R you ready for this? CHA Data Brief Templates Made Simple

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Epidemiology

5/14/25

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Marion County Public Health Department

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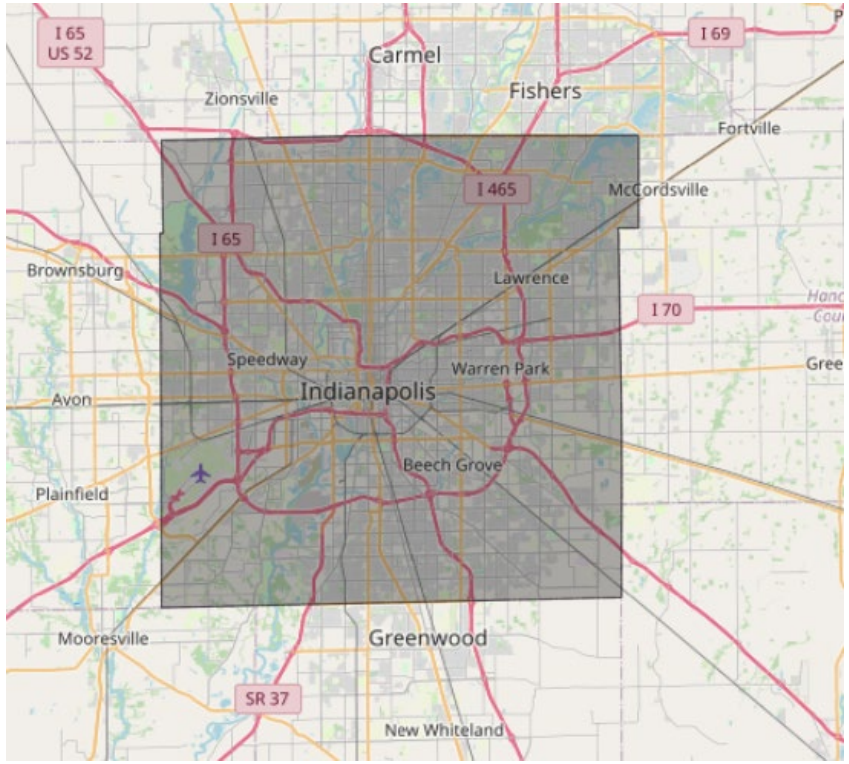
Marion County Public Health Department

- Marion County, Indiana (Indianapolis)
- County Population: 977,203[1]
- About 800 employees in the health department
- 22 people in a centralized Epidemiology department



1. Census Bureau. 2020 Decennial Census.

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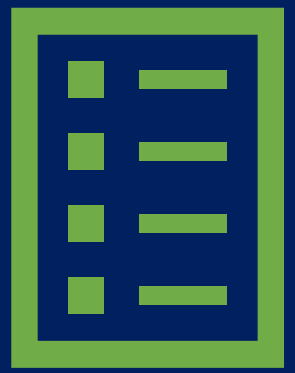
Project Background



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CHA Process

Community Health Assessment (CHA) – every 5 years, collect data and information to get a current snapshot of the community.

CHA Process:[1]

1. Organizing and engaging partners
2. Visioning
3. Collecting and analyzing data
4. Identifying and prioritizing strategic issues
5. Developing goals, strategies, and an action plan
6. Taking and sustaining action

1. https://www.naccho.org/programs/public-health-infrastructure/performance-improvement/community-health-assessment

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CHA/CHIP Prioritization

- Started with a list of 100 health topics. Partners selected 15 topics that would be presented and narrowed down to five at a committee meeting.
- For this committee meeting, we needed short data summaries (data briefs) to handout at the meeting. Attendees could review the handouts to help inform how each health topic ranked in Marion County.

2019 CHA Data Briefs

- With the last iteration of the CHA, Word document templates were created.
  - Staff would save a copy of the template for their data brief.
  - They would copy and paste their charts into the document and add their own text.
- For graphics, we used R and had some standard code set up.
  - Staff had to import their data in a very strict and specific order, otherwise it wouldn't work.
  - If something needed to be updated graphics wise, staff had to rerun code and then copy and paste things back into the Word document.

Epi Department Technology

- Both R and SAS are available for epi's to use. It's their choice which they want to code in.
- R is a free, open-source programming language. R has many different tools available that can create different outputs such as dashboards, text documents, and graphics.
- For those reasons, we decided to create the data briefs with R.

R skills of the department

- Variety of skills from beginner to expert
- We previously did 10 recorded training sessions to build R skills. New staff watch these trainings as a part of their onboarding.
- Goal for this project – make the templates easy to use for a beginner R user

Quarto

- Quarto is a multi-language, next generation version of R Markdown from Posit, with many new features and capabilities.
- Like R Markdown, Quarto uses knitr to execute R code, and is therefore able to render most existing Rmd files without modification.
- Publish reproducible, production quality articles, presentations, dashboards, websites, blogs, and books in HTML, PDF, MS Word, ePub, and more.

More Info on Quarto : https://quarto.org/

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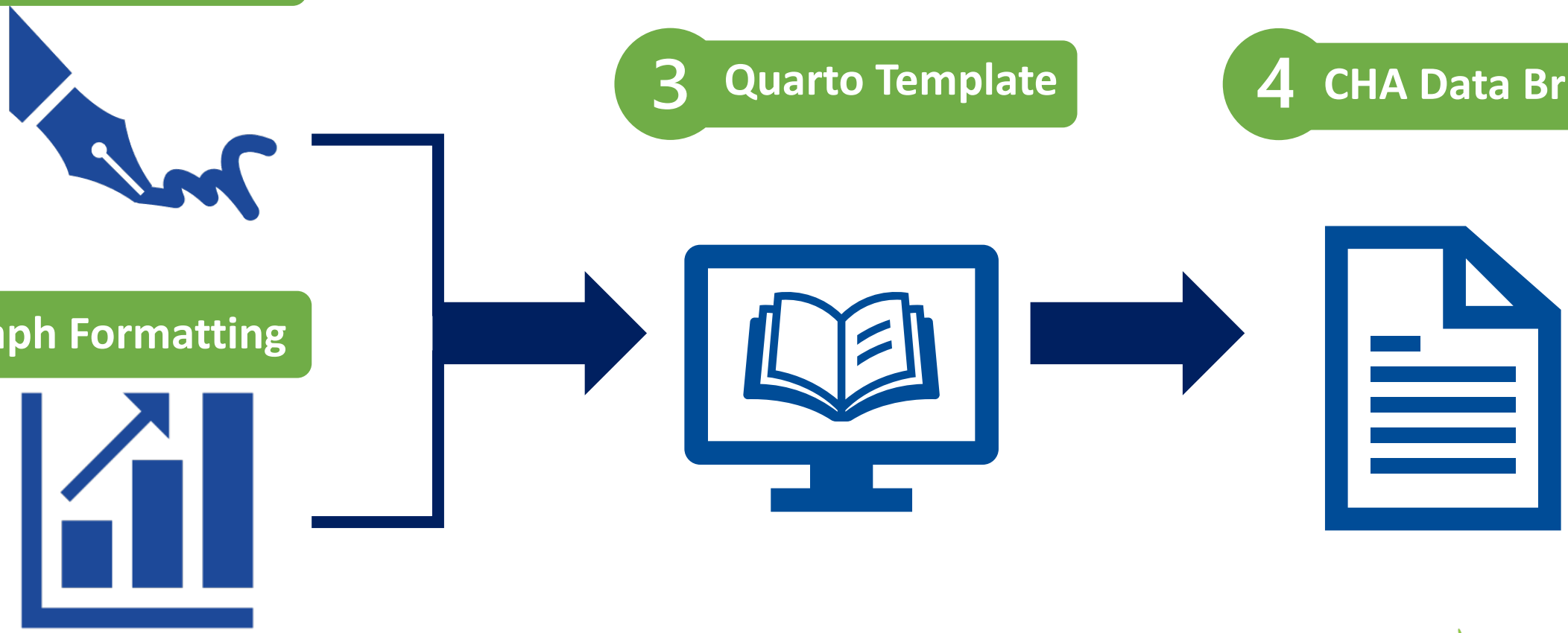
What we Needed

- Short summaries of health topics (data briefs)
- Free, easy to create
- Standard formatting
- One place for updates to formatting
- Cohesion across different data briefs
- Use R and Quarto to create these data briefs

Process Overview: How does the Template work?

1 Document Design

2 Graph Formatting



3 Quarto Template

4 CHA Data Briefs

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Document Design

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Document Design Planning

- Review Previous CHA Data Briefs
- Manager Meeting
  - Agree on a Base Design
  - Needed an adaptable design for the different data briefs
  - Decide on Content
  - Approval
- Draft, review, corrections

Goals

- Cohesive layout and theme
- Easy to use for a variety of users
- Management Approved

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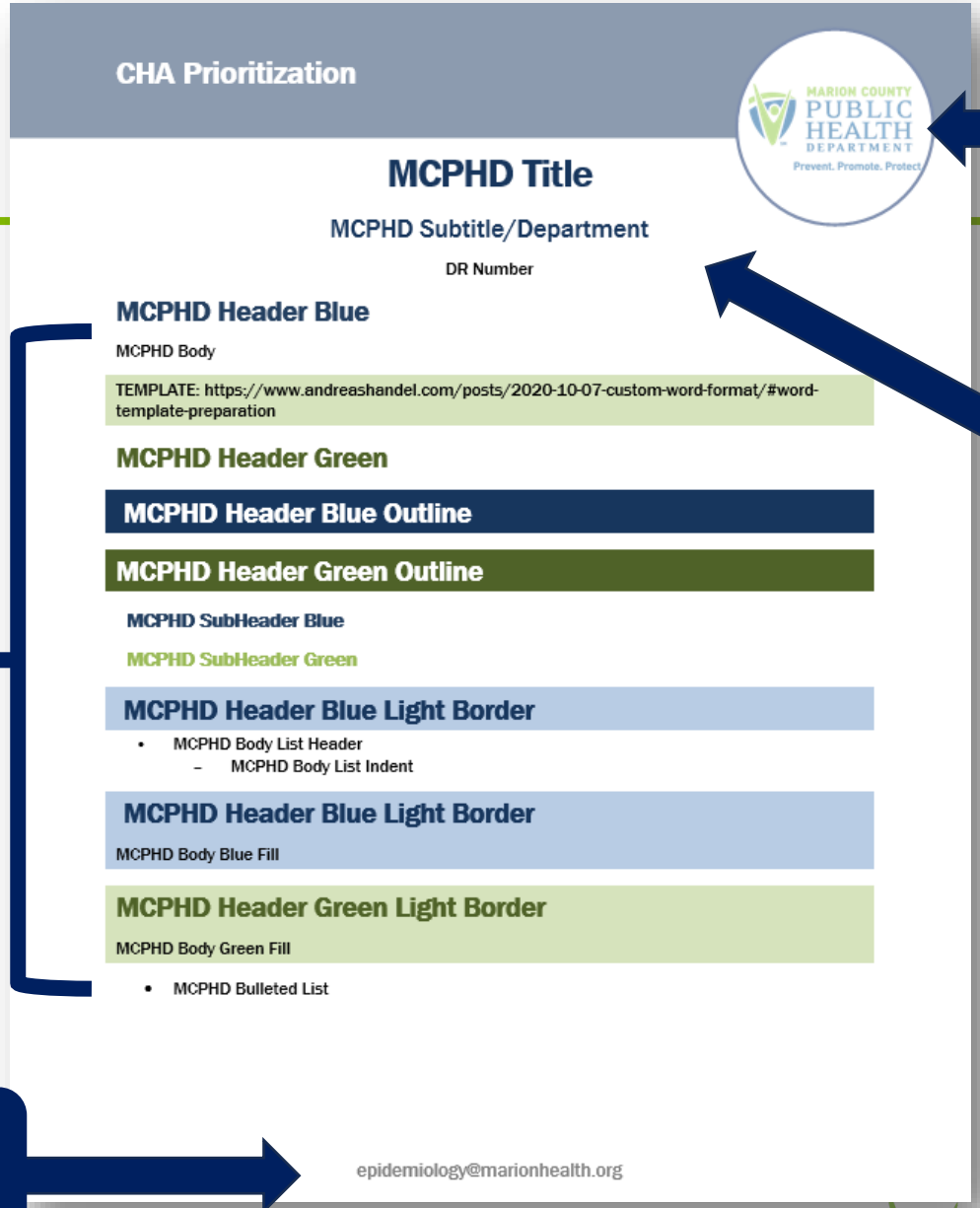
Document Design

- The first step in developing the Quarto Template focuses on layout, branding, and theme.
- Create, name, and save text styles, logos, headers, and footers within a reference Microsoft Word document.
- The word document is saved in the same folder as the Quarto template.



Header / Logo

Title

Text Styles

Footer

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Document Design

- 2 Word Documents Created
  - Blue theme
  - Green Theme

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Document Design

The Microsoft Word document was then called within the Quarto Template/R script

```
---
execute:
  echo: false
  warning: false
  message: false

format:
  docx:
    reference-doc: CHA_Data_Brief_Blue_Word_Template.docx

bibliography: references.bib
csl: american-medical-association.csl
---
```

Calling the word document and is now a reference for Quarto

How can others use this?

- Design Headers and Footers
- Customize Text
  - Save them as Styles, remember to give them an easy to remember name
- Get Creative!
  - Data Briefs, Newsletters, Posters, Meeting Minutes, Emails

Microsoft Document Design Inspo: https://create.microsoft.com/en-us/search?filters=word

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Graph Functions

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Goals for Graph Functions

- Streamline outputs – colors, fonts, labels, titles
- Easy to use for a variety of users
- Any updates to appearance can happen in one place instead of everyone editing their own code

Graph Function Planning

Examples of things that needed to be decided ahead of time:

- What charts were needed?
- What colors were going to be used on charts?
- Are there certain labels we want to be consistent?
- Should the graph backgrounds be white or transparent?
- What font size should the titles be? Should they be bold? Will they be centered?
- Should there be gridlines?
- Should there be a legend?
- What ggplot2 theme should we use?

Graph Functions

Developed R functions (custom reusable code snippets) that would require end users to enter some information and would output a chart without end users coding anything.

```
DemographicChartFx(dataset = Poverty_Age,
                   Xvar = Age_Group,
                   Yvar = Below_Poverty_Percent,
                   CILower = LowerCL,
                   CIUpper = UpperCL,
                   Ylabel = "Percent of Population Below Federal Poverty Threshold",
                   Xlabel = "Age Group",
                   DataSource = "US Census Bureau American Communities Survey, 5 year-estimates,
2018-2022",
                   GraphTitle = "Percent of the Population Below the Federal Poverty Threshold by Age
Group, Marion County, 2018-2022")
```

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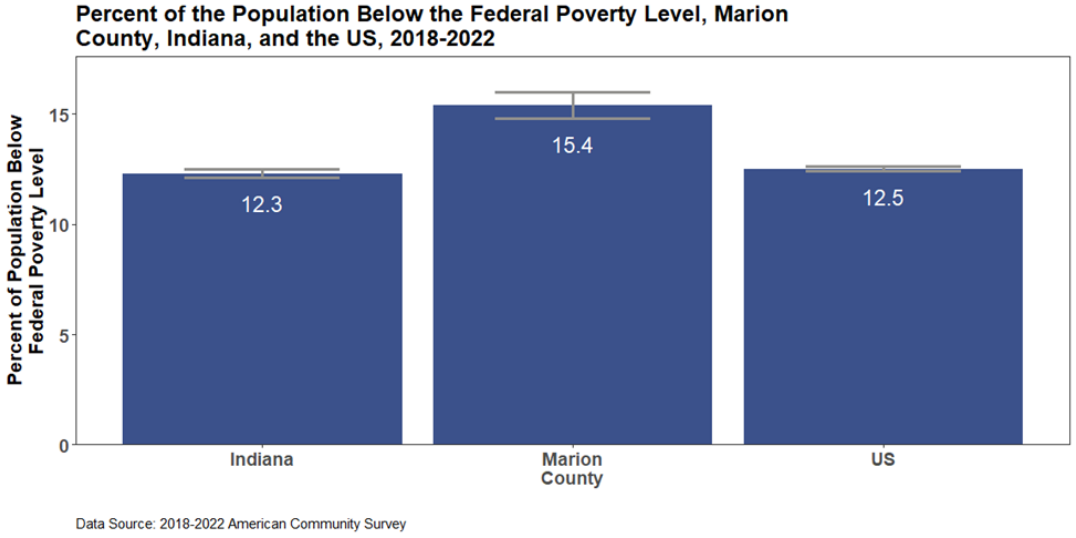
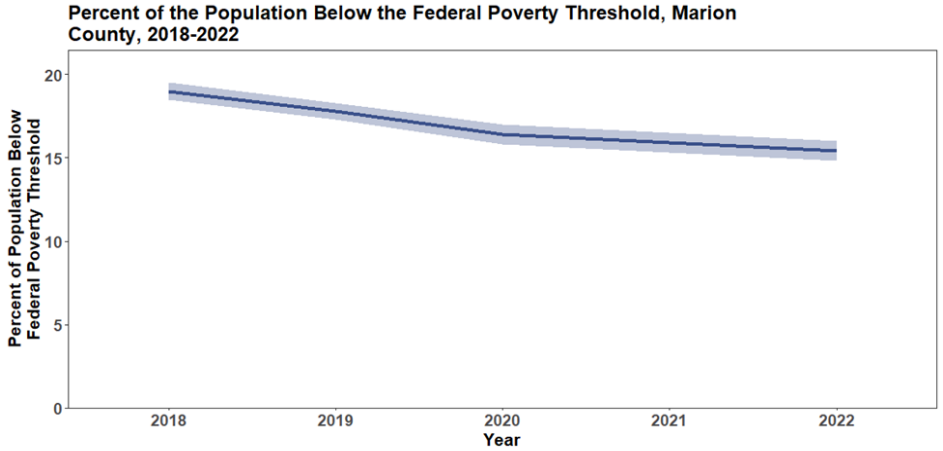
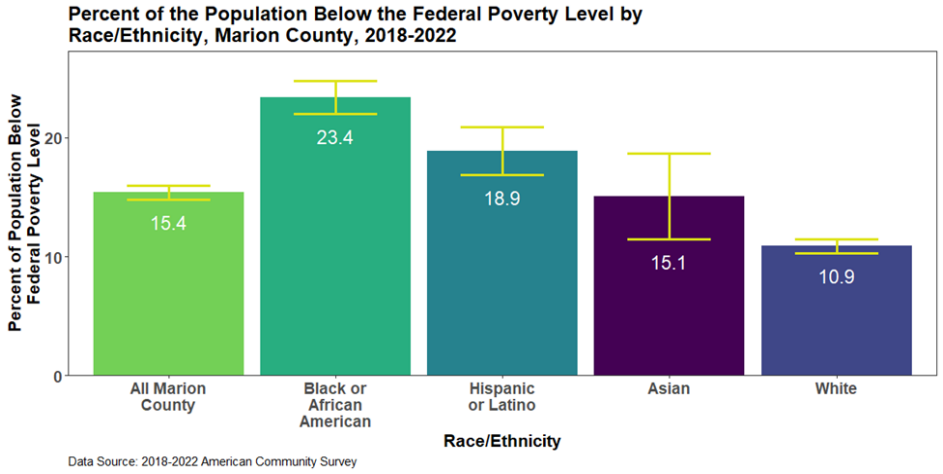
CHA Data Brief Graphs

We designed three different graphs to be used on the data briefs.







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Standard colors, labels, and themes

- Set up standard colors and labels
- Applied consistent theming to each graph

```
# set up colors for the error bar colors
# and one color charts
Error_Bar_Color <- "#dde318"
Gray_Error_Color <- "#91908d"
One_Color_Chart <- "#3b518b"

# Assign colors to each race/ethnicity
Race_Colors <- c("Black or African American" = Race_Color_Black,
                 "Hispanic or Latino" = Race_Color_Hispanic,
                 "White" = Race_Color_White,
                 "Asian" = Race_Color_Asian,
                 "Middle Eastern or North African" = Race_Color_MENA,
                 County_Label = Race_Color_County)

# Record the order of race/ethnicities on the x axis
Race_Levels <- c(County_Label, "Black or African American", "Hispanic or Latino",
                 "Asian", "White", "Middle Eastern or North African")
```

```
errorbar_geom +
# apply blank and white theme
theme_bw() +
theme(legend.position = "none",
      panel.grid.major = element_blank(),
      panel.grid.minor = element_blank(),
      axis.text = element_text(size = 14, face = "bold"), # bold, large font for the axis text
      axis.title = element_text(size = 16, face = "bold"), # bold, large font for the axis title
      plot.caption = element_text(hjust = 0, size = 11), # small font, left aligned
      plot.title = element_text(face = "bold", size = 18) # bold, large font for the title
```

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How can others use this?

- Change the County and County Label to your jurisdiction name
- Customize the colors
  - We choose colors from the viridis color palette
  - https://www.color-blindness.com/coblis-color-blindness-simulator/ - website to test your charts and see if they are color blind friendly

```
39
40  # set up some standard colors
41  Race_Color_Black <- "#28ae80"
42  Race_Color_Hispanic <- "#26828e"
43  Race_Color_White <- "#3F4788"
44  Race_Color_Asian <- "#440154"
45  Race_Color_MENA <- "#a5db36"
46  Race_Color_County <- "#73d056"
47
48  # set up county label
49  County <- "Marion"
50  County_Label <- "All Marion County"
51
52  # set up colors for the error bar colors
53  # and one color charts
54  Error_Bar_Color <- "#dde318"
55  Gray_Error_Color <- "#91908d"
56  One_Color_Chart <- "#3b518b"
```

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Quarto Template

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Goals for Quarto Template

- Easy to use and customize
- Standard layout with certain sections
- Standard reference style with Zotero

Planning Quarto Template

- How is the page supposed to be laid out?
- What sections should all data briefs have?
- Where should the charts go? What size looks best?
- What are all the different demographics someone might use?

Quarto Template

- We used the text styles we created in the Microsoft Word document and used the graphing functions to create one R Quarto template.
- Users would only need to import a dataset either from SAS or R, provide variable information for the graphs, and write text about their health topic to create their final data brief.

Quarto Template

- Outlined
- Commented to help guide the user
- Libraries and Word document already referenced/called

```
---
execute:
  echo: false
  warning: false
  message: false

format:
  docx:
    reference-doc: CHA_Data_Brief_Blue_Word_Template.docx

bibliography: references.bib
csl: american-medical-association.csl

::: {custom-style="MCPHD Header Blue Outline"}
References <!--# DO NOT EDIT -->
:::

::: {#refs custom-style="MCPHD Body"}
<!--# if citations in R aren't working, put the references here -->
:::
```

```
```{r, include=FALSE}
# Leave me here! I am the functions that will create the charts.
source("S:\\EPI\\Data Requests\\DR5114 Create R Functions and Programs for the next CHA\\DR5114 Data Brief Graph Functions.R")

# Import your data. If you wrote R code, use source to read your data in. If you used SAS, import your prepared data (csv, sas7bdat, excel, etc.)

source("S:\\EPI\\Data Requests\\DR5805 CHA Data Brief on Poverty\\DR5805 CHA Data Brief on Poverty.R")

```
```

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Quarto Template

Assigned text styles to the headers and body text throughout the Quarto Template

```
::: {custom-style="MCPHD Title"}
Poverty
:::

::: {custom-style="MCPHD Subtitle/Department"}
Marion County Public Health Department: Epidemiology <!--# DO NOT EDIT -->
:::

::: {custom-style="DR Number"}
DR5805
:::

::: {custom-style="MCPHD Header Blue Outline"}
Impact Score: 5 <!--# CHANGE ME! ADD YOUR IMPACT SCORE -->
:::
```

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Poverty

Marion County Public Health Department: Epidemiology

DR5805

Impact Score: 5

Living in poverty impacts almost all aspects of one's life. It impacts whether someone can afford to see a doctor or pay their medical bills, where they can afford to live, and their overall quality of life which can result in higher rates of morbidity and mortality. In 2022, 15% of Marion County residents live in poverty.

Definition

In this data brief, poverty refers to individuals and families whose income is below the Federal Poverty Threshold determined by the U.S. Census Bureau based on family size, age, and income. The Federal Poverty Threshold in 2023 for one individual was $15,480 and $31,200 for a household of four.[1]

Health Impacts

An individual or family's income impacts almost every aspect of their life including where they live, what resources they have available, and their overall quality of life.[2]

Low-income families and individuals are limited in what housing and neighborhoods are available and affordable to them. Lower income communities often have less access to fresh healthy foods and have a higher concentration of fast-food restaurants, as well as having higher instances of violence, fewer sidewalks, and more environmental pollutants.[2]

Low-income families and individuals are less likely to have health insurance compared to higher income families and individuals. They also have less access to primary and specialty care, are less likely to have a primary care provider, and may not receive care due to cost concerns.[2]

Individuals living in poverty experience shorter lifespans and higher instances of mental illness and chronic diseases such as heart disease and diabetes.[2]

Context

Marion County has a higher rate of poverty compared to the U.S. and Indiana. Marion County also has higher rates of poverty compared to other comparable counties in surrounding states, including counties for Chicago, Louisville, and Columbus.

epidemiology@marionhealth.org

```
::: {custom-style="MCPHD Title"}
Poverty
:::

::: {custom-style="MCPHD Subtitle/Department"}
Marion County Public Health Department: Epidemiology
:::

::: {custom-style="DR Number"}
DR5805
:::

::: {custom-style="MCPHD Header Blue Outline"}
Impact Score: 5 <!--# CHANGE ME! ADD YOUR IMPACT SCO
:::
```

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How can others use this?

- Add your word reference document to the reference doc: data step
- Place comments throughout your Quarto script to help with outlining
- Standardize your reference style with Zotero
- As you are creating, always run your code and critique the output

Zotero: https://www.zotero.org/

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Training

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Training

- Created example data briefs and Word document with instructions on creating a data brief.
- We held a recorded training session detailing how to create data brief.

CHA Data Brief Instructions

1. Open a data request like normal and prepare your data however you would like. When you start working with this template, you should have the data ready for graphing.
    a. Data can be analyzed in R or SAS; you get to choose. You can name the variables and dataset(s) whatever you like.
    b. Variables that will be displayed on the x axis should have labels suitable to be a on a graph. For example, "Female" instead of "F."
    c. The y axis variable should be formatted as a number.
    d. Race/Ethnicity field must be labeled accordingly:
        i. Black or African American
        ii. Hispanic or Latino
        iii. White
        iv. Asian
        v. Middle Eastern or North African
        vi. All Marion County
    e. Year should be the four digit format.
    f. Percentages should be times by 100. For example, 70 instead of .70.
2. Open the START HERE file (S:\EPI\Data Requests\DR5114 Create R Functions and Programs for the next CHA\DR5114 Data Brief START HERE.R) and enter the template color you are using, the DR number and the name of your DR folder at the top of the code. Highlight all the code and run.
3. In your DR folder, you should have four files added, the first three you should not edit:
    i. american-medical-association.csl
    ii. references.bib
    iii. CHA_Data_Brief_(Blue or Green)_Word_Template.docx
    iv. DRXXXX (Blue or Green) Template CHA Data Brief.qmd

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Results

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Data Brief Creation

~14 epidemiologists made data briefs. These data briefs were presented at the CHA prioritization meeting.

- Examples of Topics Included: Poverty, Overdose Data, Mental Health, Immunizations, Nutrition and Physical Activity

To create a data brief, end users had to:

1. Import data
2. Assign variables for graphing
3. Write the text for their section
4. Render data brief

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Recommendations and Future Projects

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Survey Results

We developed and sent a survey to end users after the data briefs to get feedback on the template and the process.

- Staff rated the template 4.14 on ease of use (5 being easiest)
- 100% of staff said the graph functions were easy to use and straightforward to understand.
- 100% of staff said they would use Quarto templates like this again.

Survey Testimonial

"I really liked that it brought in the functions/graphs that were predefined, on brand, etc. I had a learning curve since it was my first time with Quarto but there was so much documentation sent ahead of time, plus the notes in the R code were helpful. ... I really think we should lean more into Quarto so our products can be more on brand. I felt like it added a high degree of professionalism to the CHA briefs."

Issues and Recommendation

- Beginner R users struggled with Markdown text formatting and other R coding not included in the graph functions.
  - Recommend: Training and sharing resources about Markdown text formatting.
- Limitations with the graph functions. Some staff needed graphs that didn't fit into the scope of the functions.
  - Recommend: Having more types of graphs or having the staff create their own custom graphs with the formatting desired.
- Data briefs were text heavy with technical language.
  - Recommend: Design the template for less text and a higher-level view of the health topic.
- Zotero citations didn't work consistently.
  - Recommend: Make sure R is up to date and be prepared to enter them manually.

Future Projects

- Reuse graph function for the CHA report with edits
  - Made ordering on the x axis easier and part of the graph functions
  - Made labels removable
  - Formatting changes to fit the report style
- Expanding to use for different topics to share publicly

Thank you

Questions?

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jzuker@marionhealth.org

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