sdv-project-g4

April 25, 2024

##python

[1]:
```python
#importing the nessasary libraries
import pandas as pd

# Load the first dataset (Population Dynamics)
ct_ds_url = "https://raw.githubusercontent.com/viteshc/SDV_5320_Project_Group-4/
↪main/1"
ct_ds = pd.read_csv(ct_ds_url)

# Load the second dataset (Health Systems)
hs_ds_url = "https://raw.githubusercontent.com/viteshc/SDV_5320_Project_Group-4/
↪main/2"
hs_ds = pd.read_csv(hs_ds_url)

# Load the third dataset (Gender Equality)
gi_ds_url = "https://raw.githubusercontent.com/viteshc/SDV_5320_Project_Group-4/
↪main/3"
gi_ds = pd.read_csv(gi_ds_url)
```

[2]:
```python
#printing the columns of the dataset
print("Columns in Population Dynamics Dataset:")
print(ct_ds.columns)

print("\nColumns in Health Systems Dataset:")
print(hs_ds.columns)

print("\nColumns in Gender Inequality Dataset:")
print(gi_ds.columns)
```

```
Columns in Population Dynamics Dataset:
Index(['country', 'rank', 'area', 'landAreaKm', 'cca2', 'cca3', 'netChange',
       'growthRate', 'worldPercentage', 'density', 'densityMi', 'place',
       'pop1980', 'pop2000', 'pop2010', 'pop2022', 'pop2023', 'pop2030',
       'pop2050'],
      dtype='object')

Columns in Health Systems Dataset:
```

```
Index(['Country_Region', 'Province_State', 'World_Bank_Name',
       'Health_exp_pct_GDP_2016', 'Health_exp_public_pct_2016',
       'Health_exp_out_of_pocket_pct_2016', 'Health_exp_per_capita_USD_2016',
       'per_capita_exp_PPP_2016', 'External_health_exp_pct_2016',
       'Physicians_per_1000_2009-18', 'Nurse_midwife_per_1000_2009-18',
       'Specialist_surgical_per_1000_2008-18',
       'Completeness_of_birth_reg_2009-18',
       'Completeness_of_death_reg_2008-16'],
      dtype='object')

Columns in Gender Inequality Dataset:
Index(['Country', 'Human_development', 'GII', 'Rank', 'Maternal_mortality',
       'Adolescent_birth_rate', 'Seats_parliament', 'F_secondary_educ',
       'M_secondary_educ', 'F_Labour_force', 'M_Labour_force'],
      dtype='object')
```

[3]:

```
# Display null values for each dataset
print("Null values in Population Dynamics Dataset:")
print(ct_ds.isnull().sum())

print("\nNull values in Health Systems Dataset:")
print(hs_ds.isnull().sum())

print("\nNull values in Gender Inequality Dataset:")
print(gi_ds.isnull().sum())
```

```
Null values in Population Dynamics Dataset:
country            0
rank               0
area               0
landAreaKm         0
cca2               1
cca3               0
netChange          8
growthRate         0
worldPercentage    6
density            0
densityMi          0
place              0
pop1980            0
pop2000            0
pop2010            0
pop2022            0
pop2023            0
pop2030            0
pop2050            0
dtype: int64
```

```
Null values in Health Systems Dataset:
Country_Region                          23
Province_State                         196
World_Bank_Name                          0
Health_exp_pct_GDP_2016                 24
Health_exp_public_pct_2016              24
Health_exp_out_of_pocket_pct_2016       24
Health_exp_per_capita_USD_2016          24
per_capita_exp_PPP_2016                 24
External_health_exp_pct_2016            43
Physicians_per_1000_2009-18             21
Nurse_midwife_per_1000_2009-18          21
Specialist_surgical_per_1000_2008-18    35
Completeness_of_birth_reg_2009-18       47
Completeness_of_death_reg_2008-16      103
dtype: int64

Null values in Gender Inequality Dataset:
Country                 0
Human_development       4
GII                    25
Rank                   25
Maternal_mortality     11
Adolescent_birth_rate   0
Seats_parliament        2
F_secondary_educ       18
M_secondary_educ       18
F_Labour_force         15
M_Labour_force         15
dtype: int64
```

[4]:
```python
# Remove null values from Population Dynamics Dataset
ct_ds_clean = ct_ds.dropna()

# Remove null values from Health Systems Dataset
hs_ds_clean = hs_ds

# Remove null values from Gender Inequality Dataset
gi_ds_clean = gi_ds.dropna()
```

[5]:
```python
ct_ds_clean.isnull().sum()
```

[5]:
```
country           0
rank              0
area              0
landAreaKm        0
cca2              0
```

```
cca3               0
netChange          0
growthRate         0
worldPercentage    0
density            0
densityMi          0
place              0
pop1980            0
pop2000            0
pop2010            0
pop2022            0
pop2023            0
pop2030            0
pop2050            0
dtype: int64
```

[6]:
```
hs_ds_clean.isnull().sum()
```

[6]:
```
Country_Region                          23
Province_State                         196
World_Bank_Name                          0
Health_exp_pct_GDP_2016                 24
Health_exp_public_pct_2016              24
Health_exp_out_of_pocket_pct_2016       24
Health_exp_per_capita_USD_2016          24
per_capita_exp_PPP_2016                 24
External_health_exp_pct_2016            43
Physicians_per_1000_2009-18             21
Nurse_midwife_per_1000_2009-18          21
Specialist_surgical_per_1000_2008-18    35
Completeness_of_birth_reg_2009-18       47
Completeness_of_death_reg_2008-16      103
dtype: int64
```

[7]:
```
gi_ds_clean.isnull().sum()
```

[7]:
```
Country                  0
Human_development        0
GII                      0
Rank                     0
Maternal_mortality       0
Adolescent_birth_rate    0
Seats_parliament         0
F_secondary_educ         0
M_secondary_educ         0
F_Labour_force           0
M_Labour_force           0
```

```
dtype: int64
```

[8]:
```python
# Drop unused columns
ct_ds_clean.drop(['rank', 'area', 'landAreaKm', 'cca2', 'cca3', 'pop1980',␣
↪'pop2000', 'pop2010', 'pop2022', 'pop2030', 'pop2050'], axis=1, inplace=True)
```

```
<ipython-input-8-506ae55fc7f7>:2: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: https://pandas.pydata.org/pandas-
docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
  ct_ds_clean.drop(['rank', 'area', 'landAreaKm', 'cca2', 'cca3', 'pop1980',
'pop2000', 'pop2010', 'pop2022', 'pop2030', 'pop2050'], axis=1, inplace=True)
```

[9]:
```python
# Drop unused columns
hs_ds_clean.drop(['Province_State', 'World_Bank_Name',␣
↪'Health_exp_out_of_pocket_pct_2016', 'Health_exp_per_capita_USD_2016',␣
↪'per_capita_exp_PPP_2016', 'External_health_exp_pct_2016',␣
↪'Nurse_midwife_per_1000_2009-18', 'Specialist_surgical_per_1000_2008-18'],␣
↪axis=1, inplace=True)
```

[10]:
```python
# Drop unused columns
gi_ds_clean.drop(['Human_development', 'Rank'], axis=1, inplace=True)
```

```
<ipython-input-10-1a275f5b5126>:2: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: https://pandas.pydata.org/pandas-
docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
  gi_ds_clean.drop(['Human_development', 'Rank'], axis=1, inplace=True)
```

[11]:
```python
# Display all columns of cleaned datasets
print("Columns in Population Dynamics Dataset:")
print(ct_ds_clean.columns)

print("\nColumns in Health Systems Dataset:")
print(hs_ds_clean.columns)

print("\nColumns in Gender Inequality Dataset:")
print(gi_ds_clean.columns)
```

```
Columns in Population Dynamics Dataset:
Index(['country', 'netChange', 'growthRate', 'worldPercentage', 'density',
       'densityMi', 'place', 'pop2023'],
      dtype='object')

Columns in Health Systems Dataset:
Index(['Country_Region', 'Health_exp_pct_GDP_2016',
```

```
       'Health_exp_public_pct_2016', 'Physicians_per_1000_2009-18',
       'Completeness_of_birth_reg_2009-18',
       'Completeness_of_death_reg_2008-16'],
      dtype='object')

Columns in Gender Inequality Dataset:
Index(['Country', 'GII', 'Maternal_mortality', 'Adolescent_birth_rate',
       'Seats_parliament', 'F_secondary_educ', 'M_secondary_educ',
       'F_Labour_force', 'M_Labour_force'],
      dtype='object')
```

[12]:
```
#Saving cleaned datasets
ct_ds_clean.to_csv("population_dynamics_clean.csv", index=False)
hs_ds_clean.to_csv("health_systems_clean.csv", index=False)
gi_ds_clean.to_csv("gender_inequality_clean.csv", index=False)
```

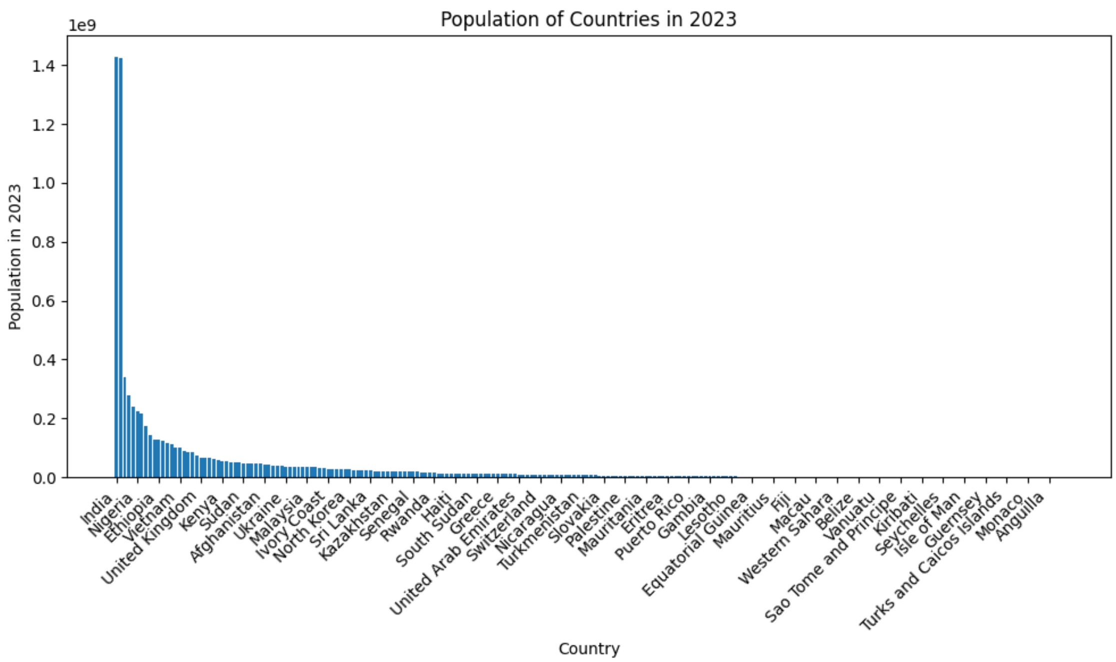
[13]:
```
import pandas as pd
import matplotlib.pyplot as plt

# Load cleaned datasets
ct_ds_clean = pd.read_csv("population_dynamics_clean.csv")
hs_ds_clean = pd.read_csv("health_systems_clean.csv")
gi_ds_clean = pd.read_csv("gender_inequality_clean.csv")
```

[14]:
```
# Print the first few rows of Population Dynamics dataset
print("Population Dynamics Dataset:")
print(ct_ds_clean.head())

# Print the first few rows of Health Systems dataset
print("\nHealth Systems Dataset:")
print(hs_ds_clean.head())

# Print the first few rows of Gender Inequality dataset
print("\nGender Inequality Dataset:")
print(gi_ds_clean.head())
```

```
Population Dynamics Dataset:
         country  netChange  growthRate  worldPercentage   density  densityMi  \
0          India     0.4184      0.0081           0.1785  480.5033  1244.5036
1          China    -0.0113     -0.0002           0.1781  151.2696   391.7884
2  United States     0.0581      0.0050           0.0425   37.1686    96.2666
3      Indonesia     0.0727      0.0074           0.0347  147.8196   382.8528
4       Pakistan     0.1495      0.0198           0.0300  311.9625   807.9829

   place     pop2023
0    356  1428627663
1    156  1425671352
2    840   339996563
```

```
3    360   277534122
4    586   240485658

Health Systems Dataset:
  Country_Region  Health_exp_pct_GDP_2016  Health_exp_public_pct_2016  \
0    Afghanistan                     10.2                         5.1
1        Albania                      6.7                        41.4
2        Algeria                      6.6                        67.7
3        Andorra                     10.4                        49.1
4         Angola                      2.9                        44.1

   Physicians_per_1000_2009-18  Completeness_of_birth_reg_2009-18  \
0                          0.3                               42.3
1                          1.2                               98.4
2                          1.8                              100.0
3                          3.3                              100.0
4                          0.2                               25.0

   Completeness_of_death_reg_2008-16
0                                NaN
1                               53.0
2                                NaN
3                               80.0
4                                NaN

Gender Inequality Dataset:
       Country    GII  Maternal_mortality  Adolescent_birth_rate  \
0  Switzerland  0.018                 5.0                    2.2
1       Norway  0.016                 2.0                    2.3
2      Iceland  0.043                 4.0                    5.4
3    Australia  0.073                 6.0                    8.1
4      Denmark  0.013                 4.0                    1.9

   Seats_parliament  F_secondary_educ  M_secondary_educ  F_Labour_force  \
0              39.8              96.9              97.5            61.7
1              45.0              99.1              99.3            60.3
2              47.6              99.8              99.7            61.7
3              37.9              94.6              94.4            61.1
4              39.7              95.1              95.2            57.7

   M_Labour_force
0            72.7
1            72.0
2            70.5
3            70.5
4            66.7
```

```
[15]: # Visualize Population Dynamics with adjusted xticks
plt.figure(figsize=(10, 6))
plt.bar(ct_ds_clean['country'], ct_ds_clean['pop2023'])
plt.xlabel('Country')
plt.ylabel('Population in 2023')
plt.title('Population of Countries in 2023')
# Rotate labels for better readability
plt.xticks(rotation=45, ha='right')
# Display every 5th label
plt.gca().set_xticks(plt.gca().get_xticks()[::5])
# Adjust layout to prevent clipping
plt.tight_layout()
plt.show()
```



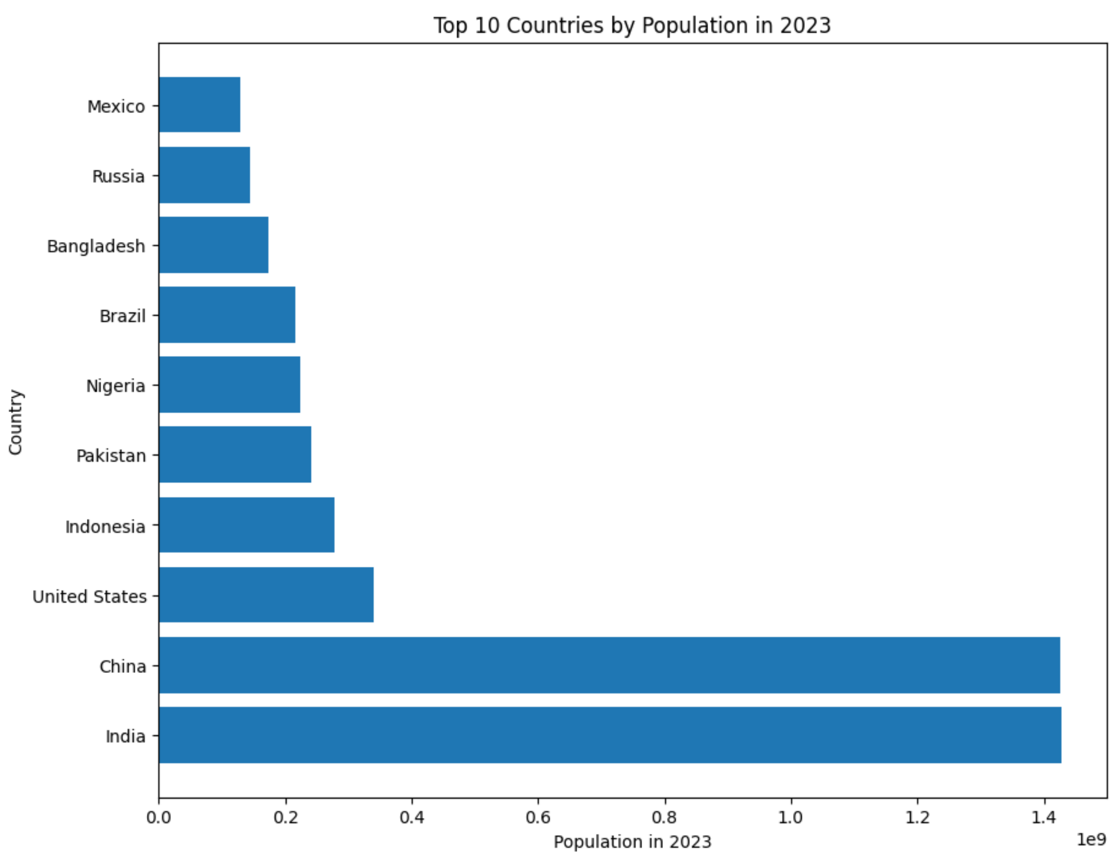
below: Different stakeholders, including policy makers, economists and social scientists, would find it useful to know which countries are projected to have the largest populations in the foreseeable future since global demographics are constantly evolving. This code furnishes a snapshot of demographic trends that shape our world.

When we look at the horizontal bar plot, it is clear that some nations dominate for their large population. On top of these populous nations include China, India and United States having populations running into billions or millions. These countries have always been recognized for their massive influence on global and regional demography.

However, besides regular giants, other states with large populations like Indonesia Pakistan and Brazil can also be seen on this graph that calls one's attention due to its huge demographic weight. These countries belong to different regions and carry implications for such aspects of global affairs as economic growth, social development and environmental sustainability.

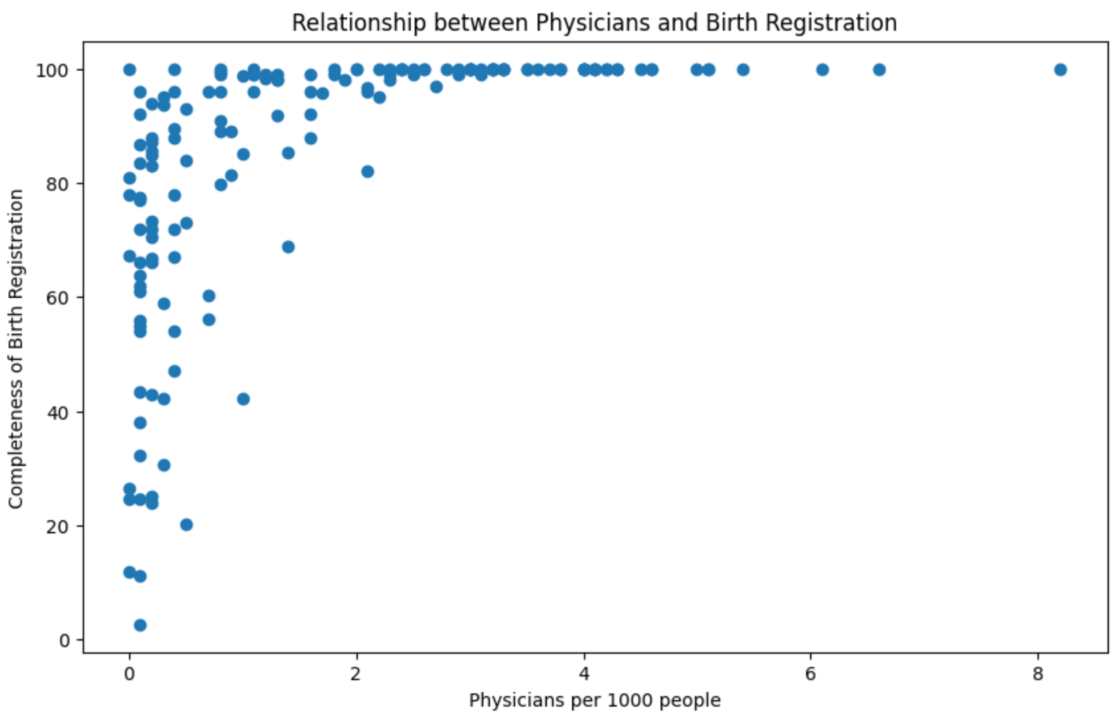
Therefore for policymakers as well as other stakeholders looking at this visualization becomes crucial since they will be able to get prepared for any upcoming challenges while benefiting from opportunities that may arise out of these demographic changes.

[16]:
```
# Sort the dataset by population in descending order
ct_ds_sorted = ct_ds_clean.sort_values(by='pop2023', ascending=False)

# Select the top 10 countries with the highest population
top_10_countries = ct_ds_sorted.head(10)

# Visualize the top 10 countries with a horizontal bar plot
plt.figure(figsize=(10, 8))
plt.barh(top_10_countries['country'], top_10_countries['pop2023'])
plt.xlabel('Population in 2023')
plt.ylabel('Country')
plt.title('Top 10 Countries by Population in 2023')
plt.show()
```



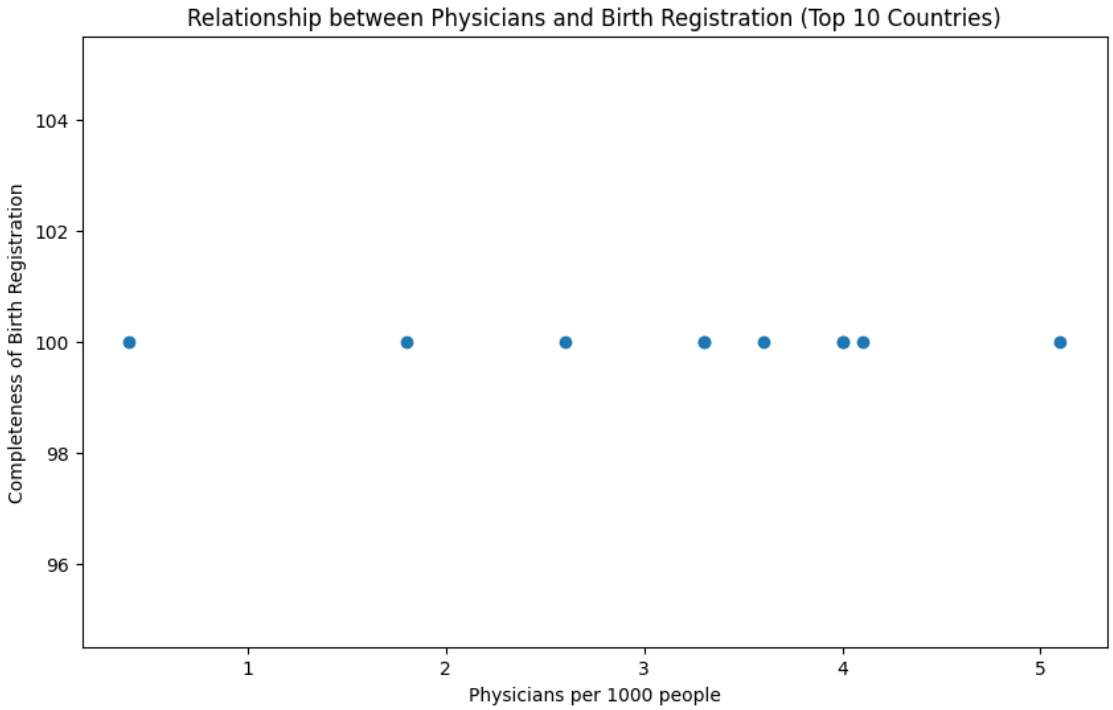
below: The diagram above is used to represent how the number of doctors per 1000 people relates with birth registration completeness. One point in the scatter plot shows one country and its x-coordinate is the number of doctors per thousand people while y-coordinate represents the percentage birth registration complete.

[17]:
```
# Visualize Health Systems
plt.figure(figsize=(10, 6))
plt.scatter(hs_ds_clean['Physicians_per_1000_2009-18'],␣
↪hs_ds_clean['Completeness_of_birth_reg_2009-18'])
plt.xlabel('Physicians per 1000 people')
plt.ylabel('Completeness of Birth Registration')
plt.title('Relationship between Physicians and Birth Registration')
plt.show()
```



[18]:
```
# Filter the top 10 countries with the highest completeness of birth␣
↪registration
top_countries_hs = hs_ds_clean.nlargest(10, 'Completeness_of_birth_reg_2009-18')

# Visualize Health Systems for top 10 countries
plt.figure(figsize=(10, 6))
plt.scatter(top_countries_hs['Physicians_per_1000_2009-18'],␣
↪top_countries_hs['Completeness_of_birth_reg_2009-18'])
plt.xlabel('Physicians per 1000 people')
plt.ylabel('Completeness of Birth Registration')
plt.title('Relationship between Physicians and Birth Registration (Top 10␣
↪Countries)')
```

```
plt.show()
```



below: The visualization is about Gender Inequality Index (GII) among the top ten most gender unequal countries. GII is a measure that combines measures for gender gaps in health, education, and economic participation.

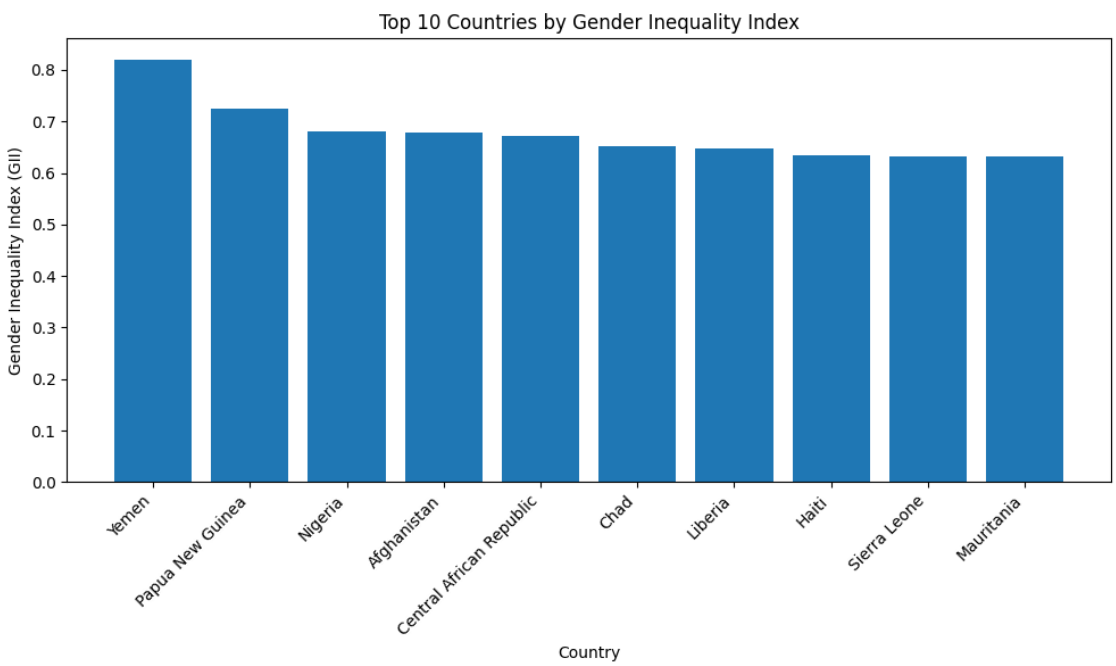
Looking at the chart we observe that higher GII values indicate more inequality between genders in the countries. Those are larger bars representing countries where inequality between women and men is greater across various elements of life such as educational access, medical care and employment.

For example, Yemen has the highest GII among the top 10 countries indicating considerable gender inequalities in areas like maternal mortality, adolescent birth rates, educational attainment and labour force morbidity. Others like Afghanistan, Niger and Chad also reveal high levels of gender inequality by their respective GII values.

This visualization underlines that addressing the question of gender inequality as one of most important aspects for social and economic development. It demonstrates specific interventions requiring focused approaches towards ensuring gender equality and empowering girls as well as women globally that will eventually create to an all-inclusive society-both aspect for human rights indeed.

[19]:
```
# Sort the DataFrame by GII and select the top 10 countries
top_10_gii = gi_ds_clean.sort_values(by='GII', ascending=False).head(10)

# Visualize Gender Inequality with adjusted xticks for top 10 countries
```

```python
plt.figure(figsize=(10, 6))
plt.bar(top_10_gii['Country'], top_10_gii['GII'])
plt.xlabel('Country')
plt.ylabel('Gender Inequality Index (GII)')
plt.title('Top 10 Countries by Gender Inequality Index')
plt.xticks(rotation=45, ha='right')  # Rotate labels for better readability
plt.tight_layout()  # Adjust layout to prevent clipping
plt.show()
```



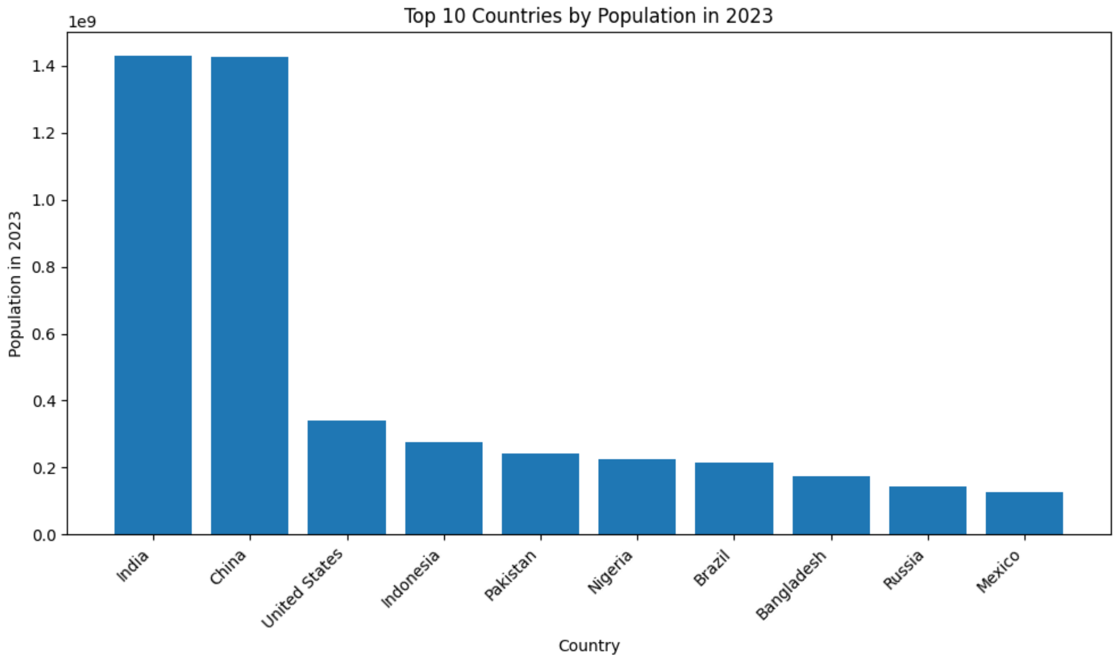
below: Population dynamics: A visualization of the top ten countries by population in 2023 lays bare the demographic landscape of the most populous nations on earth. Leading this list are giants such as India and China, whose huge populations have global implications. These countries, like United States, Indonesia and Pakistan among others, show different demographics, that is; growth rates and population densities. It is clear from these population dynamics that meeting the needs of rapidly growing populations while ensuring sustainable development will be a critical issue for years to come.

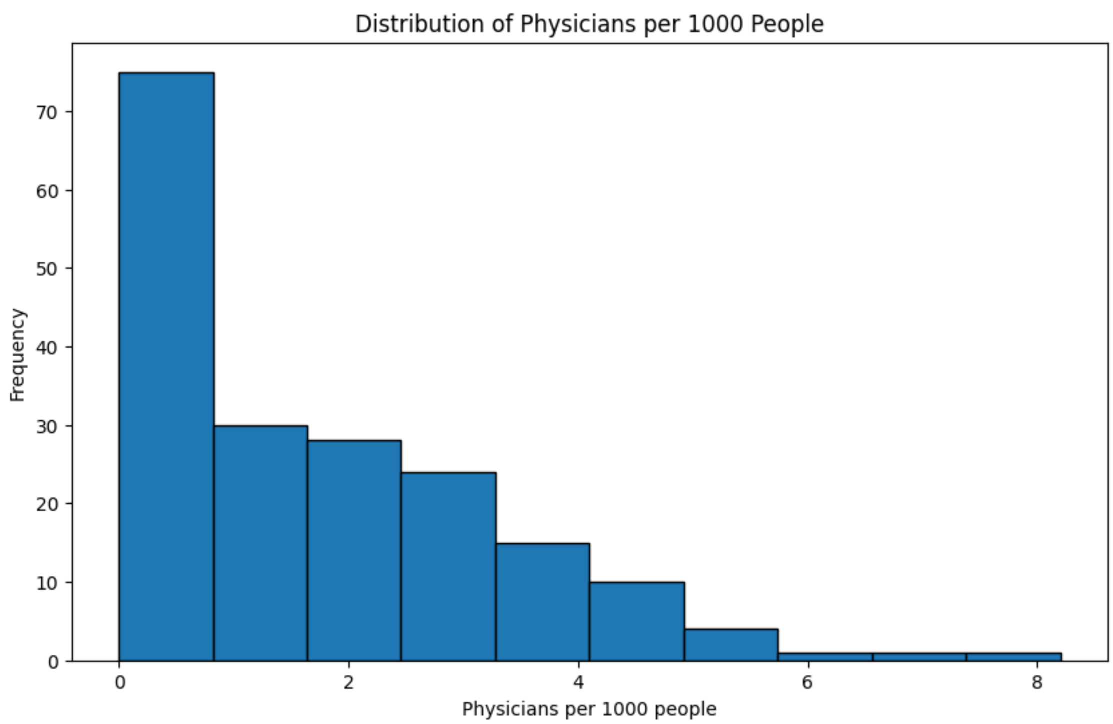
Health systems: An examination of physician distribution per 1000 persons reveals disparities in terms of access to healthcare and resources across countries. While some countries have a good physician-population ratio, others face challenges in their healthcare infrastructure's limitedness or workforce shortage. This difference shows how important it is to strengthen health systems so that every person can get quality healthcare. Also, looking at indicators like health expenditures as percentage of GDP points out the extent to which different countries invest in health care and therefore where interventions could improve health status through better delivery globally.

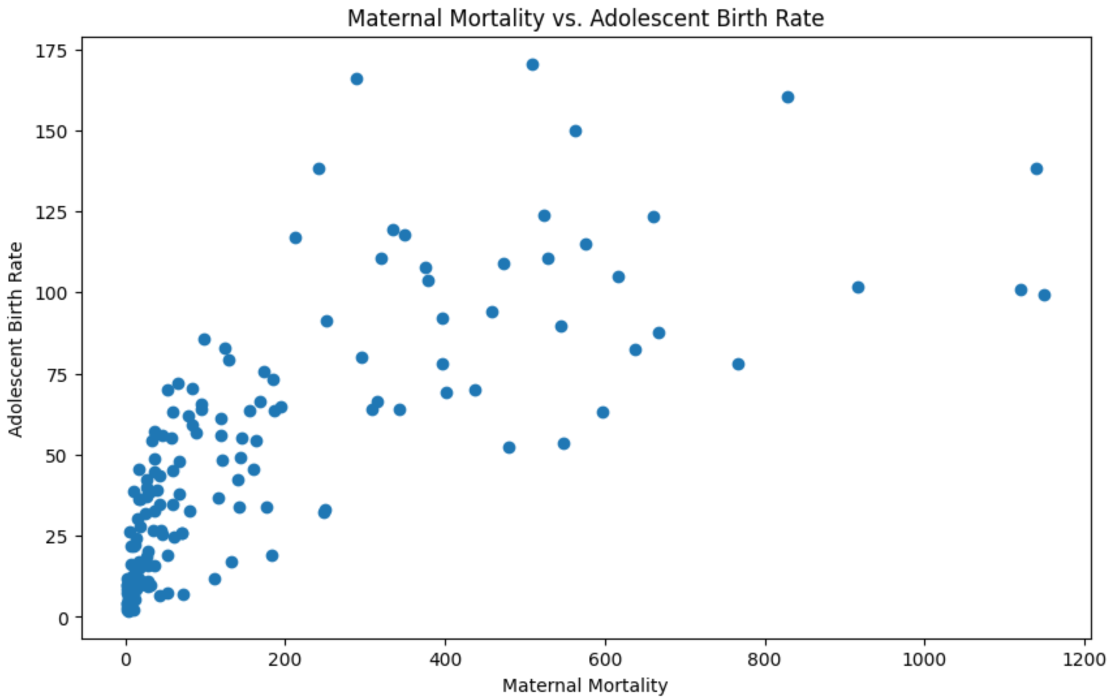
Gender Inequality: When it comes to gender inequality and maternal health, a scatter plot that shows the correlation between maternal mortality ratios and adolescent birth rates would be the best idea. It is observed that countries with higher numbers of maternal deaths tend to have elevated levels of teenage pregnancy which implies a lack of reproductive health services and education. Similarly, the Gender Inequality Index (GII) draws attention to the fact that these disparities are systemic and not limited to one sector such as education, political representation or employment. Consequently, mitigating such disproportions is indispensable towards attaining global gender parity and promoting all-embracing societies.

[20]:

```
import pandas as pd
import matplotlib.pyplot as plt

# Load cleaned datasets
population_df = pd.read_csv("population_dynamics_clean.csv")
health_systems_df = pd.read_csv("health_systems_clean.csv")
gender_inequality_df = pd.read_csv("gender_inequality_clean.csv")

# Example 1: Population Dynamics Visualization
plt.figure(figsize=(10, 6))
top_countries_population = population_df.nlargest(10, 'pop2023')
plt.bar(top_countries_population['country'],␣
 ↪top_countries_population['pop2023'])
plt.xlabel('Country')
plt.ylabel('Population in 2023')
plt.title('Top 10 Countries by Population in 2023')
plt.xticks(rotation=45, ha='right')
plt.tight_layout()
plt.show()

# Example 2: Health Systems Visualization
plt.figure(figsize=(10, 6))
plt.hist(health_systems_df['Physicians_per_1000_2009-18'], bins=10,␣
 ↪edgecolor='black')
plt.xlabel('Physicians per 1000 people')
plt.ylabel('Frequency')
plt.title('Distribution of Physicians per 1000 People')
plt.show()

# Example 3: Gender Inequality Visualization
plt.figure(figsize=(10, 6))
plt.scatter(gender_inequality_df['Maternal_mortality'],␣
 ↪gender_inequality_df['Adolescent_birth_rate'])
plt.xlabel('Maternal Mortality')
plt.ylabel('Adolescent Birth Rate')
plt.title('Maternal Mortality vs. Adolescent Birth Rate')
plt.show()
```


Top 10 Countries by Population in 2023
1e9
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
Population in 2023
India
China
United States
Indonesia
Pakistan
Nigeria
Brazil
Bangladesh
Russia
Mexico
Country


Distribution of Physicians per 1000 People
70
60
50
40
30
20
10
0
Frequency
0
2
4
6
8
Physicians per 1000 people



below: In a world of opposites, where ups and downs on progress meet with dissimilarities that are hard to bear, the Population Health Heatmap and Gender Inequality Index (GII) Map give windows into global dynamics portrayed in their intricate tapestry.

Part 1: Population Health Heatmap

As we start our journey through the Population Health Heatmap, the landscape unravels before us in vibrant hues, each shade reflecting the density of human life. From crowded Asian cities to African plains stretching out as far as the eye can see, it tells us about people over there beating by billions.

At times within bustling cities and other times in rural areas full of tranquility, gaps of inequality emerge. Areas with high population densities show strains in healthcare systems that expose the need for equal access to medical services and resources. Still from those difficulties there is light at the end of tunnel as communities rise up to address health issues that affect their people towards healthier and stronger future full of unity.

Part 2: Gender Inequality Index Map

When it comes to the Gender Inequality Index Map, things change a bit with colors giving way to another form of human life story. This is because different shades of inequity inform us about women's issues that have been influenced by cultural norms and societal expectations.

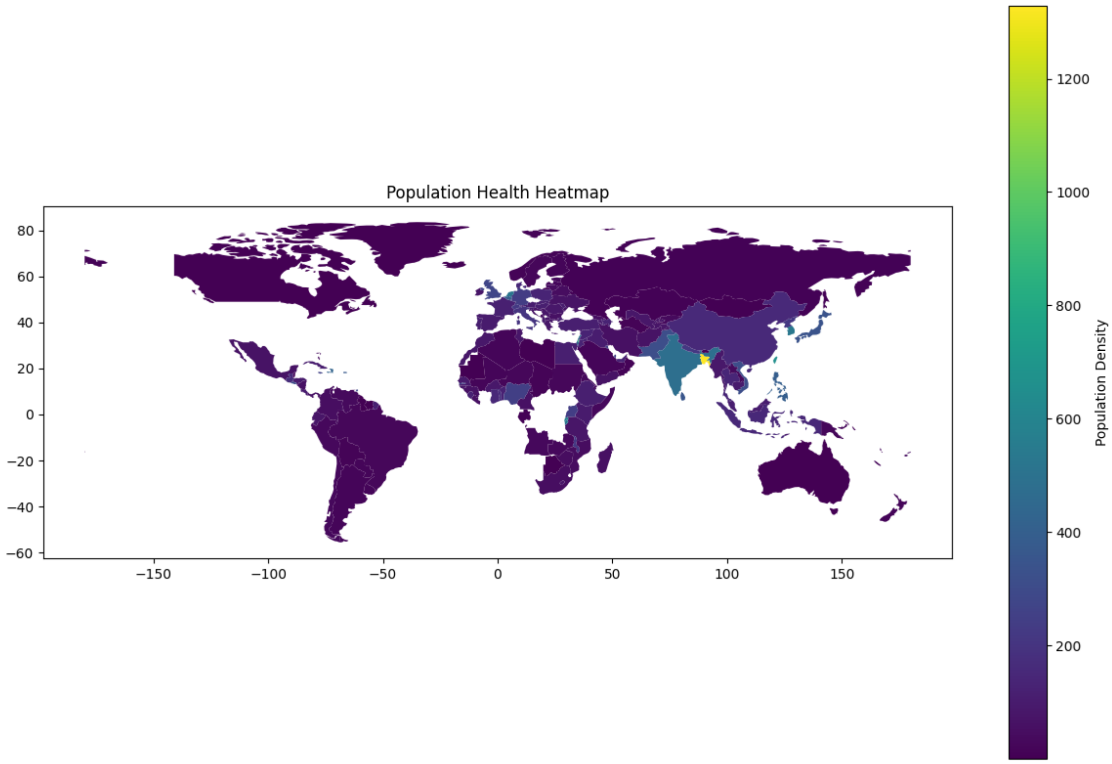
Where women voices are raised high and their rights are protected; on the other hand, the map shows softer colors denoting an advance toward gender parity. On the contrary, in regions where there is systemic discrimination and deeply rooted gender stereotyping, this landscape has darker shades of inequality that obstruct progress for women and girls.

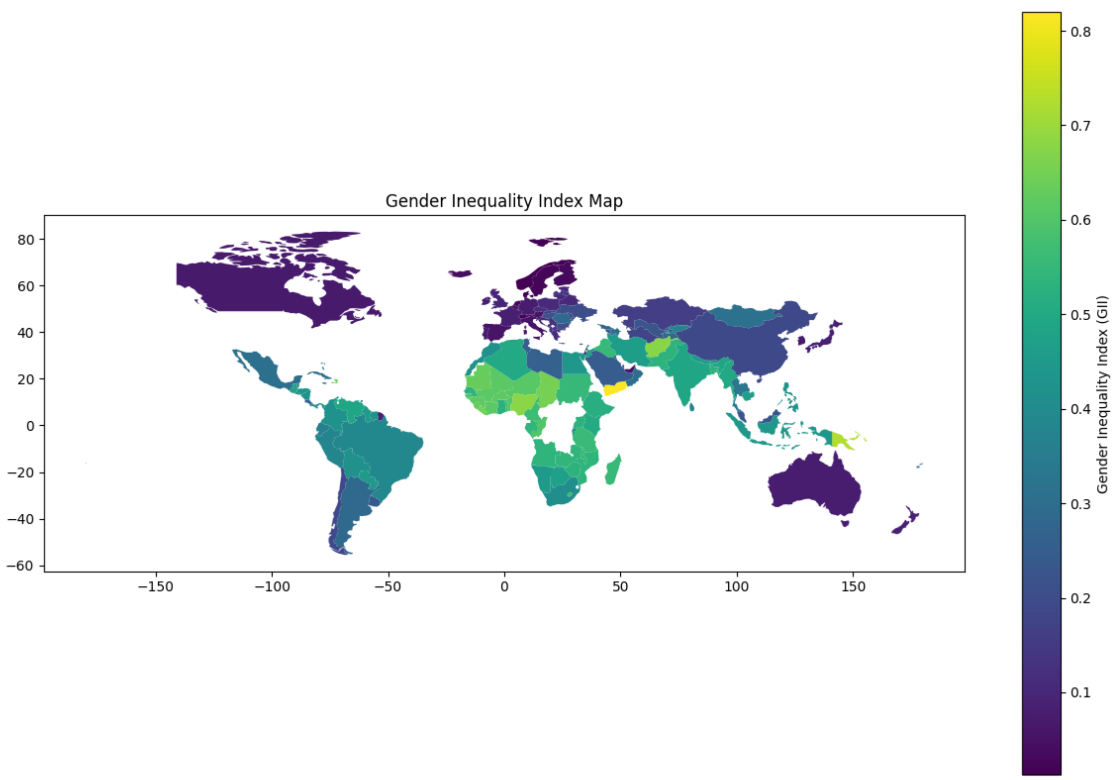
Nevertheless, some embers of resilience are ignited from within as grass root movements together with advocacy groups strive to remove obstacles that hinder equal treatment based on gender. It is all about educating, empowering and advocating; hence forging paths towards a more inclusive and just society as regards sex inequality narrative in communities.

[21]:
```python
import geopandas as gpd
import matplotlib.pyplot as plt

# Load shapefile for country boundaries
world = gpd.read_file(gpd.datasets.get_path('naturalearth_lowres'))

# Load population density data
population_density = pd.read_csv("/content/population_dynamics_clean.csv")  #␣
↪Replace with your data file

# Merge shapefile with population density data
world = world.merge(population_density, how='left', left_on='name',␣
↪right_on='country')

# Plot Population Health Heatmap
fig, ax = plt.subplots(1, 1, figsize=(15, 10))
world.plot(column='density', ax=ax, legend=True,
           legend_kwds={'label': "Population Density", 'orientation':␣
↪"vertical"})
ax.set_title('Population Health Heatmap')
plt.show()

# Load Gender Inequality Index (GII) data
gender_inequality = pd.read_csv("gender_inequality_clean.csv")  # Replace with␣
↪your data file

# Merge shapefile with GII data
world = world.merge(gender_inequality, how='left', left_on='name',␣
↪right_on='Country')

# Plot Gender Inequality Index Map
fig, ax = plt.subplots(1, 1, figsize=(15, 10))
world.plot(column='GII', ax=ax, legend=True,
           legend_kwds={'label': "Gender Inequality Index (GII)", 'orientation':
↪ "vertical"})
ax.set_title('Gender Inequality Index Map')
plt.show()
```

```
<ipython-input-21-c3699117767e>:5: FutureWarning: The geopandas.dataset module
is deprecated and will be removed in GeoPandas 1.0. You can get the original
'naturalearth_lowres' data from
https://www.naturalearthdata.com/downloads/110m-cultural-vectors/.
```

```
world = gpd.read_file(gpd.datasets.get_path('naturalearth_lowres'))
```





Basically in this world the economic growth progress is generally measured its progress by considering the gender inequality of the population and also based on the social justice and the challenges are generally based on the world gender equality of the population.

Next colors on the map are more vibrant in which it gives the whole information of the hue easily. Next the gender parity of the scadinavia tales are in the soft blues.This, in turn, has led to situations where both men and women grow and prosper.

And yet not all areas are benefiting from this progress. Across great lengths of land in Africa or Asia it is a tragic fact that the color red is used to represent inequality. Women here experience lack of access to education, health services and economic opportunities which has continued throughout generations owing to traditional customs and circumstances.

In such disparities however, there is still a ray of hope. In certain places, women have emerged as leaders, entrepreneurs or catalysts for change in a time when overall conditions were bleak. Rwanda and Bangladesh were previously characterized by violence and destitution but now they epitomize progress with their path towards achieving gender equality lighting the way for others.

Navigating the contours of GII map shows that gender inequality has no boundaries. It thrives in the silence of norms in society and indifference as well. However, it also fades away before commitment and unity.

We are one step closer to a world where people's fate is not determined by gender for every stroke painted on the canvas of progress. This GII map is both a mirror reflecting our journey together and a compass steering us into an age where equality will eventually prevail.

In this global tapestry of humanity, let us commit ourselves to creating a future that radiates with all colors, speaks through every voice, and enables any person to reach heights that were never dreamt possible due to gender identity.

[22]:
```python
import geopandas as gpd
import matplotlib.pyplot as plt

# Load shapefile for country boundaries
world = gpd.read_file(gpd.datasets.get_path('naturalearth_lowres'))

# Load Gender Inequality Index (GII) data
gender_inequality = pd.read_csv("gender_inequality_clean.csv")  # Replace with␣
 ↪your data file

# Merge shapefile with GII data
world = world.merge(gender_inequality, how='left', left_on='name',␣
 ↪right_on='Country')

# Plot Gender Inequality Index Map
fig, ax = plt.subplots(1, 1, figsize=(15, 10))
world.plot(column='GII', ax=ax, legend=True,
```

```
            legend_kwds={'label': "Gender Inequality Index (GII)", 'orientation':
 ↪ "vertical"})
ax.set_title('Gender Inequality Index Map')
plt.show()
```

```
<ipython-input-22-d1eb86f90135>:5: FutureWarning: The geopandas.dataset module
is deprecated and will be removed in GeoPandas 1.0. You can get the original
'naturalearth_lowres' data from
https://www.naturalearthdata.com/downloads/110m-cultural-vectors/.
  world = gpd.read_file(gpd.datasets.get_path('naturalearth_lowres'))
```