IOWA

Institute for Public Health
Practice, Research and Policy

Visualize This 2

Chart Smarts: Design and Deliver Meaningful Visualizations.

2026 Session 2

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.

Institute for Public Health Practice, Research and Policy

Who We Are | What We Do | Work With Us | Our Initiatives

Data and Surveillance Resources

Data Resources

Course Schedule

Tuesday, February 3rd, 10:00am-11:30am CST Live Learning Session #1 – Kick off

"Work at home" **Course 1** and homework.

Tuesday, February 10th, 10:00am-11:30am CST Live Learning Session #2

"Work at home" **Course 2** and homework.

Tuesday, February 17th, 10:00am-11:30am CST Live Learning Session #3

"Work at home" **Course 3** and homework

Tuesday, February 24th, 10:00am-11:30am CST Live Learning Session #4

Course Objectives

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

- Select the appropriate chart type for your data
- Identify critical formatting elements for effective data visualizations
- Create data visualizations for basic descriptive epidemiological data
- Create data visualizations that demonstrate comparisons and evaluation
- Describe the difference between common visualization tools such as infographics, data placemats, and data dashboards

Small Group Activity

- What is the data that you work with? Who are some of the audiences that you share this data with? What do they need to know?

- What are some of the analytic methods that you use with your data? What types of charts and graphs do you create/want to create?

Debrief

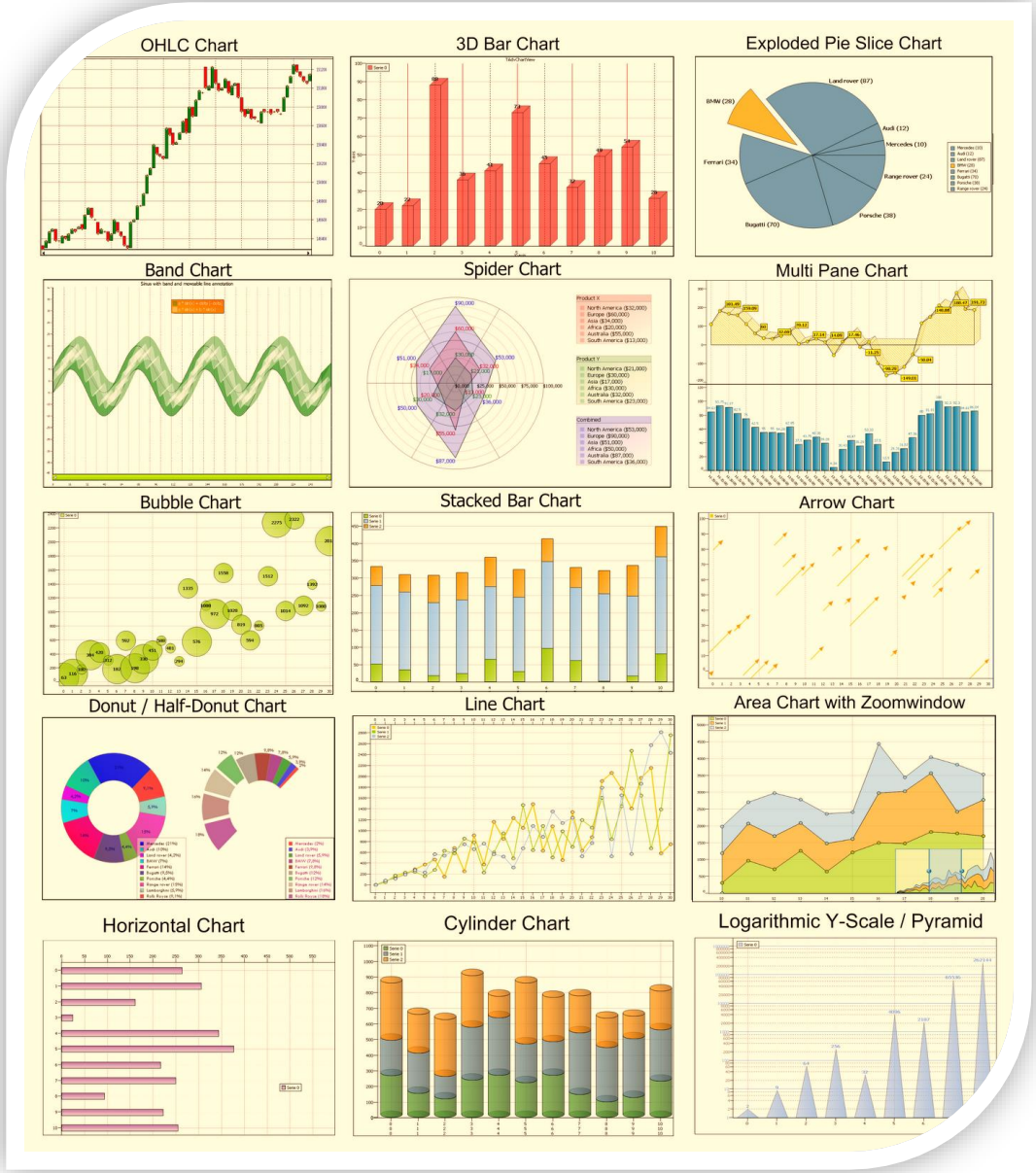
Crafting Your Message - Storytelling

- 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!

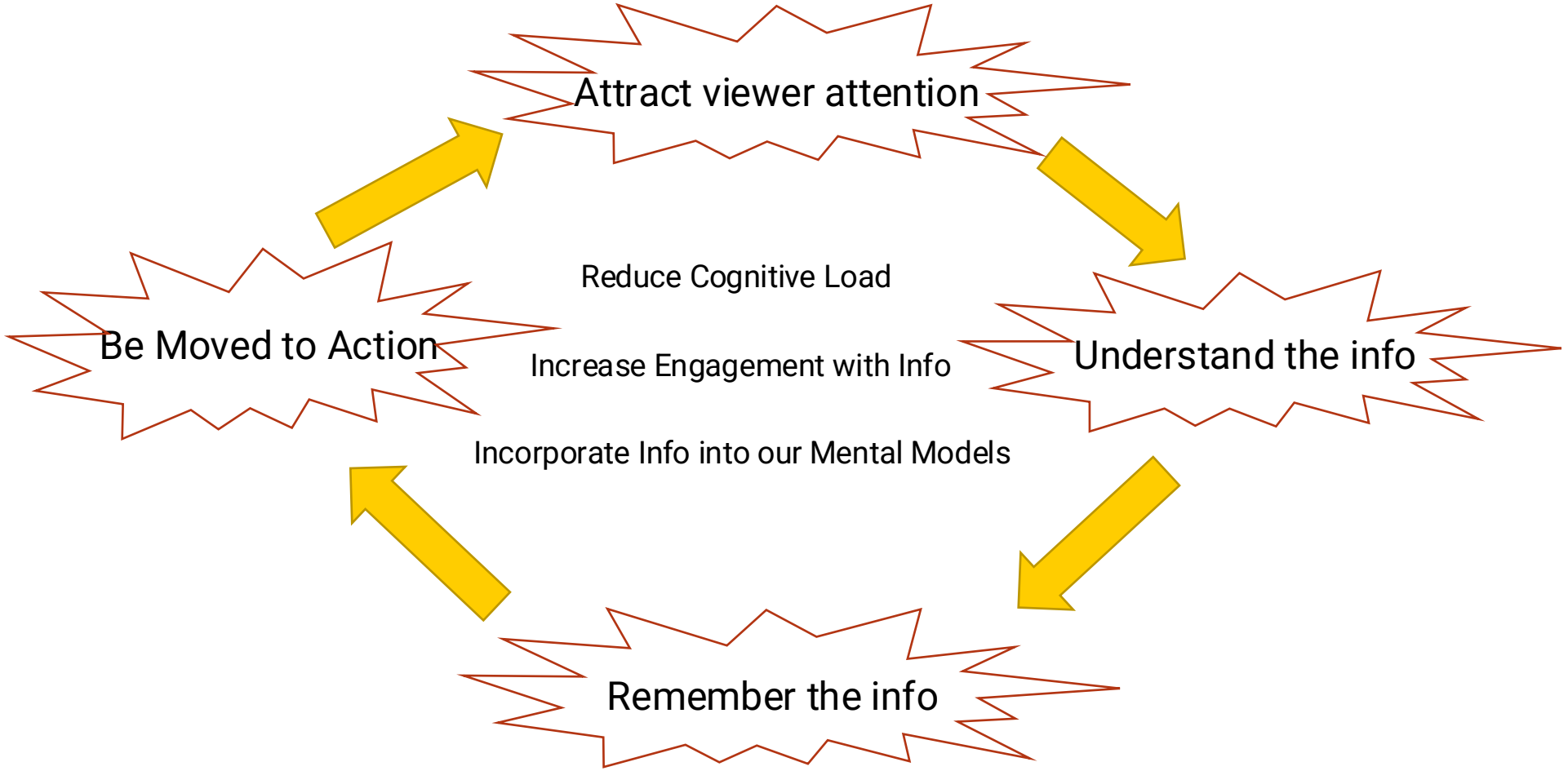
What is the main point of my data?
What is the story that I can tell?

- **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 2030 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

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



What does it mean for visualizations to be effective?



How do I choose the right chart?

Let’s start with quantitative data

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.*

Good charts vs. Bad charts
The Elements of Chart Design

- Text
- Arrangement
- Color
- Lines
- Overall attributes
- Incorporating People-Centeredness

Module 2 – Part 1

Learning Objectives

1. Describe basic descriptive epi aspects of a dataset for your primary audience
2. Visualize basic descriptive epi aspects of a dataset
3. Create basic descriptive epi visualizations for your data in Excel

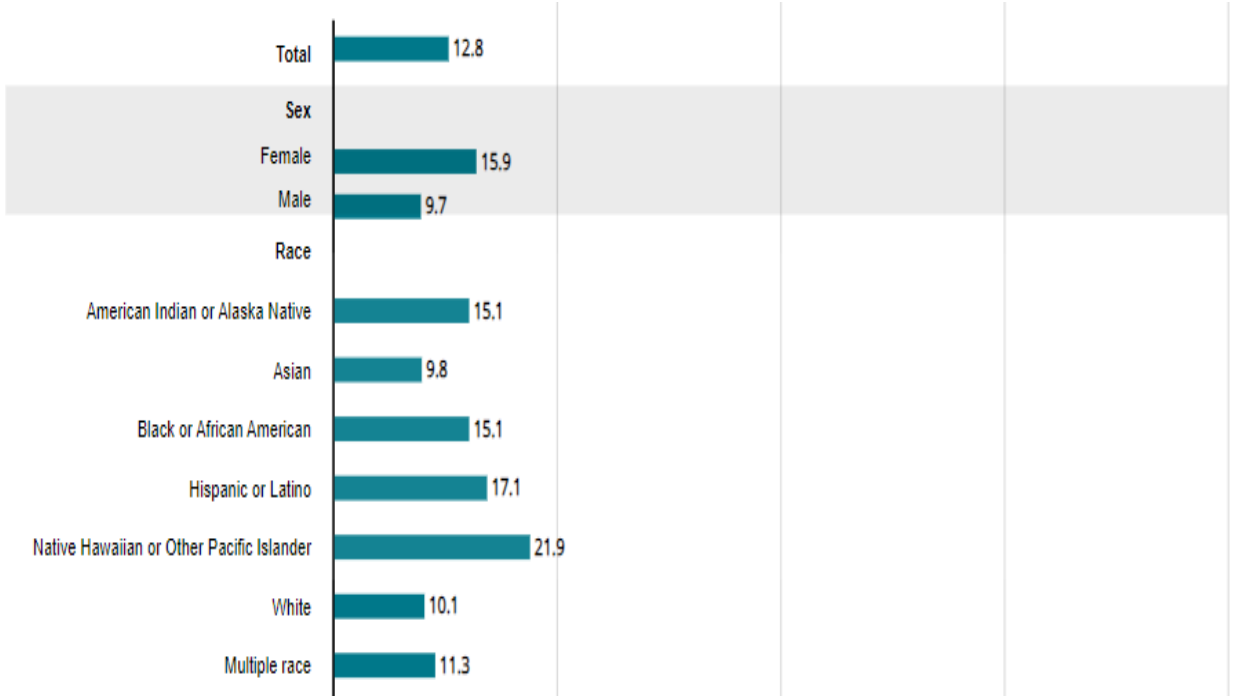
Descriptive Epidemiology – Understanding the What?

Assesses the extent of an outcome

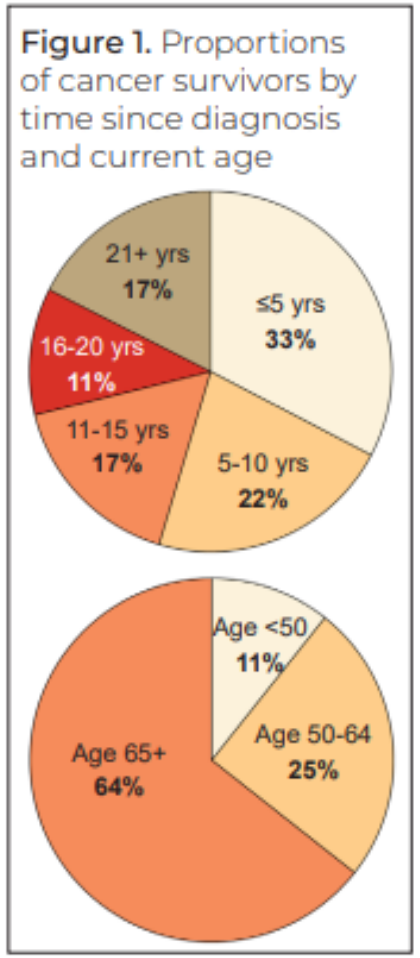
Can provide hypotheses for analytic research

Person

High School Students Who Did Not Go To School Because They Felt Unsafe at or on their way to/from School (US, 2023)



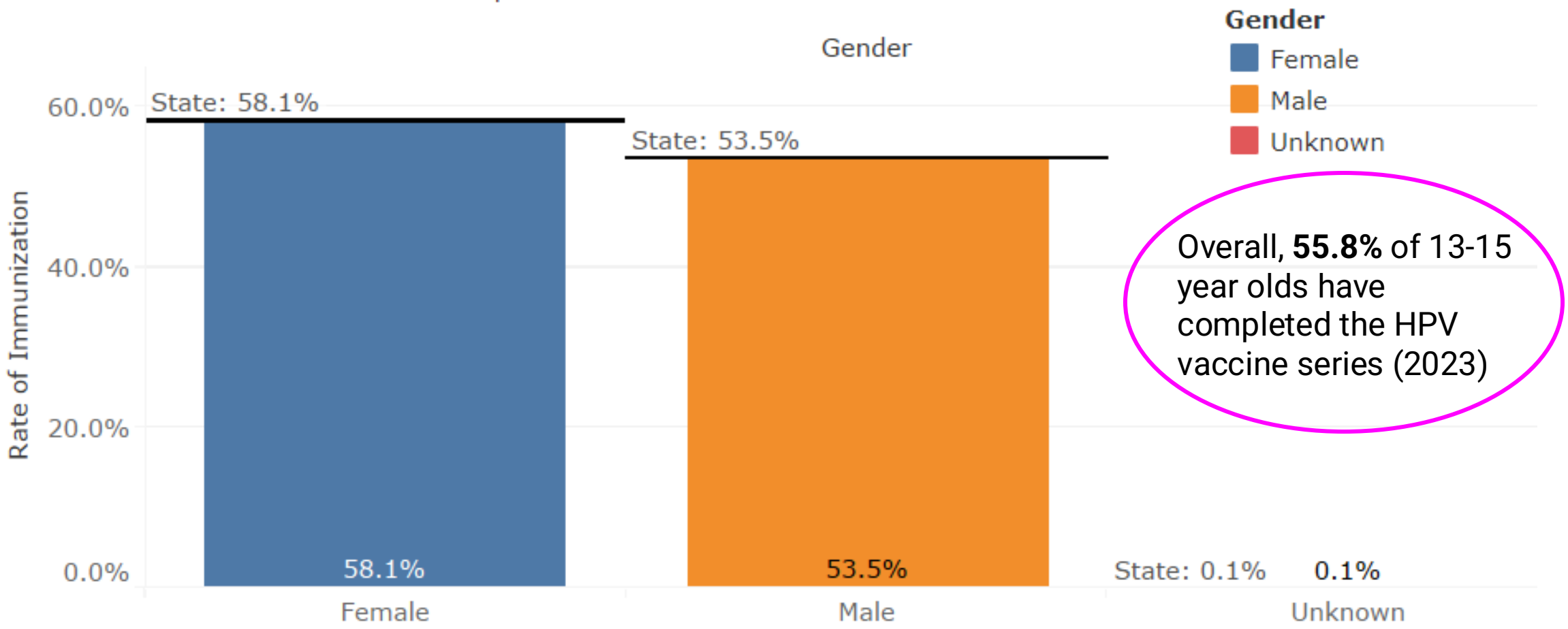
Centers for Disease Control and Prevention (CDC). 1991-2023 High School Youth Risk Behavior Survey Data. Available at http://yrbs-explorer.services.cdc.gov/.



2025 Cancer in Iowa https://shri.public-health.uiowa.edu/cancer-data/iowa-cancer-reports/

Complete HPV Vaccine Series in 13-15 year olds in All County - 2023 - Census Population

Percent of 13-15 Year Olds with Complete HPV Vaccine Series

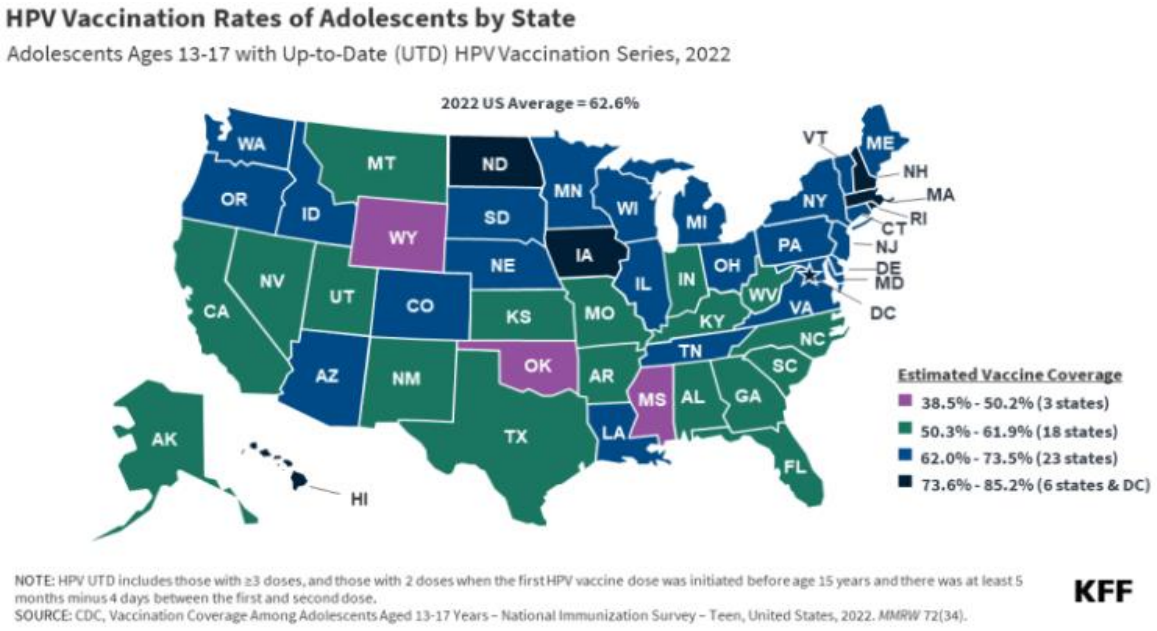


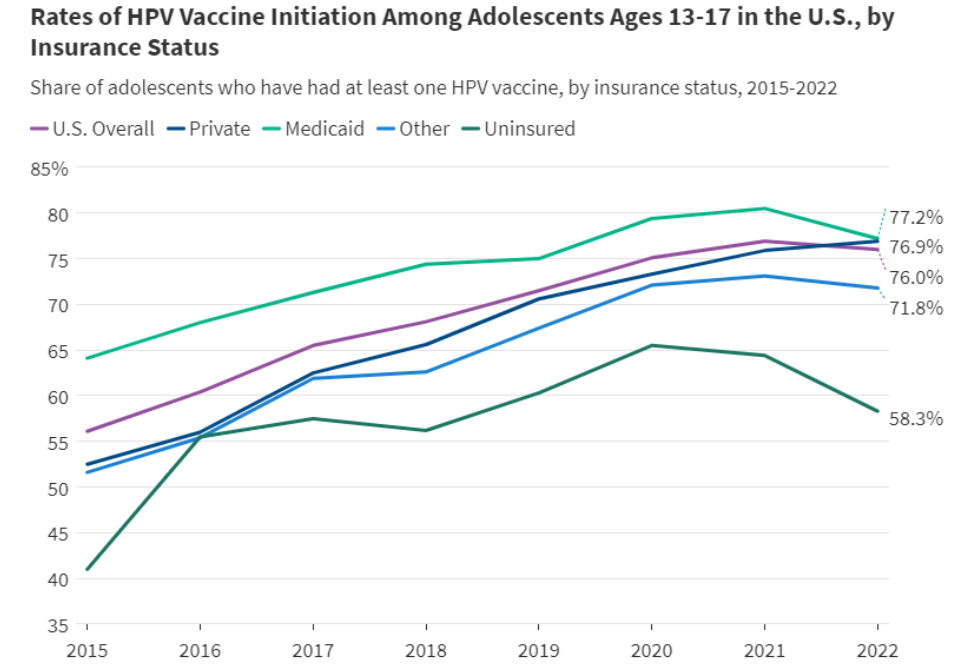
Overall, **55.8%** of 13-15 year olds have completed the HPV vaccine series (2023)

Place and Time

HPV Vaccination: Access and Use in the US

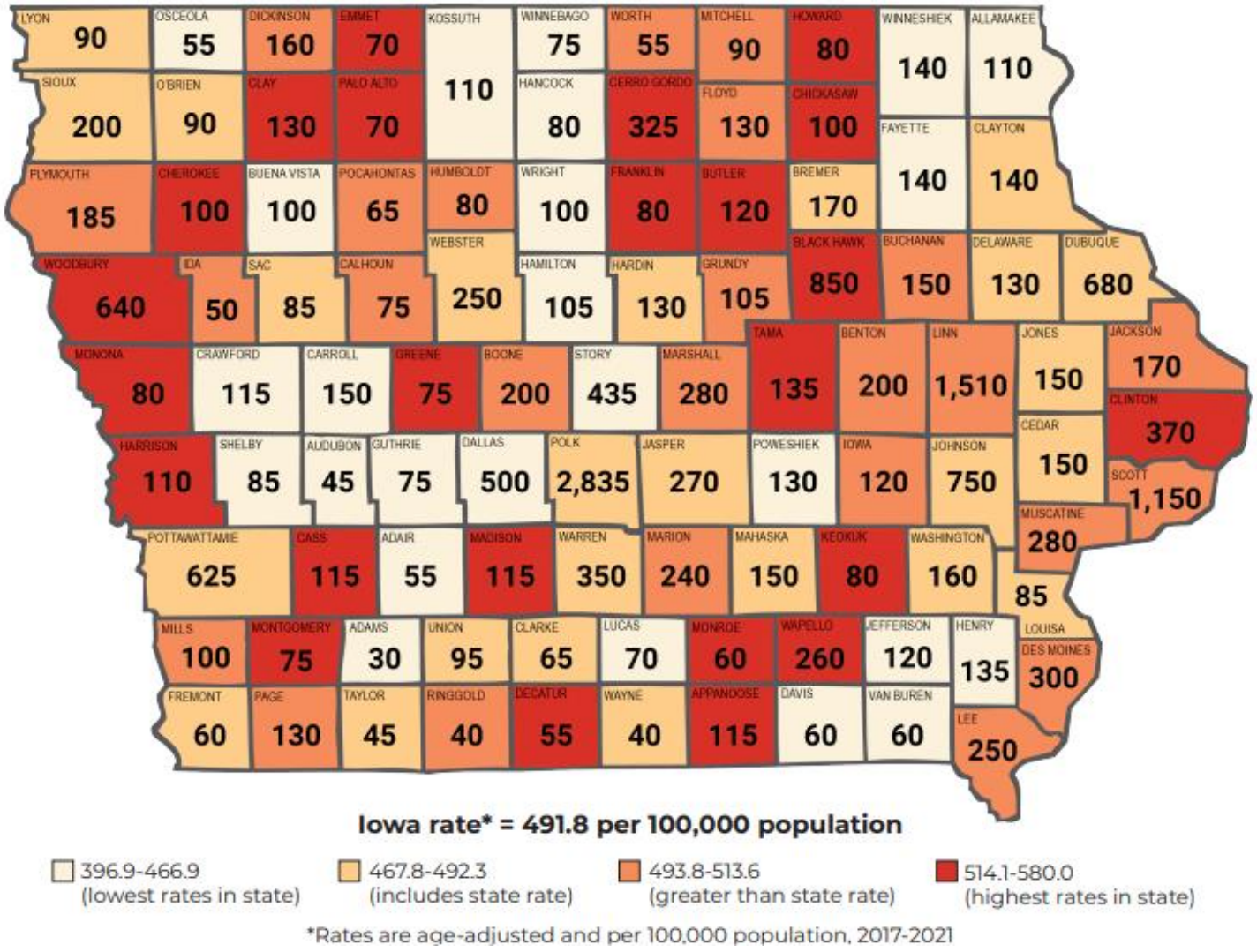
(KFF Women's Health Policy, 2024)



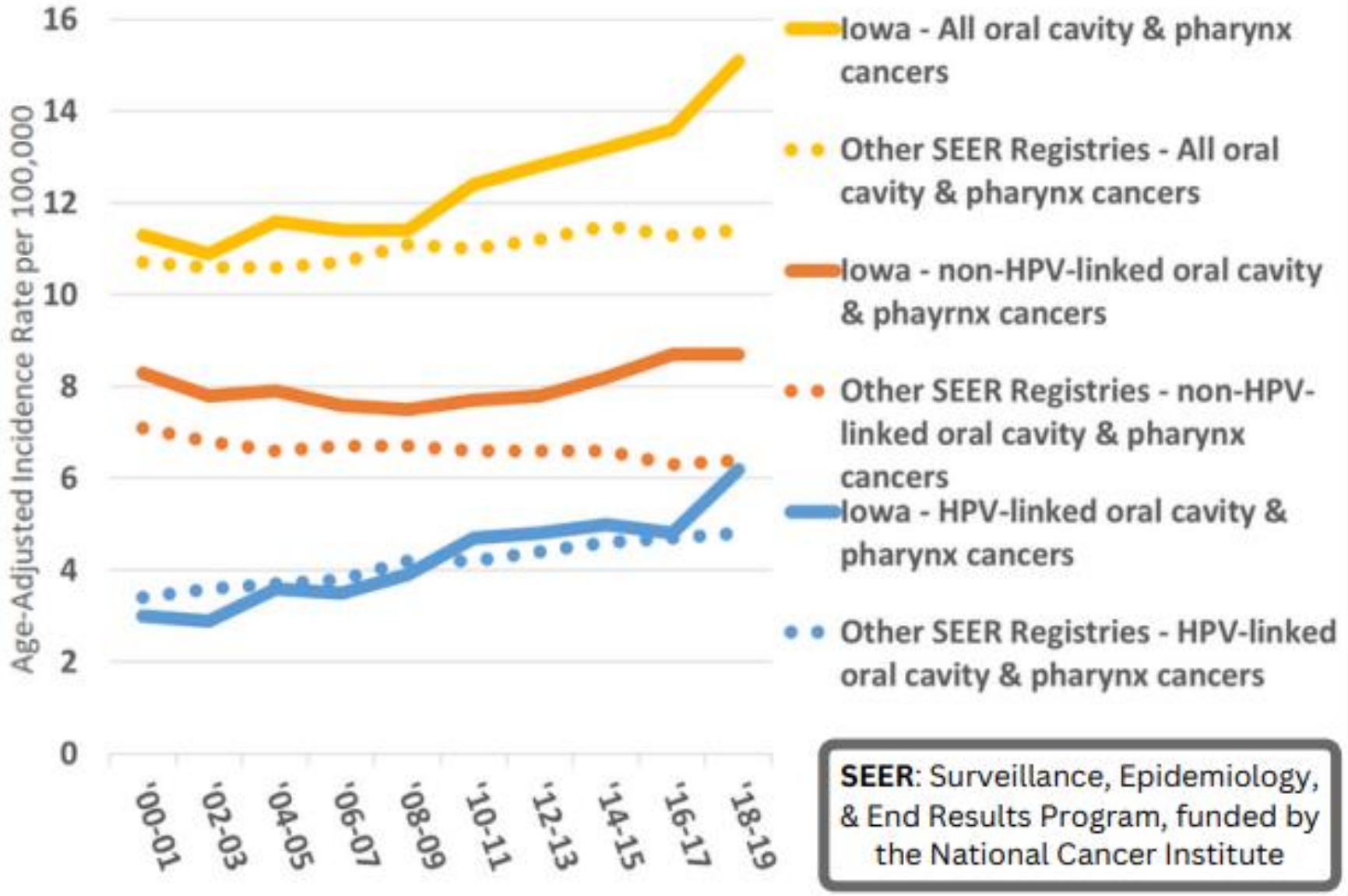


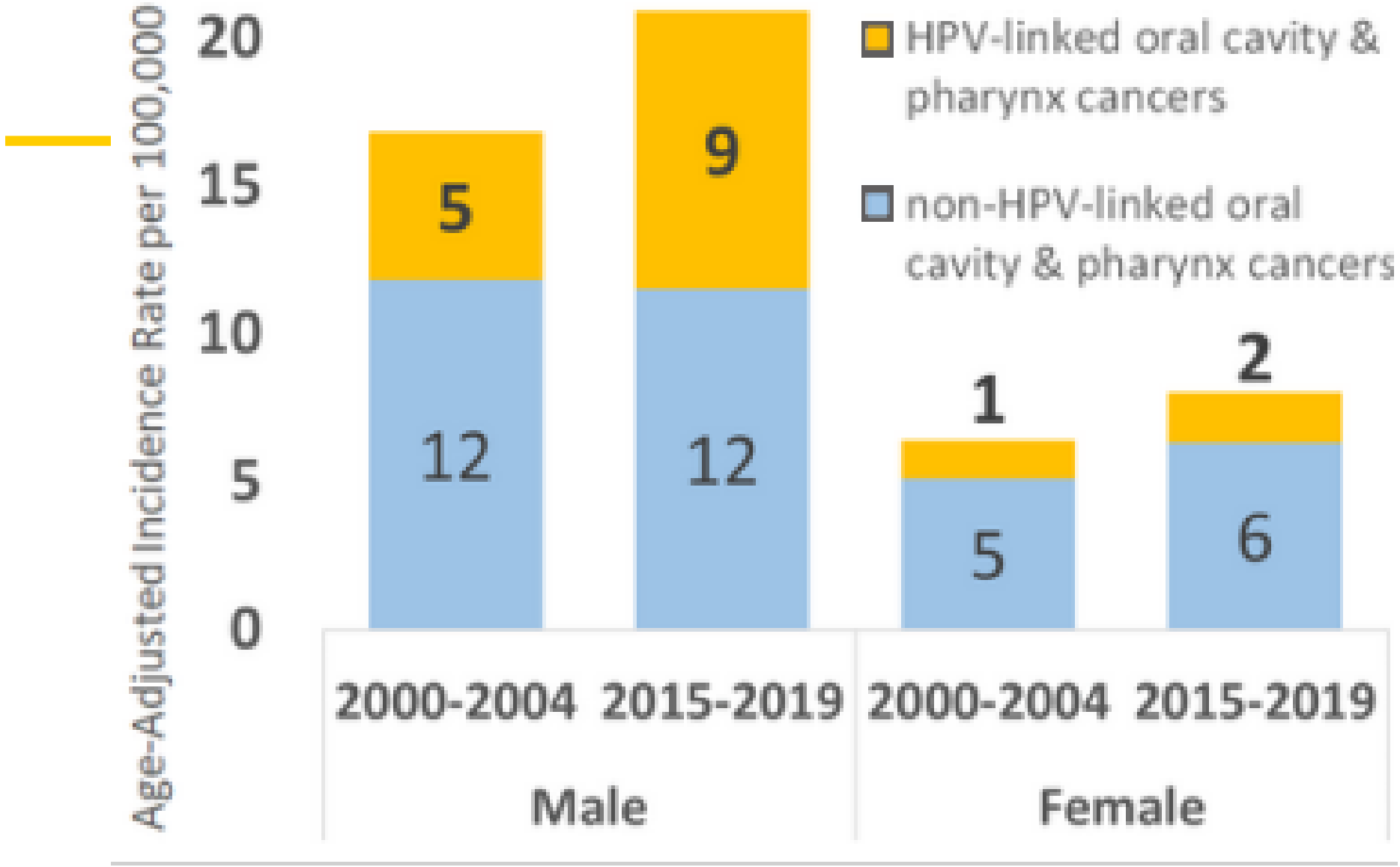
Cancer in Iowa

Color reflects incidence rate for 2017-2021; Number is est new cases in 2025

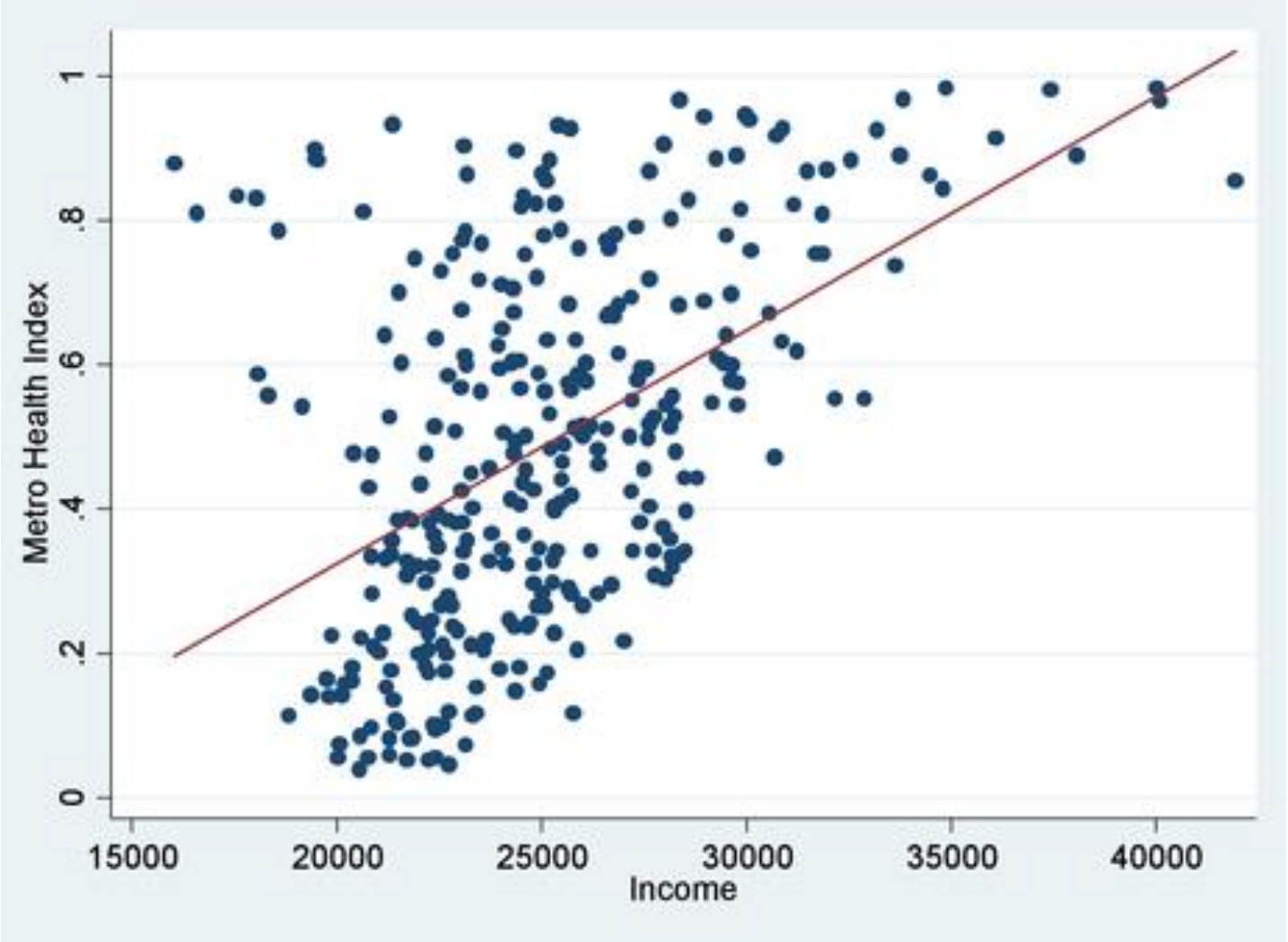


2025 Cancer in Iowa https://shri.public-health.uiowa.edu/cancer-data/iowa-cancer-reports/


16
14
12
10
8
6
4
2
0
Age-Adjusted Incidence Rate per 100,000
'00-01
'02-03
'04-05
'06-07
'08-09
'10-11
'12-13
'14-15
'16-17
'18-19
Iowa - All oral cavity & pharynx cancers
Other SEER Registries - All oral cavity & pharynx cancers
Iowa - non-HPV-linked oral cavity & phayrnx cancers
Other SEER Registries - non-HPV-linked oral cavity & pharynx cancers
Iowa - HPV-linked oral cavity & pharynx cancers
Other SEER Registries - HPV-linked oral cavity & pharynx cancers
SEER: Surveillance, Epidemiology, & End Results Program, funded by the National Cancer Institute


Age-Adjusted Incidence Rate per 100,000
20
15
10
5
0
5
12
9
12
1
5
2
6
HPV-linked oral cavity & pharynx cancers
non-HPV-linked oral cavity & pharynx cancers
2000-2004
2015-2019
2000-2004
2015-2019
Male
Female

Scatterplots allow you to show correlation between two variables.



Context, Context, Context

Module 2 Part 2

More Advanced Graph/Chart Types for Descriptive Epi Data

- Stacked Bar Chart
- Maps

Stacked Bar Charts

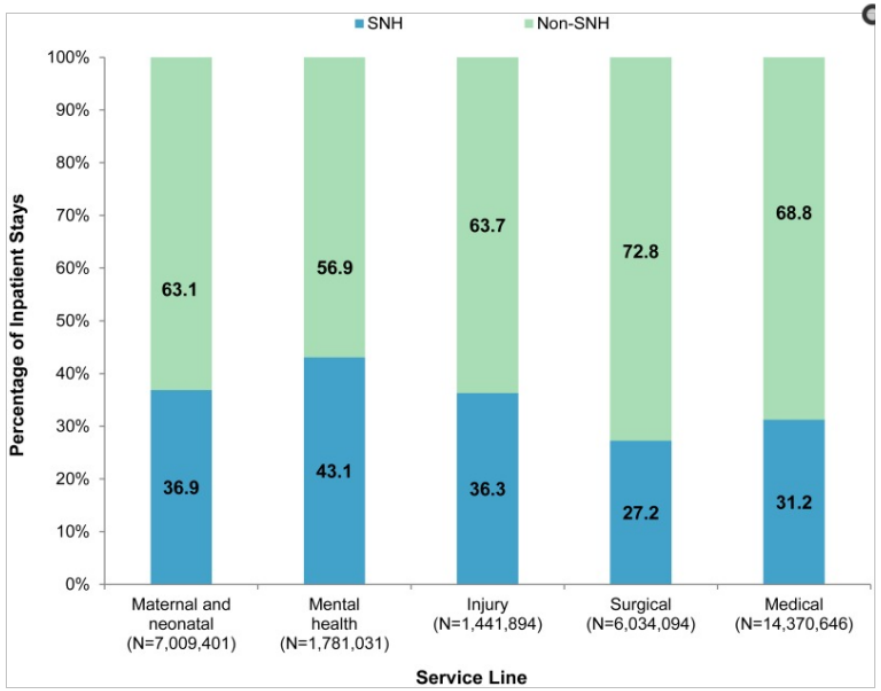
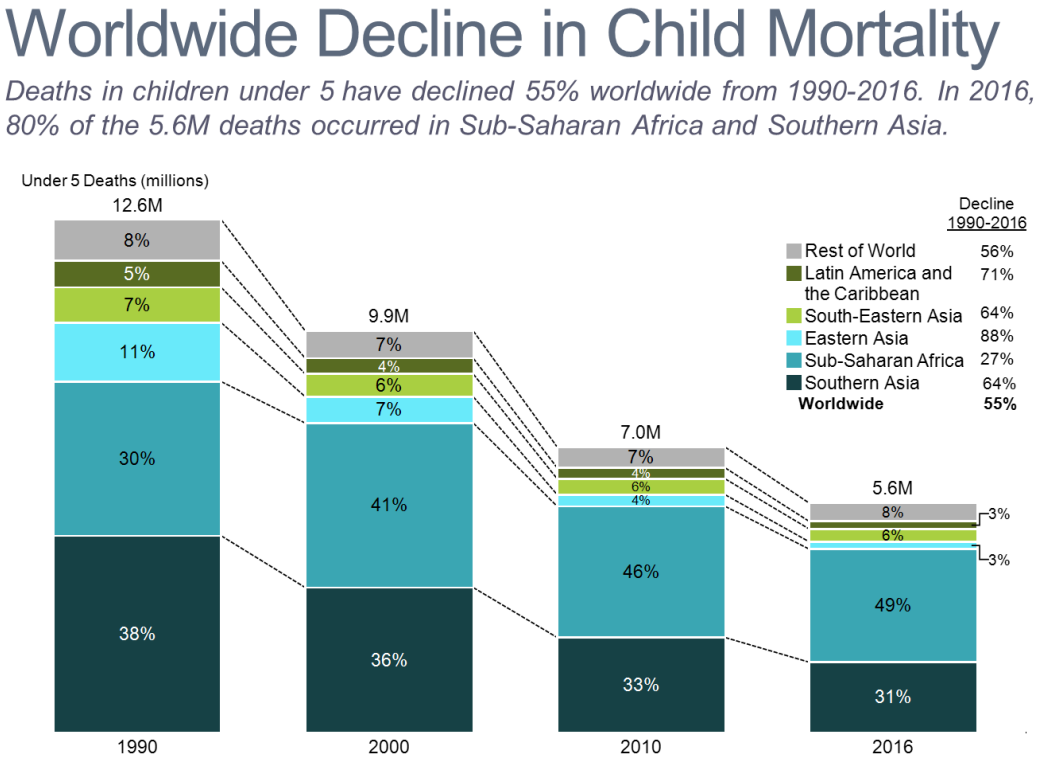


Figure 2 Percentage of inpatient hospital stays that occurred at SNHs and non-SNHs by service line in 40 States, 2014

Abbreviation: SNH, safety-net hospital

Note: SNHs were defined as those with a percentage of Medicaid and uninsured discharges in the top quartile within the State.

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), State Inpatient Databases (SID), 40 States, 2014

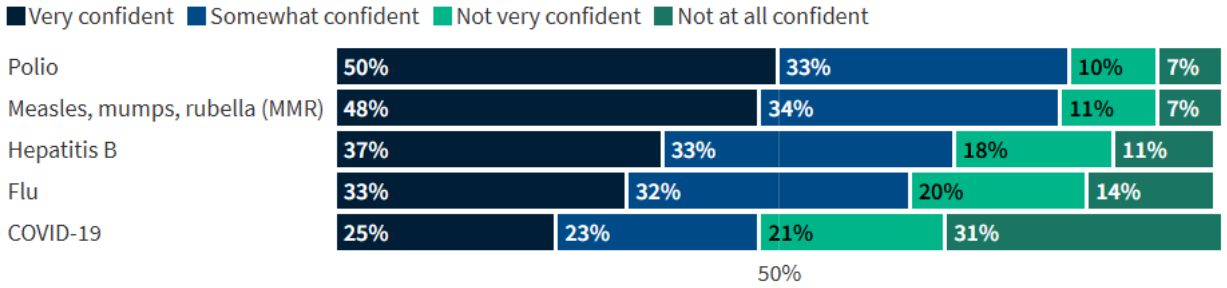


Stacked Bar Charts

Figure 7

Large Majorities of the Public Are Confident in the Safety of Polio, MMR, Hepatitis B Vaccines for Kids; Fewer Are Confident in Flu or COVID-19 Vaccine Safety

How confident are you, if at all, that the following vaccines are safe for **children**?



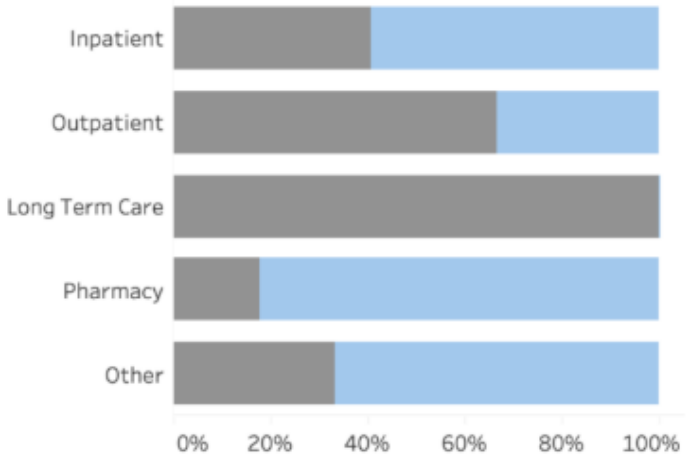
Note: See topline for full question wording.

Source: KFF Tracking Poll on Health Information and Trust (Jan. 13-20, 2026) • Get the data • Download PNG

KFF

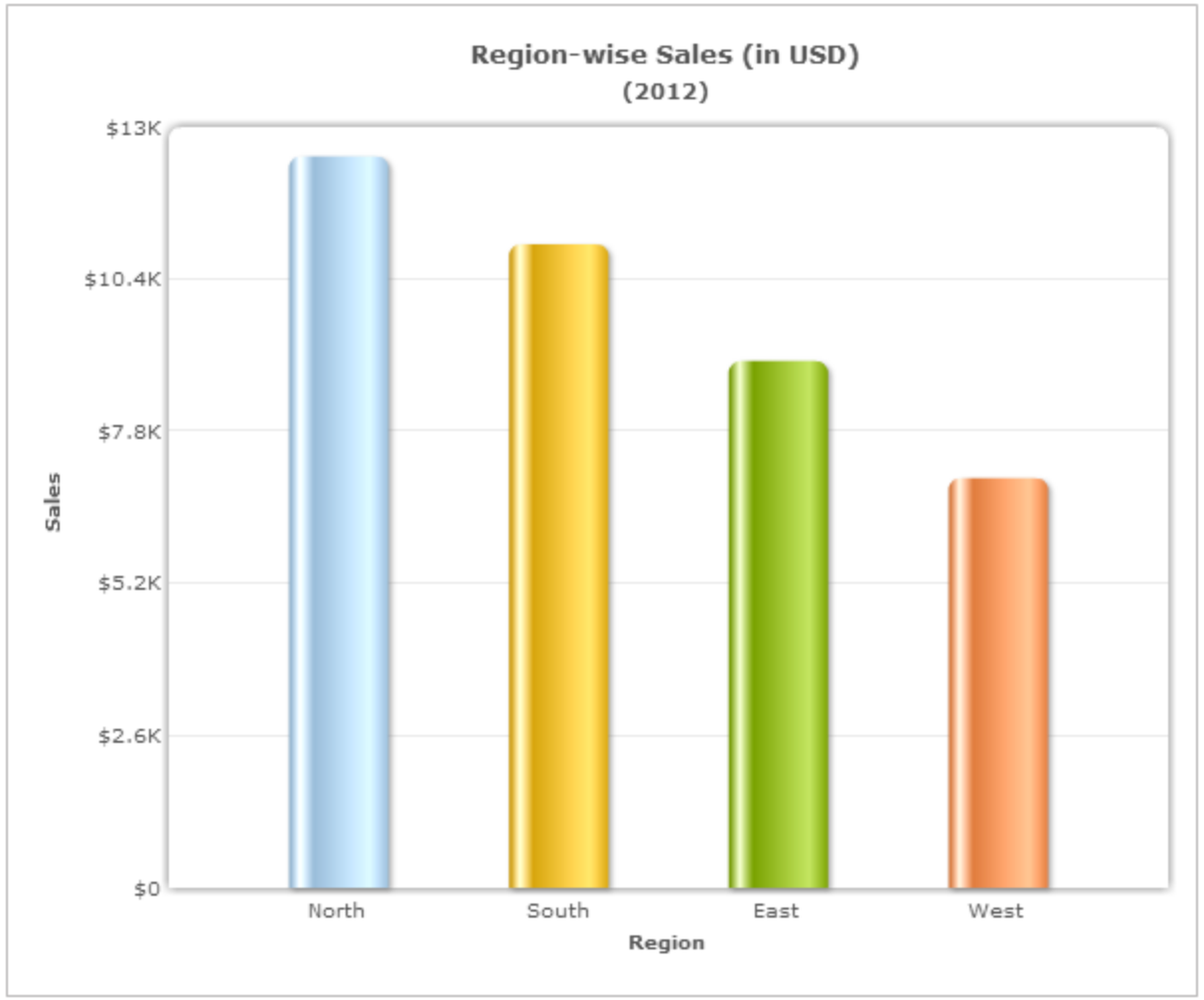
Claims by Payor Type, count and percent

Fee-for-Service (FFS) vs. Capitated Managed Care

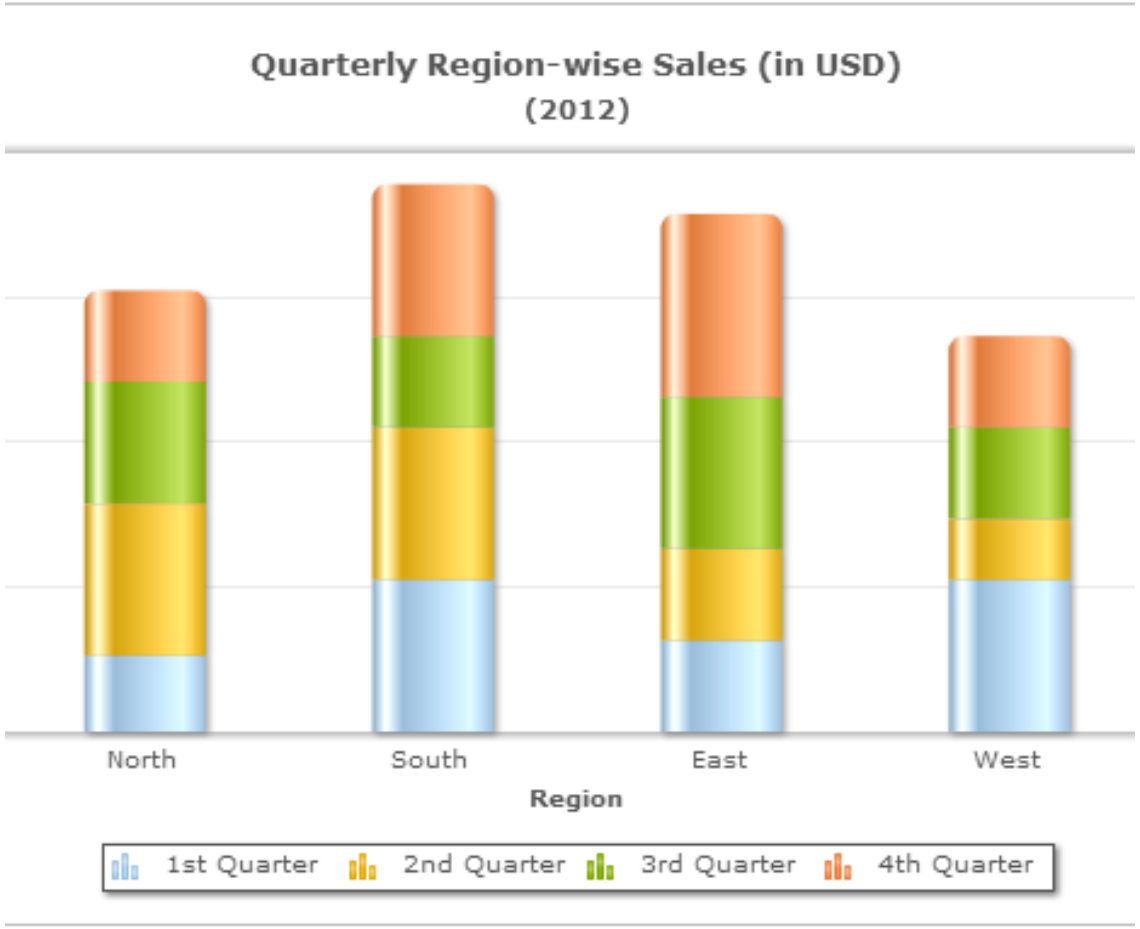


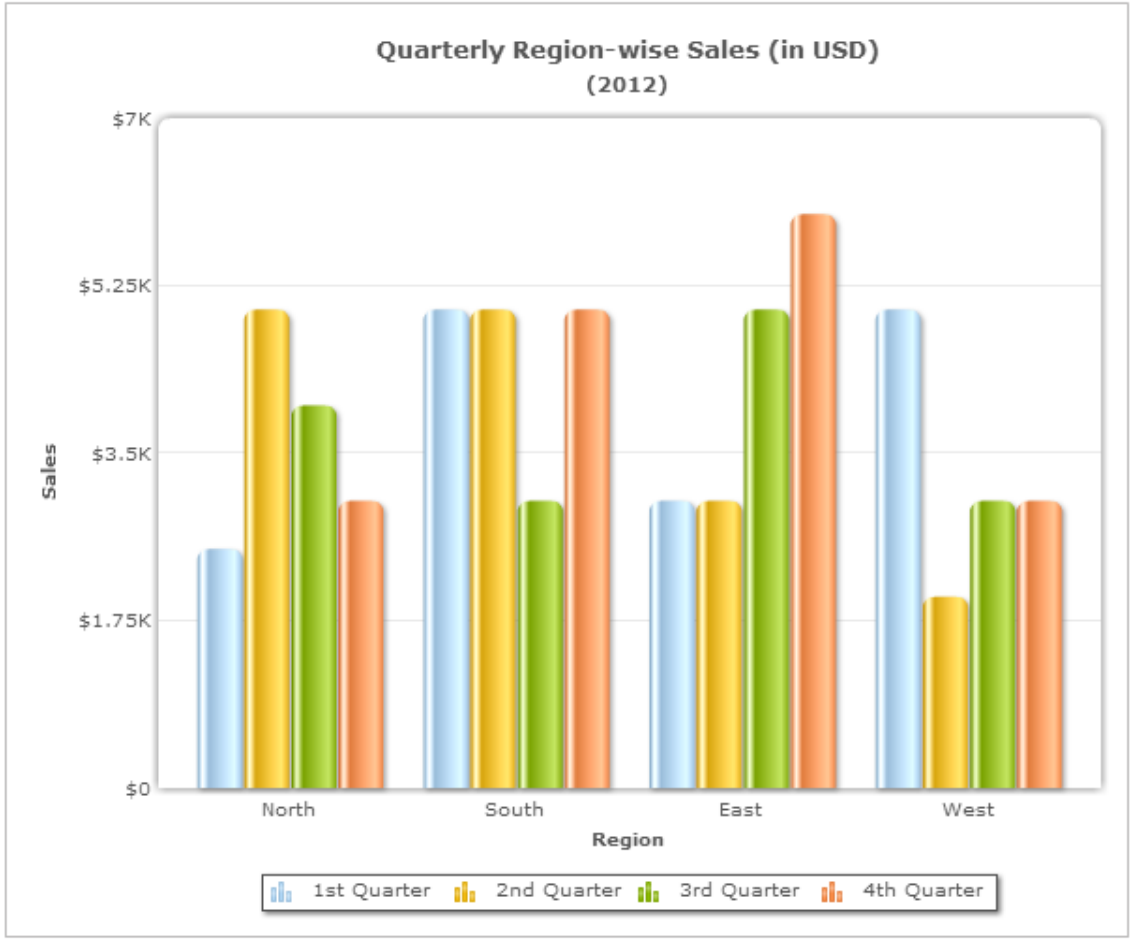
	FFS	Capitatied MC
Inpatient	11,000	16,000
	41%	59%
Outpatient	18,000	9,000
	67%	33%
Long Term Care	23,000	0
	100%	0%
Pharmacy	163,000	748,000
	18%	82%
Other	761,000	1,531,000
	33%	67%
	976,000	**2,304,000**
	30%	**70%**

Let’s look at an example

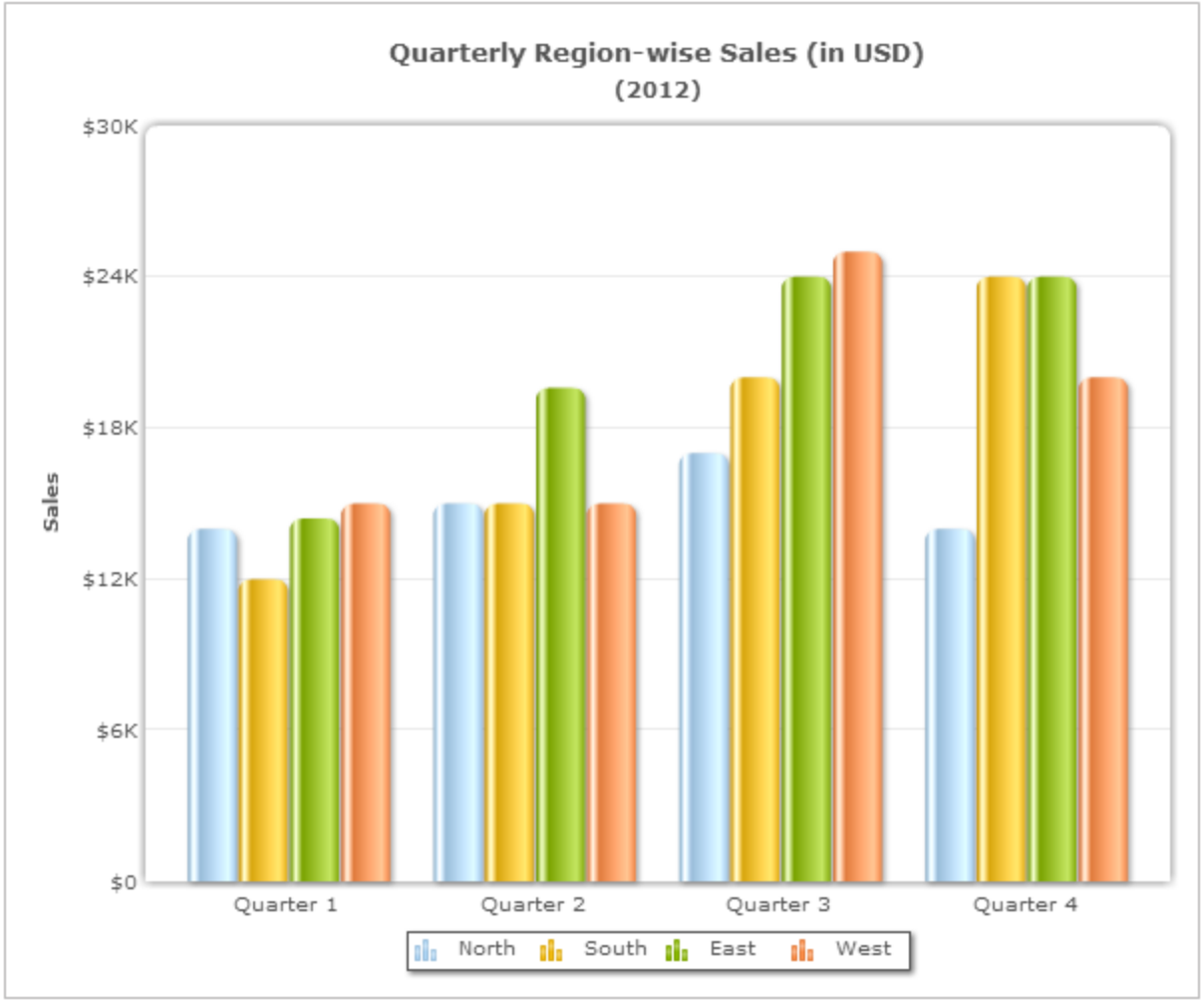


Let’s look at an example – which is better?



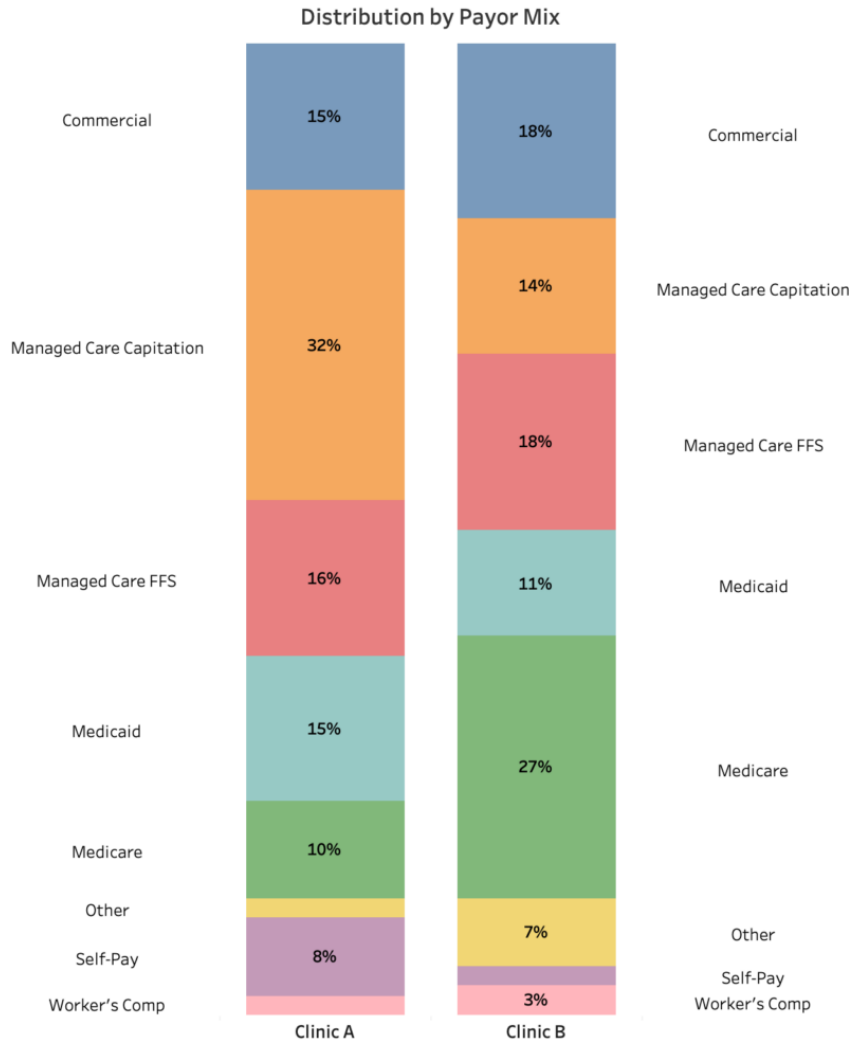


But if what you want is actually Quarterly Regional Sales, then what about this?



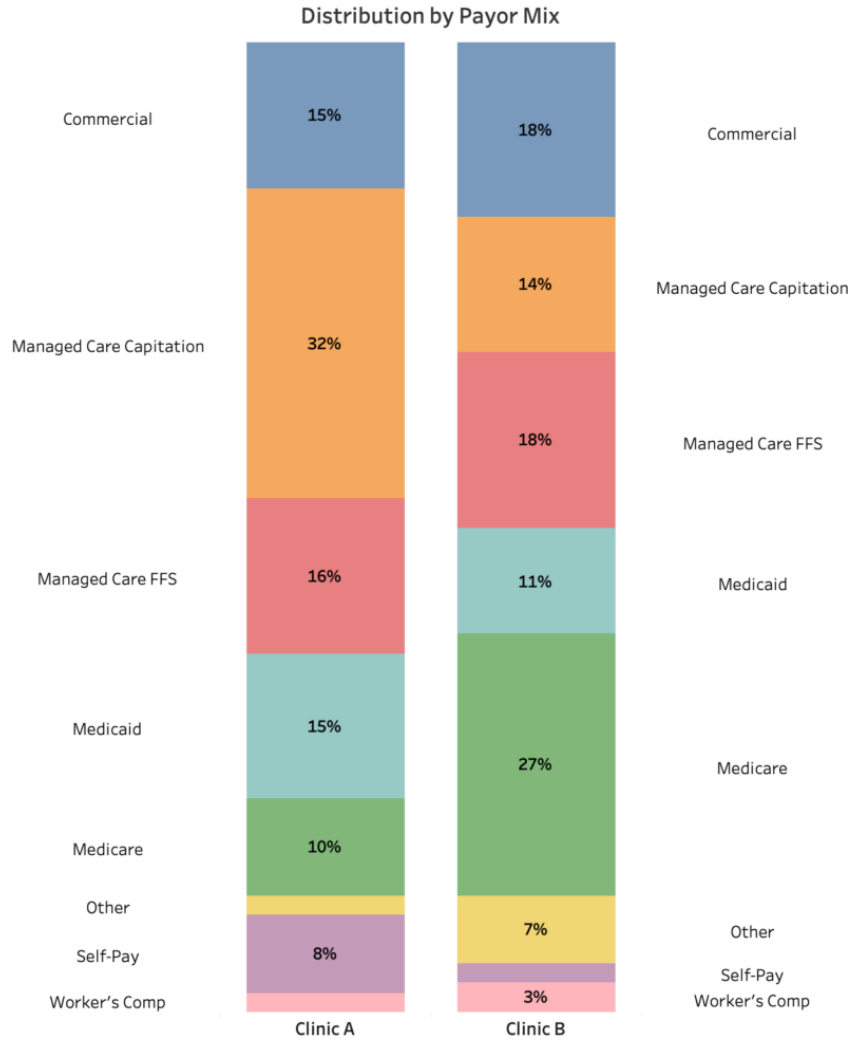
Stacked Bar Charts – Short Quiz

You want to compare clinics for % of patients who are Managed Care Fee For Service (FFS) vs. Managed Care Capitation

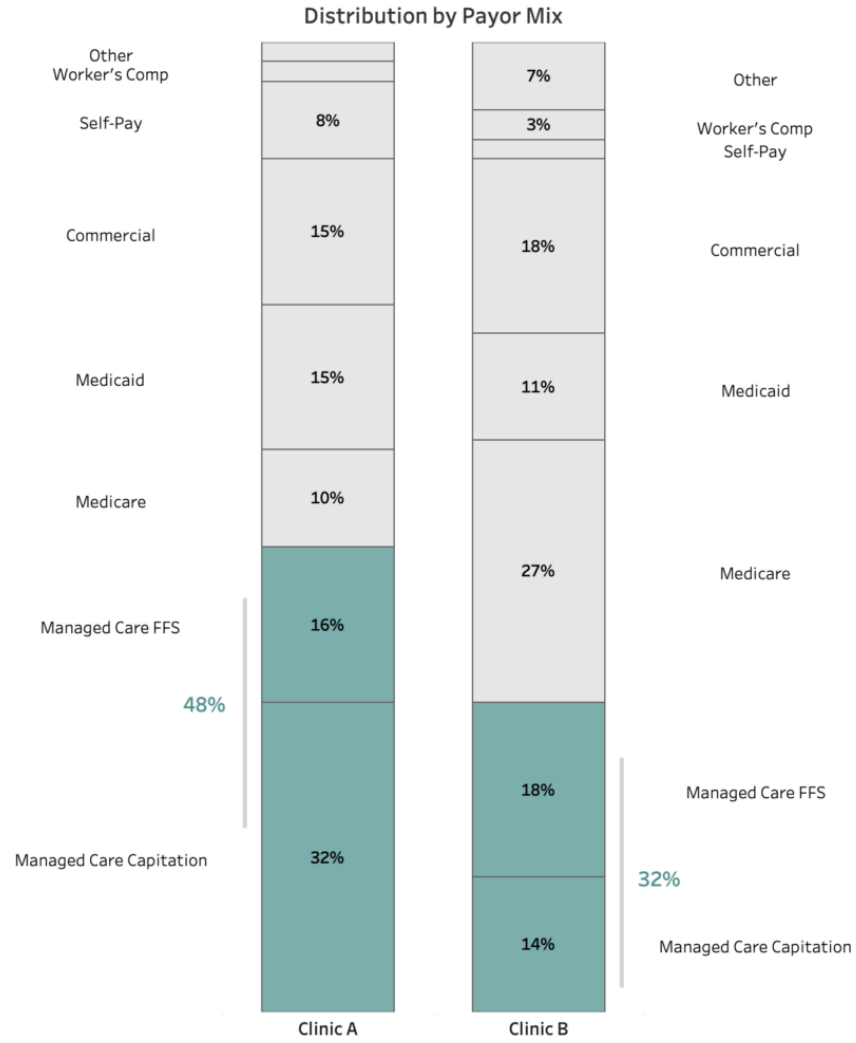


Stacked Bar Charts

You want to compare clinics for % of patients who are Managed Care Fee For Service (FFS) vs. Managed Care Capitation



ORIGINAL



IMPROVED?

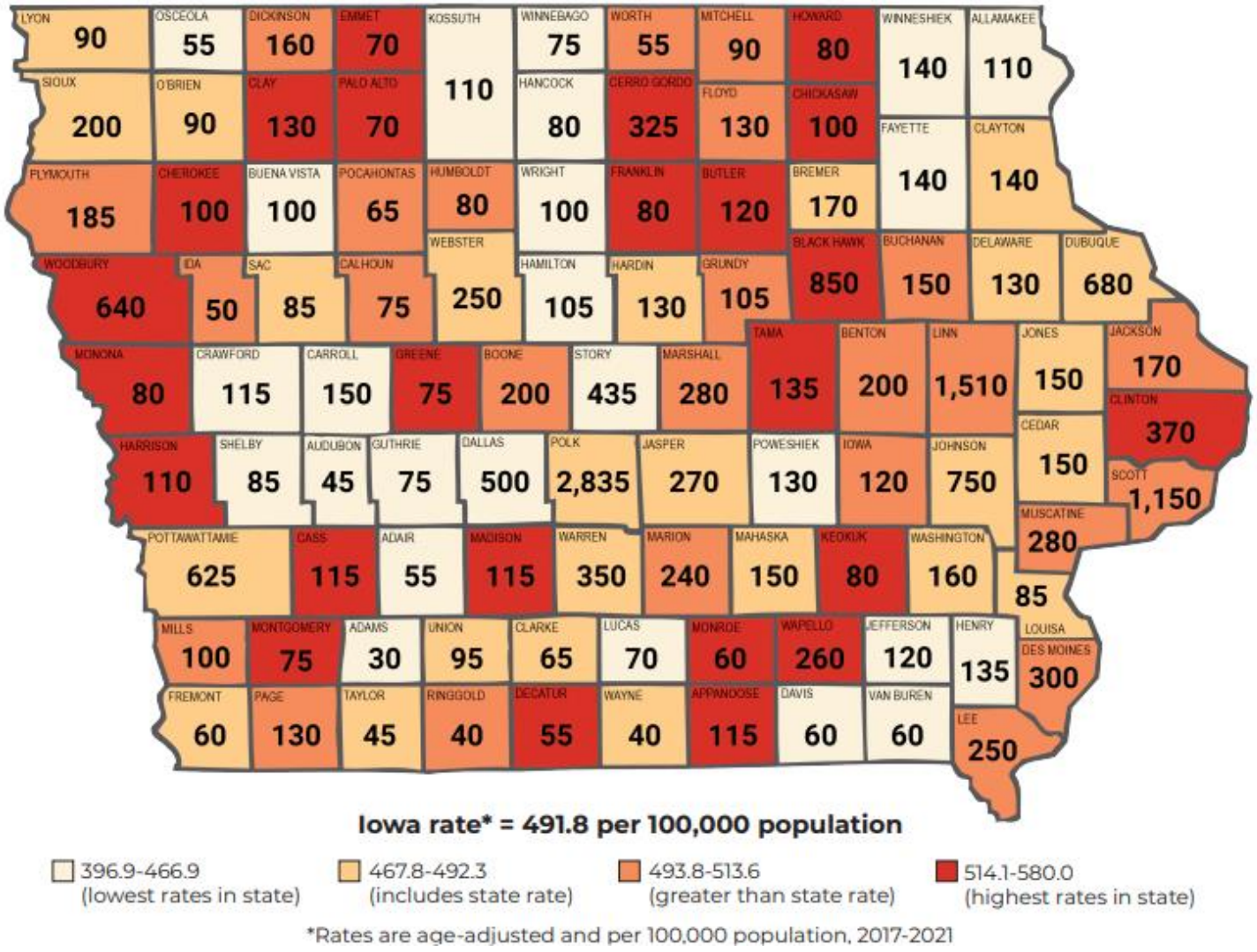
Maps – Choropleth vs Heatmap

- Choropleth maps – maps showing aggregated pre-defined geographic units (states, counties, etc) where color gradiants show intensity or patterns. Measures are usually rates, percents, etc. thereby accounting for population size.

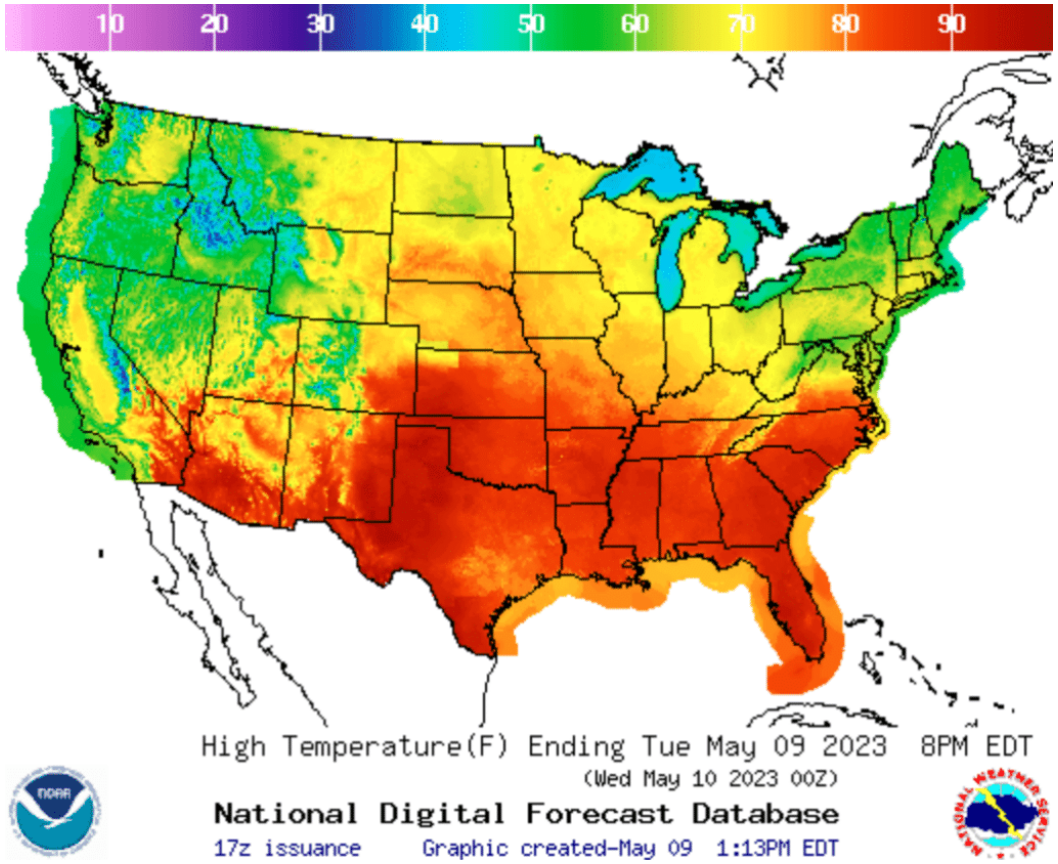
- Heat maps – Maps where color gradiants show intensity or patterns but does not need to be related to geography.

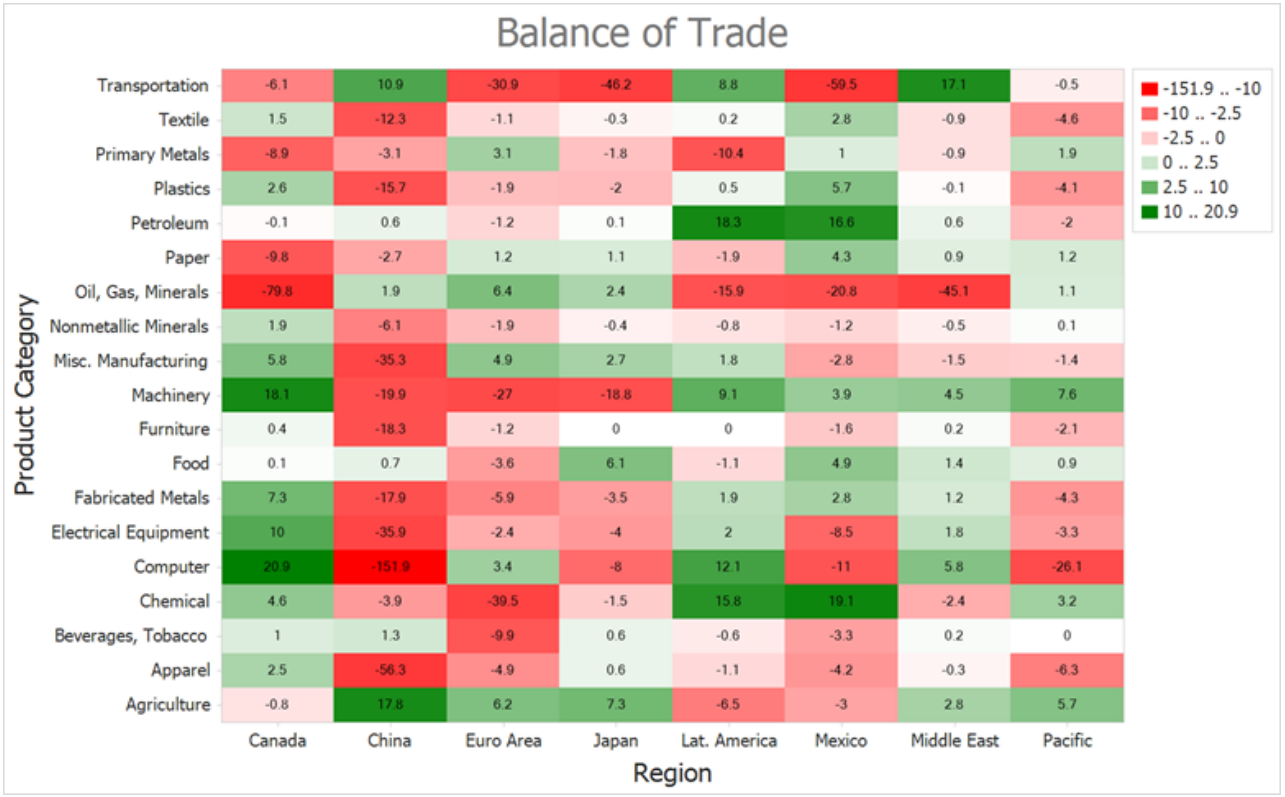
Cancer in Iowa

Color reflects incidence rate for 2017-2021; Number is est new cases in 2025



2025 Cancer in Iowa https://shri.public-health.uiowa.edu/cancer-data/iowa-cancer-reports/


10
20
30
40
50
60
70
80
90
High Temperature(F) Ending Tue May 09 2023 8PM EDT
(Wed May 10 2023 00Z)
National Digital Forecast Database
17z issuance
Graphic created-May 09 1:13PM EDT


Balance of Trade
Product Category
Region
Transportation -6.1 10.9 -30.9 -46.2 8.8 -59.5 17.1 -0.5
Textile 1.5 -12.3 -1.1 -0.3 0.2 2.8 -0.9 -4.6
Primary Metals -8.9 -3.1 3.1 -1.8 -10.4 1 -0.9 1.9
Plastics 2.6 -15.7 -1.9 -2 0.5 5.7 -0.1 -4.1
Petroleum -0.1 0.6 -1.2 0.1 18.3 16.6 0.6 -2
Paper -9.8 -2.7 1.2 1.1 -1.9 4.3 0.9 1.2
Oil, Gas, Minerals -79.8 1.9 6.4 2.4 -15.9 -20.8 -45.1 1.1
Nonmetallic Minerals 1.9 -6.1 -1.9 -0.4 -0.8 -1.2 -0.5 0.1
Misc. Manufacturing 5.8 -35.3 4.9 2.7 1.8 -2.8 -1.5 -1.4
Machinery 18.1 -19.9 -27 -18.8 9.1 3.9 4.5 7.6
Furniture 0.4 -18.3 -1.2 0 0 -1.6 0.2 -2.1
Food 0.1 0.7 -3.6 6.1 -1.1 4.9 1.4 0.9
Fabricated Metals 7.3 -17.9 -5.9 -3.5 1.9 2.8 1.2 -4.3
Electrical Equipment 10 -35.9 -2.4 -4 2 -8.5 1.8 -3.3
Computer 20.9 -151.9 3.4 -8 12.1 -11 5.8 -26.1
Chemical 4.6 -3.9 -39.5 -1.5 15.8 19.1 -2.4 3.2
Beverages, Tobacco 1 1.3 -9.9 0.6 -0.6 -3.3 0.2 0
Apparel 2.5 -56.3 -4.9 0.6 -1.1 -4.2 -0.3 -6.3
Agriculture -0.8 17.8 6.2 7.3 -6.5 -3 2.8 5.7
Canada
China
Euro Area
Japan
Lat. America
Mexico
Middle East
Pacific
-151.9 .. -10
-10 .. -2.5
-2.5 .. 0
0 .. 2.5
2.5 .. 10
10 .. 20.9

Module 2 Part 3

Instructions for:

- Stacked Bar Chart
- Maps

Stacked Bar Chart – Using Visualize This Evaluation Data

To evaluate confidence levels for skills learned in the training, we ask 4 questions having to do with the course objectives for the training. The table below represents pre-assessment data. The bold numbers represent individual responses to the assessment, and the responses are in the columns sorted out as Q1 through Q4. The numbers are based on the code below.

High Confidence	4
Moderate Confidence	3
Slight Confidence	2
No Confidence	1
No Answer	5

D	E	F	G	H
	Q1	Q2	Q3	Q4
1	3	4	3	3
2	1	1	1	1
3	3	3	3	3
4	3	3	3	2
5	3	2	3	3
6	3	3	4	4
7	3	3	3	3
8	3	3	3	3
9	2	2	4	2
10	2	1	3	2

Stacked Bar Chart – Using Visualize This Evaluation Data

Using this code, the data is sorted into the 2 tables below. The first one uses the "countif" function, which counts how many responses are in each of the confidence categories.

High Confidence	0	1	2	1
Moderate Confid	7	5	7	5
Slight Confidence	2	2	0	3
No Confidence	1	2	1	1
No Answer/Othe	0	0	0	0
Total	10	10	10	10

				Val
High Confidence	0	0.1	0.2	0.1
Moderate Confid	0.7	0.5	0.7	0.5
Slight Confidence	0.2	0.2	0	0.3
No Confidence	0.1	0.2	0.1	0.1
No Answer/Othe	0	0	0	0
Total	1	1	1	1

Below is an example of the "countif" function. The blue numbers are the column range of data and the number after the comma is the response number you want to be counted. In our code, the High Confidence category = the number 4.

High Confidence	=COUNTIF(E4:E46,4)	
Moderate Confid	COUNTIF(range, criteria)	5
Slight Confidence	2	2
No Confidence	1	2
No Answer/Othe	0	0
Total	10	10

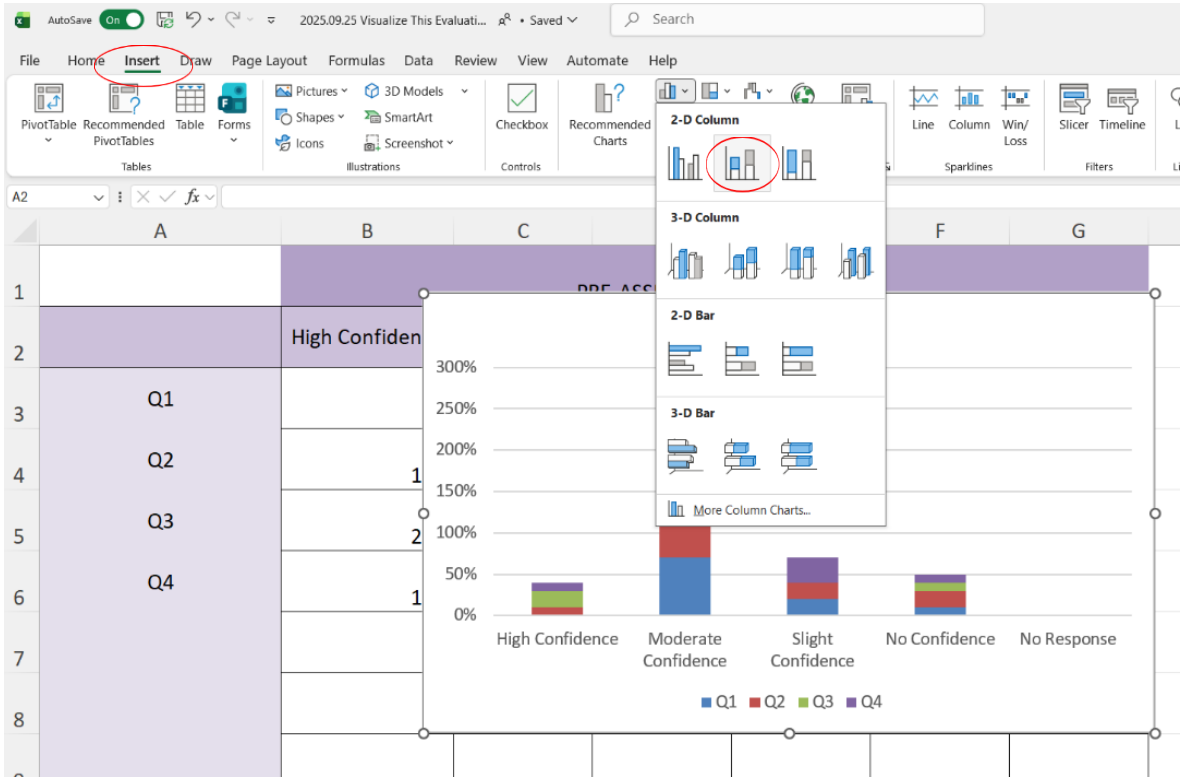
Stacked Bar Chart – Using Visualize This Evaluation Data

The bottom table in the above picture was reformatted into the table below. The data on the X and Y axis can be flipped in the table, but this is how it has been formatted previously.

	PRE-ASSESSMENT unmatched				
	High Confidence	Moderate Confidence	Slight Confidence	No Confidence	No Response
Q1	0%	70%	20%	10%	0%
Q2	10%	50%	20%	20%	0%
Q3	20%	70%	0%	10%	0%
Q4	10%	50%	30%	10%	0%

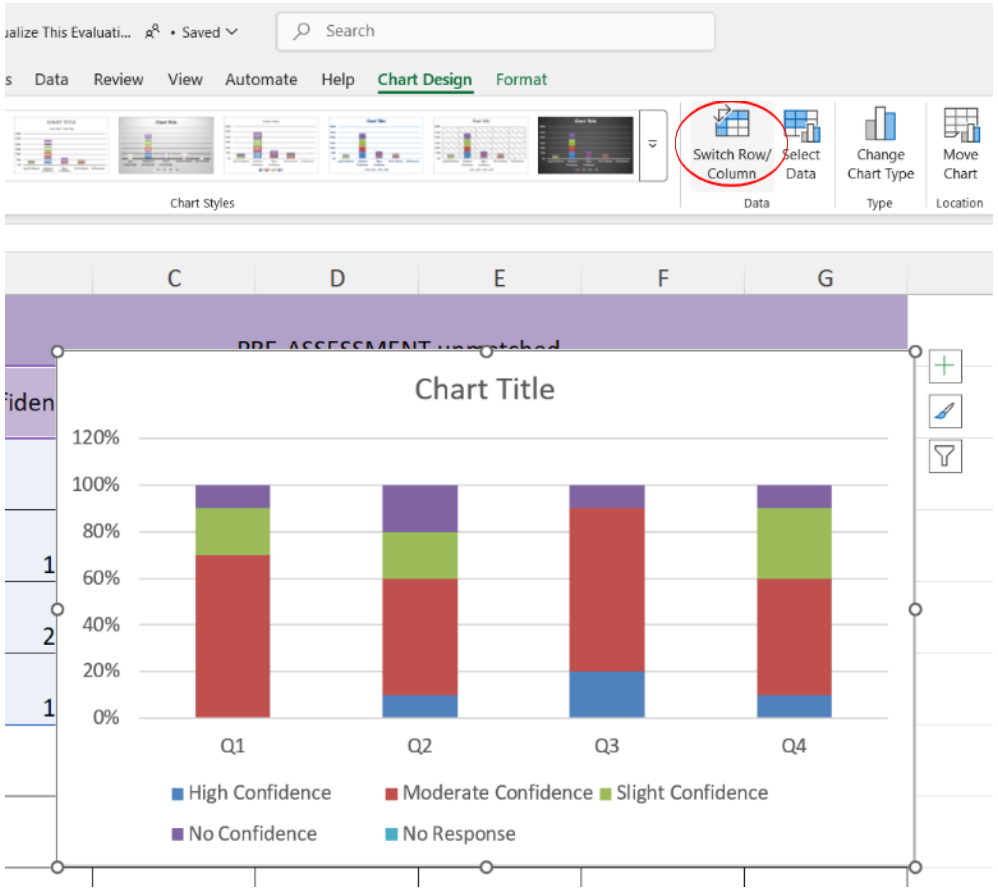
Stacked Bar Chart – Using Visualize This Evaluation Data

Highlighting this data and choosing the stacked bar option located on the insert tab will create a stacked bar chart. It is important to remember that in order to correctly use a stacked bar chart, each category needs to add up to 100%.



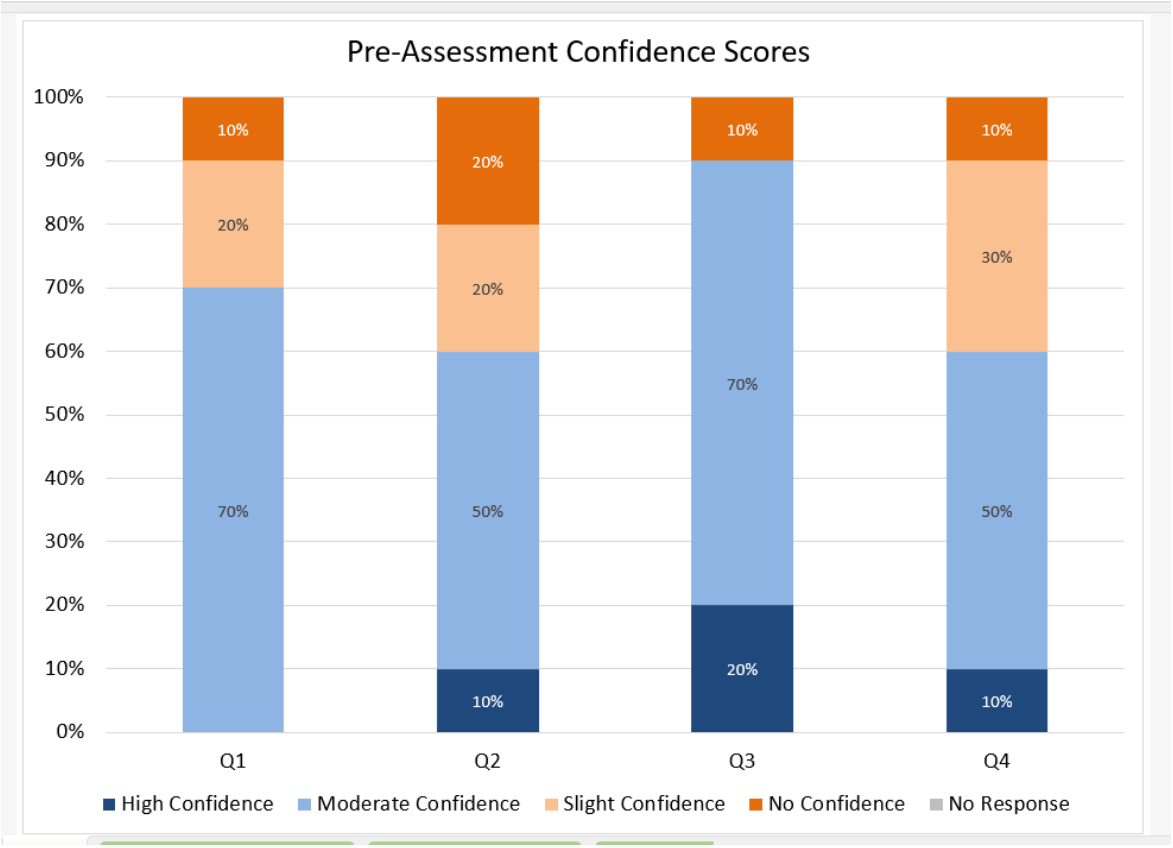
Stacked Bar Chart – Using Visualize This Evaluation Data

Right now, the table does not show the correct information, due to how the information in the data table was set up. The X and Y axis on the chart needs to be switched around, do this by clicking the “Switch Row/Column” button.



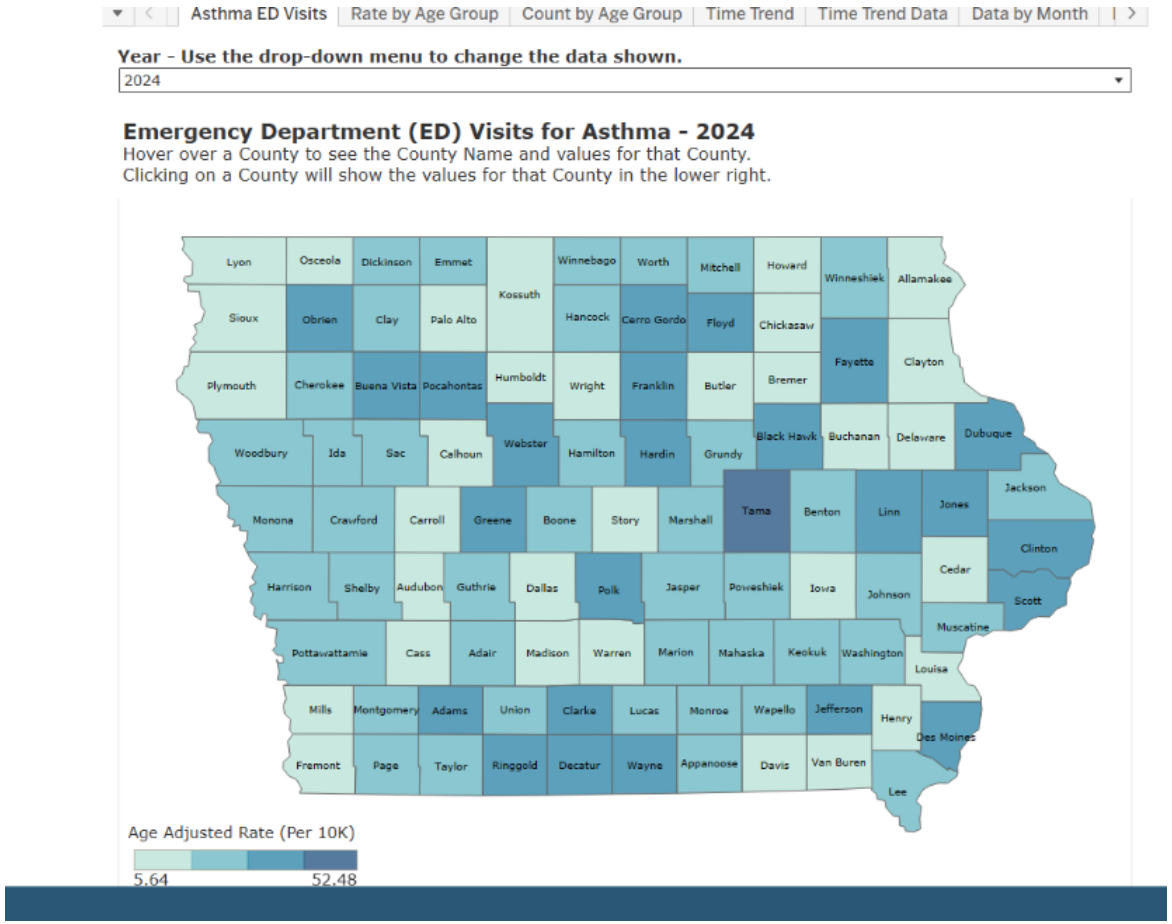
Stacked Bar Chart – Using Visualize This Evaluation Data

Here is what a finished chart could look like after adding data elements:



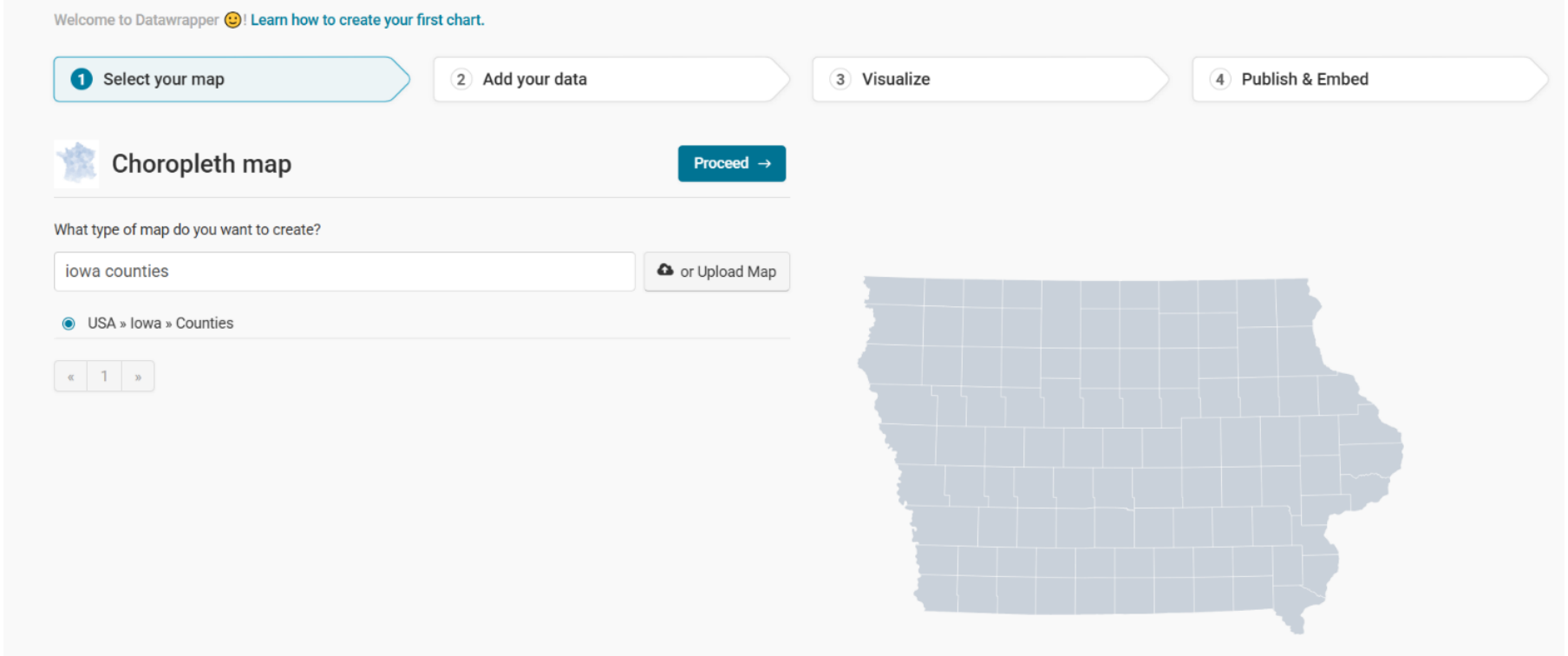
Maps – Using asthma data from the Iowa Tracking Portal

We are going to recreate the ED Visits for Asthma map below. Download the data by clicking the button in the bottom right corner.



Maps – Using asthma data from the Iowa Tracking Portal

Go to the Datawrapper website and choose the create map option. The website brings you to this page, where you can choose a basemap to work with. Type in “Iowa counties” in the search bar to find a blank map of the counties in Iowa.



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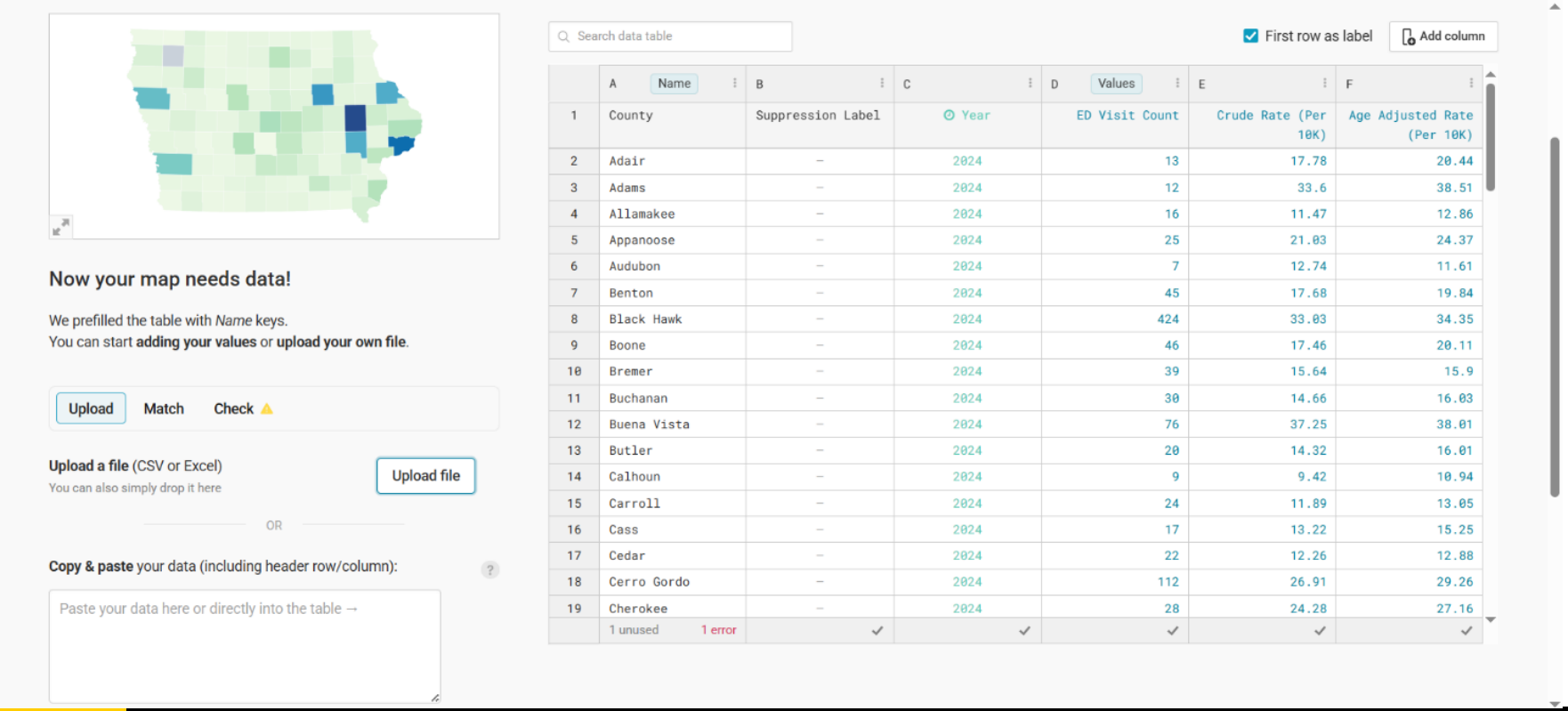
Click the proceed button, and then we can upload our data file we downloaded from the Iowa Tracking Portal.



	A Name	B	C	D Values	E	F
1	County	Suppression Label	Year	ED Visit Count	Crude Rate (Per 10K)	Age Adjusted Rate (Per 10K)
2	Adair	–	2024	13	17.78	20.44
3	Adams	–	2024	12	33.6	38.51
4	Allamakee	–	2024	16	11.47	12.86
5	Appanoose	–	2024	25	21.03	24.37
6	Audubon	–	2024	7	12.74	11.61
7	Benton	–	2024	45	17.68	19.84
8	Black Hawk	–	2024	424	33.03	34.35
9	Boone	–	2024	46	17.46	20.11
10	Bremer	–	2024	39	15.64	15.9
11	Buchanan	–	2024	30	14.66	16.03
12	Buena Vista	–	2024	76	37.25	38.01
13	Butler	–	2024	20	14.32	16.01
14	Calhoun	–	2024	9	9.42	10.94
15	Carroll	–	2024	24	11.89	13.05
16	Cass	–	2024	17	13.22	15.25
17	Cedar	–	2024	22	12.26	12.88
18	Cerro Gordo	–	2024	112	26.91	29.26
19	Cherokee	–	2024	28	24.28	27.16
	1 unused 1 error	✓	✓	✓	✓	✓

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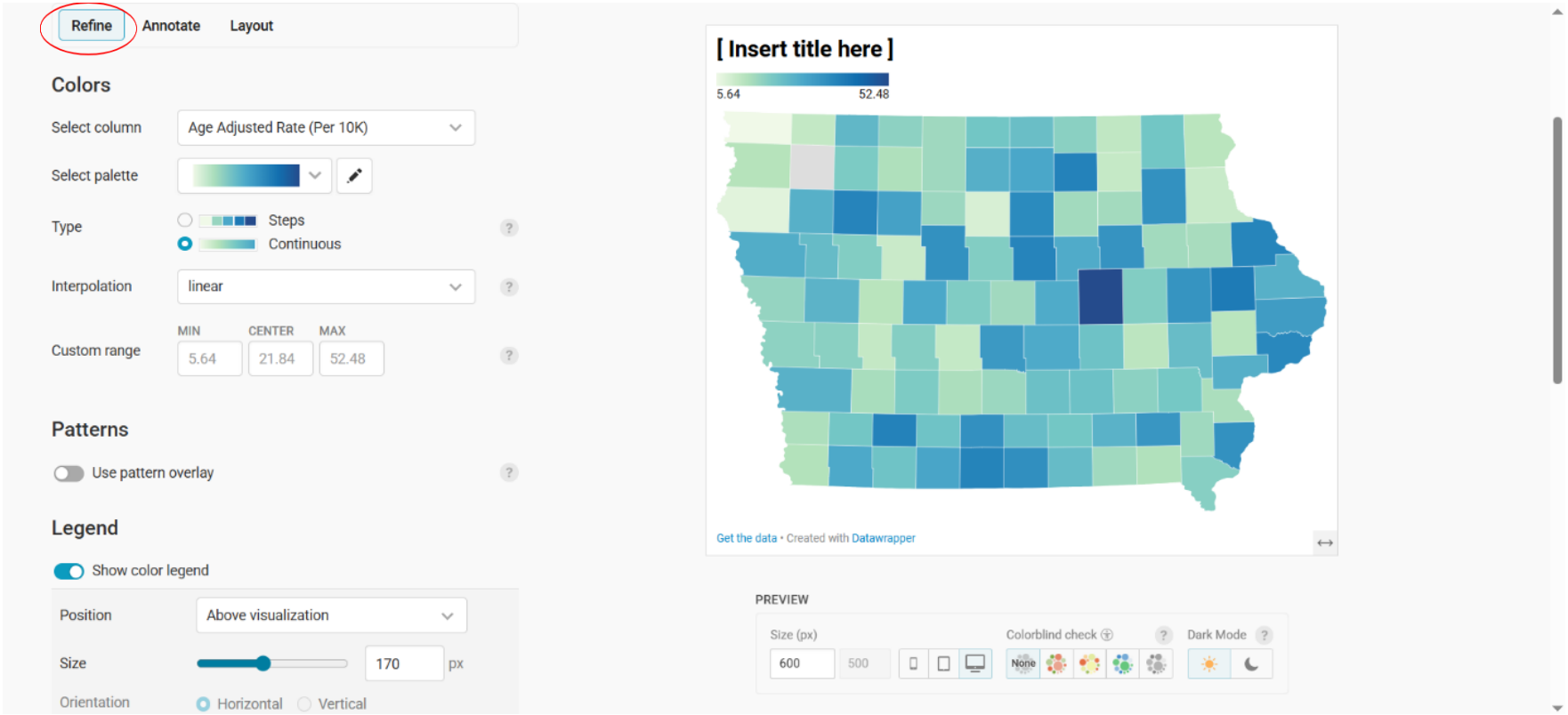
After clicking proceed, you have the option to refine, annotate, and change the layout of the map. Here is an example of each of those options.



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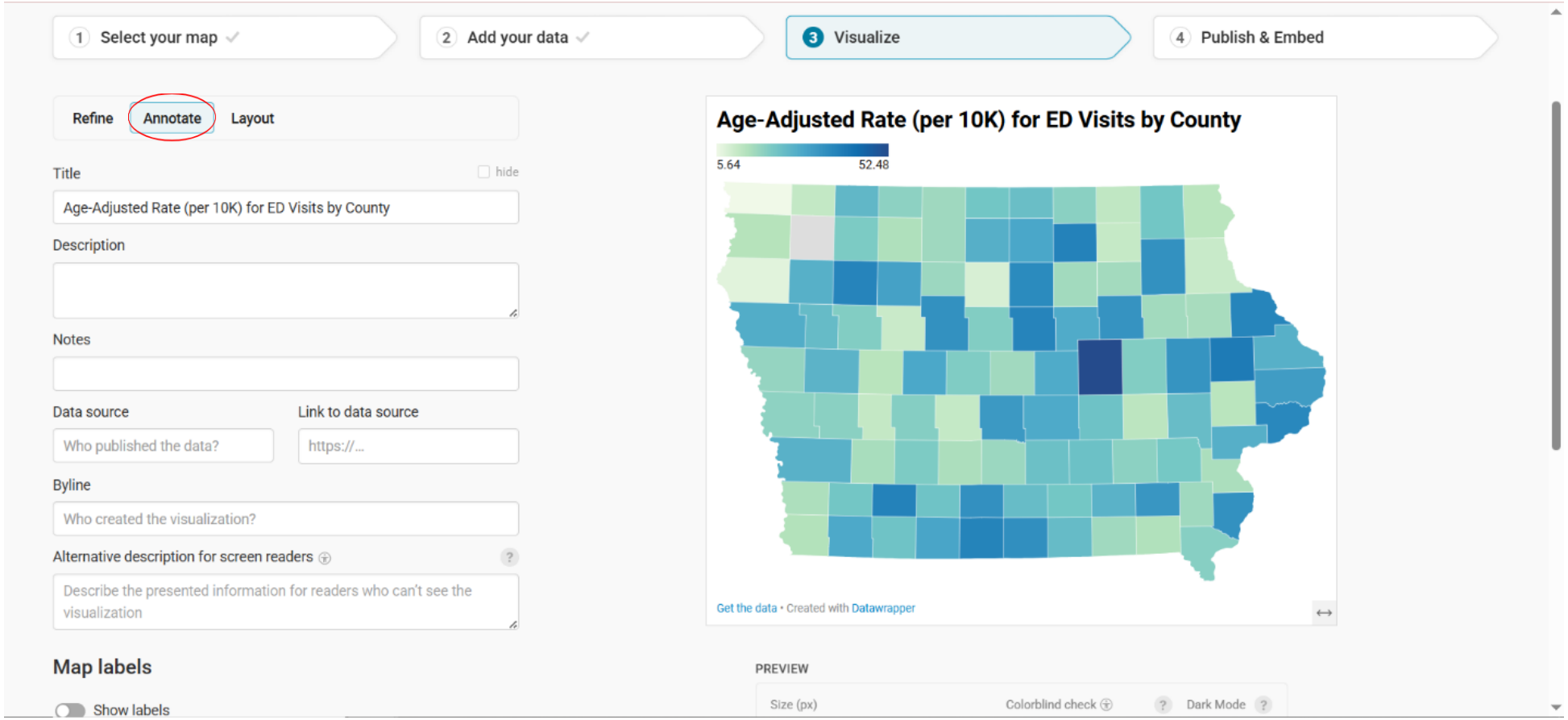

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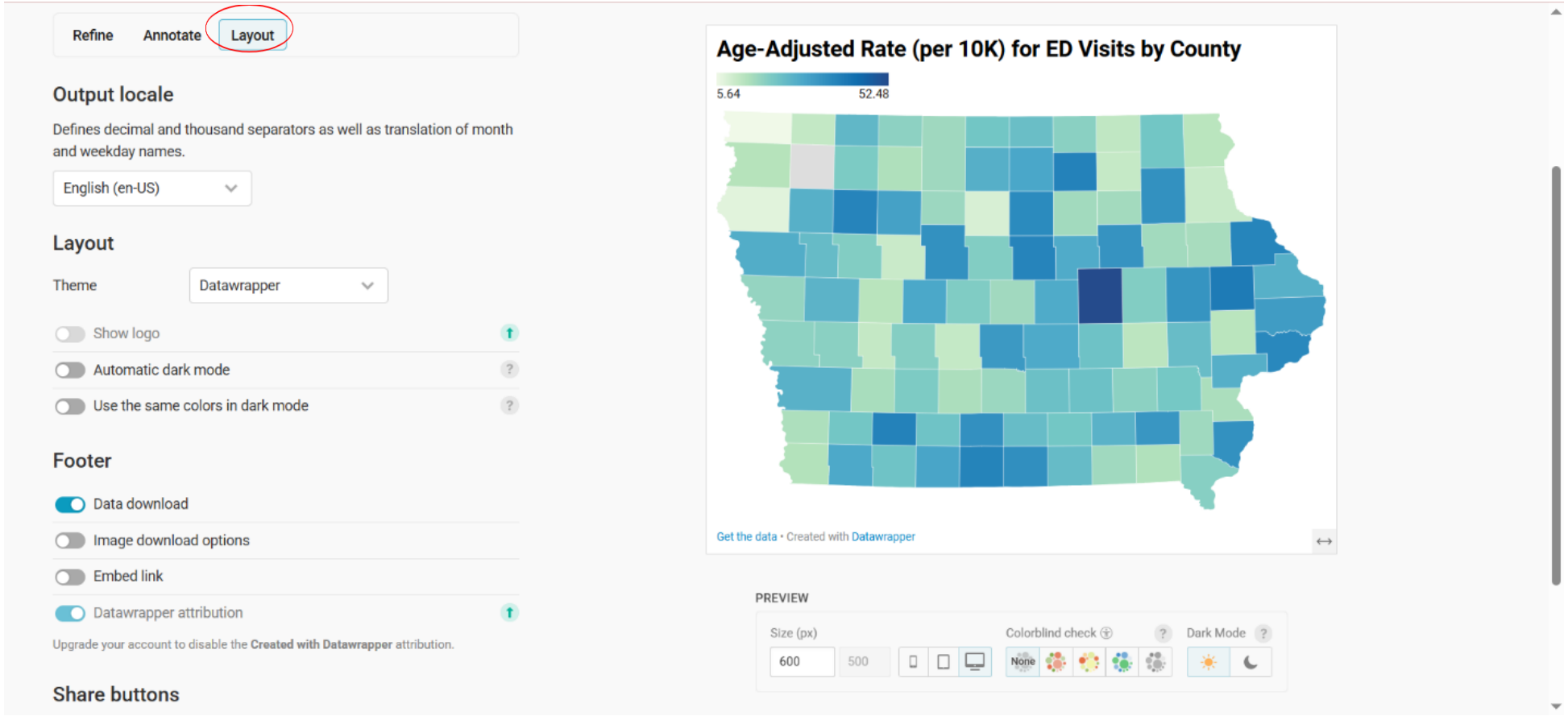
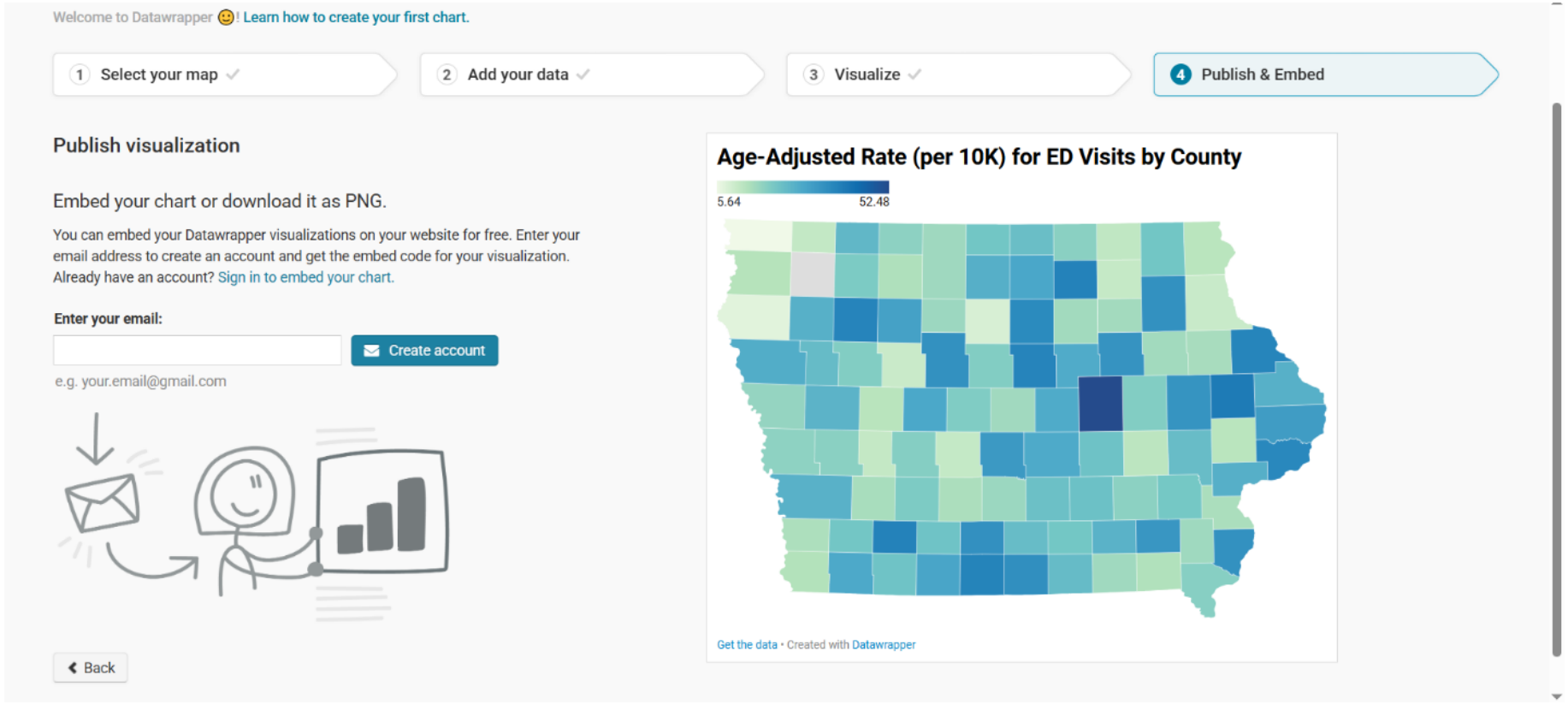


Maps – Using asthma data from the Iowa Tracking Portal

After customizing your map, you can download your map by entering your email address. Datawrapper also helps to create charts and tables as well.



Questions?

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

Thank you!

Institute for Public Health Practice, Research and Policy

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