

Data Visualizations for Everybody: A Lesson on Accessibility

Presenter: Nancy Shin,
Scholarly Communications Librarian,
Welch Medical Library

JOHNS HOPKINS
UNIVERSITY & MEDICINE

Welch Medical Library

Agenda

1. What are accessible data visualizations?
2. What is web accessibility and digital inclusion?
3. Who benefits from accessible data visualizations?
4. Designing for different users and disabilities
5. A bad example of a data visualization fixed!

What are accessible data visualizations?

- ▶ Accessibility in data visualization refers to the design and presentation of information in a way that makes it usable for people with disabilities. This includes, but is not limited to, users with visual, auditory, motor, or cognitive disabilities.
- ▶ Accessibility in data visualization involves considering factors such as color choices, font sizes, labeling, and alternative forms of representation, among others.



What is web accessibility and digital inclusion?

According to the World Wide Web Consortium's (W3C) Web Content Accessibility Guidelines (WCAG), web accessibility means that ...

"... websites, tools, and technologies are designed and developed so that people with disabilities can use them. People can perceive, understand, navigate, and interact with the web and contribute to the web. Web accessibility encompasses all disabilities that affect access to the web including auditory, cognitive, neurological, physical, speech, and visual."

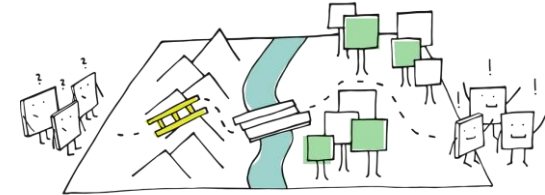
Web accessibility is part of digital inclusion which refers to how website browsers, apps, and other digital infrastructure can be used by people with auditory, cognitive, neurological, physical, speech, and visual disabilities.



Who benefits from accessible data visualizations?

Accessibility benefits people with and without disabilities (that are permanent, temporary, or situational) in the following ways:

- ▶ People using smartphones, smart watches, smart TVs, and other technology with small visual displays/screens
- ▶ Older people with changing abilities as a result of ageing
- ▶ People with “temporary disabilities” such as lost glasses or a broken arm
- ▶ People with “permanent disabilities” like low vision or hard of hearing
- ▶ People with “situational disabilities” such as bright sunlight or in a place/environment where listening to audio is challenging
- ▶ People with slow internet connection, or who have limited or expensive bandwidth



Designing for Different Users and Disabilities

Accessibility in data visualization refers to the design and presentation of information in a way that makes it usable for people with disabilities.

- ▶ Anxiety
- ▶ Autistic spectrum
- ▶ Deaf or hard of hearing
- ▶ Dyslexia
- ▶ Low vision

Anxiety

Do ...

- Give users the benefit of time (e.g., split up complex charts into simpler ones)
- Make essential information clear
- Provide all the support necessary to understand a visualization (e.g., helpful menu)



Don't ...

- Rush users or set unrealistic timelines (e.g., cram too many charts into one complex one unnecessarily)
- Confuse users with too much information
- Provide minimal support to understand a visualization



Autistic Spectrum

Do ...

- Use simple colors
- Use/write in simple language
- Use simple sentences and use bullets to separate points (e.g., visualization annotations)
- Employ simple and consistent layouts



Don't ...

- Use too bright and sharply contrasting colors
- Use figures of speech or idioms or jargon
- Create text heavy compositions (e.g., text heavy visualization annotations)
- Use complex and cluttered layouts



Deaf or Hard of Hearing

Do ...

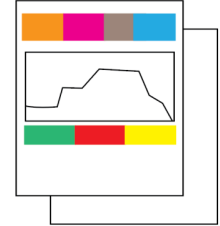
- Use/write in simple language
- Use a linear and logical layout



- Keep text on the visualization short, clear, and simple (e.g., visualization annotations)

Don't ...

- Use figures of speech or complex words or jargon
- Use complex and cluttered layouts



- Make things too text heavy and confusing (e.g., visualization annotations)

Dyslexia

Do ...

- Keep text aligned to the left and keep a consistent layout



- Consider producing the visualization in other formats (e.g., table vs. bar chart)
- Keep text on the visualization short, clear, and simple (e.g., visualization annotations)

Don't ...

- Underline words, use italics, or write in all capitals

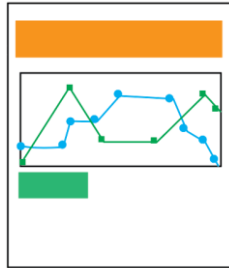
DON'T DO THIS

- Force users to recall from previous visualizations; incorporate reminders and prompts into your visualizations
- Make things too text heavy and confusing (e.g., visualization annotations)

Low Vision

Do ...

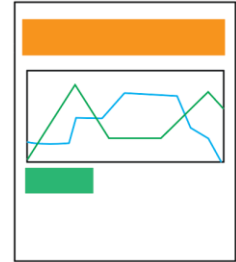
- Use good color contrasts and readable font size (e.g., minimum font size is 16, sans serif)
- Use a combination of color, shapes, and text in your visualization



- Use a linear, logical, and consistent layout

Don't ...

- Use poor color contrasts and very small/unreadable font size
- Only use color to convey chart meaning



- Use a complex and cluttered layout

Screen Readers (Part I)

Do ...

- Use Alt Text or describe visualizations
- Follow a logical and structured layout



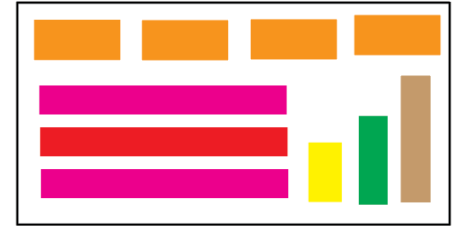
- Write descriptive links and headings; label data directly on the chart

[Contact Us](#)

- For charts like bar and line charts include a table of the data too in addition to the data visualization

Don't ...

- Only show the visualizations without Alt Text
- Messily spread content all over the visualization



- Use uninformative links and headings

[Click Here](#)

- Only show the data visualization as a bar or line chart without a data table present too

Screen Readers (Part II)

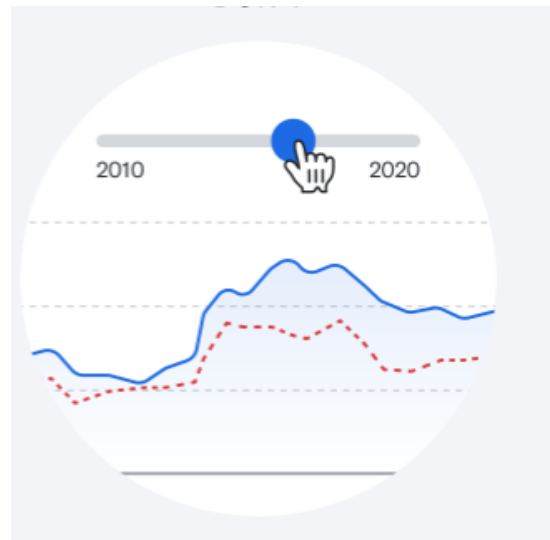
Do ...

- Stay away from sliders or other intricate tools when allowing users to manipulate the graph/chart. Use dropdown inputs instead.



Don't ...

- Use sliders and other complex tools when allowing users to interact with your graph/chart.



Screen Readers (Part III)

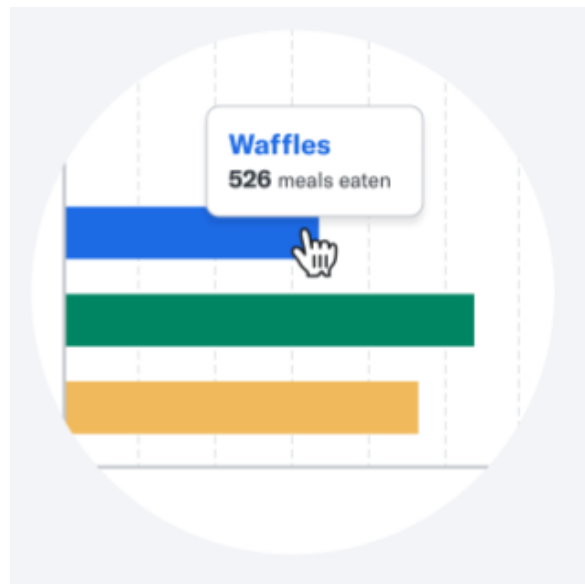
Do ...

- Show the data output for points on the graph at all times



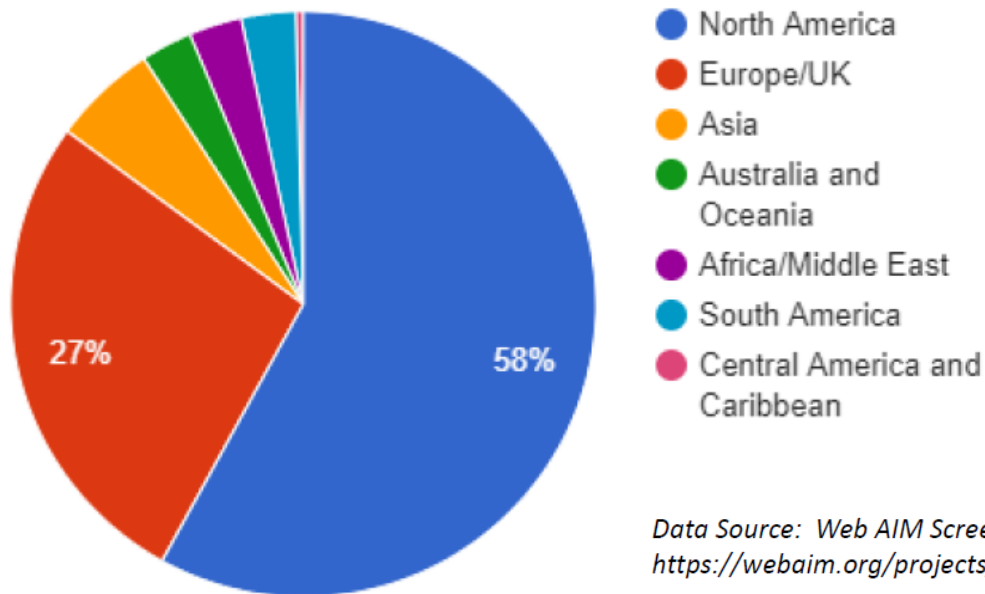
Don't ...

- Require a user to hover over a graph to see the data output/information



Bad Example of a Data Visualization

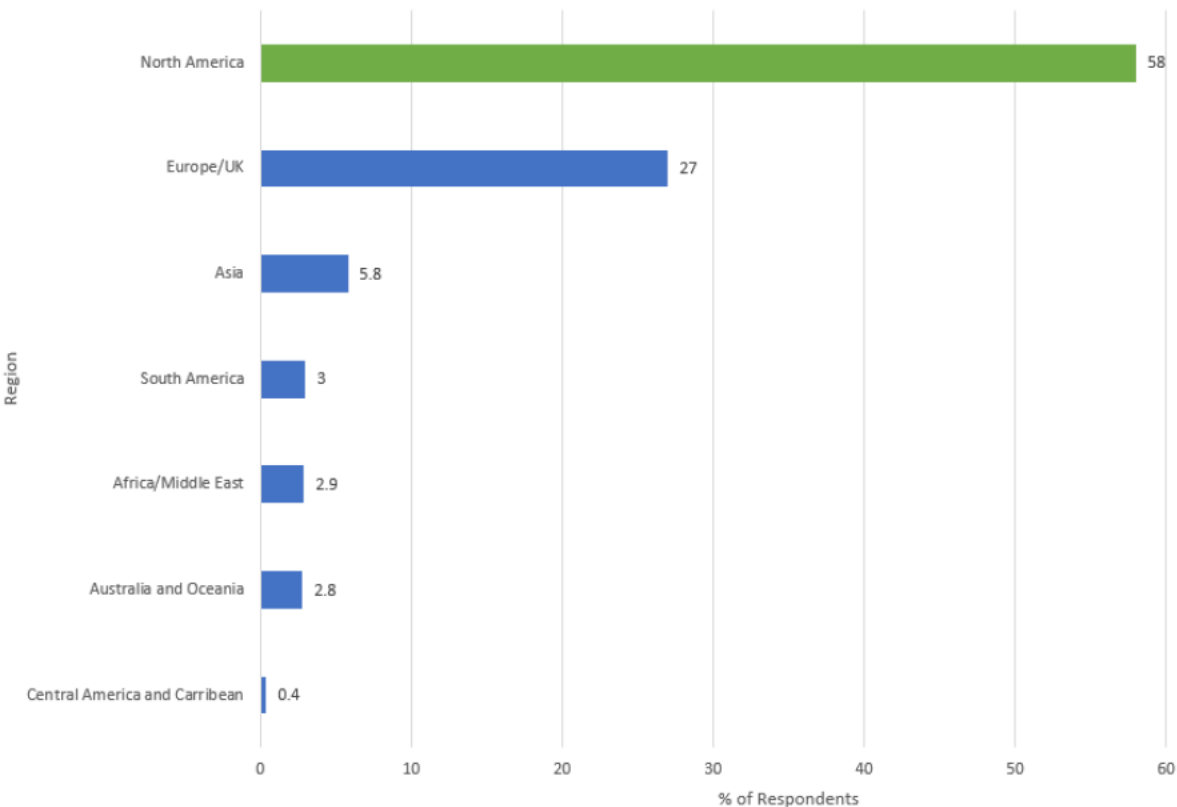
Region Respondents to Survey



Data Source: Web AIM Screen Reader User Survey #8 Results - <https://webaim.org/projects/screenreadersurvey8/>

Bad Example of a Data Visualization FIXED!

Respondent Region: North America has the largest percentage of respondents



Region	# of Respondents	% of Respondents
North America	695	58.0%
Europe/UK	324	27.0%
Asia	69	5.8%
Australia and Oceania	34	2.8%
Africa/Middle East	35	2.9%
South America	36	3.0%
Central America and Caribbean	5	0.4%

This survey had more respondents outside North America than previous surveys, thus providing better representation of the global screen reader user audience.

Data Source: *Web AIM Screen Reader User Survey #8 Results* - <https://webaim.org/projects/screenreadersurvey8/>

Informationists

<https://welch.jhmi.edu/about/informationists>

Research Guides

<https://browse.welch.jhmi.edu/>

Get Help

<https://welch.jhmi.edu/get-help>

Welch Service Center

wsc@jhmi.edu | 410-955-3410

Nancy Shin, AHIP, MLIS, B.Sc.
nshin4@jhu.edu

References

Images

All images, unless otherwise credited, are from Pixabay.com under a Public Domain License

Websites:

[Storytelling with Data Blog](#): 5 easy ways to make your data visualization more accessible

[Tableau Software](#): Best practices for designing accessible views

[UK Home Office; Digital, Data, and Technology](#): Do's and Don'ts on designing for accessibility

[World Wide Web Consortium \(W3C\) Web Content Accessibility Guidelines \(WCAG\)](#) – Web accessibility definition

References

Websites:

[MedlinePlus](#): Anxiety

[MedlinePlus](#): Autism spectrum disorder

[MedlinePlus](#): Developmental reading disorder

[MedlinePlus](#): Hearing disorders and deafness

[MedlinePlus](#): Vision impairment and blindness