Final Report: Visualizing Global Poverty through an Interactive Map

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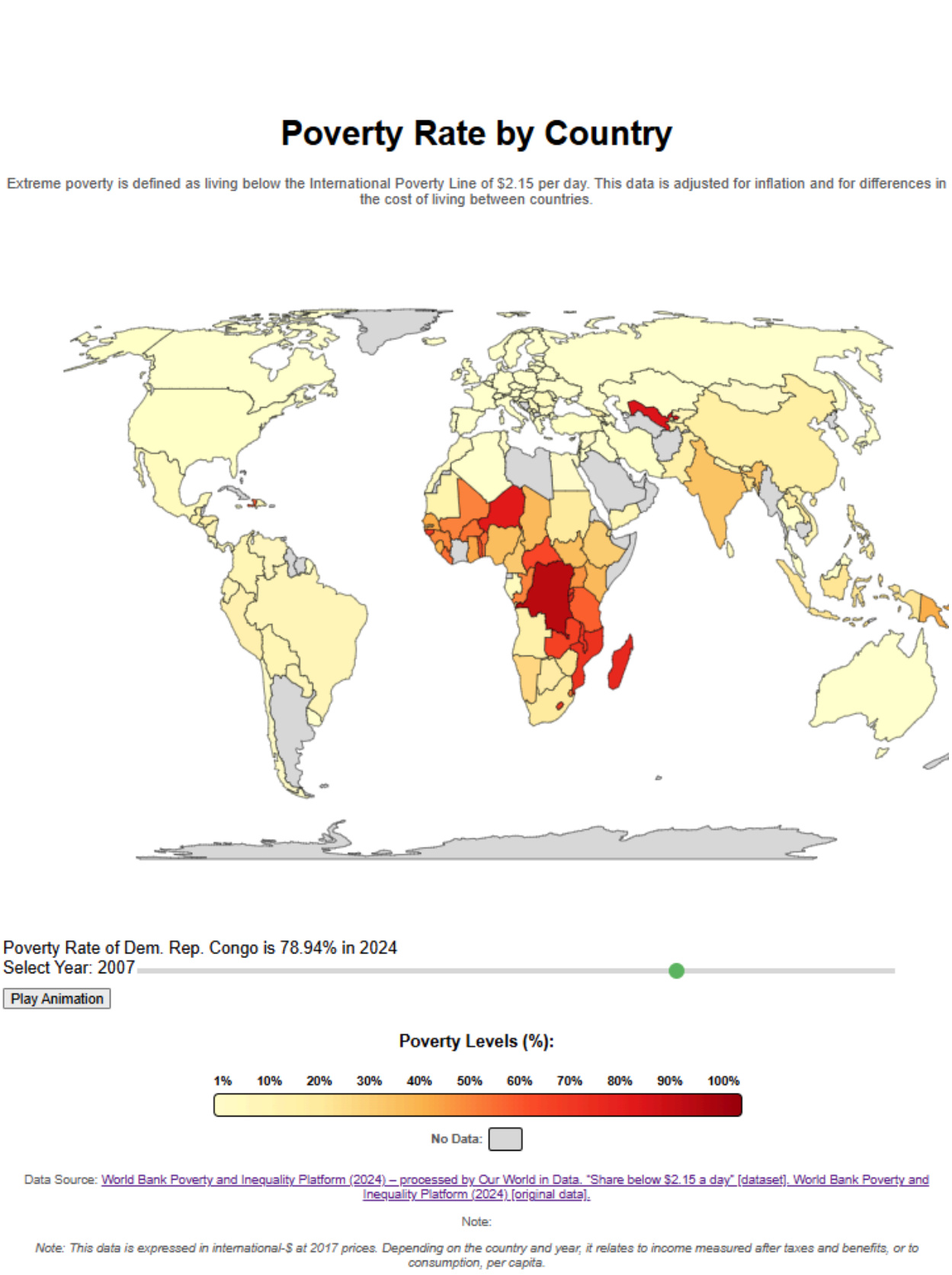
1. Introduction

Poverty is a never ending global issue that affects billions of people worldwide ranging from extreme poverty, where basic human needs such as food, clean water, and shelter remain unmet, to relative poverty, where individuals struggle with fewer resources and opportunities than others in their society. Understanding the scale, distribution, and temporal changes in poverty is important to address it effectively.

The project aims to create an interactive web-based map that visualizes how poverty rates vary worldwide and how they have evolved over a broad historical timeline from 1964 to 2024. By including three key aspects, theme as poverty world wide, space as global map presenting each country, and time as changes in poverty rates through a time slider, the visualization creates a comprehensive understanding of global poverty. The final result is a interactive global map interface where users can explore poverty data across different countries and decades, with color-coded indicators representing poverty severity and controls to navigate through time.

The original vision for the project included personal stories of living conditions, deeper contextual information, and reasoning for roots of the poverty. The final implementation is more streamlined, simpler and more reliable. Despite these limitations, the visualization still provides a valuable resource for exploring global poverty, trends, spreading awareness, and inspiring further research.

Link to the site: https://map-app-git-main-henkags-projects.vercel.app/



(Figure 1: Picture of data visualization from front page, selected year 2007)

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2. Objectives, Scope and Limitations

Initial Objectives:

- **Theme (Poverty):** Represent the global poverty by showing and highlighting different severity levels across various nations.
- **Space (Global Map):** Create a world map to display each country's poverty rate, allowing users to identify patterns and regional differences at a glance.
- **Time (Changes over time):** Include a timeline slider spanning from 1964 to 2024, enabling users to observe how poverty levels have changed over decades and potentially see influences from world events.

Changes in Scope and Limitations:
In practice, the project faced several limitations that led to a more simplified final version than initially planned. Time constraints, complexity of data integration, data reliability and technical challenges when creating the website meant that some of the features, like personal stories or deeper factor analysis was not integrated.

The final project focuses on delivering the primary functionality: a global map interface that visualizes poverty rates by country, across a long timeline, color-coded to reflect the severity of poverty with percentages of people living under the poverty line. Users can select individual years using a time slider or watch an animation that plays through the years sequentially.

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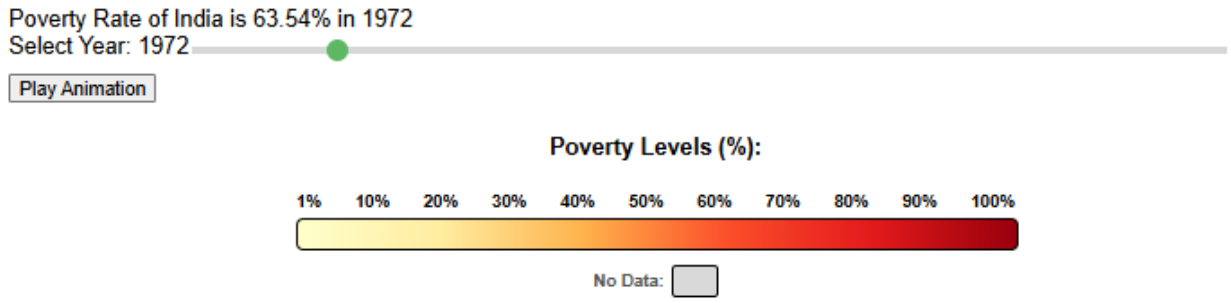
3. Methodology

Data Collection:
Poverty data was sourced from the World Bank's Poverty and Inequality Platform and processed by Our World in Data. The data defines extreme poverty as living below $2.15 per day in international dollars 2017. Data is collected from 1964 to 2024. Every country does not have data available for each year, resulting in some gaps.

Visualization Tools and Technologies:

- **React.js and react-simple-maps:** The front-end framework React.js and the react-simple-maps library were used to build the interactive map.
  React-simple-maps offers a straightforward way to render SVG maps and bind data-driven styles to geographic regions.

- **Data Binding:** The country name, poverty rate and year data was collected to a json file and was associated with each country's geographical feature. A function calculates the fill color of each country's polygon based on the poverty percentage.
- **Color Encoding:** A color scale from light yellow to deep red was used to represent poverty levels, with lighter yellow indicating lower poverty rates and darker red representing higher rates. Gray was used to indicate missing data.
- **Interactivity:** Users can hover over countries to see their names, click to see poverty rate details for the selected year and move a slider to manually select the year. Additionally, a play/pause button animates the timeline, incrementally advancing through the years to show changes over time.



(Figure 2: The time slider and poverty level bar with color grading.)

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4. Features of the Final Implementation

Global Map Interface:
The core interface is a world map where each country's fill color corresponds to its poverty rate for the selected year. Hovering over a country reveals its name, and clicking displays detailed information about that country's poverty percentage for that year.

Color bar and Interpretation:
A color bar below the map helps users to read the colors. Light yellow indicates lower poverty rates, while darker reds represent more severe poverty levels. Gray present countries or years with no data. This approach visually works as an intuitive format. Yellow and red were chosen for colors as they visually present as warning or threat colors in this kind of situation.

Time Slider and Animation:
The integrated time slider lets users choose any year between 1964 and 2024. A

play/pause function animates the progression through years, creating a time-lapse effect that showcases how poverty shifts over time world wide. Changes can reflect trends, progress or stagnation in poverty of different regions or countries.

Tooltip and On-Click Details:
Hovering cursor over map provides immediate country name, and clicking on a country shows its poverty rate in that year.

Data source:
References for data source is showed bottom of the website. This provides link to the data source site.

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5. Future Work and Improvements

Better Contextualization:
Future versions could include personal stories, policy analysis, and connections to world events, allowing users to understand not just that poverty rose or fell, but why these shifts occurred.

Additional Metrics and Layers:
Introducing more data layers like economic indicators, governance metrics, public health data could provide a better understanding of the factors influencing poverty. Users could toggle these layers to explore correlations between poverty and other development metrics.

Enhanced Interactivity and Functionality:
Adding features like zooming, filtering by continent or comparing two countries side-by-side could further enhance usability.

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6. Conclusion and Discussion
This interactive data visualization map serves as an initial platform for examining how poverty rates vary and evolve across different countries over time. Although the final implementation is less comprehensive than initially envisioned, it still enables users to quickly and effectively explore changes in global poverty levels across multiple decades.

By interacting with the visualization, users can identify regions that have experienced persistent or long-term poverty, as well as those that have seen substantial improvements. For instance:

- Parts of East Asia may show dramatic reductions in poverty over time, reflecting effective policy measures or economic growth.
- Certain conflict-affected regions, particularly in Africa, might remain steadily poor, illustrating the challenges posed by instability and weak infrastructure.
- Some middle-income countries may exhibit a slow but consistent decline in poverty rates, indicating the gradual benefits of economic reforms and enhanced social policies.

These observed patterns highlights the complexity of poverty and the importance of considering temporal, spatial, and contextual factors. By revealing where poverty increases or reduces, the visualization encourages deeper inquiry, informed decision-making, and the development of more targeted approaches to alleviate poverty worldwide.

Link to the site: https://map-app-git-main-henkags-projects.vercel.app/

References:

- World Bank Poverty and Inequality Platform (2024) – Processed by Our World in Data. “Share below $2.15 a day” [dataset].
- Our World in Data: https://ourworldindata.org/poverty
- The world bank: https://pip.worldbank.org/home
- react-simple-maps Documentation: https://www.react-simple-maps.io/