Mapping Civic Inequality in Texas: Gardens and Deserts of Democratic Engagement

Adilene Garibay, John Glendenning, Elise Ann Sawyer

EPPS 6356 Data Visualization

October 15, 2025

Introduction:

Texas presents a striking landscape of civic inequality. While some counties demonstrate robust political participation alongside strong educational attainment and positive health outcomes, which we term *civic gardens*, others exhibit significant deficits across these dimensions, forming *civic deserts*. This project maps and analyzes the spatial distribution of voter turnout, educational achievement, and health indicators across Texas counties to reveal the interconnected nature of civic engagement and community wellbeing.

Using advanced data visualization techniques, we will create an interactive dashboard that enables users to explore these relationships and identify patterns of democratic inclusion and exclusion across the state.

Research Objectives

This study examines the spatial distribution of civic engagement in Texas through three interconnected dimensions:

- Political Participation: County and precinct-level voting patterns
- Educational Attainment: Rates of educational achievement across communities
- Health Outcomes: Physical and mental health indicators at the county level

Our central research questions include:

- How do voter turnout rates vary across Texas counties.
- What are the emerging spatial patterns?
- What is the relationship between educational attainment and political participation?
- Do health outcomes correlate with civic engagement levels?
- Can we identify distinct clusters of civic gardens and civic deserts across the state?

Data Sources and Variables

Political Participation

Source: Harvard Dataverse - Texas Voting and Election Science Team

Primary Variables:

County-level voter turnout for the 2020 presidential election

- Precinct-level turnout data where available
- Registration rates and voting-eligible population

Secondary Analysis (if time permits): Comparison with 2016 and 2024 election data to identify trends

Educational Attainment

Source: American Community Survey (ACS) 5-Year Estimates

Primary Variables:

- Percentage of population (25+) with bachelor's degree or higher
- Percentage with high school diploma or equivalent

Secondary Variables:

- Employment rates and labor force participation
- Median household income
- Age distribution

Health Indicators

Source: CDC PLACES (Population Level Analysis and Community Estimates)

Primary Variables:

- Self-reported general health status (% fair or poor health)
- Mental health indicators (% frequent mental distress)
- Preventive care access (% with health insurance)

Secondary Variables (if time permits):

- Obesity prevalence
- Physical activity rates
- Routine checkup frequency

Methodology

Data Processing

- Data Acquisition: Download and clean data from Harvard Dataverse, American
 Community Survey, and CDC Places
- Spatial Integration: Join datasets to Texas county shapefiles using FIPS codes
- Variable Standardization: Create normalized indices for comparison across counties
- Classification: Develop a composite civic health score combining turnout, education, and health metrics

Analytics

- Cluster Analysis: Identify natural groupings of counties with similar civic profiles
- Correlation Analysis: Examine relationships between education, health, and turnout
- Outlier Detection: Identify counties that deviate from expected patterns
- Spatial Analysis: Test for geographic clustering and regional patterns

Visualization Strategy

Core Visualization: ggplot2 and tidyverse

- Create publication-quality static visualizations
- Generate consistent, reproducible plots across all analyses
- · Build custom themes matching project branding

Interactive Dashboard: shiny

- Enable user-driven exploration of data
- Allow filtering by region, demographic characteristics, and time period
- Provide dynamic updates as users adjust parameters

Spatial Data Management: tigris and sf

- Create interactive choropleth maps of Texas counties
- Access TIGER/Line shapefiles directly from Census Bureau
- Ensure compatibility with ACS data structures
- Maintain consistent geographic boundaries

Relevance and Conclusion:

By visualizing civic engagement as a spatial phenomenon, this project makes abstract political concepts tangible and interpretable. The *civic health* as demonstrated by the *civic gardens* and *civic deserts* framework provides an accessible metaphor for understanding how geography, health, and education shape democratic participation.

This work could help understand and shape:

- Targeted civic engagement interventions
- Resource allocation for community health initiatives
- Educational policy and outreach strategies
- Future research on the interconnected nature of civic life