

# IOWA

Institute for Public Health  
Practice, Research and Policy

# Visualize This

Storytelling with Data

December 2024



# Visualize This – Storytelling with Data



**Anjali Deshpande, PhD,**  
MPH, Clinical Associate  
Professor, University of Iowa,  
College of Public Health



**Vickie Miene, MS, MA,**  
LMHC, Executive Director,  
Institute for Public Health  
Practice, Research and  
Policy



**Abigail Stock, MPH,**  
Admin Services Specialist,  
Institute for Public  
Health Practice, Research  
and Policy

**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

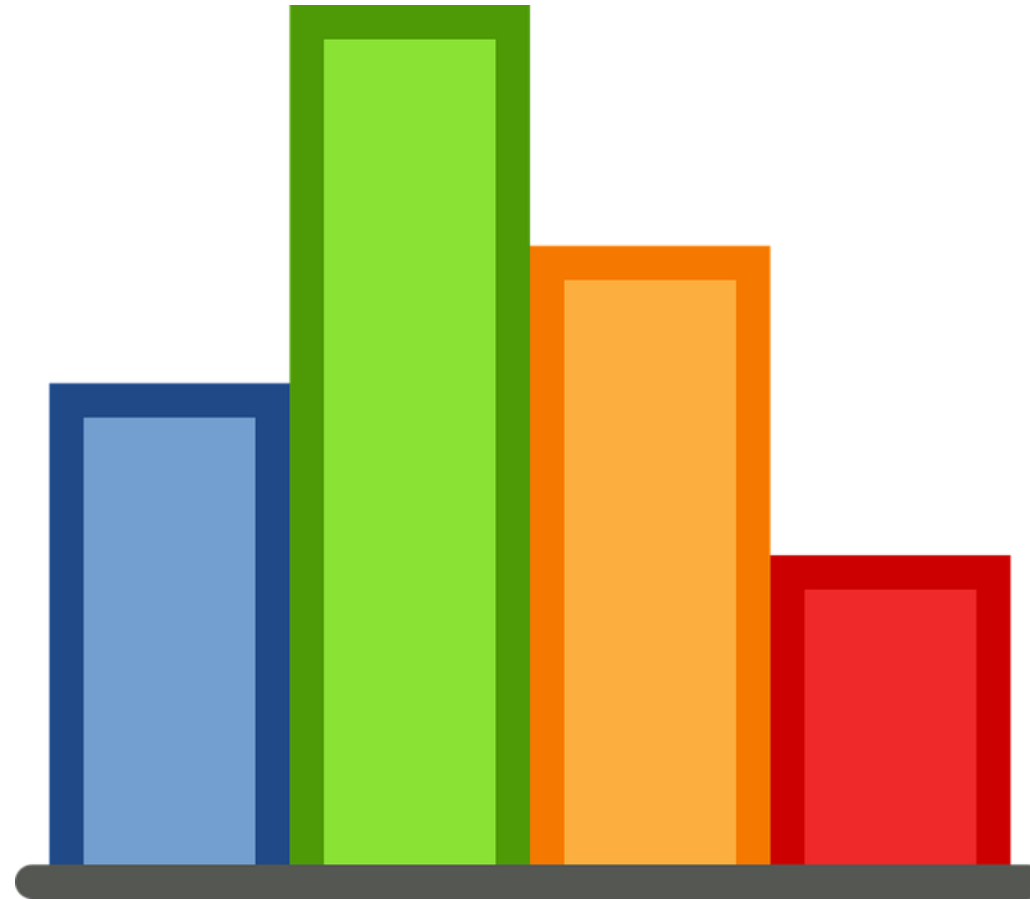
Disaggregate It

Check out our website  
to see upcoming  
training dates!



# Menti.com

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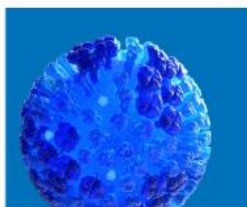
# Visualize This Resources



## Training Resources

### FLUVIEW

A Weekly Influenza  
Surveillance Report  
Prepared by the  
Influenza Division



### CDC FluView Data

Access the influenza data for this training with the link below. In order to see the data for Iowa, change "Surveillance Area" to state, and then select Iowa in the drop down list.

<https://iphprp.org/services/training/communicating-data/visualize-this-resources/>

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# Objectives for Today – By the end of this session, participants will be able to...

- Describe the importance and overall process for data-driven decision-making in organizations.
- Understand the role of data visualization in decision-making and storytelling.
- Incorporate various approaches for more effective data visualizations.
- Build health equity into data processes and visualizations.



## Data Driven Decision-Making?

- ‘using facts, metrics, and data to guide strategic organizational decisions that align with your goals, objectives, and initiatives’. Tableau
- Not to say that experience and intuition don’t have a role but this is a combination of art and science.
- It also means that data is in the hands of everyone at every level so that they can ask questions, build skills, and think critically about the data
- **Goal:** Improve efficiency, quality/performance, and outcomes

## Data-Driven Decision Making



Democratize Your Data



Decision-makers look for health information/research that is:

Understandable

Concise

Unbiased

Accurate

Relevant  
(locally)

Actionable, with  
options

Timely/current

Cost-effective  
(when data  
exist)

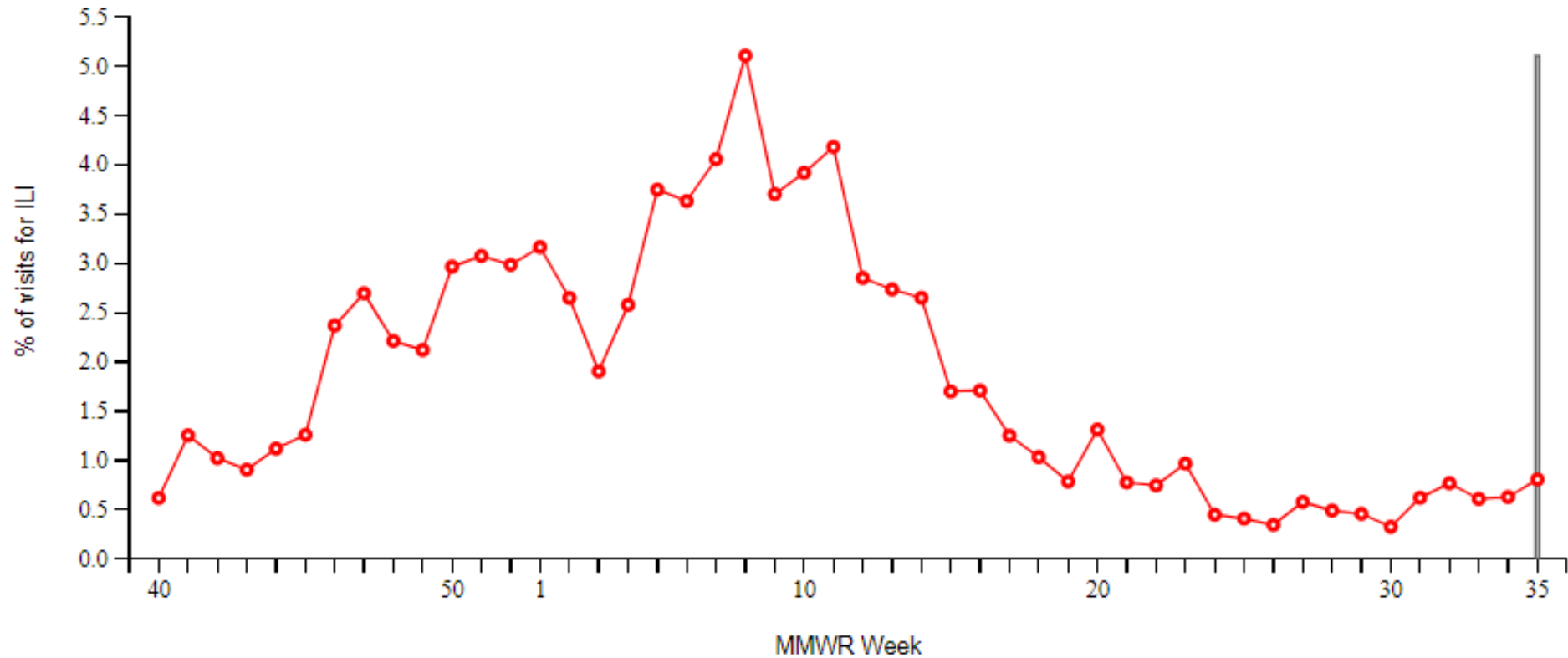


# Data on Influenza

Percentage of visits for ILI, Iowa,  
2023-24 Season, week ending Aug 31, 2024

Reported by: U.S. WHO/NREVSS Collaborating Laboratories and ILINet

[Download Image](#) [Download Data](#) [?](#)



Influenza Positive Tests Reported to CDC by Public Health Laboratories, Iowa,  
2023-24 Season, week ending Aug 31, 2024  
Reported by: U.S. WHO/NREVSS Collaborating Laboratories and ILINet



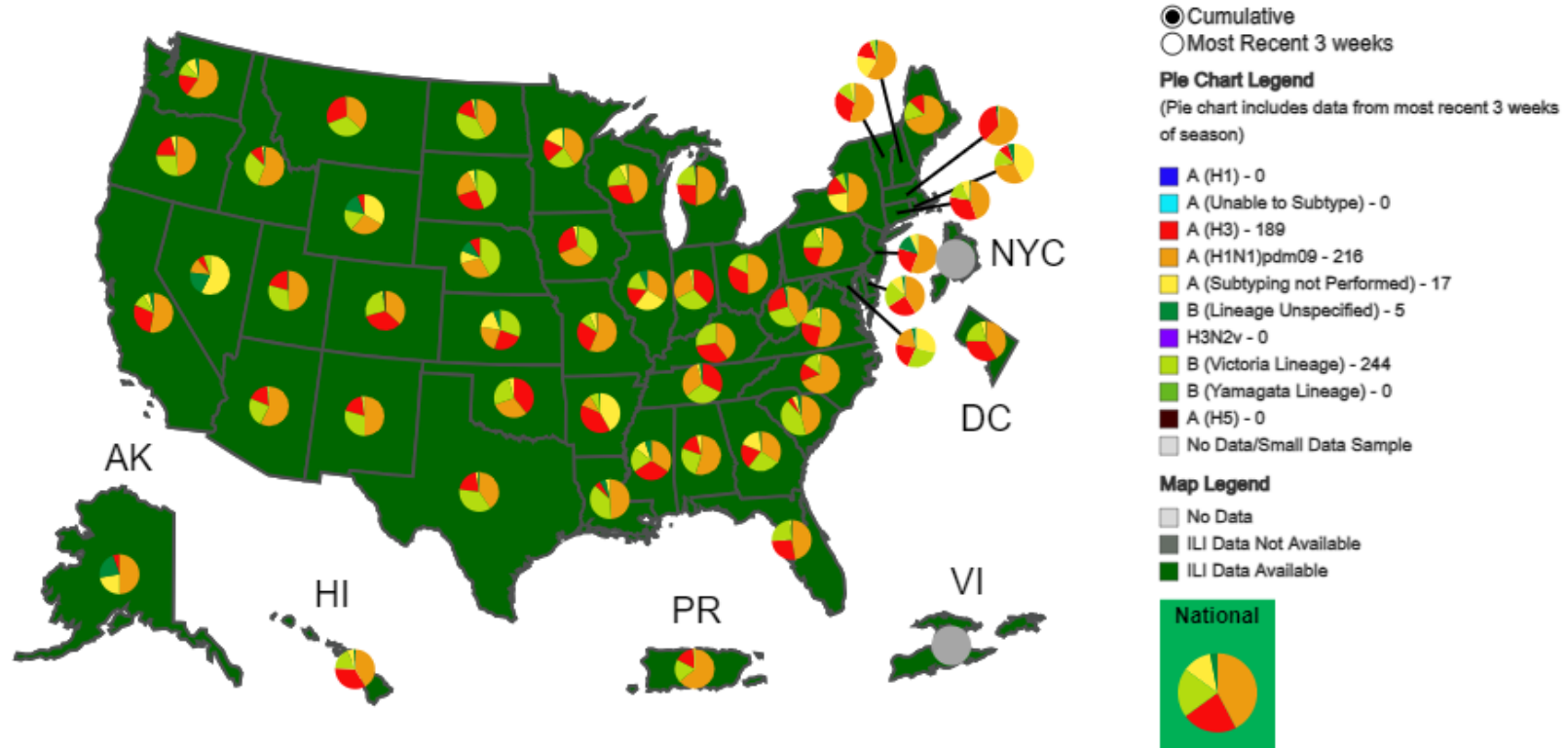
- Cumulative
- Most Recent 3 weeks

**Number of Influenza Positive Tests**

- A (H1)
- A (Unable to Subtype)
- A (H3)
- A (H1N1)pdm09
- A (Subtyping not Performed)
- B (Lineage Unspecified)
- H3N2v
- B (Victoria Lineage)
- B (Yamagata Lineage)
- A (H5)
- No Data/Small Data Sample



Influenza Positive Tests Reported to CDC by Public Health Laboratories and ILI Activity, by State, 2023-24 Season, week ending Aug 31, 2024  
Reported by: U.S. WHO/NREVSS Collaborating Laboratories and ILINet



# What can we do with this surveillance data?

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- Quality Improvement
- Disease Surveillance– burden of disease and disease patterns
- Monitor Health Equity – identify disparities, groups that would benefit from tailored intervention
- Program Evaluation

Ultimately, the data can help us in prevention, early detection, and reduction of long-term outcomes.



Why is data visualization and communication important?

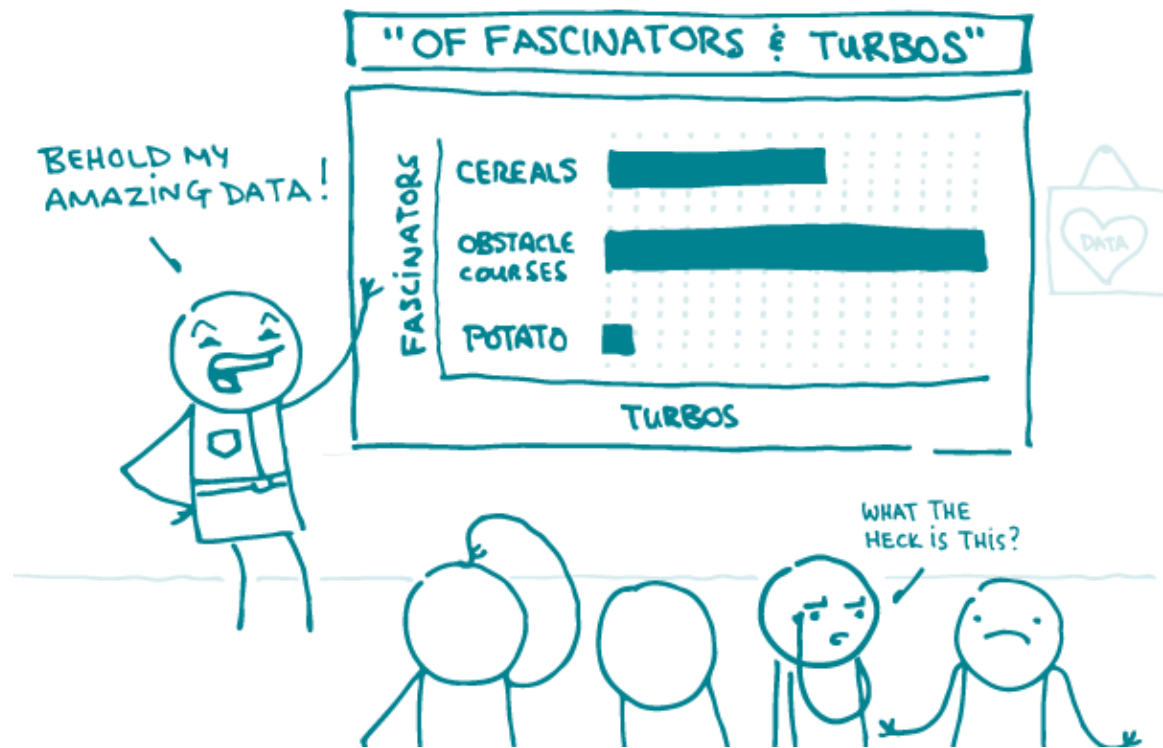
**If a speaker spoke in the forest  
And no one did anything different--**

**Did they really speak at all?**





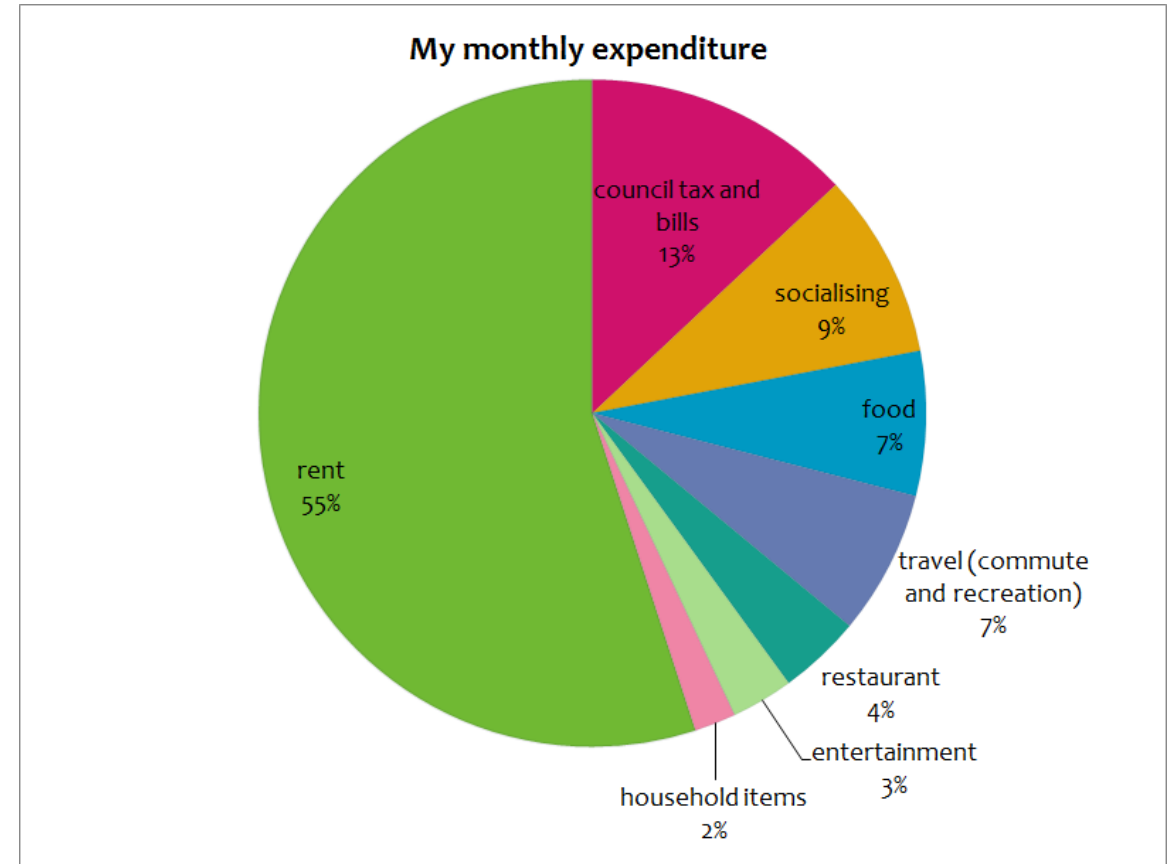
# Data and Storytelling – A picture is worth a thousand words



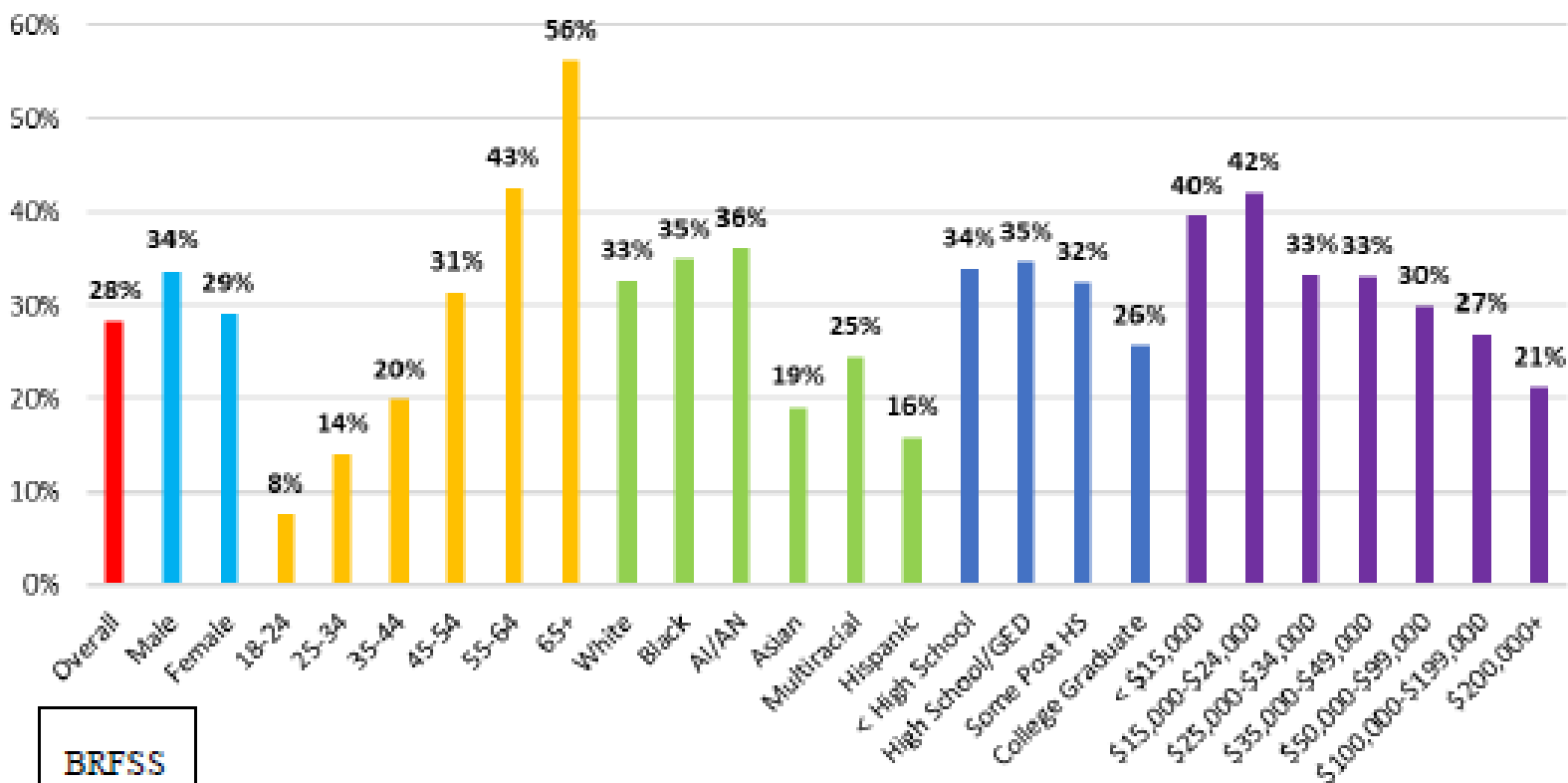
Well, not always...

- Data visualization – graphical presentation of data/info to identify trends, patterns, outliers
- Data analytics – the analysis of raw data to make meaningful insights
- Data dashboards – a collection of data visualizations that allows you to pull different but related pieces together
- Data storytelling – the interpretation of your data/analysis in a clear and compelling way that leads to action

People don't swing into action because of a pie chart.



## Prevalence of Adults Who Have Been Told They Have High Blood Pressure (2021)



# 3 Questions to Ask When Visualizing and Communicating Your Data



WHAT IS THE PURPOSE OF  
THIS COMMUNICATION?



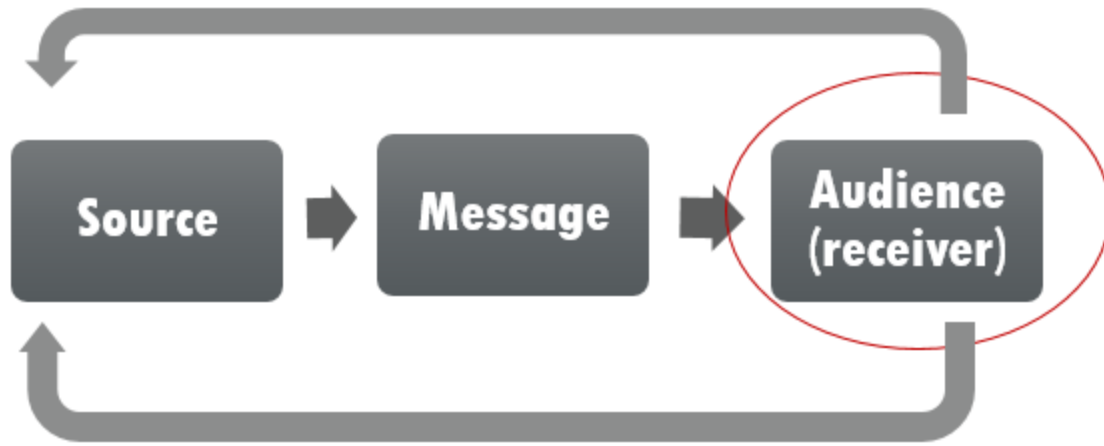
WHO WILL USE THE  
INFORMATION?



WHAT ARE THE KEY MESSAGES  
FOR THIS AUDIENCE?

# Communicate for someone—not about something!

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# Connect with your audience

- Understand your audience/ their current position
- What do they care about?
- What are their information needs?
- Where, when and how do they seek information?



# 5 Key Questions to Ask about your Audience

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- Who are they?
- What are their main needs, challenges, strengths, interests?
- How does your message solve their problem?
- What you want your audience to do?
- What questions or conflicts are they likely to have?





# Be aware of challenges

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- Health literacy
- Accessibility
- Numeracy – misunderstanding of risk and probability
- Cognitive processing limits – the 7-digit phone number
- Uncertainty – go ahead, just embrace it!
- Framing – loss vs. gain
- Defensive processing
- Role of emotion



# MESSAGE

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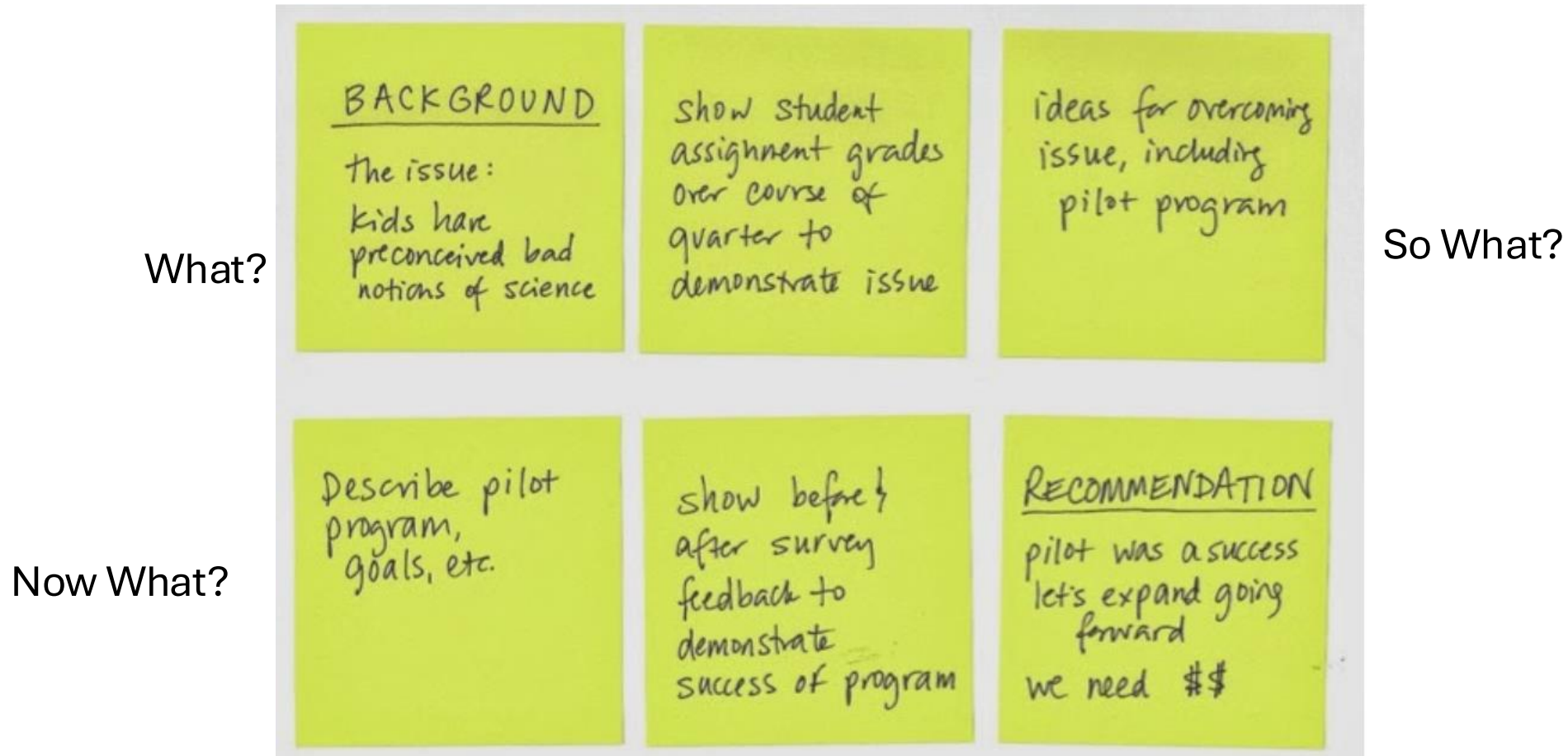
Determine your *objectives*:

- What do you want your audience to **think/believe/know**?
- What do you want your audience to **feel**?
- What do you want your audience to **do**?



# Creating a Good Story with your Data is a Process!

It's about the message—not the software!



# MESSAGE: SOCO

(Single Overriding Communication Objective)

The change you want to see in your audience as a result of this communication

One audience, one message, one issue

- Define your purpose:
  - We want **[audience]** to **[do what]** in order to **[benefit how]**
- Who is the *main* audience?
- What is the *call to action* (i.e., what you want them to do. Consider what is realistic and doable?)
- What is the *main benefit* of taking action?

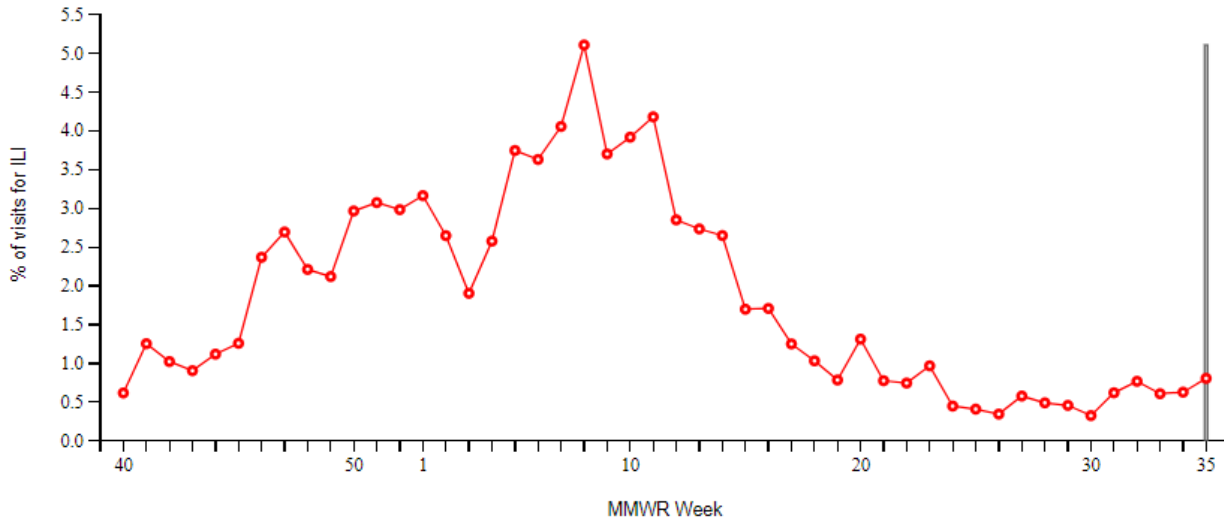
What? So What? Now What?

# Large Group Activity

Percentage of visits for ILI, Iowa,  
2023-24 Season, week ending Aug 31, 2024

Reported by: U.S. WHO/NREVSS Collaborating Laboratories and ILINet

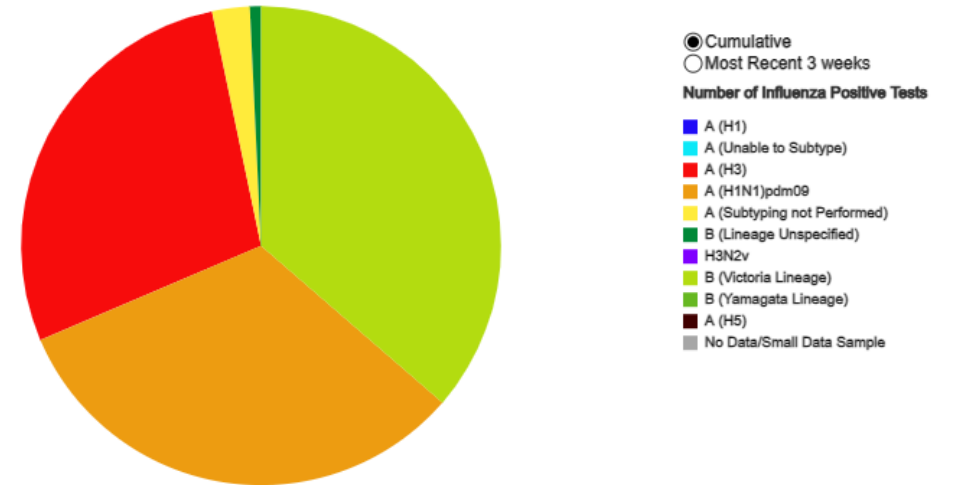
[Download Image](#) [Download Data](#) ?



FLUVIEW  
interactive

Influenza Positive Tests Reported to CDC by Public Health Laboratories, Iowa,  
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Reported by: U.S. WHO/NREVSS Collaborating Laboratories and ILINet

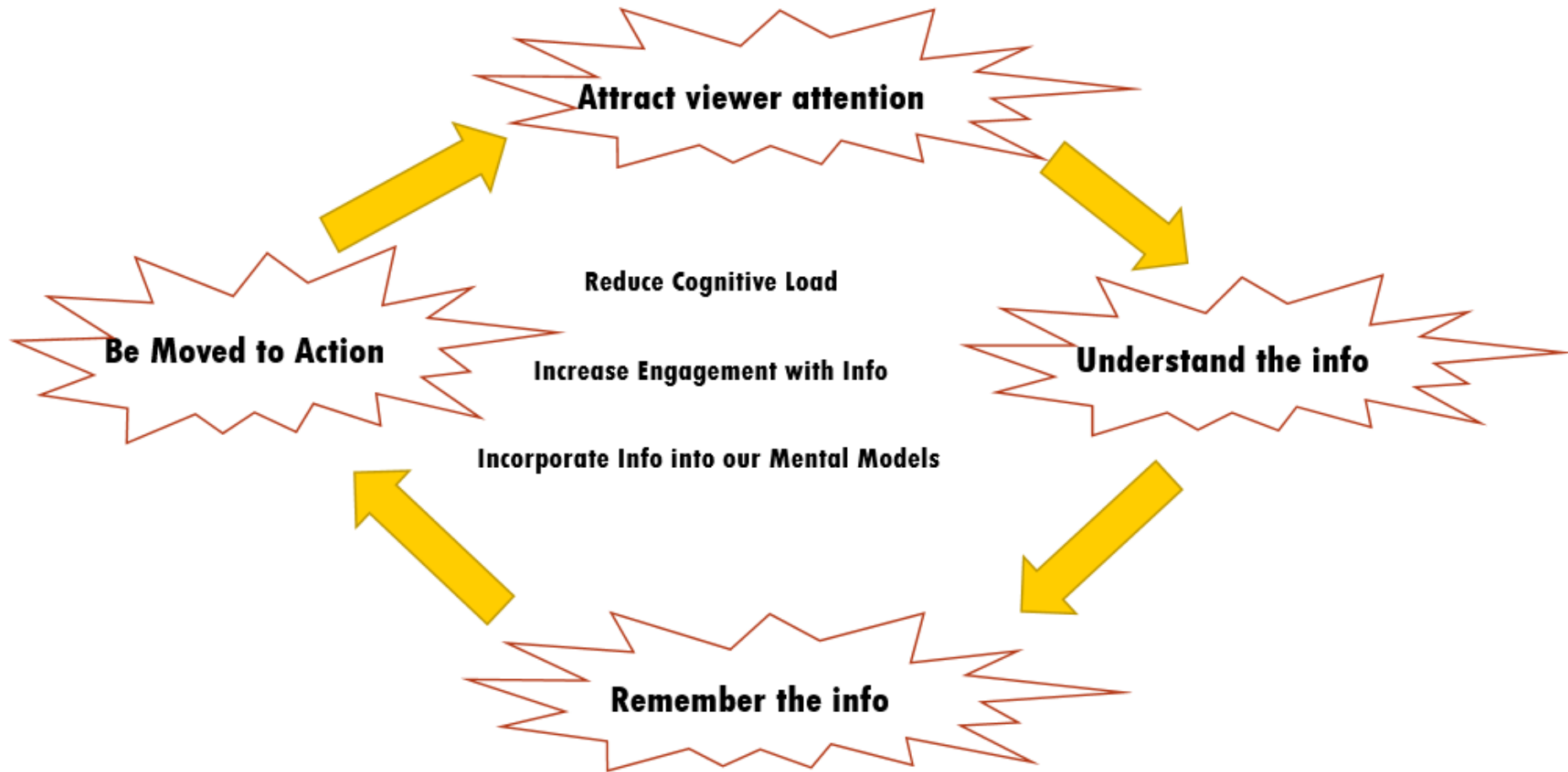


**What are the key messages you want people to take away from these charts?  
What questions do you have--About Influenza? About the Flu Vaccine? Other?**

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# What does it mean for a visualization to be effective?



# How to Create Effective Data Visualizations

Updated Every Wednesday by approximately 12:00 p.m.  
Last updated January 18, 2023 at 2:00 p.m.

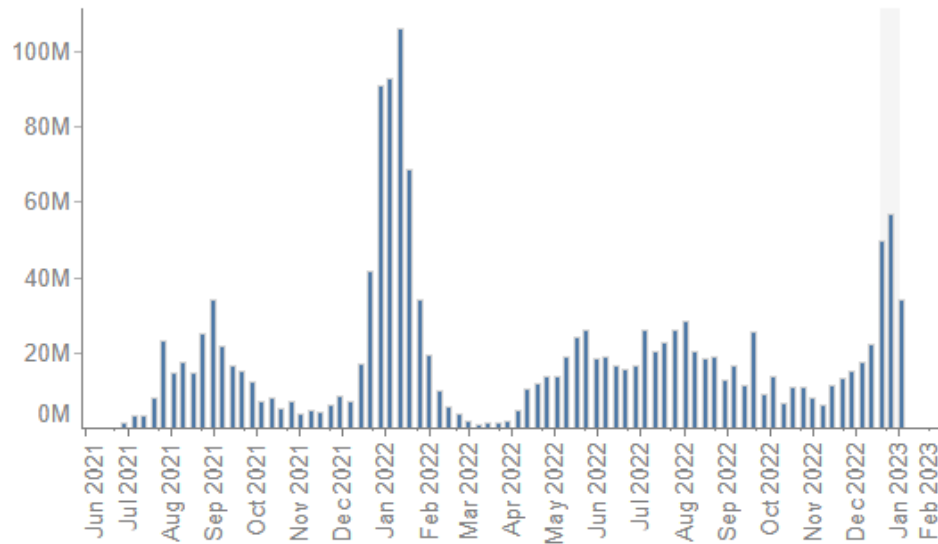


## Early Warning Indicators

Rising levels of these can be an early sign of community spread and illness.

### COVID-19 Virus Particles Found in Wastewater

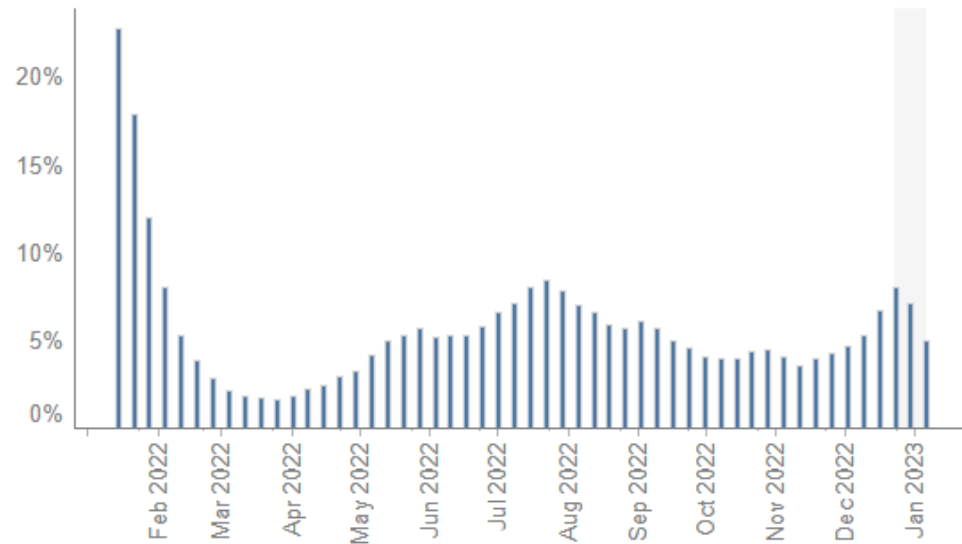
COVID-19 virus particles appearing in wastewater can signal how quickly the virus is spreading, even if people don't get tested or have symptoms.



Average COVID-19 virus copies found per person per week from participating North Carolina wastewater treatment plants. [More Info](#)

### Emergency Room Visits for COVID Symptoms

The percentage of all emergency department visits that are for COVID-like symptoms can signal how much illness there is in a community.



Emergency department visits that are for COVID-like illnesses (CLI). [More Inf.](#)



# How to Create Effective Data Visualizations

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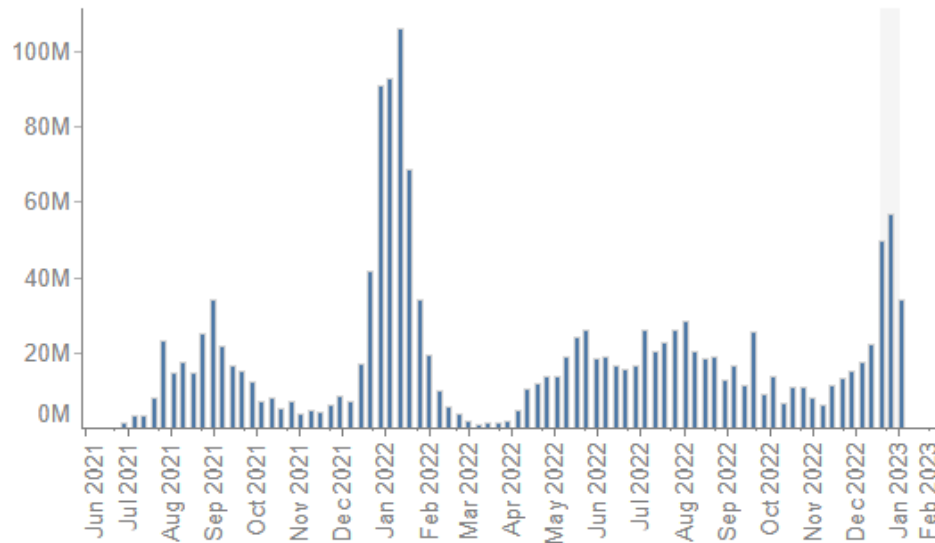
## Early Warning Indicators

Rising levels of these can be an early sign of community spread and illness.

**34.0 Million**  Previous Week 56.6 Million

### COVID-19 Virus Particles Found in Wastewater

COVID-19 virus particles appearing in wastewater can signal how quickly the virus is spreading, even if people don't get tested or have symptoms.

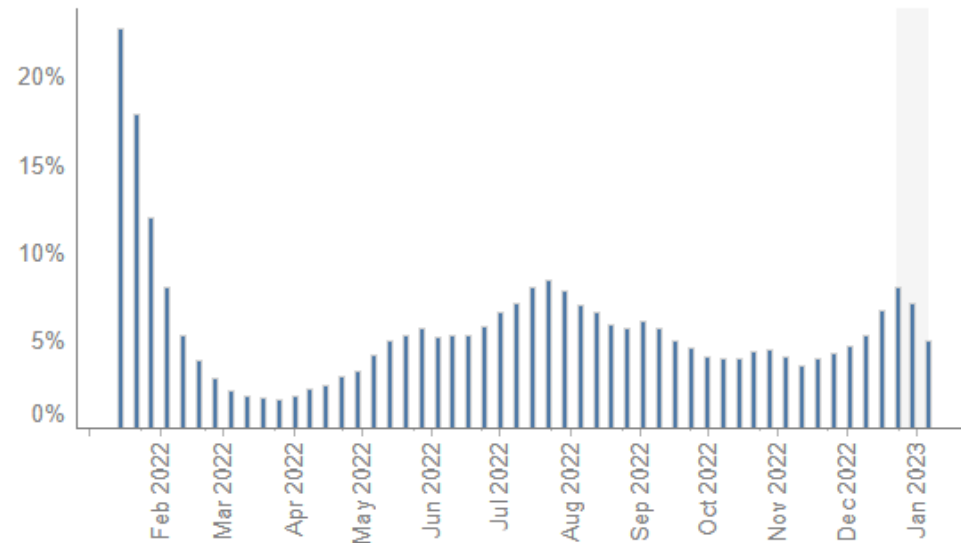


Average COVID-19 virus copies found per person per week from participating North Carolina wastewater treatment plants. [More Info](#)

**5.0%**  Previous Week 7.1%

### Emergency Room Visits for COVID Symptoms

The percentage of all emergency department visits that are for COVID-like symptoms can signal how much illness there is in a community.

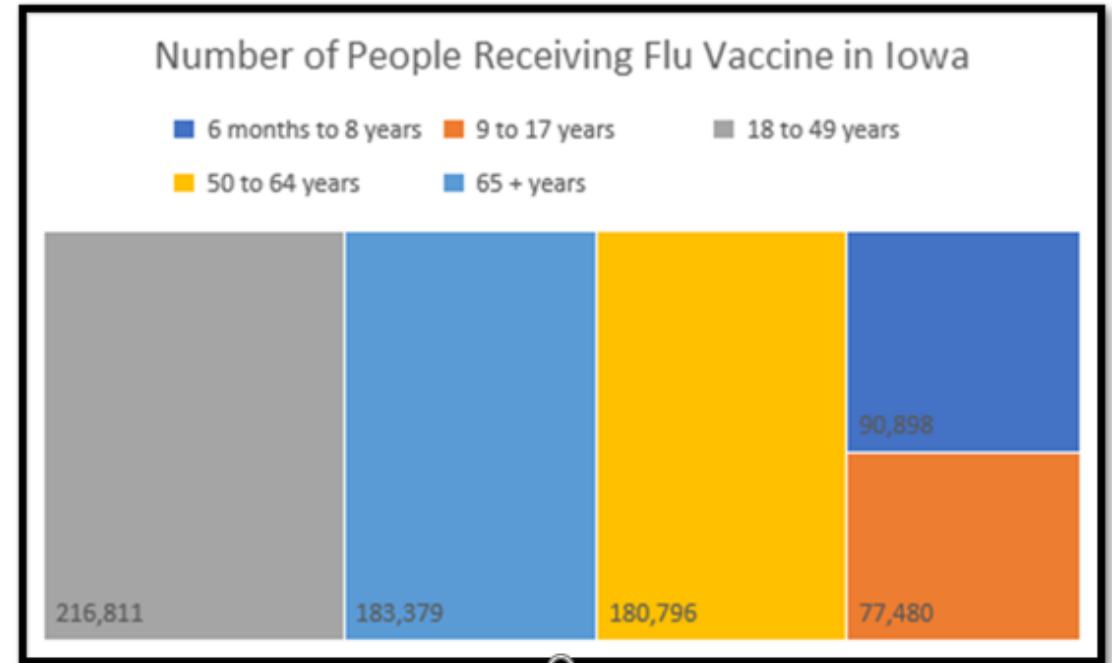


Emergency department visits that are for COVID-like illnesses (CLI). [More Inf.](#)

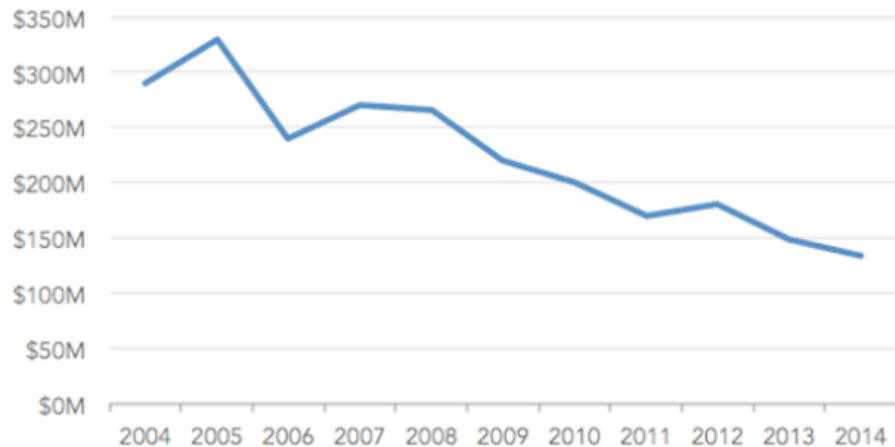
# Good charts vs. Bad charts

## The Elements of Chart Design

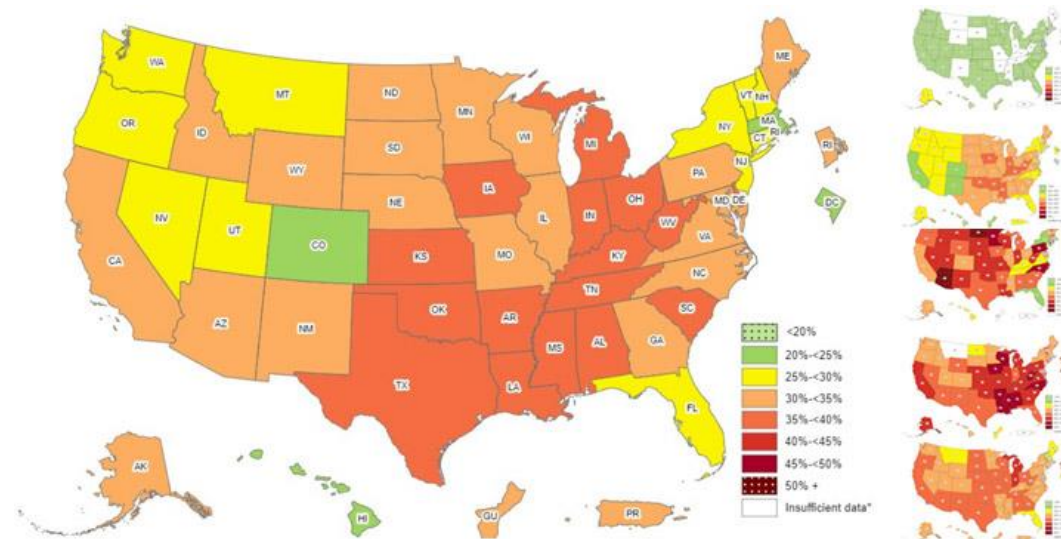
- Chart type
- Text
- Arrangement
- Color
- Lines
- Overall attributes



### Annual Revenue



### Prevalence of Obesity in Adults (2020, BRFSS)



# Choosing the Right Chart Type

**DIAGRAMS**

- Cluster Map
- Flowchart Diagram
- Diagram Branding
- Concept Mapping
- Quote and Icon
- Indicator Bars
- Venn Diagram
- Typical Diagram
- Network Mapping
- System Effect Mapping
- Icons & Lines Coding
- Change Wheel Mapping
- Word Mapping
- Flowchart
- Timeline
- Rating

**PICTURES**

**TABLES**

**QUOTES & WORDS**

- Colored Box
- Word Map
- Word Flow
- Word Cloud

**QUALITATIVE CHART CHOOSER 2.0**  
BY JENNIFER LYONS & STEPHANIE EVERGREEN

**FOR MORE SEE**  
[STEPHANIEEVERGREEN.COM/TAG/STEP-BY-STEP-PRESENTING-DATA-EFFECTIVELY](#)

**REMEMBER THIS IMPORTANT NUMBER**

Big Number: **23%**

Icon Array

Pie/Donut

Bar/Column

**CHART CHOOSER 3.0**  
BY STEPHANIE EVERGREEN

**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

Metric A

Metric B

Metric C

WATCH FOR OVERLAPPING POINTS

**SHOW SURVEY RESPONSES**

Stacked Bar

Small Multiples

Diverging Bar

Bar/Column

Number & Icon

Nested

45% their jobs

**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-PRESENTING-DATA-EFFECTIVELY](#)

# Incorporating Health Equity into your Visualization

- Demonstrate Empathy (start with cultural humility)
- Use People-first language
- Use Color/Patterns with an Equity Awareness
- Order groups in a purposeful way
- Consider Missing Groups
- Use Color/Patterns with an Equity Awareness
- Avoid Othering
- Incorporate Accessibility

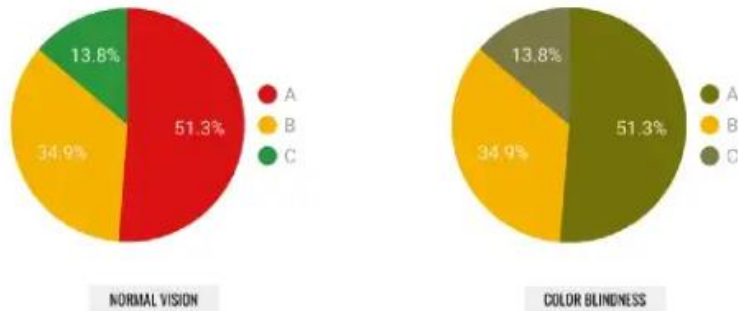
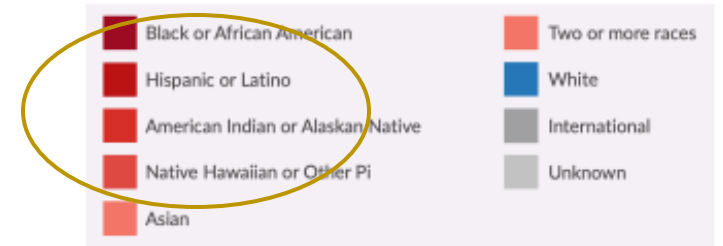


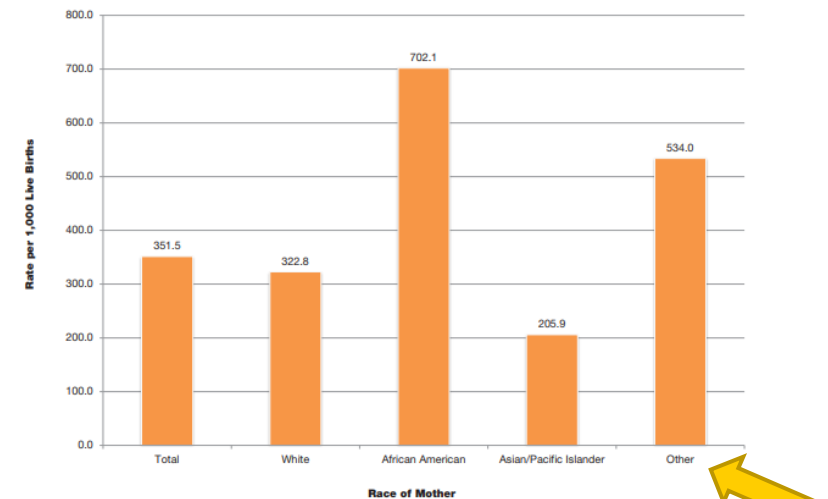
FIGURE 12

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.

FIGURE 9: OUT-OF-WEDLOCK LIVE BIRTHS BY RACE  
2014 RESIDENT DATA



# 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/>

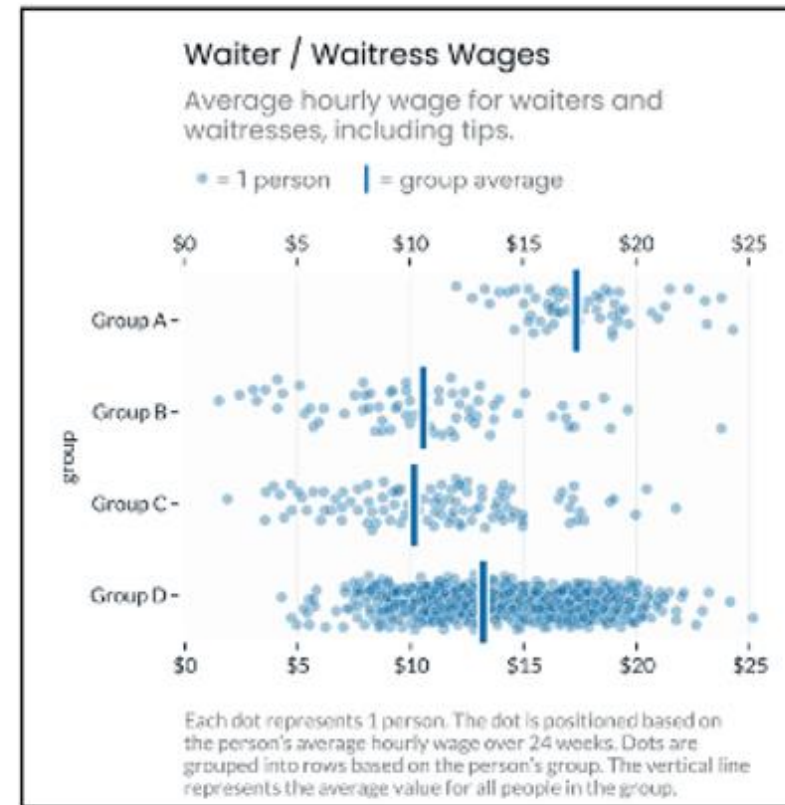
Average **pretest** & **posttest** scores show the parenting program made the biggest impact on helping participants handle their own stress.

Scale was 0-5, with 5 representing "Excellent."



# Disaggregate but also show variability

(what we are observing in the averages does not describe everybody in that group)



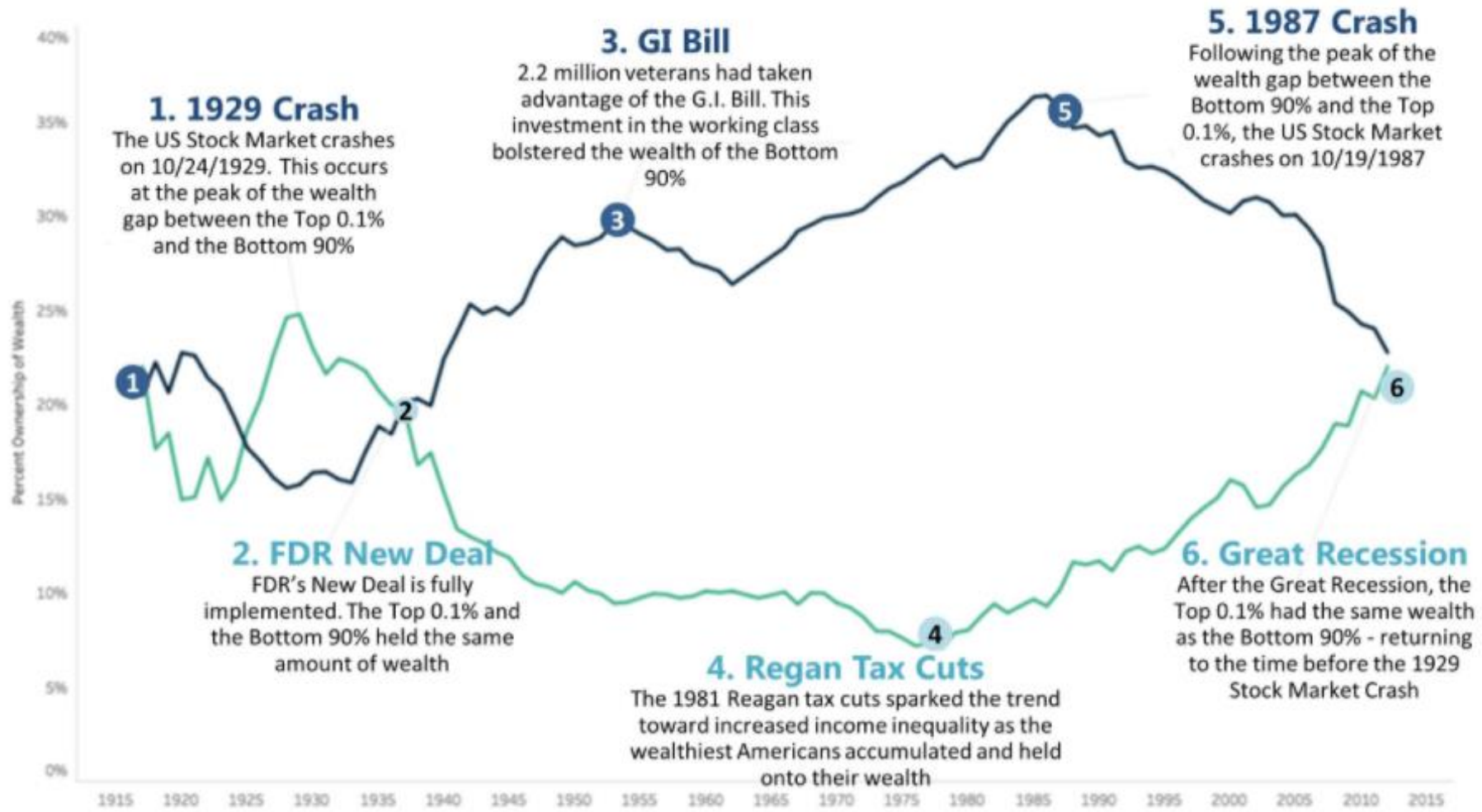
Left: Bar chart showing pay disparities between 4 groups of restaurant workers. Right: Jitter plot showing the same data.



# Annotate to make meaning

## 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/invizaiot>



# Data Visualization Checklist

by Stephanie Evergreen & Ann K. Emery

This checklist is meant to be used as a guide for the development of high impact 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. Refer to the Data Visualization Anatomy Chart on the last page for guidance on vocabulary and the Resources at the end for more details.

	Guideline	Rating
<b>Text</b>  Graphs don't contain much text, so existing text must encapsulate your message and pack a punch.	<b>6-12 word descriptive title is left-justified in upper left corner</b> Short titles enable readers to comprehend takeaway messages even while quickly skimming the graph. Rather than a generic phrase, use a descriptive sentence that encapsulates the graph's finding or "so what?" Western cultures start reading in the upper left, so locate the title there.	2 1 0 n/a
	<b>Subtitle and/or annotations provide additional information</b> Subtitles and annotations (call-out text within the graph) can add explanatory and interpretive power to a graph. Use them to answer questions a viewer might have or to highlight specific data points.	2 1 0 n/a
	<b>Text size is hierarchical and readable</b> Titles are in a larger size than subtitles or annotations, which are larger than labels, which are larger than axis labels, which are larger than source information. The smallest text - axis labels - are at least 9 point font size on paper, at least 20 on screen.	2 1 0 n/a

# Small Group Activity – 15 mins

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Using the Influenza visualizations provided and the Data Visualization Checklist, identify what works in the visualizations and what could be improved.



# Tips for Working in Small Groups

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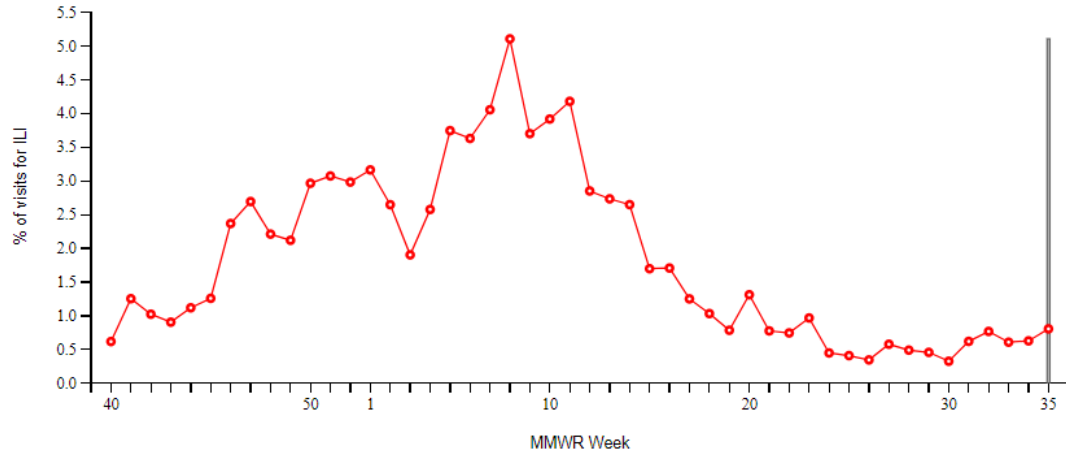
- Turn on cameras
- Identify:
  - One person to share the data on their screen
  - One person to take notes
  - One person to share with the large group
  - *Note: One person can hold multiple roles if your group is small!*
- Participation is key, utilize this as an opportunity to engage and learn with your peers
- There are no "right" answers
- Use the "Help" button if you get stuck



**Percentage of visits for ILI, Iowa,  
2023-24 Season, week ending Aug 31, 2024**

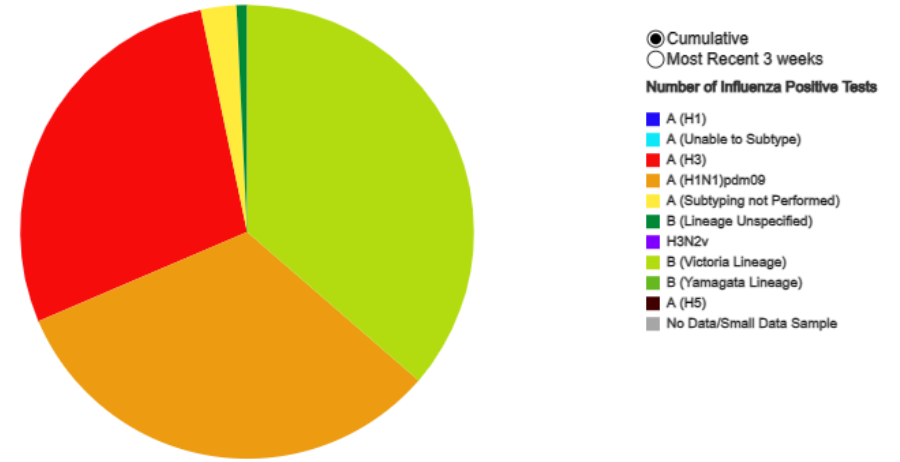
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[Download Image](#) [Download Data](#) [?](#)



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- B (Lineage Unspecified)
- H3N2v
- B (Victoria Lineage)
- B (Yamagata Lineage)
- A (H5)
- No Data/Small Data Sample





# Activity Debrief



# FINAL VIZ CONSIDERATIONS



The chart highlights the most important findings/message



Use the most appropriate chart type for the data you have



Use the level of precision that your audience requires



Create something meaningful—do not use defaults



Your use of color, text, graphics, arrangement all support what you want to communicate to your audience.



Use a What? So What? Now What? approach to tell the story



Bring equity into your visualization!



# Final Thoughts on Using Data in Public Health Practice

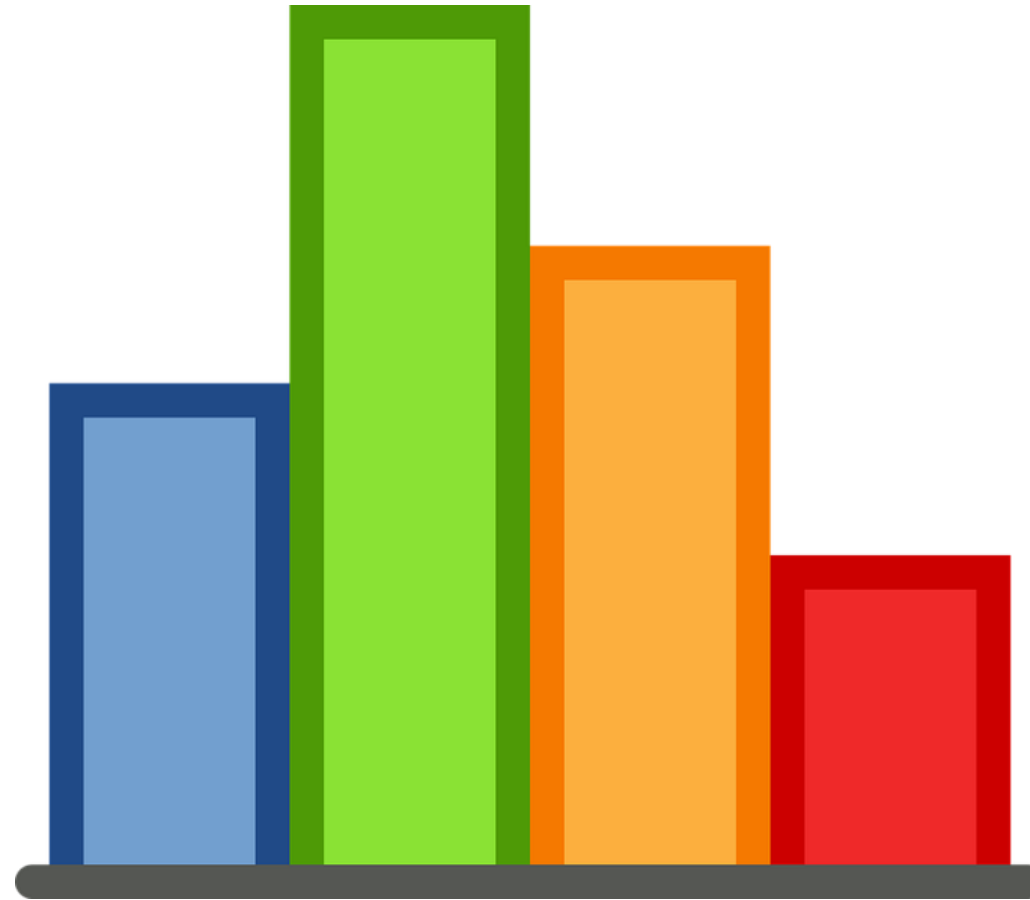
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- Data is the basis for decision-making in public health and can help us to be more efficient and provide the best quality possible
- We all collect and use data in our work—whether it is counting the number of people who come to our clinic, or the rate of breastfeeding among first-time mothers, etc.
- We won't always have the best data available to make a decision, but we can use what we have to make the best possible decision at the present time
- We can use data visualization and audience knowledge to tell better stories



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**IOWA**

**Thank you!**

[anjali-deshpande@uiowa.edu](mailto:anjali-deshpande@uiowa.edu)

[vickie-miene@uiowa.edu](mailto:vickie-miene@uiowa.edu)

[abigail-stock@uiowa.edu](mailto:abigail-stock@uiowa.edu)

  
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