Health & Socioeconomic Factors Dashboard Documentation

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Motivation

This project aims to help users explore the relationships between socioeconomic factors and health outcomes across US counties. By visualizing the data interactively, we provide insights into how income, education, and environmental factors correlate with health conditions such as stroke rates, heart disease, and high blood pressure. This dashboard allows policymakers, researchers, and the general public to better understand disparities in health outcomes and potential areas for intervention.

Data

The dataset used for this project is sourced from the US Heart and Stroke Atlas, maintained by the CDC. The dataset includes:

- Economic indicators: Poverty percentage, median household income, education levels
- Environmental factors: Air quality, park access
- Behavioral factors: Smoking rates, physical inactivity
- Demographics: Elderly population percentage, urban/rural classification
- Healthcare access: Number of hospitals, primary care physicians, uninsured population
- Health metrics: High blood pressure, stroke, heart disease, cholesterol levels

Data Access:

- CDC Heart and Stroke Atlas: https://www.cdc.gov/dhdsp/maps/atlas/index.htm
- Processed Dataset: [Download national_health_data_2024.csv](https://drive.google.com/file/d/13MDFw3n5EQ0IK9g_qFdxsHaLxVsss_lv/view?usp=drive_link)

Visualization Components

1. Interactive Scatter Plot

- Plots relationships between socioeconomic factors and health outcomes.
- Users can select different variables to see correlations.
- Data points update dynamically based on selections.

2. Choropleth Map

- Displays the geographic distribution of health and economic metrics across counties.
- Users can hover over counties for detailed data.
- Color-coded based on selected health or economic metric.

3. Distribution Histogram

- Shows the distribution of health outcomes across the dataset.
- Users can filter by different demographic groups.

4. Urban/Rural Comparison

- A comparative view of health outcomes between urban and rural counties.
- Highlights disparities in healthcare access and health conditions.

5. County Details Panel

- Displays detailed information for a selected county.
- Shows economic, health, and demographic data.

6. Dynamic Filtering

- Users can filter data by area type (urban, rural, suburban) to refine their insights.

Findings & Insights

Using this dashboard, we observed:

- Higher poverty rates correlate with worse health outcomes, including higher rates of stroke and heart disease.
- Rural counties have fewer healthcare resources, such as hospitals and primary care physicians.

- Counties with better air quality and park access tend to have lower obesity and heart disease rates.
- Higher education levels correlate with lower smoking rates and better overall health metrics.

Development Process

Libraries Used

- D3.js for data visualization
- TopoJSON for geographic visualization
- D3-legend for interactive legends
- ColorBrewer for color schemes

Code Structure

- `index.html`: Main structure of the web application.
- `styles.css`: CSS for styling.
- `script.js`: JavaScript logic for data visualization and interactivity.
- `national_health_data_2024.csv`: Processed dataset used in the dashboard.

Running the Application

1. Clone the repository.
2. Place `national_health_data_2024.csv` in the project root.
3. Open `index.html` in a browser.

Deployment

- Hosted using Vercel.
- Deployment Steps:
  1. Install Vercel CLI (`npm install -g vercel`)
  2. Run `vercel login`
  3. Deploy with `vercel`
  4. Follow the provided deployment link

Challenges & Future Work

Challenges

- Data cleaning: Merging datasets with different formats was time-consuming.
- Performance optimization: Handling large datasets in D3.js required performance tuning.
- Cross-browser compatibility: Ensuring the dashboard worked smoothly across different browsers.

Future Work

- Adding time-series analysis: Tracking health outcomes over time.
- Machine learning predictions: Predicting health trends based on socioeconomic factors.
- Improving accessibility: Enhancing usability for visually impaired users.

AI & Collaboration

Use of AI

- AI tools such as Claude were used for debugging JavaScript code and generating explanations for data visualizations.
- AI-assisted code completion was used for optimizing D3.js functions.

Collaboration

- Peer discussions helped resolve technical challenges, especially in data wrangling and D3.js debugging.

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