IOWA

Institute for Public Health
Practice, Research and Policy

Visualize This

Storytelling With Data

Session 2

Visualize This Resources – MN

Training Resources

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. Identify the appropriate data analysis.
2. Identify the appropriate data visualization type for your data.
3. Create a data chart/graph
4. Create an effective data visualization
5. Understand how to incorporate health equity in creating your 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!

Small Group Activity – 15 minutes

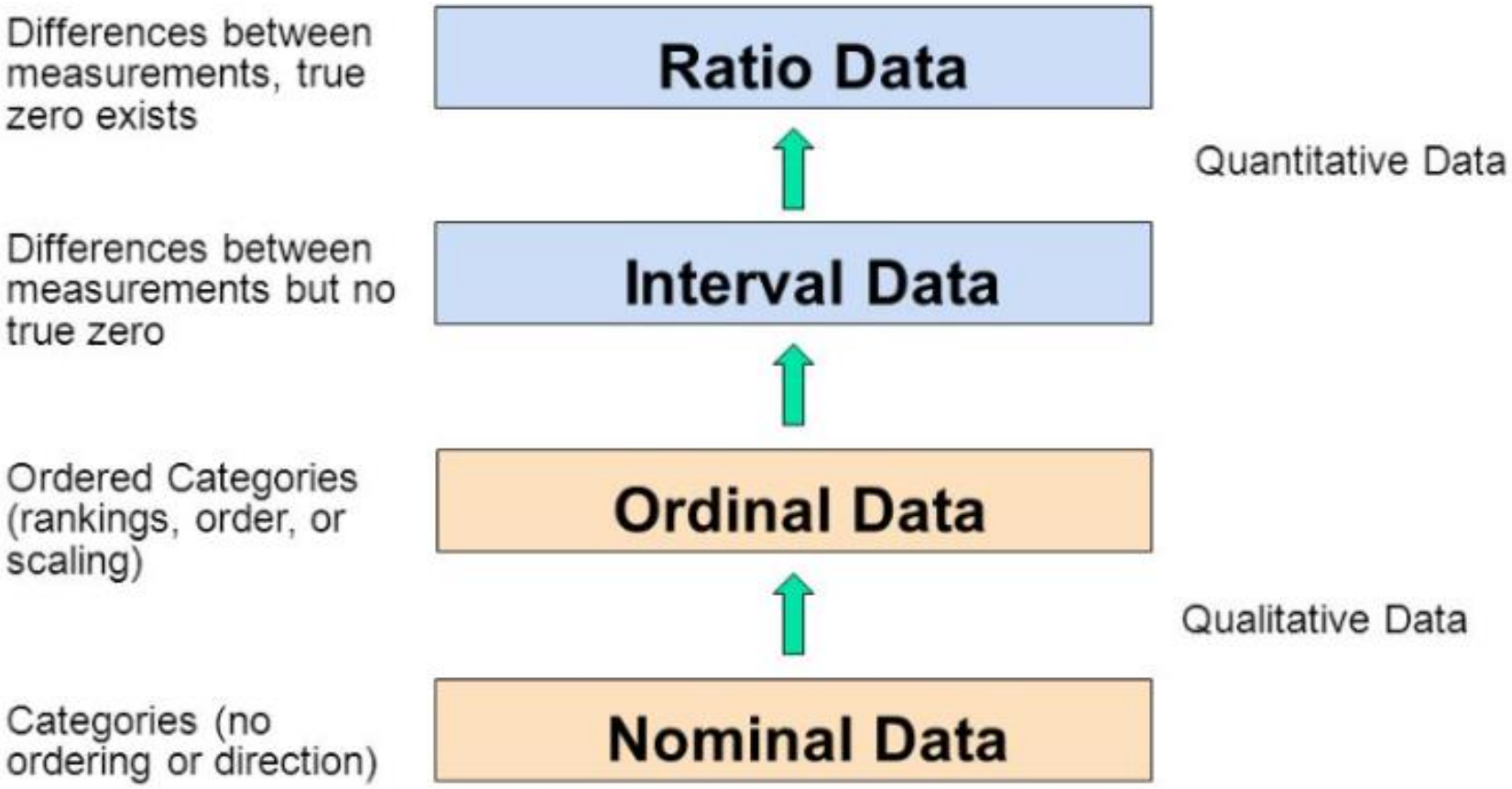
In your breakout groups,

- Share with your group the data that you will use for your project (what is the data, where did it come from/how was it collected)
- What is the key question being asked?
- Who is the target audience for your data visualization?

Module 2 – Part 1

Identify the Data and the Appropriate Data Analysis

Types of Data



A Quick Quiz… Nominal, Ordinal, Interval or Ratio??

- Favorite candy bar
- Weight of luggage
- Year of your birth
- Egg size (small, medium, large, extra large, jumbo)

A Quick Quiz… Nominal, Ordinal, Interval or Ratio??

- Favorite candy bar — NOMINAL
- Weight of luggage — RATIO
- Year of your birth — INTERVAL
- Egg size (small, medium, large, extra large, jumbo) — ORDINAL

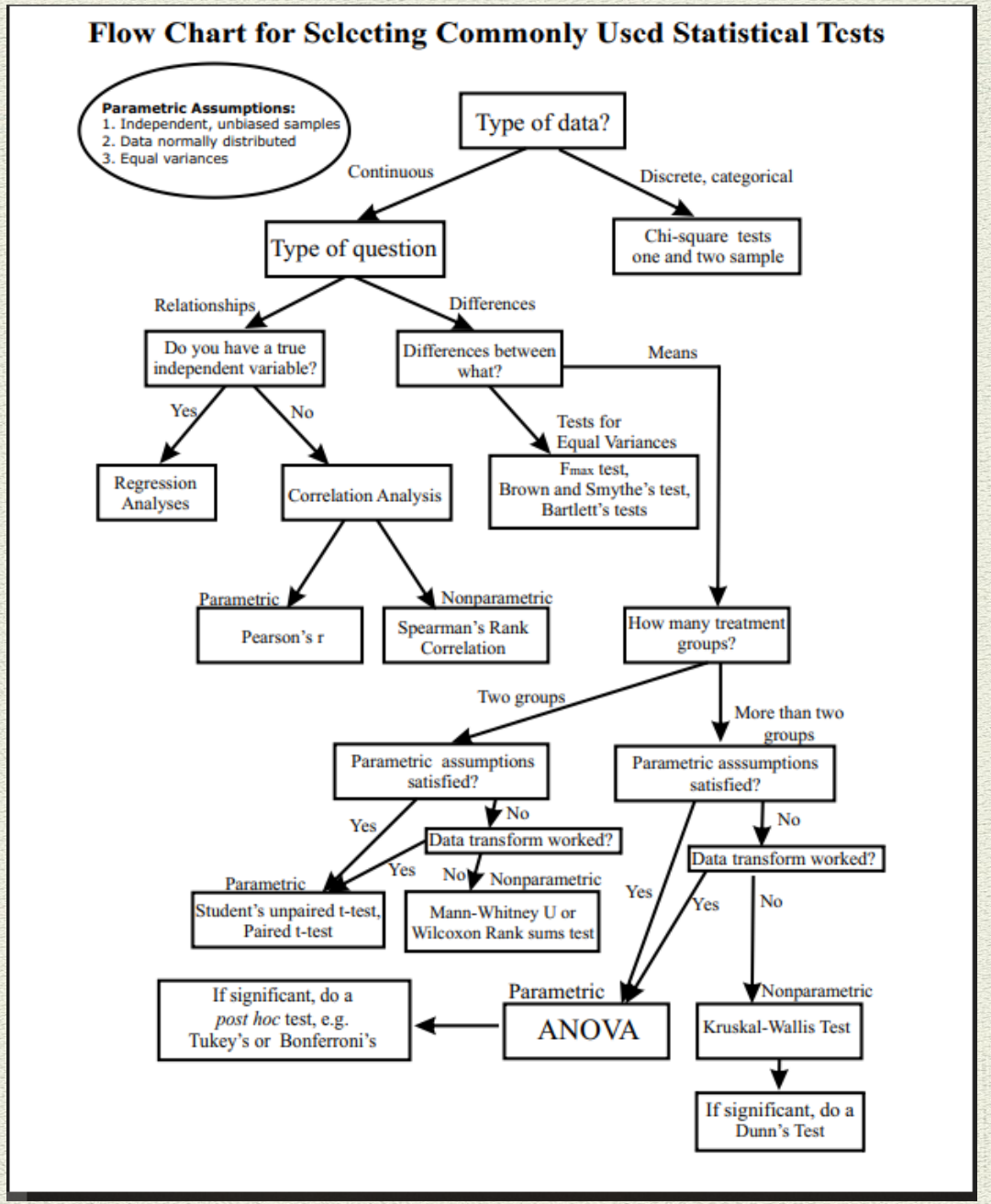
What is the main point of my data?
What is the story that I can tell?

- **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

Choosing the Right Statistical Test

- What do we want to achieve with this data analysis? What is the question being asked?
- Identify the type of data you have/will collect
- Assess statistical assumptions (data distribution)
- Consider the number of groups, size of the groups, types of samples (paired or independent)
- Choose your statistical test

Choosing the Right Statistical Test

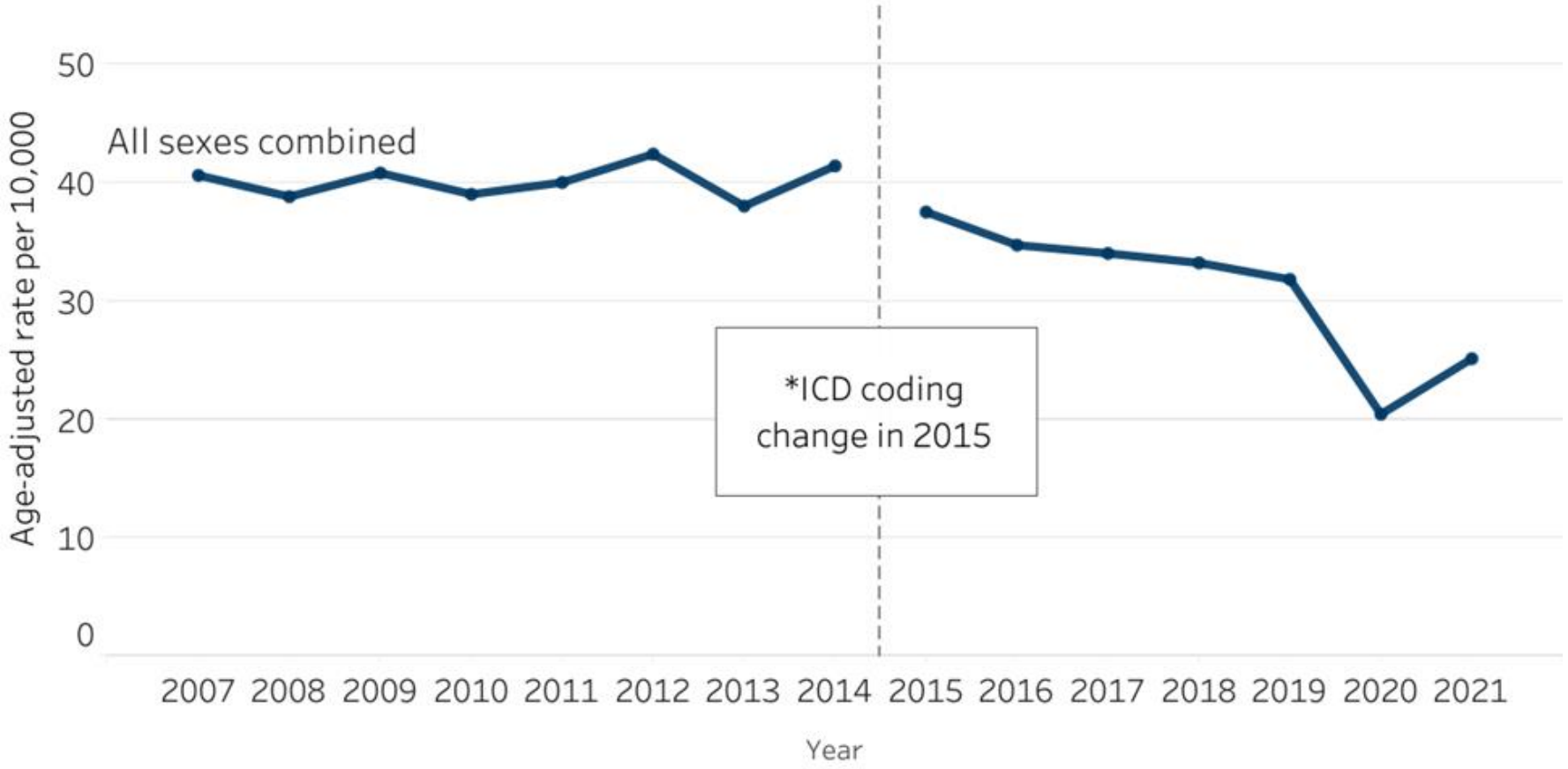


Questions?

Module 2 – Part 2

Introduction to Different Types of Charts

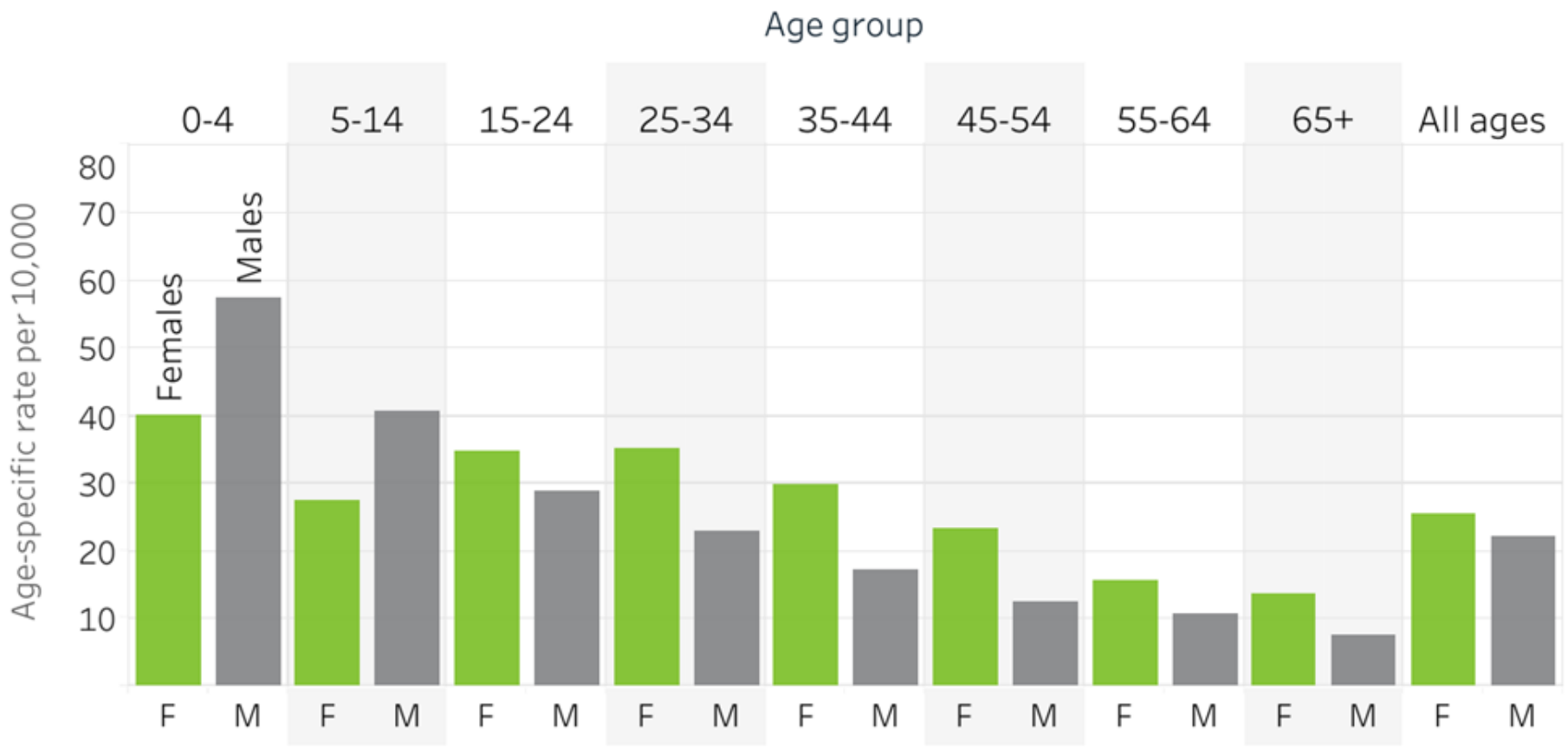
Asthma ED visit rates in Minnesota



Asthma ED visit rates in Minnesota, by age and sex in 2021

Age groups (select one or more)
All

Sexes (select one or more)
All



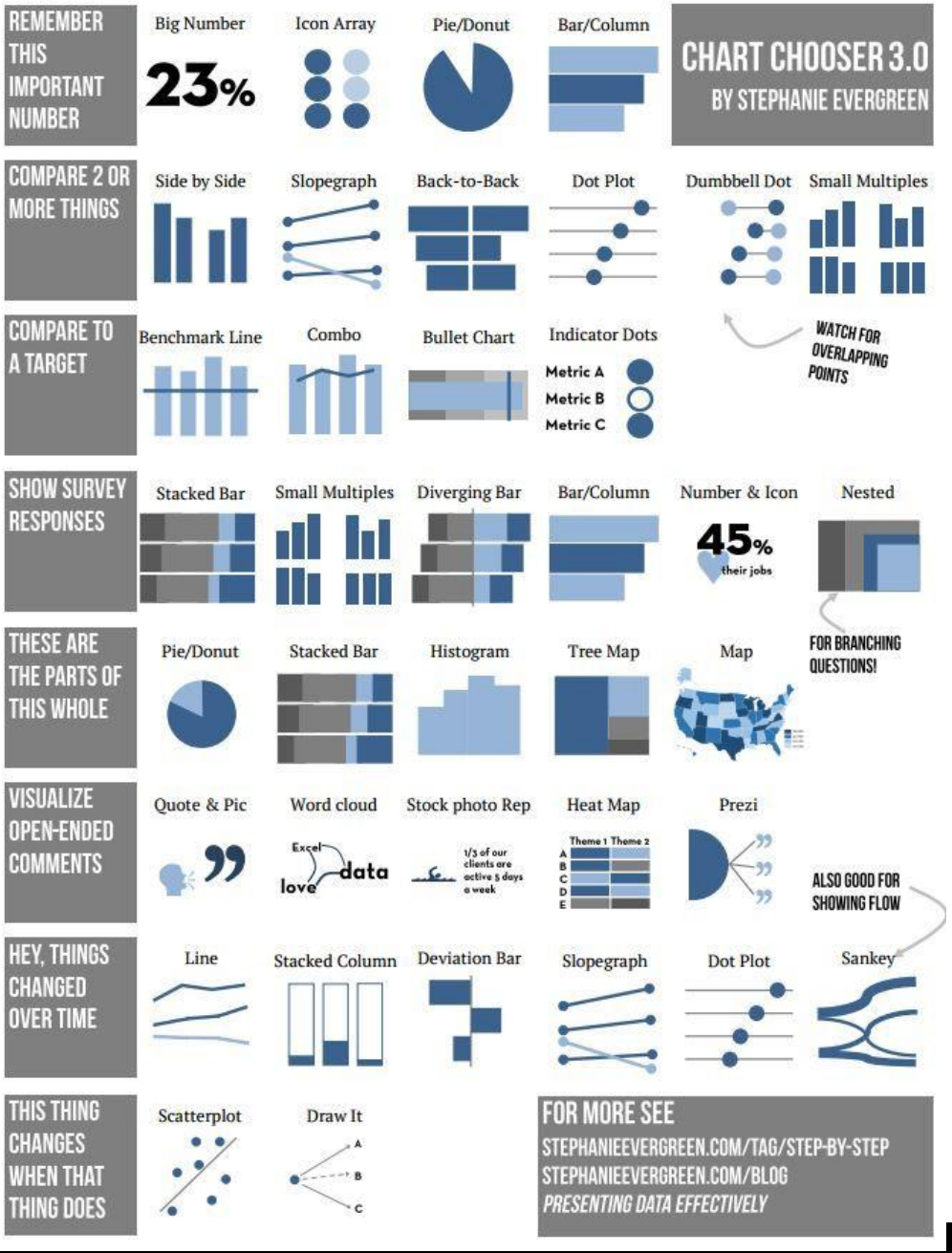
How do I choose the right chart?

Let’s start with quantitative data

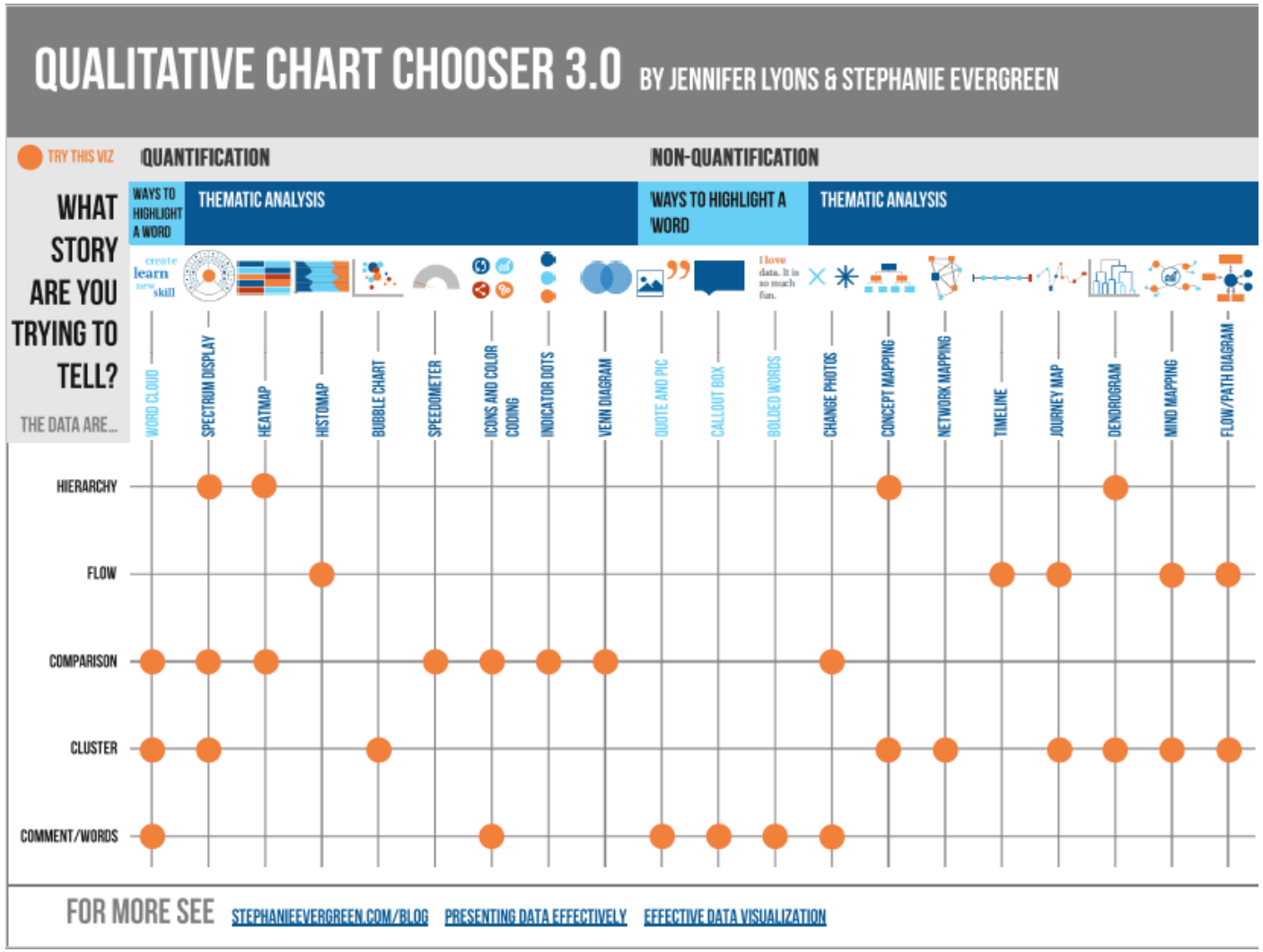
A single number (number of cases; prevalence rate; percentage) Big number [1] Icon array [2] Pie chart Bar/column chart	**Comparison (showing disparities between groups; comparing county rates; showing differences between years)** Side-by-side column chart Slope graph [3] Back-to-back bar chart [4] Dot 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.*

Quantitative Data



What about if I have qualitative data?



Evergreen, S. and Lyons, J. (2017). *Qualitative Chart Chooser 3.0.* Evergreen Data.

Module 2 Part 2

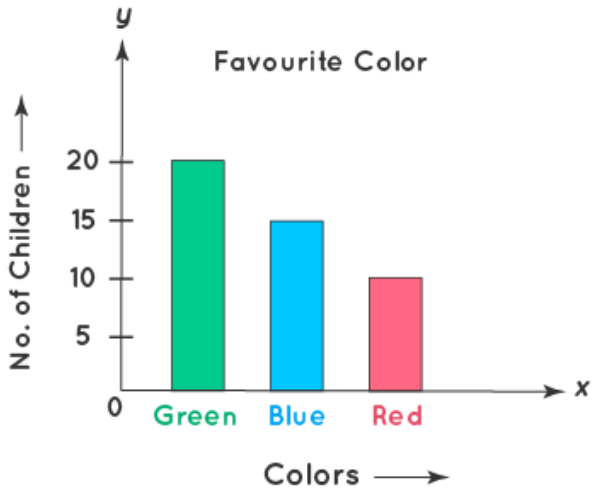
Identifying Advantages and Disadvantages in Different Types of Charts

Bar Charts

Great for comparisons between categories.

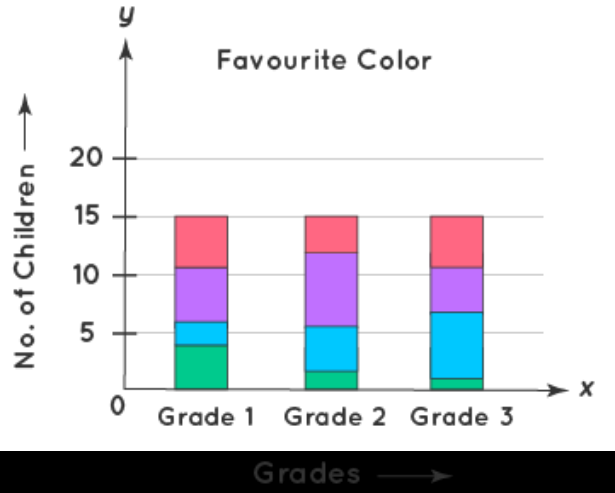
- **Advantages**: Easy to compare categories, clear representation.
- **Disadvantages**: Can become cluttered with too many categories.

Types of Bar Graph

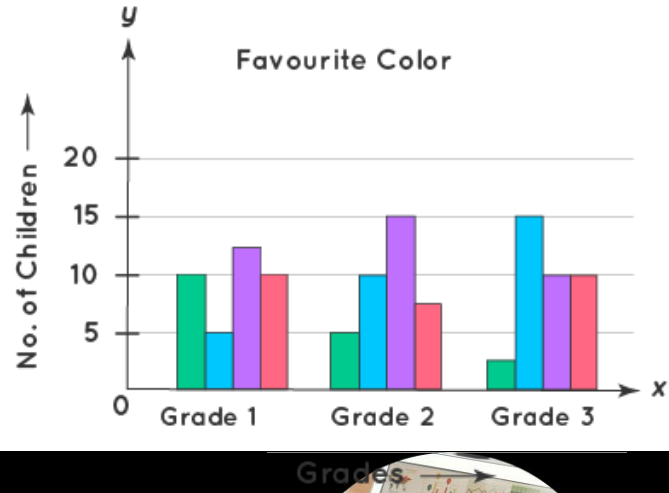


Vertical Bar Graph

Horizontal Bar Graph



Stacked Bar Graph

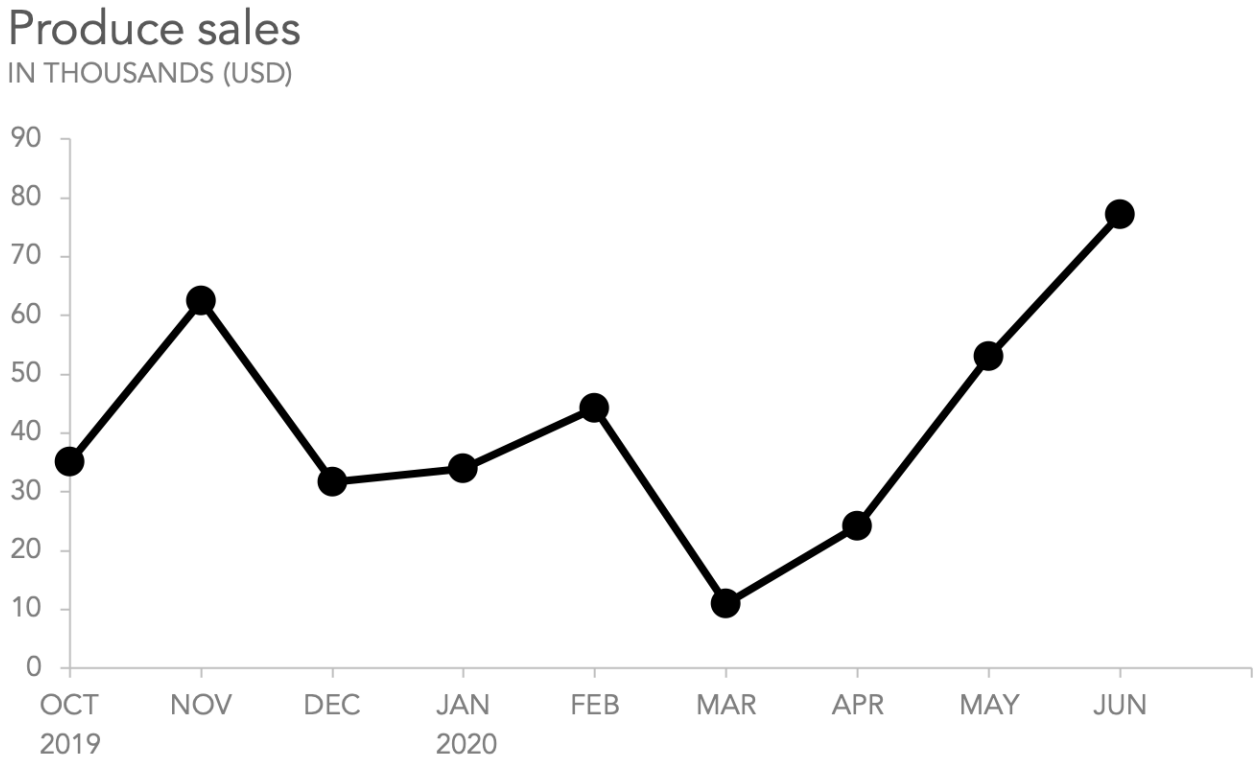


Grouped Bar Graph

Line Chart

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

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



Scatter Plot

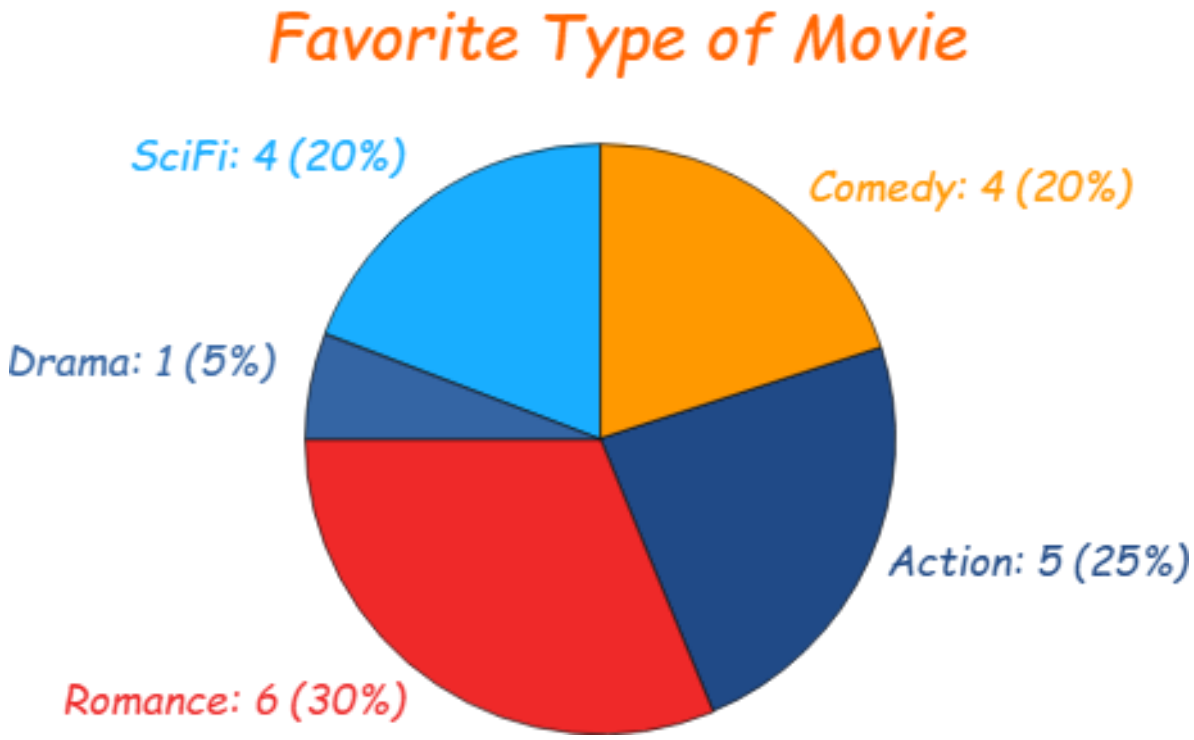
Best for showing relationships or correlations between two variables.

- **Advantages**: Great for showing correlations/relationship between variables, outliers.
- **Disadvantages**: Can be hard to interpret with too much data.

Pie Charts

Good for showing parts of a whole (use sparingly).

- **Advantages**: Simple, easy to understand for part-to-whole relationships.
- **Disadvantages**: Hard to interpret when there are many segments.



Questions?

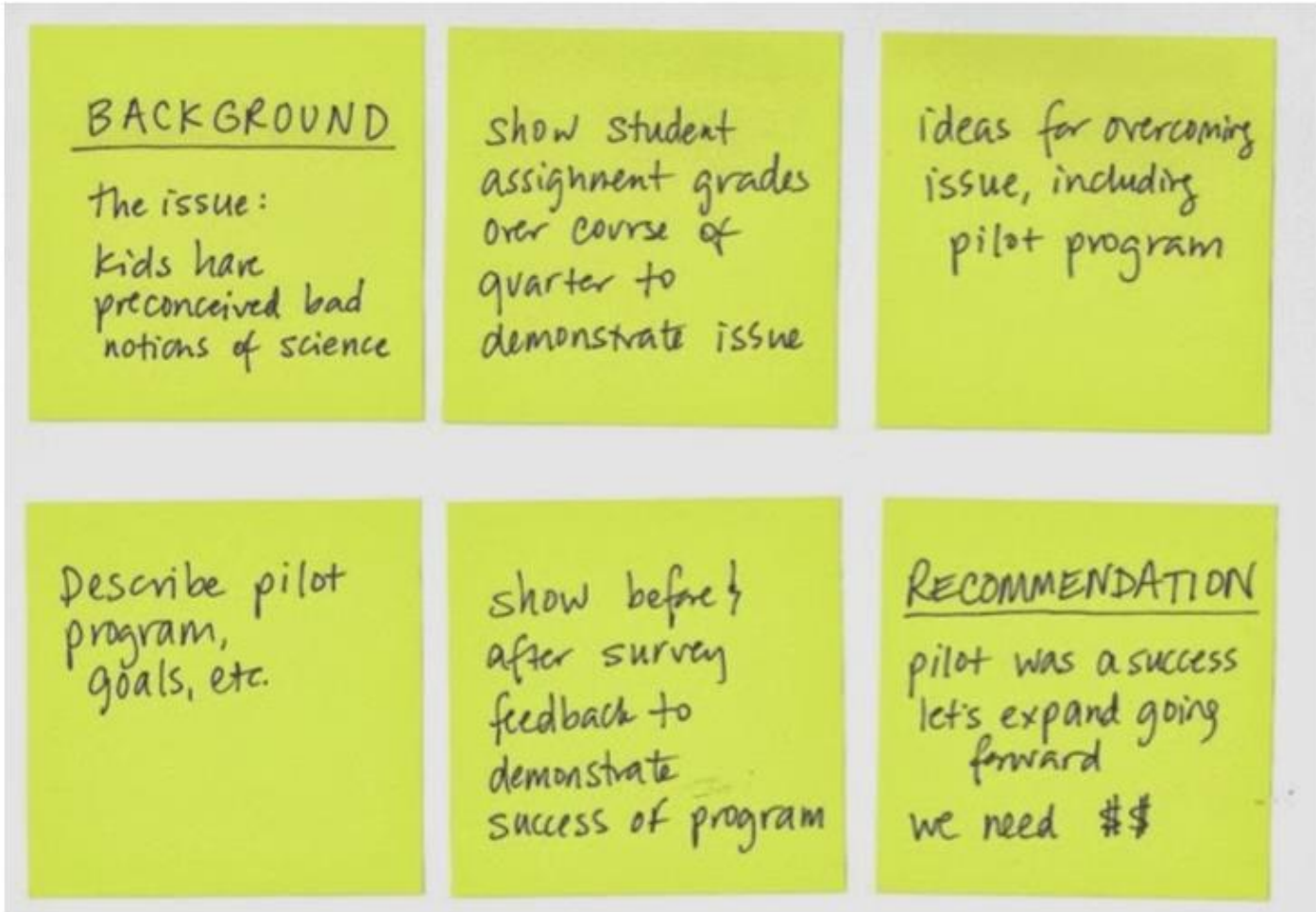
Module 2 Part 3

Making the Data Chart or Graph

Creating a Good Story with your Data is a Process!

It's about the message—not the software!

What?



So What?

Now What?

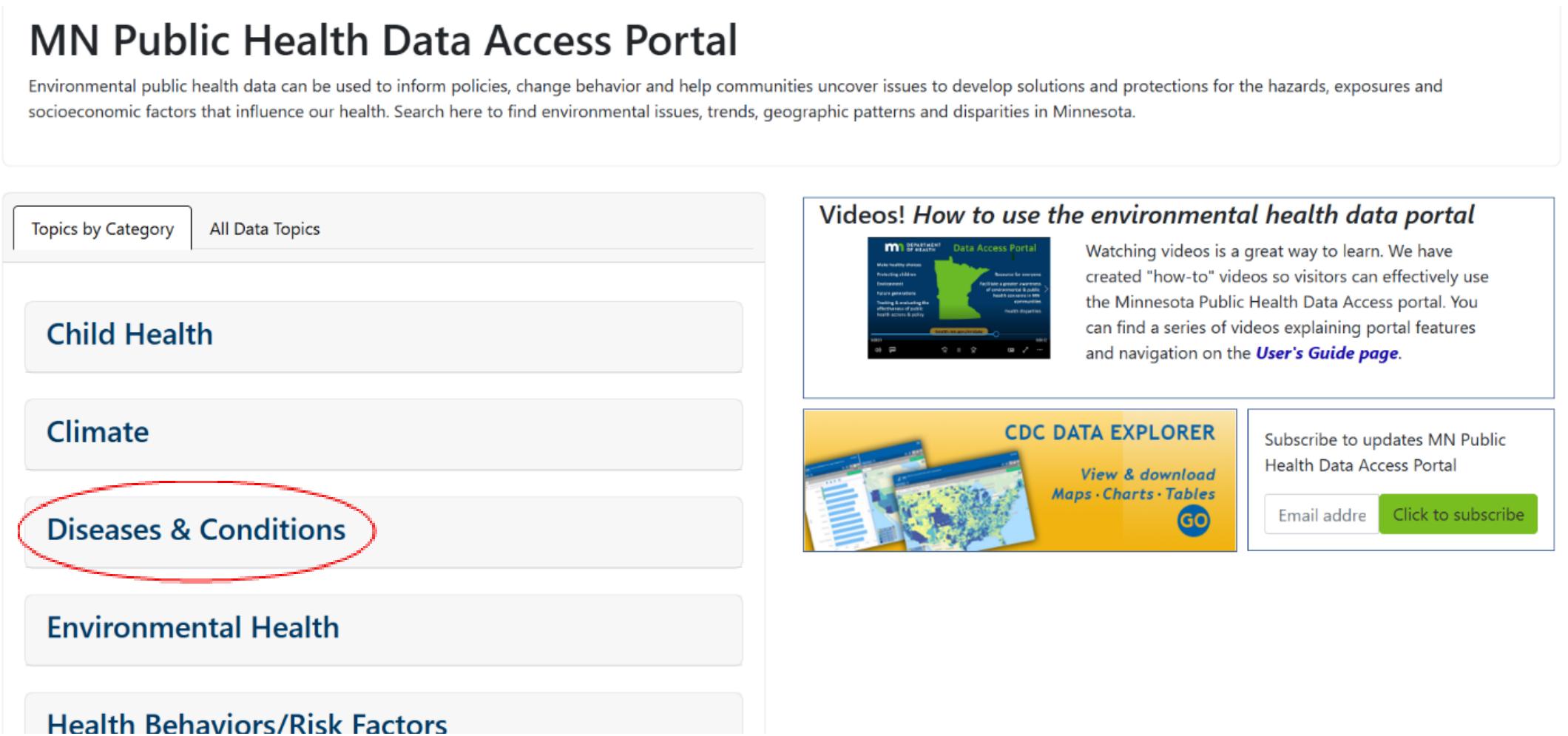
http://www.storytellingwithdata.com/blog/2014/02/storyboarding

Tools to Make Charts and Graphs

- **Excel**: Common and accessible tool for basic charts and tables.
- **Tableau**: Powerful tool for interactive dashboards and advanced visualizations.
- **Google Data Studio**: Free tool for creating interactive dashboards and charts.
- **R** (ggplot2) / **Python** (Matplotlib, Seaborn): Advanced tools for customized and complex visualizations.
- **Power BI**: Another popular platform for creating interactive visualizations.

Let's Create Some Common Charts/Graphs

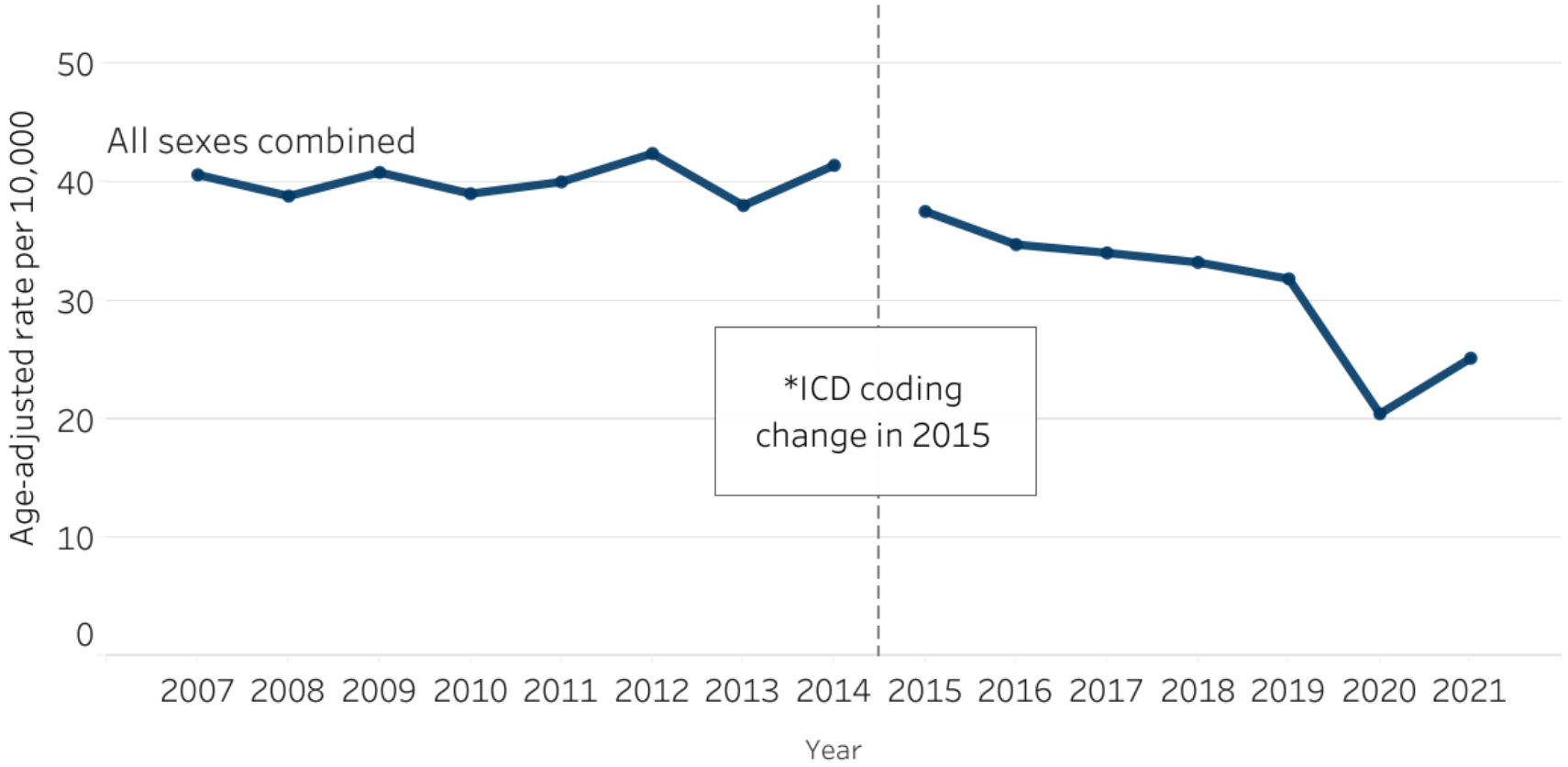
Minnesota Department of Public Health Data Access Portal home page. Click on "Minnesota Public Health Data Access Portal."



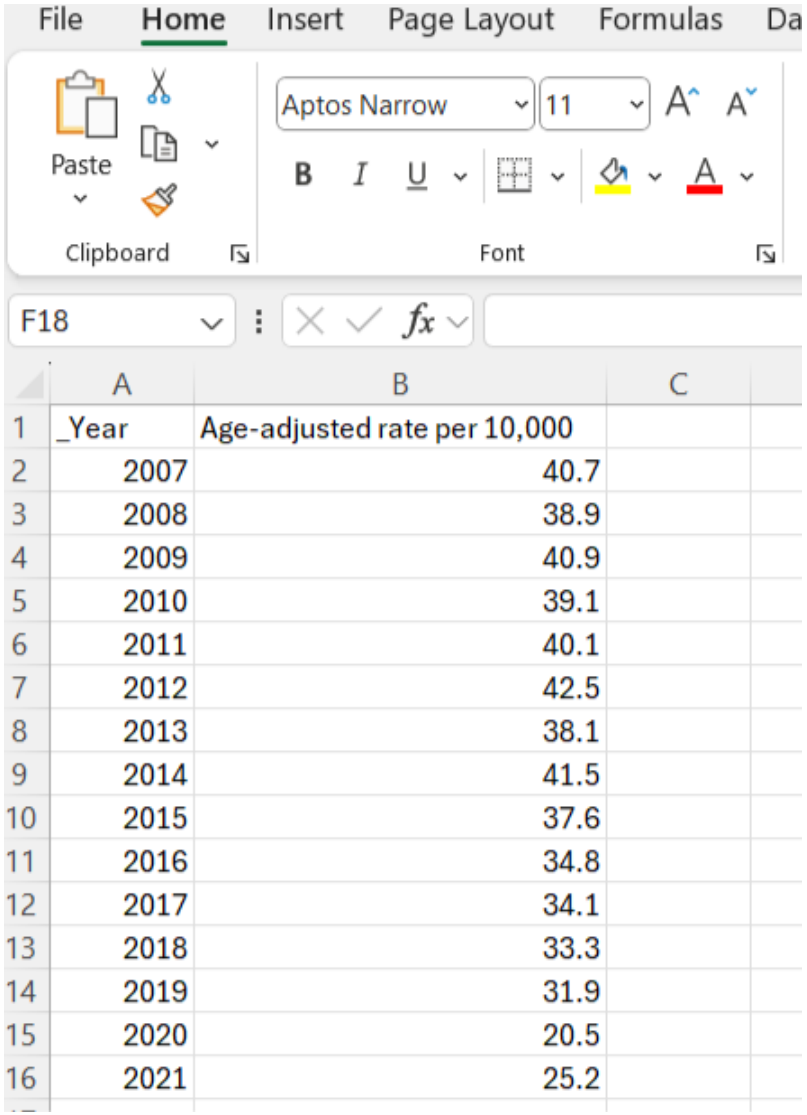
Click on “Diseases & Conditions,” and then on the next page click on “Asthma.”

Click on the blue button that says, “View Charts and Maps,” and you will be able to see the chart below.

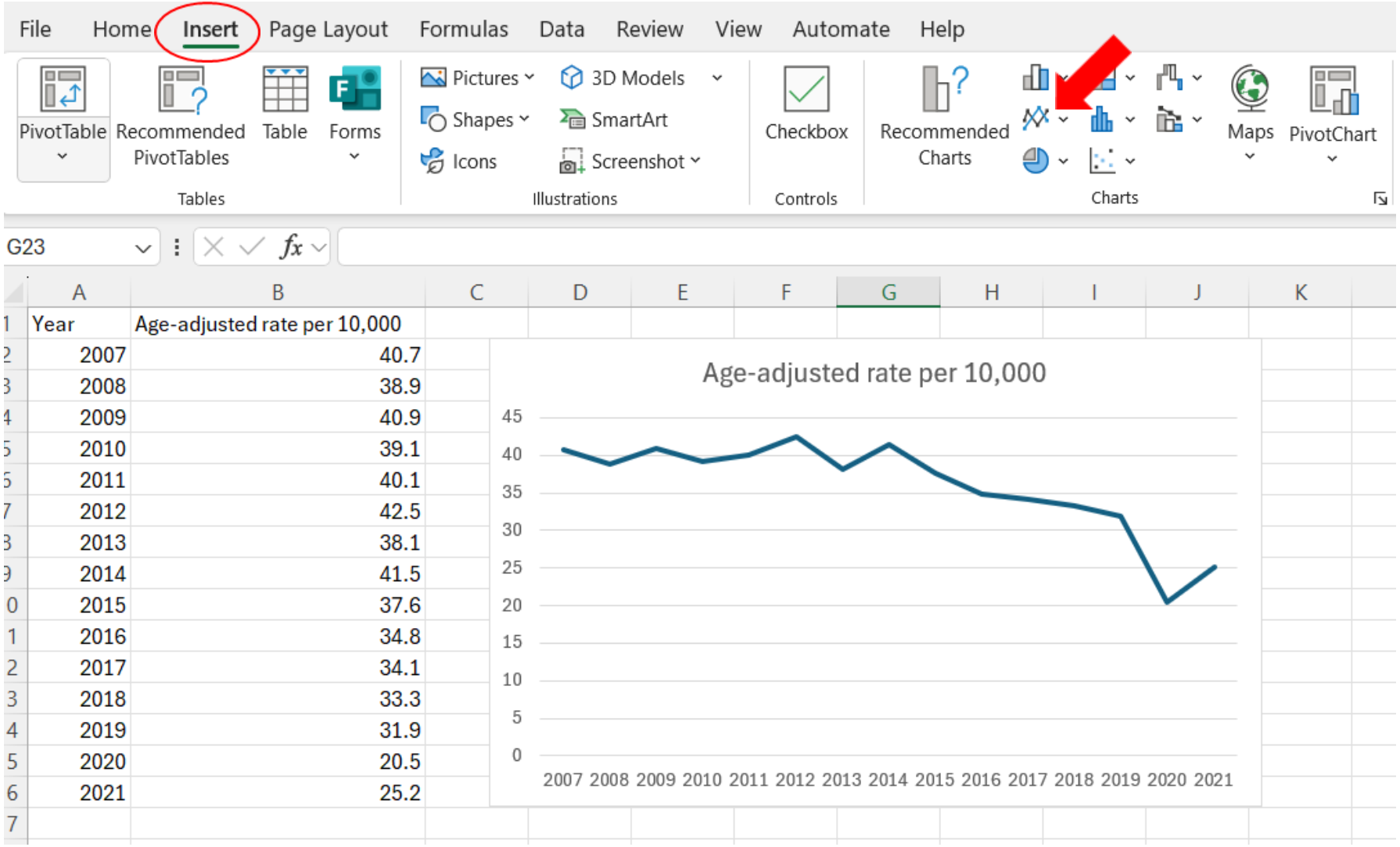
Figure 1. Asthma ED visit rates in Minnesota



Download the CSV by hitting the download button located above the line chart. Open the Excel file and copy and paste the data we need for the line chart into a new Excel document.

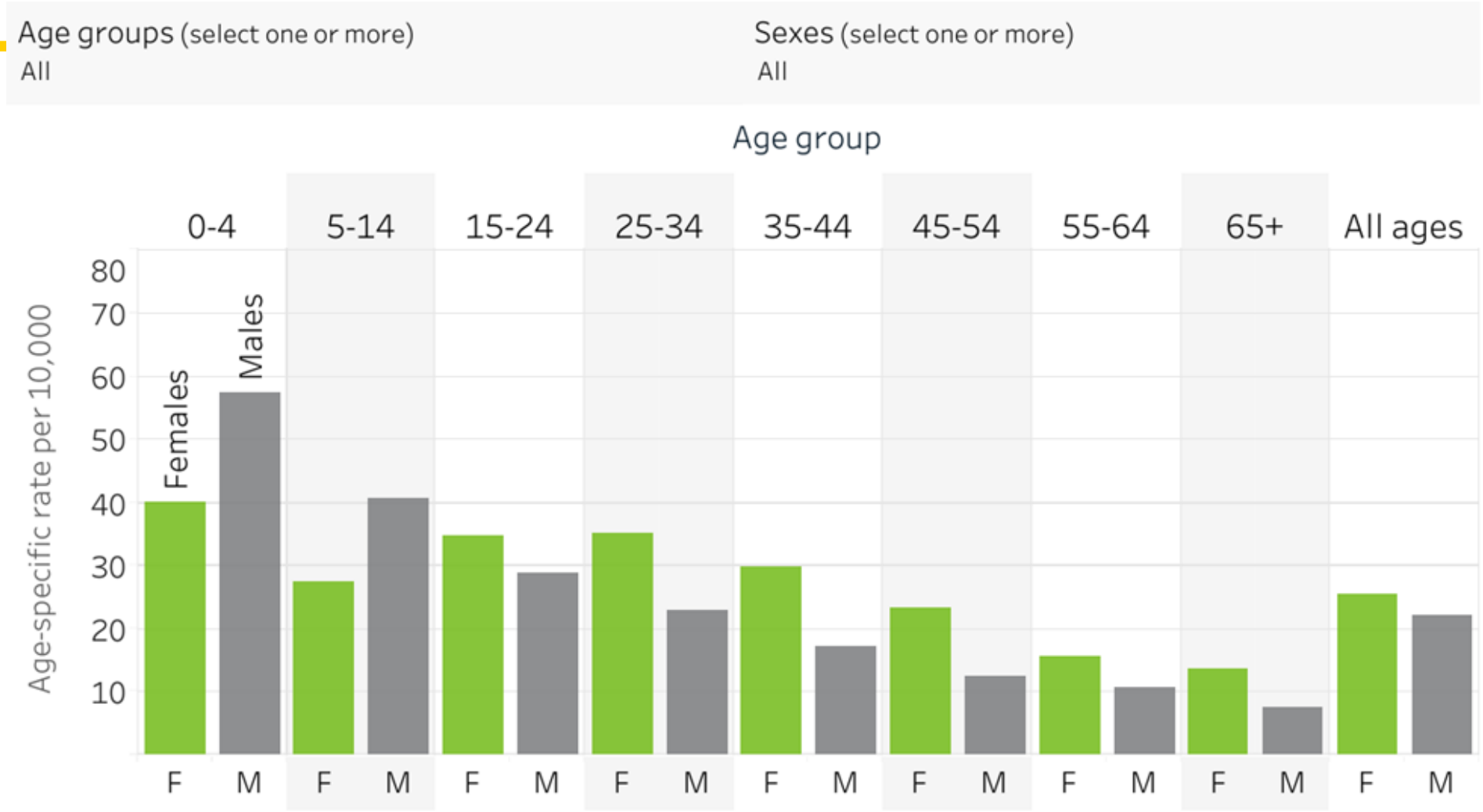


	A	B	C
1	_Year	Age-adjusted rate per 10,000	
2	2007	40.7	
3	2008	38.9	
4	2009	40.9	
5	2010	39.1	
6	2011	40.1	
7	2012	42.5	
8	2013	38.1	
9	2014	41.5	
10	2015	37.6	
11	2016	34.8	
12	2017	34.1	
13	2018	33.3	
14	2019	31.9	
15	2020	20.5	
16	2021	25.2	

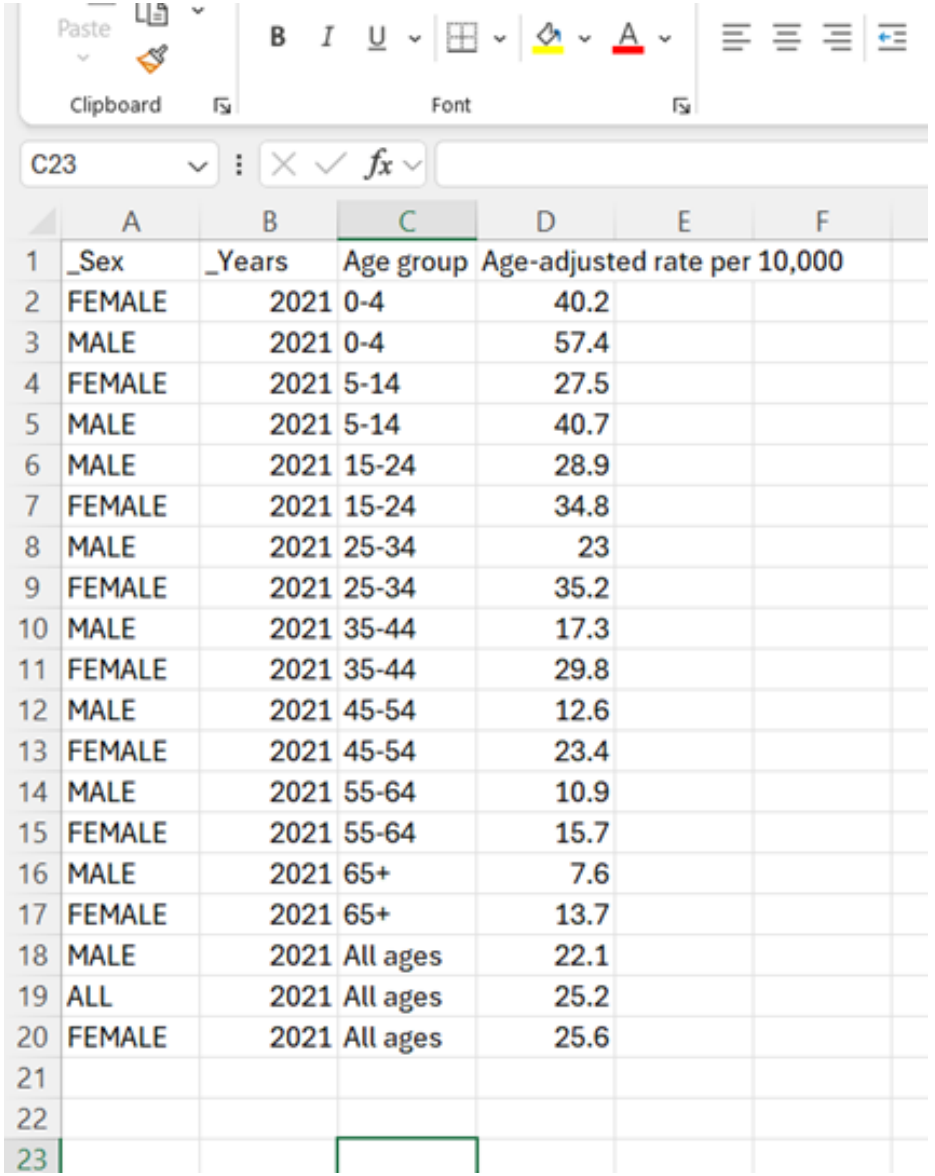


1. Highlight the data, click the “Insert” tab at the top of the Excel document
2. Choose the “line chart” option from the “charts” section.

Figure 2. Asthma ED visit rates in Minnesota, by age and sex in 2021

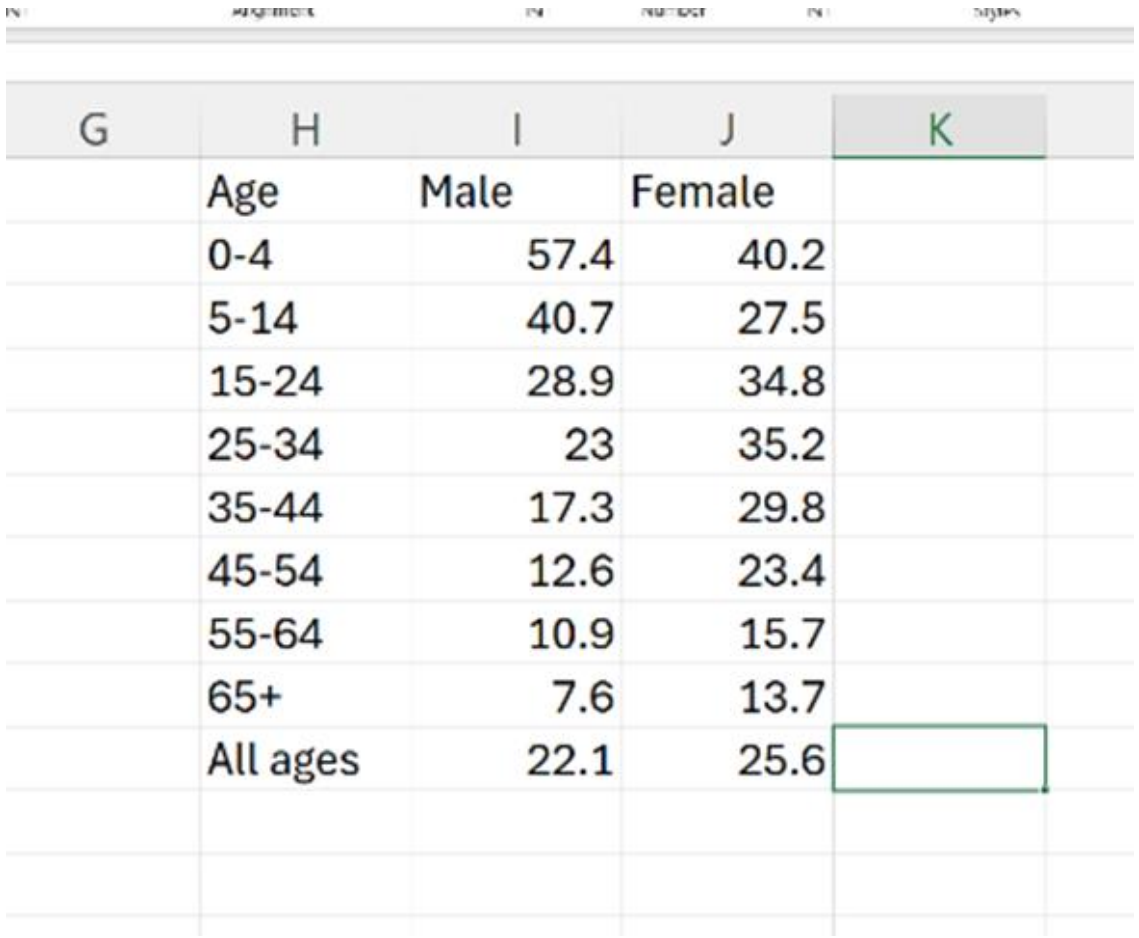


Download the data from the MN data portal like we did in the line chart example, and then copy it into a new Excel document



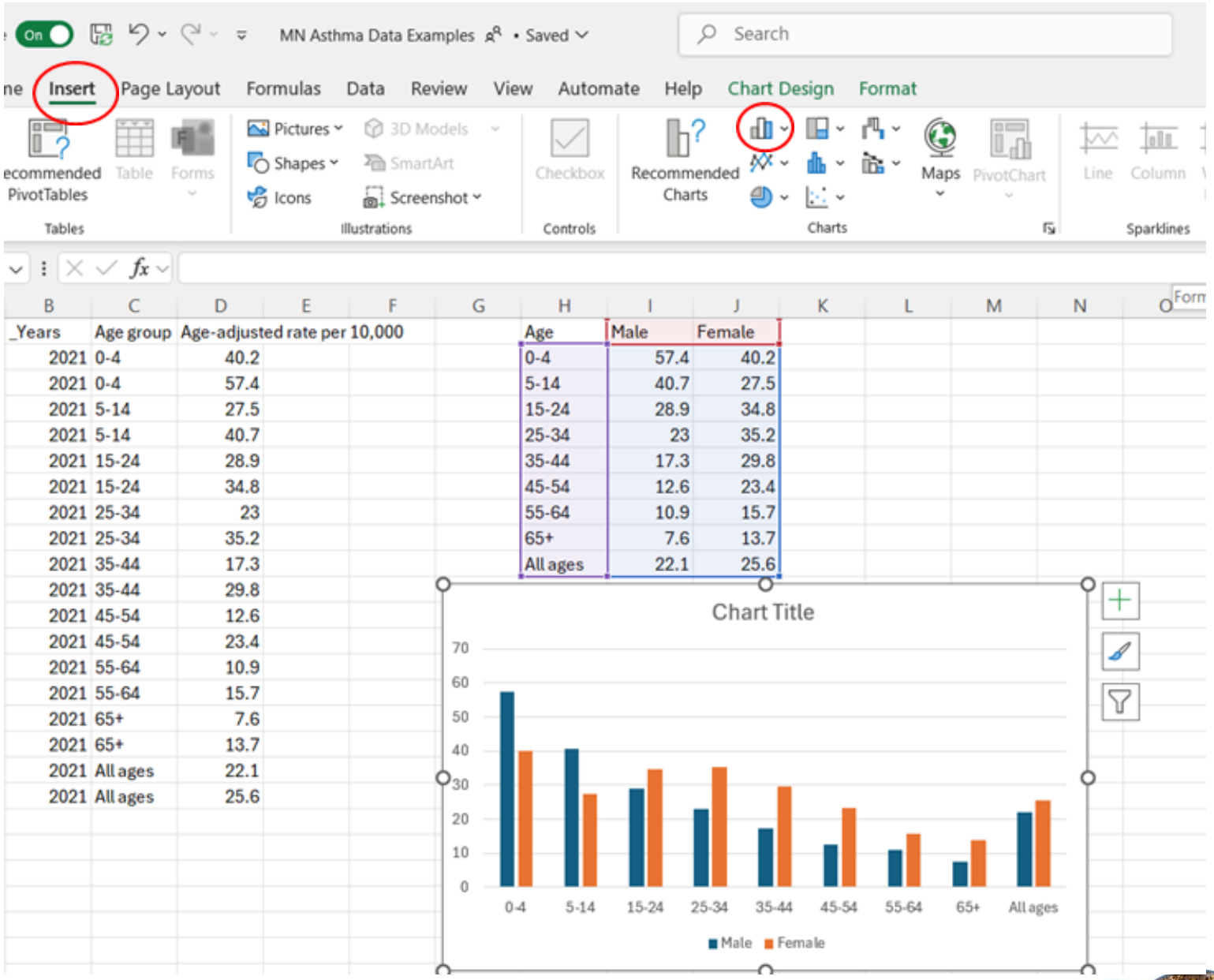
	A	B	C	D	E	F
1	_Sex	_Years	Age group	Age-adjusted rate per 10,000		
2	FEMALE	2021	0-4	40.2		
3	MALE	2021	0-4	57.4		
4	FEMALE	2021	5-14	27.5		
5	MALE	2021	5-14	40.7		
6	MALE	2021	15-24	28.9		
7	FEMALE	2021	15-24	34.8		
8	MALE	2021	25-34	23		
9	FEMALE	2021	25-34	35.2		
10	MALE	2021	35-44	17.3		
11	FEMALE	2021	35-44	29.8		
12	MALE	2021	45-54	12.6		
13	FEMALE	2021	45-54	23.4		
14	MALE	2021	55-64	10.9		
15	FEMALE	2021	55-64	15.7		
16	MALE	2021	65+	7.6		
17	FEMALE	2021	65+	13.7		
18	MALE	2021	All ages	22.1		
19	ALL	2021	All ages	25.2		
20	FEMALE	2021	All ages	25.6		
21						
22						
23						

Delete row 19, as we do not need that data in this analysis. We need to build a new table so Excel can make the table properly. Use “age,” “male,” and “female” as column headings



G	H	I	J	K
	Age	Male	Female	
	0-4	57.4	40.2	
	5-14	40.7	27.5	
	15-24	28.9	34.8	
	25-34	23	35.2	
	35-44	17.3	29.8	
	45-54	12.6	23.4	
	55-64	10.9	15.7	
	65+	7.6	13.7	
	All ages	22.1	25.6	

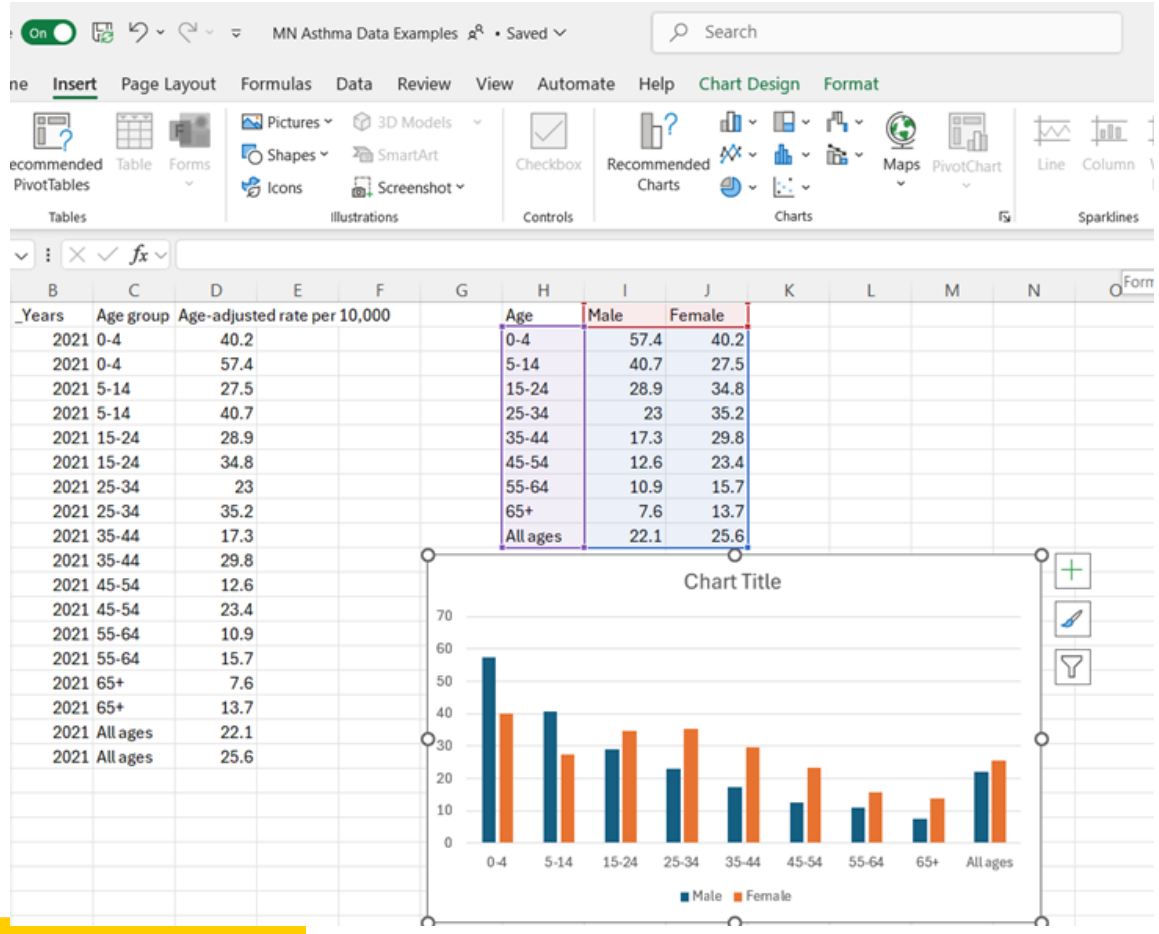
Highlight this new table and go to the “insert a table or bar chart option” on the insert tab.



_Years	Age group	Age-adjusted rate per 10,000
2021	0-4	40.2
2021	0-4	57.4
2021	5-14	27.5
2021	5-14	40.7
2021	15-24	28.9
2021	15-24	34.8
2021	25-34	23
2021	25-34	35.2
2021	35-44	17.3
2021	35-44	29.8
2021	45-54	12.6
2021	45-54	23.4
2021	55-64	10.9
2021	55-64	15.7
2021	65+	7.6
2021	65+	13.7
2021	All ages	22.1
2021	All ages	25.6

Age	Male	Female
0-4	57.4	40.2
5-14	40.7	27.5
15-24	28.9	34.8
25-34	23	35.2
35-44	17.3	29.8
45-54	12.6	23.4
55-64	10.9	15.7
65+	7.6	13.7
All ages	22.1	25.6

What if we wanted to show the rates for males and females separately?



_Years	Age group	Age-adjusted rate per 10,000
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2021	0-4	57.4
2021	5-14	27.5
2021	5-14	40.7
2021	15-24	28.9
2021	15-24	34.8
2021	25-34	23
2021	25-34	35.2
2021	35-44	17.3
2021	35-44	29.8
2021	45-54	12.6
2021	45-54	23.4
2021	55-64	10.9
2021	55-64	15.7
2021	65+	7.6
2021	65+	13.7
2021	All ages	22.1
2021	All ages	25.6

Age	Male	Female
0-4	57.4	40.2
5-14	40.7	27.5
15-24	28.9	34.8
25-34	23	35.2
35-44	17.3	29.8
45-54	12.6	23.4
55-64	10.9	15.7
65+	7.6	13.7
All ages	22.1	25.6

Would you use pie charts?

Questions?

Getting Started Making Graphs in Excel

Excel Charts and Graphs Tutorial

YouTube · Kevin Stratvert

Aug 2, 2023

https://www.youtube.com/watch?v=eHtZrIb0oWY

How to Create Pivot Table in Excel

Kevin Stratvert

1.7M views • 2 years ago

https://www.youtube.com/watch?v=PdJzy956wo4

Icon Arravs

http://www.iconarray.com/

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

And for other “road less taken” charts

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Collection

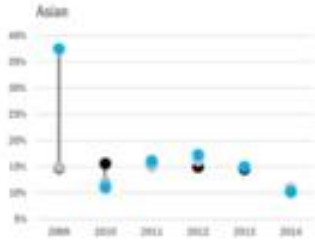
How to Build Data Visualizations in Excel

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

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

Dot Plot

Horizontal Dumbbells



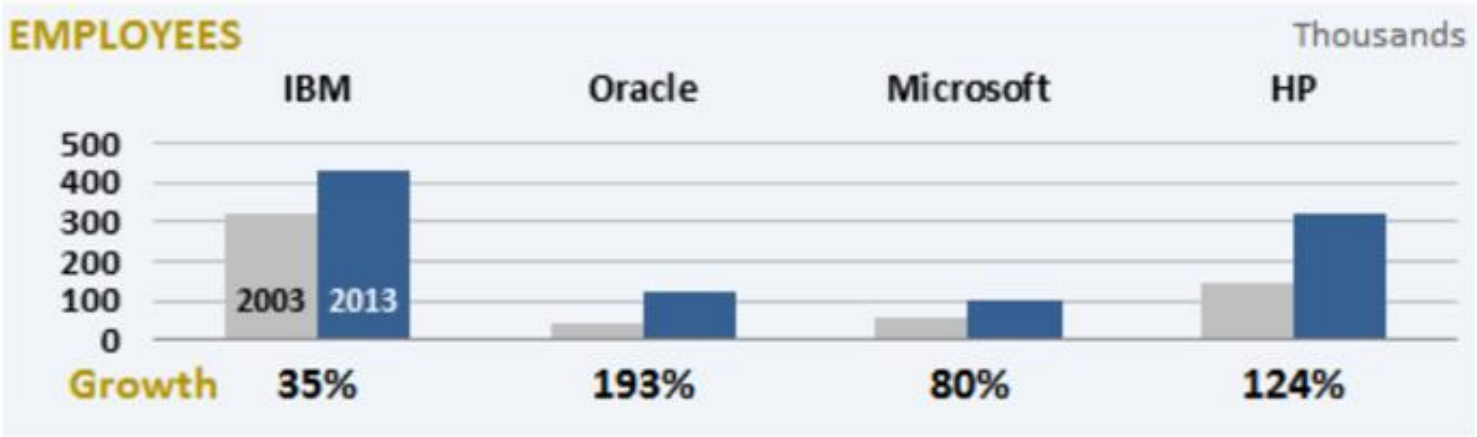
Vertical Dumbbells

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

The old KISS principle

The human brain is not good at comparing area.

But we are much better at comparing length.



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

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

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.

Thank you!

Institute for Public Health Practice, Research and Policy

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