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PYTHON INCUBATOR CLASS

PRESENTING ON COUNTRY DATASET

28TH NOVEMBER 2022

INTRODUCTION

Country information/Data Set tends to be An analysis; country reports are descriptive reports covering most areas of interest on a country. They contain an analysis of the business environment and include information on political, environmental, social, technological and risk factors. Datasets – raw data, e.g. GDP, inflation figures, etc..

BACKGROUND

This dataset offers a variety of indicators which allows for profound assessments of a target country. In this analysis, the country dataset includes the economic data and social data as an indicator for economics growth

In [ ]:
```
## AIMS
```

In [ ]:
```
## OBJECTIVES
```

RESEARCH QUESTIONS

1. What effect does Wealth index(Income) has on Child Mortality and GDP
2. What is the average life expectancy of countries by region
3. What are the top 10 and least 10 countries of net exporter
4. What are the top 10 countries by income and GDP
5. What is the relatinship between child mortality rate and fertility rate base on wealth index of countries

In [ ]:
```

```

In [2]:
```
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
%matplotlib inline
```

In [3]:
```
country = pd.read_csv('C:\\Users\\HP\Desktop\\country_data.csv')
country.head()
```

Out[3]:

	country	child_mort	exports	health	imports	income	inflation	life_expec	total_fer	gd
0	Afghanistan	90.2	10.0	7.58	44.9	1610	9.44	56.2	5.82	5
1	Albania	16.6	28.0	6.55	48.6	9930	4.49	76.3	1.65	40
2	Algeria	27.3	38.4	4.17	31.4	12900	16.10	76.5	2.89	44
3	Angola	119.0	62.3	2.85	42.9	5900	22.40	60.1	6.16	35
4	Antigua and Barbuda	10.3	45.5	6.03	58.9	19100	1.44	76.8	2.13	122

In [4]:
```
country.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 167 entries, 0 to 166
Data columns (total 10 columns):
 #   Column      Non-Null Count  Dtype  
---  ------      --------------  -----  
 0   country     167 non-null    object 
 1   child_mort  167 non-null    float64
 2   exports     167 non-null    float64
 3   health      167 non-null    float64
 4   imports     167 non-null    float64
 5   income      167 non-null    int64  
 6   inflation   167 non-null    float64
 7   life_expec  167 non-null    float64
 8   total_fer   167 non-null    float64
 9   gdpp        167 non-null    int64  
dtypes: float64(7), int64(2), object(1)
memory usage: 13.2+ KB
```

Inaccurate spelling of 9 country name

Define

- Congo, Dem. Rep.
- Congo, Rep.
- Cote d'Ivoire
- Kyrgyz Republic
- Lao

- Macedonia, FYR
- Micronesia, Fed. Sts.
- Slovak Republic
- St. Vincent and the Grenadines

Clean

- DR Congo
- Republic of the Congo
- Ivory Coast
- Kyrgyzstan
- Laos
- North Macedonia
- Micronesia
- Slovakia
- Saint Vincent and the Grenadines

Code

In [5]:
```
country['country'].replace('Congo, Dem. Rep.','DR Congo', inplace = True)
country['country'].replace('Congo, Rep.','Republic of the Congo', inplace = T
country['country'].replace("Cote d'Ivoire",'Ivory Coast', inplace = True)
country['country'].replace('Kyrgyz Republic','Kyrgyzstan', inplace = True)
country['country'].replace('Lao','Laos', inplace = True)
country['country'].replace('Macedonia, FYR','North Macedonia', inplace = True
country['country'].replace('Micronesia, Fed. Sts.','Micronesia', inplace = Tr
country['country'].replace('Slovak Republic','Slovakia', inplace = True)
country['country'].replace('St. Vincent and the Grenadines','Saint Vincent an
```

In [6]:
```
country.head()
```

Out[6]:

	country	child_mort	exports	health	imports	income	inflation	life_expec	total_fer	gd
0	Afghanistan	90.2	10.0	7.58	44.9	1610	9.44	56.2	5.82	5
1	Albania	16.6	28.0	6.55	48.6	9930	4.49	76.3	1.65	40
2	Algeria	27.3	38.4	4.17	31.4	12900	16.10	76.5	2.89	44
3	Angola	119.0	62.3	2.85	42.9	5900	22.40	60.1	6.16	35
4	Antigua and Barbuda	10.3	45.5	6.03	58.9	19100	1.44	76.8	2.13	122

In [7]:
```
country['Net_Export'] = country.apply(lambda row: row.exports - row.imports,
country.head()
```

Out[7]:

	country	child_mort	exports	health	imports	income	inflation	life_expec	total_fer	gd
0	Afghanistan	90.2	10.0	7.58	44.9	1610	9.44	56.2	5.82	5
1	Albania	16.6	28.0	6.55	48.6	9930	4.49	76.3	1.65	40
2	Algeria	27.3	38.4	4.17	31.4	12900	16.10	76.5	2.89	44
3	Angola	119.0	62.3	2.85	42.9	5900	22.40	60.1	6.16	35
4	Antigua and Barbuda	10.3	45.5	6.03	58.9	19100	1.44	76.8	2.13	122

Wealth Index

In [8]:
```
def income_class(x):
    if x < 1045:
        return "Low income"
    if 1045 <= x < 4095:
        return "Lower-middle income"
    elif 4096 <= x < 12695:
        return "Upper-middle income"
    elif x > 12695:
        return "High income"
country['wealth_index'] = country['income'].map(income_class)
country.head()
```

Out[8]:

	country	child_mort	exports	health	imports	income	inflation	life_expec	total_fer	gd
0	Afghanistan	90.2	10.0	7.58	44.9	1610	9.44	56.2	5.82	5
1	Albania	16.6	28.0	6.55	48.6	9930	4.49	76.3	1.65	40
2	Algeria	27.3	38.4	4.17	31.4	12900	16.10	76.5	2.89	44
3	Angola	119.0	62.3	2.85	42.9	5900	22.40	60.1	6.16	35
4	Antigua and Barbuda	10.3	45.5	6.03	58.9	19100	1.44	76.8	2.13	122

To calculate Child Mortality

$$ChildMR = \frac{(child_mort)}{(1000)} * 100$$

In [9]:
```
country['Child_Mortality'] = country.apply(lambda row: ((row.child_mort)/1000
country.head()
```

Out[9]:

	country	child_mort	exports	health	imports	income	inflation	life_expec	total_fer	gd
0	Afghanistan	90.2	10.0	7.58	44.9	1610	9.44	56.2	5.82	5
1	Albania	16.6	28.0	6.55	48.6	9930	4.49	76.3	1.65	40
2	Algeria	27.3	38.4	4.17	31.4	12900	16.10	76.5	2.89	44
3	Angola	119.0	62.3	2.85	42.9	5900	22.40	60.1	6.16	35
4	Antigua and Barbuda	10.3	45.5	6.03	58.9	19100	1.44	76.8	2.13	122

Region

In [10]:
```
Region = pd.read_csv('C:\\Users\\HP\Downloads\\csvData.csv')
Region.head()
```

Out[10]:

	country	continent
0	Algeria	Africa
1	Angola	Africa
2	Benin	Africa
3	Botswana	Africa
4	Burkina Faso	Africa

In [11]:
```
df = pd.merge(country,Region, on ="country", how='left')
df
```

Out[11]:

	country	child_mort	exports	health	imports	income	inflation	life_expec	total_fer	g
0	Afghanistan	90.2	10.0	7.58	44.9	1610	9.44	56.2	5.82	
1	Albania	16.6	28.0	6.55	48.6	9930	4.49	76.3	1.65	
2	Algeria	27.3	38.4	4.17	31.4	12900	16.10	76.5	2.89	
3	Angola	119.0	62.3	2.85	42.9	5900	22.40	60.1	6.16	
4	Antigua and Barbuda	10.3	45.5	6.03	58.9	19100	1.44	76.8	2.13	1
...	...	...	...	...	...	...	...	...	...	
162	Vanuatu	29.2	46.6	5.25	52.7	2950	2.62	63.0	3.50	
163	Venezuela	17.1	28.5	4.91	17.6	16500	45.90	75.4	2.47	1
164	Vietnam	23.3	72.0	6.84	80.2	4490	12.10	73.1	1.95	
165	Yemen	56.3	30.0	5.18	34.4	4480	23.60	67.5	4.67	
166	Zambia	83.1	37.0	5.89	30.9	3280	14.00	52.0	5.40	

167 rows × 14 columns

In [12]:
```
df_columns = ['country', 'continent', 'wealth_index','Child_Mortality','incom
```

In [13]:
```
df = df[df_columns].copy()
```

In [14]:
```
data = df.rename(columns={'country':'Country', 'continent':'Region', 'wealth_
                          'income':'Income', 'life_expec':'Life_Expectancy', 'total_fe
data.head()
```

Out[14]:

	Country	Region	Wealth_Index	Child_Mortality	Income	Life_Expectancy	Total_Fertilty
0	Afghanistan	Asia	Lower-middle income	9.02	1610	56.2	5.82
1	Albania	Europe	Upper-middle income	1.66	9930	76.3	1.65
2	Algeria	Africa	High income	2.73	12900	76.5	2.89
3	Angola	Africa	Upper-middle income	11.90	5900	60.1	6.16
4	Antigua and Barbuda	North America	High income	1.03	19100	76.8	2.13

In [15]:
```
data.isnull().sum()
```

Out[15]:
```
Country            0
Region             0
Wealth_Index       0
Child_Mortality    0
Income             0
Life_Expectancy    0
Total_Fertilty     0
GDP                0
Net_Export         0
dtype: int64
```

In [16]:
```
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 167 entries, 0 to 166
Data columns (total 9 columns):
 #   Column           Non-Null Count  Dtype  
---  ------           --------------  -----  
 0   Country          167 non-null    object 
 1   Region           167 non-null    object 
 2   Wealth_Index     167 non-null    object 
 3   Child_Mortality  167 non-null    float64
 4   Income           167 non-null    int64  
 5   Life_Expectancy  167 non-null    float64
 6   Total_Fertilty   167 non-null    float64
 7   GDP              167 non-null    int64  
 8   Net_Export       167 non-null    float64
dtypes: float64(4), int64(2), object(3)
memory usage: 13.0+ KB
```

Analysis

In [41]:
```
sns.set_style('darkgrid')
plt.rcParams['font.size'] = 15
plt.rcParams['figure.figsize'] = (12, 8)
plt.rcParams['figure.facecolor'] = '#89CFF0'
```

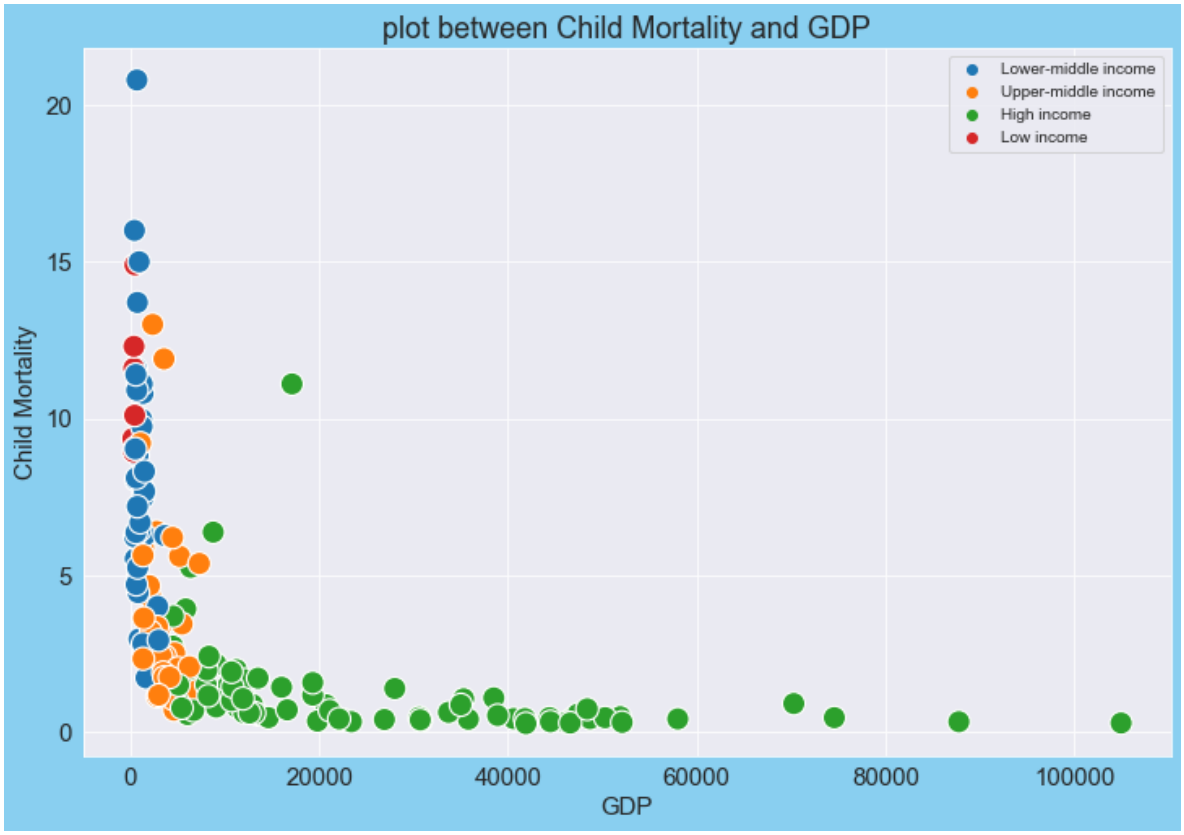
WHAT EFFECT DOES WEALTH INDEX HAS ON CHILD MORTALITY AND GDP

In [40]:
```
# plot between child mortality and GDP

plt.rcParams['figure.figsize'] = (12, 8)
plt.title('plot between Child Mortality and GDP')
sns.scatterplot(x= data.GDP, y =data.Child_Mortality, hue =data.Wealth_Index,

plt.legend(loc = 'upper right', fontsize = '10')
plt.xlabel('GDP')
plt.ylabel('Child Mortality')
```

Out[40]:
```
Text(0, 0.5, 'Child Mortality')
```



AVERAGE LIFE EXPECTANCY BY REGION

What is Life Expectancy?

The term “life expectancy” refers to the number of years a person can expect to live. By definition, life expectancy is based on an estimate of the average age that members of a particular population group will be when they die

In [45]:
```
Avg_life = data.groupby('Region')['Life_Expectancy'].mean()
pd.DataFrame(Avg_life)
```

Out[45]:

Region	Life_Expectancy
Africa	61.504255
Asia	72.486364
Europe	77.557500
North America	72.440000
Oceania	68.933333
South America	74.450000

WHAT IS THE AVERAGE INCOME OF COUNTRIES BY REGION

What is National Income

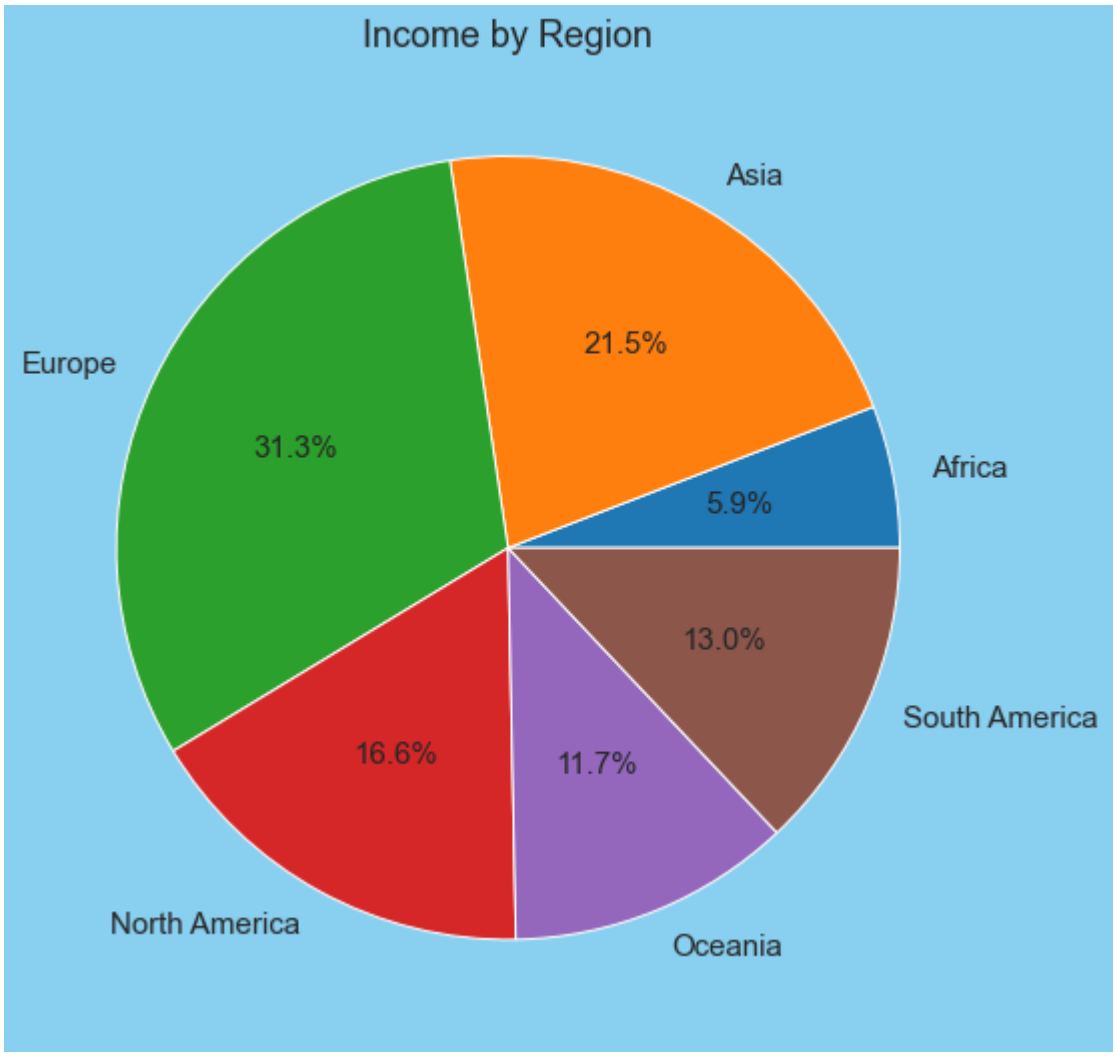
the aggregate of earnings from a nation's current production including compensation of employees, interest, rental income, and profits of business after taxes

In [19]:
```
data_region = data.groupby('Region')['Income'].mean()
data_region
```

Out[19]:
```
Region
Africa            5627.510638
Asia             20629.545455
Europe           30029.500000
North America    15960.666667
Oceania          11247.777778
South America    12429.166667
Name: Income, dtype: float64
```

In [20]:
```
data_region.plot.pie(autopct ='%1.1f%%')
plt.title('Income by Region')
plt.ylabel("");
```

Out[20]:
```
Text(0, 0.5, '')
```



Total Number of Countries in Each Region

In [21]:
```
# Total country

total_country = data.groupby('Region')[('Country')].count()
pd.DataFrame(total_country)
```

Out[21]:

Region	Country
Africa	47
Asia	44
Europe	40
North America	15
Oceania	9
South America	12

WHAT ARE THE TOP AND LEAST 10 COUNTRIES IN NET EXPORT

What Are Net Exports?

Net exports are a measure of a nation's total trade. The formula for net exports is: The value of a nation's total export goods and services minus the value of all the goods and services it imports equal its net exports.

A nation that has positive net exports enjoys a trade surplus, while negative net exports mean the nation has a trade deficit

In [22]:
```
top_country = data.nlargest(10,['Net_Export'])
top_country
```

Out[22]:

	Country	Region	Wealth_Index	Child_Mortality	Income	Life_Expectancy	Total_Fertilty
23	Brunei	Asia	High income	1.05	80600	77.1	1.84
55	Gabon	Africa	High income	6.37	15400	62.9	4.08
123	Qatar	Asia	High income	0.90	125000	79.5	2.07
82	Kuwait	Asia	High income	1.08	75200	78.2	2.21
9	Azerbaijan	Asia	High income	3.92	16000	69.1	1.92
91	Luxembourg	Europe	High income	0.28	91700	81.3	1.63
154	Turkmenistan	Asia	Upper-middle income	6.20	9940	67.9	2.83
38	Republic of the Congo	Africa	Upper-middle income	6.39	5190	60.4	4.95
49	Equatorial Guinea	Africa	High income	11.10	33700	60.9	5.21
133	Singapore	Asia	High income	0.28	72100	82.7	1.15

In [23]:
```
least_country =  data.nsmallest(10,['Net_Export'])
least_country
```

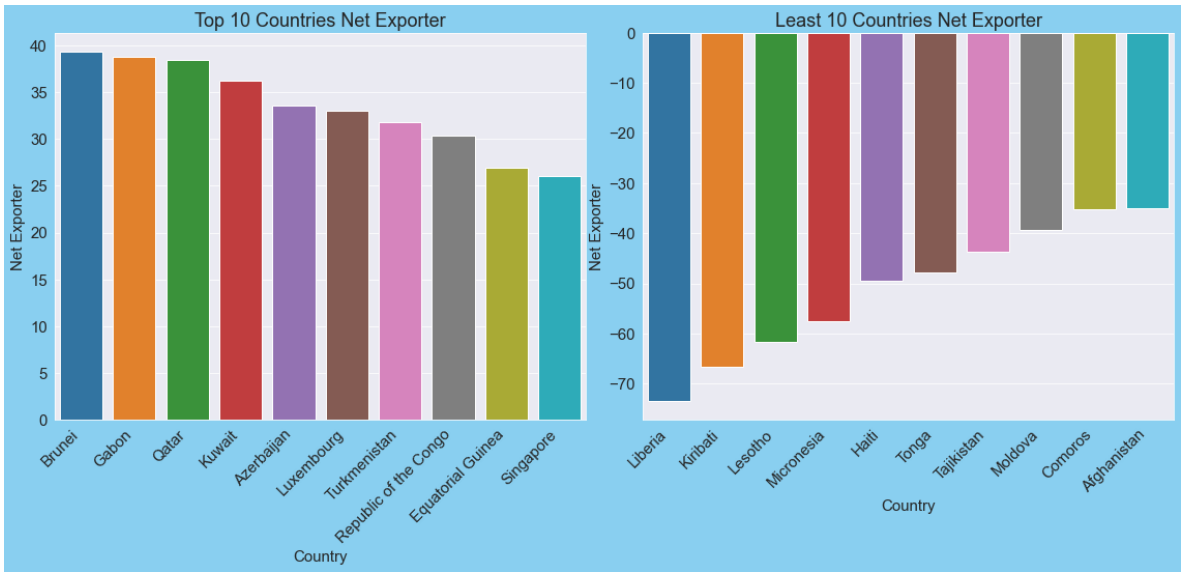
Out[23]:

	Country	Region	Wealth_Index	Child_Mortality	Income	Life_Expectancy	Total_Fertilty
88	Liberia	Africa	Low income	8.93	700	60.8	5.02
81	Kiribati	Oceania	Lower-middle income	6.27	1730	60.7	3.84
87	Lesotho	Africa	Lower-middle income	9.97	2380	46.5	3.30
101	Micronesia	Oceania	Lower-middle income	4.00	3340	65.4	3.46
66	Haiti	North America	Lower-middle income	20.80	1500	32.1	3.33
151	Tonga	Oceania	Upper-middle income	1.74	4980	69.9	3.91
146	Tajikistan	Asia	Lower-middle income	5.24	2110	69.6	3.51
102	Moldova	Europe	Lower-middle income	1.72	3910	69.7	1.27
36	Comoros	Africa	Lower-middle income	8.82	1410	65.9	4.75
0	Afghanistan	Asia	Lower-middle income	9.02	1610	56.2	5.82

In [29]:
```
fig,axes = plt.subplots(1,2, figsize=(16,6))
plt.tight_layout()
xlabels = top_country.Country
axes[0].set_title("Top 10 Countries Net Exporter")
axes[0].set_xticklabels(xlabels, rotation=45, ha = 'right')
sns.barplot(x=top_country.Country, y = top_country.Net_Export, ax=axes[0])
axes[0].set_ylabel('Country Name')
axes[0].set_ylabel('Net Exporter')

xlabels = least_country.Country
axes[1].set_title("Least 10 Countries Net Exporter")
axes[1].set_xticklabels(xlabels, rotation=45, ha = 'right')
sns.barplot(x=least_country.Country, y = least_country.Net_Export, ax=axes[1]
axes[1].set_ylabel('Country Name')
axes[1].set_ylabel('Net Exporter');
```

```
<ipython-input-29-d5fa8b080484>:5: UserWarning: FixedFormatter should only b
e used together with FixedLocator
  axes[0].set_xticklabels(xlabels, rotation=45, ha = 'right')
<ipython-input-29-d5fa8b080484>:12: UserWarning: FixedFormatter should only
be used together with FixedLocator
  axes[1].set_xticklabels(xlabels, rotation=45, ha = 'right')
```



WHAT ARE THE TOP 10 COUNTRIES BY INCOME AND GDP

In [26]:
```
top_income= data.nlargest(10,['Income'])
top_income
```

Out[26]:

	Country	Region	Wealth_Index	Child_Mortality	Income	Life_Expectancy	Total_Fertilty
123	Qatar	Asia	High income	0.90	125000	79.5	2.07
91	Luxembourg	Europe	High income	0.28	91700	81.3	1.63
23	Brunei	Asia	High income	1.05	80600	77.1	1.84
82	Kuwait	Asia	High income	1.08	75200	78.2	2.21
133	Singapore	Asia	High income	0.28	72100	82.7	1.15
114	Norway	Europe	High income	0.32	62300	81.0	1.95
157	United Arab Emirates	Asia	High income	0.86	57600	76.5	1.87
145	Switzerland	Europe	High income	0.45	55500	82.2	1.52
159	United States	North America	High income	0.73	49400	78.7	1.93
73	Ireland	Europe	High income	0.42	45700	80.4	2.05

In [27]:
```
top_gdp = data.nlargest(10,['GDP'])
top_gdp
```

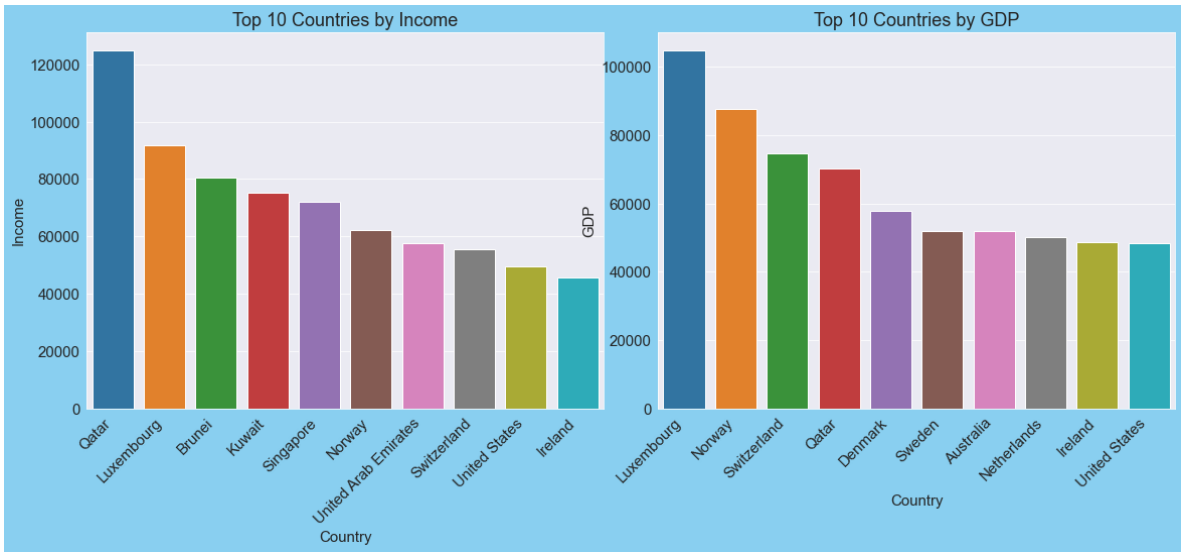
Out[27]:

	Country	Region	Wealth_Index	Child_Mortality	Income	Life_Expectancy	Total_Fertilty
91	Luxembourg	Europe	High income	0.28	91700	81.3	1.63
114	Norway	Europe	High income	0.32	62300	81.0	1.95
145	Switzerland	Europe	High income	0.45	55500	82.2	1.52
123	Qatar	Asia	High income	0.90	125000	79.5	2.07
44	Denmark	Europe	High income	0.41	44000	79.5	1.87
144	Sweden	Europe	High income	0.30	42900	81.5	1.98
7	Australia	Oceania	High income	0.48	41400	82.0	1.93
110	Netherlands	Europe	High income	0.45	45500	80.7	1.79
73	Ireland	Europe	High income	0.42	45700	80.4	2.05
159	United States	North America	High income	0.73	49400	78.7	1.93

In [30]:
```
fig,axes = plt.subplots(1,2, figsize=(16,6))
plt.tight_layout()
xlabels = top_income.Country
axes[0].set_title("Top 10 Countries by Income")
axes[0].set_xticklabels(xlabels, rotation=45, ha = 'right')
sns.barplot(x=top_income.Country, y = top_income.Income, ax=axes[0])
axes[0].set_ylabel('Country Name')
axes[0].set_ylabel('Income')

xlabels = top_gdp.Country
axes[1].set_title("Top 10 Countries by GDP")
axes[1].set_xticklabels(xlabels, rotation=45, ha = 'right')
sns.barplot(x=top_gdp.Country, y = top_gdp.GDP, ax=axes[1])
axes[1].set_ylabel('Country Name')
axes[1].set_ylabel('GDP');
```

```
<ipython-input-30-a49c559306ec>:5: UserWarning: FixedFormatter should only b
e used together with FixedLocator
  axes[0].set_xticklabels(xlabels, rotation=45, ha = 'right')
<ipython-input-30-a49c559306ec>:12: UserWarning: FixedFormatter should only
be used together with FixedLocator
  axes[1].set_xticklabels(xlabels, rotation=45, ha = 'right')
```



WHAT IS THE RELATIONSHIP BETWEEN CHILD MORTALITY AND FERTILITY RATE BASE ON WEALTH INDEX

What is Child Mortality Rate?

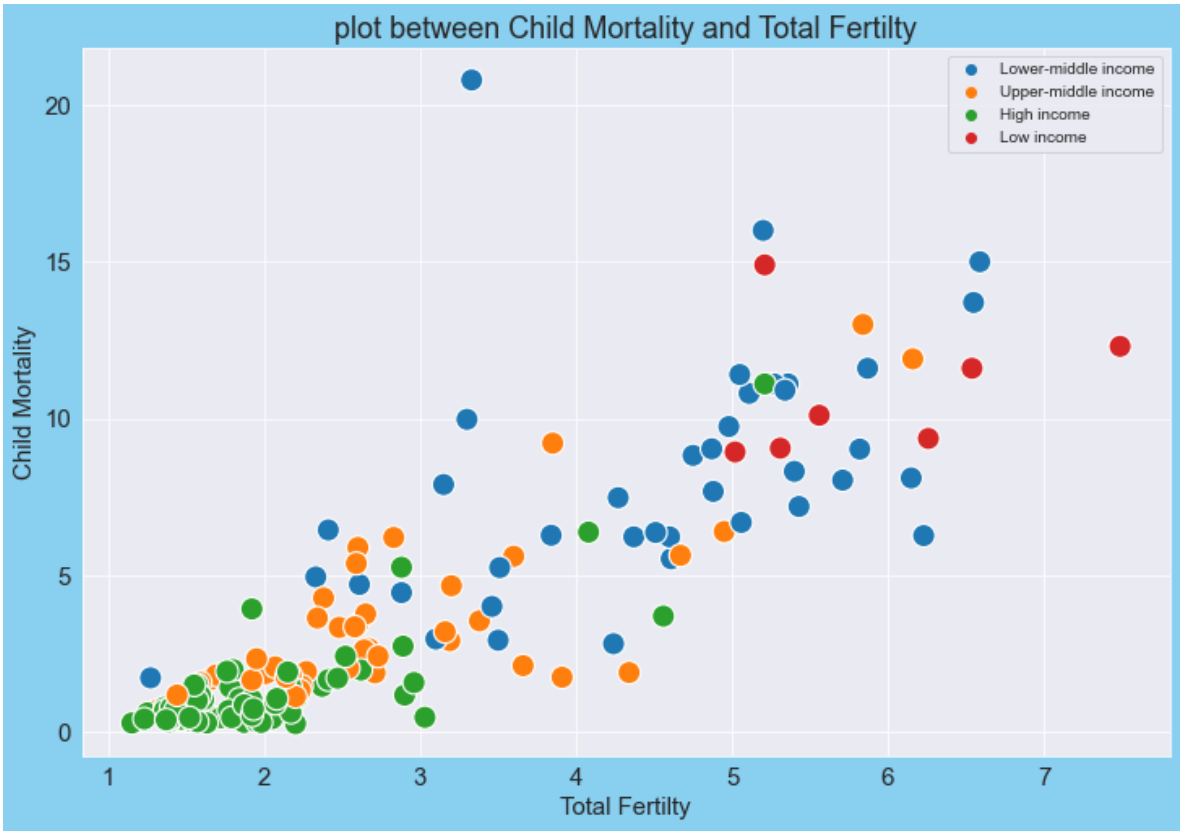
Child mortality or the under-five mortality rate refers to the probability of a child dying between birth and exactly 5 years of age, expressed per 1,000 live births

What is Fertility Rate?

The fertility rate at a given age is the number of children born alive to women of that age during the year as a proportion of the average annual population of women of the same

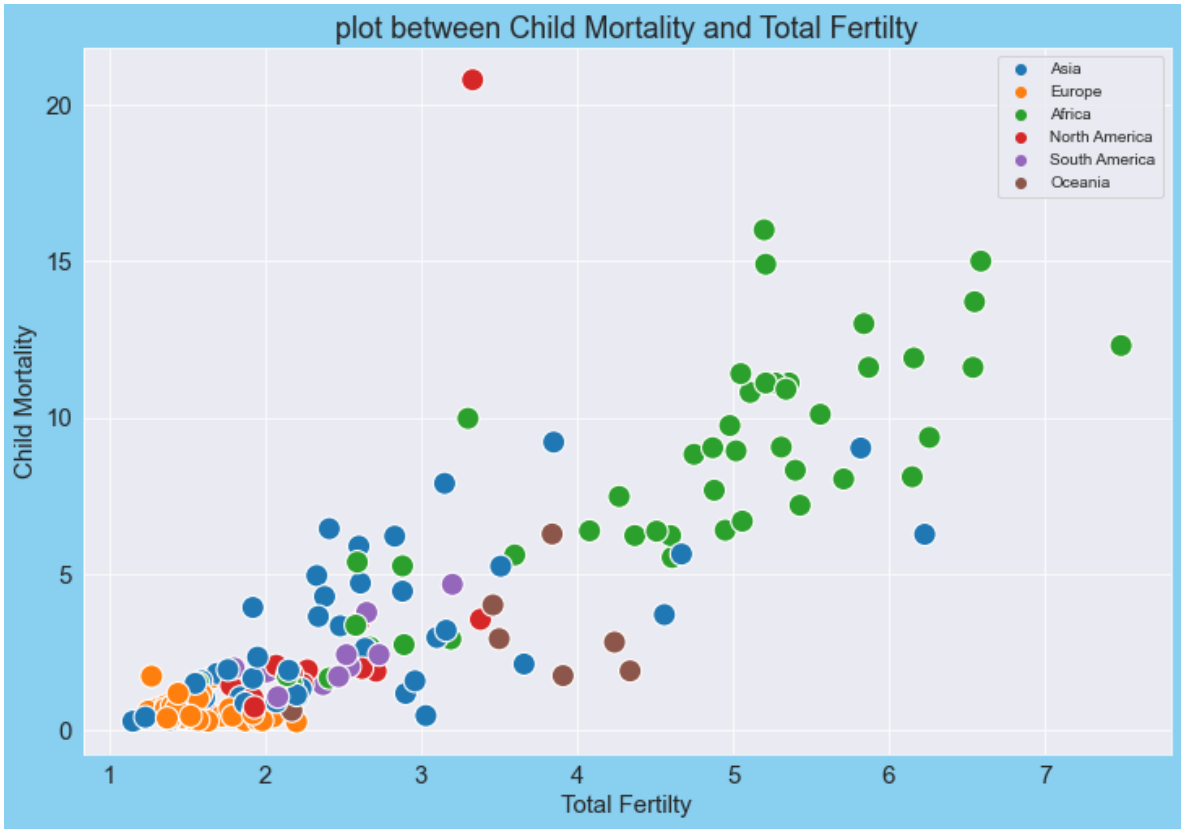
In [38]:
```
plt.rcParams['figure.figsize'] = (12, 8)
plt.title('plot between Child Mortality and Total Fertilty')
sns.scatterplot(x= data.Total_Fertilty, y =data.Child_Mortality, hue =data.We

plt.legend(loc = 'upper right', fontsize = '10')
plt.xlabel('Total Fertilty')
plt.ylabel('Child Mortality');
```



In [39]:
```
plt.rcParams['figure.figsize'] = (12, 8)
plt.title('plot between Child Mortality and Total Fertilty')
sns.scatterplot(x= data.Total_Fertilty, y =data.Child_Mortality, hue =data.Re

plt.legend(loc = 'upper right', fontsize = '10')
plt.xlabel('Total Fertilty')
plt.ylabel('Child Mortality');
```



CONCLUSION

**