**VDSS\_ZIP\_BAD\_ZIPCOUNTY\_RATE\_HEAT\_MAP.R - README**

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**File Name: VDSS\_ZIP\_BAD\_ZIPCOUNTY\_RATE\_HEAT\_MAP.R**

**Purpose**

This script creates an interactive heatmap to visualize the "Bad ZipCounty Rate," which represents the percentage of SNAP recipients in Virginia receiving services from an incorrect Local Department of Social Services (LDSS) office. The heatmap provides insights into service discrepancies across ZIP codes and is exported in multiple formats.

**Overview**

The script processes data from a .dta file to:

1. Merge ZIP code data with geographic shapefiles for Virginia.
2. Identify missing ZIP codes.
3. Generate a heatmap displaying the rate of incorrect LDSS services by ZIP code.
4. Overlay county boundaries for additional context.

**Datasets and Tools**

**Input Files:**

1. **bad\_zipcounty\_rate.dta:** Includes SNAP recipient counts and the percentage of recipients receiving incorrect LDSS services, by ZIP code.
2. **ZCTA Shapefiles:** Used to obtain geographic boundaries for ZIP Code Tabulation Areas (ZCTAs) in Virginia.
3. **County Shapefiles:** Used to overlay county boundaries for better visualization.

**Output Files:**

1. **VDSS\_Bad\_ZipCounty\_Rate\_Heat\_Map.html:** An interactive heatmap in HTML format.
2. **VDSS\_Bad\_ZipCounty\_Rate\_Heat\_Map.pdf:** A static PDF version of the heatmap.
3. **VDSS\_Bad\_ZipCounty\_Rate\_Heat\_Map.png:** A static PNG version of the heatmap.

**Dependencies:**

* **R Libraries:**
  + haven: For reading .dta files.
  + sf: For handling and transforming shapefiles.
  + tmap: For creating thematic maps.
  + dplyr: For data manipulation.
  + tigris: For accessing TIGER/Line shapefiles.

**Script Functionality**

**1. Loading and Preparing Data:**

* Reads the bad\_zipcounty\_rate.dta file and converts ZIP codes to character format.
* Retrieves ZCTA shapefiles for Virginia and extracts geographic boundaries.
* Merges ZCTA data with the SNAP dataset by ZIP code.

**2. Identifying Missing ZIP Codes:**

* Identifies and logs any ZIP codes in the dataset that do not match the shapefile data.

**3. Creating Breakpoints:**

* Filters and analyzes bad\_zipcounty values to define heatmap categories.
* Calculates breakpoints based on lower and upper bounds, including the median value within the interval of interest.

**4. Generating the Heatmap:**

* Uses the tmap library to create a thematic heatmap showing the "Bad ZipCounty Rate."
* Overlays county boundaries from the Virginia county shapefile for added context.
* Configures interactive elements, such as hover labels and legends, for the HTML map.

**5. Saving the Heatmap:**

* Exports the map in HTML, PDF, and PNG formats for compatibility with various use cases.

**File Output**

1. **VDSS\_Bad\_ZipCounty\_Rate\_Heat\_Map.html:** Interactive heatmap.
2. **VDSS\_Bad\_ZipCounty\_Rate\_Heat\_Map.pdf:** Static PDF version.
3. **VDSS\_Bad\_ZipCounty\_Rate\_Heat\_Map.png:** Static PNG image.

**Usage**

1. Place the input files in the appropriate directories.
2. Install the required R libraries.
3. Execute the script in an R project environment.
4. Access the output files in the Plots/VDSS\_Bad\_ZipCounty\_Rate\_Heat\_Map/ directory.

**Notes**

* Ensure input data and shapefiles are complete and correctly formatted.
* Review and adjust heatmap breakpoints as needed to reflect the distribution of bad\_zipcounty values.
* Interactive maps require a browser for viewing HTML files.