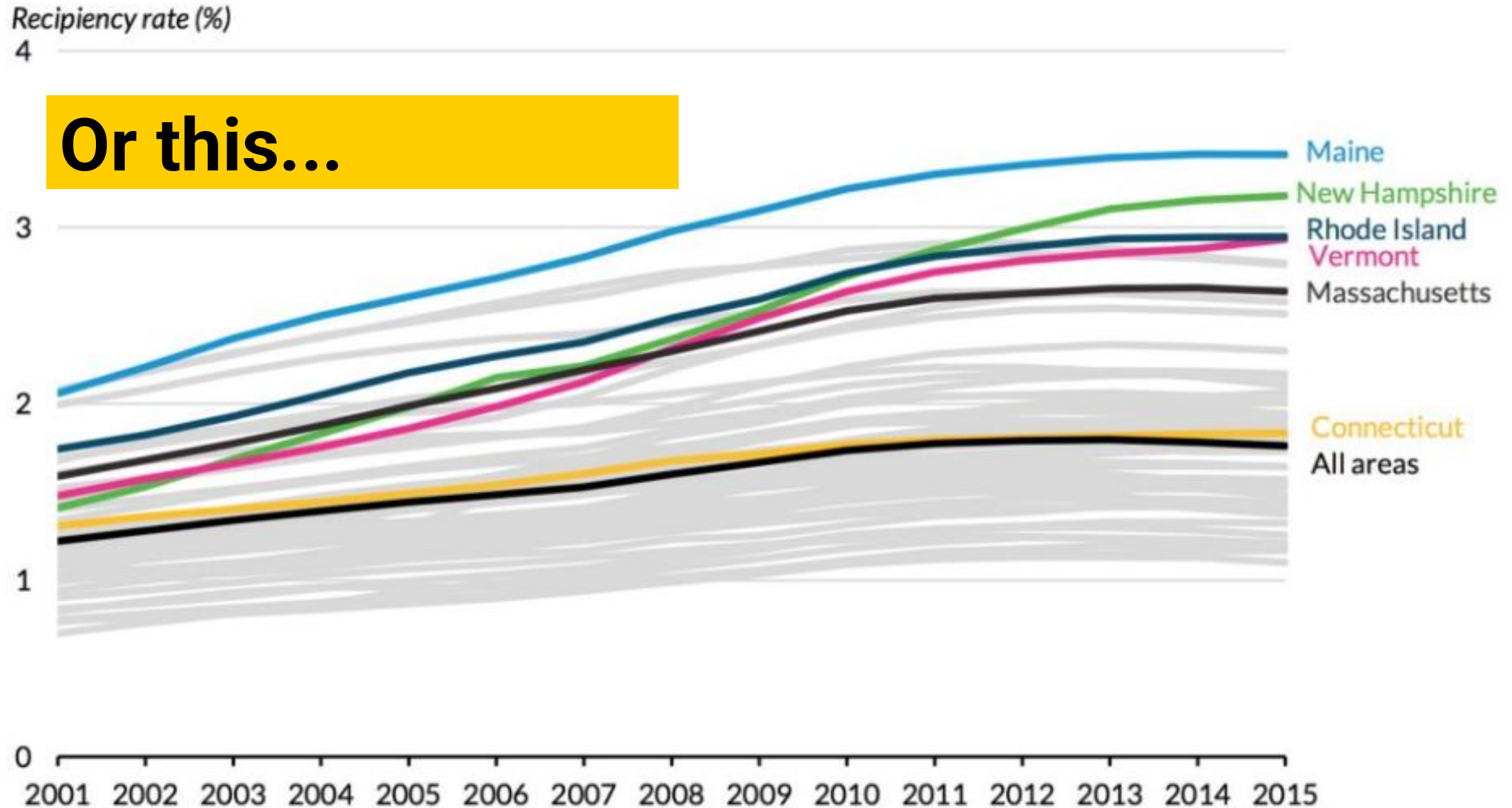
But what if we did something like this...

Average **pretest** & **posttest** scores show the parenting program made the biggest impact on helping participants handle their own stress.
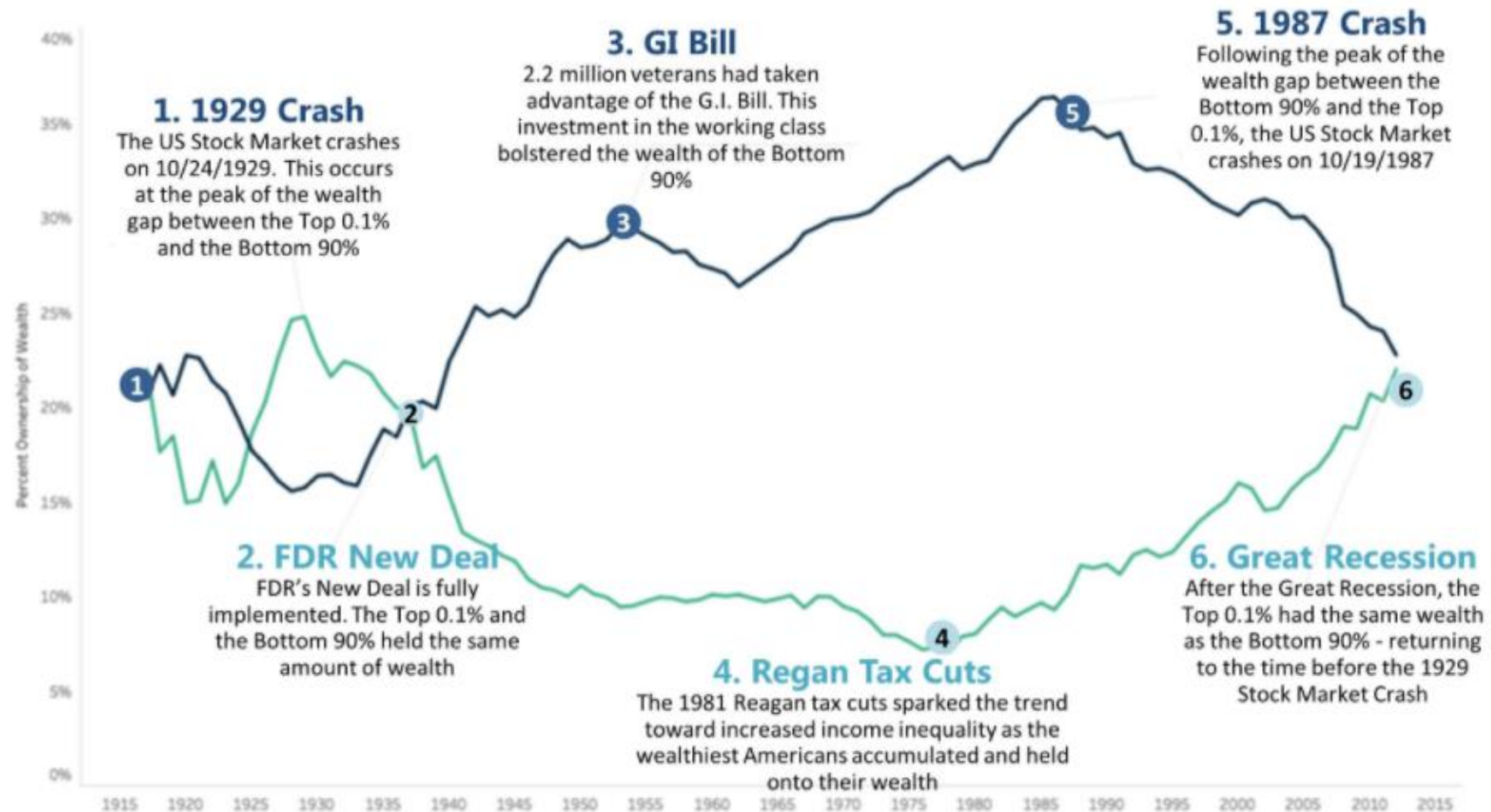Scale was 0-5, with 5 representing "Excellent."

How good do you think you are at handling your own stress? — 2.8 — 4.0

How well do you think you understand how your baby will develop? — 4.0 — 4.6

How good do you think you are at comforting your baby? — 4.7 — 5.0

How do you feel when your baby is crying? — 4.0 — 4.2

How close do you feel to your baby? — 4.8 — 5.0

How good do you think you are at soothing your baby if he or she is crying? — 4.4

How good do you think you are at understanding what your baby wants? — 4.2

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The DI Recipiency Rate for Mental Disorders Rose Swiftly in New England States between 2001 and 2015

Or this...

Recipiency rate (%)

Maine
New Hampshire
Rhode Island
Vermont
Massachusetts
Connecticut
All areas

2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015

Source: Social Security Administration, 2002–16; US Census Bureau, 2015.

ARRANGEMENT of Charts

- People assume things near each other are related

- Proportions must be accurate (bars in bar charts should reflect relative size)

- Stick to convention (Percentage goes from 0 to 100)

- 0 on the Y-axis may not be needed for something where 0 is not a realistic value (stock market values)

- Ordering of data to emphasize your main point

- Don't go overboard—2D graphs are fine

- Decoration can distract (no need for icons or graphics that take focus away from main point)

COLOR

- Color grabs our attention

- The color you use is driven by the purpose of the communication
  (learning vs. emphasis)

- Use the org's color scheme if possible

- A change in color indicates a change in meaning

- Remember color-blind readers (10% of adult pop)

- Color can be used for decorating, navigating, creating emphasis

Flu vaccination rates are lowest in Iowans the ages of **18 to 49 years** old.
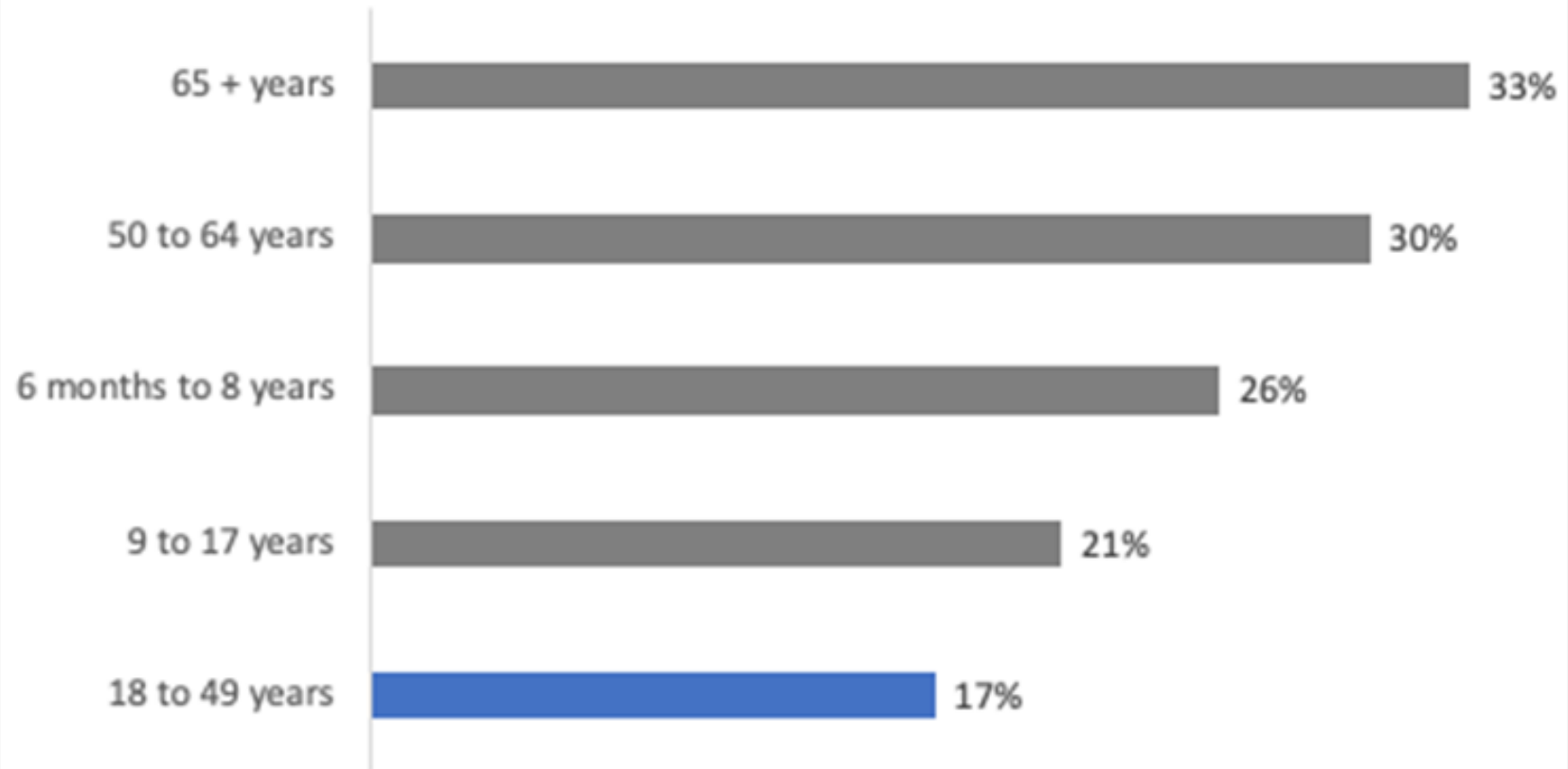
Prevalence of Obesity in Adults (2020, BRFSS)

⬚	<20%
🟩	20%-<25%
🟨	25%-<30%
🟧	30%-<35%
🟥	35%-<40%
🟥	40%-<45%
🟥	45%-<50%
⬛	50% +
⬜	Insufficient data*
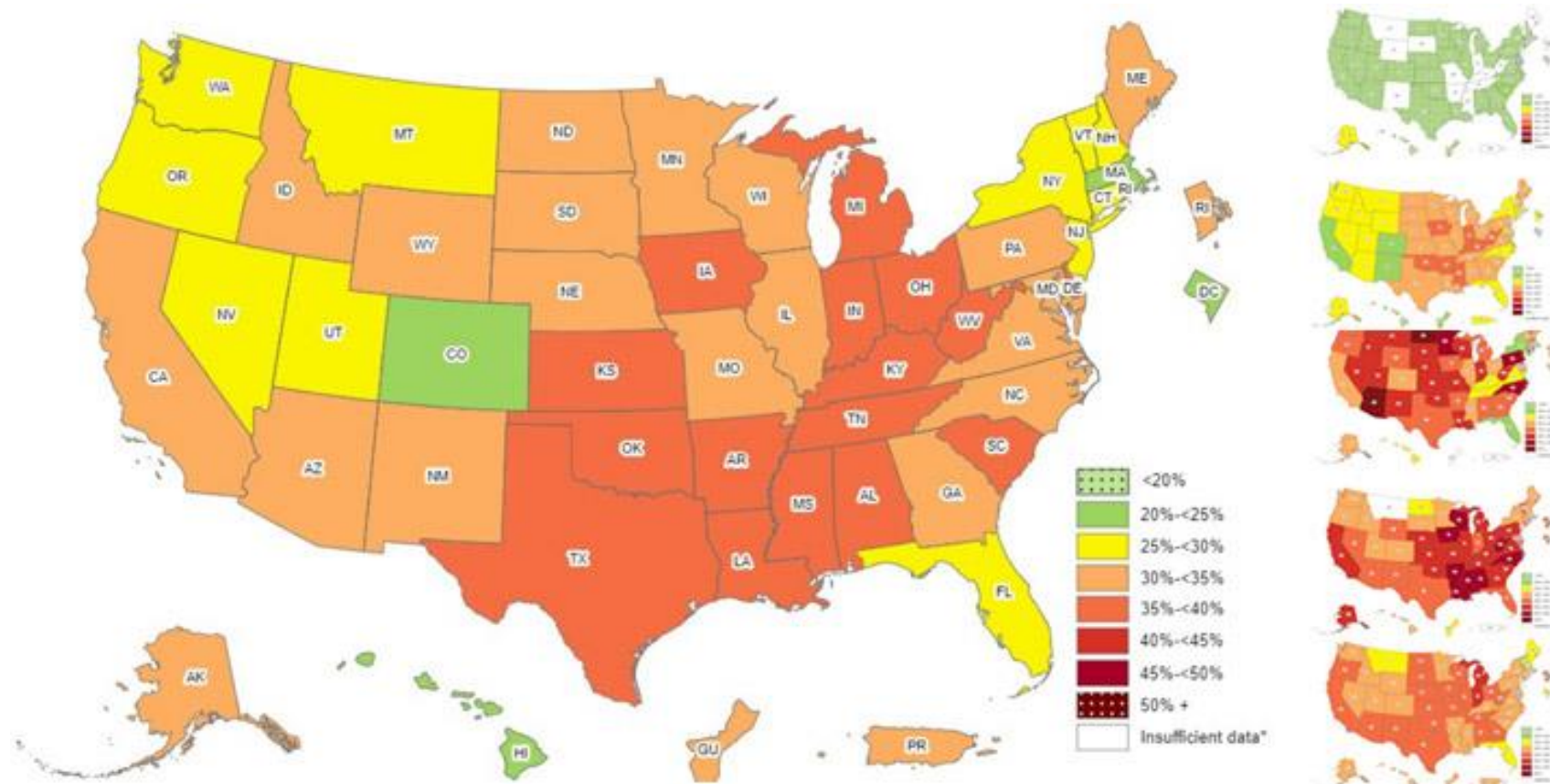
LINES

- Minimize gridlines and axis lines

However…
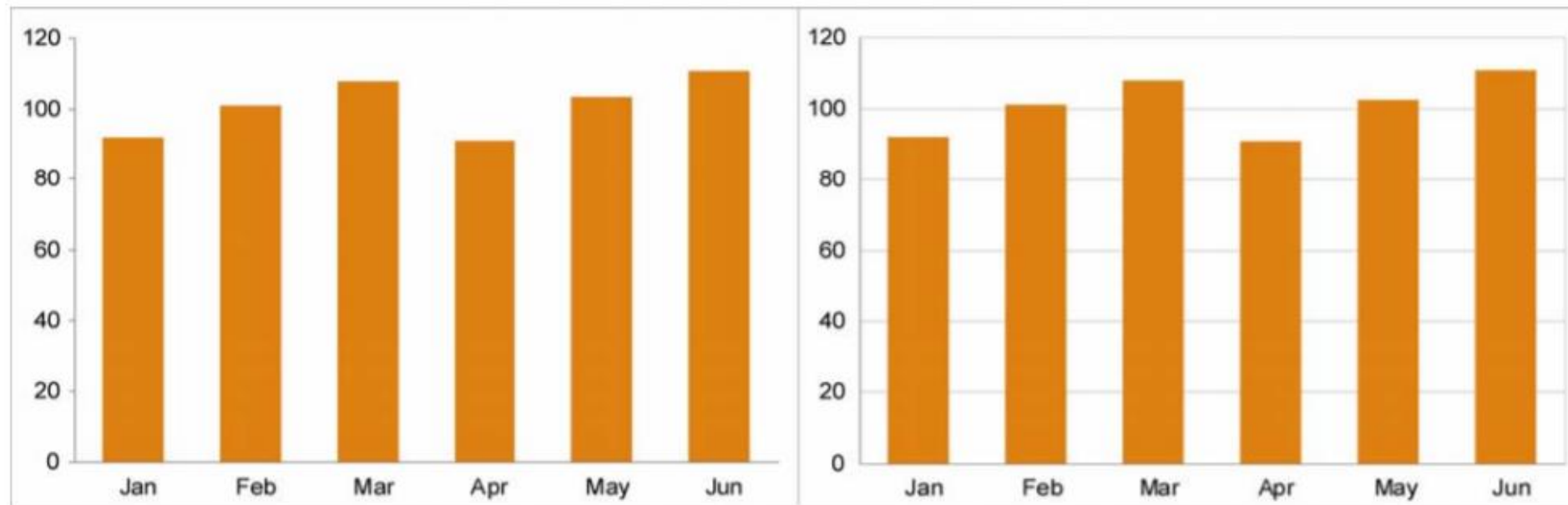
Figure 2: Enhancing perception of small differences

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Example – Obesity in Public Health Region 6

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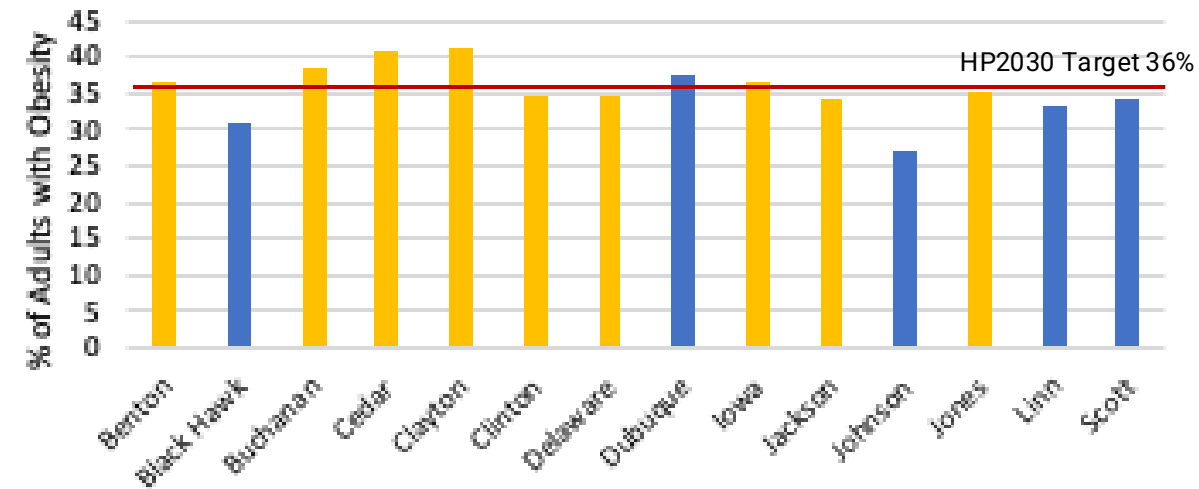
Data visualization checklist

- 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)

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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.
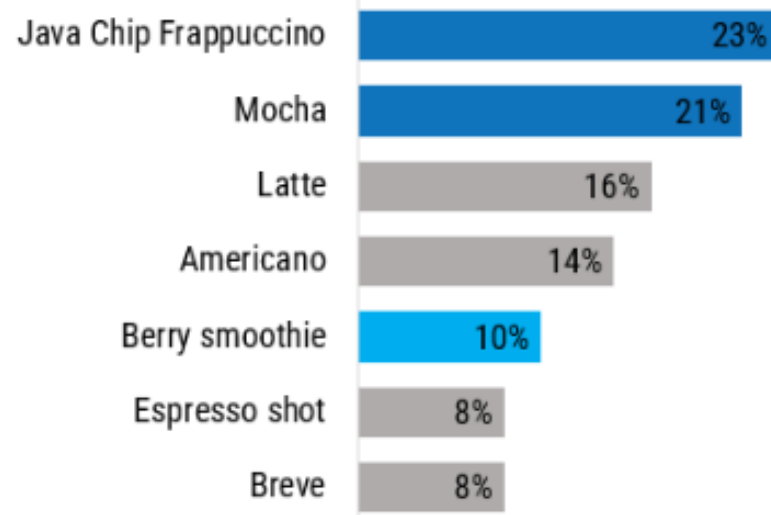
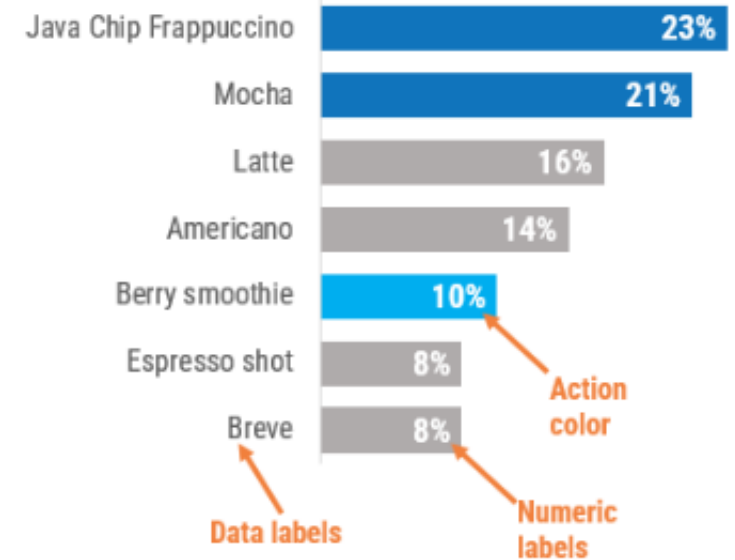| Guideline	Description	Rating
8-20 word descriptive title is a full sentence, left-justified, in upper left	Rather than a generic phrase, use a full, descriptive sentence that encapsulates a takeaway message about the graph's finding or "so what?" When communicating to Western cultures put the title 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

Coffee preferences focus on chocolate-based drinks.

One in ten fellow attendees do not consume caffeine in their preferred morning drinks.

Drink	%
Java Chip Frappuccino	23%
Mocha	21%
Latte	16%
Americano	14%
Berry smoothie	10%
Espresso shot	8%
Breve	8%

After the Checklist

title
subtitle

Coffee preferences focus on chocolate-based drinks.

One in ten fellow attendees do not consume caffeine in their preferred morning drinks.

Drink	%
Java Chip Frappuccino	23%
Mocha	21%
Latte	16%
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Berry smoothie	10%
Espresso shot	8%
Breve	8%

Action color
Numeric labels
Data labels

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# Incorporating People-Centeredness into your Visualization

Demonstrate Empathy (start with cultural humility)

- Use People-first language

- Avoid Othering

- Order groups in a purposeful way

- Consider Missing Groups

- Use Color/Patterns with a People-Centeredness Awareness

- Incorporate Accessibility

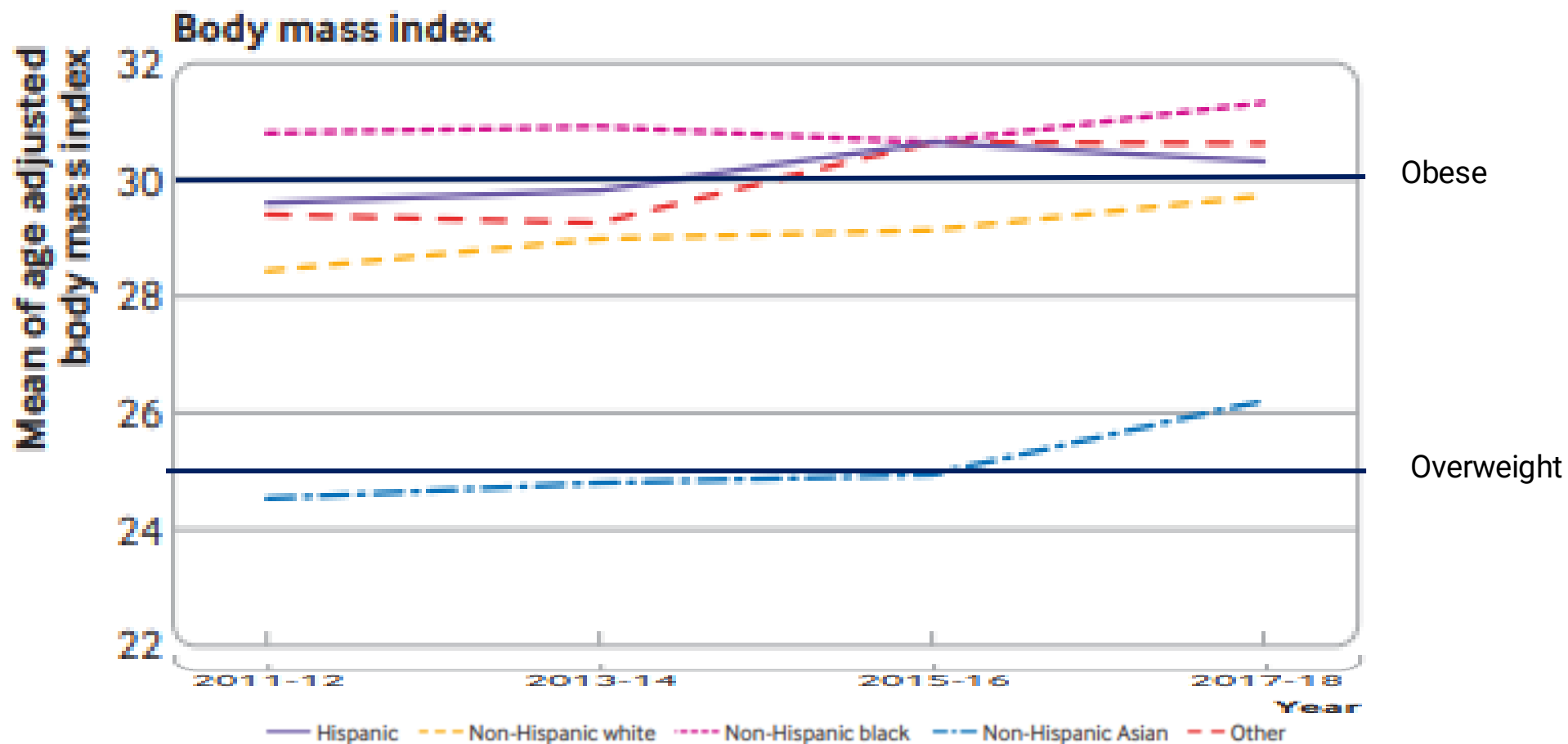Do No Harm Guide. Applying Equity Awareness in Data Visualization" 2021

Disaggregating Data by Race/Ethnicity
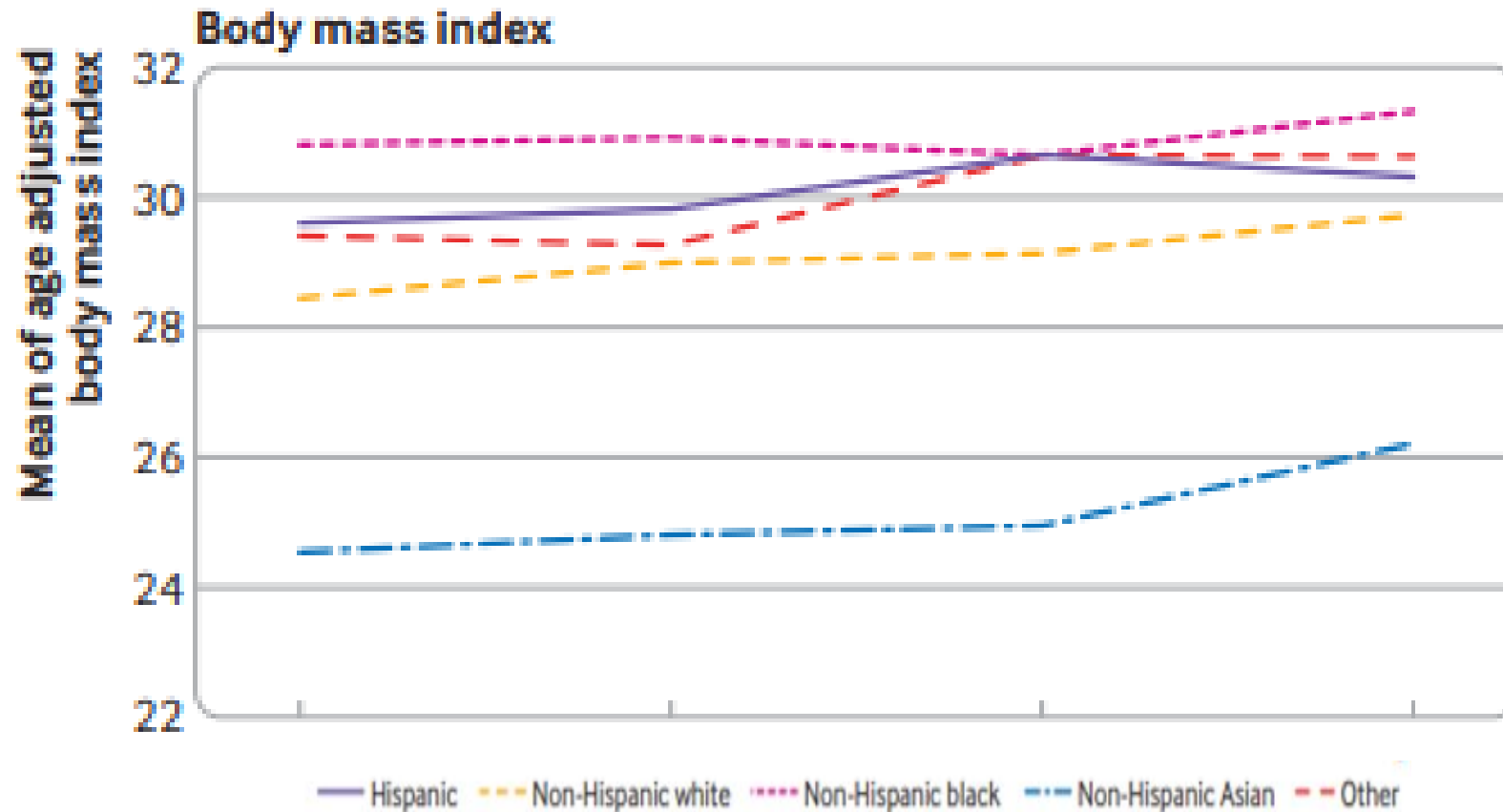
from "What Can Go Wrong? Racial equity, data viz & deficit thinking" P. Blakely 2022)

Disaggregating Data by Race/Ethnicity

Disaggregate but also show variability

(what we are observing in the averages does not describe everybody in that group)
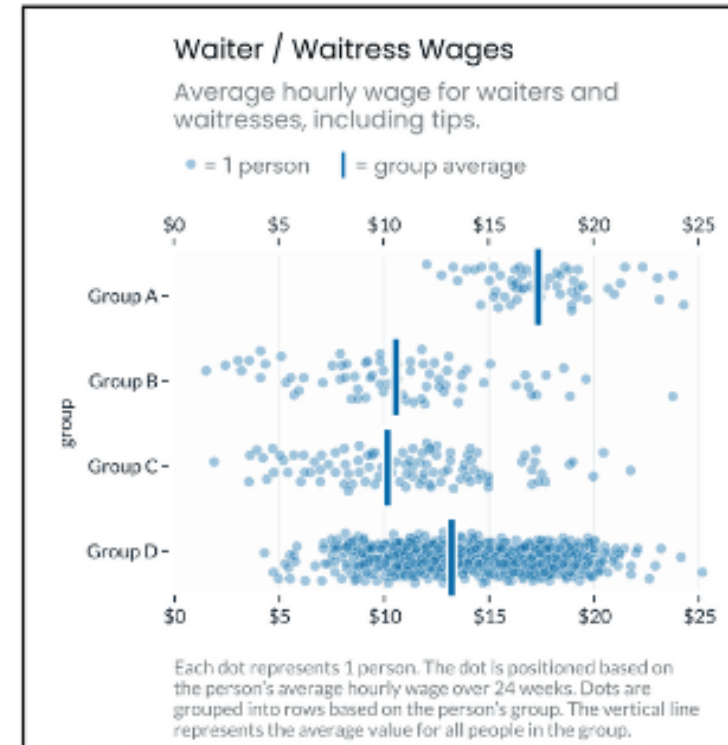
Left: Bar chart showing pay disparities between 4 groups of restaurant workers. Right: Jitter plot showing the same data.

Data represents the lived experience of real people!

Mr. Patel

Tommy Kwon (they, them)

Mrs. Smith

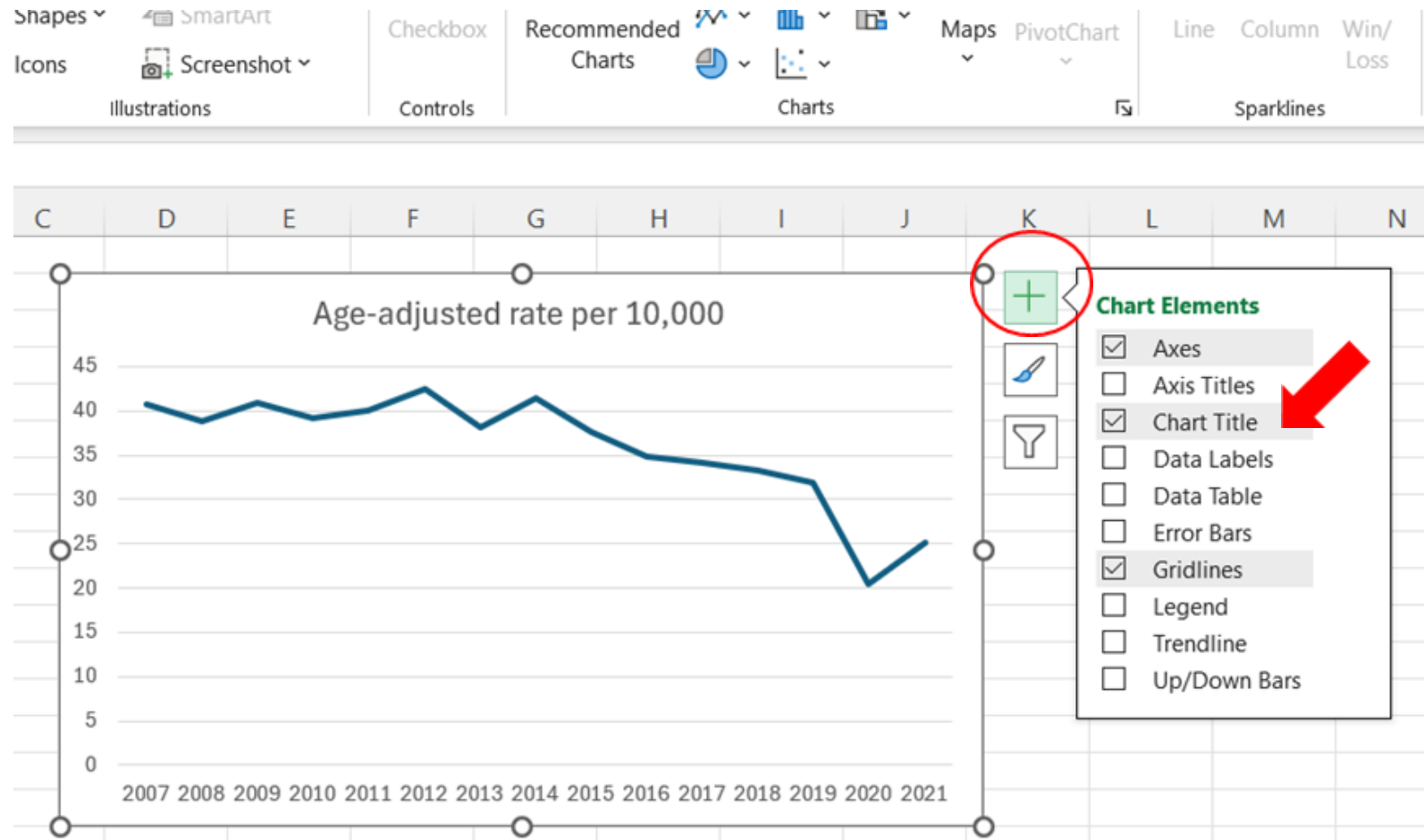The Garza Family

Context, Context, Context

Questions?

Module 3 Part 3

Creating Effective Charts in Excel

Click on the chart, and a green plus button will appear. This is the "chart elements" button, and it lets you add features such as chart titles, axis titles, and data labels.

Additionally, we can add markers to the line to make it easier to see what data points correspond with what year. Right click on the trendline and then click the bottom option that says, "format data series." This will open a menu on the left side of the screen.
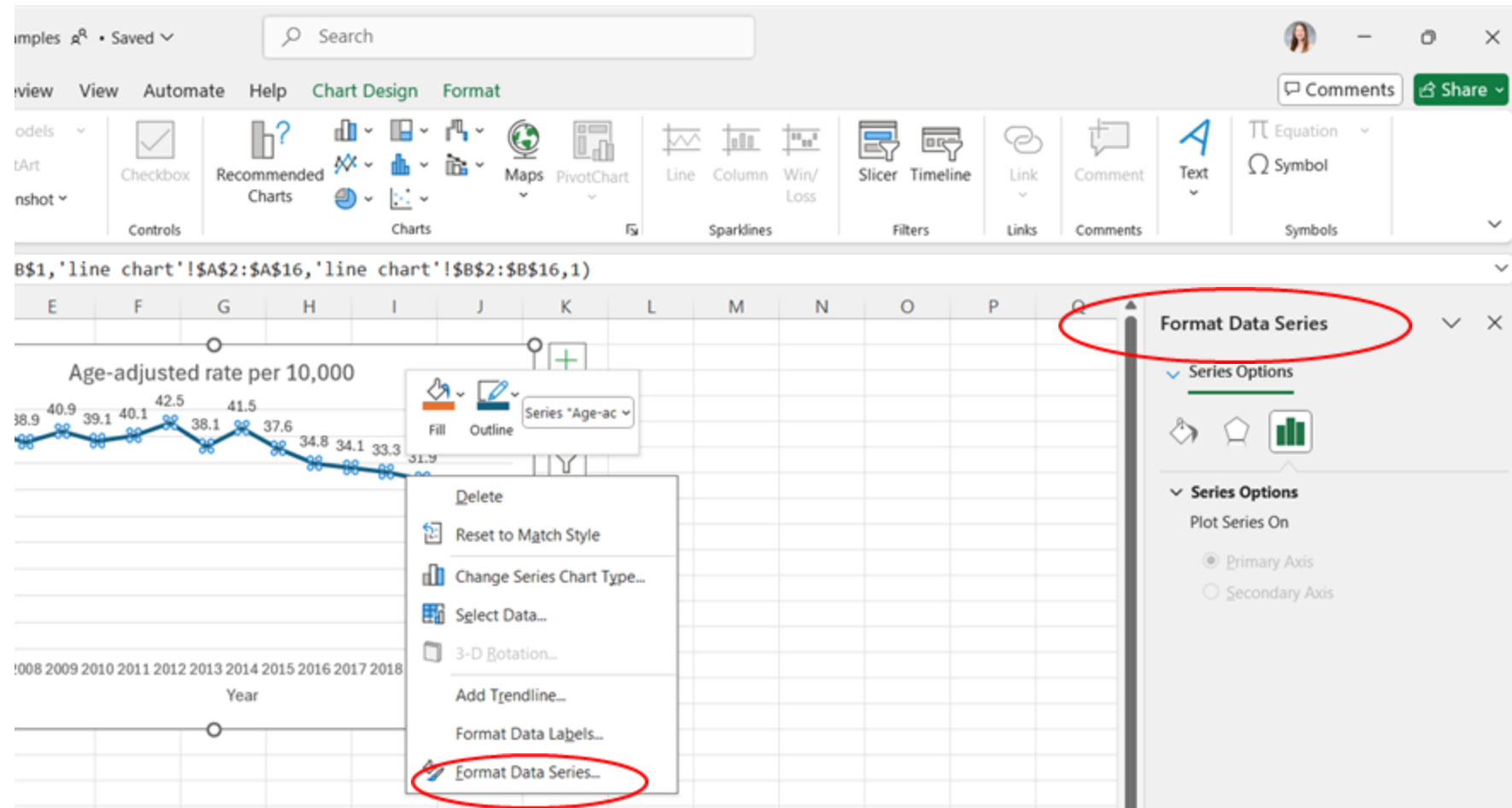
To add the markers, click on the paint bucket icon under series options, under the paint bucket select the marker icon, and then under "marker options" choose automatic.
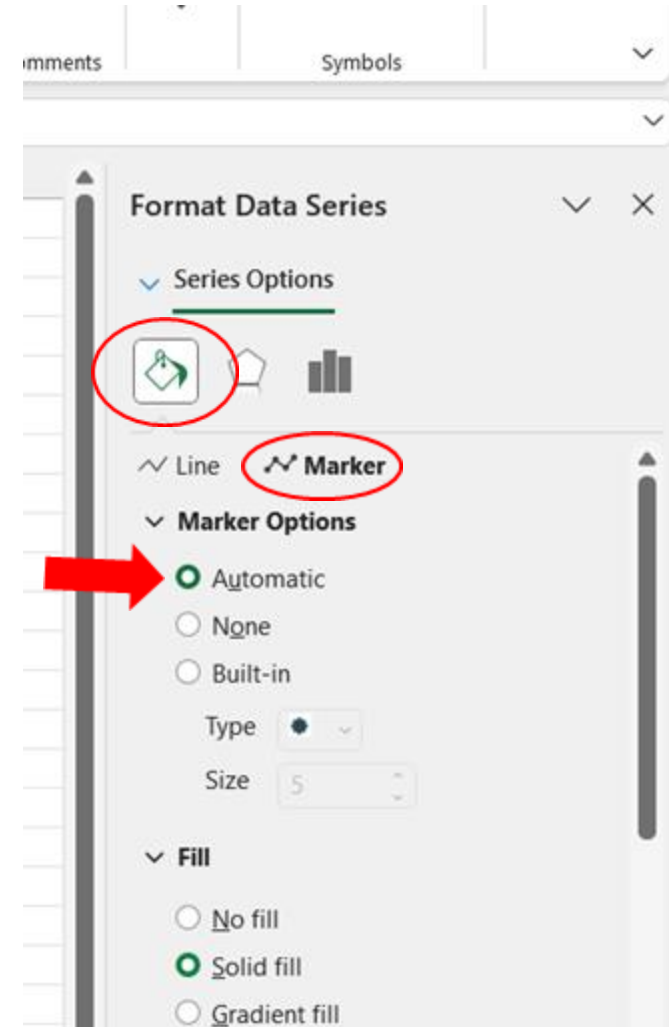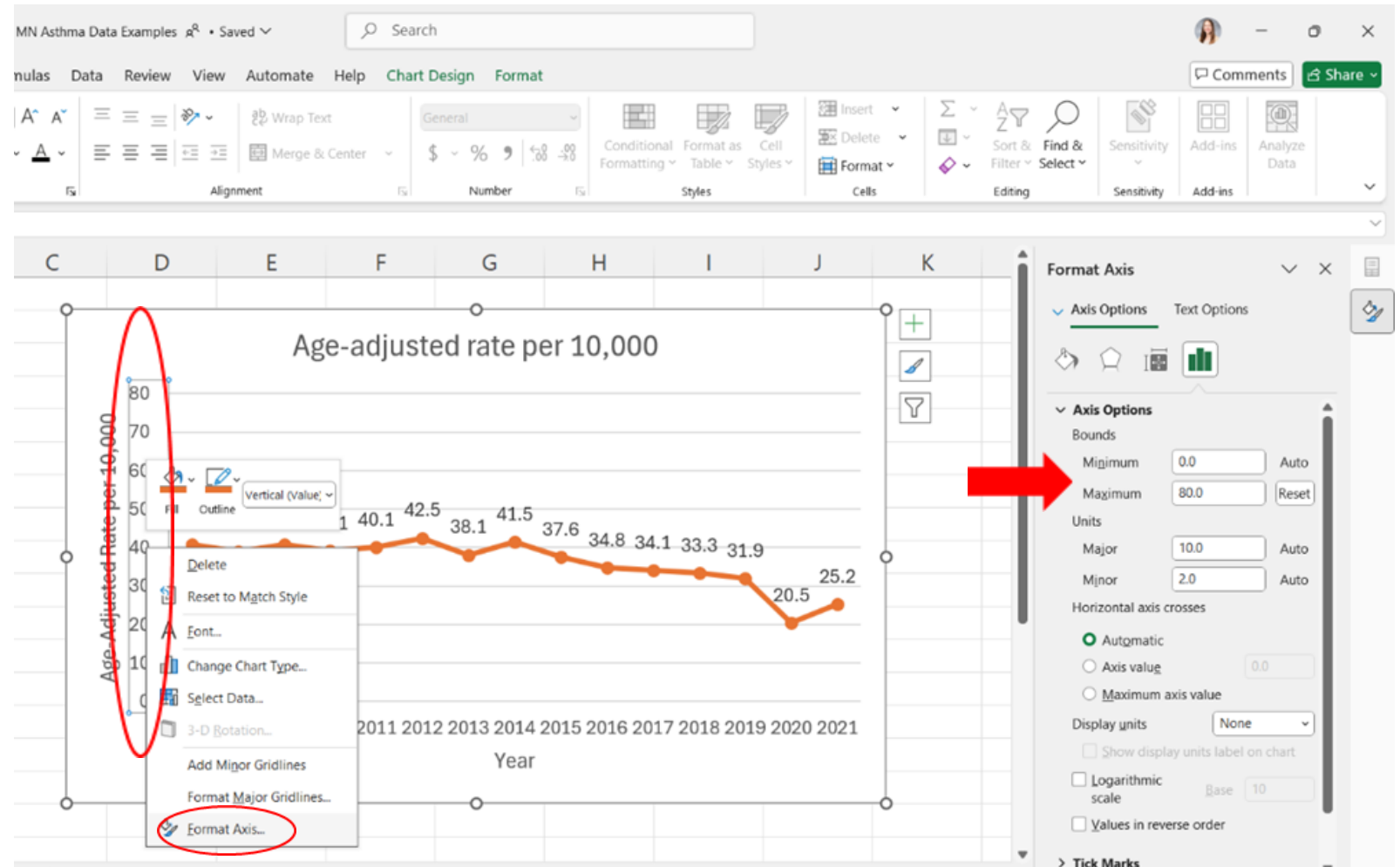
The chart will look like this after adding the axis titles, data labels and line markers.


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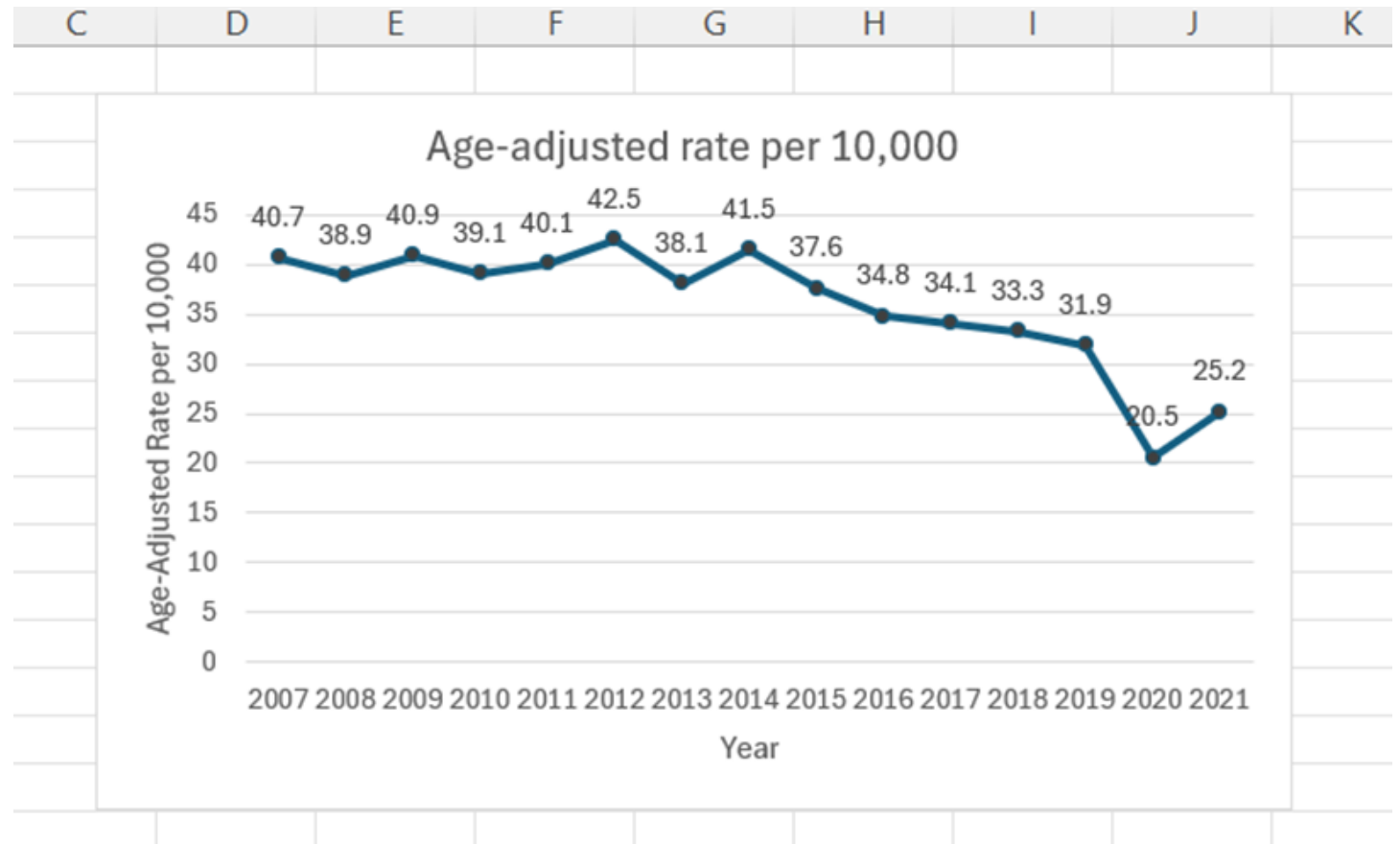
To change the color of the line and markers, right click on the line, and above the menu that pops up, you should see a shortcut where you can change the fill and the outline of the line on the chart. Additionally, you can also change the color, and other aspects of the line such as the width, by opening the "format data series" menu and selecting the paint bucket.
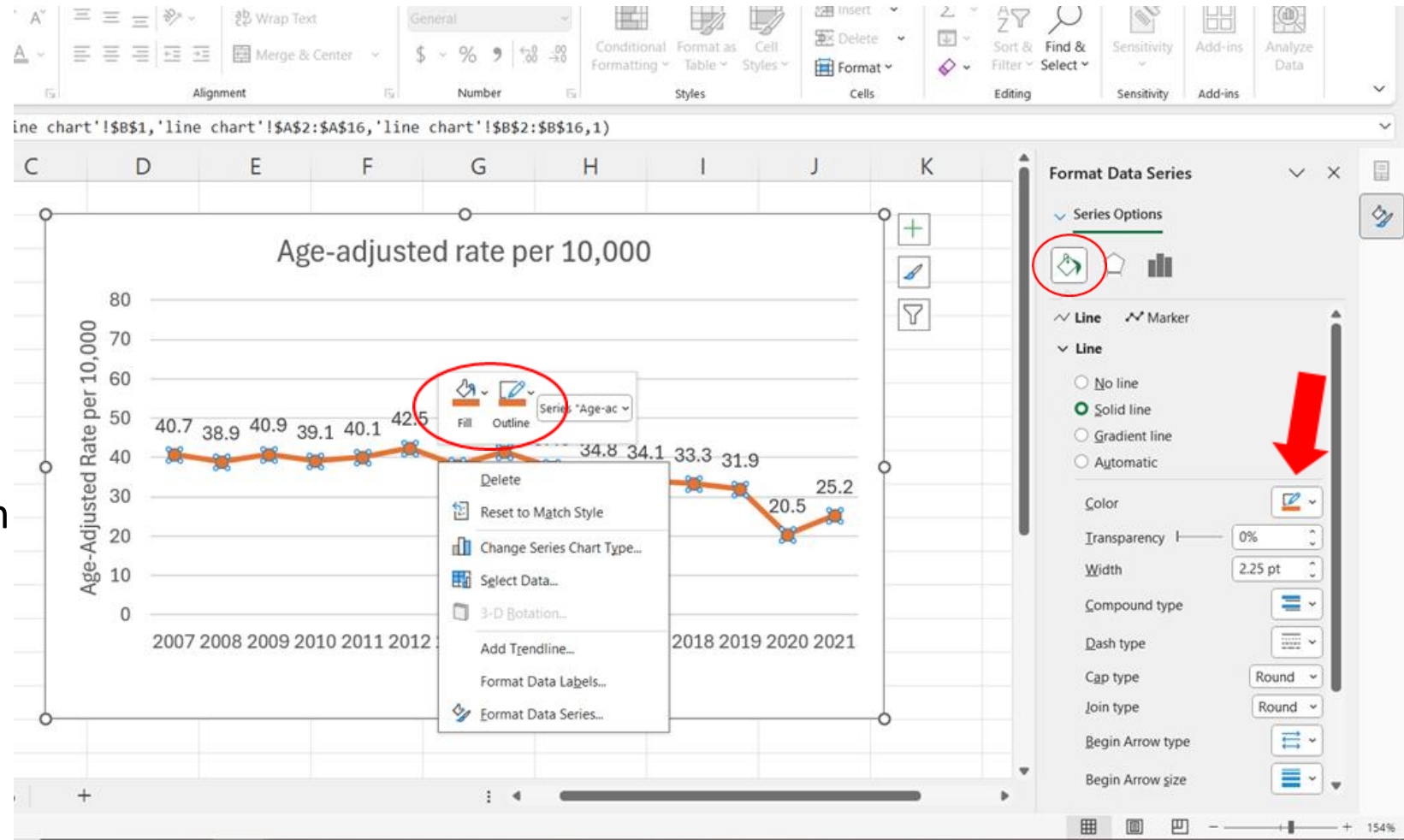
We can change the scale of the y-axis by right clicking on the axis numbers and clicking "Format axis." A similar side menu will appear, and then the minimum and maximum numbers on the y-axis can be changed.

After changing the maximum number to 80, the finished chart will look like this.
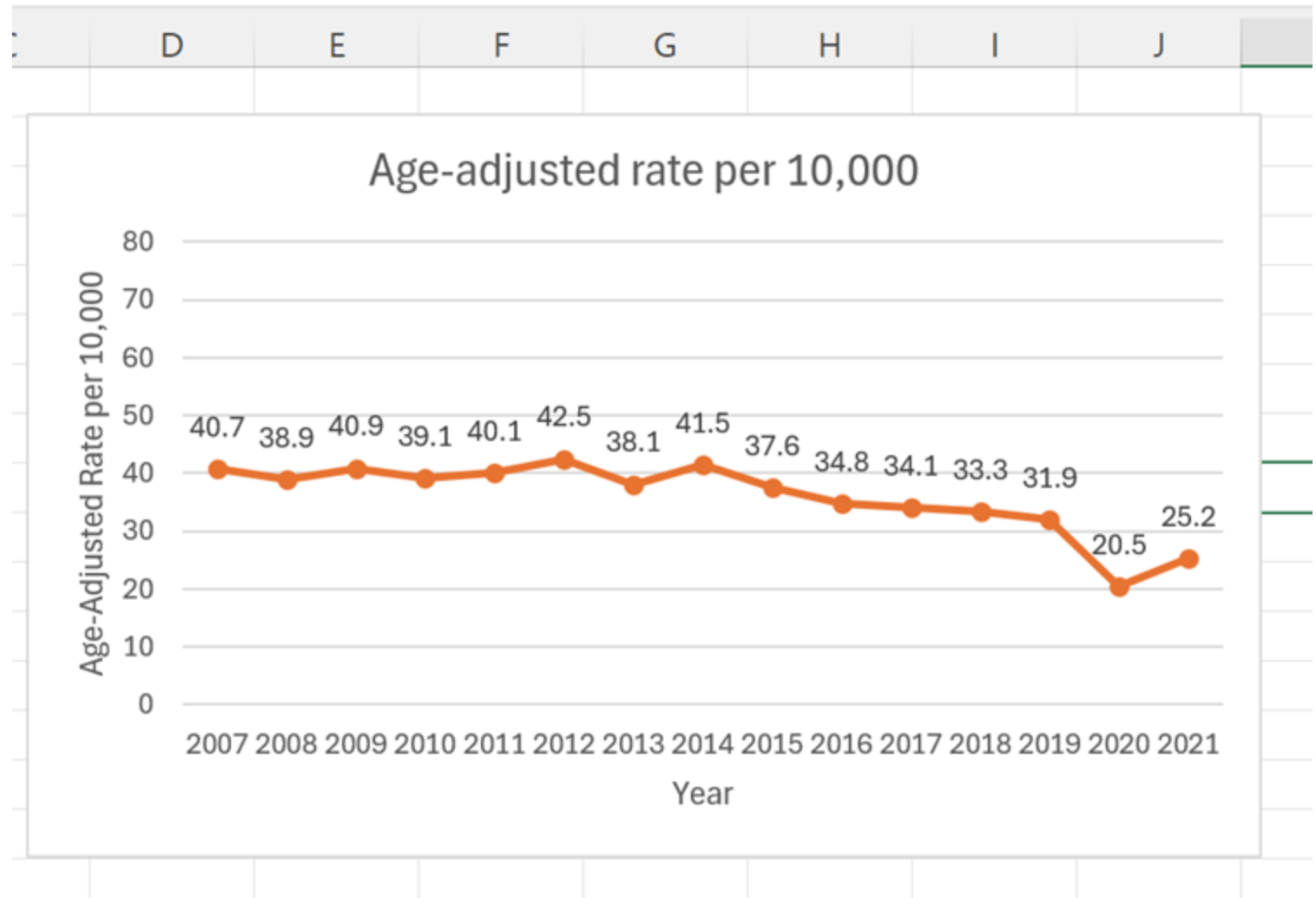
Homework Assignment: Create Visualization

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 (check out the checklist), **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.

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Research
and Policy

Thank you!

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