

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

Differences between measurements, true zero exists

Ratio Data

Quantitative Data

Differences between measurements but no true zero

Interval Data

Ordered Categories (rankings, order, or scaling)

Ordinal Data

Qualitative Data

Categories (no ordering or direction)

Nominal 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



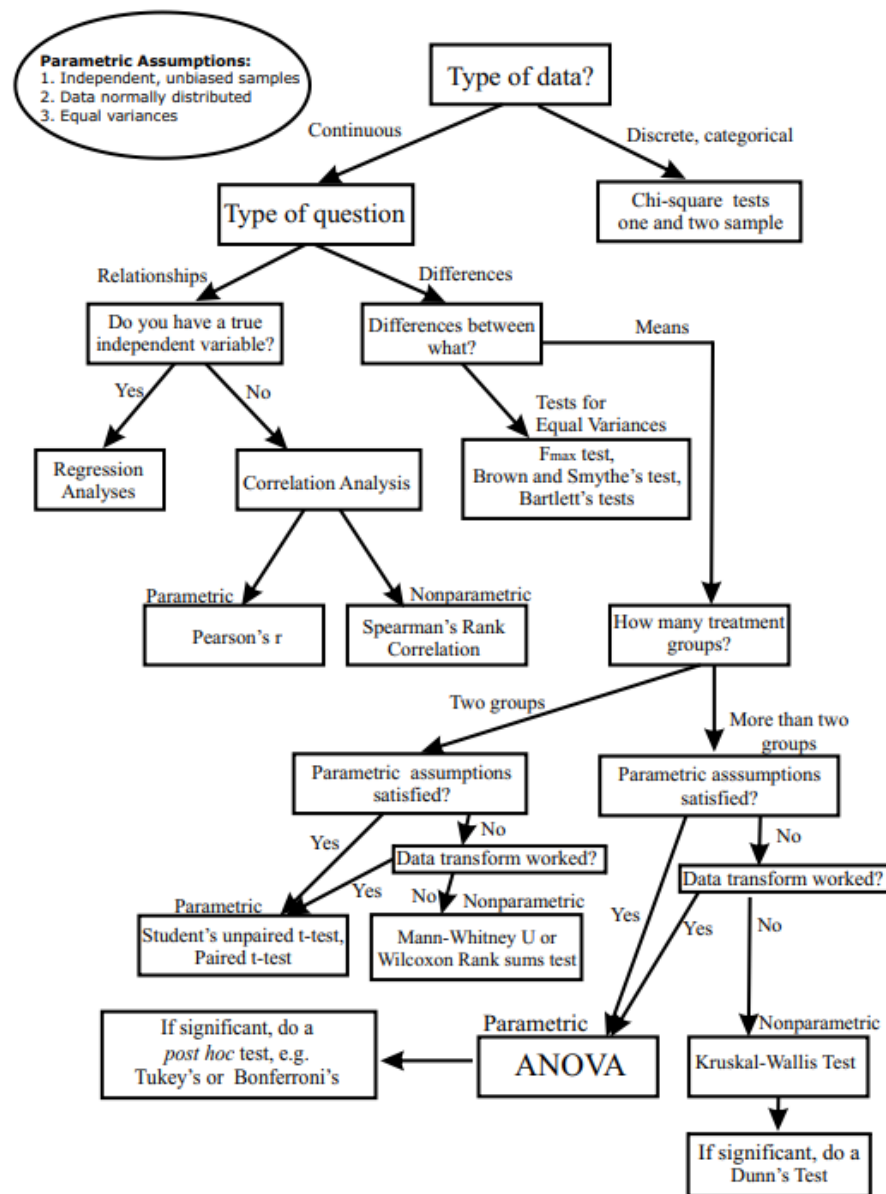
Choosing the Right Statistical Test

- 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

Flow Chart for Selecting Commonly Used Statistical Tests



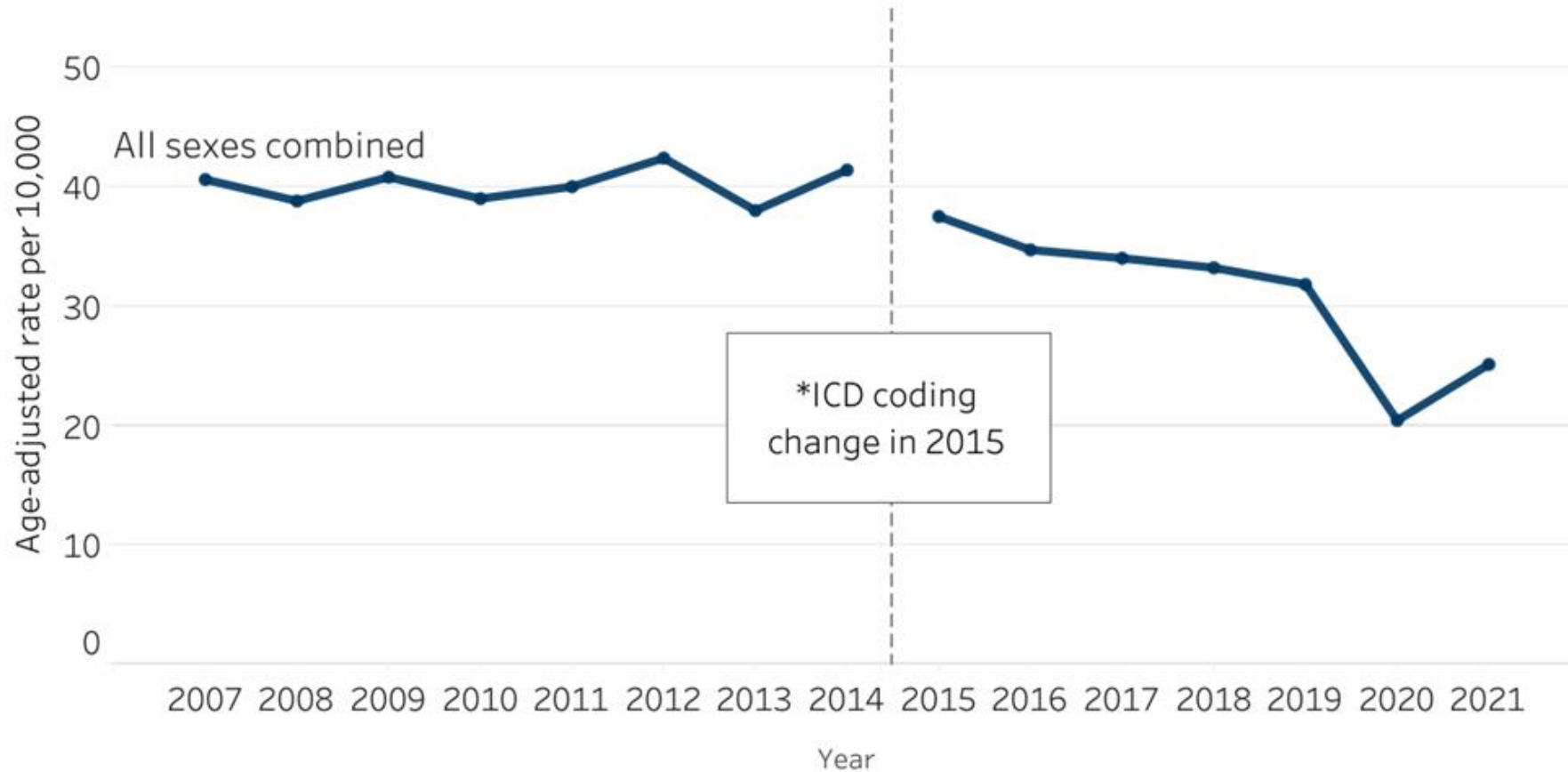
Questions?



Module 2 – Part 2

Introduction to Different Types of Charts

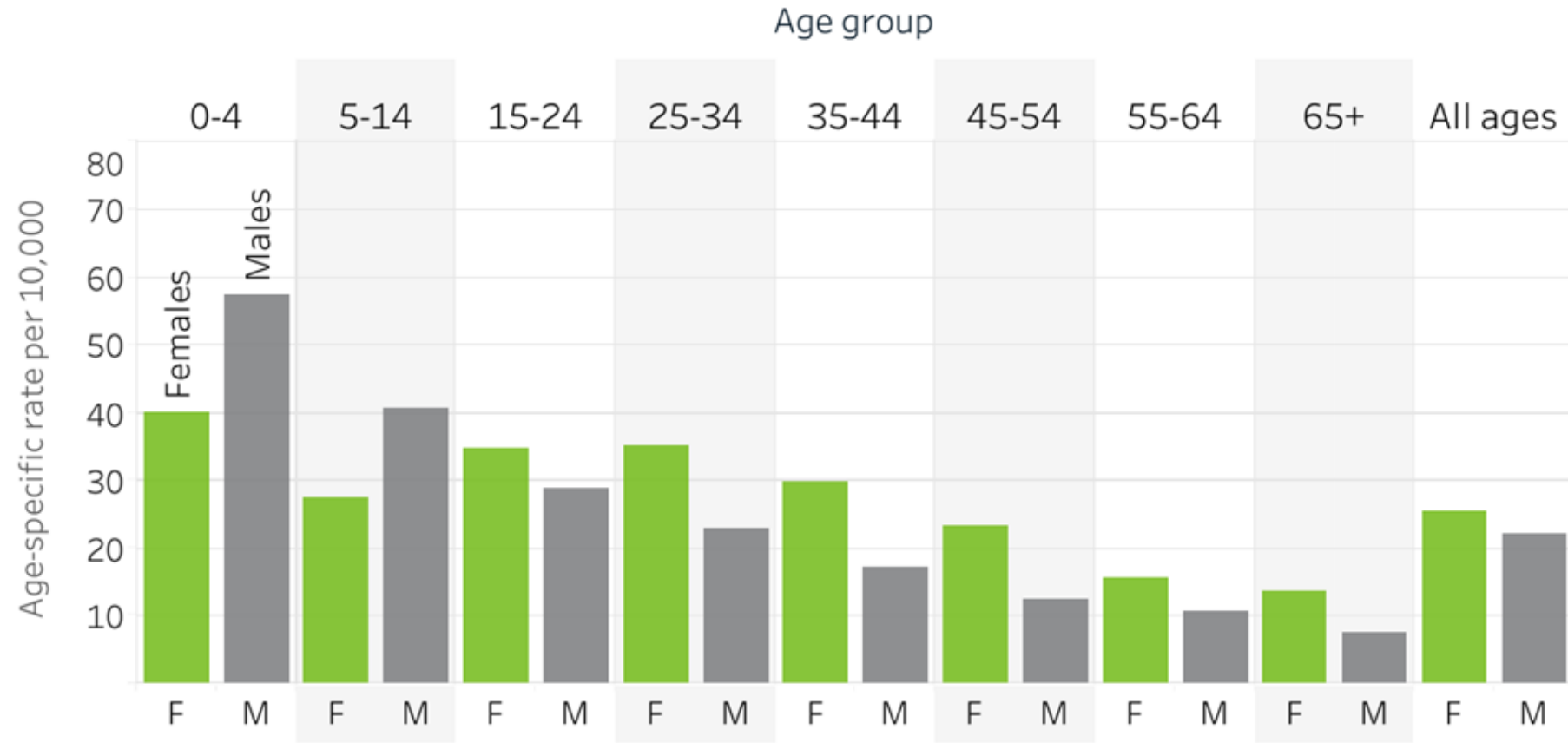
Asthma ED visit rates in Minnesota



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?

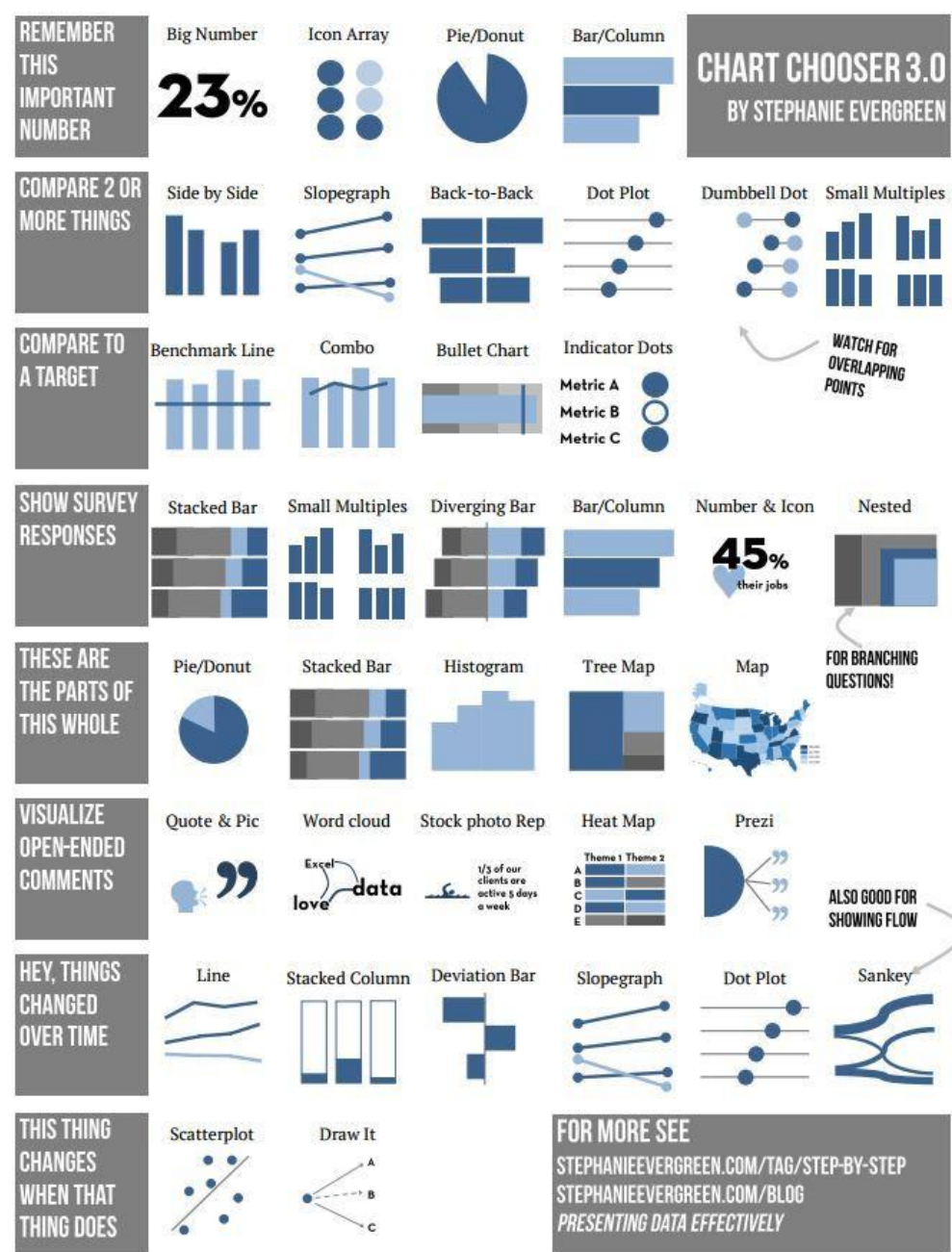
Let's start with
quantitative data

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

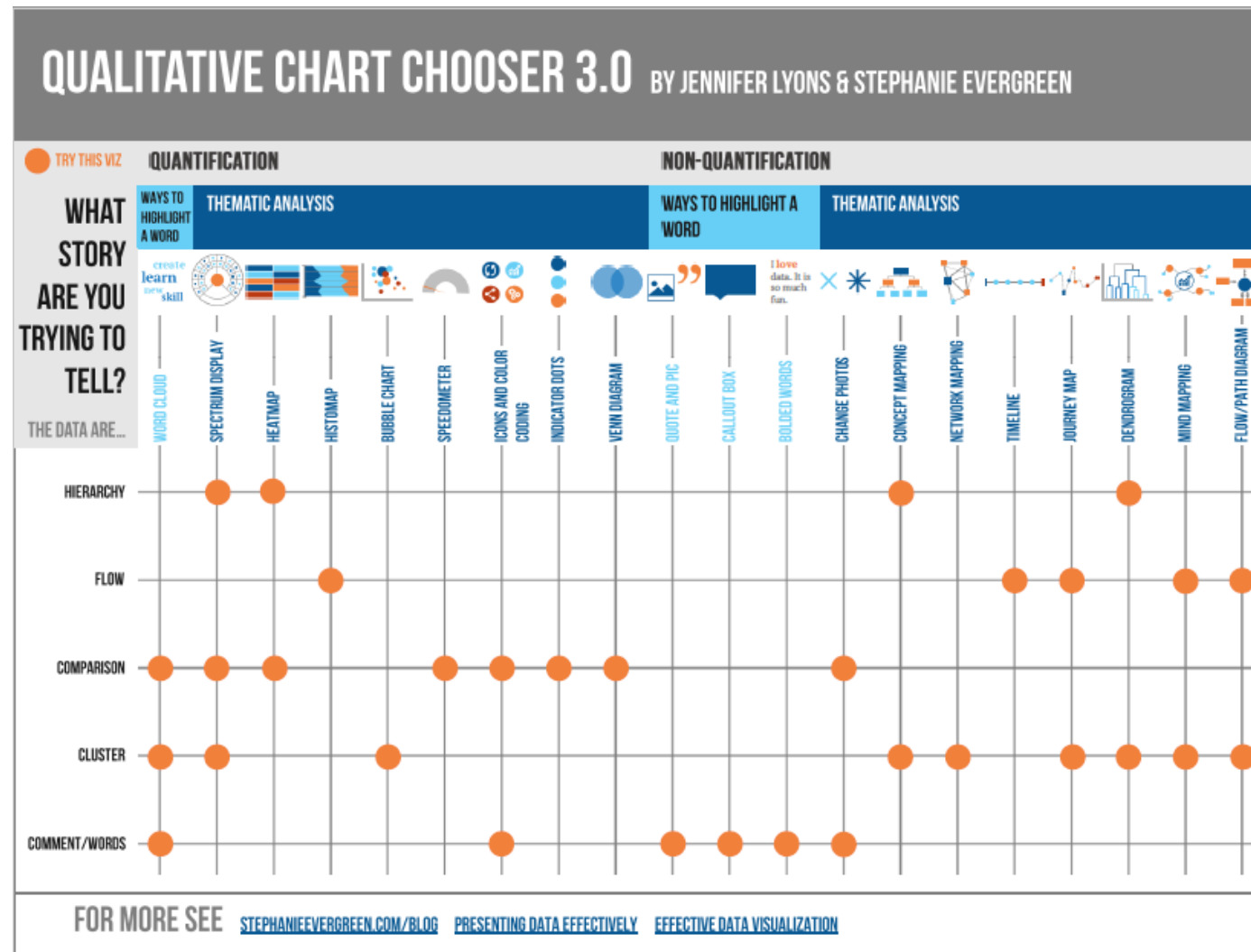
Adapted from Evergreen, S. D. H. (2017). *Effective data visualization: The right chart for the right data.*



Quantitative Data



What about if I have qualitative data?



Module 2 Part 2

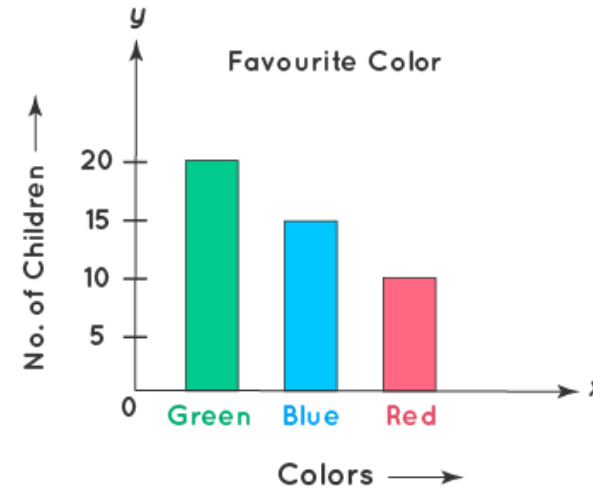
Identifying Advantages and Disadvantages in Different Types of Charts

Types of Bar Graph

Bar Charts

Great for comparisons between categories.

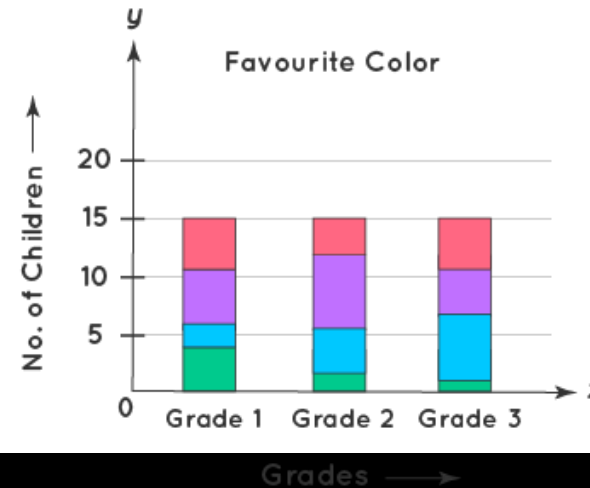
- **Advantages:** Easy to compare categories, clear representation.
- **Disadvantages:** Can become cluttered with too many categories.



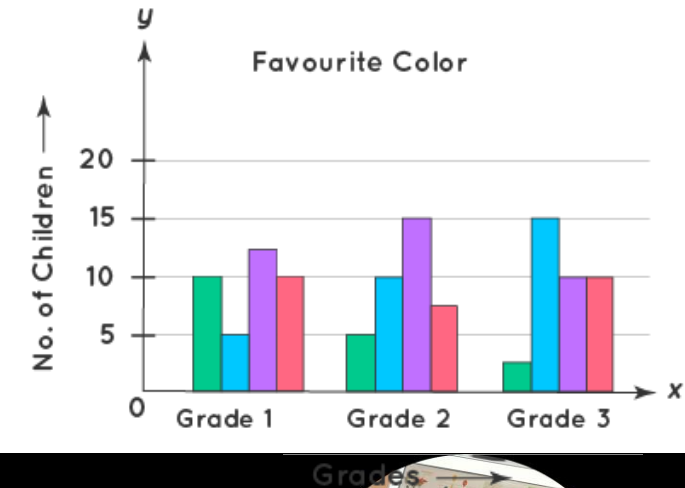
Vertical Bar Graph



Horizontal Bar Graph



Stacked Bar Graph



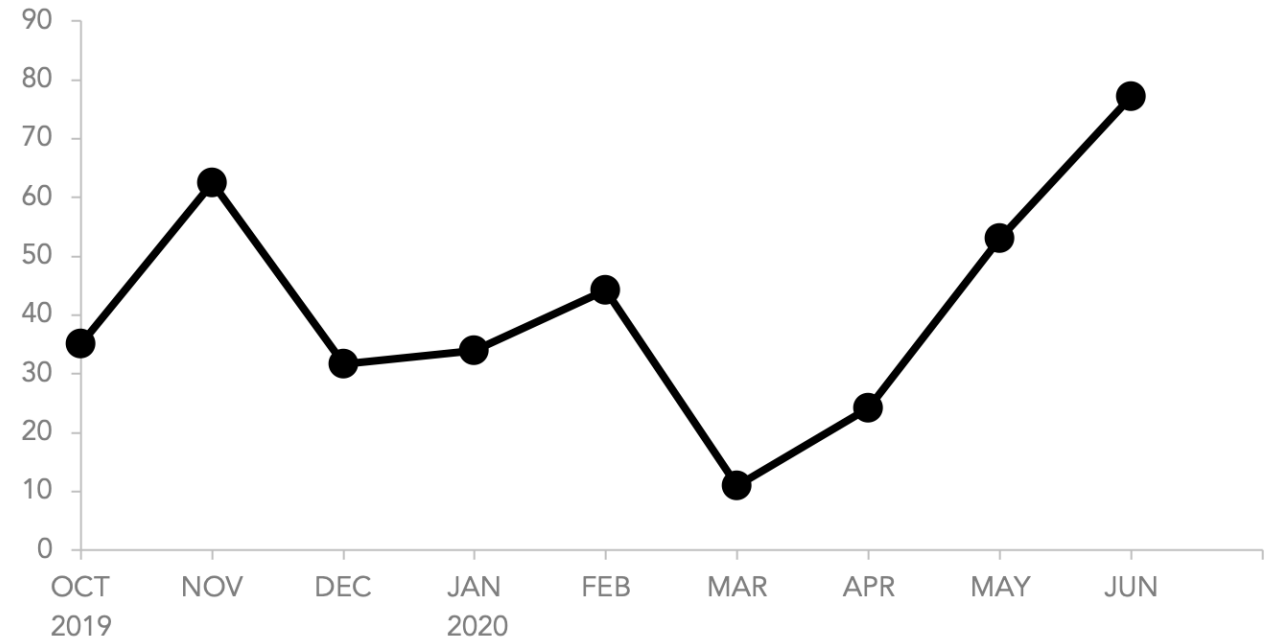
Grouped Bar Graph

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.

Produce sales
IN THOUSANDS (USD)



Scatter Plot

Best for showing relationships or correlations between two variables.

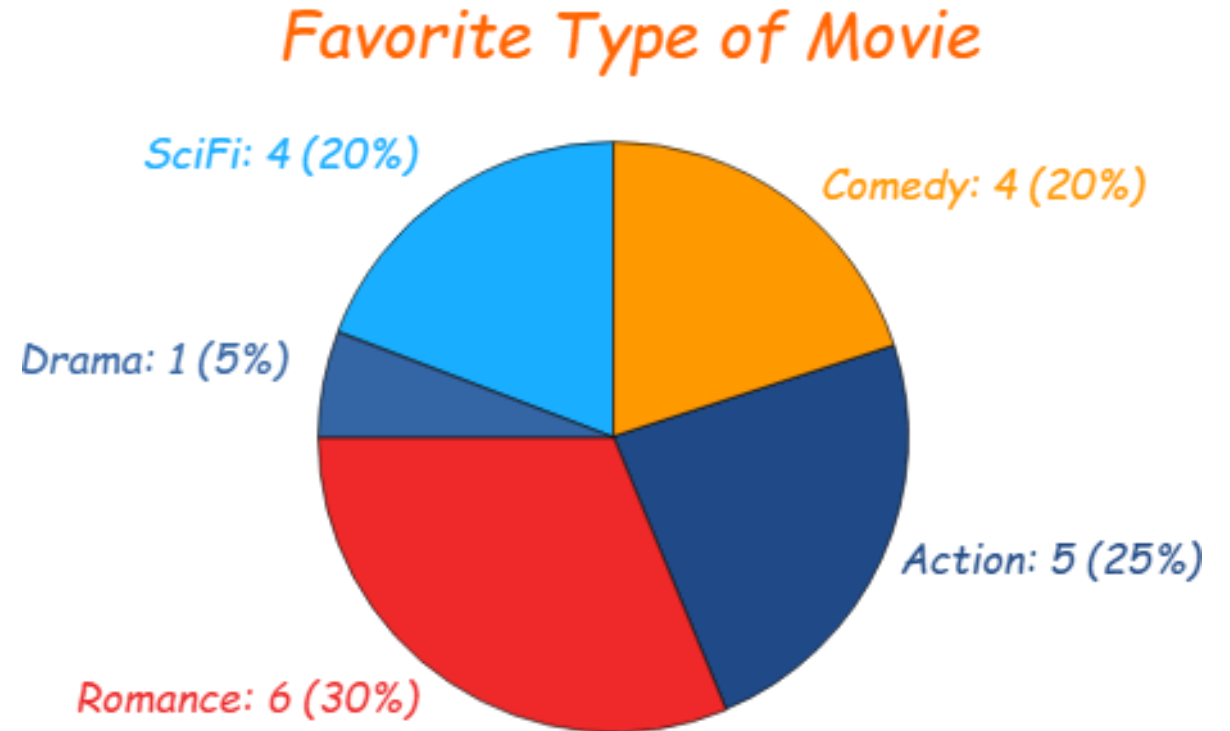
- **Advantages:** Great for showing correlations/relationship between variables, outliers.
- **Disadvantages:** Can be hard to interpret with too much data.



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?

BACKGROUND

The issue:
kids have
preconceived bad
notions of science

show student
assignment grades
over course of
quarter to
demonstrate issue

ideas for overcoming
issue, including
pilot program

So What?

Now What?

Describe pilot
program,
goals, etc.

show before &
after survey
feedback to
demonstrate
success of program

RECOMMENDATION

pilot was a success
let's expand going
forward
we need \$\$

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

The screenshot shows the homepage of the Minnesota Department of Health Data Access Portal. The header features the MDH logo, a menu icon, and a search bar. The breadcrumb trail indicates the path: Home > Data, Statistics and Legislation > MN Public Health Data Access Portal. The main content area is titled "MN Public Health Data Access Portal" and includes a description of the portal's purpose. A red arrow points to a link for "Minnesota Public Health Data Access Portal". The left sidebar contains links to "Portal Home", "About the Data Access Portal", "Evaluating New Data", and "Case Studies", as well as a "RELATED SITES" section with links to "Minnesota Tracking", "Minnesota Biomonitoring", "Minnesota Center for Health Statistics", and "MN Cancer Registry". The bottom of the page has sections for "About the Data Access Portal" and "Case Studies".

MN PUBLIC HEALTH DATA ACCESS PORTAL

[Portal Home](#)

[About the Data Access Portal](#)

[Evaluating New Data](#)

[Case Studies](#)

RELATED SITES

[Minnesota Tracking](#)

[Minnesota Biomonitoring](#)

[Minnesota Center for Health Statistics](#)

[MN Cancer Registry](#)

HEALTH PROMOTION AND CHRONIC DISEASE DIVISION

MN Public Health Data Access Portal

The Minnesota Public Health Data Access portal (Data Access portal) is an online data web resource designed to provide public access to Minnesota data about environmental risk factors and public health. Information on the portal is for anyone who wants to access and use data and to learn more about the public health, the environment and other risk factors. The website was created and is maintained by the [MN Tracking Program at the Minnesota Department of Health \(MDH\)](#).

 A wealth of environmental public health data can be accessed through the [Minnesota Public Health Data Access Portal](#).

About the Data Access Portal

[About the Data Access Portal](#)

Case Studies

[Case Studies](#) - Read about the successful use of data by

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



MN Public Health Data Access Portal

Environmental public health data can be used to inform policies, change behavior and help communities uncover issues to develop solutions and protections for the hazards, exposures and socioeconomic factors that influence our health. Search here to find environmental issues, trends, geographic patterns and disparities in Minnesota.

Topics by Category All Data Topics

Child Health

Climate

Diseases & Conditions

Environmental Health

Health Behaviors/Risk Factors

Videos! *How to use the environmental health data portal*



Watching videos is a great way to learn. We have created "how-to" videos so visitors can effectively use the Minnesota Public Health Data Access portal. You can find a series of videos explaining portal features and navigation on the [User's Guide page](#).



Subscribe to updates MN Public Health Data Access Portal

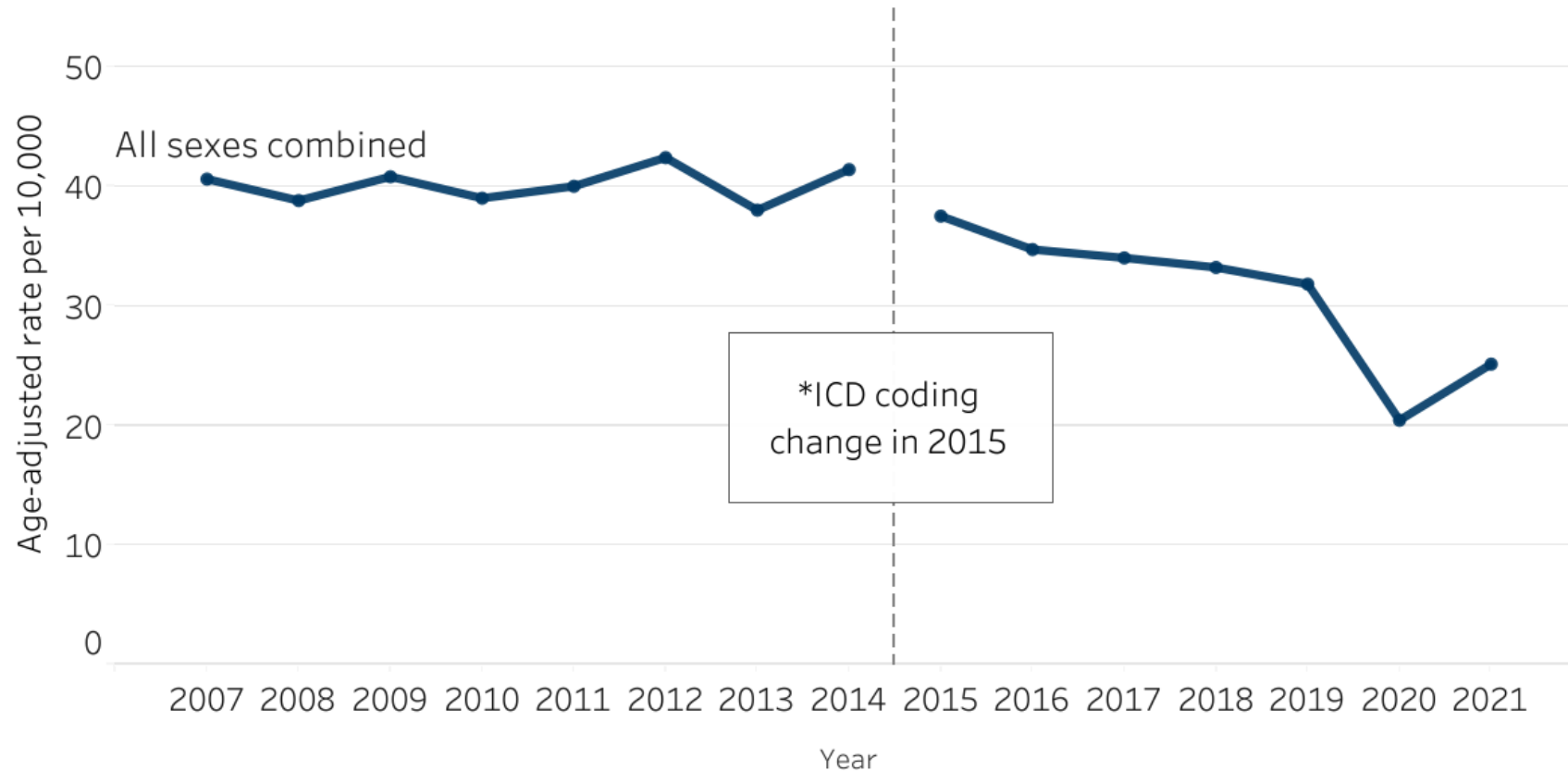
Email address Click to subscribe

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

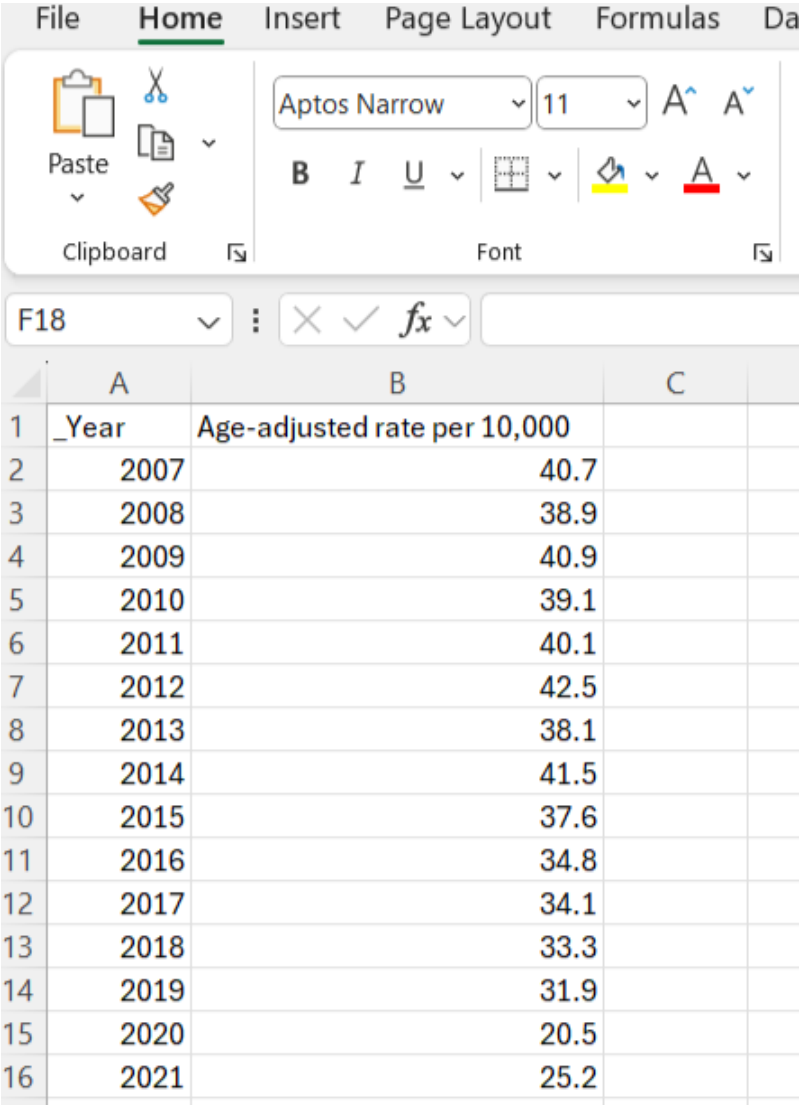


Click on the blue button that says, “View Charts and Maps,” and you will be able to see the chart below.

Figure 1. Asthma ED visit rates in Minnesota



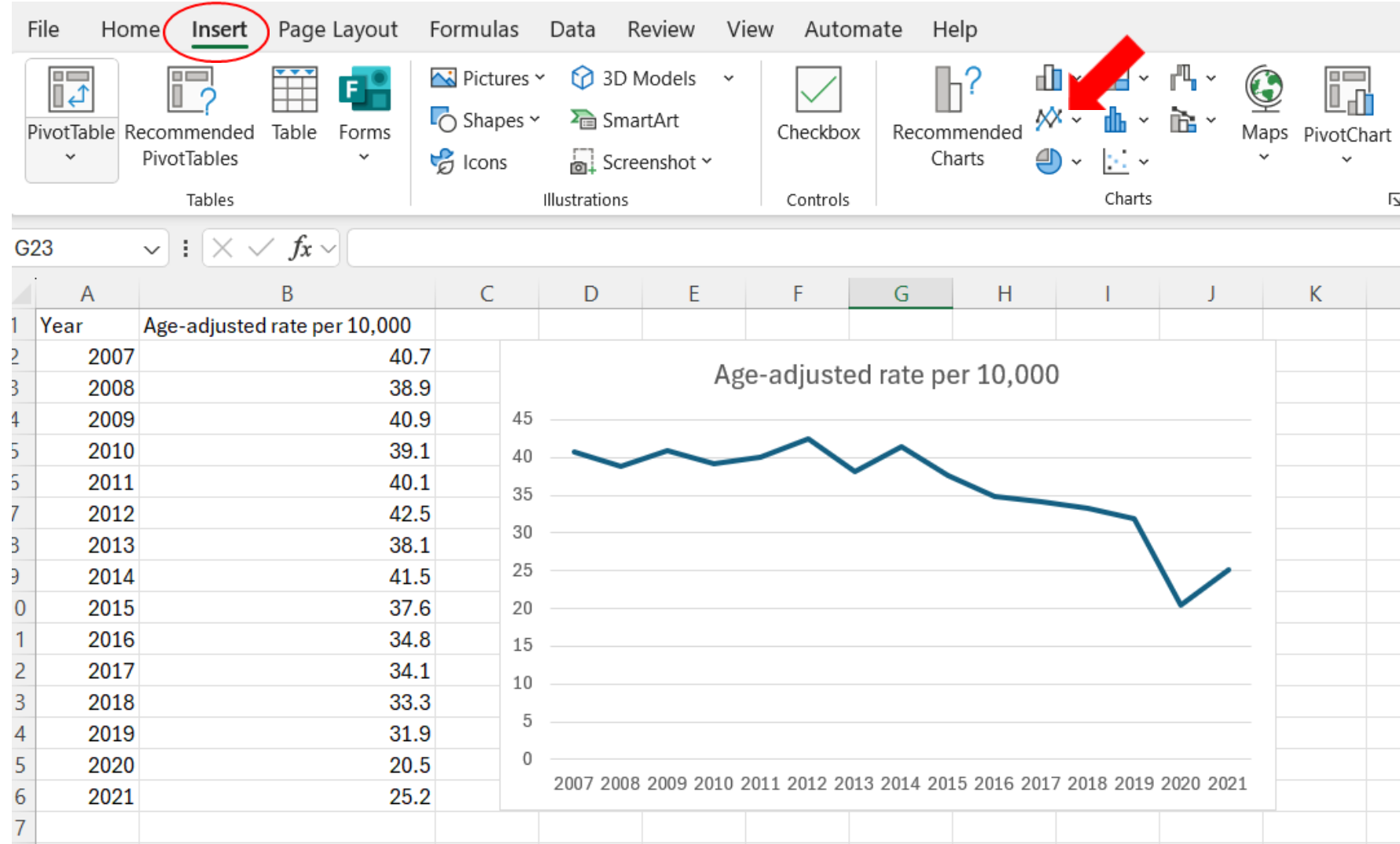
Download the CSV by hitting the download button located above the line chart. Open the Excel file and copy and paste the data we need for the line chart into a new Excel document.



The screenshot shows the Microsoft Excel interface with the 'Home' tab selected. The ribbon includes 'File', 'Home', 'Insert', 'Page Layout', 'Formulas', and 'Data'. The 'Clipboard' group shows 'Paste' and 'Clipboard' icons. The 'Font' group shows 'Aptos Narrow' font, size '11', and various formatting options like bold, italic, underline, and color. The active cell is F18. Below the ribbon, a table is displayed with the following data:

	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	





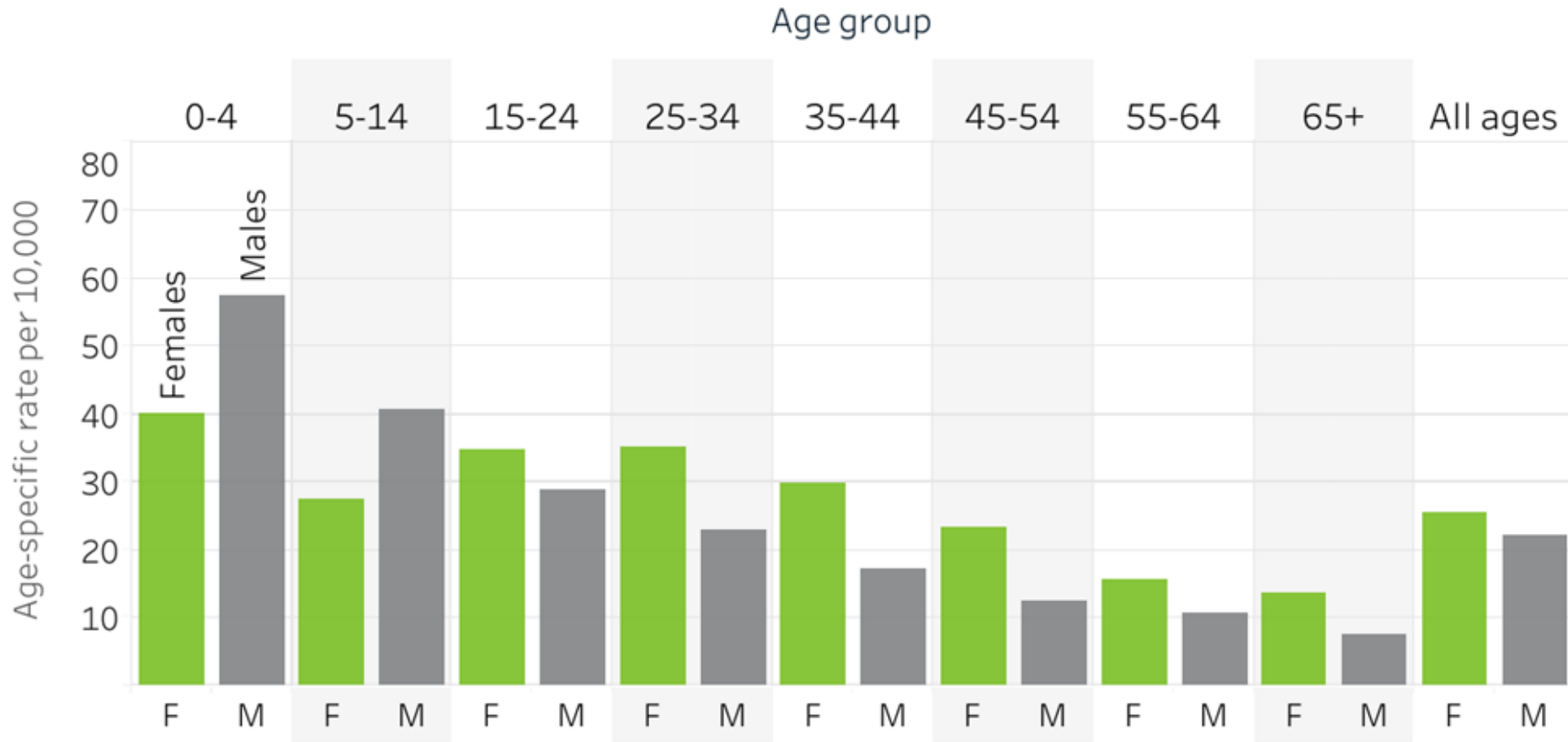
1. Highlight the data, click the “Insert” tab at the top of the Excel document
2. Choose the “line chart” option from the “charts” section.



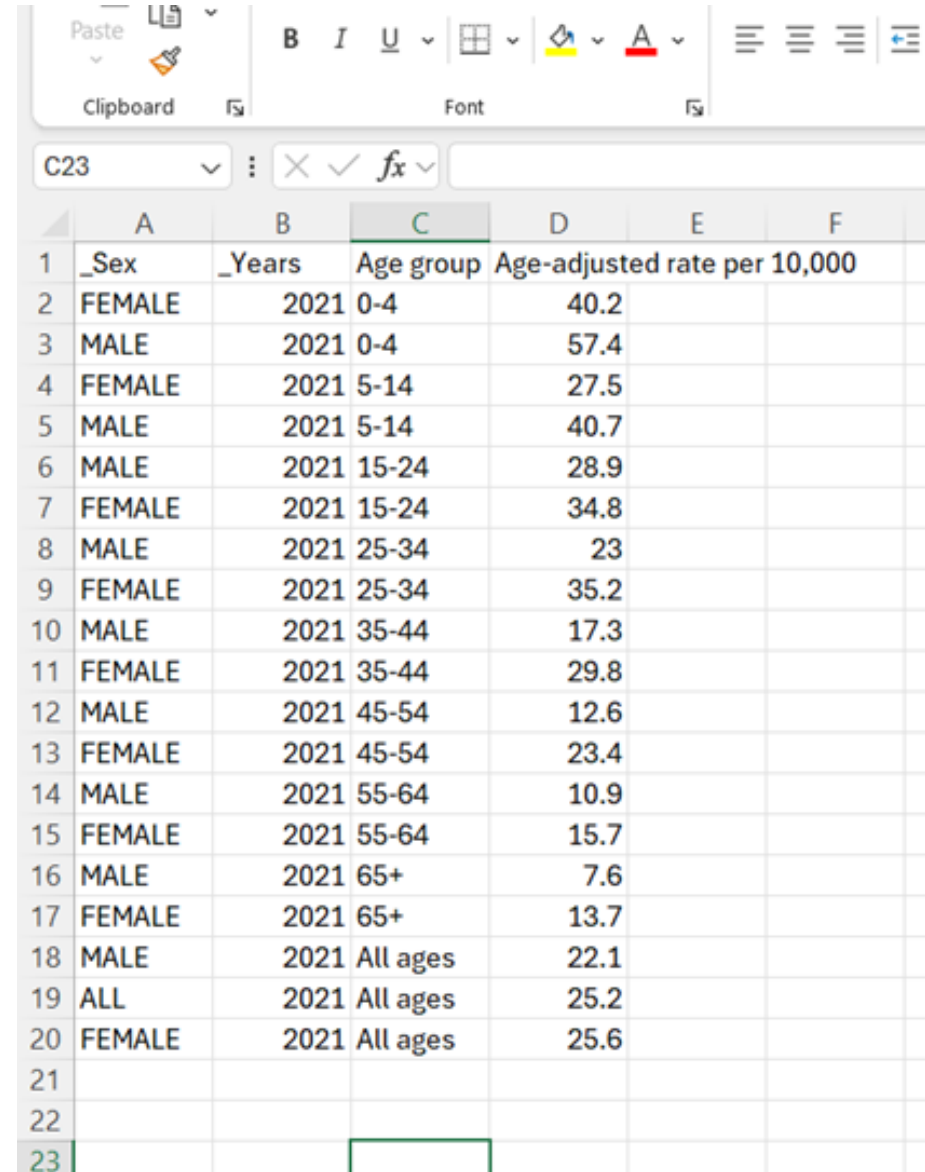
Figure 2. Asthma ED visit rates in Minnesota, by age and sex in 2021

Age groups (select one or more)
All

Sexes (select one or more)
All



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



The screenshot shows an Excel spreadsheet with a table of age-adjusted rates per 10,000. The table has columns for Sex, Year, Age group, and Age-adjusted rate per 10,000. The data is for the year 2021 and covers age groups from 0-4 to All ages. The rates are listed for both Male and Female for each age group, except for the 'All ages' category which is listed for both sexes.

	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						

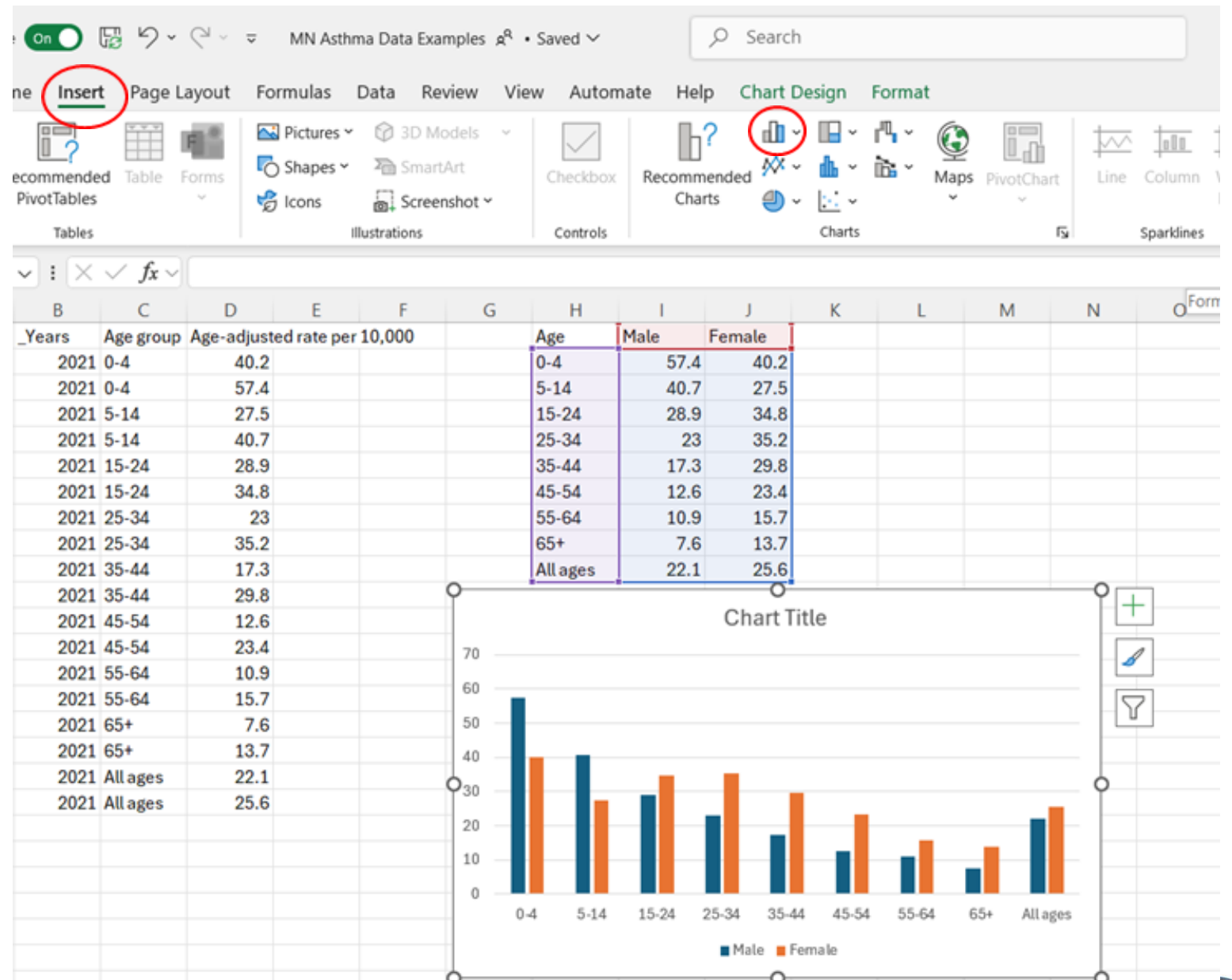


Delete row 19, as we do not need that data in this analysis. We need to build a new table so Excel can make the table properly. Use “age,” “male,” and “female” as column headings

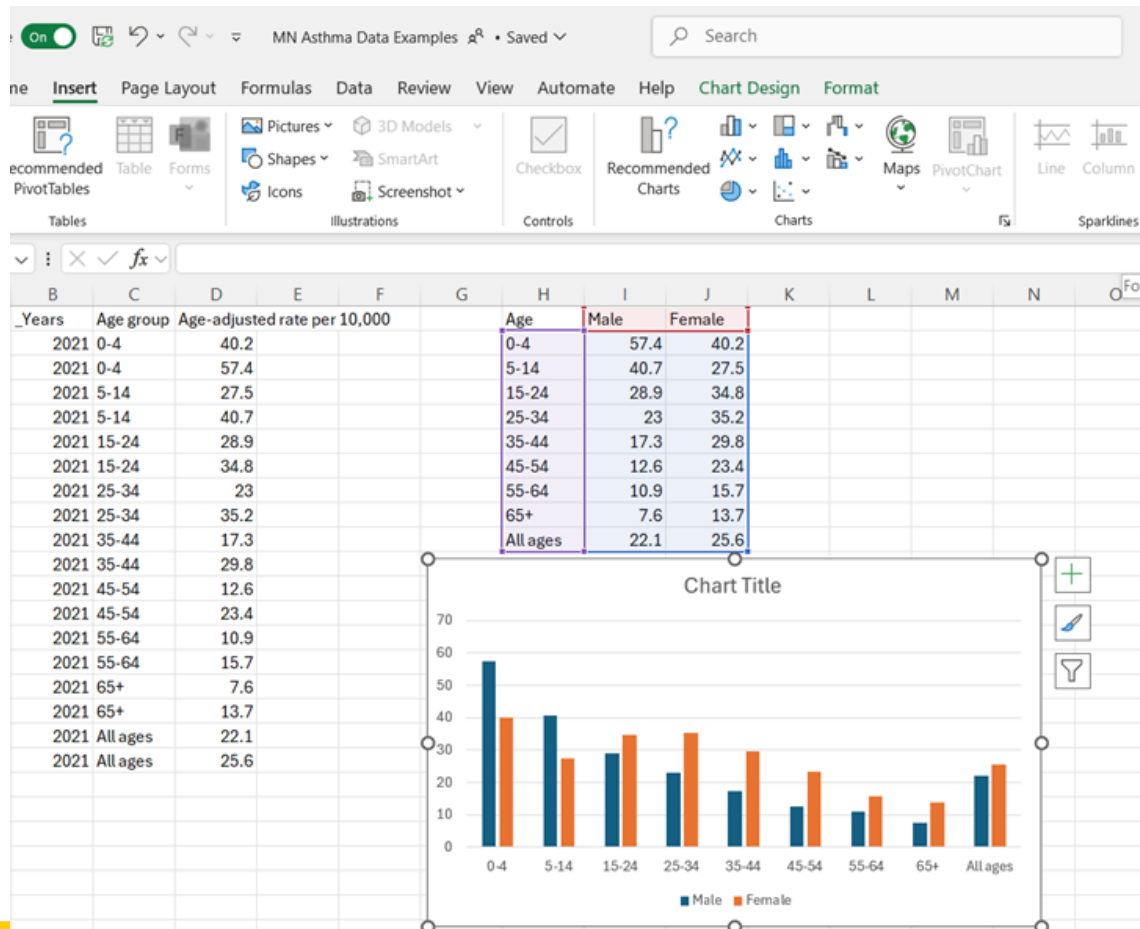
G	H	I	J	K
	Age	Male	Female	
	0-4	57.4	40.2	
	5-14	40.7	27.5	
	15-24	28.9	34.8	
	25-34	23	35.2	
	35-44	17.3	29.8	
	45-54	12.6	23.4	
	55-64	10.9	15.7	
	65+	7.6	13.7	
	All ages	22.1	25.6	



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



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



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=eHtZrlb0oWY>



How to Create Pivot Table in Excel

Kevin Stratvert ✓

1.7M views • 2 years ago

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



Icon Arrays

3 in 10

students in our **district** qualify
for free or reduced meals



5 in 10

students in our **school** qualify
for free or reduced meals



<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



Home About Workshops Design Blog Books Data Academy Contact

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.

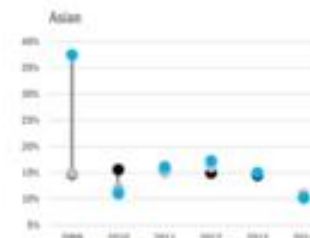
You’ll find more chart choices with updated instructions on how to make them – AND my Quantitative Chart Chooser – in my book, *Effective Data Visualization*.



Dot Plot



Horizontal Dumbbells



Vertical Dumbbells

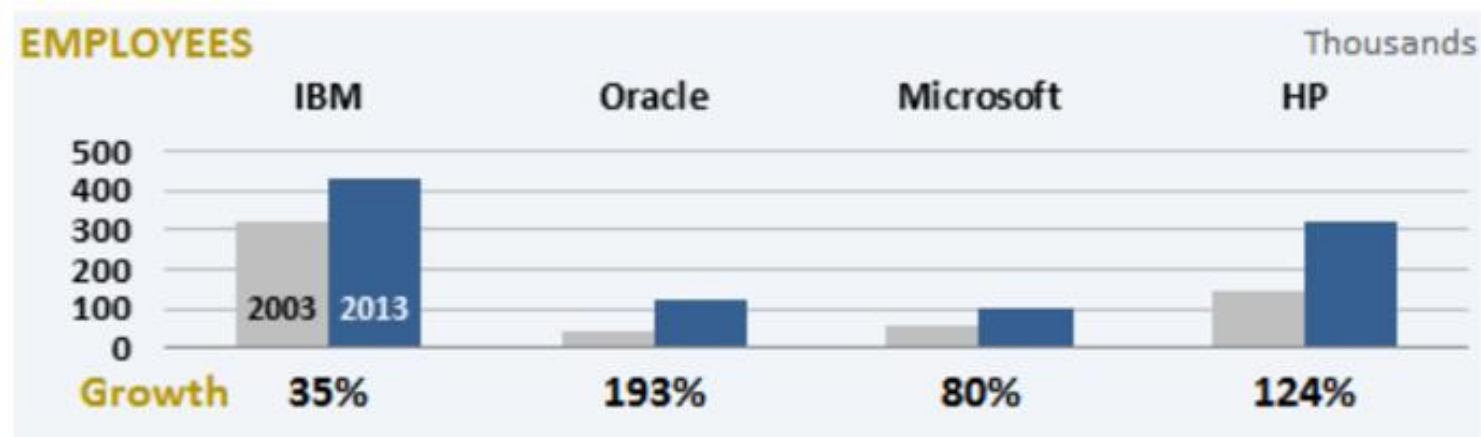
<https://stephanieevergreen.com/how-to/>

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 Knafllic, 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.



IOWA

Thank you!

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Institute for
Public
Health
Practice,
Research
and Policy

