DROUGHT CONDITIONS IN THE US AND CRITIQUE

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Contents

DROUGHT CONDITIONS IN THE US

Data background

The US drought dataset used in this portfolio comes from the the TidyTuesday Github repo and represents data collected from the National Integrated Drought Information System dated from 1895 to 2022. The dataset has information including Date, Five (5) different levels of drought (Abnormal, Moderate, Severe, Extreme and Exceptional drought), Five different levels of wetness (Abnormal, Moderate, Severe, Extreme and Exceptional wet) and State of the United State. This data information is used in this portfolio to make six (6) different visualization. More detail about the dataset can be found on the Github link TidyTuesday.

Variable	Class	Description
0	numeric	Percentage area with no drought
DATE	date	Date
D0	numeric	Percentage area with Abnormal Drought
D1	numeric	Percentage area with Moderately Drought
D2	numeric	Percentage area with severe drought
D3	numeric	Percentage area with Extreme Drought
D4	numeric	Percentage area with Exceptional Drought
-9	numeric	Percentage area with missing data
W0	numeric	Percentage area with Abnormal Wet conditions
W1	numeric	Percentage area with Moderate Wet conditions
W2	numeric	Percentage area with Severe Wet conditions
W3	numeric	Percentage area with Extreme Wet conditions
W4	numeric	Percentage area with Exceptional Wet conditions
state	character	State

The drought dataset has 14 variables and 73,344 observations from year 1895 to 2022 and 48 States in US.

The relationship between Abnormal drought and Abnormal wet using Base R

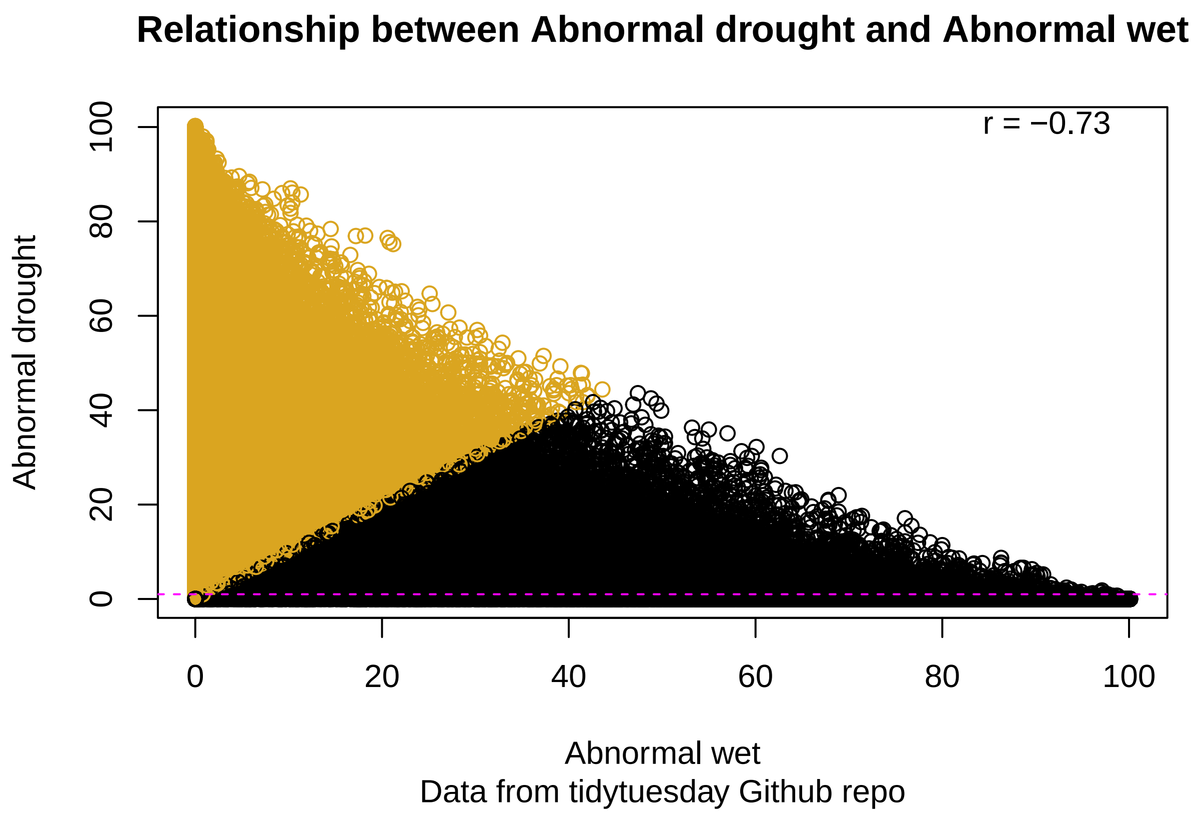


Figure 1: Scatter plot of the Relationship between Abnormal Drought and Abnormal Wet

Figure 1 shows a negative relationship between abnormal drought and abnormal wet condition of -0.73 correlation coefficient and a line to the plot using the abline function. This line has an intercept of 1 and a slope of 0, and it is drawn with a dashed line type (lty = 2) and a magenta color (col = "magenta"). The correlation coefficient value to the plot using the text function. The text is placed at the top right corner of the plot (pos = 2), and its x and y coordinates are set to the maximum values of abnormal drought and abnormal wet conditions, respectively.

Bar Chart of drought severity by state using ggplot

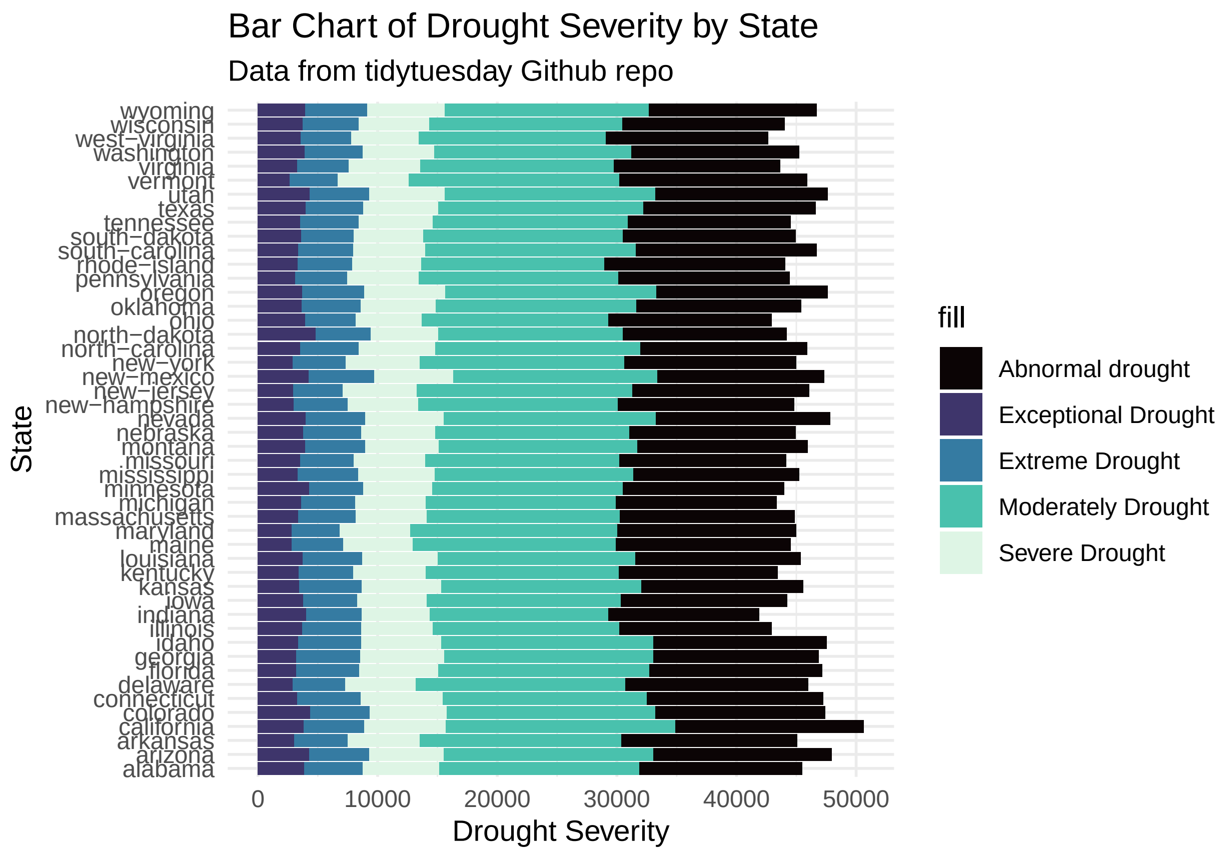


Figure 2: Bar chart of Drought levels by States

Figure 2 used the aesthetic function in ggplot to map the drought level plot. The x aesthetic is set to the State variable, and y is set to the severity of Abnormal, Moderate, Sever, Extreme, and Exceptional drought. The geom_bar function is used to create the bars for each drought level, and the fill aesthetic is set to the severity level name and it is observed that Moderate drought has the highest severity across the states. The coord_flip function was used to flip the chart horizontally to make it easier to read the state names.

Drought Severity levels over time from 2000 to 2022 Using line plot

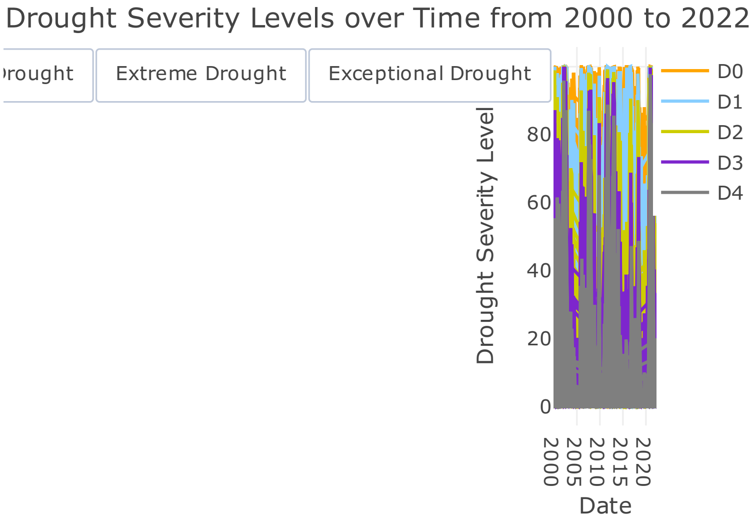


Figure 3: Interactive line plot for drought severity levels over time.

The above plot in figure 3 shows a line plot with a drop-down menu to select different drought severity levels over time. It shows the trends and changes in drought severity levels from 2000 to 2022 with the help of the function plotly. From the visualization, Abnormal drought has more residuals and Exceptional drought has the the least when clicked through the selected years.

Combination of a line chart and a scatter plot with jittered points of Abnormal drought conditions over time (ggplot)

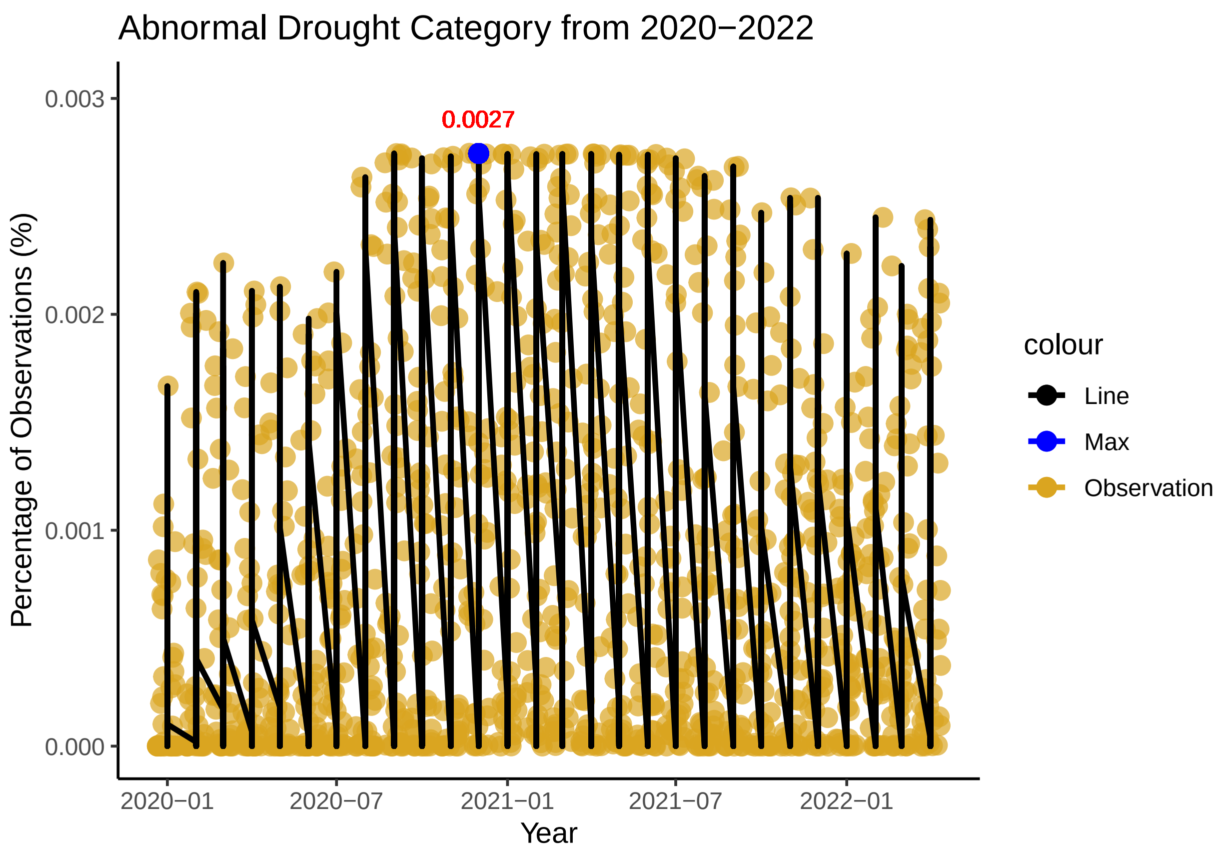
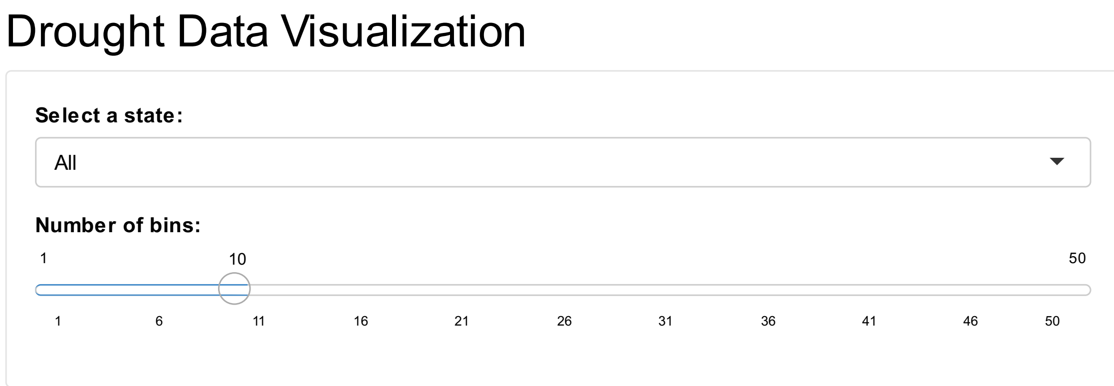


Figure 4: Percentage of observations in the Abnormal Drought Category from 2020 to 2022

Figure 4 shows the percentage observation of abnormal drought from year 2000 - 2022 which visualizes the maximum value and its corresponding date in the data, rounds the maximum value to 4 decimal places, and then uses ggplot to create a jittered line chart and with the maximum value point of 0.0027 within the last part of year 2020 and its label highlighted in blue. The plot is customized with axis labels, title, theme, and color scheme.

Time series plot of drought and wet conditions over time (ggplot)

```
##
## Listening on http://127.0.0.1:7992
```


Drought Data Visualization
Select a state:
All
Number of bins:
1
10
50
1 6 11 16 21 26 31 36 41 46 50

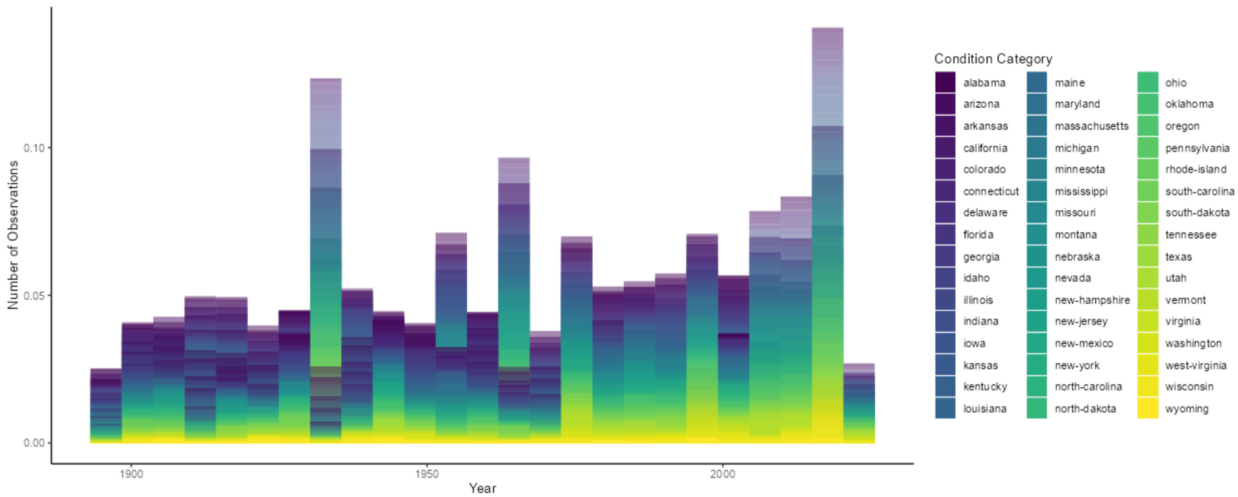


Figure 1: Drought with State over time

Figure 5: Interactive plot of drought with state data over time using Shiny

The output of figure 5 was created using Shiny app for visualizing drought data. The app has a sidebar panel with input controls for selecting a state and the number of bins in the histogram. The main panel displays a histogram plot that shows the percentage of observations in each condition category for the selected state. The visualization filters the data based on the selected state and calculates the percentage of observations in each category. The histogram is created using ggplot and has a legend that shows the fill color for each condition category. The app can be viewed on shiny. with the drop-down one can choose to view individual state or All the state to see their drought level.

Interactive map of US showing the total drought sum

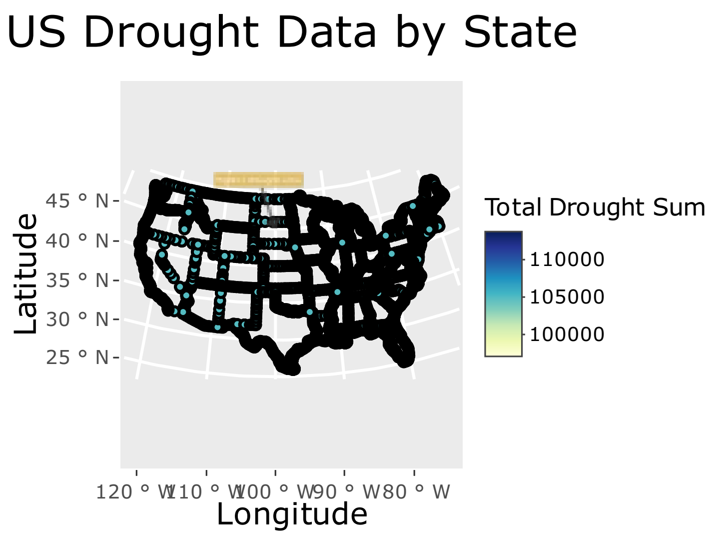


Figure 6:Interactive map of US showing the total drought sum

Figure 6 shows US state data on drought, aggregates of the drought data by state, joins of the aggregated data with state data, and plot of the total drought severity by state using ggplot2 and plotly. The resulting plot shows an interactive map of the US with states colored by the severity of drought. As the mouse moves over and through the map, total drought of the state is displayed and an arrow showing the area with the highest number of droughts around South Dakota.

CRITIQUE

Good Visualization

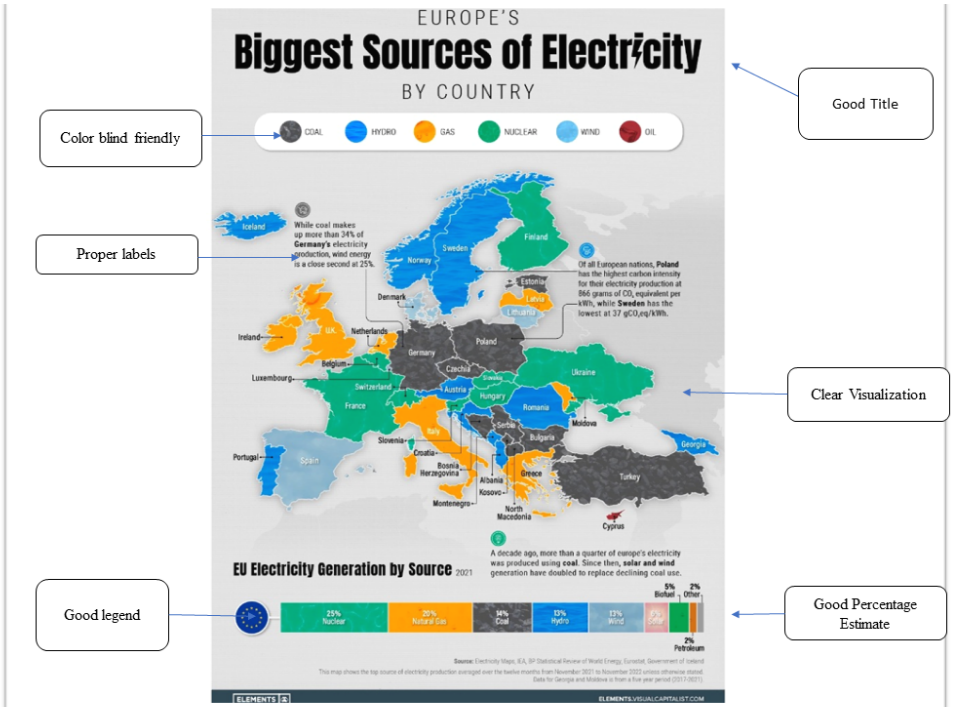


Figure 2: Europe's Biggest Source of Electricity

The visualization in Figure 7 provides a clear and concise overview of Europe's biggest sources of electricity by country. The map is an effective tool for communicating complex information to a wide audience, as it is easy to read, understand, and interpret. The map's title is descriptive, and it provides readers with a clear understanding of what they will be viewing. The color scheme is distinctive, making it easy for readers, including color-blind readers, to differentiate between energy sources. The placement of the legends and labels is appropriate, with areas of interest clearly labeled and statistical percentages accurately recorded. The clarity of the visualization ensures that readers can easily navigate the map without any help. Additionally, the labeled countries make it easy for those without a strong background in geography to understand which countries are being represented. The visualization's purpose is clearly conveyed, as readers can easily understand the distribution of electricity sources across Europe. The map allows readers to quickly identify the countries that rely heavily on certain sources of energy, providing valuable insights into the energy landscape of Europe. In conclusion, the visualization in Figure 7 is an effective communication tool that provides readers with a clear and concise overview of Europe's biggest sources of electricity by country. The map's well-designed title, distinctive color scheme, appropriate labels, and accurate statistics make it easy for readers to read, understand, and interpret the information presented. Overall, the visualization meets its purpose of informing readers about Europe's energy sources while also being accessible to a wide audience.

Bad Visualization

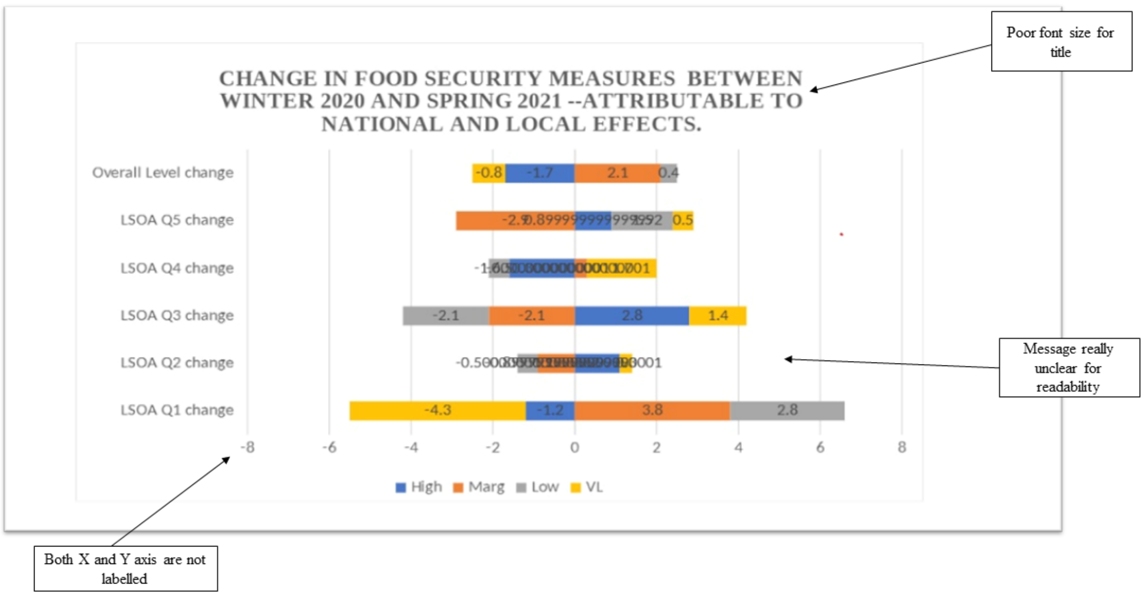


Figure 3: Changes in Food Security Measures

Figure 8 displays a bar graph that aims to illustrate the changes in food security measures between Winter 2002 and Spring 2021 and the contribution of both national and local effects. Although the visualization has a title, the font size is too big and may distract the reader from the actual message. Furthermore, the lack of labels for both the X and Y axes makes it difficult for the reader to comprehend what each outlined point or variable represents.

The message that was intended to be conveyed in the graph is unclear due to the poor spacing of figures in the bars. It is challenging to read the plot without serious mental calculations and straining of the eyes. Without a good knowledge of the subject topic, it is almost impossible for anyone to understand the changes within the plot and what each value represents.

One way to improve the visualization is by labeling the axes. This will make it easier for the reader to understand what each variable represents. Additionally, keeping the graph simple by making space to expand the graphics will enhance readability. Moreover, the audience should be the focus of the presentation, and this will influence the choice of graph. It may be more effective to use a line graph, which can better illustrate changes over time.

In conclusion, Figure 8's bar graph fails to communicate the intended message due to the lack of axis labels, poor spacing, and excessive font size. By implementing the proposed changes, such as labeling the axes and using a simpler, more reader-friendly graph type, the visualization could be more effective in conveying its message. The changes will enhance the visualization's readability, making it easier for readers to understand the changes in food security measures between Winter 2002 and Spring 2021.

Reference

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