GLOBAL POPULATION ANALYSIS

FINAL PRODUCT

INTRODUCTION AND BACKGROUND:

- Population growth around the world is a vital and dynamic factor.
- Urban planning, policymaking, resource allocation, and other areas all depend on an understanding of its patterns, distribution, and changes over time.
- By building an interactive and visually appealing depiction of population data, we plan to share insights into the global population through this data visualization project.
- Over the course of history, there has been a considerable increase in the global population.
- Numerous elements, including migration trends, socioeconomic advancements, and mortality and birth rates, have an impact on it.
- We may find patterns, differences, and trends by visualizing this data, which enables us to better understand the intricate dynamics of population development.
- Source inspired by : https://ourworldindata.org/world-population-growth

DATASETS:

- The dataset is retrieved from Kaggle (Pandey. (2023, June). *World Population by Country*.) and it provides population information for 234 countries across all seven continents (*Wikipedia Foundation, Inc. (2023, June 13)*).
- It is divided into four datasets, representing the North, South, East, and West hemispheres (*Wikipedia Foundation, Inc. (2023, May 4)*).
- Prior to analysis, the data will undergo minor transformations for preparation.
- The dataset consists of three dimensions: country, continent, and hemisphere, along with 15 measures. These measures provide various insights into the population dynamics of each country, allowing for analysis and comparisons based on factors such as rank, area, landAreaKm, netChange, growthRate, worldPercentage, density, densityMi, pop1980, pop2000, pop2010, pop2022, pop2023, pop2030, pop2050.
- The following data dictionary presents a description of each field within the dataset:

Columns	Description	Data Type
country	The name of the country for which population data is recorded	String
rank	The numerical ranking or position of a country or place based on population	Integer
area	The total area of the country	Integer
landAreaKm	The total area of the country measured in square kilometers	Integer
cca2	A two-letter country code, often used to uniquely identify countries	String
cca3	A three-letter country code, used for unique identification of countries	String
netChange	The net change in population over a specific period, indicating the difference between births, deaths etc.	Decimal

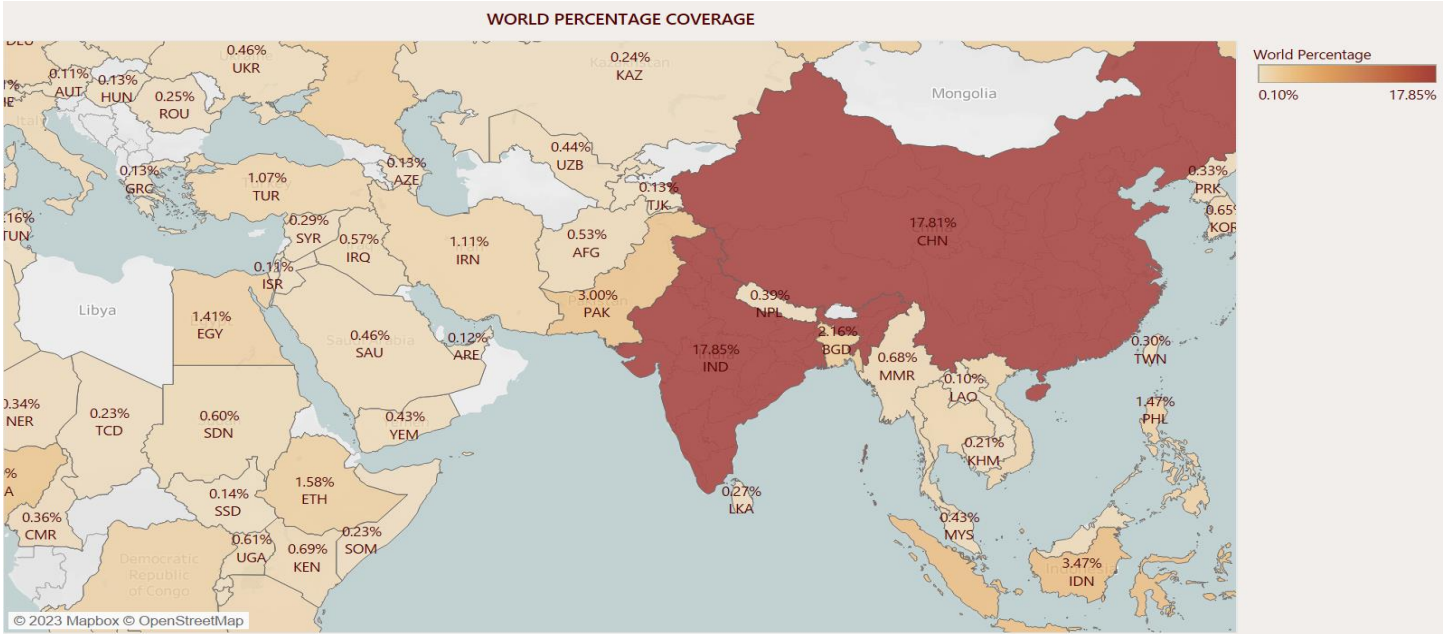
growthRate	The percentage rate at which the population of a country is growing over a specific period	Decimal
worldPercentage	The percentage of the world's total population that a country is representing	Decimal
density	The population density of the country, calculated as the number of individuals per square kilometer	Decimal
densityMi	The population density of the country, calculated as the number of individuals per Mile	Decimal
pop1980- 2050	Integer total count of individuals in the years starting from 1980, 2000, 2010, 2022, 2023, 2030, 2050	Integer
Continents	The continent to which the country belongs (e.g., Asia, Europe, etc.)	String
Hemisphere	The hemisphere to which the country belongs (e.g., East, West, North, South)	String

DATA STORY:

- Charts
- Dashboards
- Limitations

Charts:

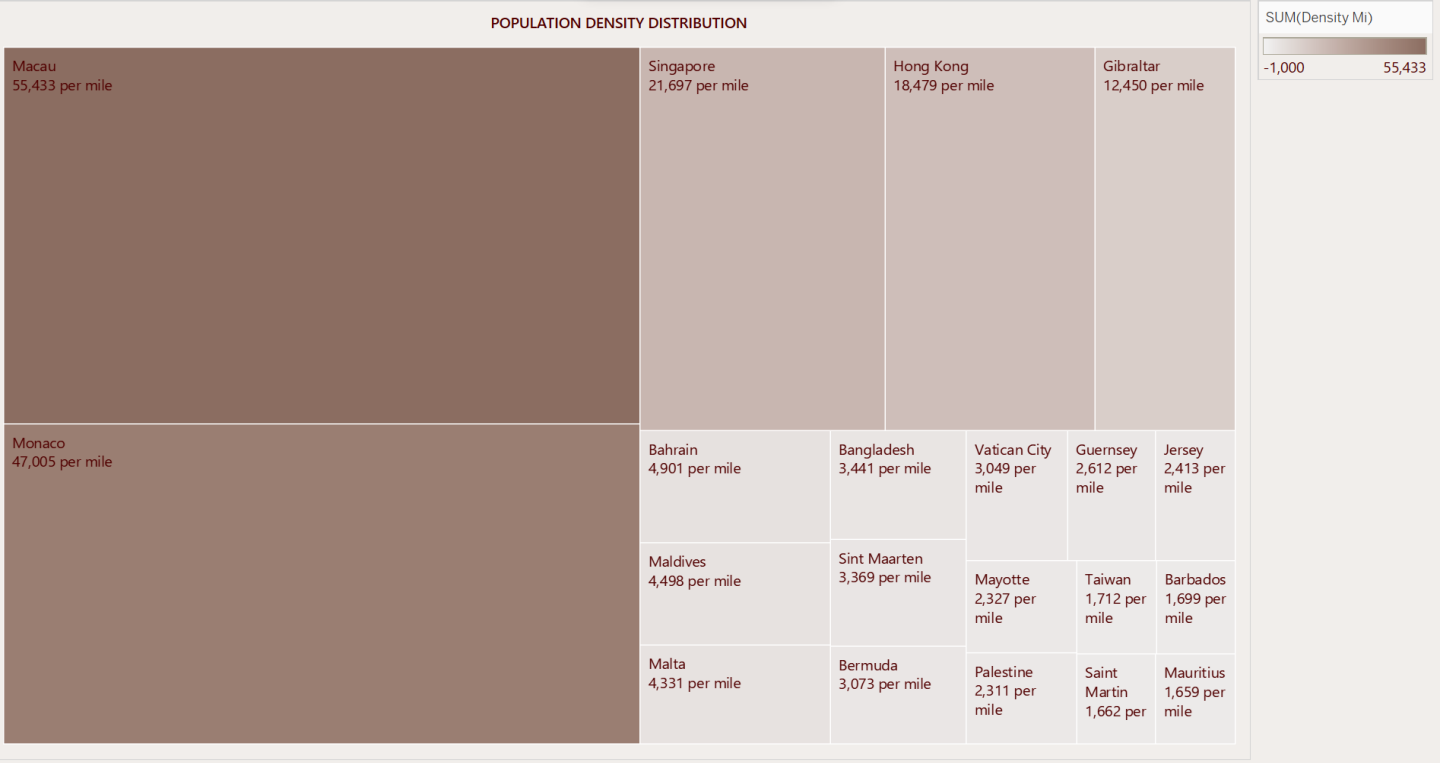
1. Analyze World's Percentage Coverage Across All Countries



The graph above illustrates the percentage of the world's total population for each country. It is evident that India and China have the highest proportion of the world's population compared to all other countries.

Variables Used: Country, worldPercentage, cca3(For displaying country codes in the map)

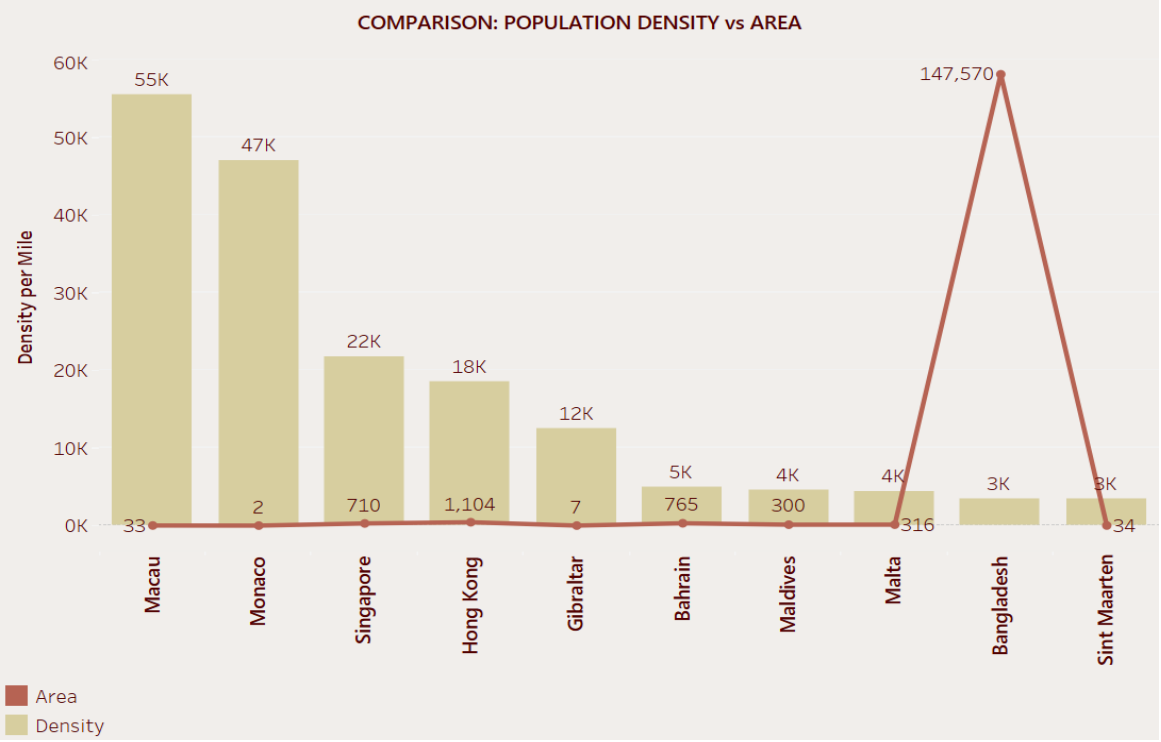
2. Exploring Population Density Distribution in Top 20 Countries



The chart depicts the distribution of population density in the top 20 countries. It is evident from the graph that Macau and Monaco exhibit the highest population densities among the included countries. Following closely are Singapore, Hong Kong, and Gibraltar.

Variables Used: Country, density, cca3(For displaying country codes in the map)

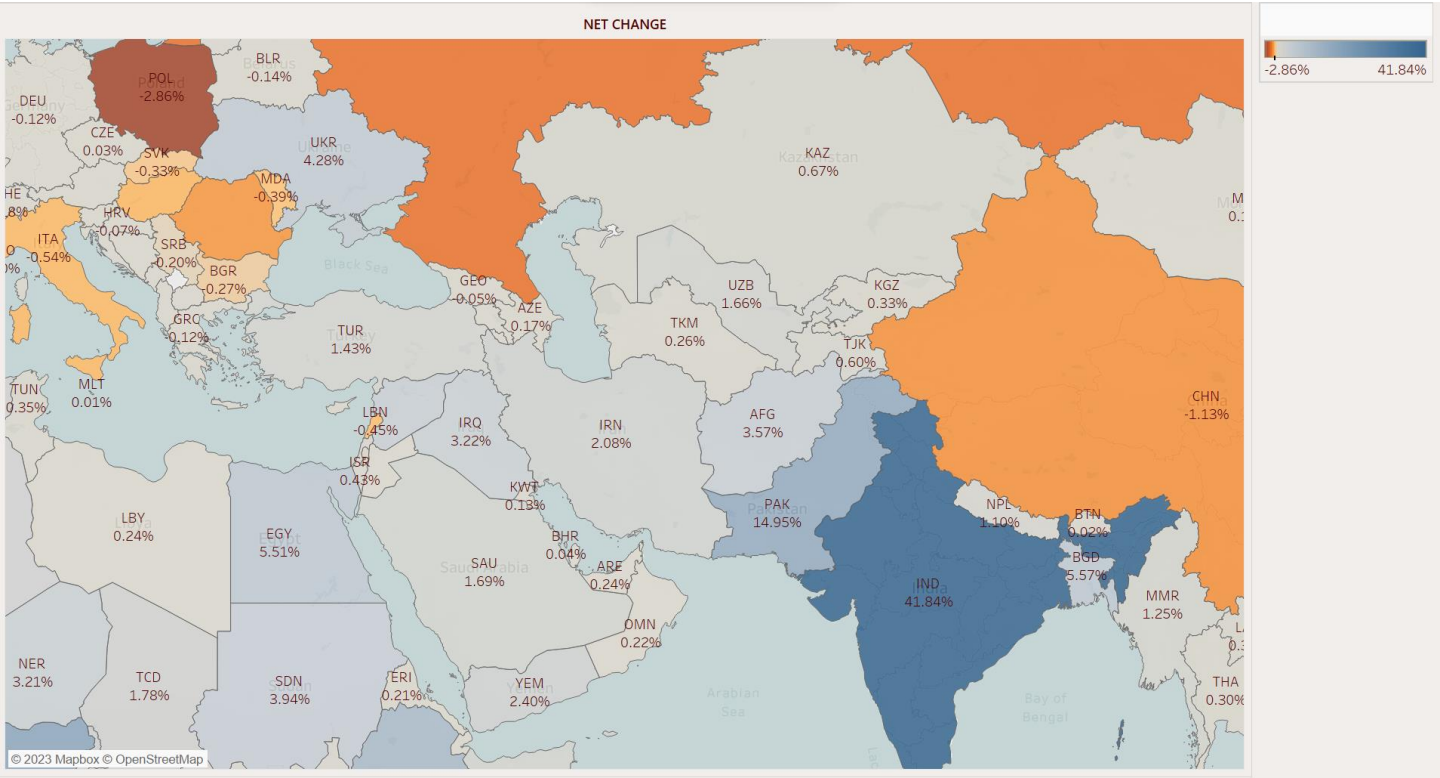
3. Conducting Comparative Analysis Between Population Density & Area in Top 10 Countries



The chart compares the population density and area of the top 10 countries. It is evident from the chart that Macau has the highest population density of 55,433 people per square mile. This can be attributed to the fact that Macau is the smallest country in terms of area, spanning only 32.9 square kilometers.

Variables Used: Country, density, area.

4. Conducting Comparative Analysis Between Population Density & Area in Top 10 Countries



This map illustrates the net change in population across all countries. An observation from the map reveals that India exhibits the highest percentage of net change, indicating significant net change in population. Conversely, Poland display the lowest percentages of net change.

Variables Used: Country, netChange

5. Quantifying Relative Difference in Population: 1980 vs. 2023

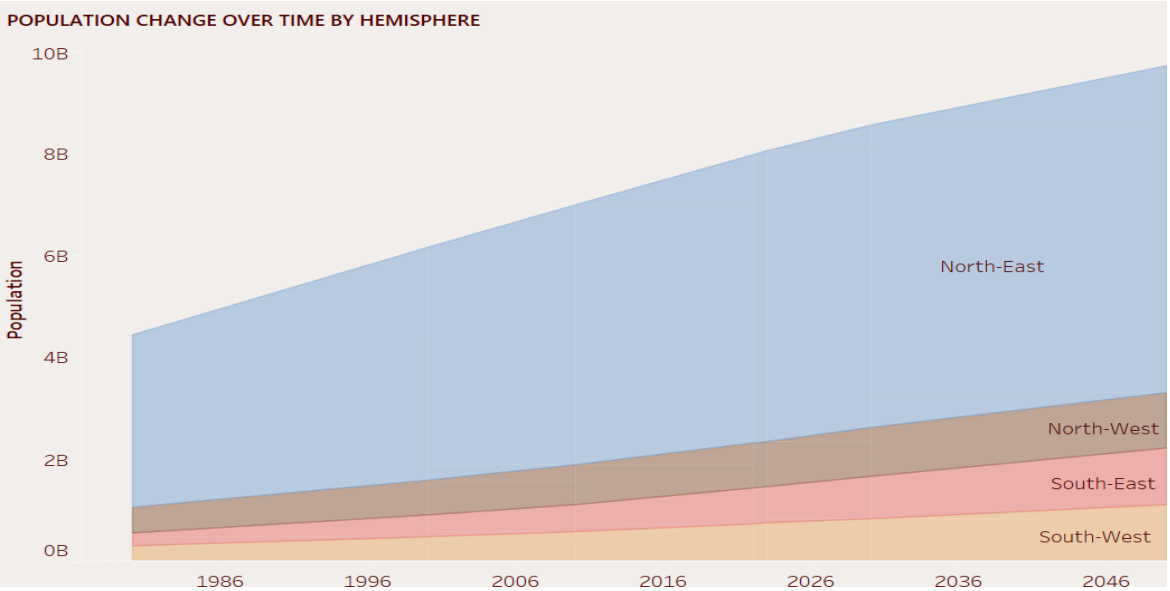
RELATIVE DIFFERENCE

Continent	Pop-1980	Pop-2023	% Difference
Africa	481,536,379	1,460,476,458	117.43%
Asia	2,765,310,682	4,889,757,695	81.30%
North America	368,293,362	604,155,369	37.10%
Oceania	22,920,240	45,575,769	16.62%
South America	241,789,006	439,719,009	13.82%
Europe	562,550,705	603,931,090	8.37%

This table showcases the percentage difference in population between the years 1980 and 2023 across different continents. It is clearly evident from the table that the African continent exhibits the highest percentage difference, indicating a substantial change in population over the given period. On the other hand, Oceania demonstrates the lowest percentage difference, suggesting a relatively smaller shift in population during the same timeframe.

Variables Used: Continent, pop1980, pop2023, %difference (percentage difference between pop1980 and pop2023)

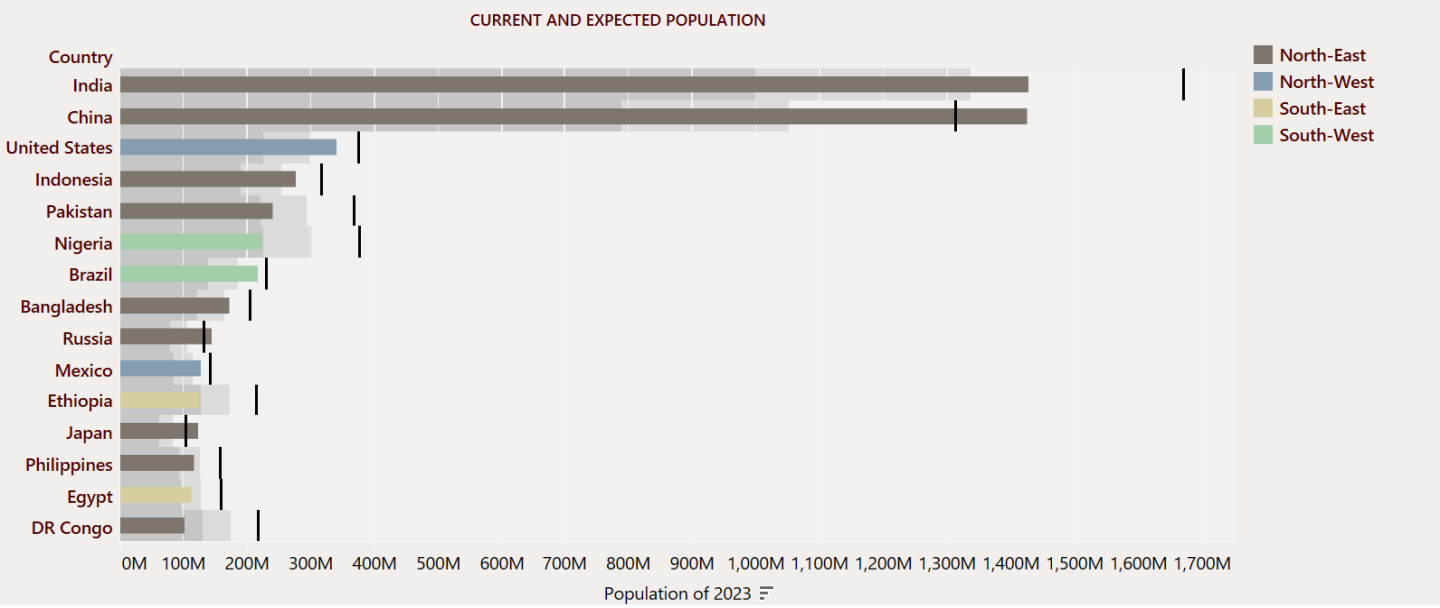
6. Visualize Population Change Over Time by Hemisphere



The chart here depicts the distribution of population from the year 1980 to 2050 across four hemispheres. It is evident from the graph that North-East has the highest population as the major countries such as CHINA, INDIA belong to North-East hemisphere.

Variables Used: Hemisphere, Year, Population

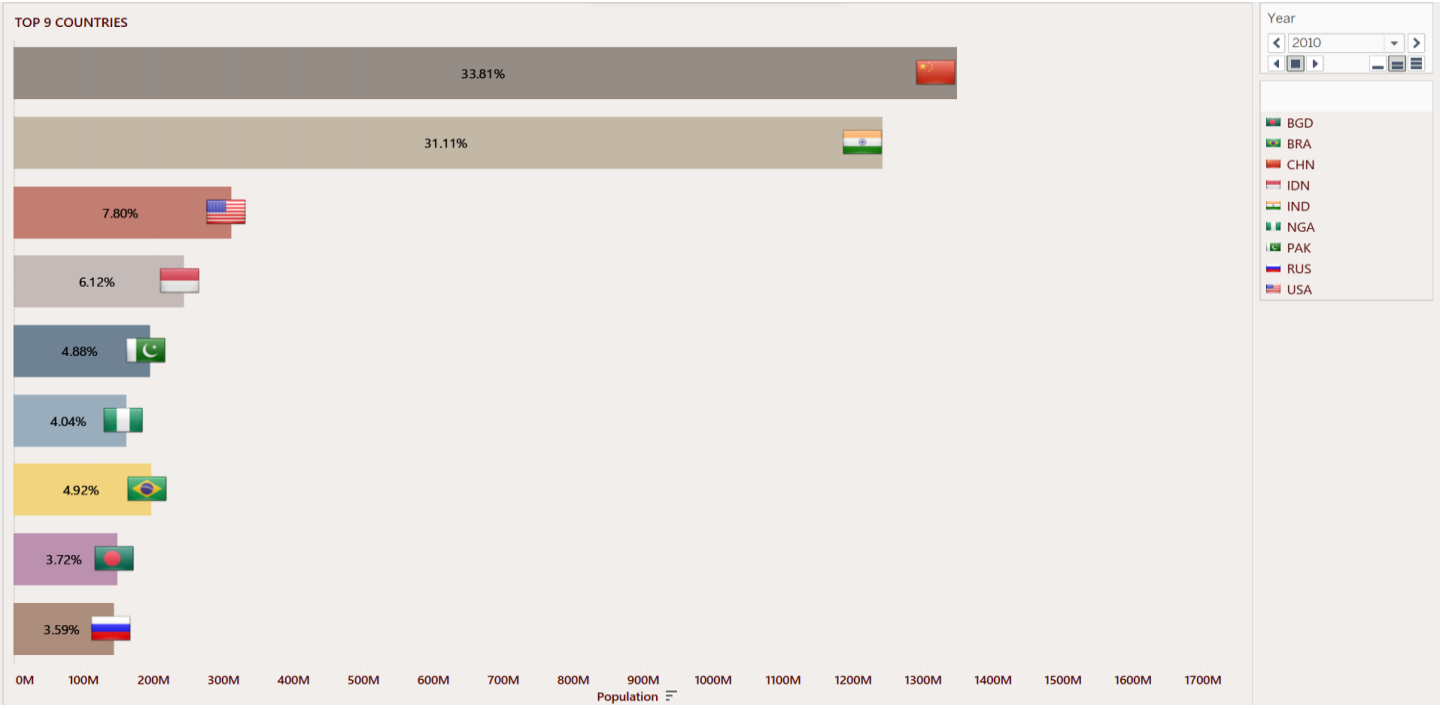
7. Comparing Current and Expected Population Trends



The bullet chart above presents a comparison between the current population in 2023 and the projected population growth in 2050, categorized by hemisphere. The data clearly indicates that the majority of countries are anticipated to experience population growth by 2050. However, notable exceptions include China, Russia, and Japan, which are projected to have a decrease in population during that period.

Variables Used: Hemisphere, Country, pop2023, pop2050.

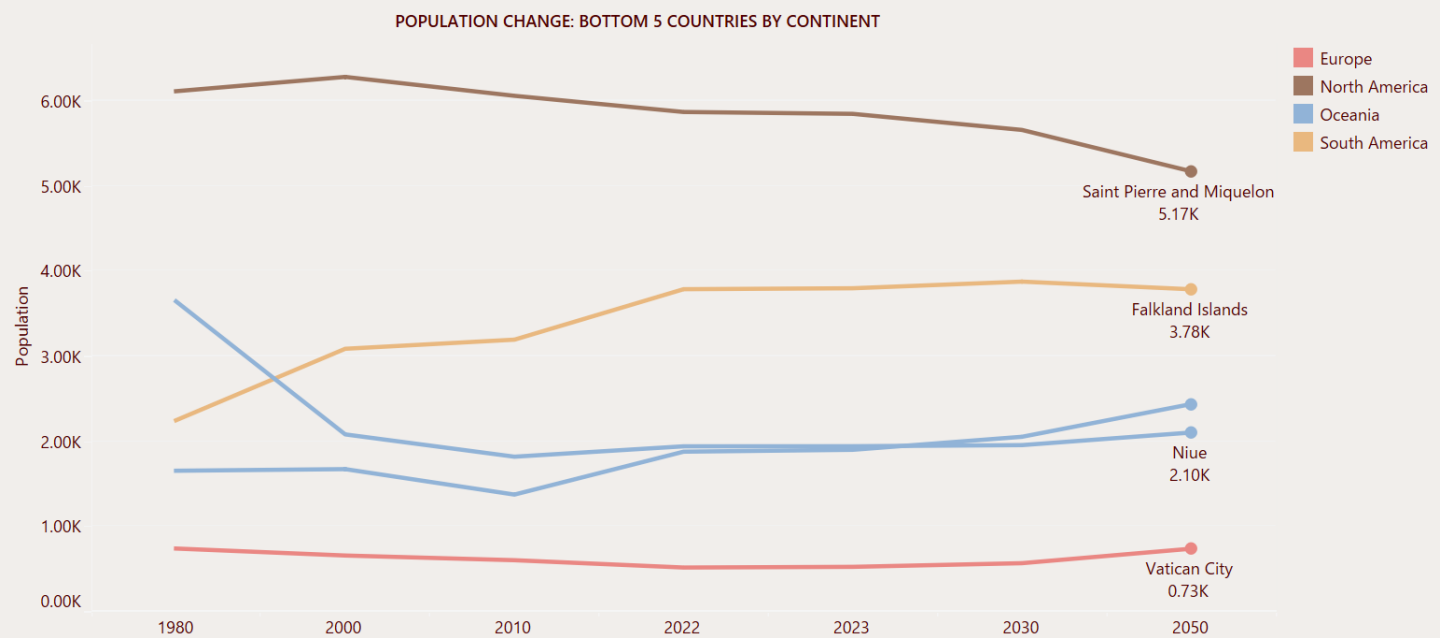
8. Visualize the Dynamic Population Changes in the Top 9 Countries Over the Years 1980 to 2050



The chart above illustrates the percentage distribution of population from the year 1980 to 2050 across the top 9 countries, categorized by four hemispheres. It is evident from the graph that India and China have the highest populations among the selected countries, followed by the United States and Indonesia.

Variables Used: Continent, population, cca3(For displaying country codes in the map)

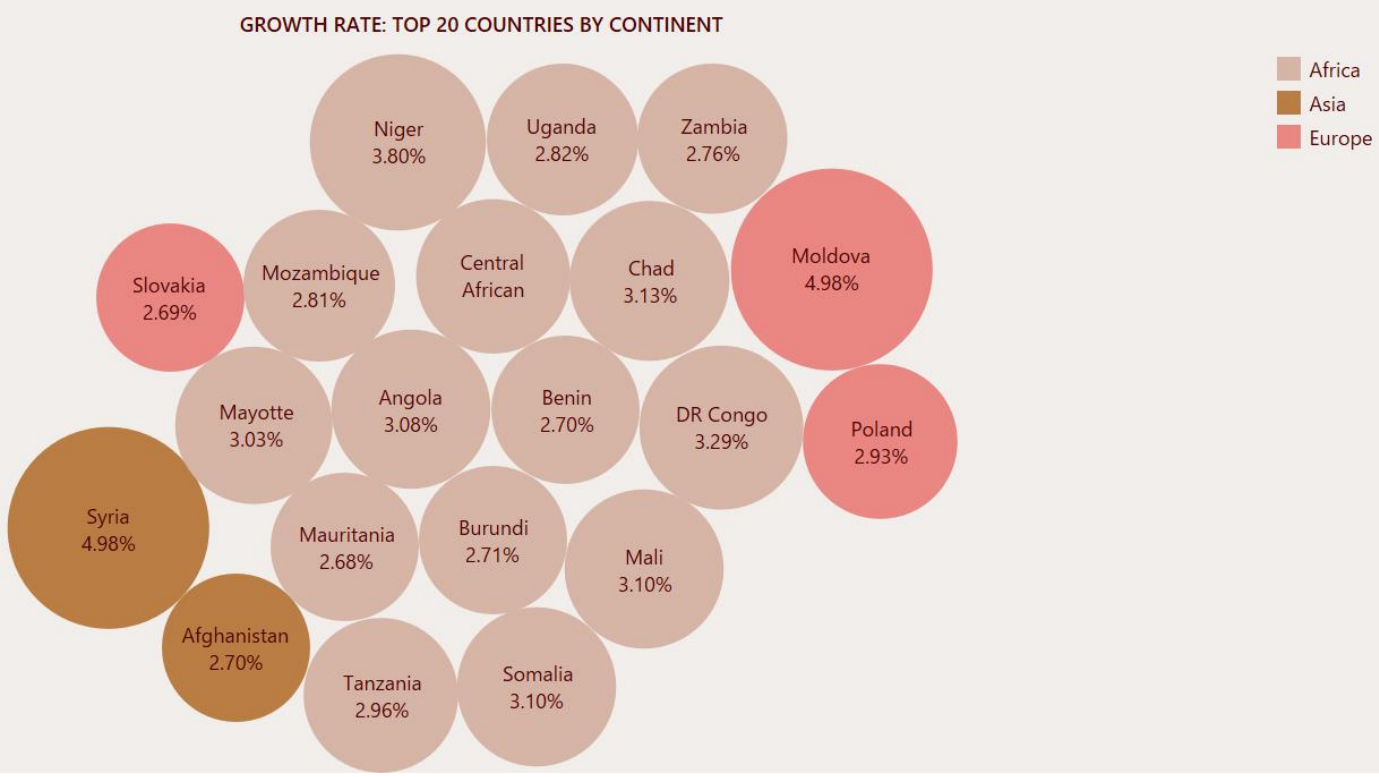
9. Visualize the Dynamic Population Changes in the Bottom 5 Countries Over the Years 1980 to 2050



The line chart above illustrates the population distribution of the bottom 5 countries from the year 1980 to 2050 categorized by continents. It is evident from the graph that the population is growing for three countries, and it is decreasing for the two of them Falkland Islands and Saint Pierre and Miquelon.

Variables Used: Country, population, Year, Continent

10. Comparing Growth Rates: Top 20 Countries by Continent

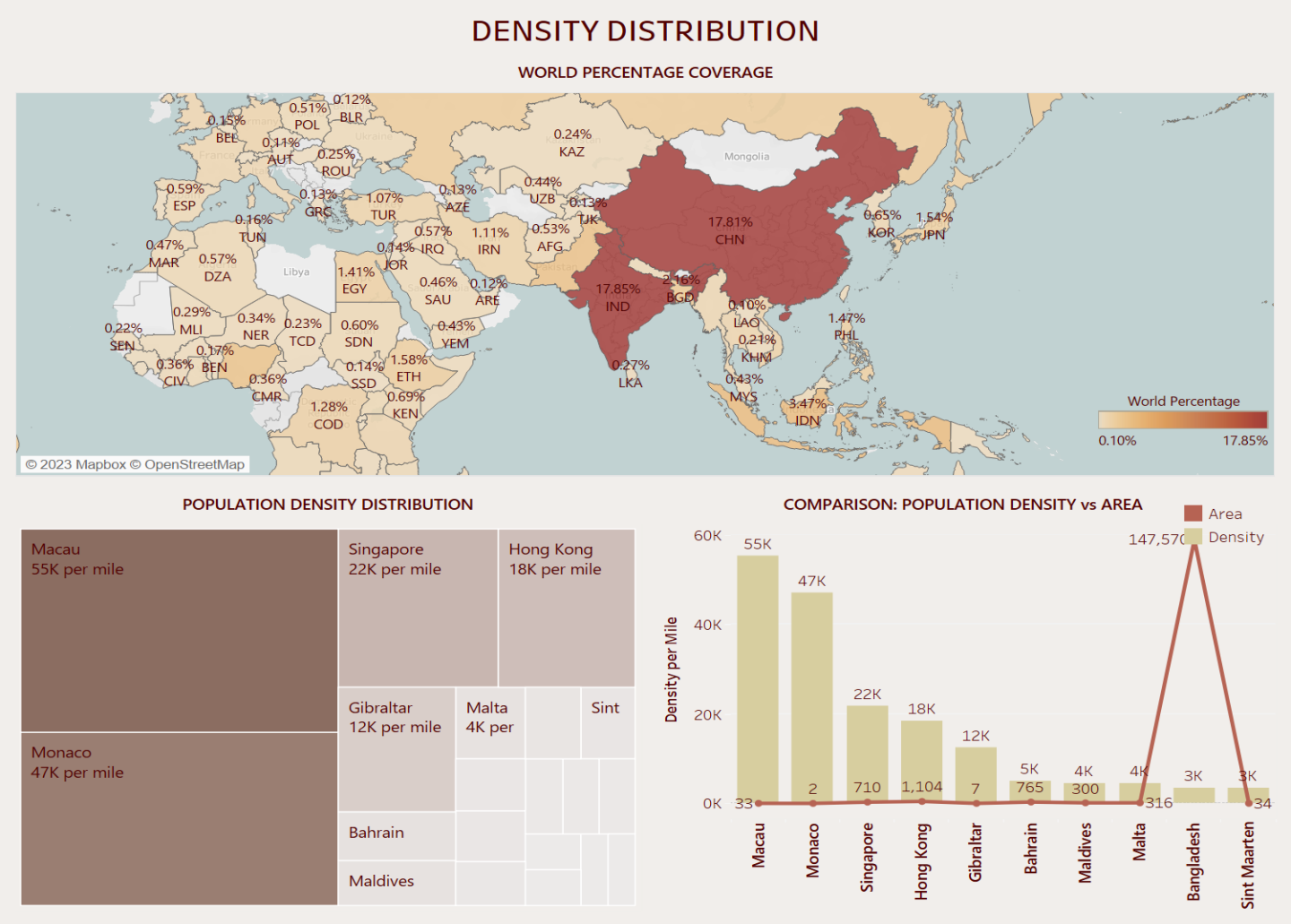


The chart presented above showcases the growth rates of the top 20 countries across different continents. It is evident from the graph that countries from the Asia and Europe continents exhibit the highest growth rates. Specifically, Syria and Moldova stand out with a growth rate of 4.98%, reflecting significant population growth in these countries.

Variables Used: Continent, growthRate, country.

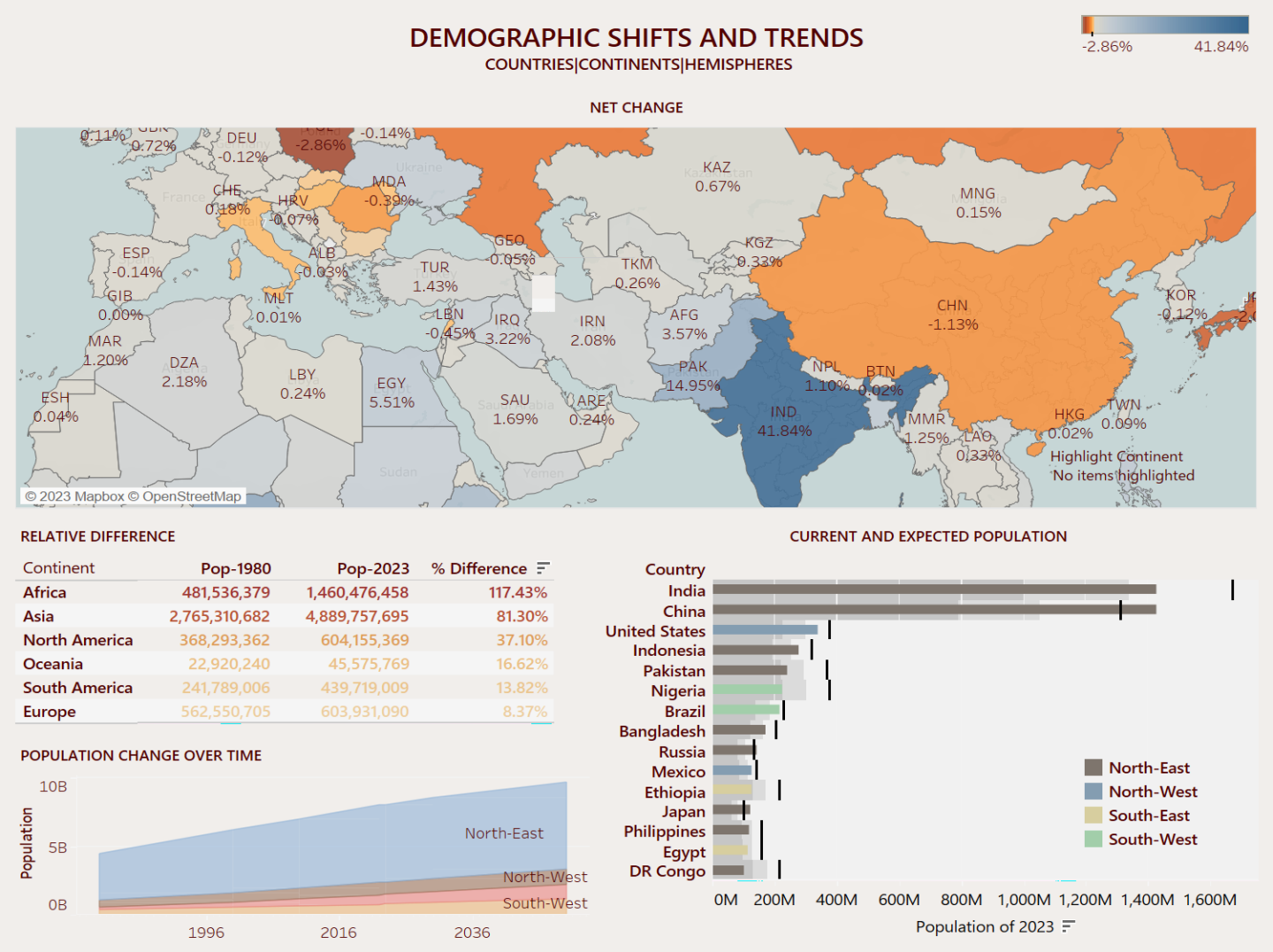
Dashboards:

1. DENSITY DISTRIBUTION



Based on the percentage of the world percentage coverage, population density distribution, and a comparison of population density with area, a dashboard displaying population density over the entire world is displayed. India and China are the nations with the biggest global population coverage, as is evident from the dashboard above. Despite the fact that Bangladesh has a larger population, Macau still has the highest density of inhabitants as Bangladesh also has a larger land area than that of Macau.

2. DEMOGRAPHICS SHIFTS AND TRENDS

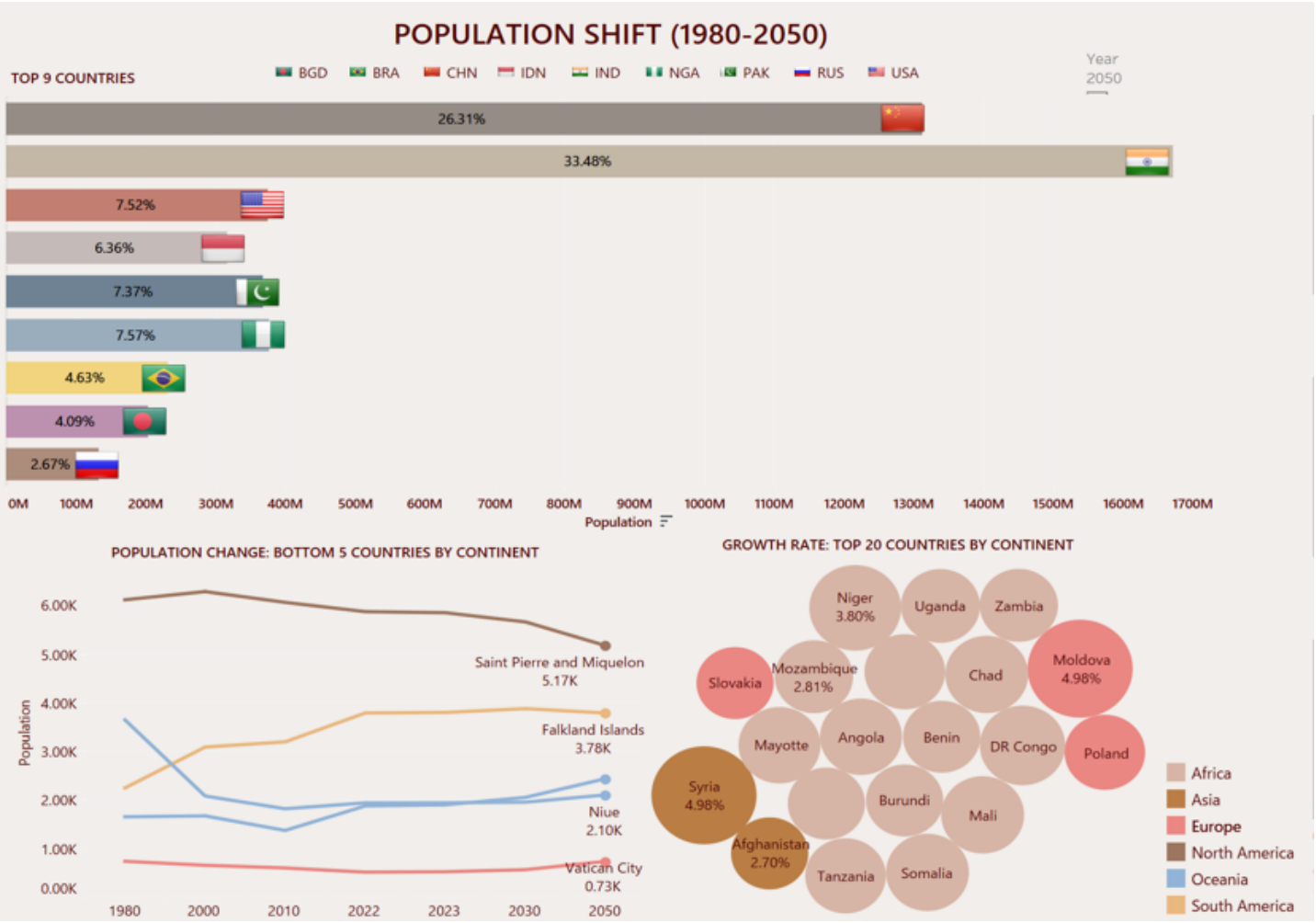


The above dashboard provides a comprehensive view of the net change in population for all countries worldwide. The data reveals that India experiences the highest net change, indicating significant population growth. On the other hand, Poland demonstrates the least net change, suggesting a relatively smaller shift in population.

Furthermore, the dashboard showcases the past, current, and expected population trends for the top 15 countries across four hemispheres. Additionally, the dashboard includes information about the relative difference in population between 1980 and 2023, providing insights into long-term population trends.

By presenting these key metrics, the dashboard offers valuable information for understanding global population dynamics and the varying growth patterns across countries, continents, and hemispheres.

3. POPULATION SHIFT (1980-2050)



The above dashboard provides insights into the population trends of the top 9 and bottom 5 countries from 1980 to 2050. Notably, China held the highest population until 2022, but India surpassed it in 2023 and maintained the highest population position until 2050.

On the other hand, among the bottom five countries, the population of Saint Pierre and Miquelon is declining, whereas the population of Niue is projected to grow by 2050.

Furthermore, the dashboard showcases the growth rates of the top 50 countries, categorized by continents. Moldova from Europe and Syria from Asia exhibit the highest growth rates among their respective continents.

Limitations:

- **Lack of Birth and Death Rate Data:** The absence of birth and death rate data in the dataset limits the precision of the net change information. Including these rates would have provided a more accurate understanding of population dynamics and net change over time.

- **Absence of Country Development Segregation:** The dataset's lack of information on segregating countries into developing and developed categories hinders the ability to showcase population distribution based on a country's level of development. This segregation could have provided valuable insights into how population patterns vary across different stages of development.

- **Missing Age Bracket Data:** The absence of a column specifying age brackets restricts the visualization's ability to showcase population distribution based on different age factors. Incorporating this data would have enabled the creation of visuals that highlight population distribution across various age groups, aiding in the analysis of demographic trends and patterns.

SUMMARY & CONCLUSIONS:

- Our analysis reveals that INDIA and CHINA are the countries with the highest population worldwide. Furthermore, our findings indicate that the population of INDIA is projected to continue growing until 2050. Whereas the population of CHINA is anticipated to experience a decline during this period. These trends highlight the dynamic nature of population changes and have significant implications for the future demographics of these nations.
- Our analysis of densities reveals that MACAU and MONACO stand out as the most densely populated countries. Despite their small land areas, these countries accommodate a high number of people, resulting in a significant population concentration within limited space.
- Analyzing the net change in population across all countries. An observation from the analysis reveals that INDIA exhibits the highest percentage of net change, indicating significant net change in population. Conversely, POLAND display the lowest percentages of net change.
- Analyzing percentage difference in population between the years 1980 and 2023 across different continents. It was observed that the AFRICAN continent exhibits the highest percentage difference, indicating a substantial change in population over the given period. Whereas OCEANIA demonstrates the lowest percentage difference.
- Our analysis of population by hemispheres reveals that the North-East hemisphere has the highest population. This is primarily due to the presence of major countries like CHINA and INDIA, which contribute significantly to the population in this hemisphere. On the other hand, the other three hemispheres (North-West, South-East, and South-West) demonstrate approximately equal population sizes.
- Based on our analysis of the data, we have determined that the FALKLAND ISLANDS and TOKELAU are the least populated countries globally. These countries have relatively small populations compared to other nations. Additionally, our findings suggest that the population of FALKLAND ISLANDS and SAINT PIERRE and MIQUELON is expected to decline over the given period.
- It is evident from the analysis that countries from the ASIA and EUROPE continents exhibit the highest growth rates. Specifically, SYRIA and MOLDOVA stand out with a growth rate of 4.98%, reflecting significant population growth in these countries.
- Based on the analysis, it is suggested that governments of countries with high populations should consider implementing measures to educate their citizens on birth control. By providing education and awareness programs, governments can empower individuals to make informed choices regarding family planning and reproductive health. Such initiatives can help address population growth concerns and promote sustainable population development.

- The analysis suggests that countries with lower population and larger land areas could consider encouraging immigration from other countries. By welcoming immigrants, these countries have the potential to address population challenges, boost economic growth, and enhance cultural diversity.

REFERENCES:

- DATASET SOURCE-
  - Pandey. (2023, June). *World Population by Country*. Kaggle: Your Machine Learning and Data Science Community. https://www.kaggle.com/datasets/rajkumarpandey02/2023-world-population-by-country
- OTHER SOURCES-
  - Wikipedia Foundation, Inc. (2023, May 4). *Hemispheres of earth*. Wikipedia, the free encyclopedia. Retrieved June 23, 2023, from https://en.wikipedia.org/wiki/Hemispheres_of_Earth
  - Wikipedia Foundation, Inc. (2004, July 1). *List of countries by continents - Simple English Wikipedia, the free encyclopedia*. Wikipedia. Retrieved June 23, 2023, from https://simple.wikipedia.org/wiki/List_of_countries_by_continents
- CITATIONS TO PUBLICATIONS-
  - Nicole De Wet- Billings. (2019, August 7). *How population data can help countries plan and tweak policy*. The Conversation. https://theconversation.com/how-population-data-can-help-countries-plan-and-tweak-policy-121288#:~:text=Population%20data%20is%20essential%20for,do%20people%20live%20and%20work%3F
  - Max Roser, Hannah Ritchie, Esteban Ortiz-Ospina and Lucas Rodés-Guirao. (2013). *World population growth*. Our World in Data. https://ourworldindata.org/world-population-growth
  - Gu, D., Andreev, K., & E. Dupre, M. (2021). Major trends in population growth around the world. *China CDC Weekly*, *3*(28), 604-613. https://doi.org/10.46234/ccdcw2021.160

CONTRIBUTIONS:

Ikram Patel	Finalizing dataset, proposal, visualization, documentation, Presentation
Sujata Biswas	Finalizing dataset, proposal, visualization, documentation, Presentation
Vidya Biradar	Visualization plan, references, and visualization
Srikanth Ayyalasomayajula	Searching Dataset, Taking rest before presentation
Jayan Francis	Introduction & Background, Taking rest during presentation