

IOWA

Institute for Public Health
Practice, Research and Policy

Visualize This

Storytelling With Data

Session 2



Visualize This – Storytelling with Data



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Training provided in partnership with the Institute for Public Health Practice, Research and Policy through a contract from the Iowa Department of Health and Human Services



Data Training Opportunities

Data Basics

Tackling Data

Visualize This

Disaggregate It

Check out our website
to see upcoming
training dates!



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Visualize This Resources – IHHS



VISUALIZE THIS

STORYTELLING WITH DATA

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.

[VIEW THE HPV WORKBOOK](#)



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



Agenda for Today

- 10 – 10:15 Welcome/Questions?
- 10:15 – 10:30 Module 2
- 10:30 – 10:45 Small Group Activity
- 10:45 – 11:15 Module 2, cont'd
- 11:15 – 11:25 Large Group Activity
- 11:25 – 11:30 Wrap Up/HW for Next Week



Module 2 – Part 1

Learning Objectives

1. Create the key message/story that you want to communicate.
2. Identify the data/appropriate data analysis.
3. Identify the appropriate data visualization type for your data.
4. Create an effective data visualization.
5. Understand how to incorporate health equity in creating your visualization.
6. Evaluate key elements of an effective data visualization.



Crafting Your Message

- What is the question that your audience is asking? (or should be asking?)
- Use a What? So What? Now What? Approach
- Use a Story Approach—Current Reality, Conflict/Threat to Current Reality, Resolution/New Reality—and make sure to have a few good characters!



What is the main point of my data?

- **A single number** – number of cases, prevalence rate, percentage
- **Comparison between groups** – showing disparities between groups, comparing county rates, showing prevalence differences over years
- **Comparing to a benchmark** – comparing your county to the state rate, or to HP 2020 objectives
- **Survey results** – this will depend on the type of questions/response categories that you are using
- **Changes over time** – comparing rates in one group over time or across multiple groups over time
- **Patterns** – you want the audience to see certain relationships between variables or across groups



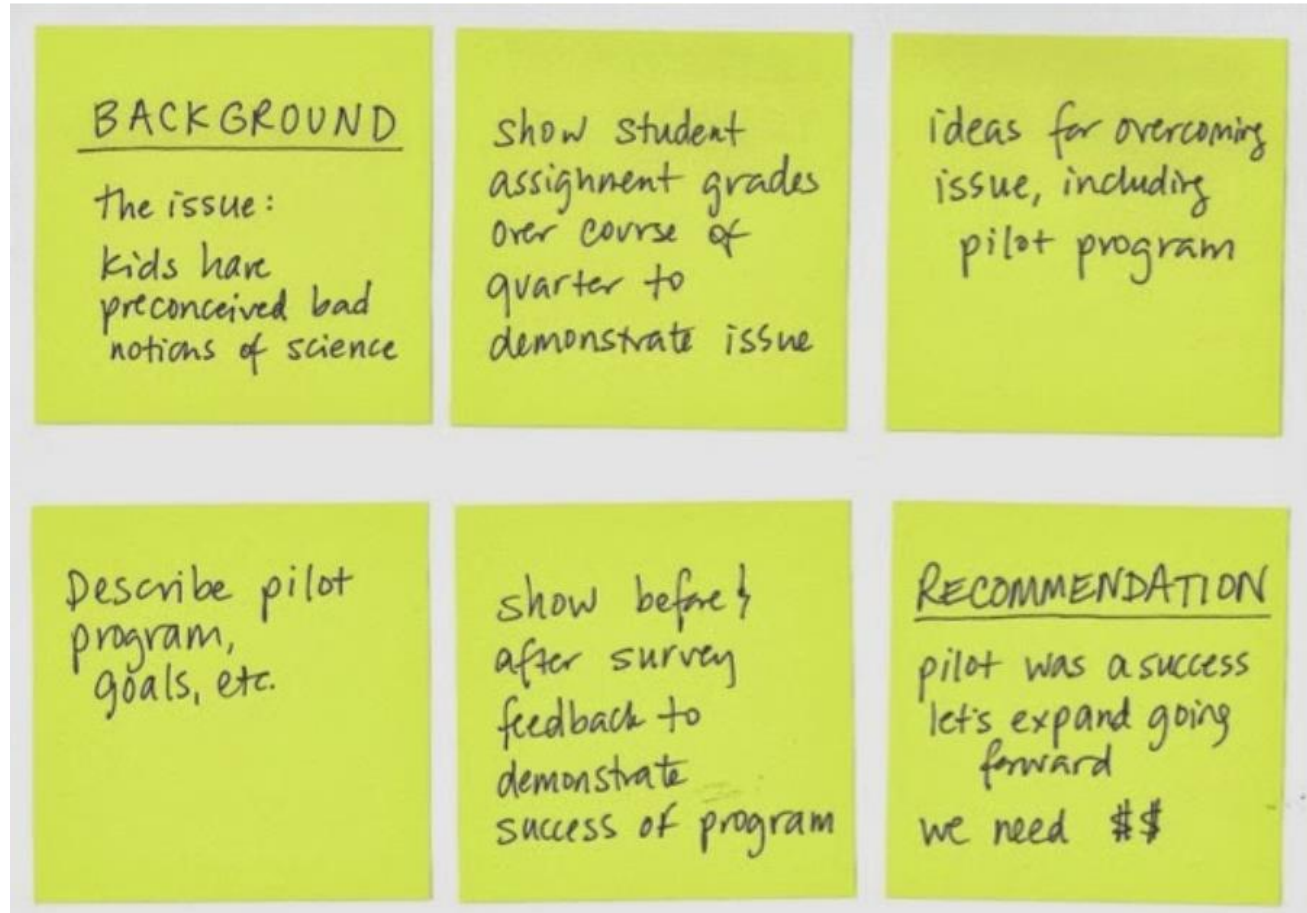
Context, Context, Context



Creating a Storyboard

It's about the message—not the software!

What?



So What?

Now What?



Small Group Activity – 15 mins

Talk about your data set

What is your key message (known or considered)

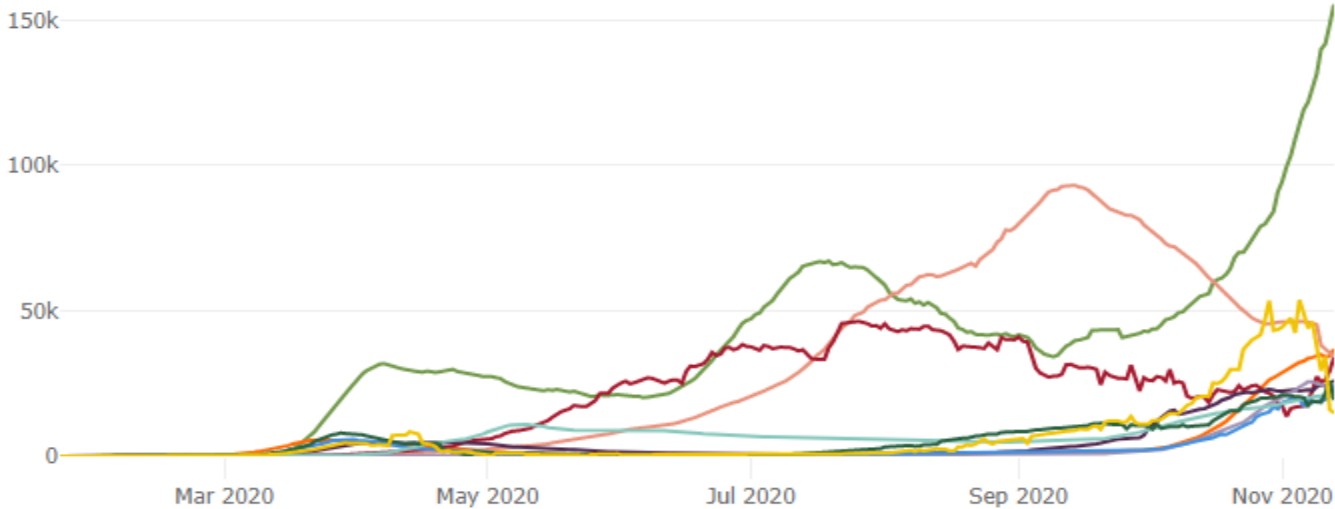
Target audience

Get feedback from your colleagues



Module 2 Part 2

Creating an Effective Visualization



Click any country below to hide/show from the graph:

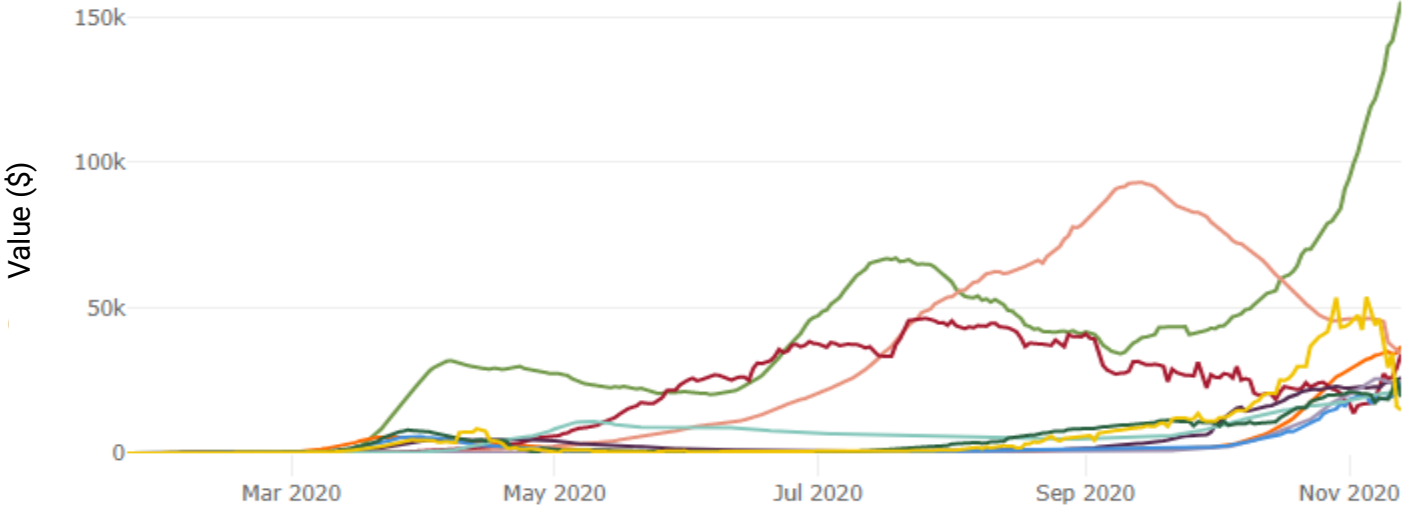
- US
- Italy
- India
- Brazil
- United Kingdom
- Poland
- Germany
- Russia
- Spain
- France



Creating an Effective Visualization



Increase in Retirement Portfolio Valuation (\$) during the COVID Pandemic by Country



Click any country below to hide/show from the graph:

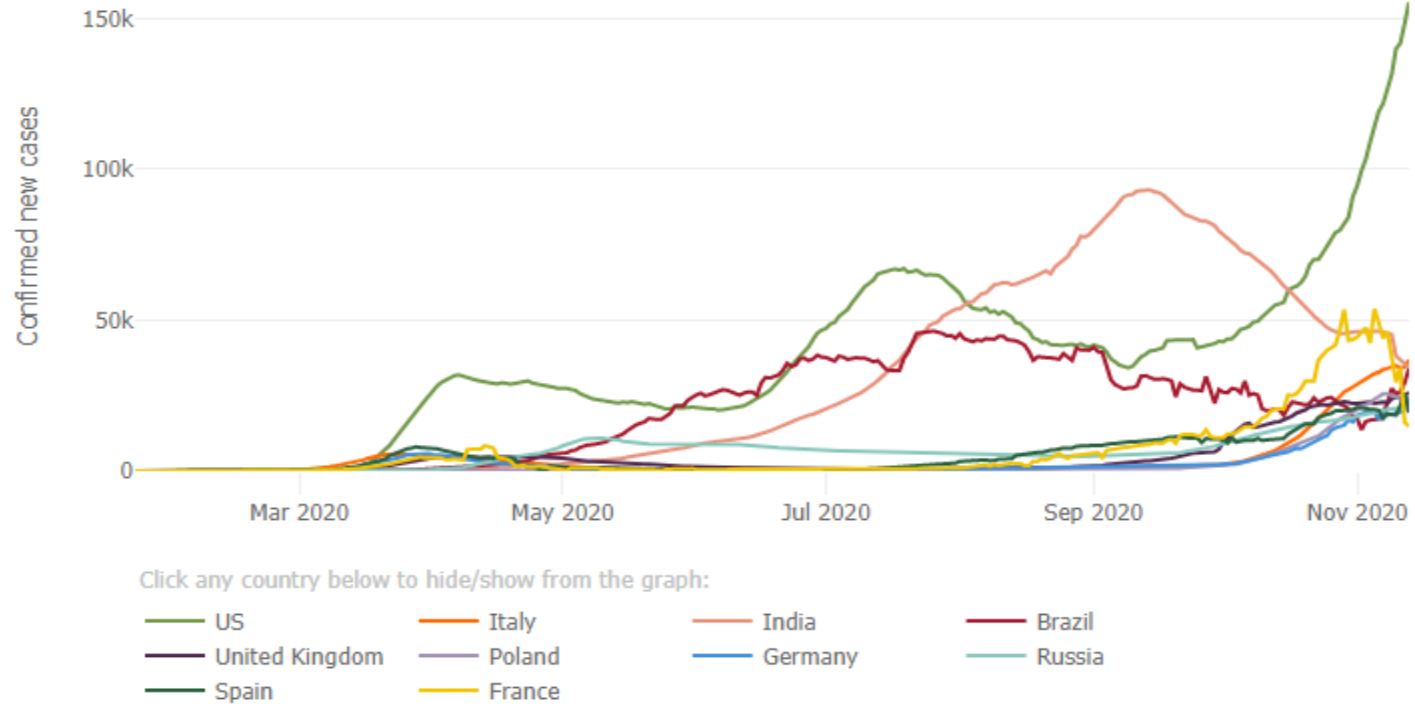
US	Italy	India	Brazil
United Kingdom	Poland	Germany	Russia
Spain	France		



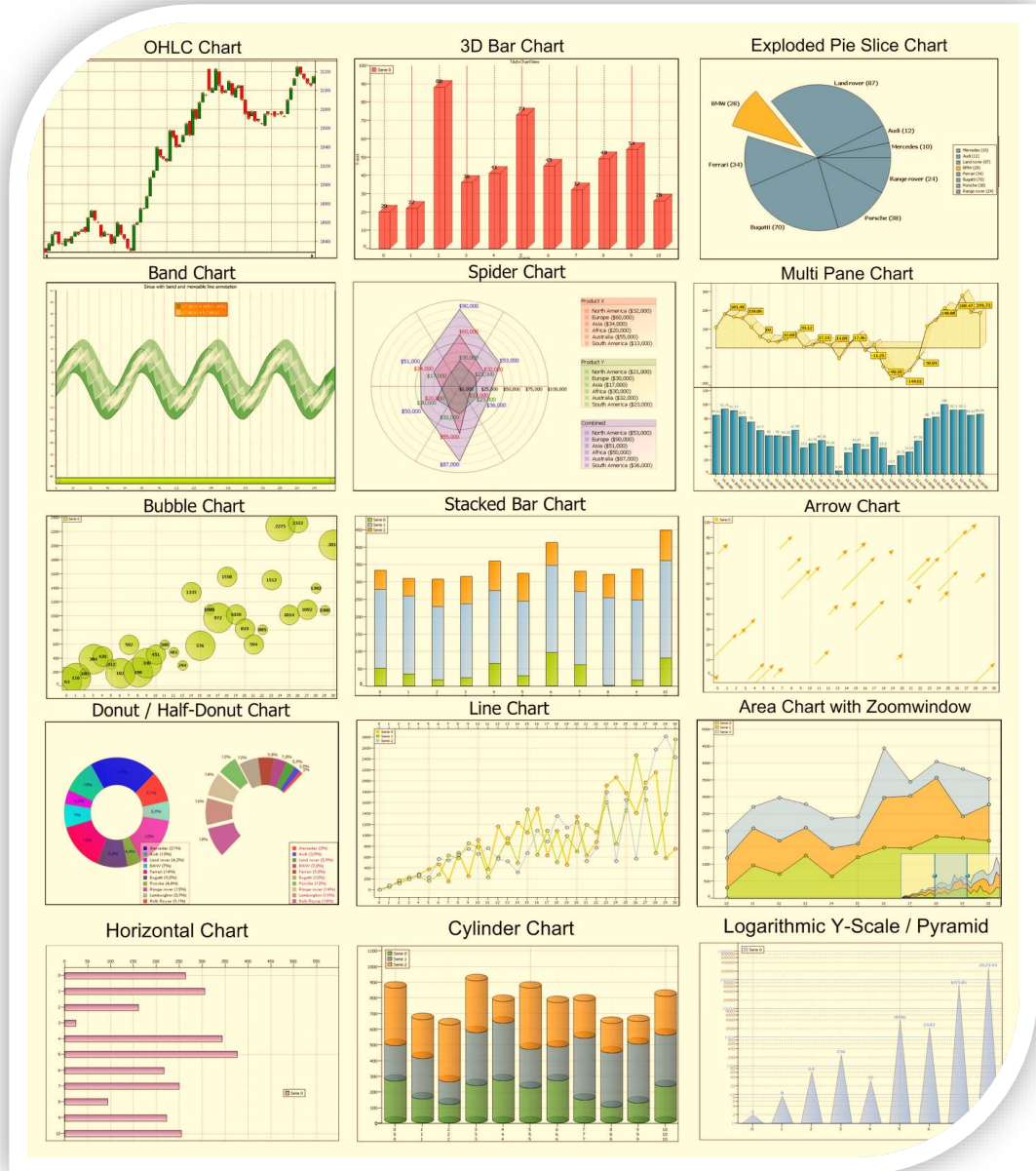
Creating an Effective Visualization

DAILY CONFIRMED NEW CASES (7-DAY MOVING AVERAGE)

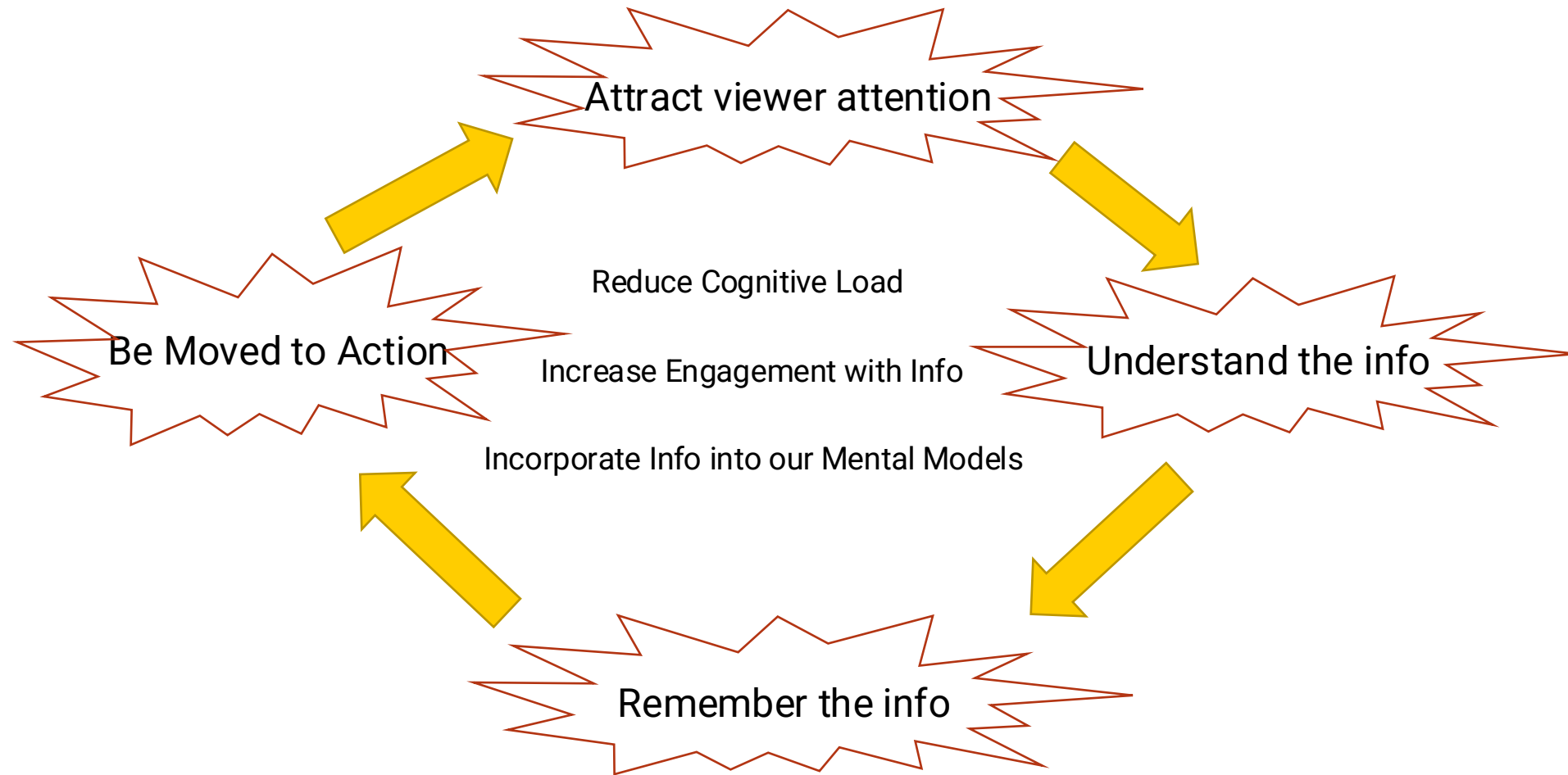
Outbreak evolution for the current 10 most affected countries



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



What does it mean to be effective?





What do you want your audience to FEEL?



WPIX
MICHAEL D. CISNEROS

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



How do I choose the right chart?

Let's start with quantitative data

<p>A single number (number of cases; prevalence rate; percentage)</p> <ul style="list-style-type: none"> Big number [1] Icon array [2] Pie chart Bar/column chart 	<p>Comparison (showing disparities between groups; comparing county rates; showing differences between years)</p> <ul style="list-style-type: none"> Side-by-side column chart Slope graph [3] Back-to-back bar chart [4] Dot plot [5] Small multiples [6]
<p>Beating a benchmark (comparing your county to the state rate or to HP2020 objective)</p> <ul style="list-style-type: none"> Column chart with benchmark line [7] Combo chart [8] 	<p>Survey results (this will depend on the type of question/response categories you are using)</p> <ul style="list-style-type: none"> Stacked bar chart Small multiples [6] Back-to-back bar chart [4] Bar/column chart Number and icon Pie chart
<p>Parts of a whole</p> <ul style="list-style-type: none"> Pie chart Stacked bar chart Histogram [9] Map 	<p>Correlations (you want to visually show how two factors are related)</p> <ul style="list-style-type: none"> Scatterplot Diagram Don't visualize
<p>Change over time (comparing rates over time-one group or multiple groups)</p> <ul style="list-style-type: none"> Line chart Stacked column chart Deviating bar chart (akin to back-to-back) Slope graph [3] Dot plot 	<p>Qualitative data</p> <ul style="list-style-type: none"> Word cloud Picture with text

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



Quantitative Data

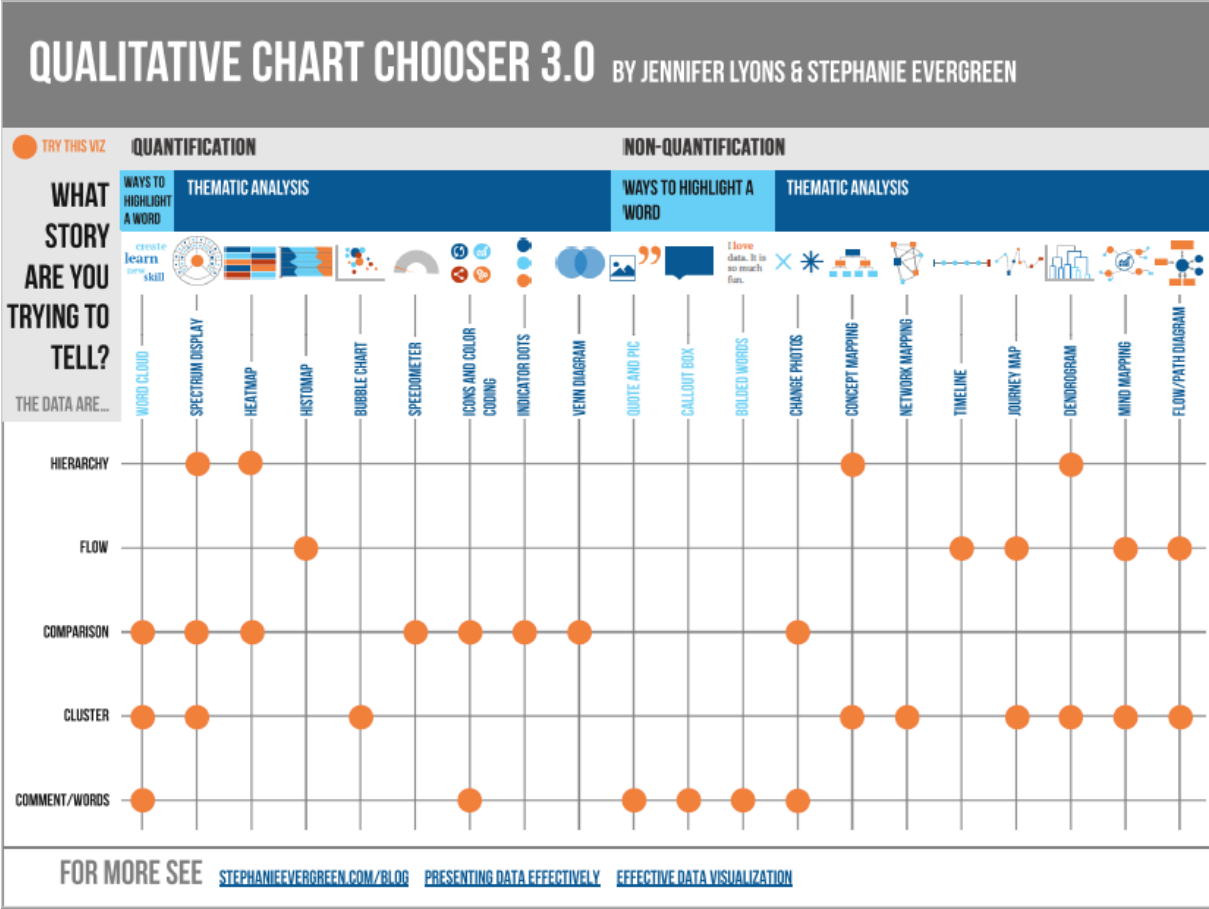
CHART CHOOSER 3.0
BY STEPHANIE EVERGREEN

REMEMBER THIS IMPORTANT NUMBER	Big Number 23%	Icon Array	Pie/Donut	Bar/Column		
COMPARE 2 OR MORE THINGS	Side by Side	Slopegraph	Back-to-Back	Dot Plot	Dumbbell Dot	Small Multiples
COMPARE TO A TARGET	Benchmark Line	Combo	Bullet Chart	Indicator Dots	WATCH FOR OVERLAPPING POINTS	
SHOW SURVEY RESPONSES	Stacked Bar	Small Multiples	Diverging Bar	Bar/Column	Number & Icon 45% their jobs	Nested
THESE ARE THE PARTS OF THIS WHOLE	Pie/Donut	Stacked Bar	Histogram	Tree Map	Map	FOR BRANCHING QUESTIONS!
VISUALIZE OPEN-ENDED COMMENTS	Quote & Pic	Word cloud	Stock photo Rep	Heat Map	Prezi	ALSO GOOD FOR SHOWING FLOW
HEY, THINGS CHANGED OVER TIME	Line	Stacked Column	Deviation Bar	Slopegraph	Dot Plot	Sankey
THIS THING CHANGES WHEN THAT THING DOES	Scatterplot	Draw It				

FOR MORE SEE
STEPHANIEEVERGREEN.COM/TAG/STEP-BY-STEP
STEPHANIEEVERGREEN.COM/BLOG
 PRESENTING DATA EFFECTIVELY



What about if I have qualitative data?



Evergreen, S. and Lyons, J. (2017). *Qualitative Chart Chooser 3.0*. Evergreen Data. <https://stephanieevergreen.com/qualitative-chart-chooser-3/>



Good charts vs. Bad charts

The Elements of Chart Design

- Text
- Arrangement
- Color
- Lines
- Overall attributes



TEXT

- Use a descriptive title – What is the takeaway?
- 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 --

<https://stephanieevergreen.com/strong-titles/>

Parenting Program Pretest and Posttest Scores



But what if we did something like this...

<https://stephanieevergreen.com/strong-titles/>

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."



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

Recipiency rate (%)

4

Or this...

3

2

1

0

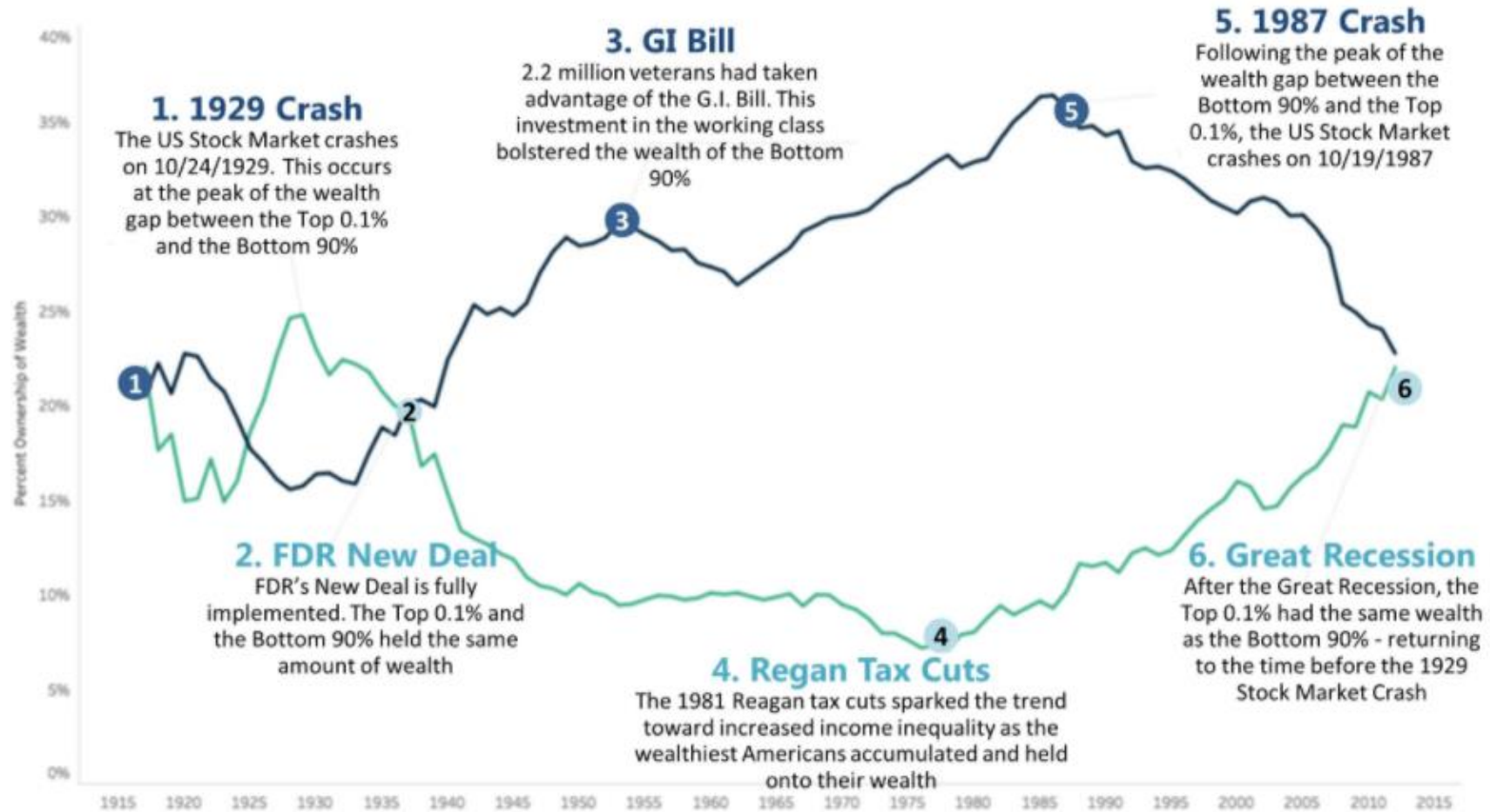
2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015

- Maine
- New Hampshire
- Rhode Island
- Vermont
- Massachusetts
- Connecticut
- All areas

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

The Wealth Gap

A historical view of wealth ownership within the **Top 0.1%** and the **Bottom 90%** of US households



Source: <http://www.businessinsider.com/share-of-us-household-wealth-by-income-level-2016-11>

Designer: <https://twitter.com/invizalot>

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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)

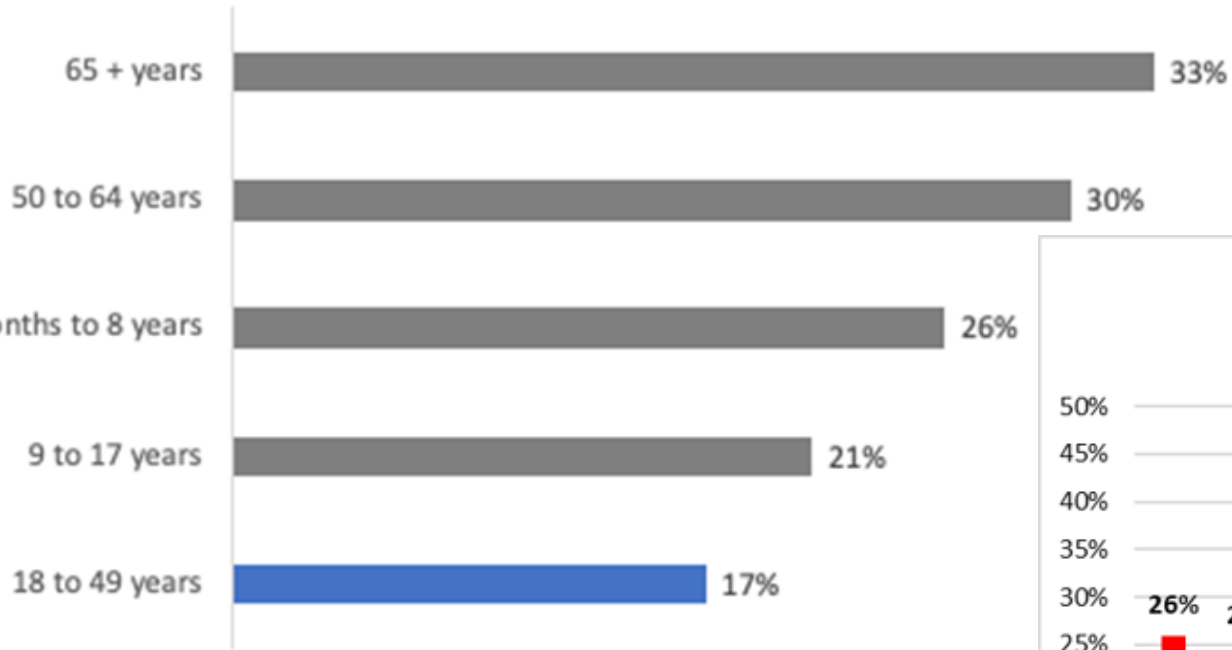


COLOR

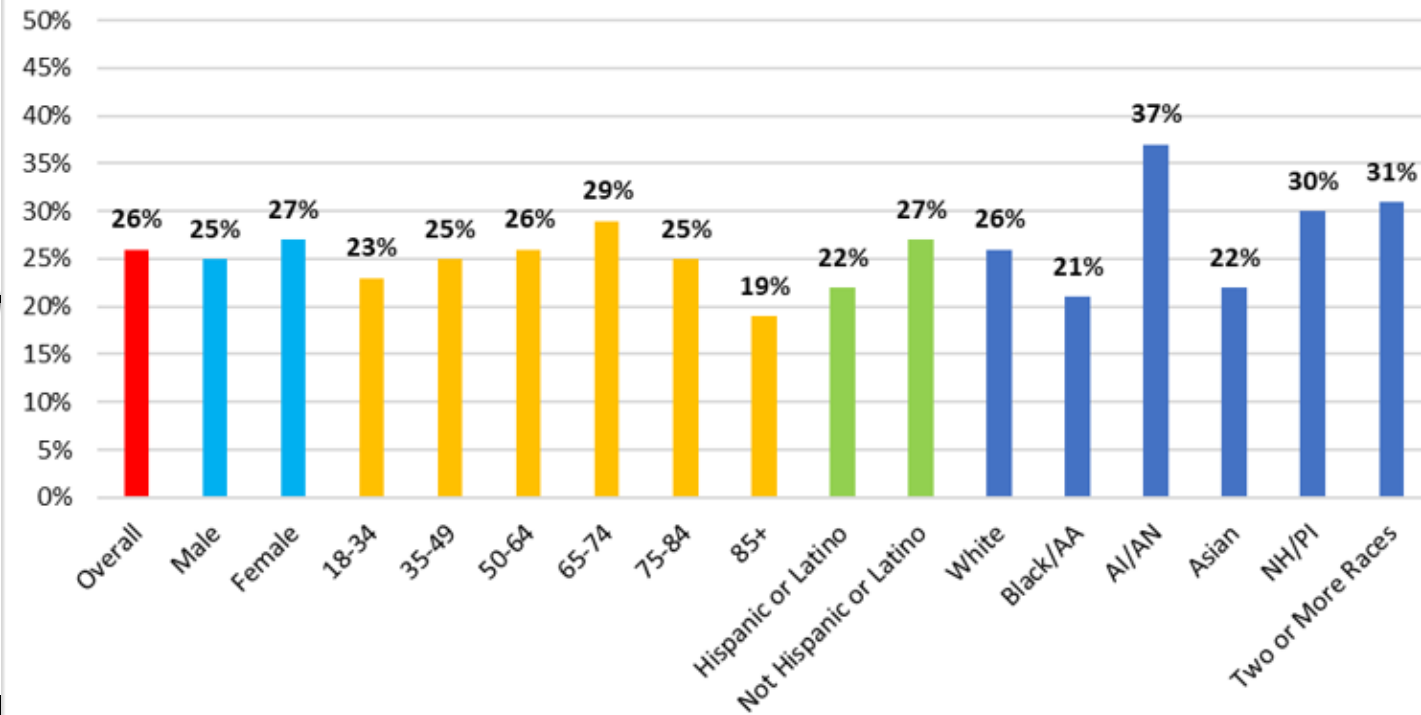
- **Color** grabs our attention
- The color you use is driven by the purpose of the communication (learning vs. emphasis)
- Use the org's **color** scheme if possible
- A change in color indicates a change in meaning
- Remember color-blind readers (10% of adult pop)
- Color can be used for decorating, navigating, creating emphasis



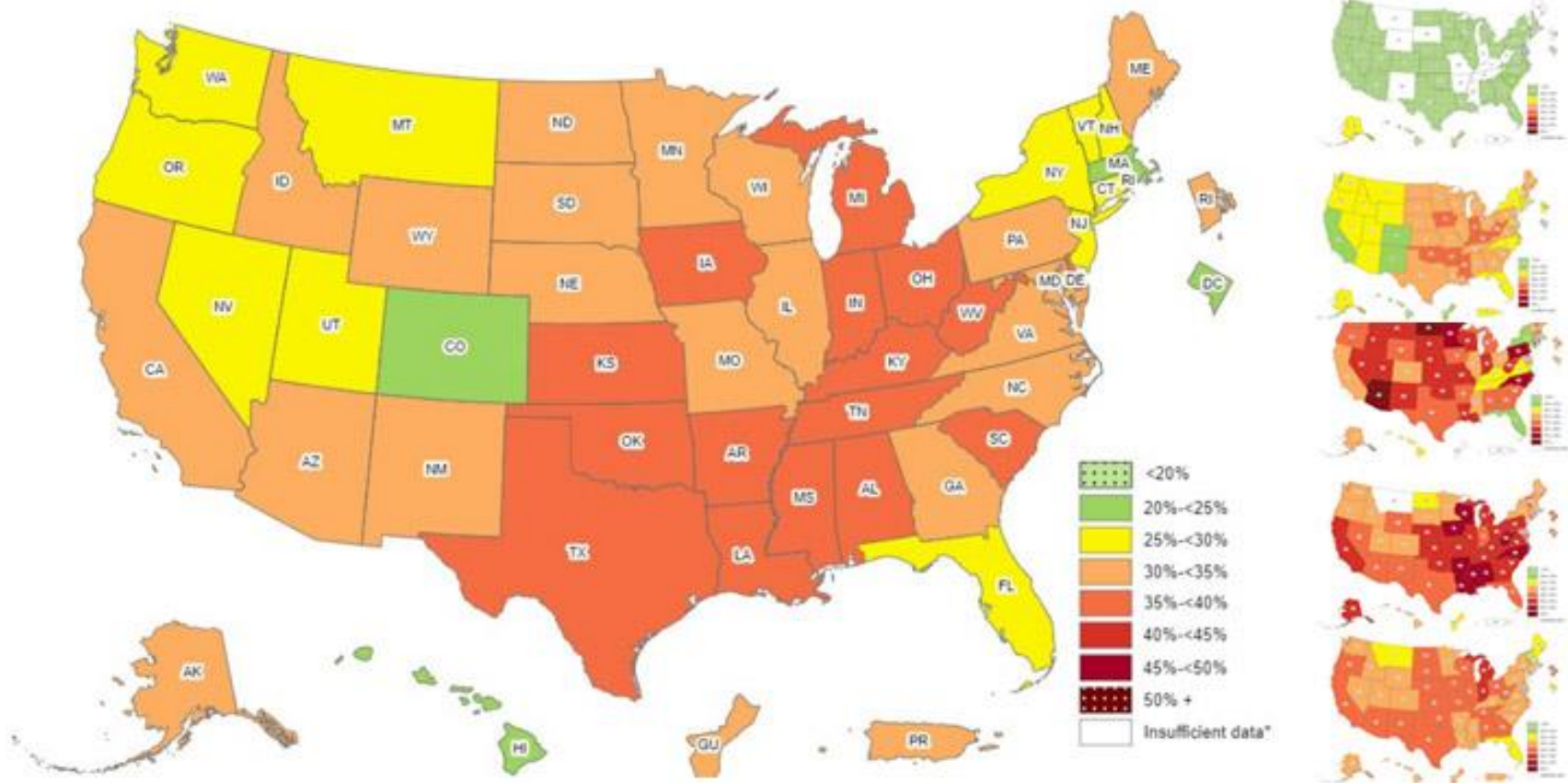
Flu vaccination rates are lowest in Iowans the ages of 18 to 49 years old.



Comprehensive Diabetes Care: Medical Attention for Nephropathy (KED) (n = 15,335)



Prevalence of Obesity in Adults (2020, BRFSS)



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LINES

- Minimize gridlines and axis lines

However...

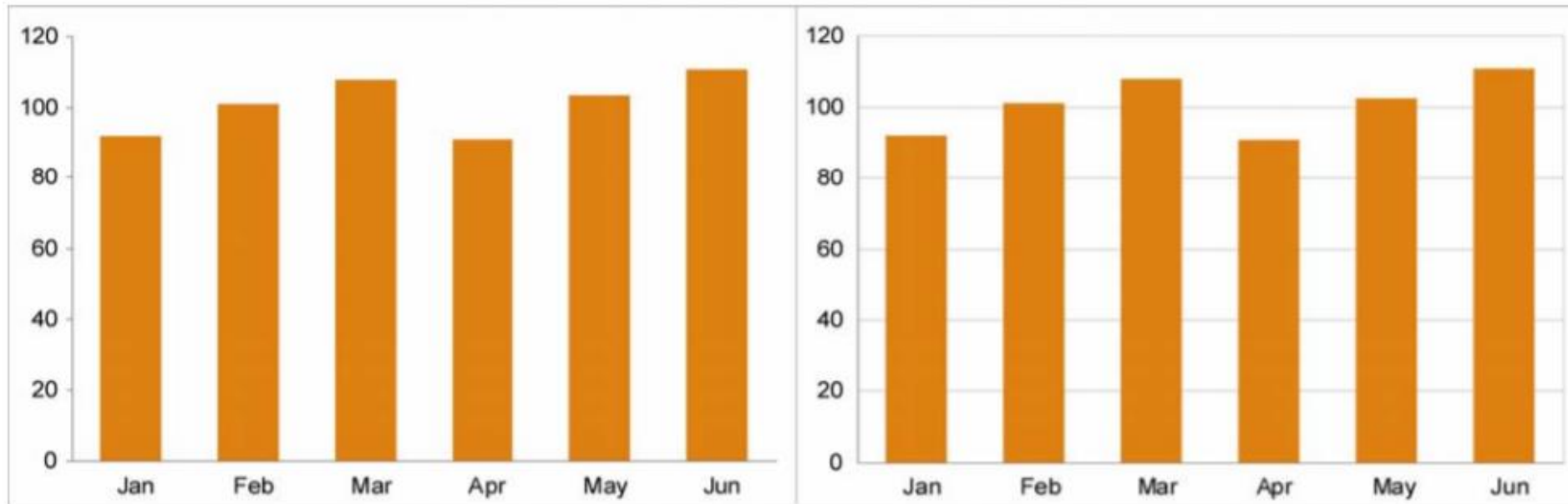


Figure 2: Enhancing perception of small differences

Perceptual Edge

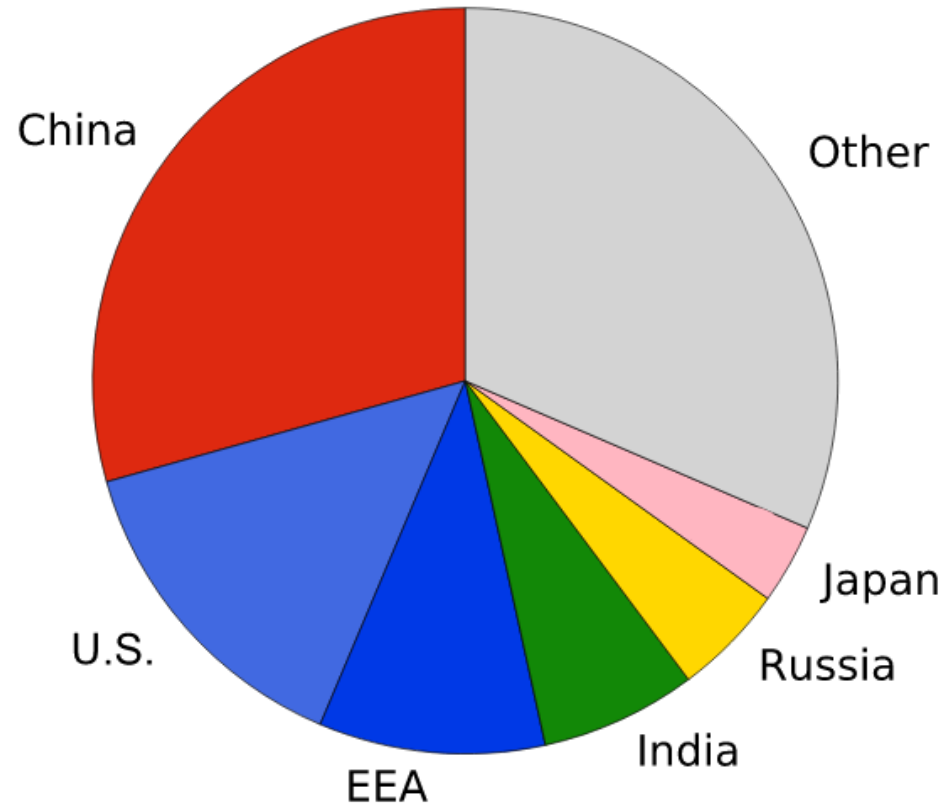
Grid Lines in Graphs are Rarely Useful

Page 2



Ok, let's practice a bit

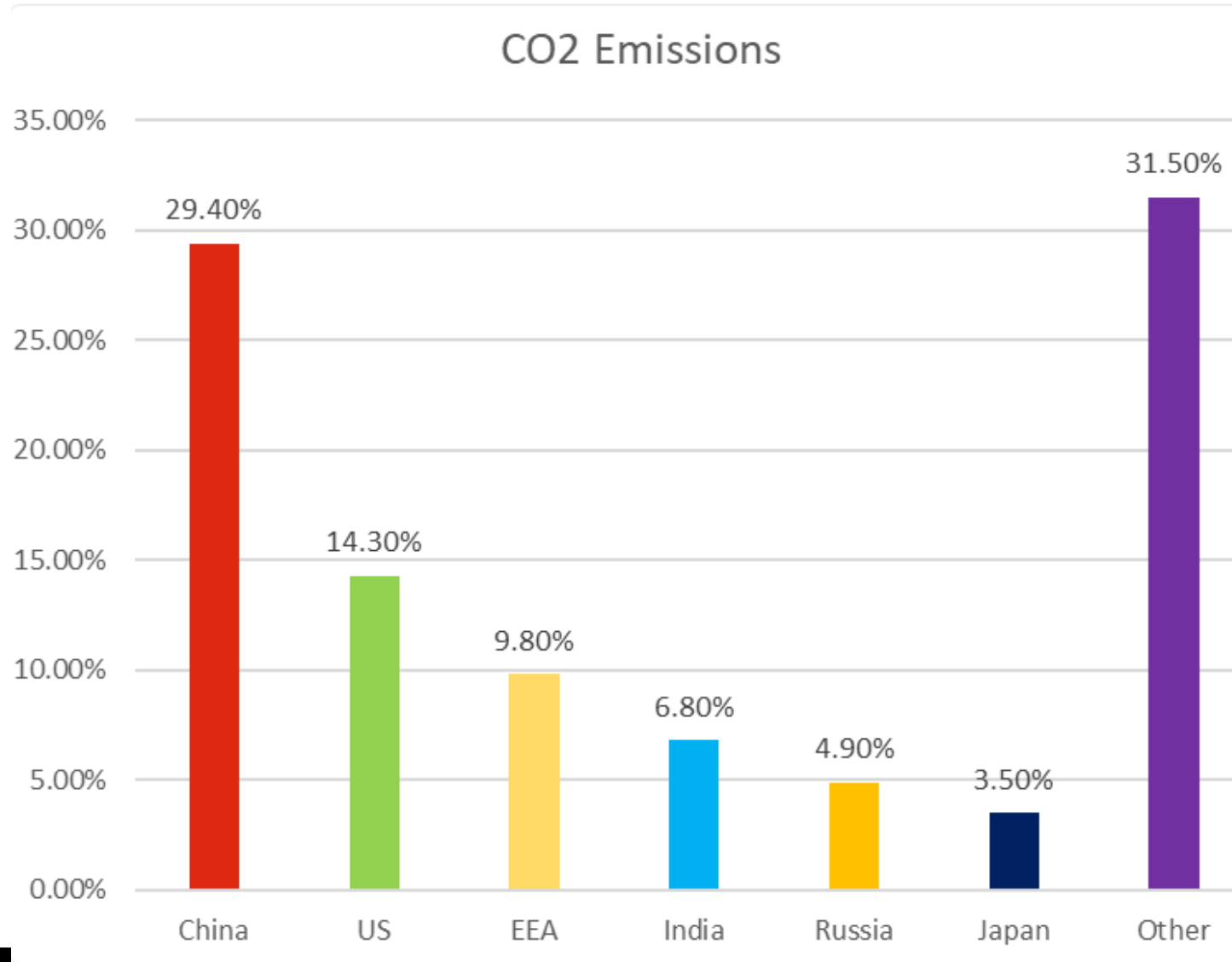
Proportion of World CO2 Emissions by Country



Is this the right chart type?



Is this one better?

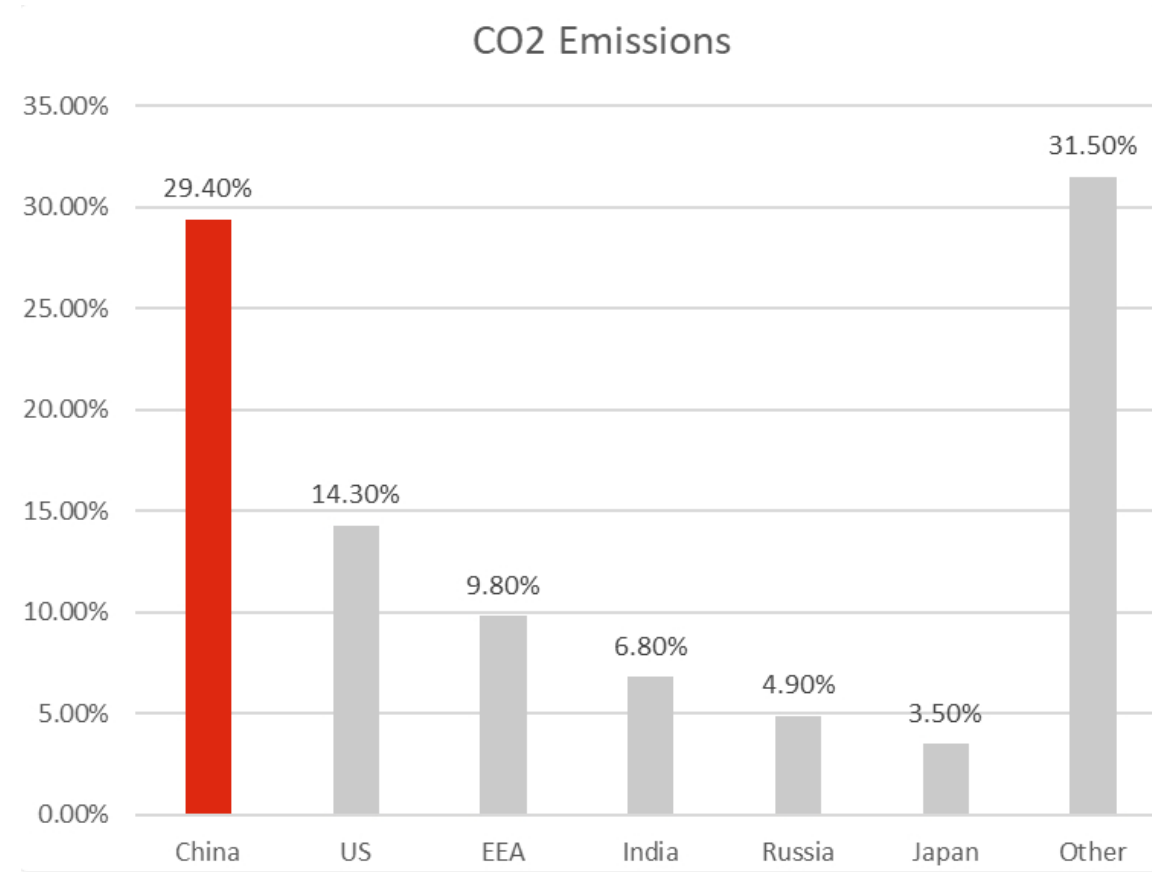
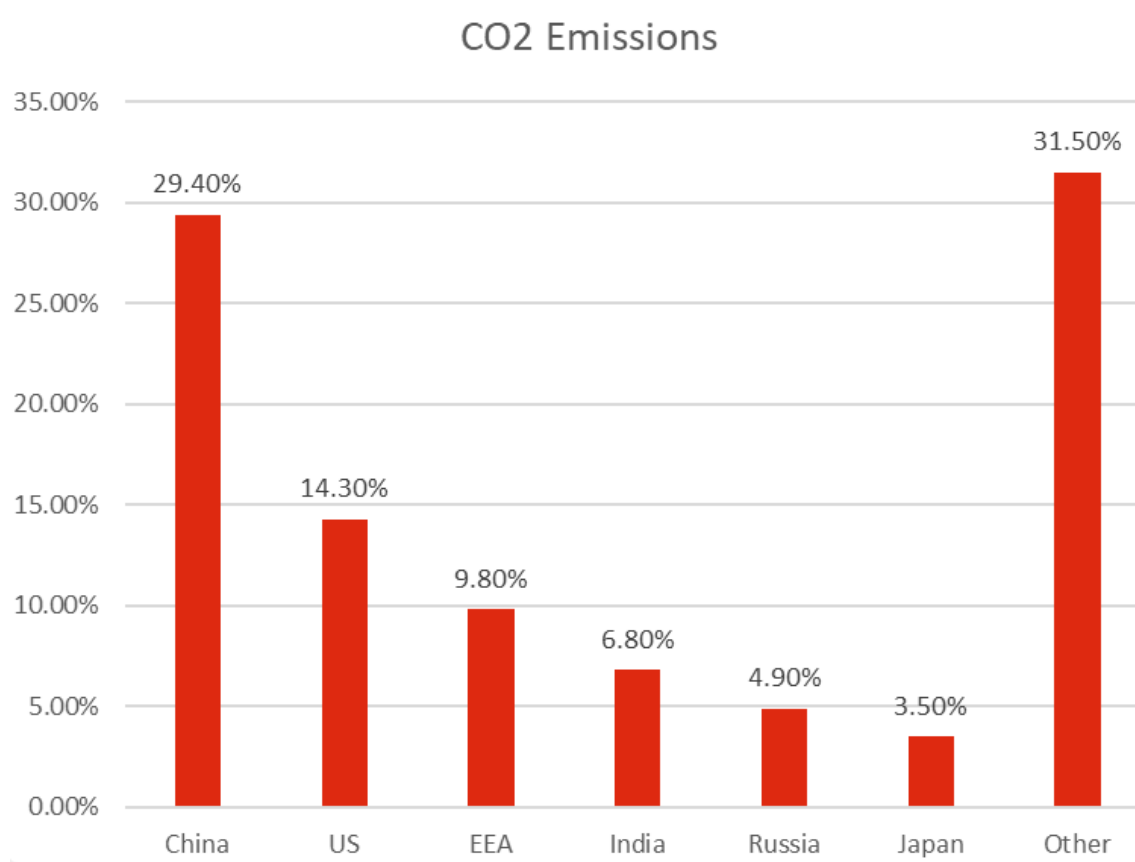


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And what about these?

China makes up the largest proportion of world CO2 emissions.



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Incorporating Health Equity into your Visualization

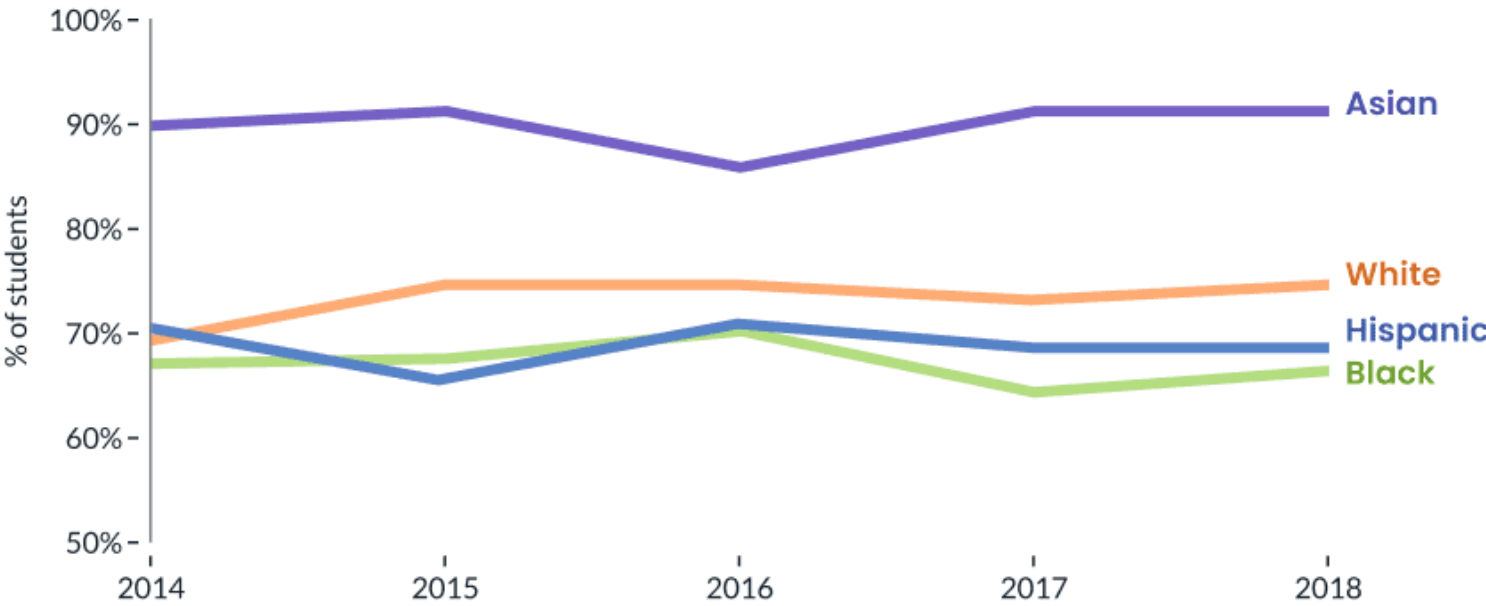
Demonstrate Empathy (start with cultural humility)

- Use People-first language
- Avoid Othering
- Order groups in a purposeful way
- Consider Missing Groups
- Use Color/Patterns with an Equity Awareness
- Incorporate Accessibility



Disaggregating Data by Race/Ethnicity

% of Boston 10th graders scoring proficient or higher on Massachusetts Comprehensive Assessment System



What questions do you have?

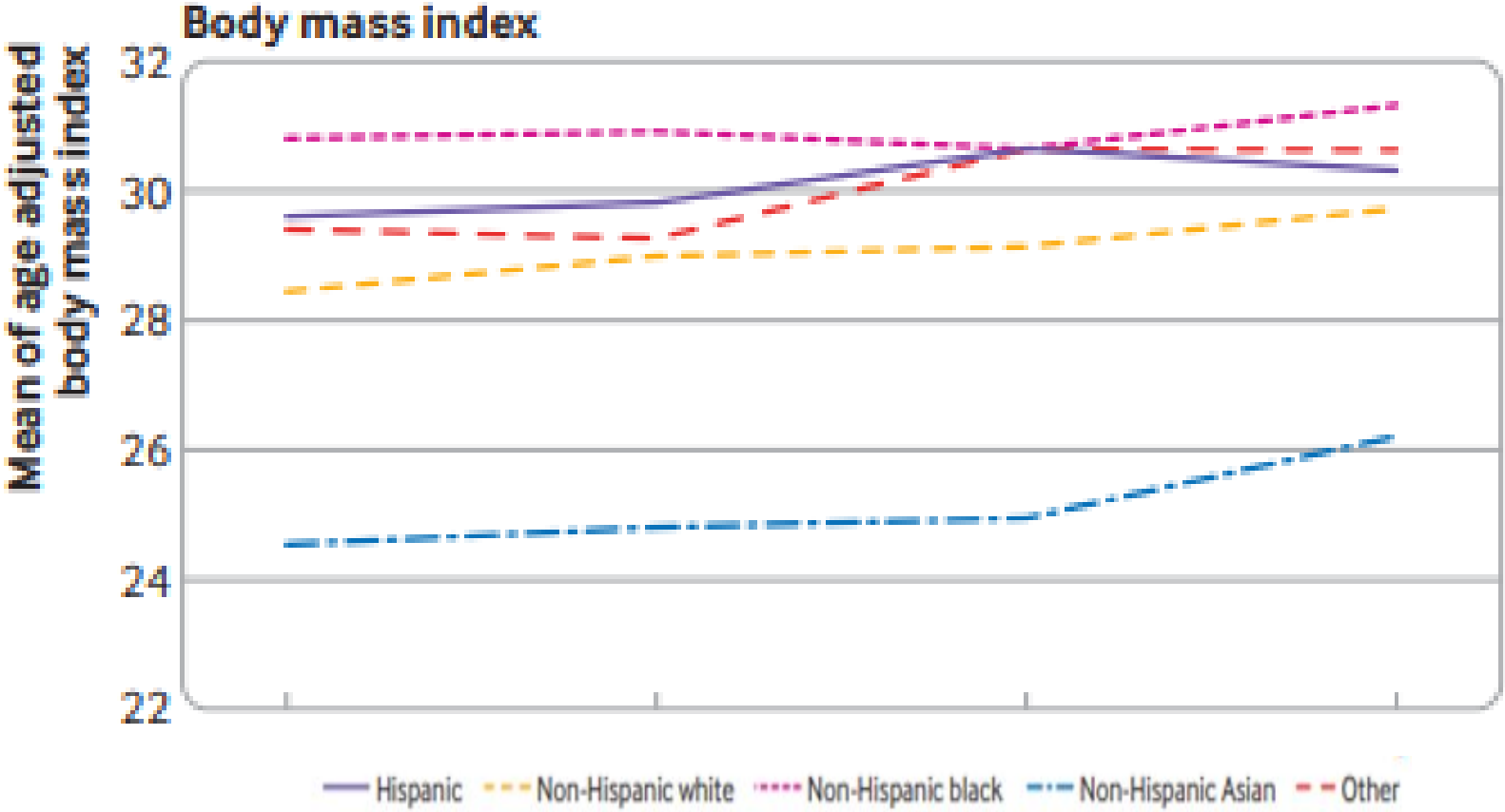
What other data/analysis would you want to see?



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



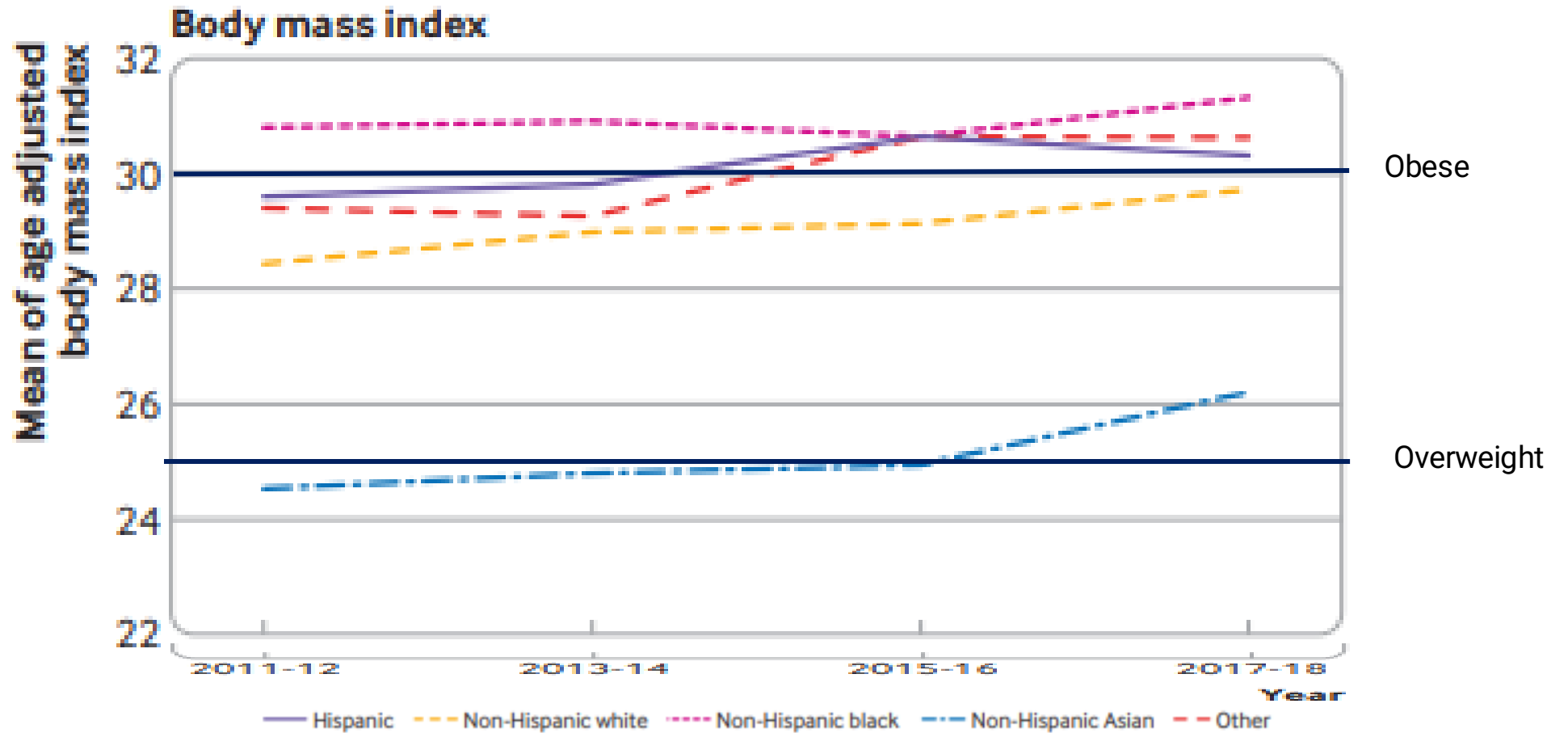
Disaggregating Data by Race/Ethnicity



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

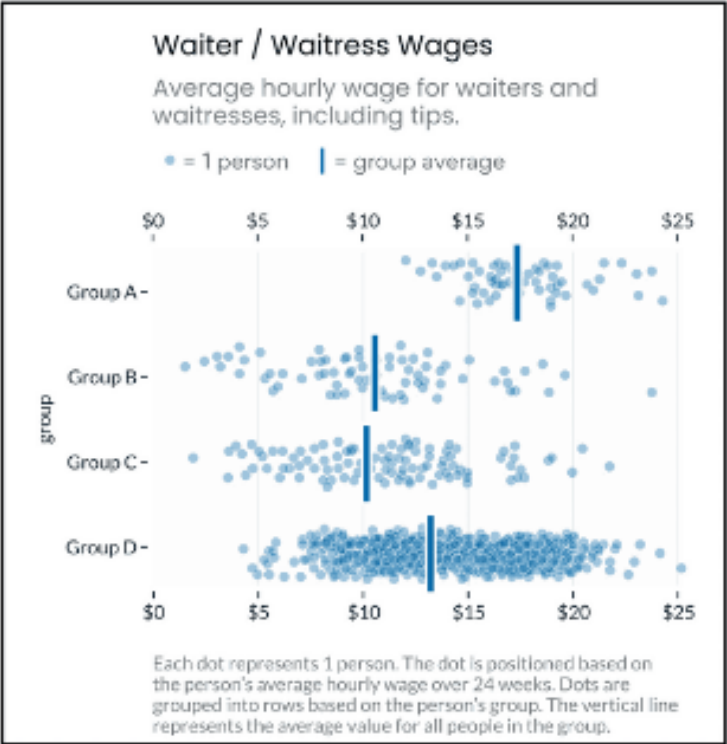


Disaggregating Data by Race/Ethnicity



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.



What is wrong with this one?

FIGURE 12

Legend showing a problematic color scheme applied to data on race and ethnicity.



Source: Recreated based on the June 2020 version of the *Diversity Dashboard* from the Massachusetts Institute of Technology, Office of the Provost.



Data represents the lived experience of real people!

Mr. Patel

Tommy Kwon
(they, them)



Mrs. Smith

The Garza Family

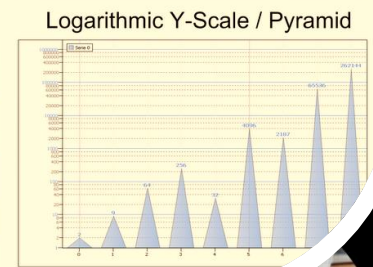
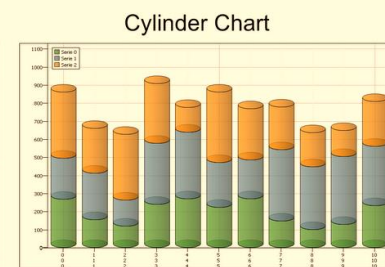
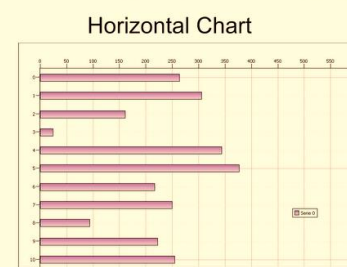
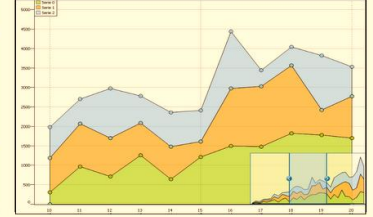
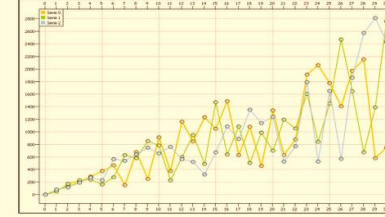
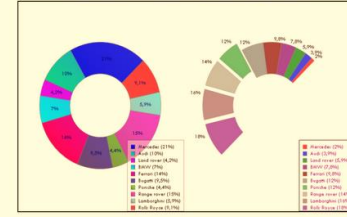
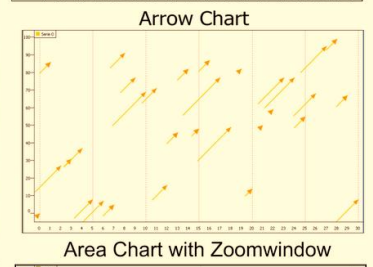
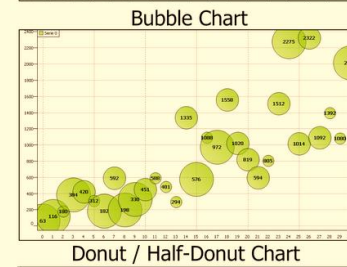
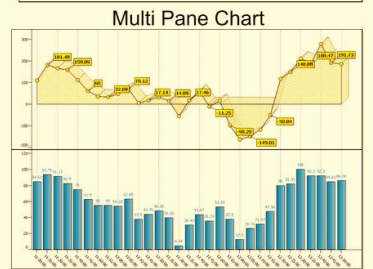
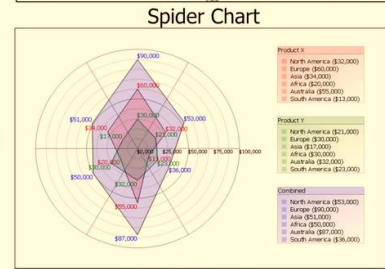
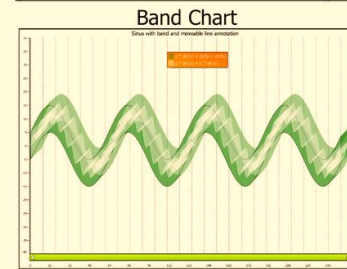
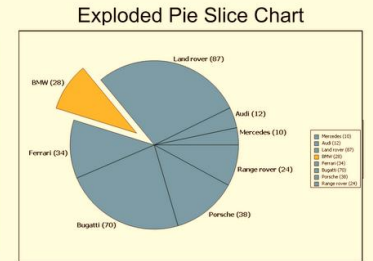
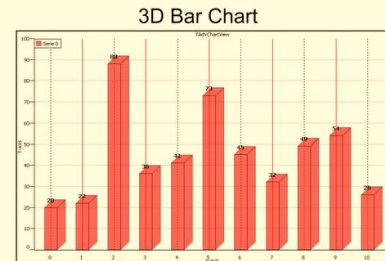
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Questions?



Large Group Activity



Example – Obesity in Public Health Region 6

2021 Adult obesity - County Health Rankings IA					
% Adults with Obesity	Food Environment Index	% Physical Inactivity	Income Inequality Ratio	Rural	Metropolitan (pop over 250,000)
37	9.0	26	3.9		
31	8.0	29	4.3		Y
39	9.0	27	4.2	Y	
41	9.1	25	3.5	Y	
41	8.7	30	3.8	Y	
35	8.0	30	4.2	Y	
35	9.2	28	3.8	Y	
37	8.7	25	4.0		Y
37	9.3	26	3.7	Y	
34	8.3	29	4.5	Y	
27	9.0	21	5.6		Y
35	8.8	28	3.5		
33	8.7	24	4.0		Y
34	8.8	25	4.5		Y

Food Environment Index score is

Income Inequality Ratio is worse.

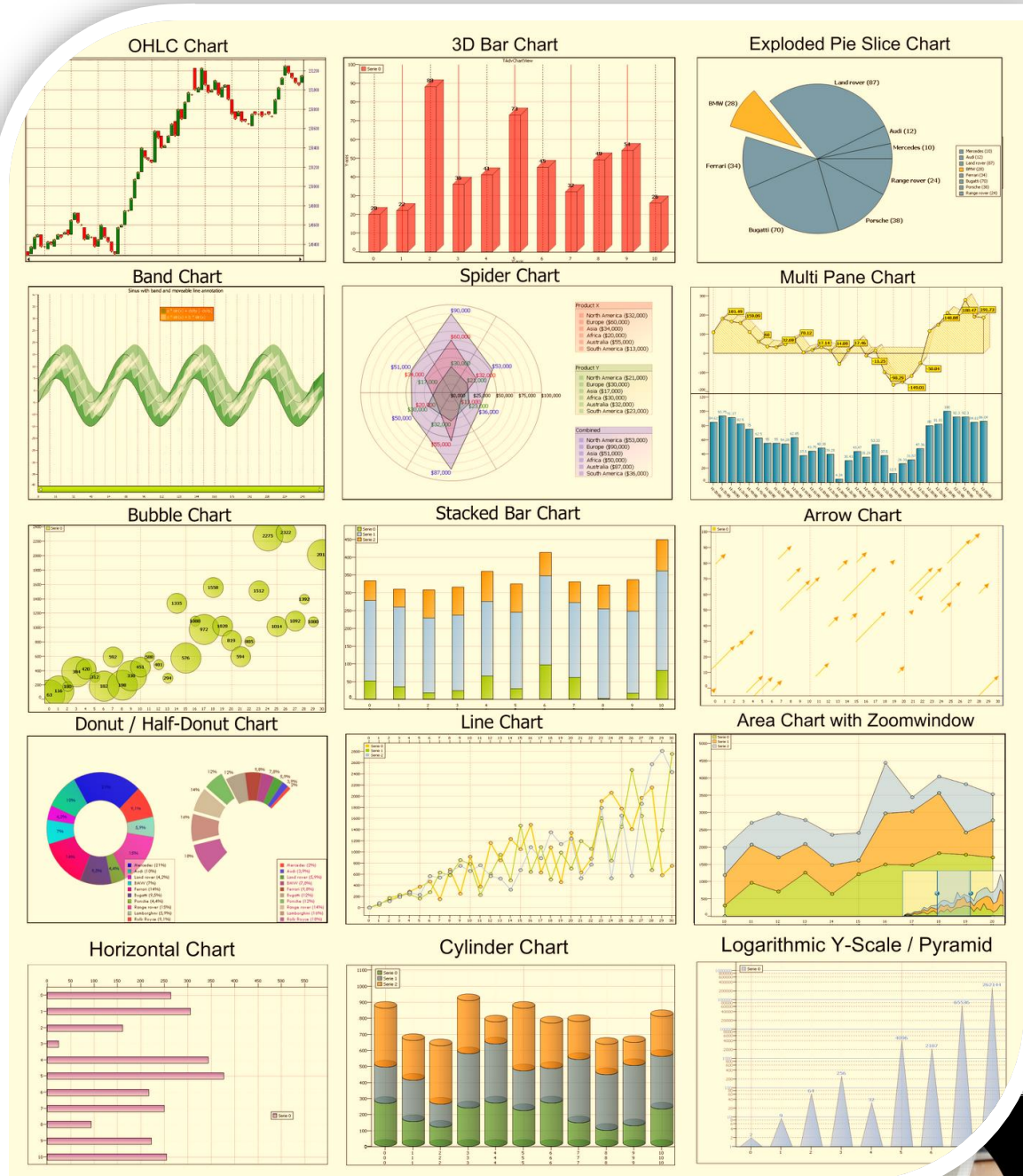
% Adult Obesity in Region 6 Iowa counties 2016-2021 County Health Rankings							
Public Health Region	County	2016	2017	2018	2019	2020	
6	Benton	33	34	35	33	36	
6	Black Hawk	29	30	31	31	31	
6	Buchanan	33	35	33	33	33	
6	Cedar	33	32	34	36	35	
6	Clayton	35	32	33	34	36	
6	Clinton	31	33	32	32	33	
6	Delaware	32	34	35	38	33	
6	Dubuque	28	29	28	30	34	
6	Iowa	30	31	30	34	32	
6	Jackson	33	33	33	33	31	
6	Johnson	23	23	23	25	26	
6	Jones	32	38	38	40	38	
6	Linn	30	31	33	33	34	
6	Scott	31	32	33	32	33	

* baseline data from 2005-2008 33.9%; HP2020 target was 30.5%

** baseline data from 2013-2016 38.6%; HP2030 target for 2030 36.0%

Large Group Activity

- What is the takeaway message you want your audience to get from your data?
- What type of visualization is most appropriate for your data and will effectively convey the message you want to share?



Homework Assignment: Conveying your message

- Using your individual dataset that you want to create a visualization for, answer the following questions.
 - What is the takeaway message you want your audience to get from your data?
 - What type of visualization is most appropriate for your data and will effectively convey the message you want to share?
 - What elements of design will you utilize to emphasize your message?
 - What is the action (such as intervention or advocacy) that is associated with your message?
- Using the technique of storyboarding, draw a rough sketch of what your data visualization might look like, using elements of chart design to emphasize your message and keeping in mind your answers to the previous questions. Your rough sketch should include any color-coding, legends, labels, etc. that you plan to include in your final draft of your data visualization. You will share your sketch with your breakout group during the next session. You may also bring in a previously made chart or use Excel to create your rough draft if you are comfortable using it.



Resources

- Stephanie D.H. Evergreen, Effective Data Visualization, 2nd edition 2020
- Using Graphics to Report Evaluation Results <http://learningstore.uwex.edu/assets/pdfs/G3658-13.PDF>
- Cole Nussbaumer Knaflic, Storytelling with Data: a data visualization guide for business professionals, Wiley, 2015
- <https://policyviz.com/product/core-principles-of-data-visualization-cheatsheet/>
- <https://coolinfographics.com/dataviz-guides>
- <https://www.urban.org/research/publication/do-no-harm-guide-applying-equity-awareness-data-visualization>
- Stephen Few Alberto Cairo Ann Emery Jon Schwabish Edward Tufte



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Thank you!

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Institute for
Public
Health
Practice,
Research
and Policy

