About Dataset:

Attributes:

- 'country' : indexed on country
- 'continent' : the continent on which the country belongs
- 'population' : population of the country
- 'day' : last updated on
- 'time' : last updated time
- 'Cases' : total number of cases
- 'Deaths' : total number of deaths
- 'Recovered' : total number of recovery
- 'Tests' : Number of tests conducted

In [25]:

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

In [26]:

```
df = pd.read_csv('covid_19.csv')
```

In [27]:

```
df.head()
```

Out[27]:

	country	continent	population	day	time	Cases	Recovered	Deaths	Tests
0	Saint-Helena	Africa	6115.0	2024-06-30	2024-06-30T16:15:16+00:00	2166	2.0	NaN	NaN
1	Falkland-Islands	South-America	3539.0	2024-06-30	2024-06-30T16:15:16+00:00	1930	1930.0	NaN	8632.0
2	Montserrat	North-America	4965.0	2024-06-30	2024-06-30T16:15:16+00:00	1403	1376.0	8.0	17762.0
3	Diamond-Princess	NaN	NaN	2024-06-30	2024-06-30T16:15:16+00:00	712	699.0	13.0	NaN
4	Vatican-City	Europe	799.0	2024-06-30	2024-06-30T16:15:16+00:00	29	29.0	NaN	NaN

In [28]:

```
df.shape
```

Out[28]:

```
(238, 9)
```

In [29]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 238 entries, 0 to 237
Data columns (total 9 columns):
 #   Column      Non-Null Count  Dtype  
---  ------      --------------  -----  
 0   country     238 non-null    object 
 1   continent   236 non-null    object 
 2   population  229 non-null    float64
 3   day         238 non-null    object 
 4   time        238 non-null    object 
 5   Cases       238 non-null    int64  
 6   Recovered   190 non-null    float64
 7   Deaths      233 non-null    float64
 8   Tests       213 non-null    float64
dtypes: float64(4), int64(1), object(4)
memory usage: 16.9+ KB
```

In [30]:

```
df.isnull().sum()
```

Out[30]:

```
country        0
continent      2
population     9
day            0
time           0
Cases          0
Recovered     48
Deaths         5
Tests         25
dtype: int64
```

In [31]:

```
df.dropna(subset=['population'],inplace=True)
df.dropna(subset=['Recovered'],inplace=True)
df.dropna(subset=['Deaths'],inplace=True)
df.dropna(subset=['Tests'],inplace=True)
```

In [32]:

```
df.duplicated().sum()
```

Out[32]:

```
0
```

In [33]:

```
df.describe()
```

Out[33]:

	population	Cases	Recovered	Deaths	Tests
count	1.690000e+02	1.690000e+02	1.690000e+02	1.690000e+02	1.690000e+02
mean	3.393555e+07	3.358564e+06	3.288112e+06	3.437705e+04	3.114130e+07
std	1.199166e+08	1.082718e+07	1.062387e+07	1.199160e+05	1.129389e+08
min	4.965000e+03	1.403000e+03	4.380000e+02	1.000000e+00	7.850000e+03
25%	1.369429e+06	3.613800e+04	3.233200e+04	3.160000e+02	4.004660e+05
50%	8.680837e+06	2.720100e+05	2.588880e+05	3.165000e+03	2.525756e+06
75%	2.791155e+07	1.734582e+06	1.724921e+06	1.805700e+04	1.346373e+07
max	1.448471e+09	1.118201e+08	1.098144e+08	1.219487e+06	1.186852e+09

In [34]:
```
df.country.nunique()
```

Out[34]:
```
169
```

In [35]:
```
df['continent'].nunique()
```

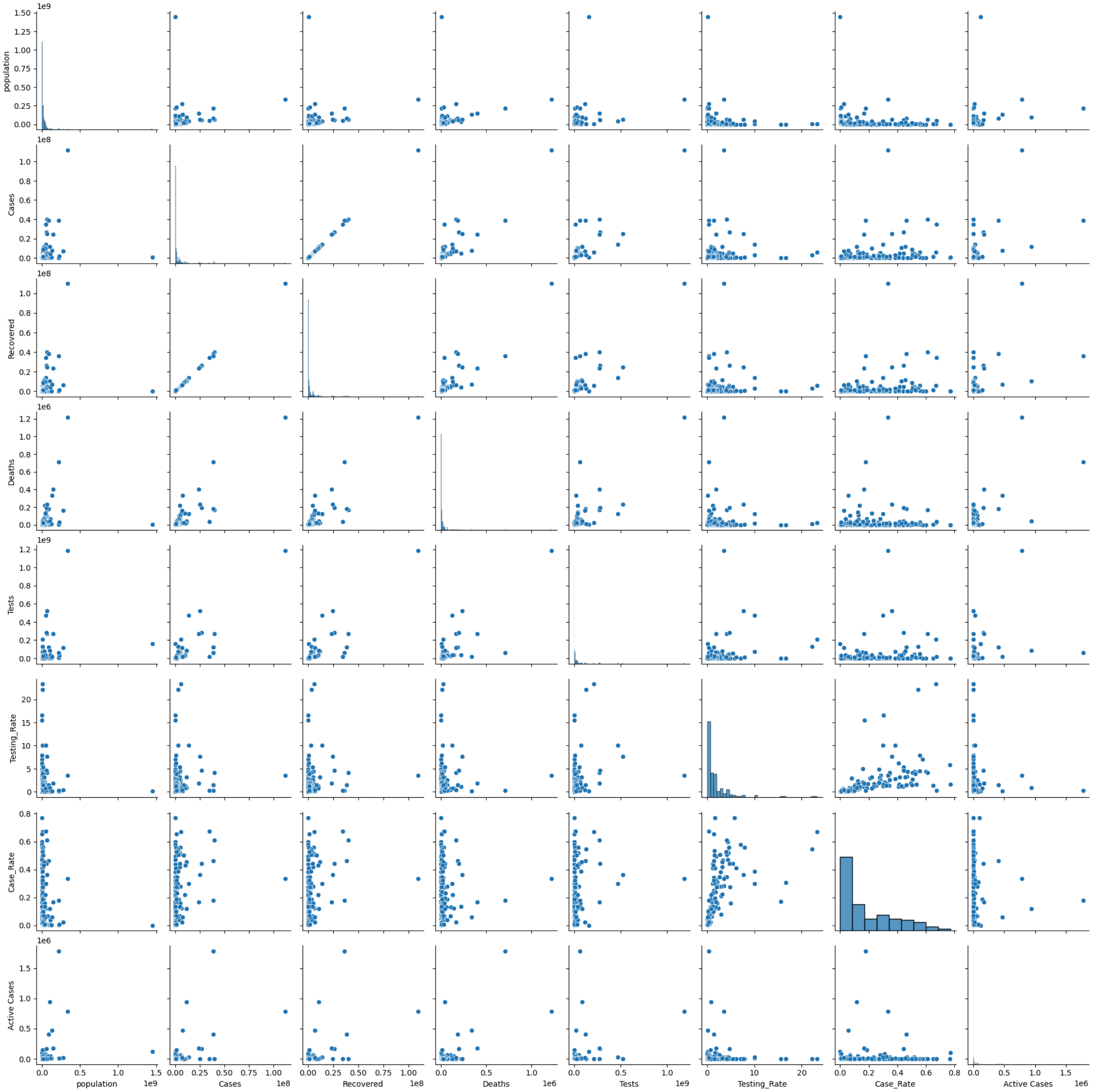
Out[35]:
```
6
```

In [37]:
```
df['Testing_Rate'] = df['Tests'] / df['population']
df['Case_Rate'] = df['Cases'] / df['population']
df['Active Cases'] = df['Cases'] - df['Recovered'] - df['Deaths']
```

Pair Plot

In [39]:
```
sns.pairplot(data=df)
```

Out[39]:
```
<seaborn.axisgrid.PairGrid at 0x2111632d9d0>
```



Deaths by Continent

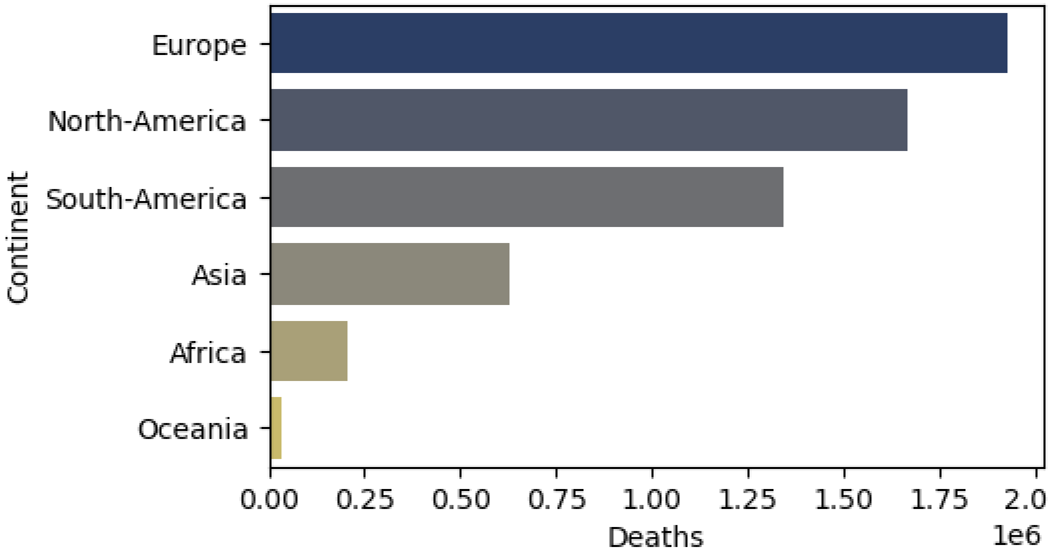
In [41]:
```
deathbyContinent = df.groupby('continent')['Deaths'].sum().sort_values(ascending=False).reset_in
plt.figure(figsize=(5,3))
sns.barplot(x='Deaths',y='continent', data=deathbyContinent, palette='cividis')
plt.ylabel('Continent')
```

```
C:\Users\negar\AppData\Local\Temp\ipykernel_4848\1238622963.py:3: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign th
e `y` variable to `hue` and set `legend=False` for the same effect.

  sns.barplot(x='Deaths',y='continent', data=deathbyContinent, palette='cividis')
```

Out[41]:
```
Text(0, 0.5, 'Continent')
```



Cases by Continent

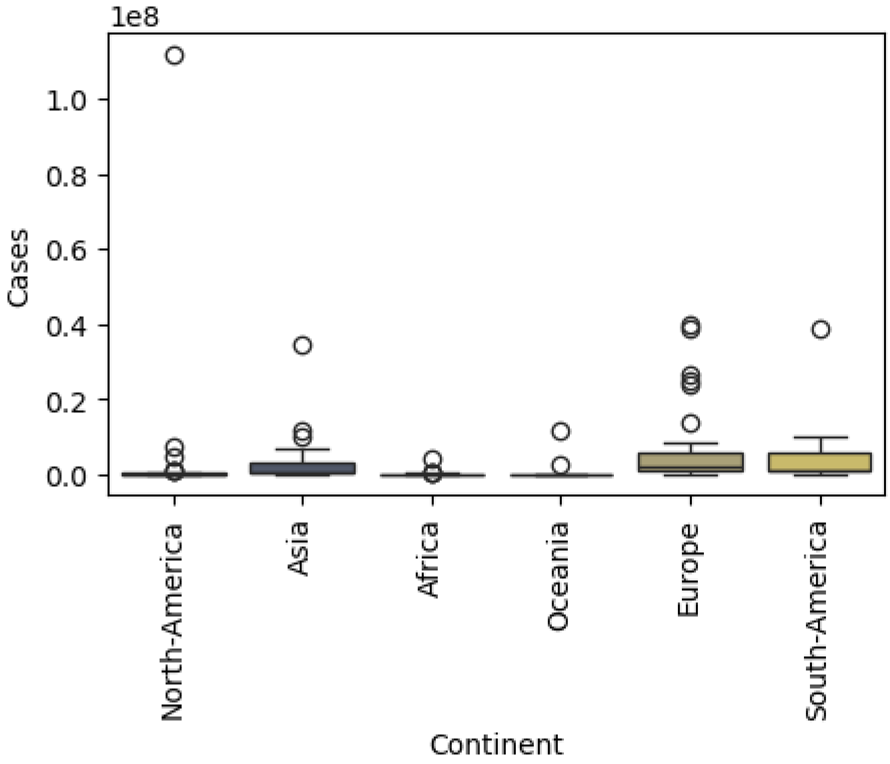
In [43]:

```
plt.figure(figsize=(5, 3))
sns.boxplot(data=df, x='continent', y='Cases', palette='cividis')
plt.xlabel('Continent')
plt.ylabel('Cases')
plt.xticks(rotation=90)
plt.show()
plt.tight_layout()
```

```
C:\Users\negar\AppData\Local\Temp\ipykernel_4848\3010117995.py:2: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign th
e `x` variable to `hue` and set `legend=False` for the same effect.

  sns.boxplot(data=df, x='continent', y='Cases', palette='cividis')
```



```
<Figure size 640x480 with 0 Axes>
```

Deaths by Country

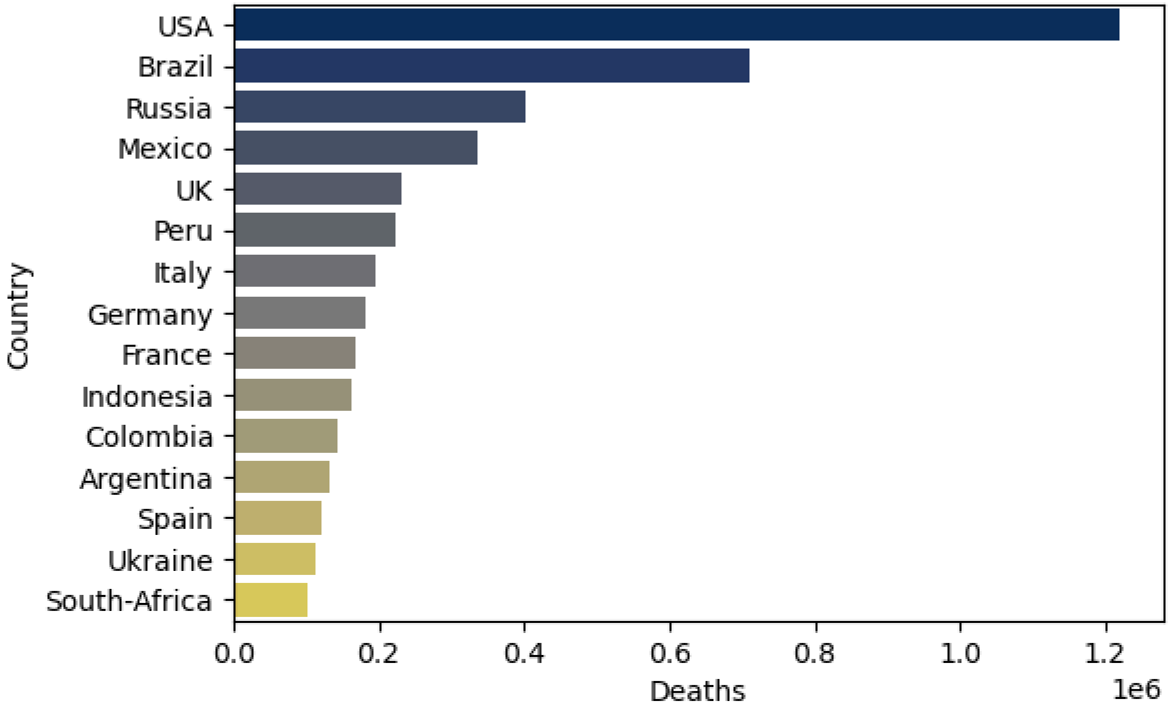
```
In [45]: deathbyCountry = df.groupby('country')['Deaths'].sum().sort_values(ascending=False).reset_index(
         plt.figure(figsize=(6,4))
         sns.barplot(x='Deaths',y='country', data=deathbyCountry, palette='cividis')
         plt.ylabel('Country')
```

```
C:\Users\negar\AppData\Local\Temp\ipykernel_4848\1154196552.py:3: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign th
e `y` variable to `hue` and set `legend=False` for the same effect.

  sns.barplot(x='Deaths',y='country', data=deathbyCountry, palette='cividis')
```

```
Out[45]: Text(0, 0.5, 'Country')
```



Cases by Country

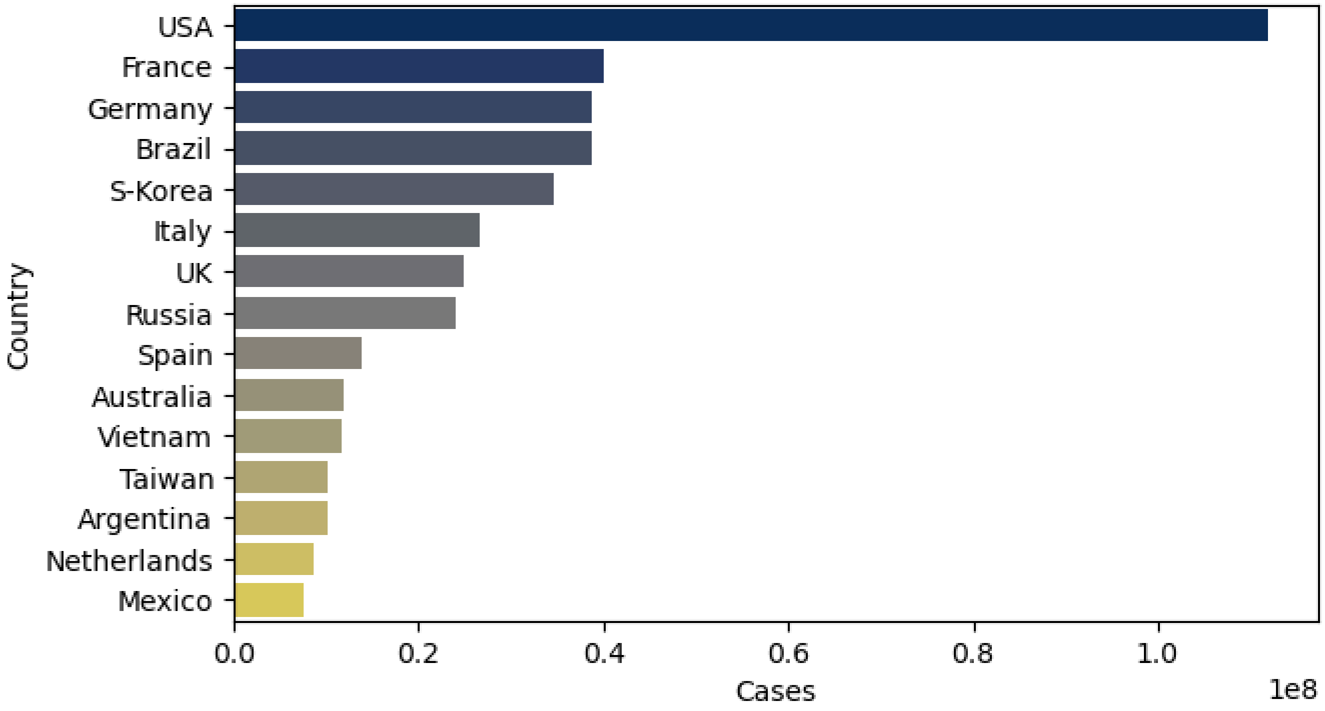
```
In [47]: casesbyCountry = df.groupby('country')['Cases'].sum().sort_values(ascending=False).reset_index()
         plt.figure(figsize=(7,4))
         sns.barplot(x='Cases',y='country', data=casesbyCountry, palette='cividis')
         plt.ylabel('Country')
```

```
C:\Users\negar\AppData\Local\Temp\ipykernel_4848\1157279710.py:3: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign th
e `y` variable to `hue` and set `legend=False` for the same effect.

  sns.barplot(x='Cases',y='country', data=casesbyCountry, palette='cividis')
```

```
Out[47]: Text(0, 0.5, 'Country')
```



Corrolation

In [49]:

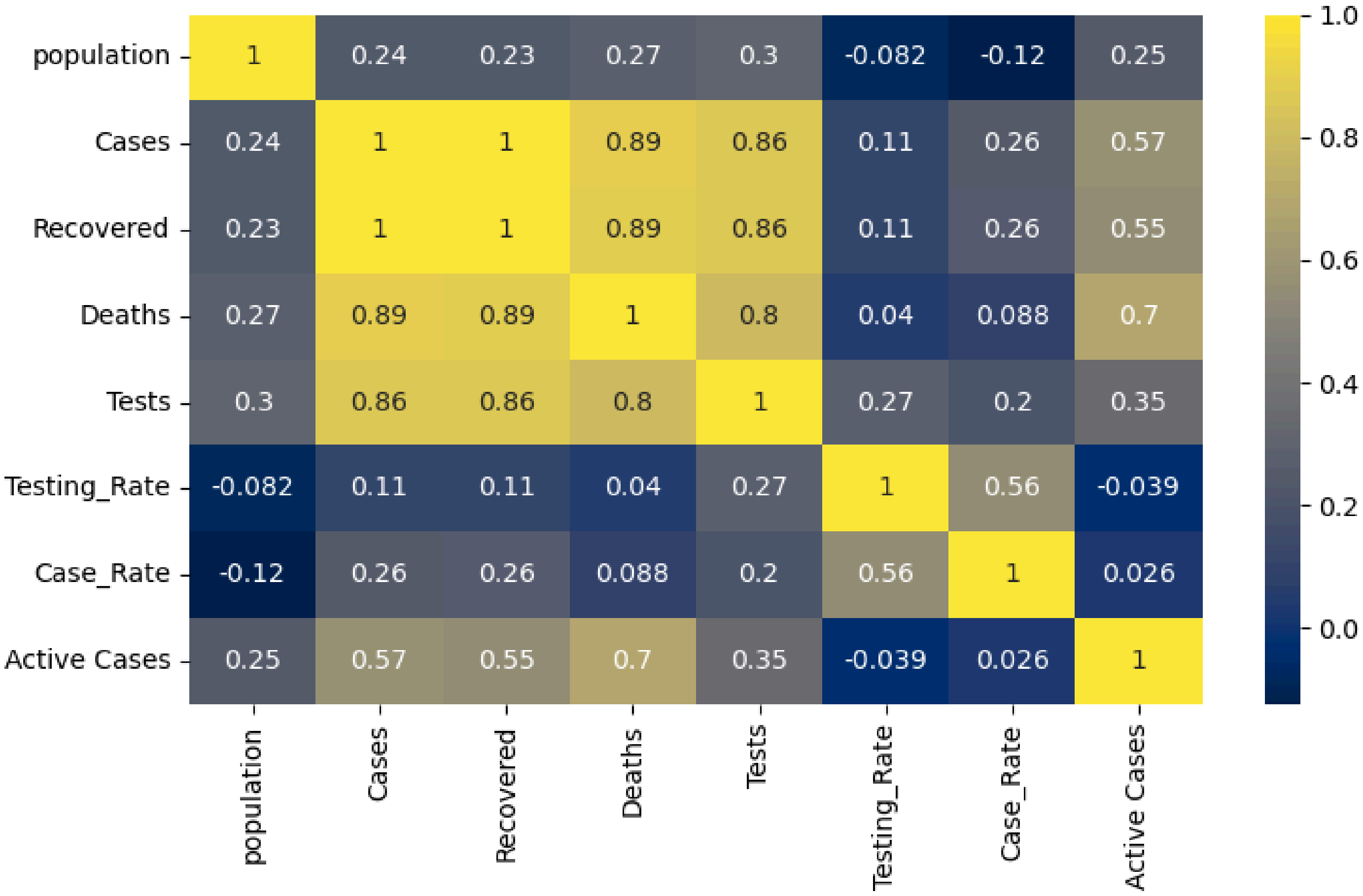
```
df_corr = df.corr(numeric_only=True)
df_corr
```

Out[49]:

	population	Cases	Recovered	Deaths	Tests	Testing_Rate	Case_Rate	Active Cases
population	1.000000	0.236048	0.233388	0.272309	0.304887	-0.081935	-0.123764	0.252894
Cases	0.236048	1.000000	0.999862	0.891011	0.860752	0.105958	0.257422	0.568058
Recovered	0.233388	0.999862	1.000000	0.885428	0.862549	0.108168	0.260940	0.554809
Deaths	0.272309	0.891011	0.885428	1.000000	0.798248	0.039729	0.088098	0.699288
Tests	0.304887	0.860752	0.862549	0.798248	1.000000	0.273163	0.199763	0.349114
Testing_Rate	-0.081935	0.105958	0.108168	0.039729	0.273163	1.000000	0.555450	-0.038891
Case_Rate	-0.123764	0.257422	0.260940	0.088098	0.199763	0.555450	1.000000	0.025508
Active Cases	0.252894	0.568058	0.554809	0.699288	0.349114	-0.038891	0.025508	1.000000

In [50]:

```
plt.figure(figsize=(8,5))
sns.heatmap(df_corr, cmap='cividis', annot=True)
plt.tight_layout()
```



Tests by Country

In [52]:

```
testsbyCountry = df.groupby('country')['Tests'].sum().sort_values(ascending=False).reset_index()
sns.barplot(x='Tests',y='country', data=testsbyCountry, palette='cividis')
plt.ylabel('Country')
```

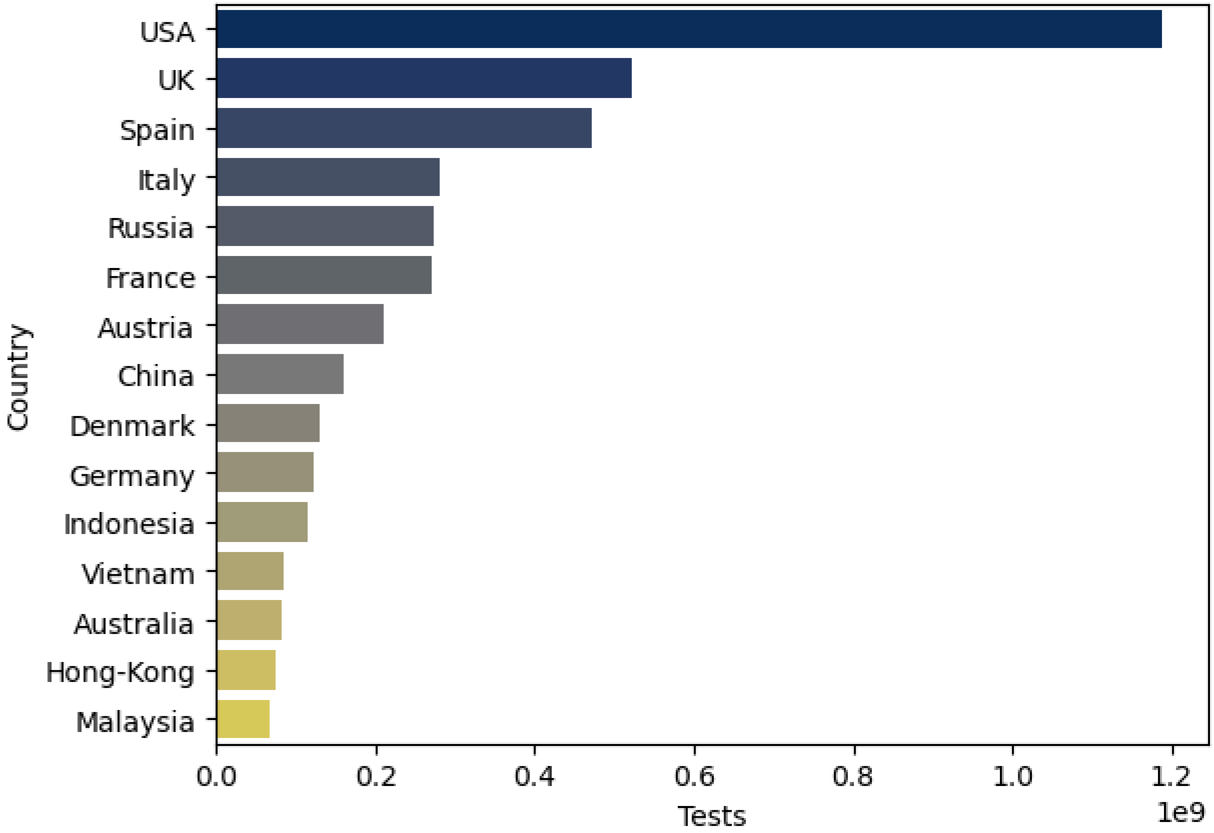
```
C:\Users\negar\AppData\Local\Temp\ipykernel_4848\2955700388.py:2: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign th
e `y` variable to `hue` and set `legend=False` for the same effect.

  sns.barplot(x='Tests',y='country', data=testsbyCountry, palette='cividis')
```

Out[52]:

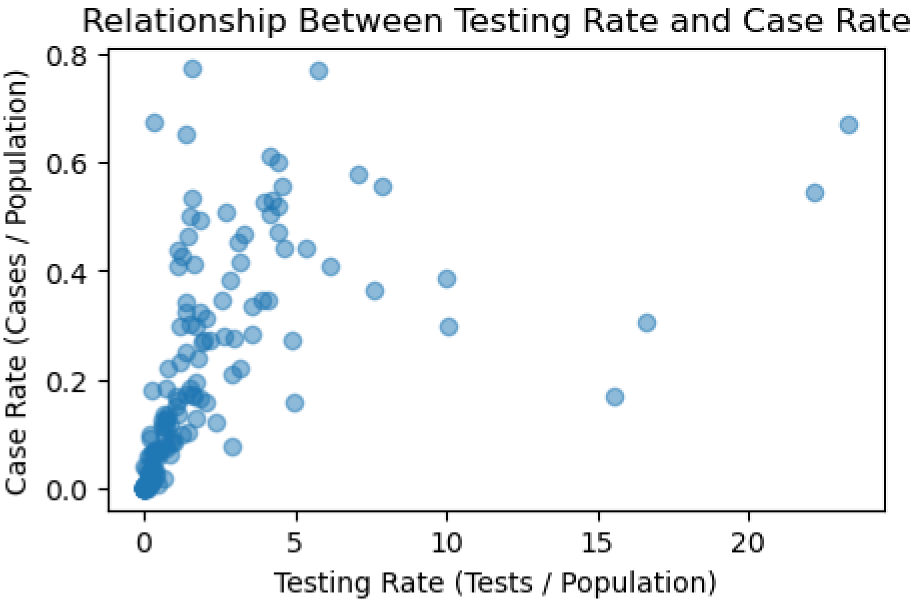
```
Text(0, 0.5, 'Country')
```



Testing Rate and Case Rate

In [54]:
```
plt.figure(figsize=(5, 3))
plt.scatter(df['Testing_Rate'], df['Case_Rate'], alpha=0.5)
plt.xlabel('Testing Rate (Tests / Population)')
plt.ylabel('Case Rate (Cases / Population)')
plt.title('Relationship Between Testing Rate and Case Rate')
```

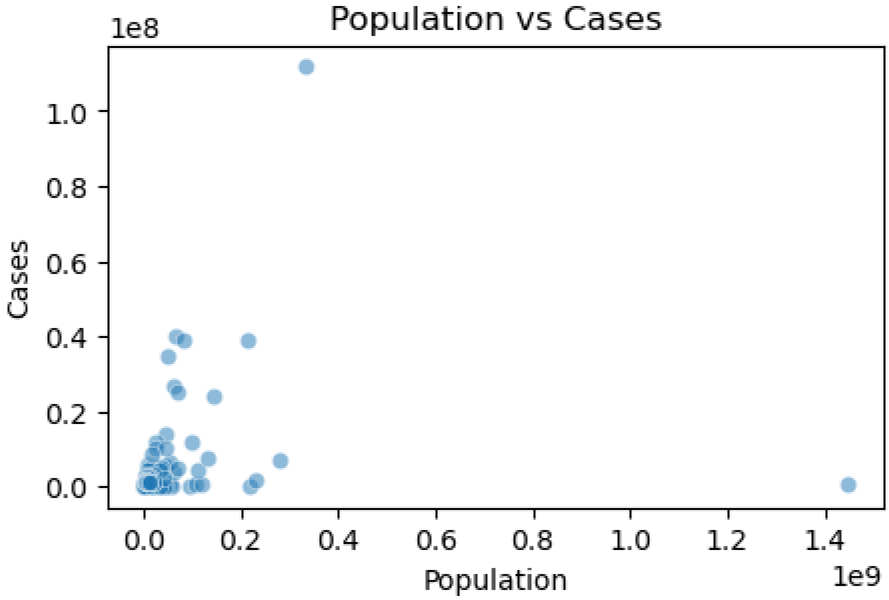
Out[54]:
```
Text(0.5, 1.0, 'Relationship Between Testing Rate and Case Rate')
```



Population and Cases

```
In [56]: plt.figure(figsize=(5, 3))
         sns.scatterplot(data=df,x='population',y='Cases', alpha=0.5)
         plt.title('Population vs Cases')
         plt.xlabel('Population')
         plt.ylabel('Cases')
```

```
Out[56]: Text(0, 0.5, 'Cases')
```



Active Cases per Country

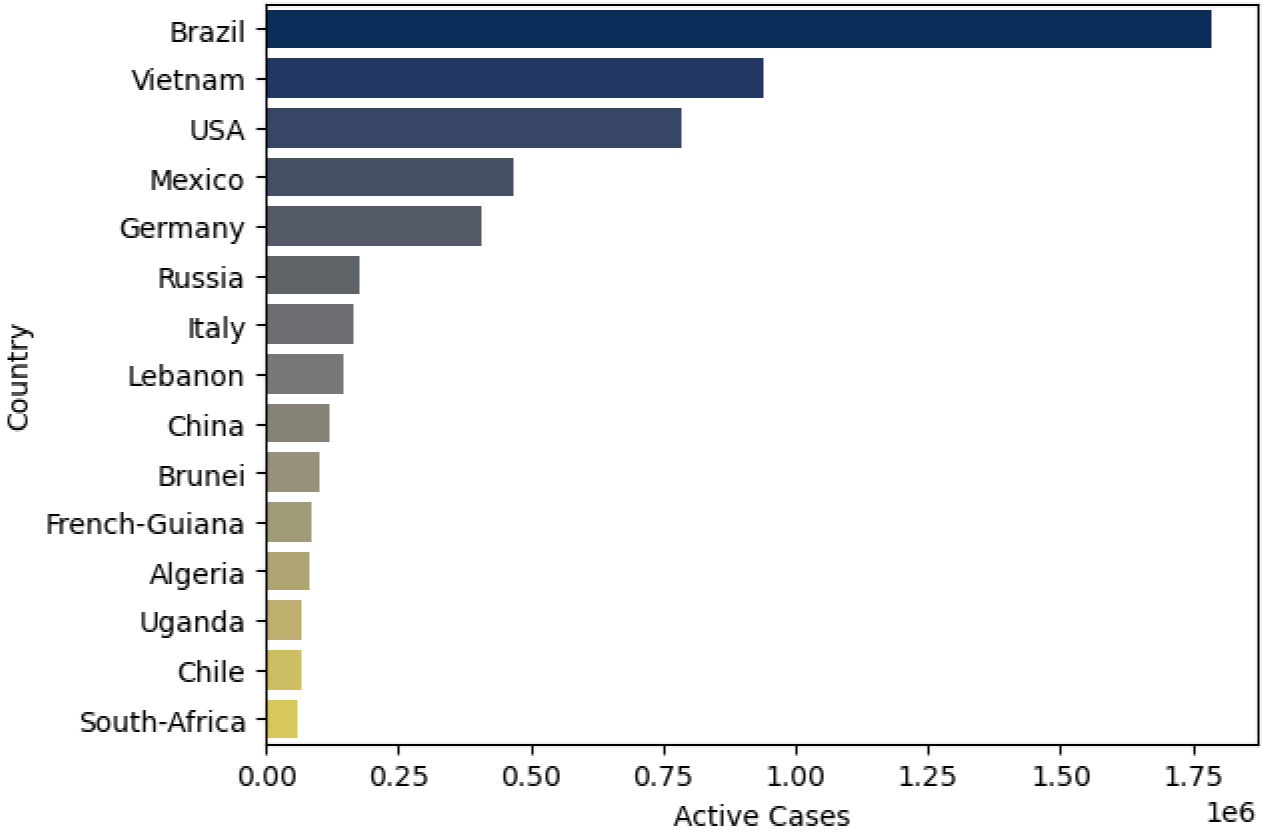
```
In [58]: activebyCountry = df.groupby('country')['Active Cases'].sum().sort_values(ascending=False).reset_
         sns.barplot(x='Active Cases',y='country', data=activebyCountry, palette='cividis')
         plt.ylabel('Country')
```

```
C:\Users\negar\AppData\Local\Temp\ipykernel_4848\3903671761.py:2: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign th
e `y` variable to `hue` and set `legend=False` for the same effect.

  sns.barplot(x='Active Cases',y='country', data=activebyCountry, palette='cividis')
```

```
Out[58]: Text(0, 0.5, 'Country')
```


Brazil
Vietnam
USA
Mexico
Germany
Russia
Italy
Lebanon
China
Brunei
French-Guiana
Algeria
Uganda
Chile
South-Africa
Country
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
1e6
Active Cases