**ISM6419.001F24.87700 – Data Visualization**

**Final Project Report**

**University of South Florida**

**ISM6419.901S24 -Data Visualization**

**Prof. Han Reichgelt**

|  |
| --- |
| Table of Contents |

1. Introduction
2. Ambitiousness Of The Project
3. Research Questions
4. Methodology
5. Visual Analysis Of Insights
6. Key Findings
7. Recommendations And Implementation
8. Conclusion
9. Additional Research Questions
10. References
11. **Introduction**

Mental health in the United States is a growing concern that touches nearly every individual in some way, whether directly or indirectly. Over the years, mental distress has become more pronounced, particularly as various socio-economic, cultural, and geographical factors come into play. The complexities of mental health are not just defined by clinical conditions, but are deeply influenced by aspects like age, gender, ethnicity, income levels, and even the prevalence of violence in certain regions. By examining mental distress rates across different states, demographics, and in relation to external factors, we uncover a story that is multifaceted and rich with insight. This visual analysis seeks to explore the intricate layers of mental distress, shedding light on how societal challenges contribute to the mental health crisis, while also offering potential pathways toward improving well-being across diverse populations.

1. **Ambitiousness of the Project**

* **Interdisciplinary Approach**: This study integrates psychology, public health, and sociology.
* **Advanced Methodologies**: Utilizes advanced data visualization and statistical modeling.
* **Global Impact**: Insights could contribute to global mental health discussions.
* **Policy and Practical Implications**: Findings can guide public health policies.
* **Future Research Pathways**: Opens doors for studies on mental health disparities.
* **Educational Contribution**: Enhances understanding of mental health patterns.

The project’s ambitiousness lies in its aim to bridge data analysis with actionable insights. By examining multiple indicators (age, ethnicity, income, violence), it brings a nuanced view that can influence both health policies and individual understanding of mental health.

1. **Research Questions**

* **What are the geographic patterns of mental distress in the U.S., and which states exhibit higher rates?**
  + Using a heatmap analysis, we can identify states with higher mental distress, helping to allocate mental health resources effectively.
* **How does mental distress vary across different age groups and gender?**
  + By exploring distress percentages across age and gender, we can understand which demographics are most affected.
* **How is mental distress correlated with violent crime rates across states?**
  + Analyzing correlations with violent crime rates reveals potential links between public safety and mental health.
* **Does income level correlate with mental distress rates?**
  + Studying income data allows us to assess if economic disparities influence mental health.
* **How has the trend in mental distress changed over the years?**
  + This trend analysis can inform policymakers on whether mental health issues are worsening over time.

1. **Methodology**

This study incorporates several key datasets to analyze mental distress across various dimensions, such as demographics, income levels, and crime rates. To provide a comprehensive overview, data from multiple authoritative sources has been gathered, cleaned, and processed. This methodology section details the origin, content, and role of each dataset, followed by the data processing applied.

1. **Datasets**
2. **Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Population Health**

* **Description:** This dataset offers valuable insights into mental health at the state level, focusing on various age groups, ethnicities, and genders. Specifically, it contains information about mental distress percentages across different states and demographic categories. This data enables an understanding of mental distress variations geographically and demographically, allowing for comparisons between groups and regions.
* **Source:** <https://catalog.data.gov/dataset/alzheimers-disease-and-healthy-aging-data>

1. **Federal Bureau of Investigation (FBI), Crime in the United States 2015 Report**

* **Description:** This dataset provides comprehensive crime statistics by state, focusing on violent crime rates. It is essential for examining the correlation between violent crime and mental distress levels across states. By understanding how crime influences mental health at the state level, the analysis can reveal societal factors that may contribute to heightened mental distress.
* **Source:** <https://ucr.fbi.gov/crime-in-the-u.s/2015/crime-in-the-u.s.-2015/tables/table-5>

1. **World Population Review, Crime Rate by State (2023)**

* **Description:** This dataset presents recent crime rates, allowing for an updated perspective on the relationship between crime and mental distress. Comparing this data with historical crime rates helps establish trends in mental health that may be affected by changes in the crime rate over time. It provides further insight into potential increases or decreases in mental distress in response to fluctuations in societal safety.
* **Source:** <https://worldpopulationreview.com/state-rankings/crime-rate-by-state>

1. **Data Cleaning and Processing**

* **Removing Duplicates and Handling Missing Values:** To ensure the reliability and accuracy of the analysis, any duplicate records within each dataset were removed. Additionally, missing data points were addressed through imputation methods, such as filling missing values with mean or median values, or through cross-referencing available data from alternate sources when possible.
* **Data Normalization:** Since the data comes from various sources with potentially different formats, normalization was essential to ensure consistency. For instance, income levels were adjusted to a standard dollar value, and percentages for mental distress were calculated uniformly. Crime rates were recalibrated to a per-100,000 population standard to allow fair comparisons across states with varying population sizes.
* **Statistical Validation and Verification**: To ensure data accuracy, statistical checks were implemented, including range verification (e.g., confirming that percentage values did not exceed 100) and outlier analysis to detect any anomalies. These steps helped to confirm that the data values aligned with expected distributions and minimized the risk of analysis distortion due to incorrect data points.
* **Integration of Datasets:** Once cleaned and normalized, the datasets were merged based on common identifiers such as state names. This integration facilitated a cross-sectional analysis, enabling the simultaneous examination of mental distress alongside demographic, income, and crime data for each state.

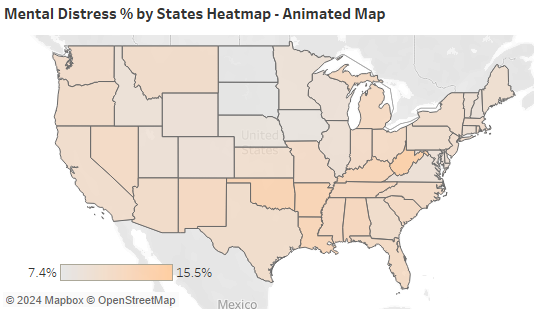
By combining, cleaning, and integrating these datasets, the methodology establishes a robust framework to explore relationships between mental distress and factors such as crime, income, and demographics. This structured approach supports an in-depth analysis, leading to insights on how societal and economic factors interplay with mental health.

**5.Visual Analysis of Insights**

In a world of increasing complexity, the mental health landscape in the United States provides a window into the well-being of diverse populations across the country. By exploring mental distress rates at the state level, across demographics, and alongside factors like income and violence, we see a unique narrative unfold. This story is not just about numbers; it’s about how socioeconomic, demographic, and geographic forces converge to shape mental health outcomes for millions of Americans.

* **Mental Distress % by States (Heatmap)**

Visualizing the mental distress percentage across states through a heatmap immediately unveils striking geographical disparities. From North Dakota to West Virginia, states exhibit significant variation. States like North Dakota (7.4%) and South Dakota (7.6%) display relatively lower distress percentages, painting a picture of potential social stability or robust mental health resources.



Conversely, West Virginia emerges as an outlier, with the highest average mental distress percentage at 15.5%. This stark contrast may reflect socio-economic challenges, public health disparities, or unique stressors affecting residents.

As we look further west, we notice that states like Oklahoma (14.3%), Arkansas (13.9%), and Kentucky (13.5%) also experience elevated levels of mental distress, suggesting a regional trend in distress that correlates with some socio-economic issues in these areas. This heatmap insight sets the stage, highlighting the places where distress is felt most strongly across the United States, suggesting a need for localized interventions.

* **Mental Distress % Trend Over the Years**

The mental health story becomes more dynamic when we examine the trend in mental distress over recent years. In 2015, the average mental distress percentage was about 10.3%. However, by 2022, this number had climbed to nearly 11.8%. The year-on-year data reveals a gradual, yet persistent increase in mental distress, indicating that issues of mental health are not static but are intensifying.

Interestingly, the data from 2020 to 2022 aligns with the period of the COVID-19 pandemic, which brought immense challenges to individuals’ mental well-being. This rise reflects not only the direct effects of the pandemic but also the lingering economic, social, and healthcare-related impacts. The upward trend tells a compelling story of a society under increasing pressure, where mental health has become a progressively significant public concern.

A graph with a line

Description automatically generated

* **Mental Distress % by Age & Gender**

Looking deeper into age and gender sheds light on how mental distress is distributed across different life stages. Middle-aged adults (ages 50-64) report the highest levels of distress at 12.9%, possibly due to stressors related to careers, family responsibilities, and financial stability. Individuals aged 65 and older, on the other hand, report the lowest mental distress at 7.7%, potentially indicating greater resilience or established social support systems in older age groups.

Gender, too, reveals distinct patterns, with females reporting an average mental distress percentage of 12.1%, significantly higher than males, who report 8.6%. This discrepancy aligns with broader research suggesting that women often face higher levels of stress, likely due to gender-based social and economic pressures. These findings underscore the importance of gender-sensitive mental health support structures.

A graph of a number of people with numbers

Description automatically generated with medium confidence

* **Mental Distress % by Ethnicity**

The diversity of experiences within racial and ethnic groups paints a powerful picture of how mental health is affected by systemic factors. Native American and Alaskan Native communities experience the highest average mental distress (18.5%), followed closely by Hispanic and Black communities, with distress rates of approximately 13%. This pattern points to the impact of historic and systemic challenges, such as socioeconomic disparities and limited access to healthcare, that may disproportionately affect these communities.

A graph of different colored squares

Description automatically generated

Conversely, Asian/Pacific Islander communities report the lowest distress rates at 7.0%, followed by White, non-Hispanic individuals at around 10%. This data suggests that tailored, culturally sensitive mental health programs are essential to address the varying needs of these groups. Recognizing and responding to these disparities can help policymakers focus on targeted initiatives for communities experiencing the highest distress.

* **Mental Distress % by Gender**

Mental health disparities by gender are also essential in this narrative. Here, women’s mental distress is consistently higher, a trend that may reflect the layered responsibilities and social expectations that women face, from career demands to family obligations. Female distress percentages at 12.1%, compared to 8.6% for males, reveal a gender gap that calls for support systems sensitive to gender-specific pressures.

A graph of different colored squares

Description automatically generated

* **Mental Distress vs. Violence Correlation**

Moving into external influences, we find that mental distress levels are closely tied to violent crime rates across states. States like New Mexico and Louisiana, where violent crime rates per 100,000 are among the highest, also report some of the highest mental distress levels. For example, New Mexico shows a violent crime rate of 778 incidents per 100,000 alongside high mental distress levels of 10.7%.

This insight suggests that high crime environments may intensify mental health issues for residents. Violence can create a constant state of anxiety, leading to chronic stress and mental health decline. The correlation between these two factors emphasizes the importance of addressing community safety as part of a comprehensive mental health strategy.

A graph with dots and lines

Description automatically generated

* **Mental Distress vs. Median Income Correlation**

As we examine the impact of income, we see a trend where states with lower median incomes, such as Mississippi and Arkansas, report higher mental distress rates. Conversely, states with higher median incomes, such as Maryland, have lower distress rates. This data highlights how economic factors like income stability and access to resources influence mental health outcomes, indicating that economic empowerment programs may be beneficial.

A graph of a line graph

Description automatically generated with medium confidence

* **Mental Distress vs. Violence Trends**

Examining trends in violent crime rates alongside mental distress over time reveals a fascinating intersection. While the average violent crime rate has seen slight fluctuations, mental distress has trended upward, suggesting that while crime alone does not fully explain rising distress, it may amplify it. This relationship underlines that a holistic approach to reducing mental distress would involve reducing violent crime as one component.

A graph with a line and text

Description automatically generated

* **Mental Distress vs. Median Income Trends**

Finally, we analyze the trends in income and mental distress. Between 2015 and 2020, median income showed an upward trend; however, mental distress also rose, suggesting that while income plays a role, it is not a singular factor. This insight points to the complexity of mental health, where multiple elements such as income stability, social safety, and healthcare access must be aligned to see a meaningful decline in distress rates.

A graph with a line and text

Description automatically generated

These insights create a vivid tableau of mental health in America. From geography to gender, ethnicity, and socioeconomic factors, the analysis tells a story of mental distress as an intricate, multi-faceted issue. This narrative reveals the importance of a comprehensive approach to mental health, one that considers crime reduction, income support, and tailored programs for at-risk groups. By addressing these insights collectively, stakeholders can make strides in alleviating the mental health crisis gripping the nation.

**6.Key Findings**

* **Geographic Variance**: Mental distress rates vary significantly by state, with higher rates in certain states potentially linked to economic or social conditions.
* **Increasing Trend**: Mental distress has shown a steady increase over the years, with a notable rise in the past few years.
* **Age, Gender, and Ethnicity Impact**: Certain demographics, particularly middle-aged adults and ethnic minorities, exhibit higher levels of distress.
* **Correlations with Violence and Income**: Higher violence rates and lower income levels correlate with increased mental distress, suggesting the need for policies addressing these root causes.

**7. Recommendations and Implementation**

* **Policy Interventions**: Increase mental health funding in high-distress states and create targeted programs for vulnerable populations, such as ethnic minorities and low-income groups.
* **Community Safety**: Implement community-driven safety initiatives to reduce crime and, in turn, alleviate associated mental distress.
* **Income Support Programs**: Introduce or expand financial assistance programs to support mental health in economically disadvantaged regions.
* **Continued Monitoring**: Establish continuous data collection efforts to monitor mental health trends and adapt strategies accordingly.

**8. Conclusion**

* In summary, the analysis reveals important insights into the geographic, demographic, and socioeconomic factors influencing mental distress in the U.S. By examining these elements, we see clear disparities that align with issues in income and violence rates, as well as differences by age, gender, and ethnicity. This data-driven approach underscores the need for multi-faceted solutions, combining policy changes, community initiatives, and economic support. As mental distress continues to rise, timely intervention is crucial to alleviate these growing challenges and improve mental health across the nation.

**9.Additional Research Questions**

* **How do education levels affect mental distress rates?**
* **What is the impact of healthcare access on mental distress?**
* **How does social support influence mental distress in high-violence areas?**
* **Are urban or rural populations more susceptible to mental distress?**
* **What is the effect of substance abuse rates on mental distress?**

**10.References**

* Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Population Health. (n.d.). *Alzheimer’s Disease and Healthy Aging Data*. Data.gov. Retrieved from <https://catalog.data.gov/dataset/alzheimers-disease-and-healthy-aging-data>
* Federal Bureau of Investigation. (2015). *Crime in the United States 2015: Table 5 - Crime in the U.S. by State*. Retrieved from <https://ucr.fbi.gov/crime-in-the-u.s/2015/crime-in-the-u.s.-2015/tables/table-5>
* World Population Review. (2023). *Crime rate by state*. Retrieved from <https://worldpopulationreview.com/state-rankings/crime-rate-by-state>