



Intro to Data Visualization Using Best Practices

July 8, 2022



The Ginsberg Center's Community Technical Assistance Collaborative.

Multi-partner student driven initiative to enhance the data and evaluation capacity of community organizations through reciprocal community-engaged projects

Interested in working with us: ginsberg.ctac@umich.edu

The Ginsberg Center

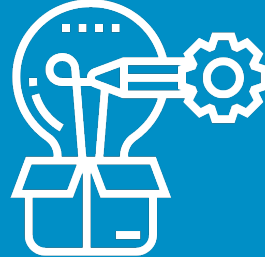


Cultivating and stewarding equitable partnerships between communities and The University of Michigan to advance social change for the common good.

Overview of Today



Using Data to
Elevate



Using Data to
Create

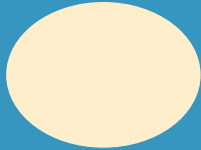


Use your Data to Elevate

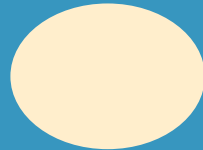
- » Start with a Thorough Understanding of The Problem
 - » Use the Right Data to Build Your Case
 - » Avoid Circular Reasoning
 - » Find Quality Data Sources
- 

Start with a Thorough Understanding of The Problem

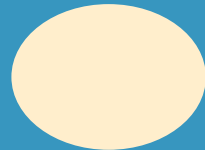
We know gathering data can be expensive in terms of time and focus, and in all likelihood, you already have too much on your plate. So why invest in understanding the problem with such rigor?



Clearly articulating your problem is the best way to garner support for your cause



Making the wrong assumptions can lead you to design an ineffective intervention



A nuanced understanding of the problem

Using the Right Data To Build Your Case

Qualitative

Focuses on the experience of individuals and their stories

Appeals to some supporters emotions

VS


Quantitative

Focuses on numerical data and analysis


Helps define your problem

Beware Circular Reasoning


As you begin crafting your argument using the data you've gathered, be aware that using circular reasoning is an easy trap to fall into and one that will weaken your case substantially



"A is true because of
B; B is true because
of A."



"The community
lacks a park, and
therefore it needs a
park"



Use a Blend of
Quantitative and
Qualitative Data



Quality National Quantitative Data Sources

The Bureau of Census

American Community Survey

Bureau of Labor Statistics

KIDS COUNT Data Book

Centers for Disease Control

National Health and Nutrition Examination Survey

Academic journals available at local libraries or universities



Quality Local Data Sources

City, county, and state government agencies or departments provide data

- » *City of Ann Arbor Data Catalog*

Chamber of Commerce

Hospital admission and exit records

County Health Rankings & Roadmaps

- » *WCHD Community Health Assessment*
- » *WCHD Health Improvement Plan Survey Data*

Police records or safety maps


- » *Washtenaw County Records Office - submit request through FOA*

School districts and school report cards

- » *Washtenaw ISD Student Demographics*

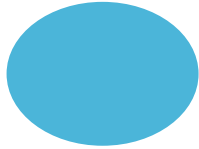


Use your Data to Create

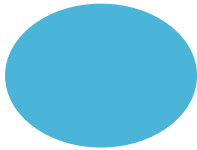
- » Introduction of data visualization & its importance
 - » Reviewing examples of good visualization methods vs. bad
 - » What visualizations work for specific types of data
 - » How to create visualizations of data using best practices
- 

What is Data Viz?

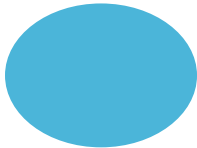
Data Visualization is the graphical representation of information and data



Putting data into graphics that are easy to understand



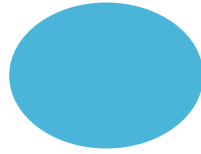
Able to show key findings to a wide range of audiences



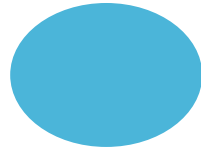
Communicating information & research

Why is it Important?

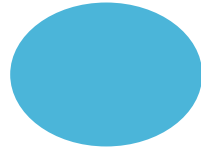
Based on how our
brain and eyes
process
information



Avoid misinterpretations of the data



Make our results accessible to stakeholders



Can help inform actions and make decisions



Principles of “GOOD” data visualization & “BAD” data visualization

GOOD

- » Consistent formatting throughout
- » The correct graph for the type of data you're working with
- » Easily understood by audience

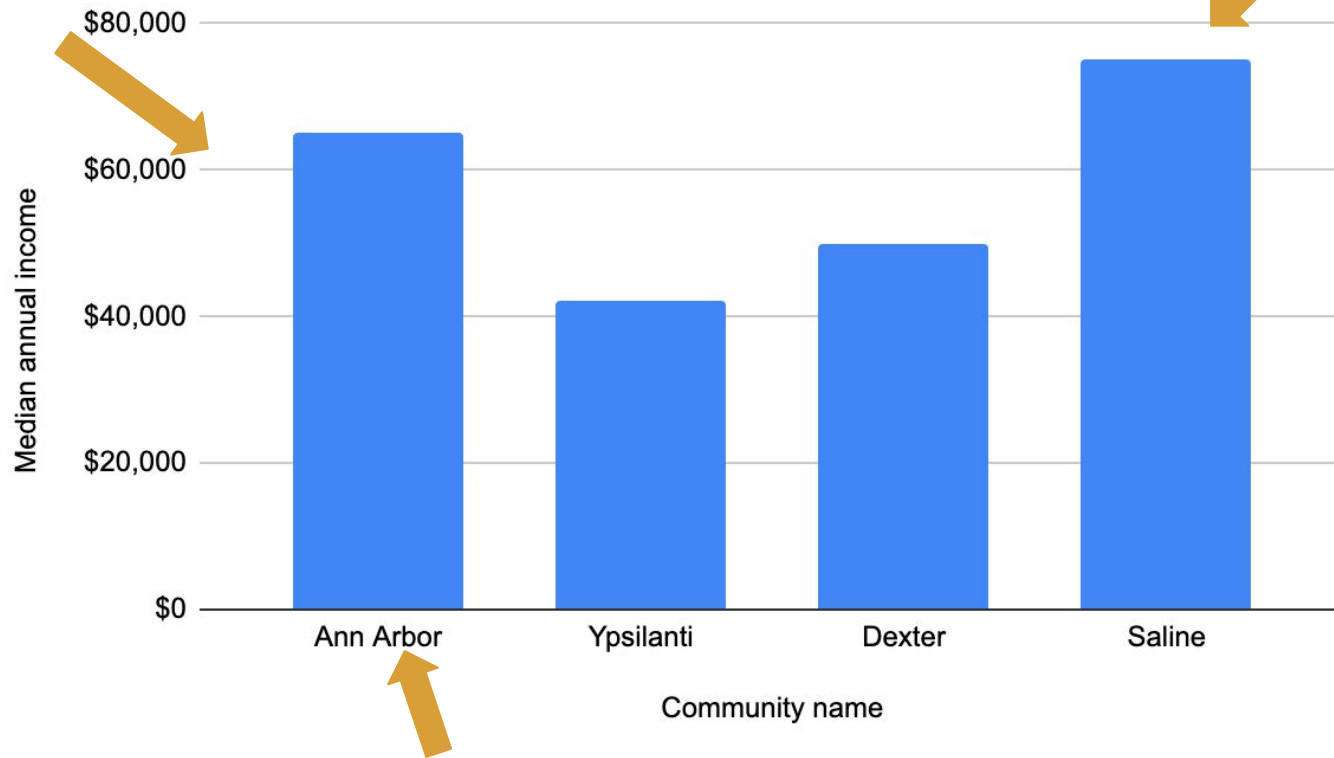
BAD

- » Inconsistent formatting
- » Cluttered titles, axis, etc.
- » Difficult to understand what is meant to be learned

Examples

Instead of this...


Median annual income vs. Community name

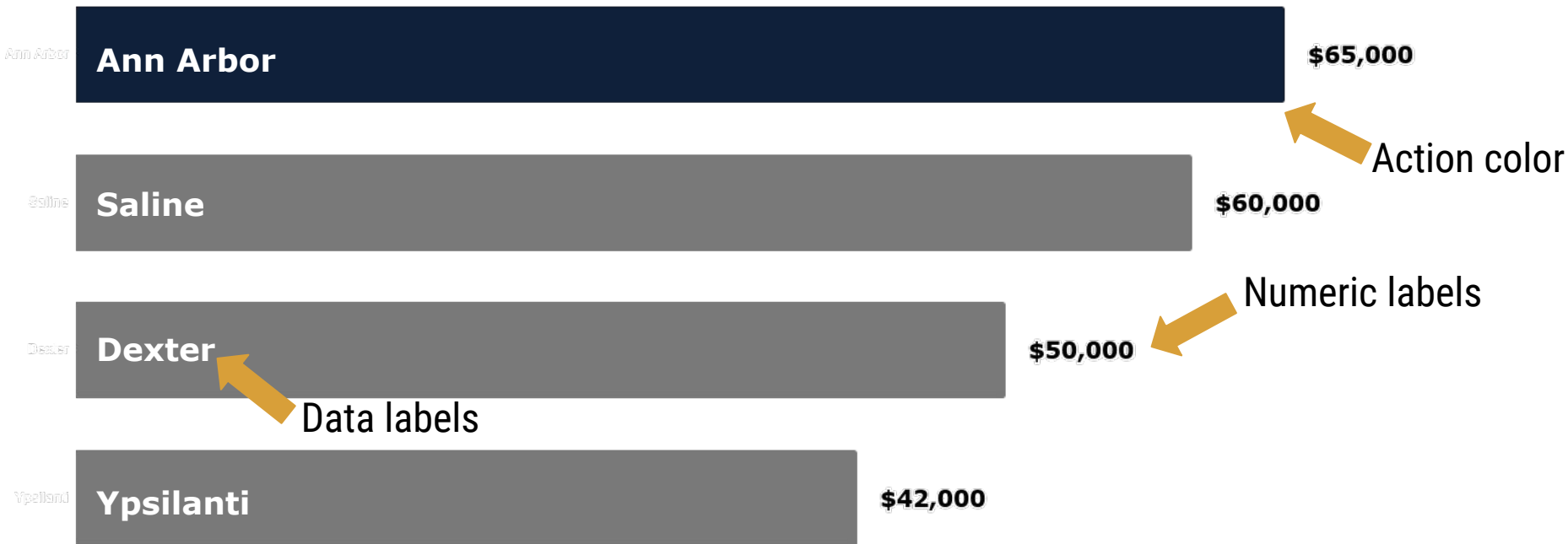


Here's what could be improved:

- » **Bolder & larger font that goes along with a custom color scheme or matches your presentation/logo**
- » **Remove clutter (tick marks, borders, axes lines, labels)**
- » **Apply gray to less important categories and highlight your focus points with action colors**

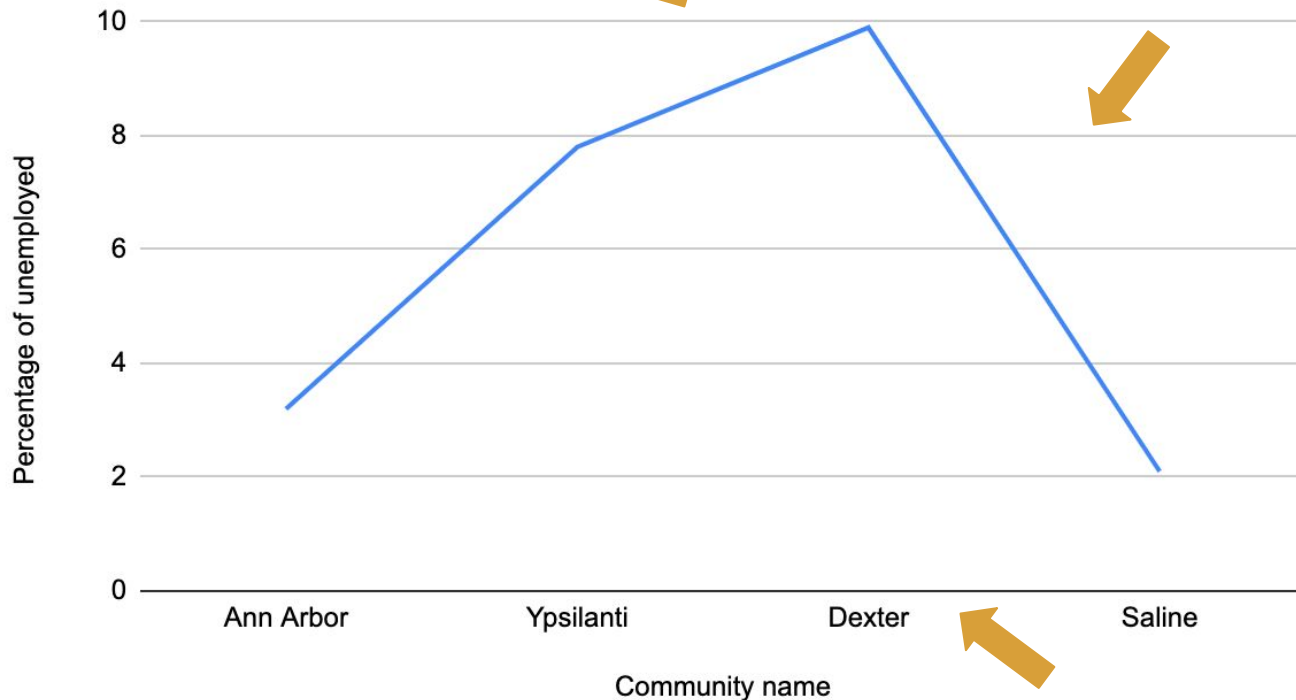
Visualize this...

Ann Arbor ranks as community with the highest average annual income.
The average income in Ypsilanti is 35% less than Ann Arbor.  Title & subtitle



Instead of this...

Percentage of unemployed



Here's what could be improved:

- » **Erase gridlines or make faint gray**
- » **Take out the bottom border line**
- » **Create a more informative title**

Visualize this...

Ypsilanti consistently has highest unemployment rate in Washtenaw County.

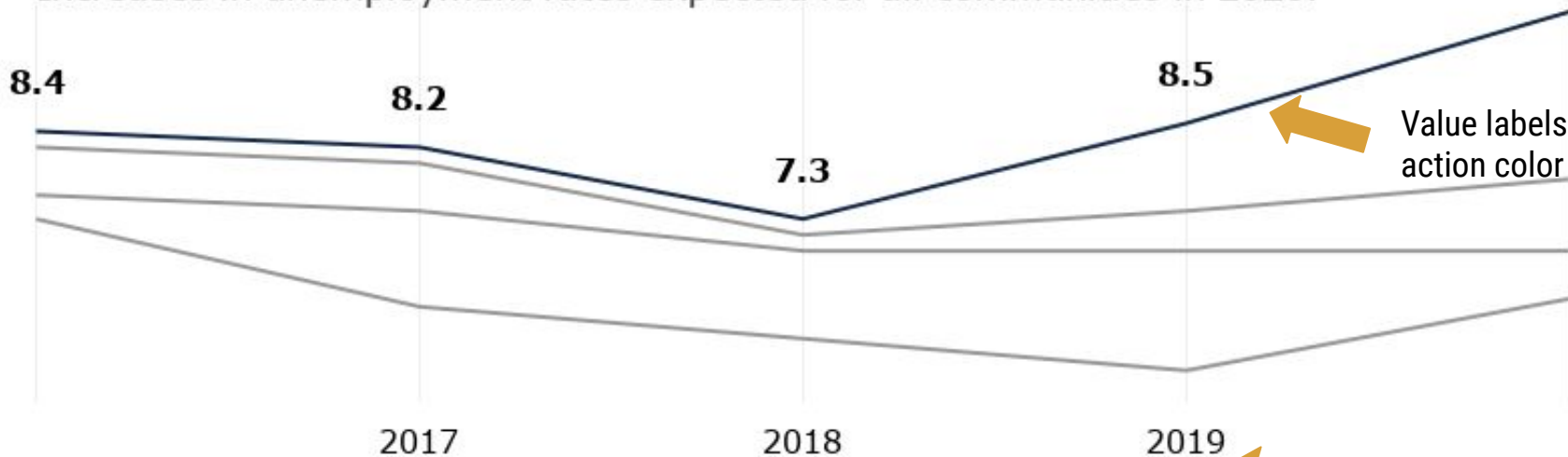
Increases in unemployment rates expected for all communities in 2020.

Informative title & subtitle

Value labels, action color

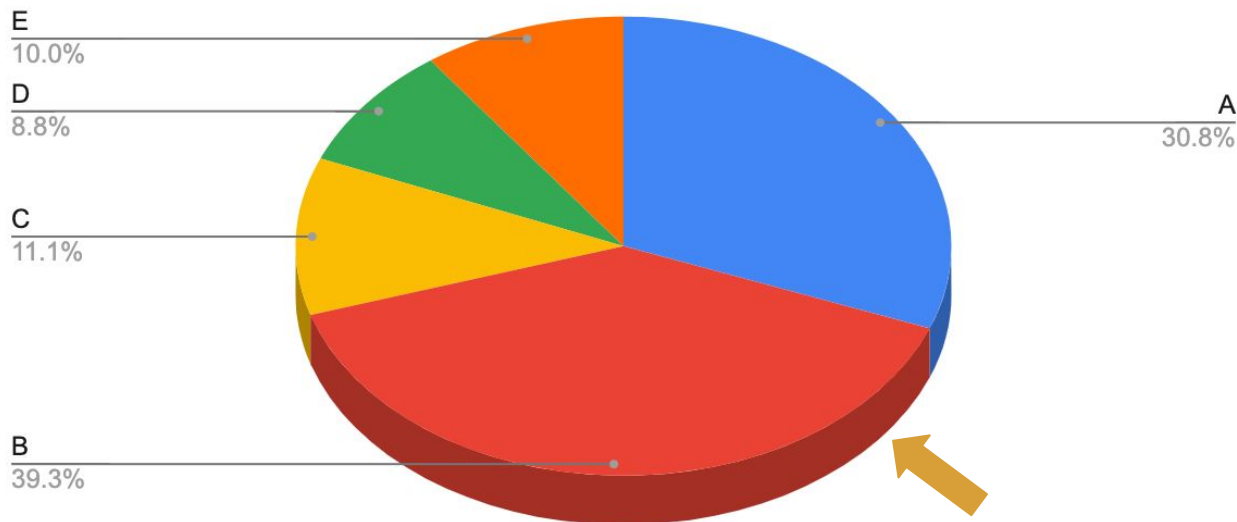
Data shown over time

Percentage of Unemployment



Instead of this...

Breakdown of undergrad student grades at U of M



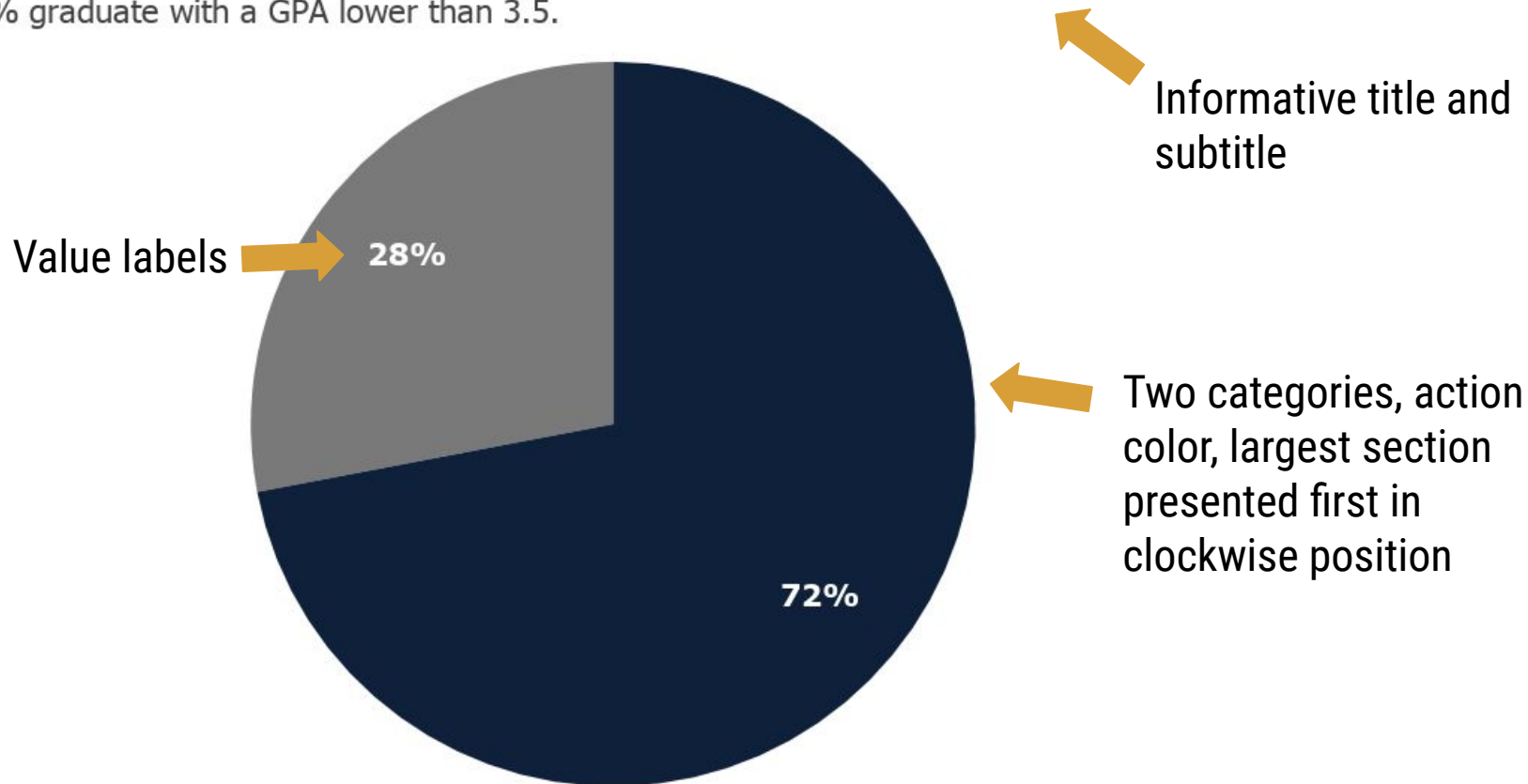
Here's what could be improved:

- » **Never use 3D visualizations**
- » **Pie charts work best when you only have 2 categories**
- » **Largest category should always start first and the rest follow clockwise in descending order**

Visualize this...

Majority of University of Michigan students graduate with a 3.5 GPA or higher.

But 28% graduate with a GPA lower than 3.5.





Choosing a graph

for the best visualization of your data



How to assess your data

What type of data is this?

- Qualitative?
- Quantitative?

What am I trying to show?

- Change over time?
- Outcomes?
- Feedback?

What are my variables?

- Time?
- Place?
- Amount?
- Performance?
- Relationship?

What types of visualizations work best for your type of data?

If you're asking:

- Who?
- What?
- How much?
- When?
- How frequently?
- Where?



Stacked Bar



Icon Arrays



Geographic Map



Histogram

What types of visualizations work best for your type of data?

If you're comparing:

- Which is better?
- Which is more effective?
- Did some perform better than others?



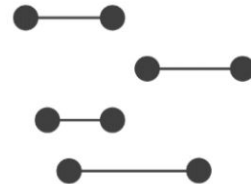
Bar



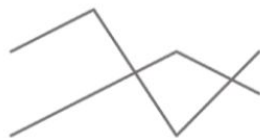
Back-to-Back



Small Multiples



Dumbbell Dot



Line



Dot Plot

What types of visualizations work best for your type of data?

If you're looking at changes over time:

- How did things get better/change from Time A to Time B?



Line



Multiple Line



Area



Stacked Area

What types of visualizations work best for your type of data?

If you're looking at how variables are related:

- Did X influence Y?
- What is the relationship between X and Y?



Bubble

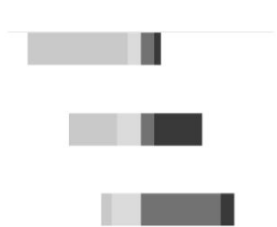


Scatter

What types of visualizations work best for your type of data?

If you're looking at evaluative measures:

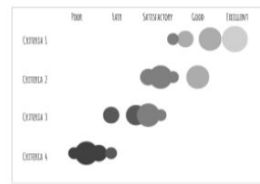
- Did the intervention work?
- Was the change caused by X meaningful?
- Meaningful by how much?



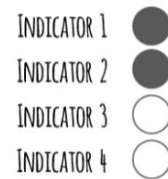
Diverging Stacked Bar



Bar with Benchmark



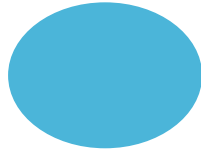
Rubic with Bubble



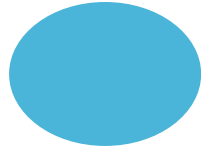
Indicator Dots

Social Equity Lens

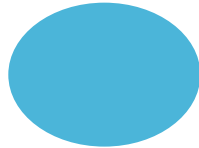
Tips from The
Urban Institute



Titles, Labels, and Text



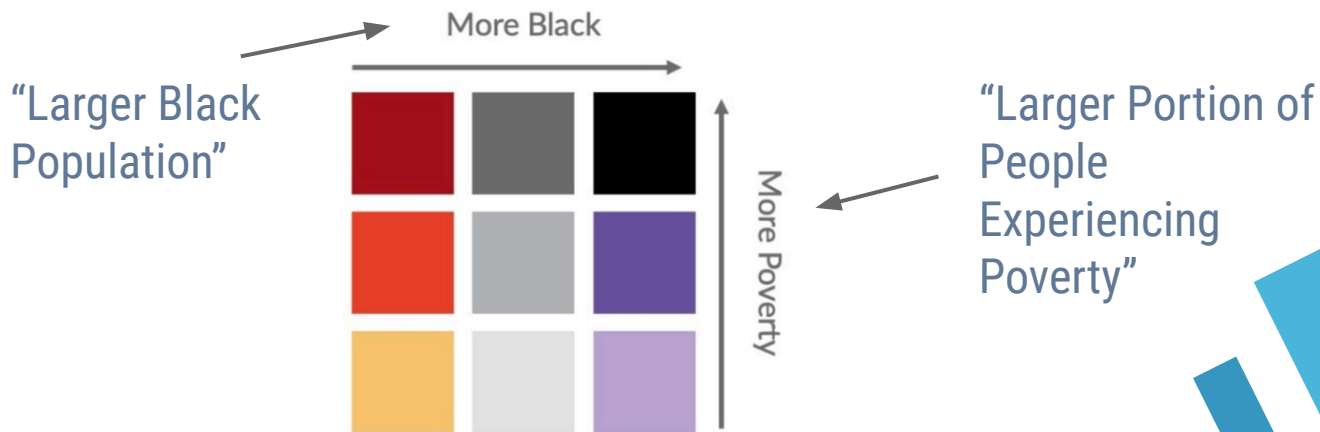
Ordering of data and data labels



Using colors, photographs, and icons intentionally

Social Equity in Data Viz: Language

- » Use language with social equity awareness
 - ◇ Complexity of People-first language
 - ◇ Terms that refer to people and not strictly their skin color ("Black people", not "blacks")
 - ◇ Consider including a footnote to explain why a particular term was used



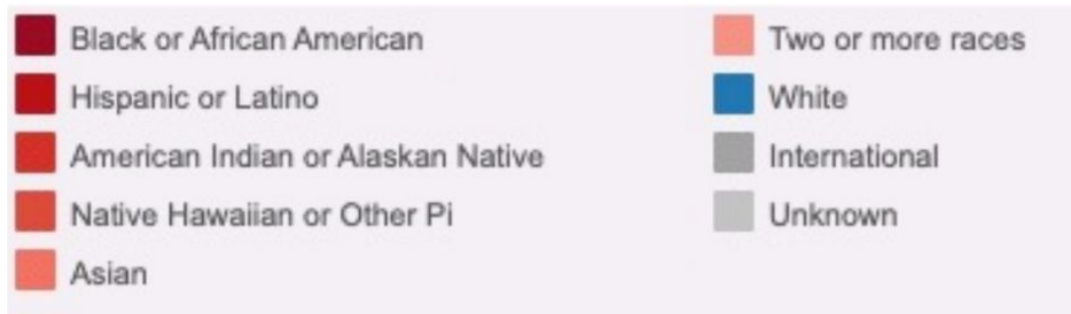
Social Equity in Data Viz: Ordering

- » Order data labels in a purposeful way
- » Not one “right way” to do it
- » Consider the following questions:
 - ◇ Does your study focus on a particular community?
 - ◇ Is there a particular argument or story you’re trying to tell?
 - ◇ Is there a quantitative relationship that can guide how the groups are ordered? (IE by population size, sample size, or magnitude/effect of the results)

Social Equity in Data Viz: Colors

- » Use color intentionally
 - ◇ Meet basic accessibility guidelines for color
 - ◇ Do not reinforce gender or racial stereotypes with your colors
 - ◇ Think critically about presentation of your colors/legend

Original (Bad)

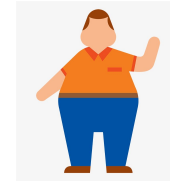


Updated (Better)



Social Equity in Data Viz: Icons/Photos

- » Icons & photographs: beware of reinforcing stereotypes
 - ◇ When reporting on "obesity", don't cut off the heads of photos of people in larger bodies or depict them doing stereotypical things
 - ◇ When using male icon for "boss", female icon for "nurse"





Creating Visualizations





Best practices to consider:

Text: no smaller than 20pt font (on screen), horizontal and left justified, 6-12 word descriptive title in upper corner, data labeled directly, text is hierarchical

Color: color represent brand or intentional choice, used to highlight key points or patterns, legible when printed in black and white or displayed on screens, legible for people who are colorblind, color contrasts background

Arrangement: accurate proportions shown in graphs, logical order of data, two-dimensional graphs, no unnecessary decoration, visualization can be read from left to right

Lines and Borders: muted gridlines, no borders, removal of unnecessary tick marks

Other: graph highlights conclusion, appropriate graph choice for data



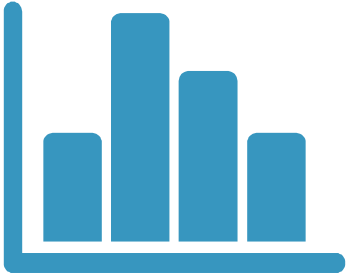
There are a number of softwares that can be used to create best practice data visualizations.

- R (free)
 - Tableau (free to UMich students)
 - Excel (free with Microsoft Office license)
 - Power BI
 - Stata
 - QGIS
 - & more
- 

STEP BY STEP DATA VISUALIZATION ON EXCEL/GOOGLE SHEETS

Since there are so many different types of graphs to build in Excel/Google Sheets, here is a thorough guide to building different types of graphs from Evergreen Data, free of charge.

[Evergreen Data Excel Walkthroughs](#)



THANK YOU

Remember to reach out to —
ginsberg.ctac@umich.edu if you are interested
in working with CTAC or have any questions
about today's presentation

Presentation Sources

- » <https://stephanieevergreen.com>
- » [https://www.foodgatherers.org/images/Plenty Newsletter PDFs/Fall 2019 NL-Web1.pdf](https://www.foodgatherers.org/images/Plenty%20Newsletter%20PDFs/Fall%202019%20NL-Web1.pdf)
- » https://www.sas.com/en_us/insights/big-data/data-visualization.html
- » <https://datavizcatalogue.com/>
- » <https://datavizproject.com/#>
- » <https://evalviz.wordpress.com>
- » <https://www.elevatedeffect.com>
- » <https://www.piktochart.com>
- » <https://www.measureevaluation.org>
- » <https://ctb.ku.edu>
- » Urban Institute, "Applying Racial Equity Awareness in Data Visualization"

