FOOD INSECURITY IN U.S.-MEXICO BORDER COUNTIES: DATA VISUALIZATION ANALYSIS
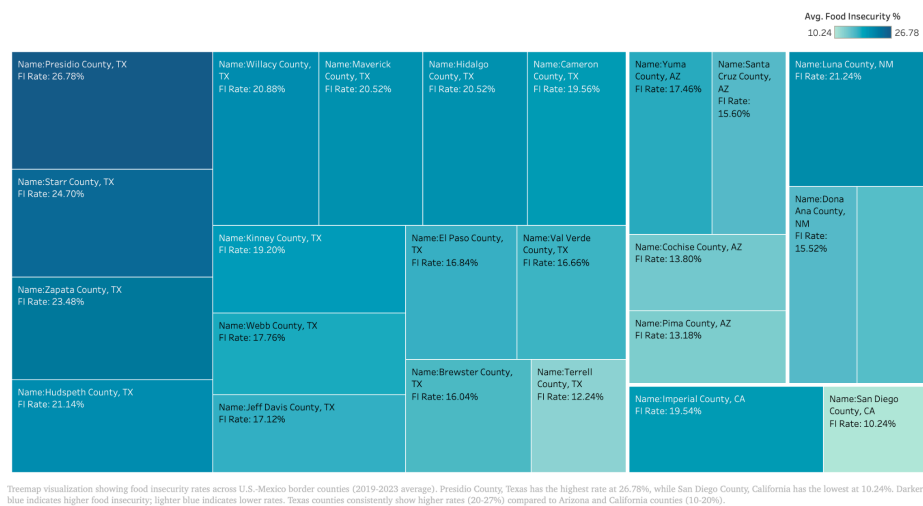
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For our Deliverable 3 assignment, we created 5 visualizations in Tableau to show trends surrounding food insecurity metrics along the US and Mexico border.

**Dashboard Link:** Deliverable 3: Dashboard

Visualizations Created:

1. **Food Insecurity Rates Across Border Counties Average (2019-2023)**

Treemap visualization showing food insecurity rates across U.S.-Mexico border counties (2019-2023 average). Presidio County, Texas has the highest rate at 26.78%, while San Diego County, California has the lowest at 10.24%. Darker blue indicates higher food insecurity; lighter blue indicates lower rates. Texas counties consistently show higher rates (20-27%) compared to Arizona and California counties (10-20%).

This visualization shows an overview of average food insecurity rates across the U.S. and Mexico border counties, filtering the years from 2019 to 2023. We displayed each county as a proportional tile, and the chart highlights the substantial geographic differences in food insecurity across the border region. The visualization reveals a clear east-to-west pattern: Texas border counties experience the highest levels of food insecurity, ranging from 20% to 27%, whereas Arizona and California counties exhibit significantly lower averages, ranging from 10% to 20%. With this, we can see that Presidio County, TX had the highest average food insecurity rate at 26.78%, while San Diego County, CA had the lowest at 10.24%.

These differences highlight how food insecurity is not evenly distributed across the border. Counties in Texas and parts of New Mexico face more severe challenges compared to the counties in Arizona and California. This visualization helped us identify which areas are most vulnerable and provided an important foundation for comparing socioeconomic factors that may contribute to these disparities.

2. Food Insecurity Trends: Border vs. Non-Border Counties (2019-2023)


County Status
■ Border County ■ Non-Border
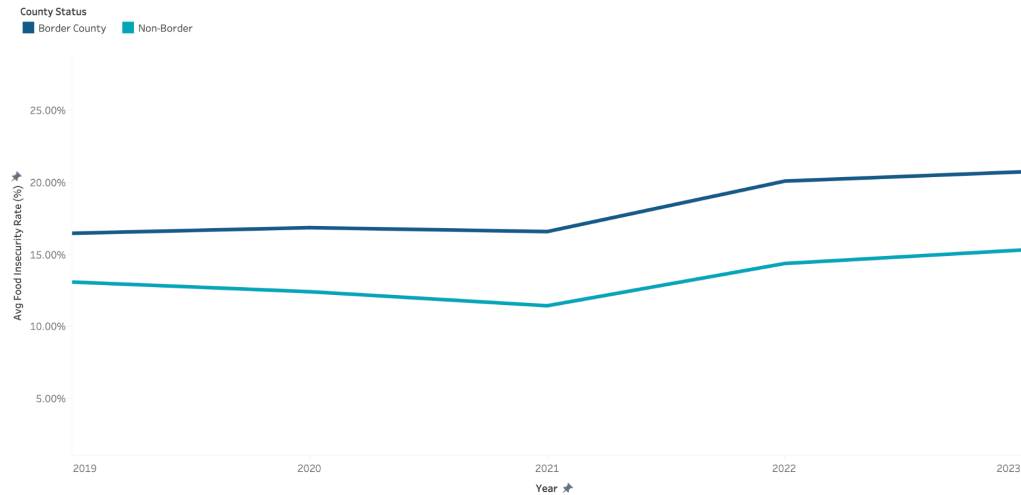
To examine the differences in food insecurity over time, we created a line chart comparing the average food insecurity rate in border and non-border counties, filtering the years from 2019 to 2023. This visualization uses the variable Year on the x-axis and the average food insecurity rate on the y-axis, with two continuous lines representing each county group to show the correlation. With this, we are able to see that both groups remain relatively stable through 2019–2020 and then show a clear upward trend starting in 2021. Border counties rose from 16.6% in 2019 to 20.73% in 2023, and non-border counties increased from 11.4% to 15.3% over the same period.

This visualization makes it clear that border counties consistently face substantially higher food insecurity than non-border counties, and the gap between the two groups has widened over time, growing from about 3.1 percentage points in 2019 to roughly 5.3 percentage points by 2023.

3. Socioeconomic Factors Affecting Food Insecurity in Border Counties

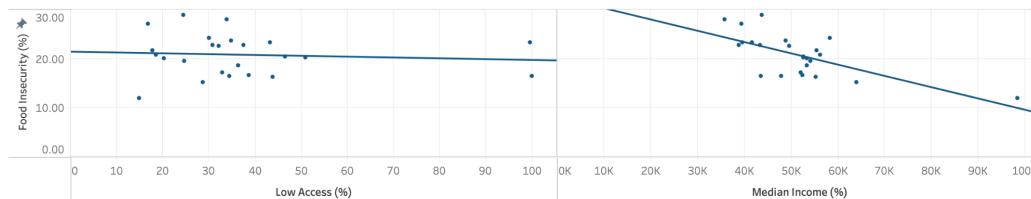### Poverty and Unemployment: Drivers of Food Insecurity

Poverty and unemployment both demonstrate positive correlations with food insecurity in border counties. Poverty shows a substantially stronger relationship, with higher poverty rates consistently associated with elevated food insecurity. Unemployment also increases food insecurity, though with more variability in the data. Together, these economic hardships are primary drivers of food insecurity.
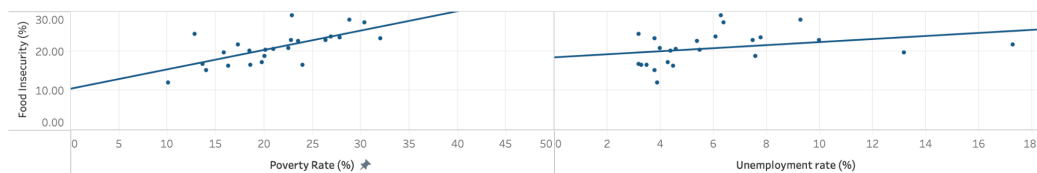
Average of Poverty Rate Pct and average of Unemployment rate 2023 vs. average of Food Insecurity Percent. Color shows details about Is Border County. Details are shown for County. The data is filtered on Year, which ranges from 2023 to 2023. The view is filtered on Is Border County, which keeps Border County.

Income and Food Access: Impact on Food Insecurity

Median income is a strong negative predictor of food insecurity—higher incomes significantly reduce food insecurity rates. Low food access, however, shows minimal correlation with food insecurity, indicating that economic capacity to purchase food is far more critical than geographic proximity to food sources in determining food insecurity in border counties.

Average of Low Access Pct and average of Median Income vs. average of Food Insecurity Percent. Color shows details about Is Border County. Details are shown for County. The data is filtered on Year, which ranges from 2023 to 2023. The view is filtered on Is Border County, which keeps Border County.

To better understand the underlying factors associated with food insecurity in border counties, we developed four scatterplots showing relationships between food insecurity and key socioeconomic indicators. Two plots highlight "drivers" of food insecurity (poverty and unemployment), and two reflect "impacts" on food insecurity (income and food access). All plots were filtered to the year 2023 for a consistent comparison.

    a.   Drivers of food insecurity:

The first scatter plot we made compared the average poverty rate and food insecurity rate per each border county. This plot has a strong positive correlation, meaning that when the poverty rate increases in each border county, the food insecurity rate also increases.

The second scatter plot we made compared the average unemployment and food insecurity rate per each border county. This plot also had a strong positive correlation, meaning that when the unemployment rate increases in each border county, the food insecurity rate also increases.

    b.   Impact on food insecurity:

The first scatter plot we made compared the average low access rate (proximity to food sources) and food insecurity rate per each border county. This plot has a weak negative correlation, meaning that when the low access rate increases in each border county, the food insecurity rate slightly decreases.

The second scatter plot we made compared the average median income and food insecurity rate per each border county. This plot shows a strong negative correlation, meaning that when the average median income increases in each border county, the food insecurity rate decreases.

All together, these scatterplots helped us determine which socioeconomic variables are most strongly connected to food insecurity by illustrating the different levels of influence that each variable has on border counties.

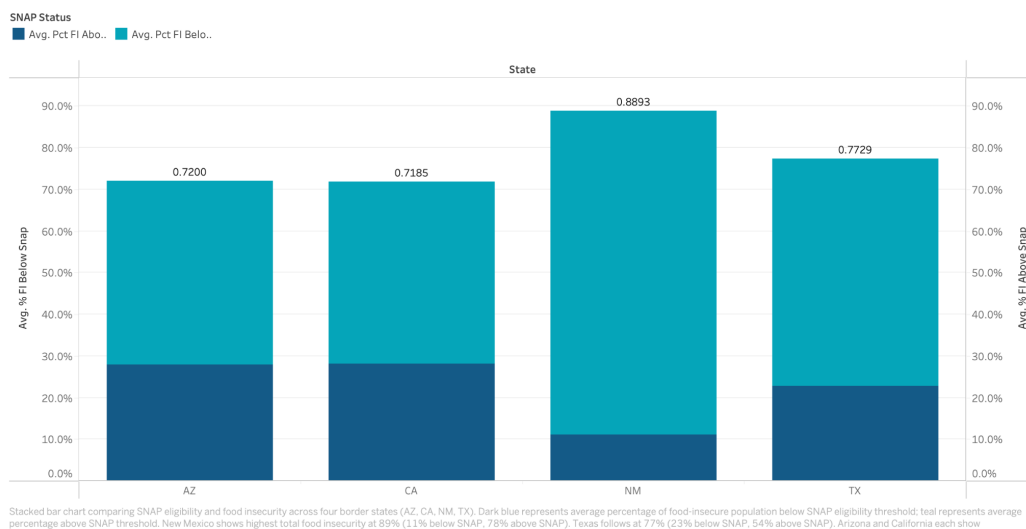## 4. Child Food Insecurity Rates in Border Counties (2019-2023)
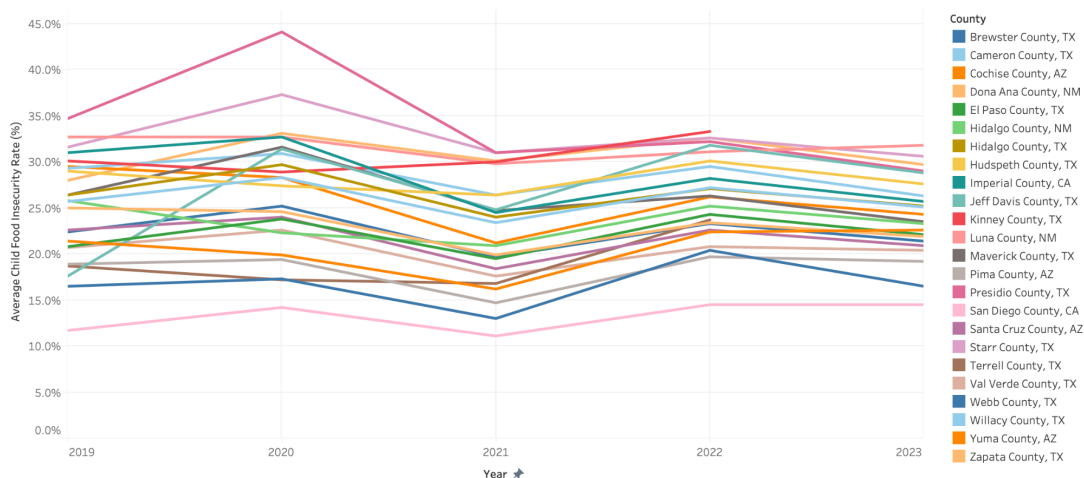
Multi-line chart showing child food insecurity rates across 25 border counties from 2019 to 2023. Rates range from approximately 10% to 45%. Peak rates occurred in 2020, with most counties showing decline or stabilization through 2023. Texas and New Mexico counties show consistently higher rates than Arizona and California border counties.

We created a multi-line chart to compare the child food insecurity rate in 25 border counties, filtering the years from 2019 to 2023. The plot shows that the child food insecurity rate peaked during Covid in 2020, then declined into 2021, and stabilized afterwards until 2023.

The county with the highest peak in child food insecurity rate during Covid, was Presidio County in Texas, while the county with the lowest peak was San Diego County in California. This pattern suggests that child food insecurity varies by location, with the Texas and New Mexico border counties showing much higher rates than the border counties in Arizona and California.

The visualization demonstrates that child food insecurity is a persistent challenge in many parts of the border region, with significant differences across states.

5. **SNAP Eligibility and Food Insecurity in Border States (2023)**

Stacked bar chart comparing SNAP eligibility and food insecurity across four border states (AZ, CA, NM, TX). Dark blue represents average percentage of food-insecure population below SNAP eligibility threshold; teal represents average percentage above SNAP threshold. New Mexico shows highest total food insecurity at 89% (11% below SNAP, 78% above SNAP). Texas follows at 77% (23% below SNAP, 54% above SNAP). Arizona and California each show

This visualization shows how the food insecurity rates in border states (Texas, New Mexico, Arizona, and California) relate to SNAP (Supplemental Nutrition Assistance Program) eligibility. We separated the food-insecure population per state into those that were below the SNAP income threshold and those that are above the threshold. We are able to see that New Mexico faces the most severe overall food insecurity, with approximately 88.9% of its food-insecure population below the SNAP threshold and 11% above. Texas border counties show about 77% of the food-insecure population below the SNAP threshold and 23% above. California and Arizona show similar patterns, with roughly 72% of their food-insecure populations below the SNAP threshold and 28% above.

Overall, this visualization highlights how well the federal assistance aligns with economic food vulnerability across the border states. It reflects an important gap that many food-insecure individuals along the border are not eligible for SNAP benefits.