# Analysis of Household Consumption and Expenditure Patterns in India

## Project report

Website🔗 Github🔗

# Table of contents

# 1. Data collection

- **The dataset for this study was obtained from Survey on Household Consumption Expenditure: 2022-23.**

- **The following tables were used:**
  - **Table A2: Estimated number of households and persons by gender and average MPCE for each fractile class of MPCE.**
  - **Table A3: Percentage distribution of households by size for each fractile class of MPCE .**
  - **Table A4: Quantity (kg.) of consumption of cereals and pulses per person for a period of 30 days for each fractile class of MPCE .**
  - **Table A5: Value (Rs.) of consumption of cereals and pulses per person for a period of 30 days for each fractile class of MPCE.**
  - **Table A6: Value of consumption (Rs.) of broad groups of food and non-food items per person for a period of 30 days for each fractile class of MPCE .**
  - **Table A8R/8U: Percentage distribution of persons by fractile class of MPCE and average value of MPCE for different household types.**

- **The data consists of household-level records covering monthly per capita expenditure (MPCE), family size distribution, consumption of rice and pulses, employment distribution, state wise sex ratio, and employment distribution across various Indian states and union territories.**

## 2. Data Preprocessing

- **Removed unnecessary text data, footers and remodeled the data in excel so that it can be loaded in pandas for further cleaning.**

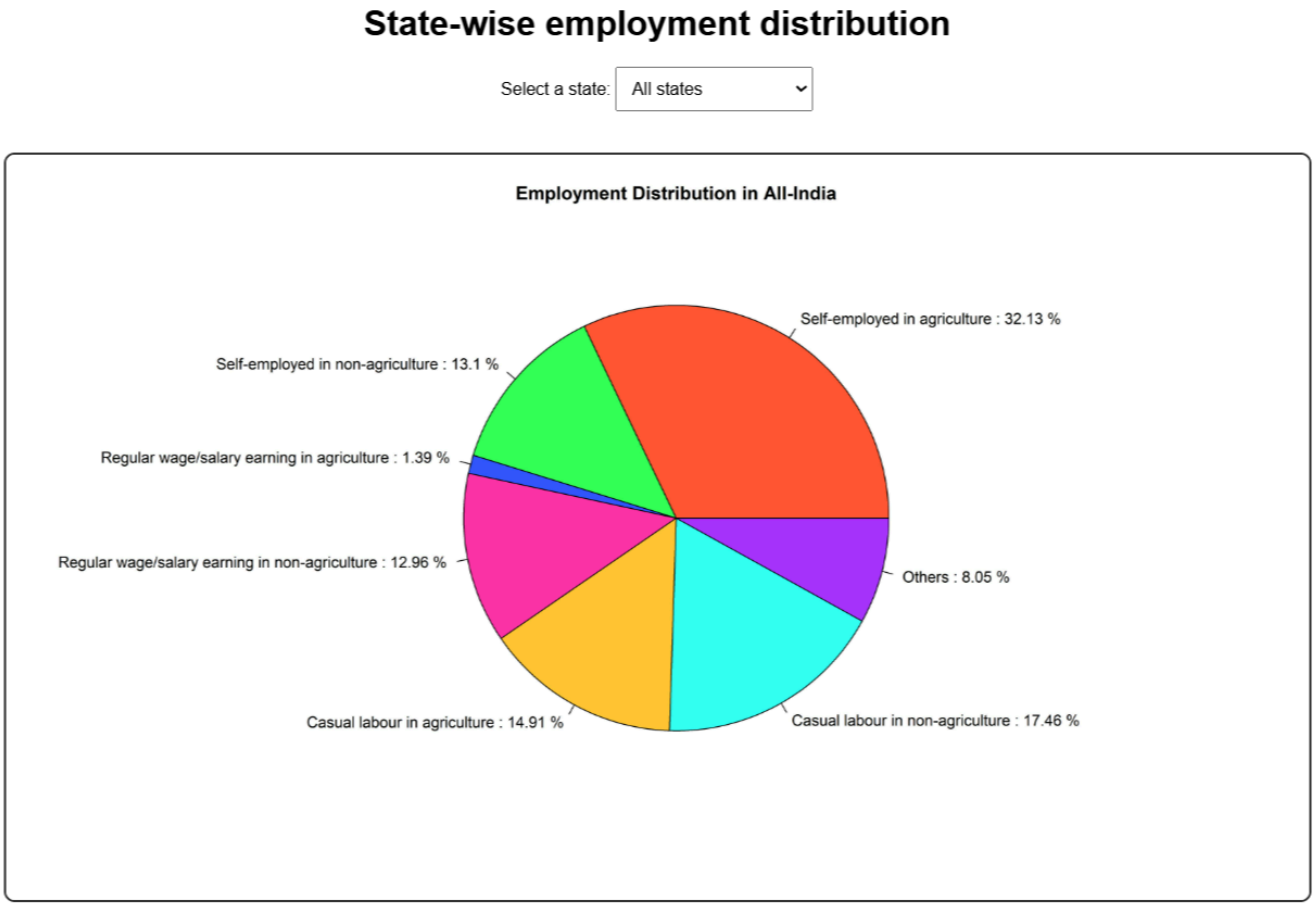
- **Converted excel data into multi-index data frame with two levels (state name, rural/urban) in order to make data indexing easy.**

- **Dropped unnecessary columns and modeled visualization friendly datasets in python.**

- **Extracted data subset in to order to make interactive dashboards in Tableau.**

# 3. Data visualization

- **Pie charts:**
  - **Illustrates State wise employment distribution.**
  - **Select a state from the dropdown.**

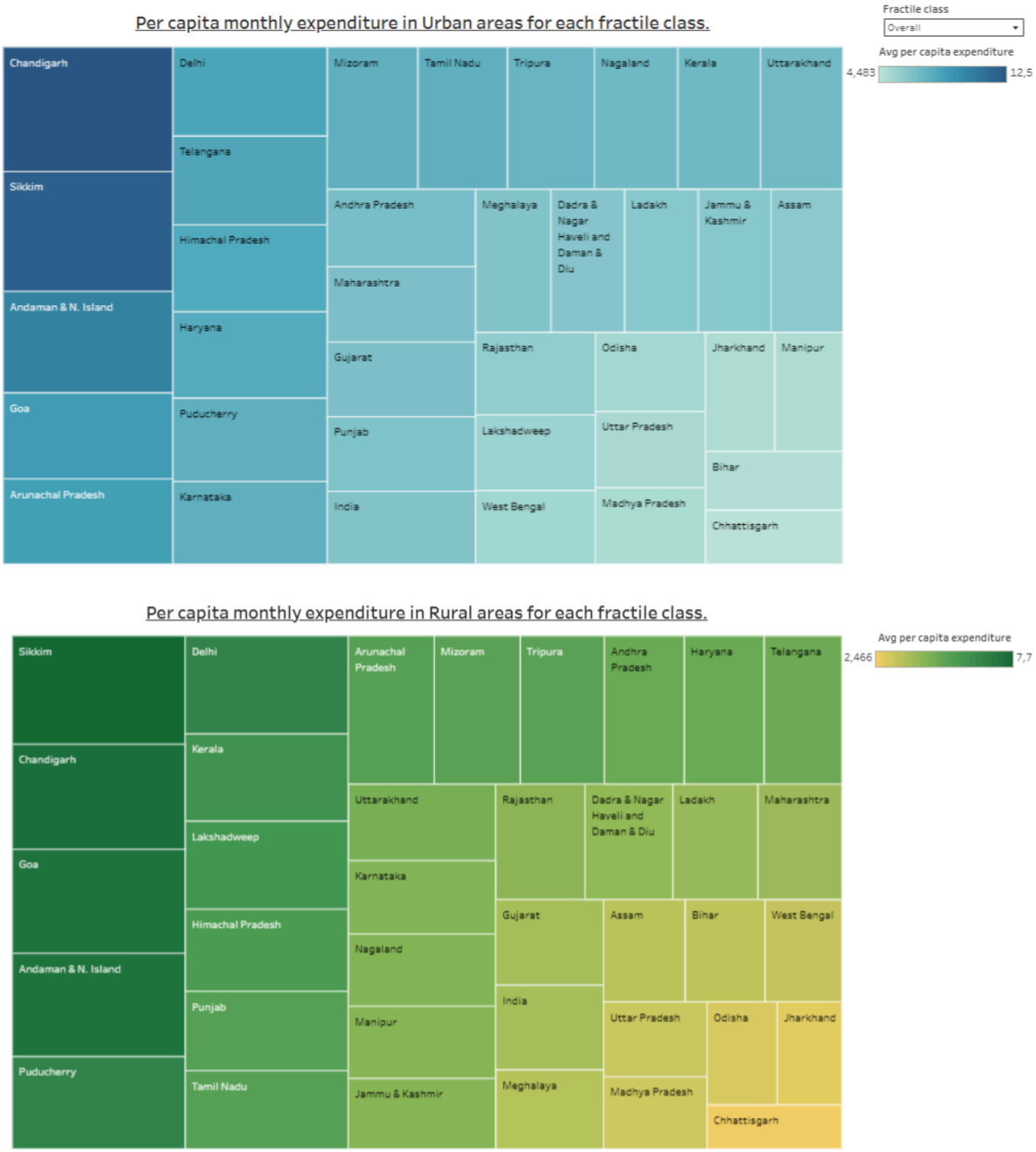



- **Sunburst chart:**
  - **Interactive graphs visualize sex ratio.**
  - **Tap on a state to deep dive into 4 level of granularity (State➡Fractile class➡Rural/Urban➡Sex ratio).**

**Statewise sex ratio**


- Tree maps:
  - Interactive graphs to show monthly expenditure across fractile class for each state.
  - Hover over each tile to know the exact value of monthly expenditure.

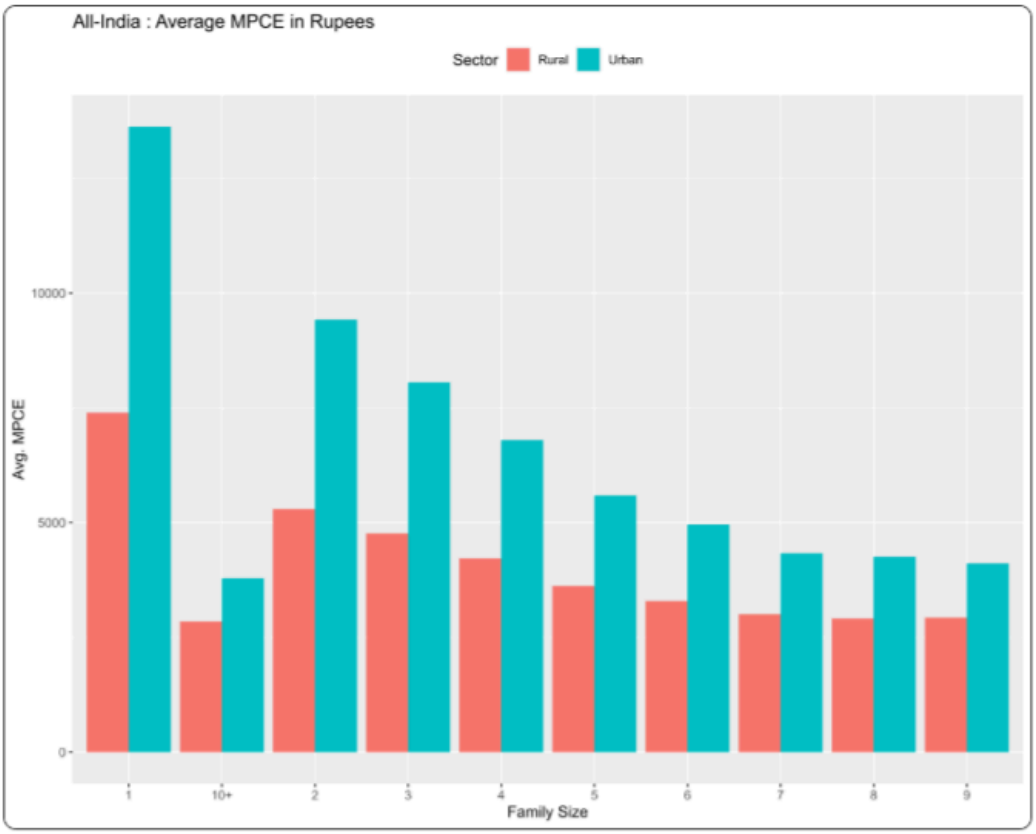
## Monthly per capita expenditure




- **Vertical Bar charts:**
  - **Visualizes monthly per capita expenditure across different family sizes in rural and urban areas.**

## Avg MonthlyPerCapityExpenditure(MPCE) in Rs for different family size.

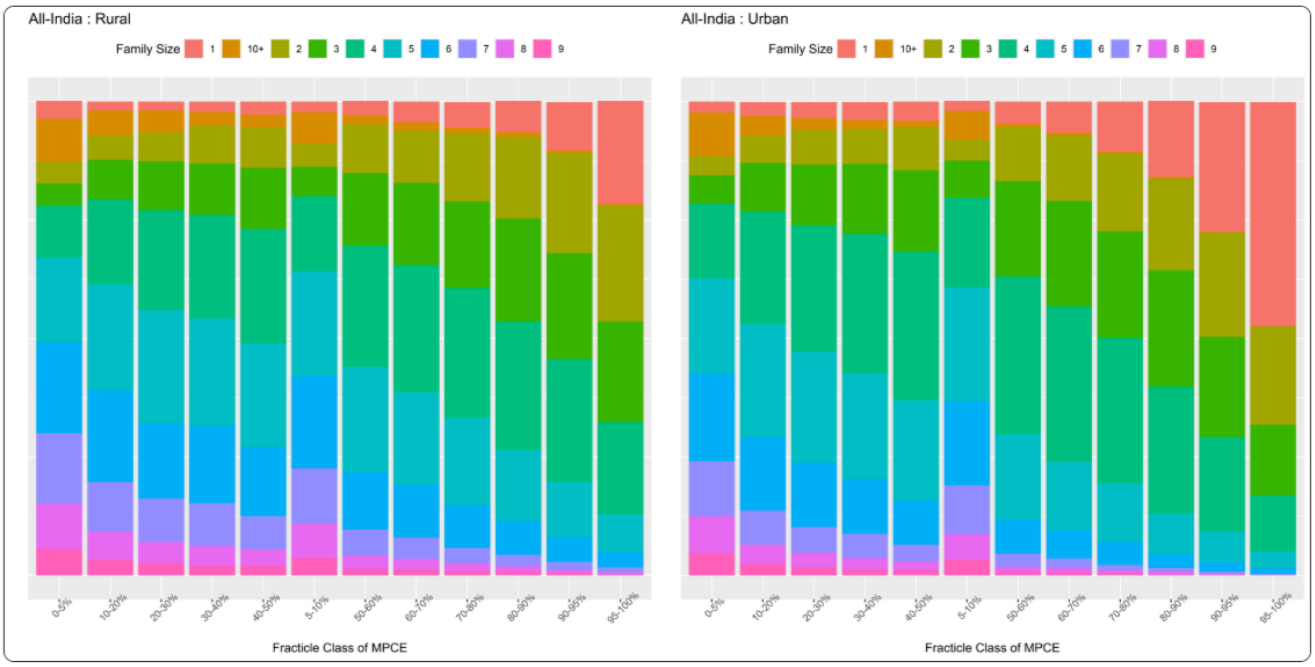
Select a state: All India




- **Stacked bar charts:**
  - **Shows family size in rural and urban area across different economic sections.**

## Distribution of family size for different fractile class

Select a state: All States

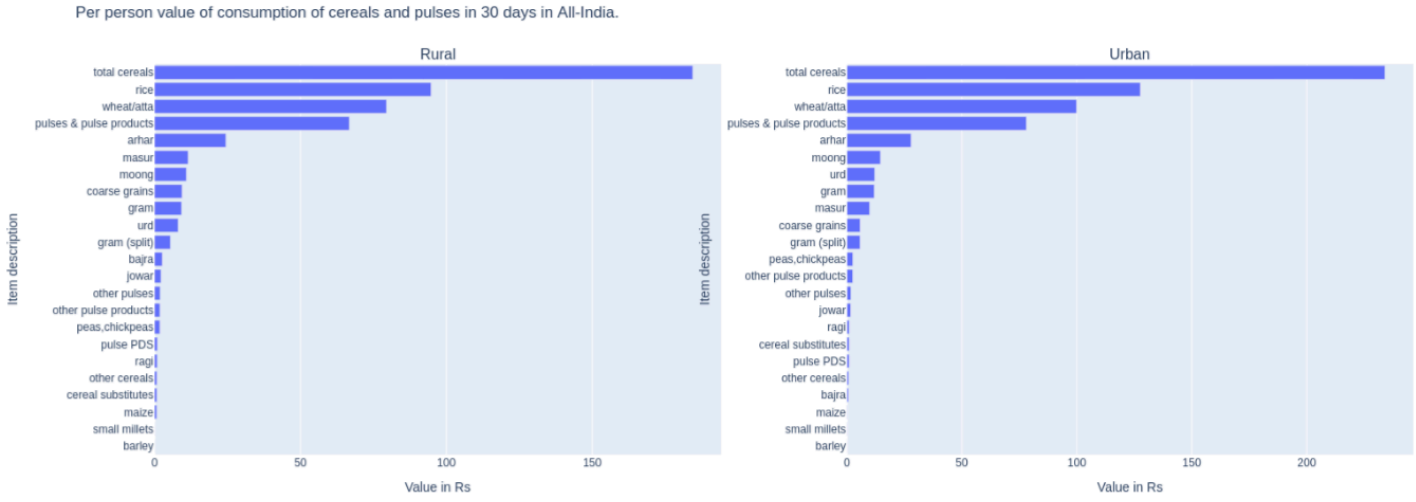



- **Horizontal bar charts:**
  - **Visualizes the consumption of cereals and pulses across various states.**

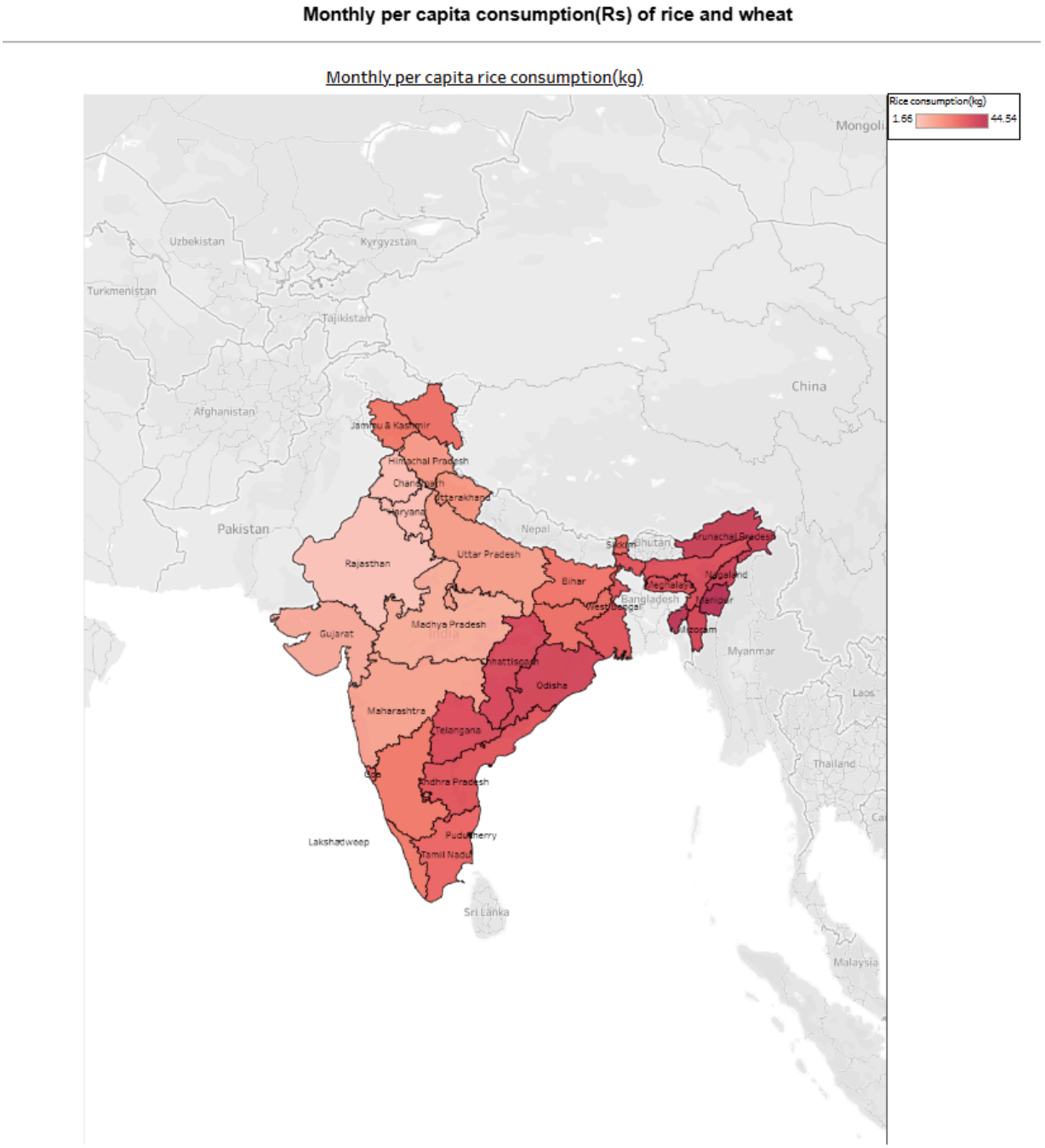
## Per person monthly consumption of rice and pulses in India

**Select a State or Union Territory:**

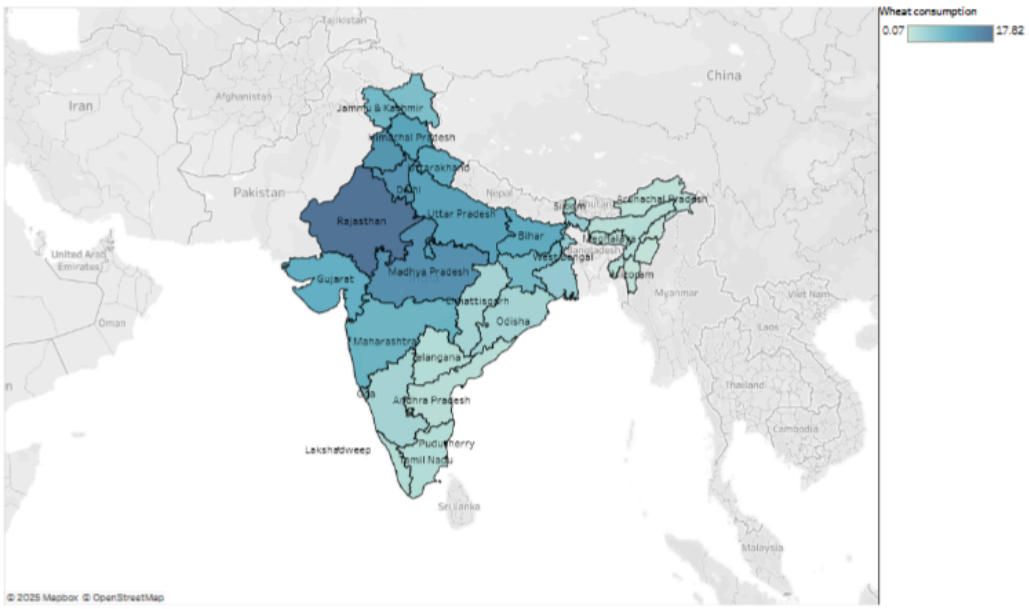
All States



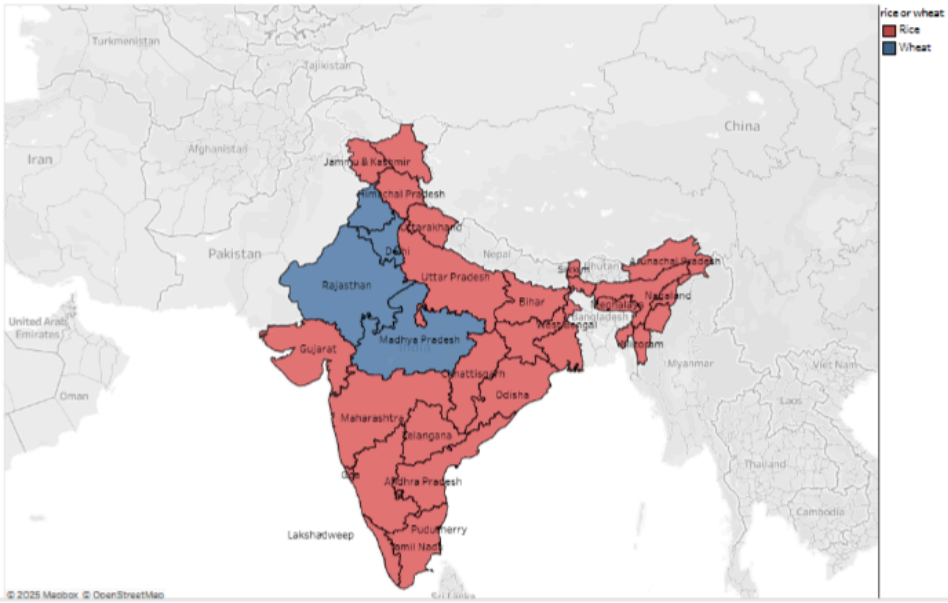
- **Choropleth maps:**
  - **Shows the trend of rice and wheat consumption across various Indian states.**



Monthly per captita wheat consumption(kg).




Rice vs Wheat



## 4. Tools and technologies used

- **Python (Pandas, Plotly express):** Data processing and visualization.
- **R(ggplots2):** Data visualization.
- **Tableau:** Interactive dashboard for enhanced data exploration.
- **HTML, CSS, JavaScript:** Built a web interface to display interactive visualizations.
- **GitHub Pages:** Hosted the project for online accessibility.

# 5. Visualization strategies employed

## 1. Choice of Visualization Types

- **Bar Charts** 📊: Used to compare **monthly per capita expenditure (MPCE)** across different family sizes, allowing easy comparison of spending patterns.

- **Stacked bar charts** 📈: Displayed the **distribution of family sizes** within various fractile classes, making it easy to see the concentration of household sizes.

- **Pie Charts** 🥧: Visualized state wise **employment distribution**, providing a clear proportion-based view of workforce participation across states.

- **Choropleth maps**📉: Showed **trends in rice and wheat consumption across India**, making it easier to identify regions with higher rice or wheat consumption .

- **Sunburst chart** 📊: Used for **sex ratio distribution across states and fractile class**, offering an interactive way to compare male-female population proportions across different regions and economic sections.

- **Tree maps**📉: Showed **monthly per capita expenditure across states and fractile class**, making it easier to identify regions with higher cost of living and living standards.

## 2. Color & Design Choices 🎨

- **Distinct Color Schemes:** Used contrasting colors for different categories to improve readability. Example:
  - **MPCE categories** → Shades of blue
  - **Employment sectors** → Industry-based color coding

- **Consistent Labels & Legends:** Ensured that each chart had properly labeled axes, legends, and tooltips for better clarity.

- **Minimalist Design:** Avoided excessive grid lines and clutter for a clean, professional look.

## 3. Enhancing Interpretability

- **Interactivity (if used):** Tableau and JavaScript were used to add **hover tooltips** and **filter options** for dynamic exploration of data.

- **Comparative Layouts:** Related visualizations were grouped together to allow side-by-side comparison, making trends more apparent.

## 4. Hosting & Accessibility 🌍

- **GitHub Pages Deployment:** The visualizations were hosted online to make them easily accessible to anyone.

- **Mobile-Friendly Charts:** Ensured responsiveness so that visualizations are readable on both desktop and mobile devices.

# 6. Insights derived

### 1. Employment Distribution 💼

- Agriculture remains the dominant employment sector all India with 35.48% of people employed in agriculture sector one way or another.

- Urbanized states show a shift towards non agriculture sectors.

- Goa being the only state with more than 50% people employed in non-agriculture sectors.

### 2. State wise sex ratio trends ⚖️

- States with higher literacy and economic development generally have better sex ratios (e.g., Kerala, Tamil Nadu).

- Northern states show a declining trend in sex ratios, possibly due to sociocultural factors.

### 3. Family Size Distribution 👨‍👨‍👧‍👧

- The majority of households in lower fractile classes have larger family sizes, indicating a possible correlation between income levels and household size.

- Wealthier households tend to have fewer members, possibly due to better family planning and economic stability.

### 4. Food Consumption Trends 🍚

- Rice consumption is highest in eastern and southern states like West Bengal, Odisha, and Tamil Nadu, whereas pulses consumption is more prominent in central and northern states.

- States with lower MPCE also tend to have higher reliance on staple grains like rice, possibly due to affordability factors.

- Overall rice is consumed more than wheat except for some northern states.

## 5. Regional Disparities 🌍

- Southern and western states (e.g., Maharashtra, Karnataka, Gujarat) exhibit higher economic prosperity, reflected in higher MPCE and lower dependency on staple food items.

- Eastern and central states (e.g., Bihar, Chhattisgarh, Odisha) still rely heavily on agriculture and government support programs.