Suicide Rates Overview 1985 to 2020

In [1]:
```
#importing the Libery
import warnings
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt

warnings.filterwarnings('ignore')
%pylab inline
```

```
%pylab is deprecated, use %matplotlib inline and import the requir
ed libraries.
Populating the interactive namespace from numpy and matplotlib
```

Data Collection ¶

In [2]:
```
#loading the Data set in pandas
data = pd.read_csv('master.csv')
```

In [3]:
```
#drop the value
data = data.drop(['country-year','HDI for year'], axis=1)
```

In [4]:
```
#check first five rows of the dataset
data.head()
```

Out[4]:

	country	year	sex	age	suicides_no	population	suicides/100k pop	gdp_for_year ($)	gdp_
0	Albania	1987	male	15-24 years	21	312900	6.71	2,156,624,900	
1	Albania	1987	male	35-54 years	16	308000	5.19	2,156,624,900	
2	Albania	1987	female	15-24 years	14	289700	4.83	2,156,624,900	
3	Albania	1987	male	75+ years	1	21800	4.59	2,156,624,900	
4	Albania	1987	male	25-34 years	9	274300	3.28	2,156,624,900	

In [5]:
```
#check last five rows of the dataset
data.tail()
```

Out[5]:

	country	year	sex	age	suicides_no	population	suicides/100k pop	gdp_for_ye (
27815	Uzbekistan	2014	female	35-54 years	107	3620833	2.96	63,067,077,1
27816	Uzbekistan	2014	female	75+ years	9	348465	2.58	63,067,077,1
27817	Uzbekistan	2014	male	5-14 years	60	2762158	2.17	63,067,077,1
27818	Uzbekistan	2014	female	5-14 years	44	2631600	1.67	63,067,077,1
27819	Uzbekistan	2014	female	55-74 years	21	1438935	1.46	63,067,077,1

In [6]:
```
#check shape of the datset
data.shape
```

Out[6]:
```
(27820, 10)
```

In [7]:
```
#check basic infomation of the. dataset
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 27820 entries, 0 to 27819
Data columns (total 10 columns):
 #   Column              Non-Null Count  Dtype  
---  ------              --------------  -----  
 0   country             27820 non-null  object 
 1   year                27820 non-null  int64  
 2   sex                 27820 non-null  object 
 3   age                 27820 non-null  object 
 4   suicides_no         27820 non-null  int64  
 5   population          27820 non-null  int64  
 6   suicides/100k pop   27820 non-null  float64
 7    gdp_for_year ($)   27820 non-null  object 
 8   gdp_per_capita ($)  27820 non-null  int64  
 9   generation          27820 non-null  object 
dtypes: float64(1), int64(4), object(5)
memory usage: 2.1+ MB
```

In [8]:
```
#check mathamtic realtionship of the dataset
data[['suicides_no','population','suicides/100k pop','gdp_per_capit
```

Out[8]:

	suicides_no	population	suicides/100k pop	gdp_per_capita ($)
count	27820.000000	2.782000e+04	27820.000000	27820.000000
mean	242.574407	1.844794e+06	12.816097	16866.464414
std	902.047917	3.911779e+06	18.961511	18887.576472
min	0.000000	2.780000e+02	0.000000	251.000000
25%	3.000000	9.749850e+04	0.920000	3447.000000
50%	25.000000	4.301500e+05	5.990000	9372.000000
75%	131.000000	1.486143e+06	16.620000	24874.000000
max	22338.000000	4.380521e+07	224.970000	126352.000000

In [9]:
```
#check missing value opf the dataset
data.isnull().sum()
```

Out[9]:
```
country               0
year                  0
sex                   0
age                   0
suicides_no           0
population            0
suicides/100k pop     0
 gdp_for_year ($)     0
gdp_per_capita ($)    0
generation            0
dtype: int64
```

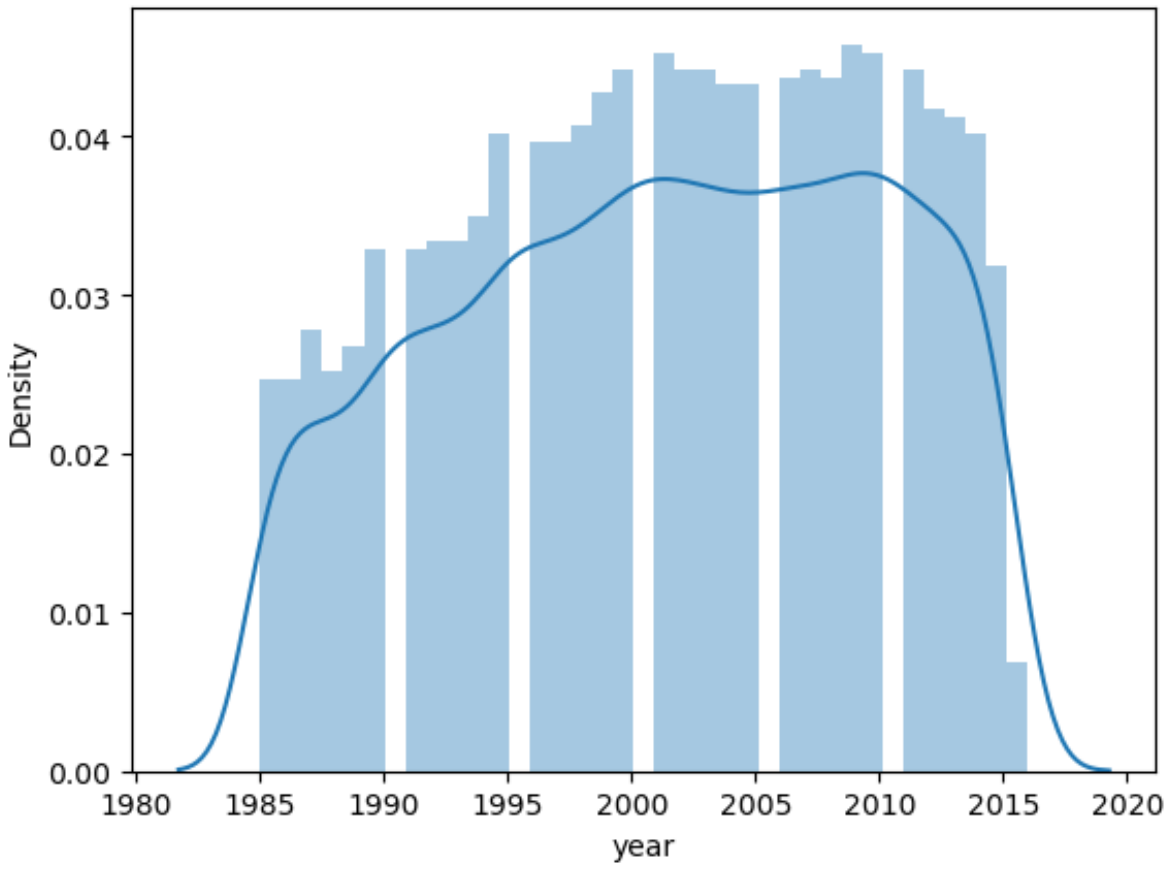
EDA of the Dataset

In [10]:
```
#conut the value of country
data['country'].value_counts()
```

Out[10]:
```
Mauritius                382
Austria                  382
Netherlands              382
Iceland                  382
Brazil                   372
                        ...
Bosnia and Herzegovina    24
Cabo Verde                12
Dominica                  12
Macau                     12
Mongolia                  10
Name: country, Length: 101, dtype: int64
```

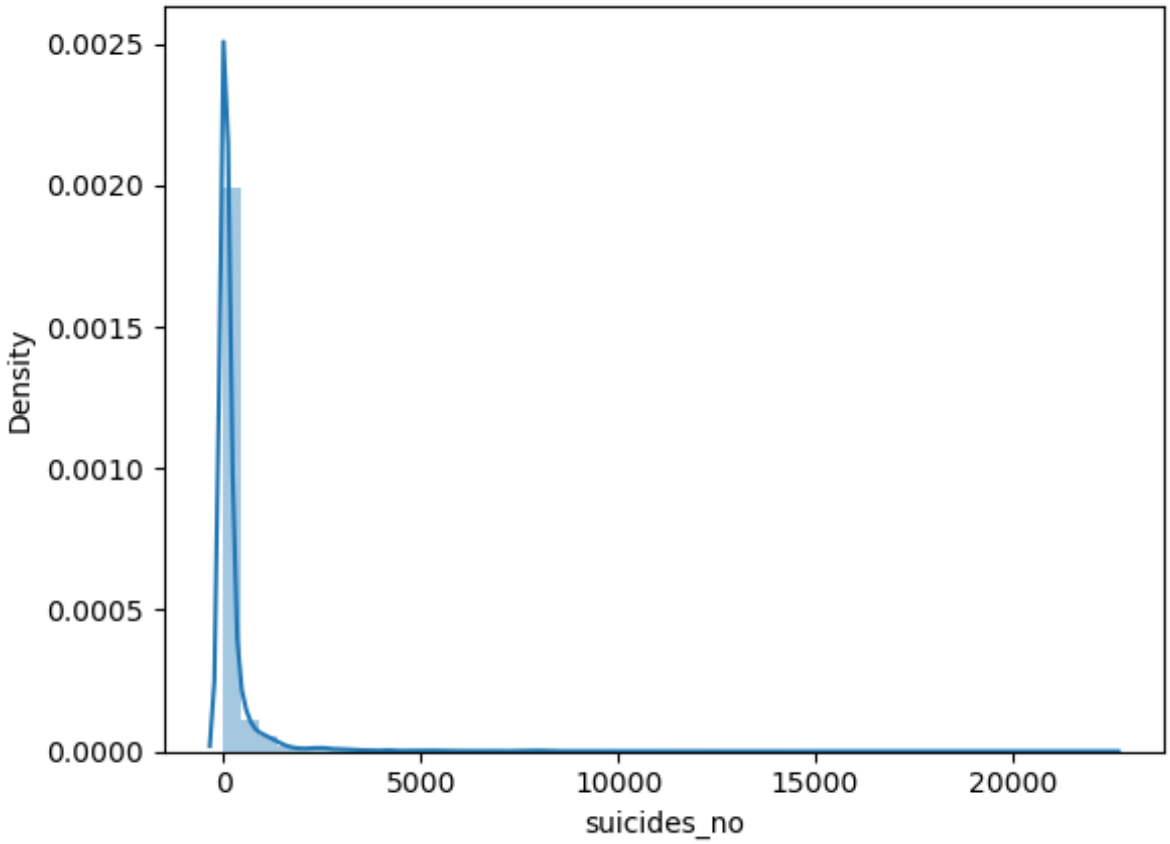
In [11]:
```
#plot distplot for year
sns.distplot(data['year'])
```

Out[11]:
```
<Axes: xlabel='year', ylabel='Density'>
```



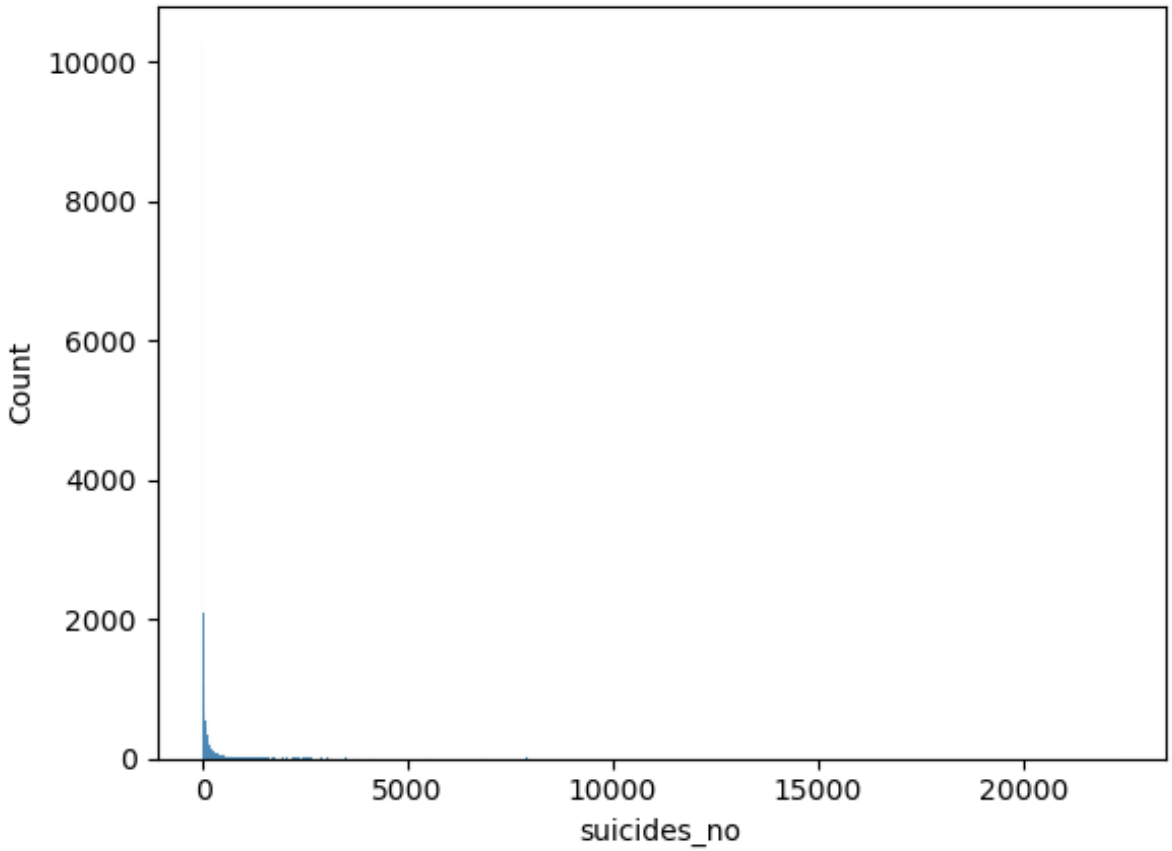
In [12]:
```
#plot distplot for suicides_no
sns.distplot(data['suicides_no'])
```

Out[12]: <Axes: xlabel='suicides_no', ylabel='Density'>



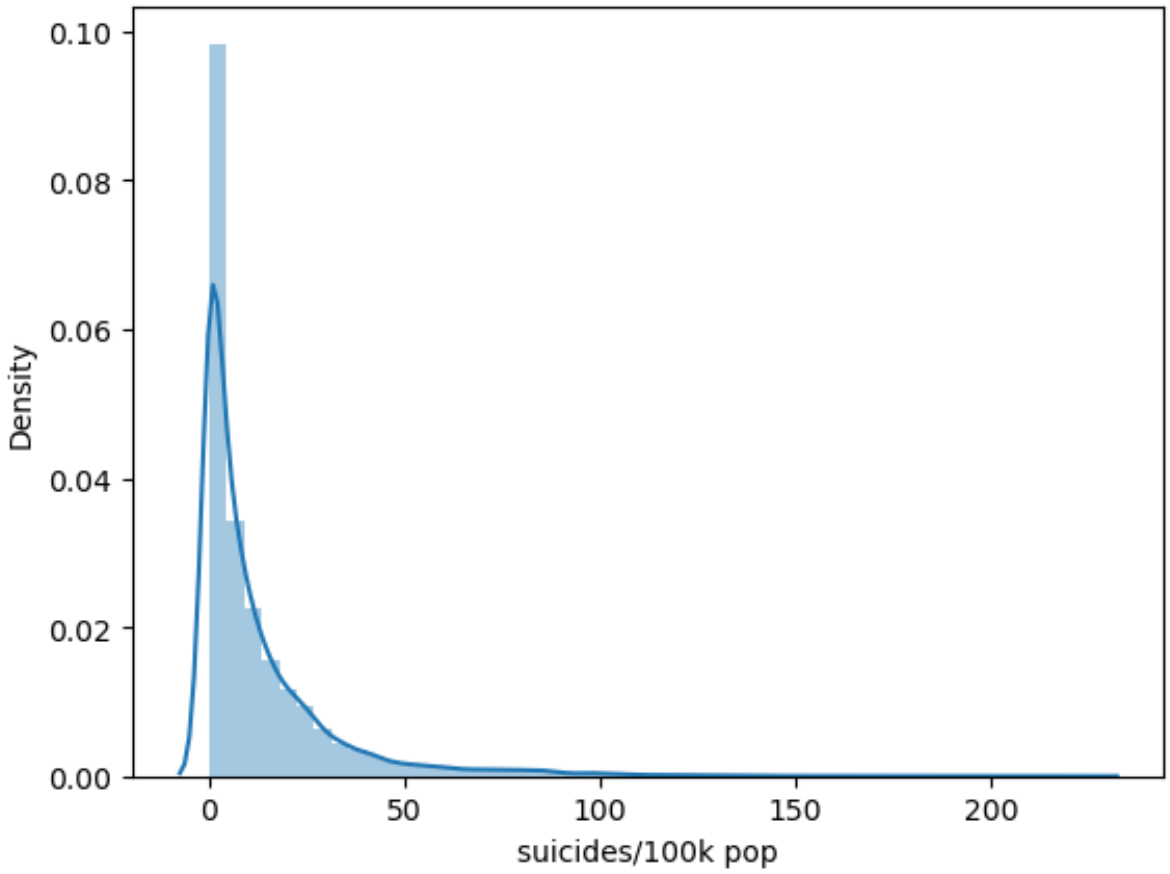
In [13]:
```
sns.histplot(data['suicides_no'])
```

Out[13]: <Axes: xlabel='suicides_no', ylabel='Count'>



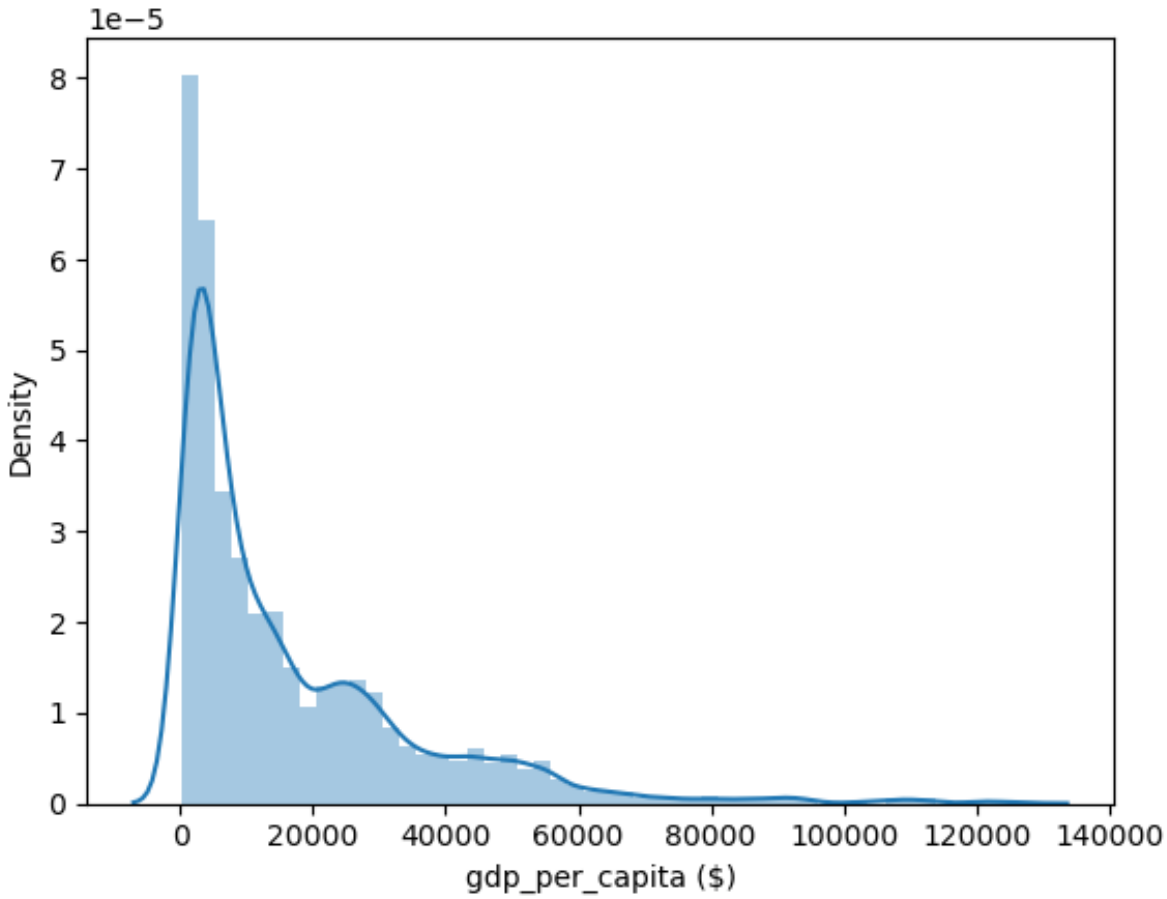
In [14]:
```
#plot distplot for suicides/100k pop
sns.distplot(data['suicides/100k pop'])
```

Out[14]: <Axes: xlabel='suicides/100k pop', ylabel='Density'>



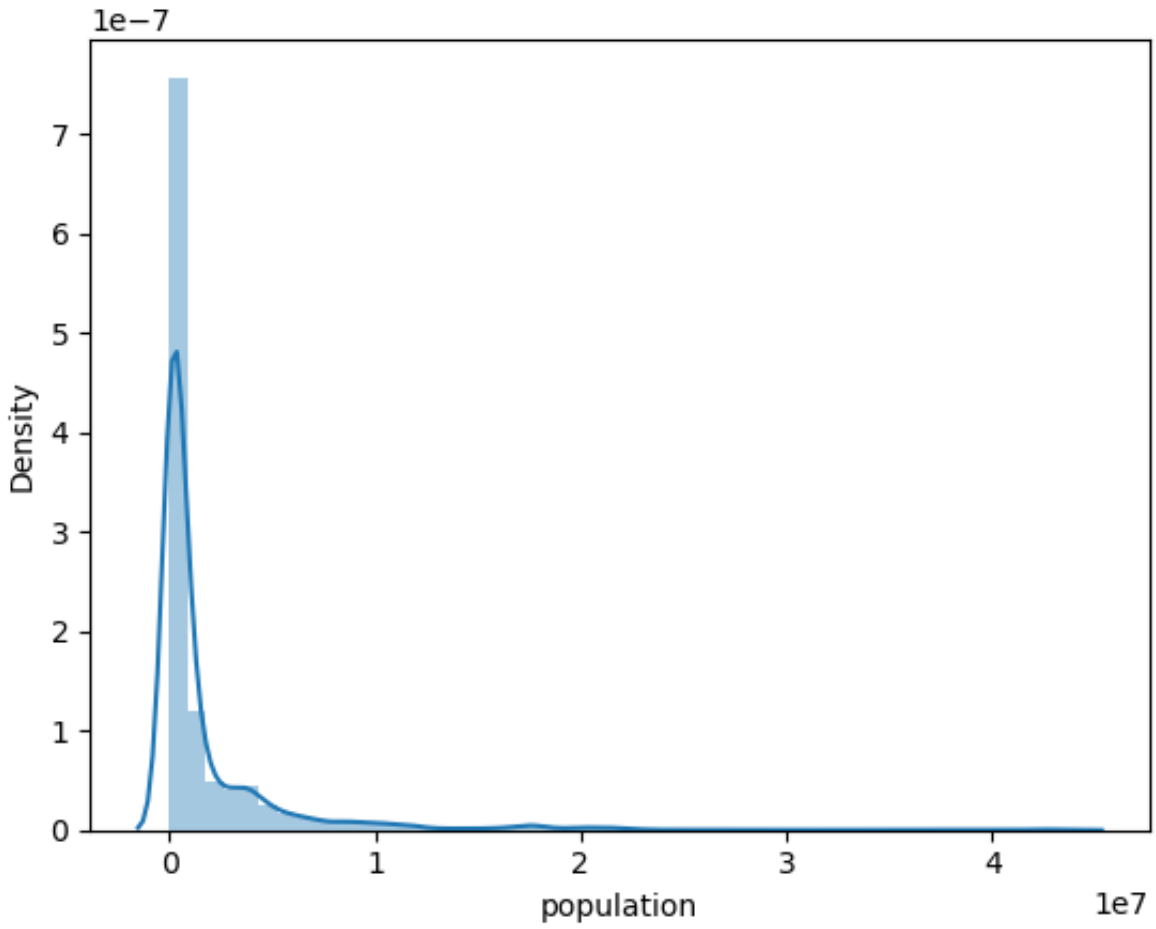
In [15]:
```
#plot distplot for gdp_per_capita ($)
sns.distplot(data['gdp_per_capita ($)'])
```

Out[15]: <Axes: xlabel='gdp_per_capita ($)', ylabel='Density'>



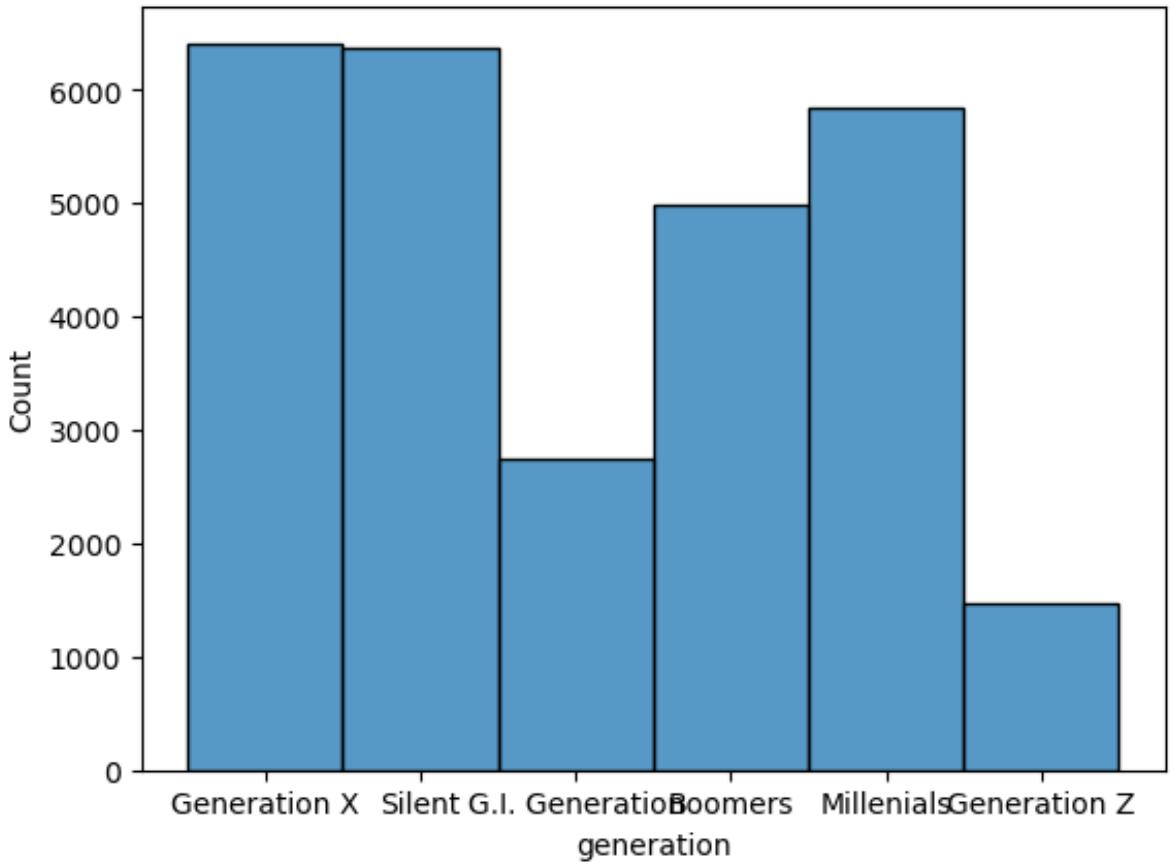
In [16]:
```
#plot distplot for population
sns.distplot(data['population'])
```

Out[16]: <Axes: xlabel='population', ylabel='Density'>



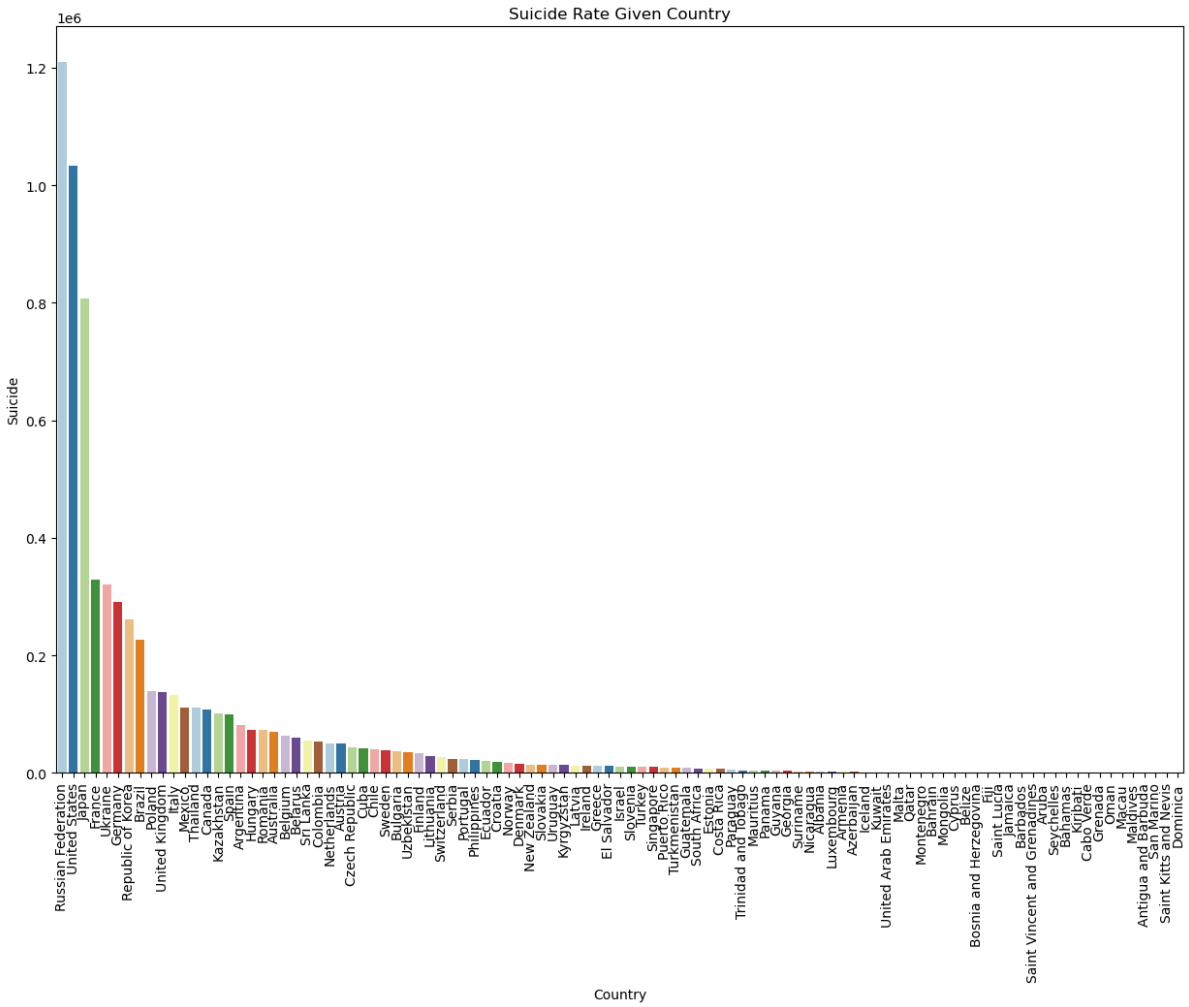
In [20]:
```
sns.histplot(data['generation'])
```

Out[20]: <Axes: xlabel='generation', ylabel='Count'>



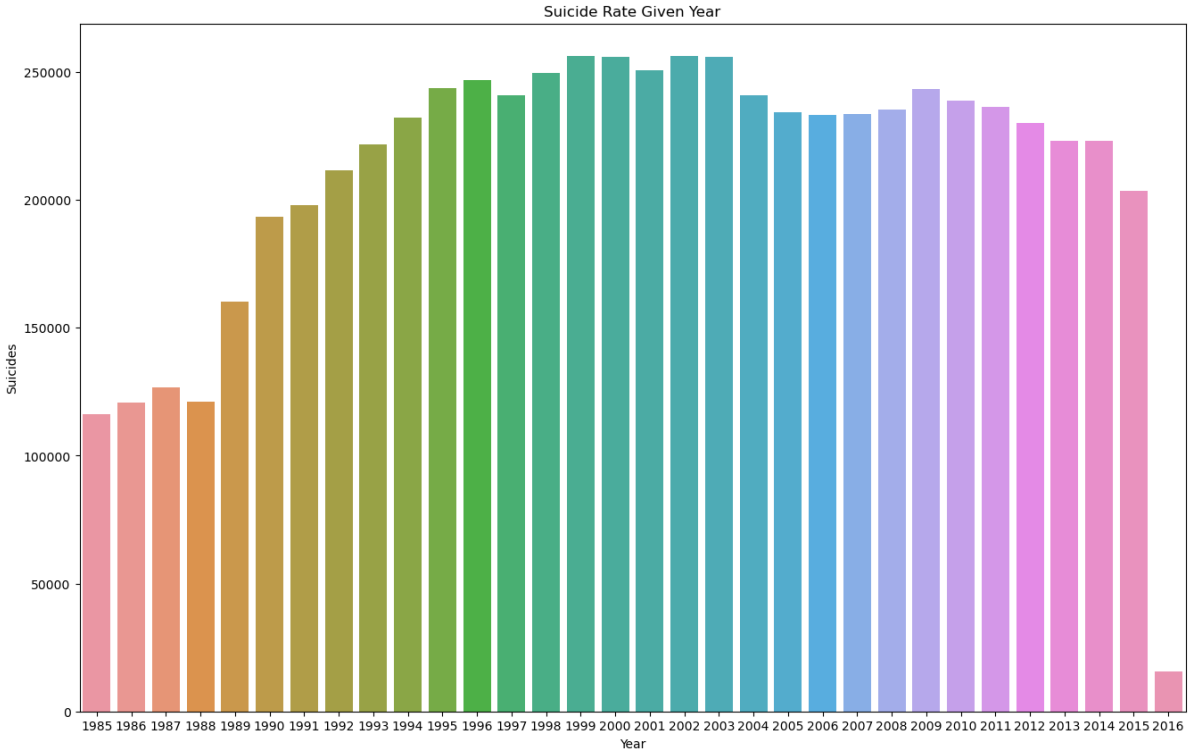
In [24]:
```
# Sum suicides by countrys
data_country = data.groupby(["country"]).sum()["suicides_no"].reset

# Visualization with Bar Plot
plt.figure(figsize=(15,10))
sns.barplot(x=data_country['country'], y=data_country['suicides_no'
plt.xticks(rotation= 90)
plt.xlabel('Country')
plt.ylabel('Suicide')
plt.title('Suicide Rate Given Country')
```

Out[24]: Text(0.5, 1.0, 'Suicide Rate Given Country')

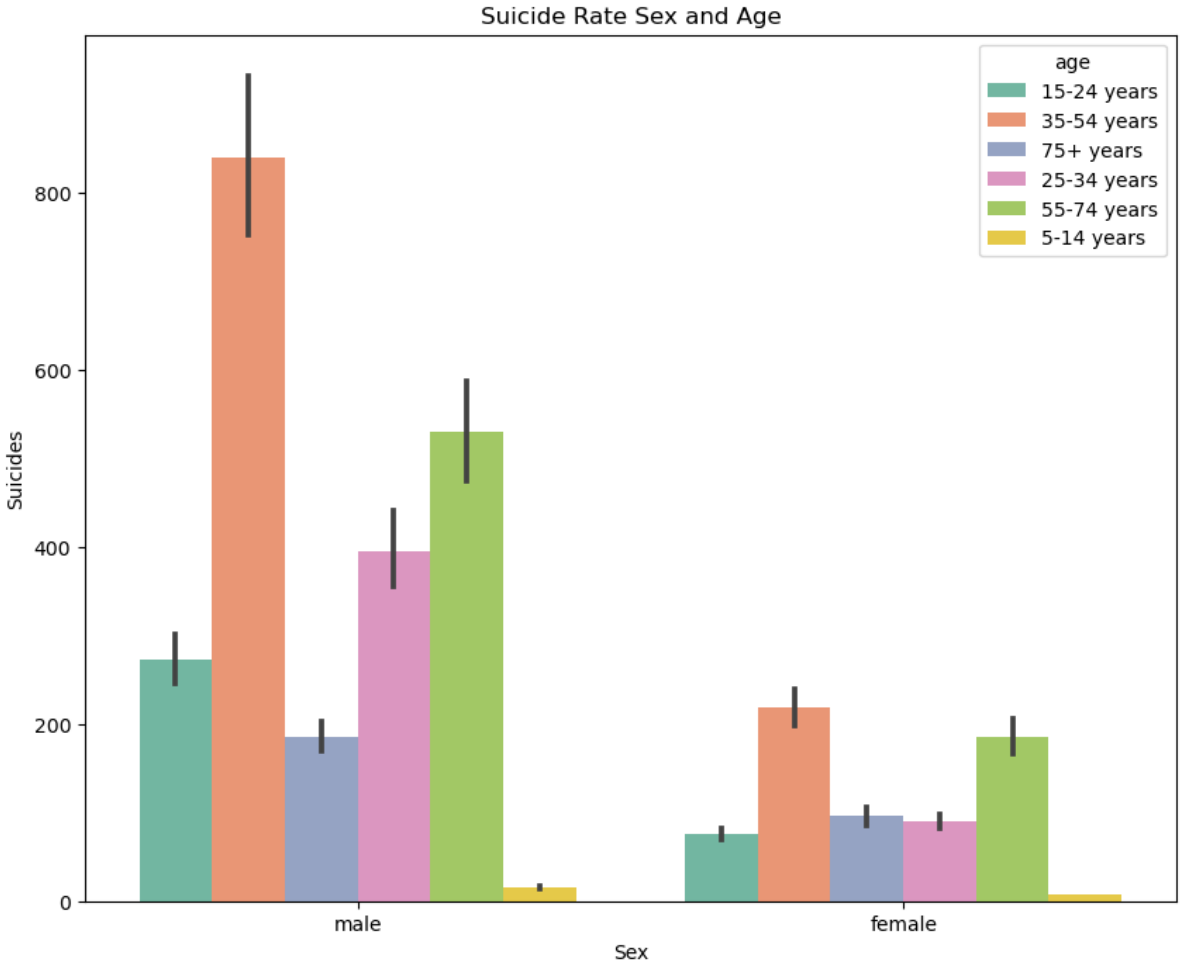


In [25]:
```
# Sum suicides by years
data_year = data.groupby(["year"]).sum()["suicides_no"].reset_index

plt.figure(figsize=(16,10))
ax= sns.barplot(x=data_year["year"], y=data_year["suicides_no"])
plt.xlabel('Year')
plt.ylabel('Suicides')
plt.title('Suicide Rate Given Year')
```

Out[25]: Text(0.5, 1.0, 'Suicide Rate Given Year')



In [27]:
```
plt.figure(figsize=(10,8))
sns.barplot(x=data["sex"], y=data["suicides_no"],hue=data["age"], p
plt.xlabel('Sex')
plt.ylabel('Suicides')
plt.title('Suicide Rate Sex and Age')
plt.show()
```



In [28]:
```
# Sum suicides by age and sex in all years
data_as = data.groupby(["age","sex"]).sum()["suicides_no"].reset_in
data_as
```

Out[28]:

	age	sex	suicides_no
0	15-24 years	female	175437
1	15-24 years	male	633105
2	25-34 years	female	208823
3	25-34 years	male	915089
4	35-54 years	female	506233
5	35-54 years	male	1945908
6	5-14 years	female	16997
7	5-14 years	male	35267
8	55-74 years	female	430036
9	55-74 years	male	1228407
10	75+ years	female	221984
11	75+ years	male	431134

In [29]:
```
female = data[data["sex"]=="female"]
female
```

Out[29]:

	country	year	sex	age	suicides_no	population	suicides/100k pop	gdp_for_ye (
2	Albania	1987	female	15-24 years	14	289700	4.83	2,156,624,9(
5	Albania	1987	female	75+ years	1	35600	2.81	2,156,624,9(
6	Albania	1987	female	35-54 years	6	278800	2.15	2,156,624,9(
7	Albania	1987	female	25-34 years	4	257200	1.56	2,156,624,9(
9	Albania	1987	female	5-14 years	0	311000	0.00	2,156,624,9(
...	...	...	...	...	...	...	...	
27814	Uzbekistan	2014	female	25-34 years	162	2735238	5.92	63,067,077,1
27815	Uzbekistan	2014	female	35-54 years	107	3620833	2.96	63,067,077,1
27816	Uzbekistan	2014	female	75+ years	9	348465	2.58	63,067,077,1
27818	Uzbekistan	2014	female	5-14 years	44	2631600	1.67	63,067,077,1
27819	Uzbekistan	2014	female	55-74 years	21	1438935	1.46	63,067,077,1

13910 rows × 10 columns

In [30]:
```
male = data[data["sex"]=="male"]
male
```

Out[30]:

	country	year	sex	age	suicides_no	population	suicides/100k pop	gdp_for_year ($)
0	Albania	1987	male	15-24 years	21	312900	6.71	2,156,624,900
1	Albania	1987	male	35-54 years	16	308000	5.19	2,156,624,900
3	Albania	1987	male	75+ years	1	21800	4.59	2,156,624,900
4	Albania	1987	male	25-34 years	9	274300	3.28	2,156,624,900
8	Albania	1987	male	55-74 years	1	137500	0.73	2,156,624,900
...	...	...	...	...	...	...	...	...
27809	Uzbekistan	2014	male	25-34 years	318	2739150	11.61	63,067,077,179
27811	Uzbekistan	2014	male	55-74 years	144	1271111	11.33	63,067,077,179
27812	Uzbekistan	2014	male	15-24 years	347	3126905	11.10	63,067,077,179
27813	Uzbekistan	2014	male	75+ years	17	224995	7.56	63,067,077,179
27817	Uzbekistan	2014	male	5-14 years	60	2762158	2.17	63,067,077,179

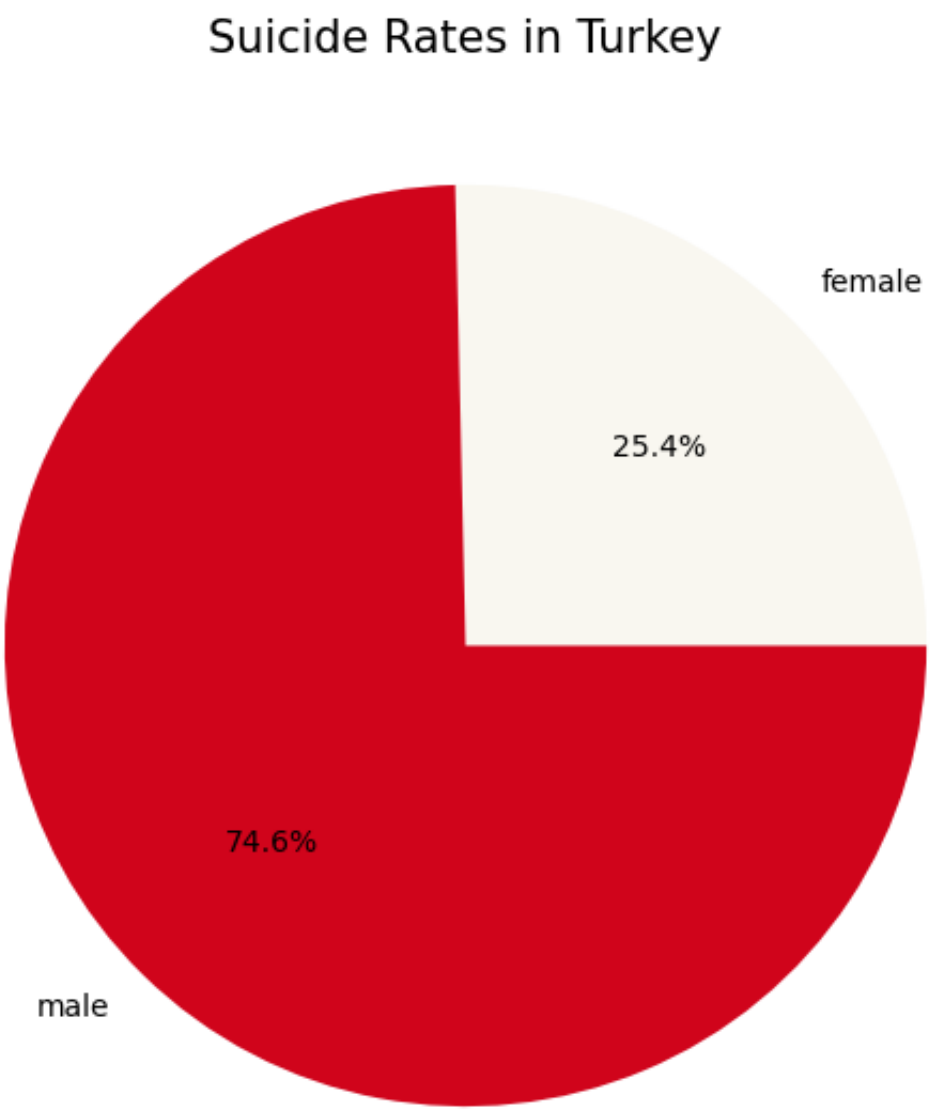
13910 rows × 10 columns

In [39]:
```
# Sum suicide by country and sex
data_cs = data.groupby(["country","sex"]).sum()["suicides_no"].rese
data_cs_Turkey = data_cs[data_cs['country']=='Turkey']
data_cs_Turkey
```

Out[39]:

	country	sex	suicides_no
186	Turkey	female	2569
187	Turkey	male	7562

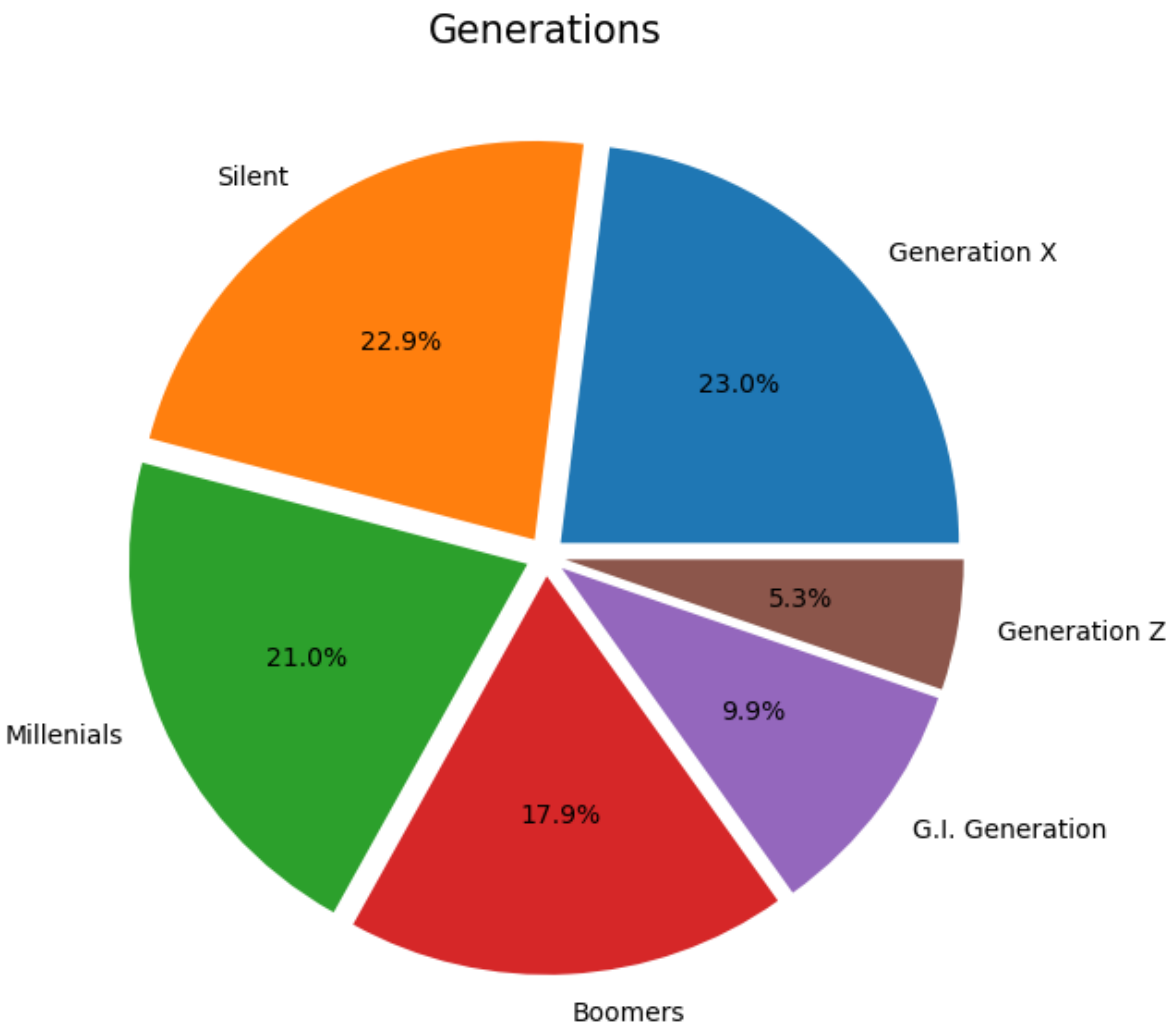
In [40]:
```
labels = data_cs_Turkey.sex.value_counts().index
colors = ['#f9f7f0','#d0041b']
explode = [0,0]
sizes = data_cs_Turkey.suicides_no.value_counts().index.sort_values

# Visualization with Pie Plot
plt.figure(figsize = (7,7))
plt.pie(sizes, explode=explode, labels=labels, colors=colors, autop
plt.title('Suicide Rates in Turkey',fontsize = 15)
plt.show()
```



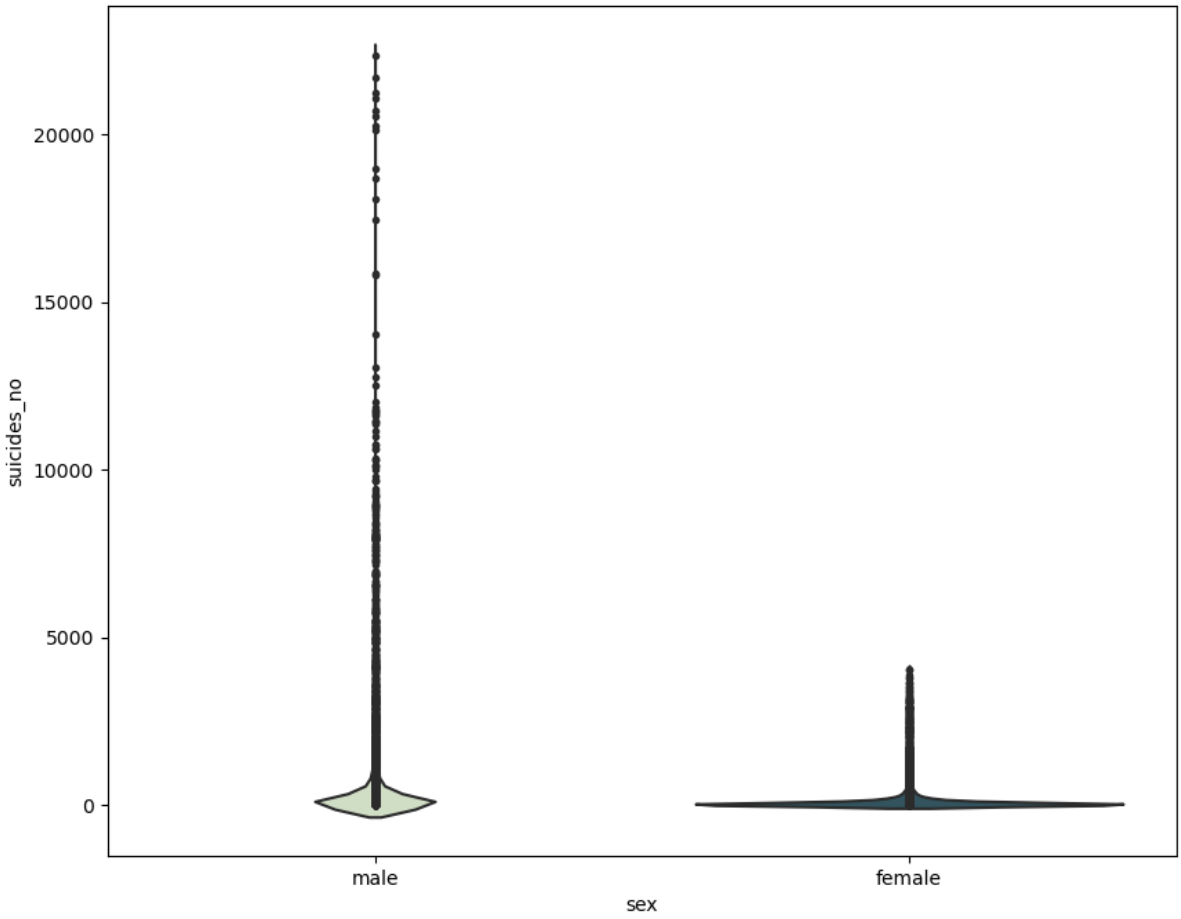
In [41]:
```
data_generation = data["generation"].value_counts()
data_generation
```

Out[41]:
```
Generation X       6408
Silent             6364
Millenials         5844
Boomers            4990
G.I. Generation    2744
Generation Z       1470
Name: generation, dtype: int64
```

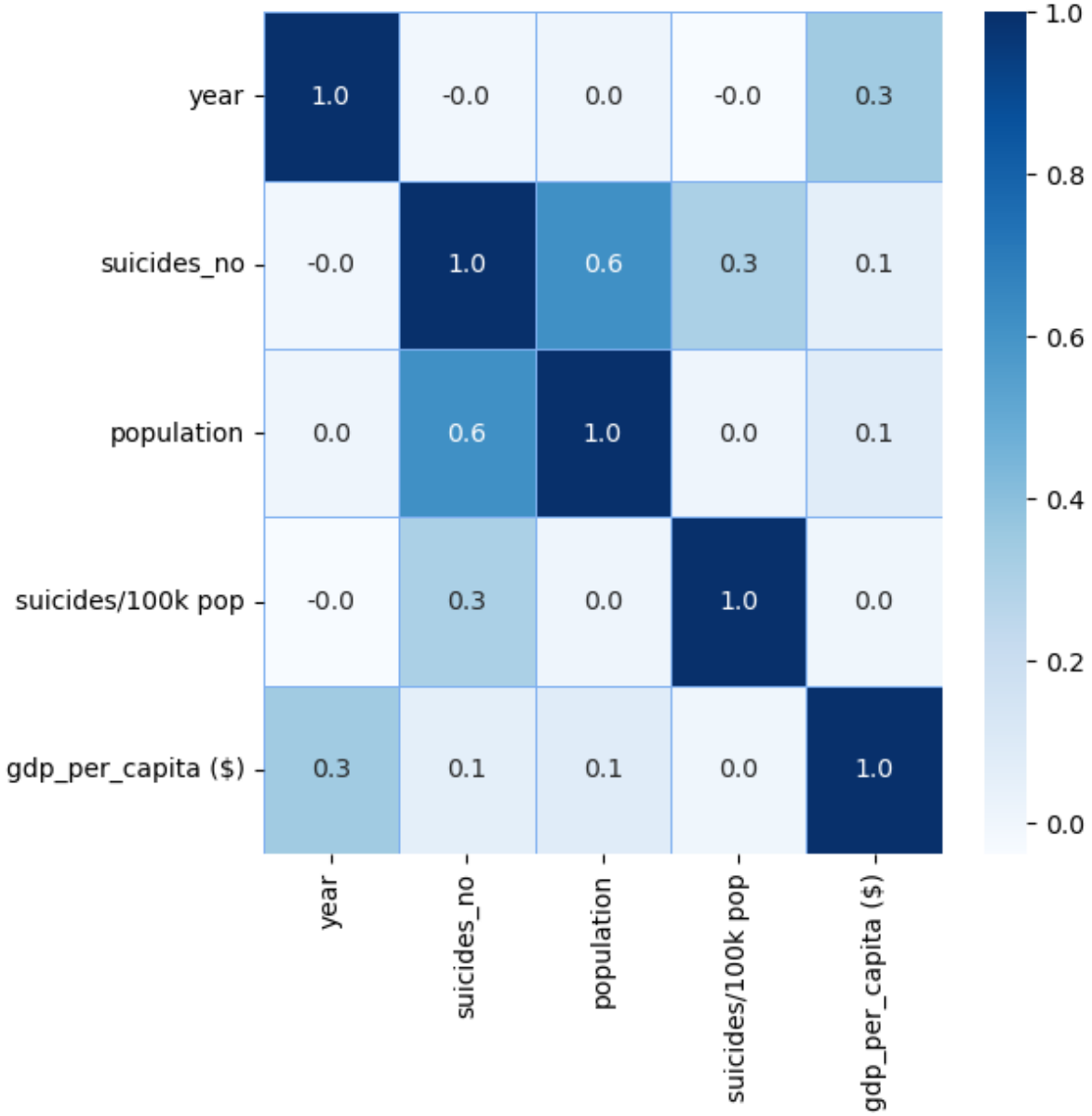
In [42]:
```
labels = data_generation.index
explode = [0.05,0.05,0.05,0.05,0.05,0.05]
sizes = data_generation.values

plt.figure(figsize = (7,7))
plt.pie(sizes, explode=explode, labels=labels, autopct='%1.1f%%')
plt.title('Generations',fontsize = 15)
plt.show()
```



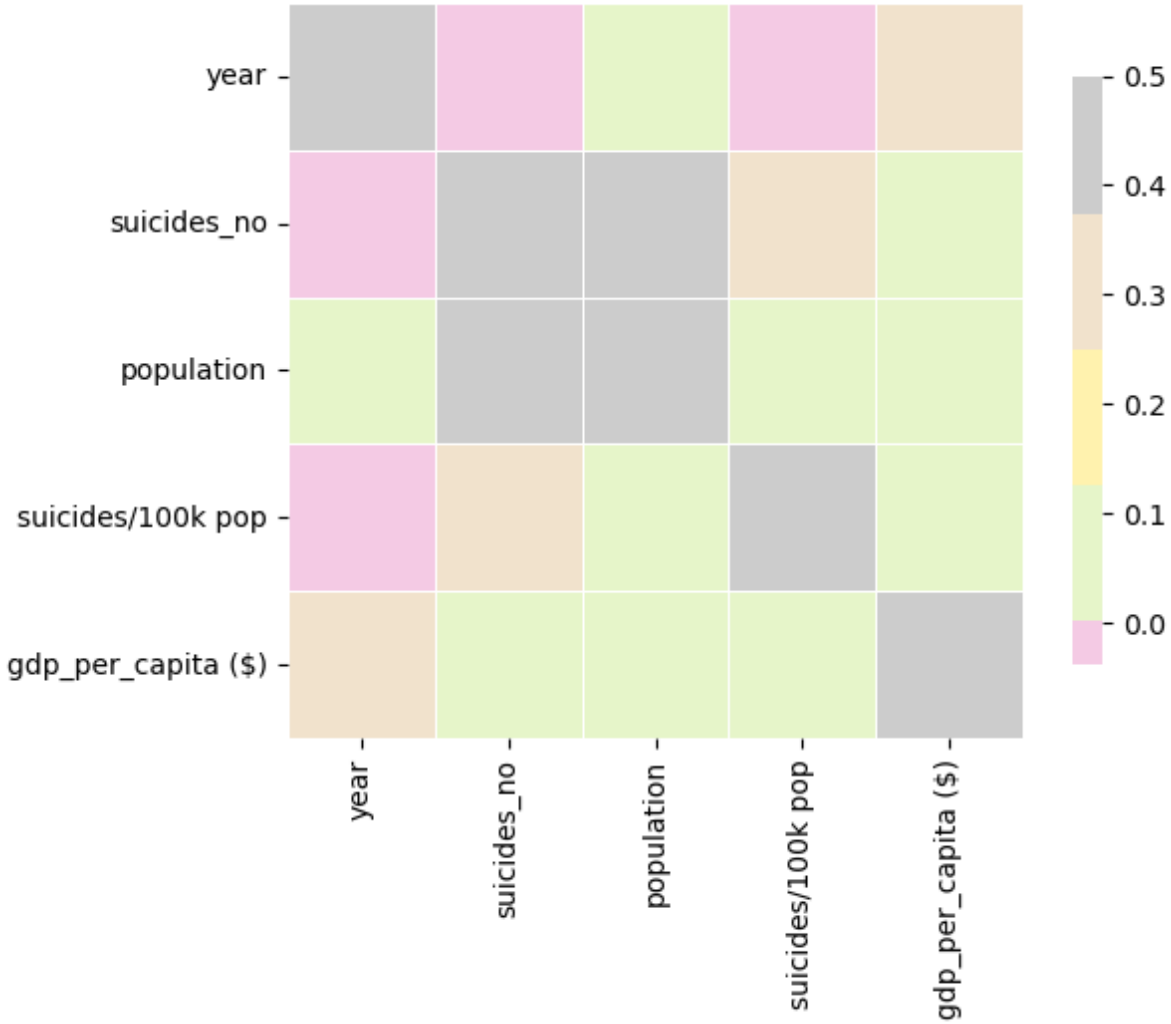
In [43]:
```
# Visualization with Violin Plot
plt.figure(figsize=(10,8))
pal = sns.cubehelix_palette(2, rot=-.5, dark=.3)
sns.violinplot(x="sex", y="suicides_no",data=data, palette=pal, inn
plt.show()
```



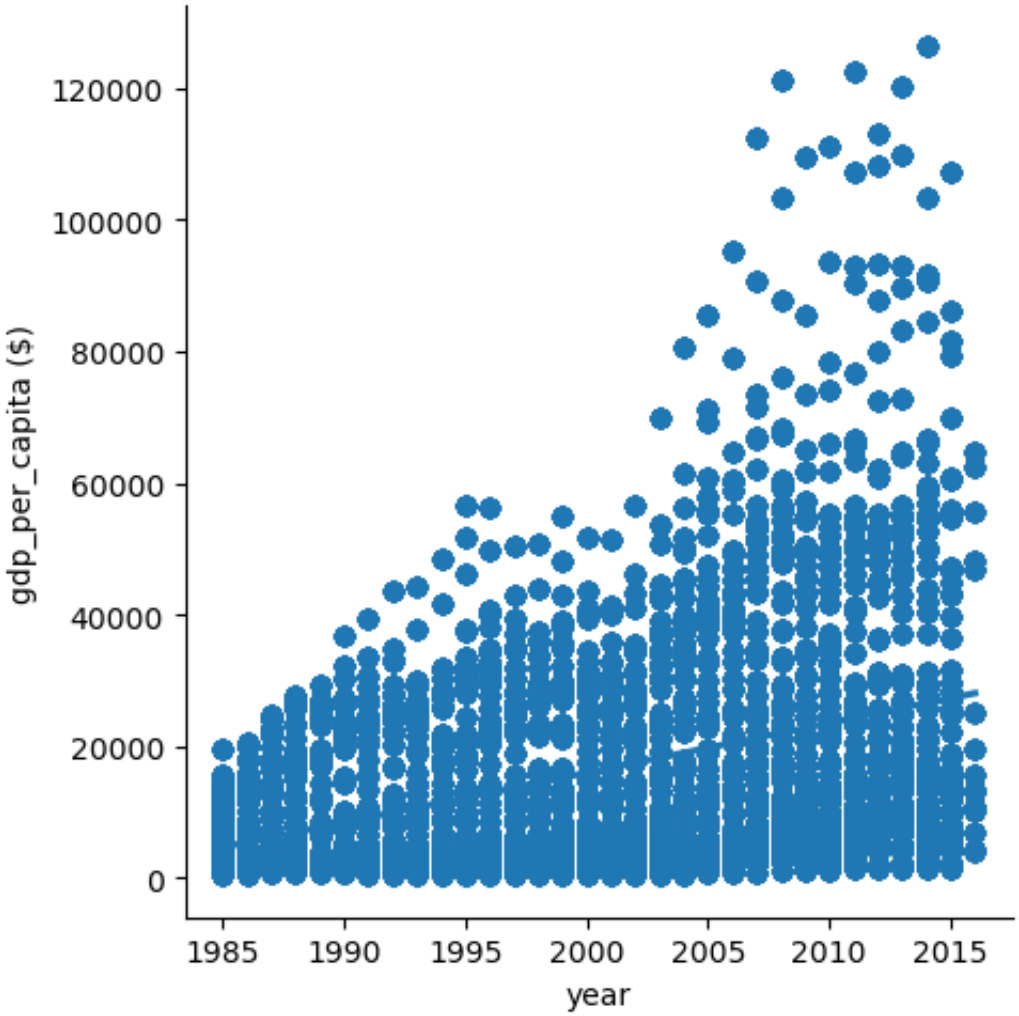
In [44]:
```
# Heatmap
f,ax = plt.subplots(figsize=(6, 6))
sns.heatmap(data.corr(), cmap="Blues",annot=True, linewidths=0.5,li
plt.show()
```



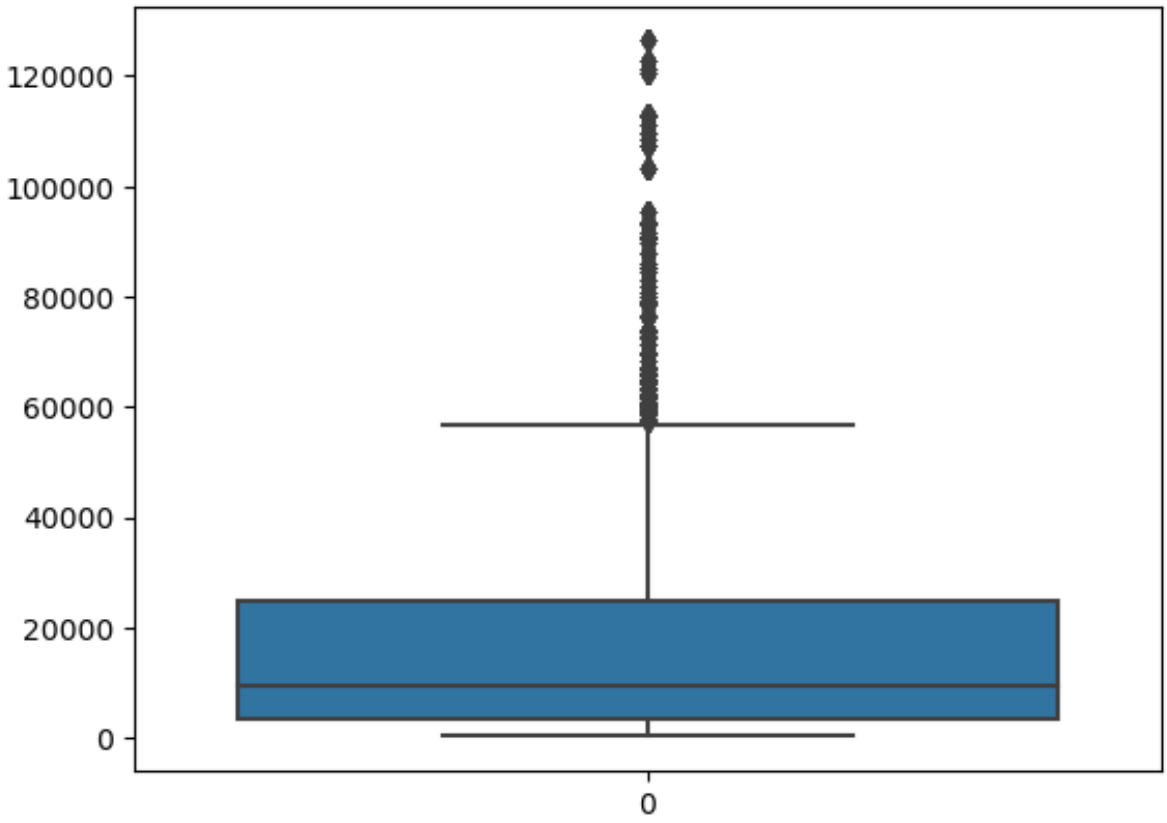
In [45]:
```
sns.heatmap(data.corr(), cmap="Pastel2", vmax=0.5, center=0,
            square=True, linewidths=.5, cbar_kws={"shrink": .8})
plt.show()
```



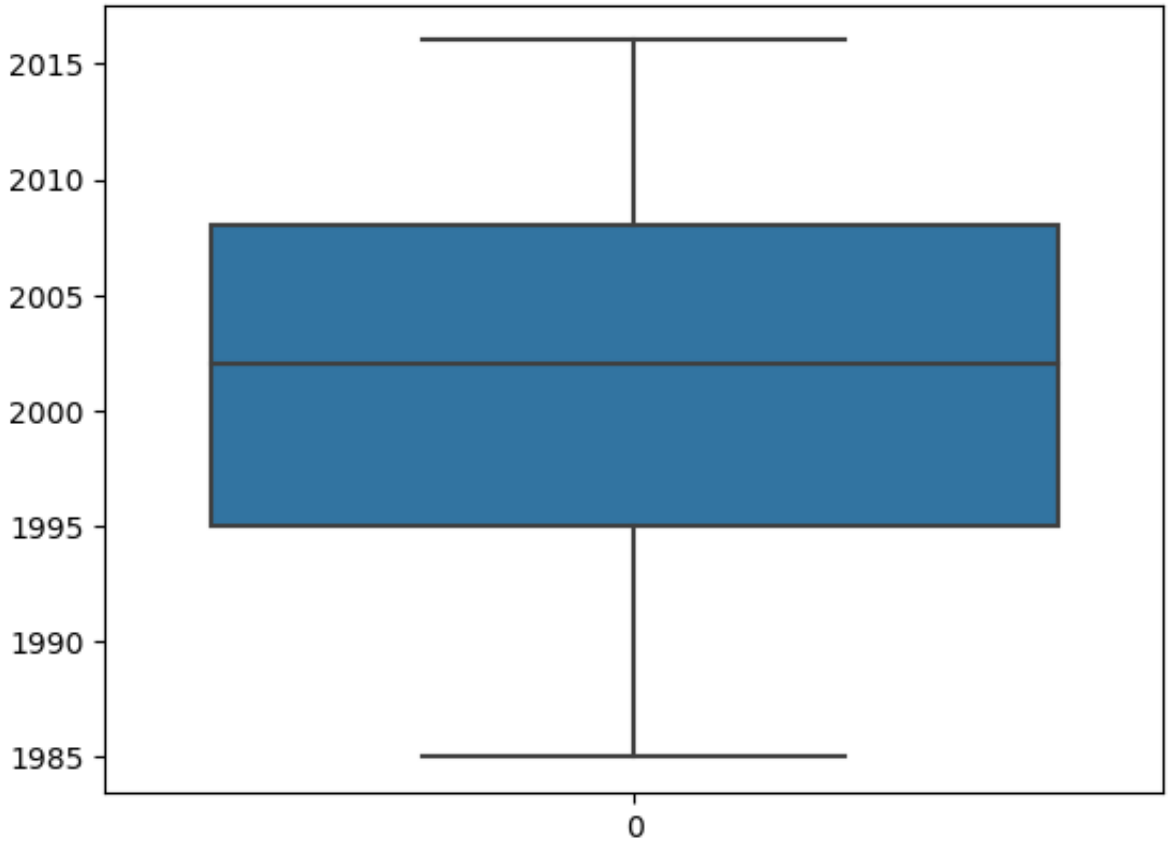
In [47]:
```
# Visualization with Lm Plot
sns.lmplot(x="year", y="gdp_per_capita ($)", data=data)
plt.show()
```



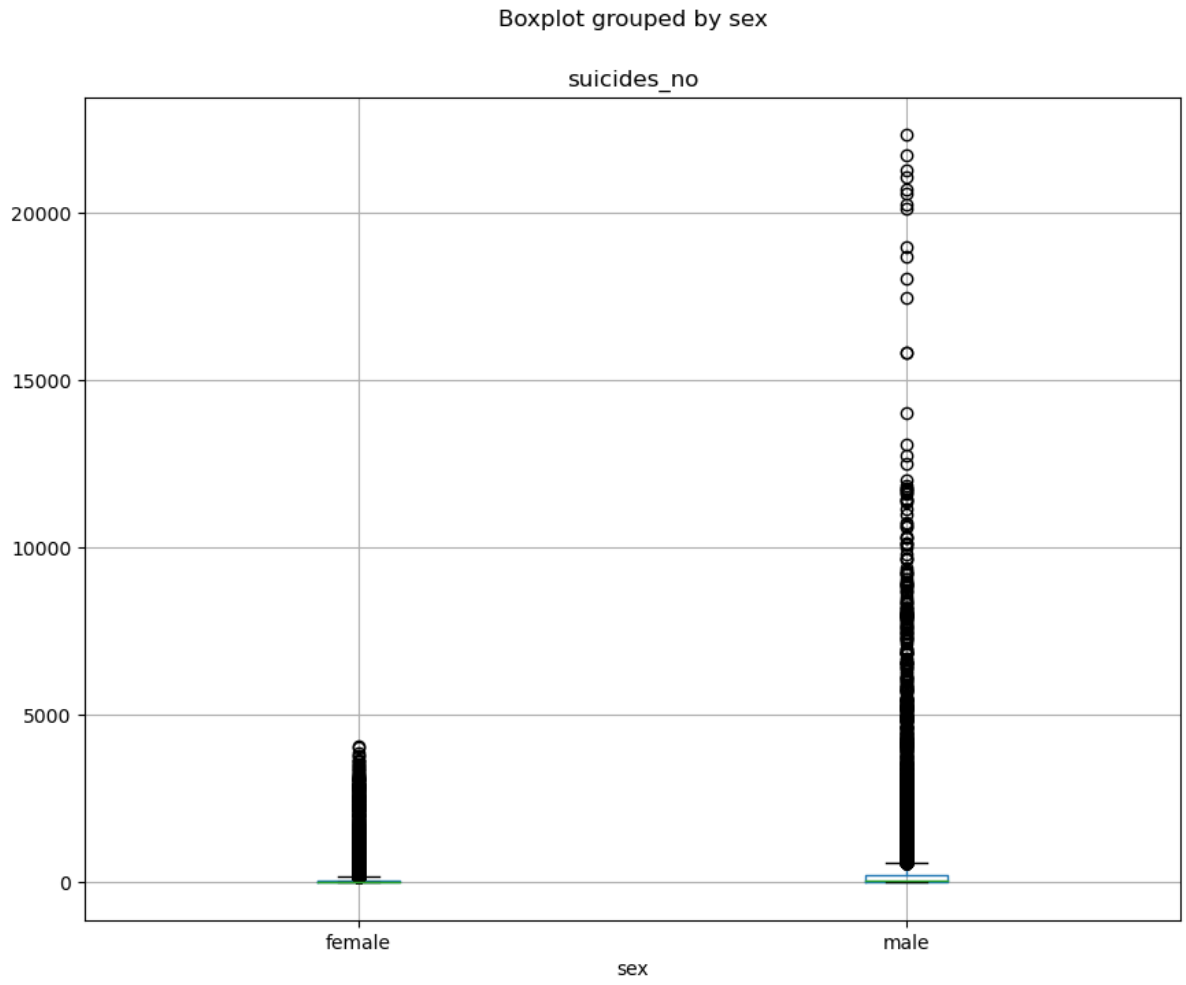
In [48]:
```
# Visualization with Box Plot
sns.boxplot(data['gdp_per_capita ($)'])
plt.show()
```



In [49]:
```
sns.boxplot(data['year'])
plt.show()
```

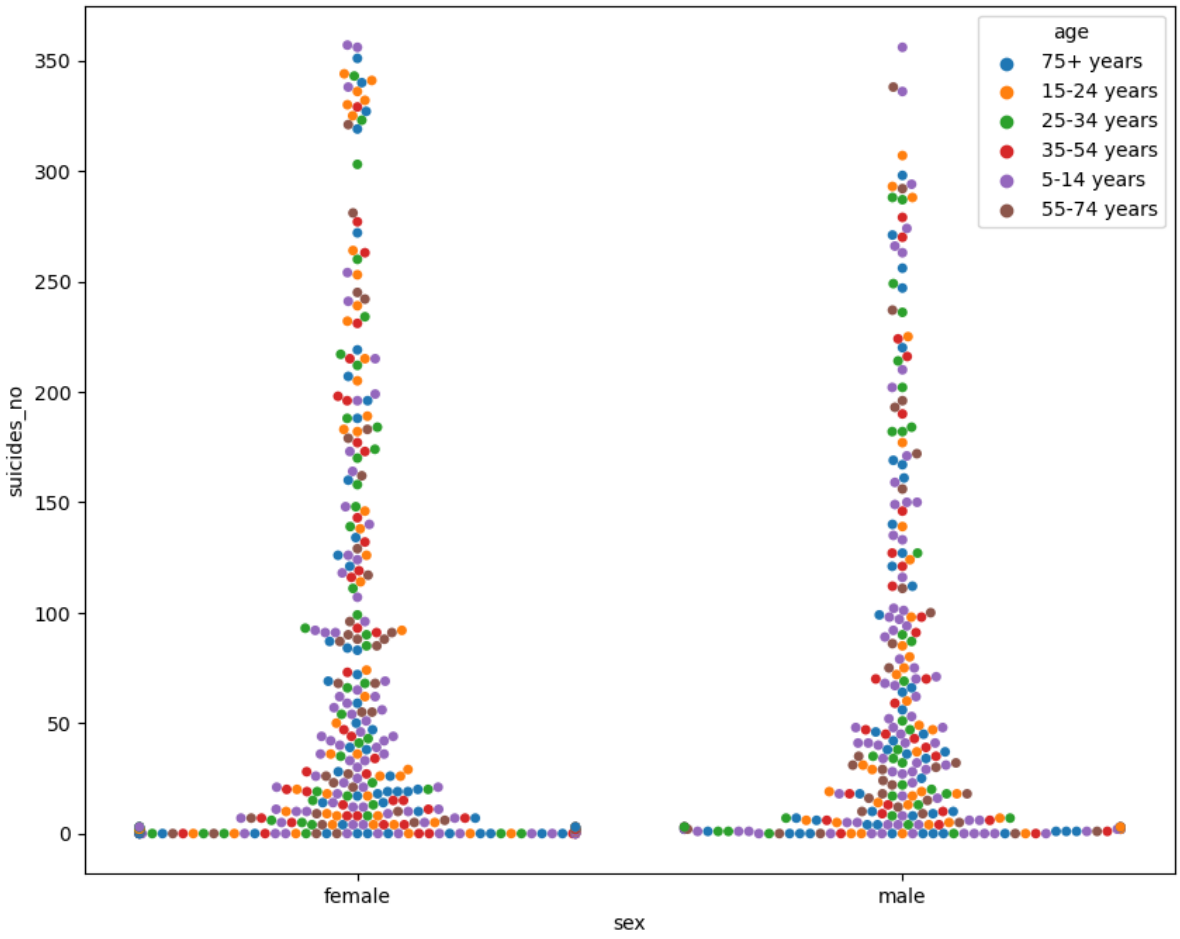


In [50]:
```
data.boxplot(figsize=(10,8),column='suicides_no',by ='sex')
plt.show()
```

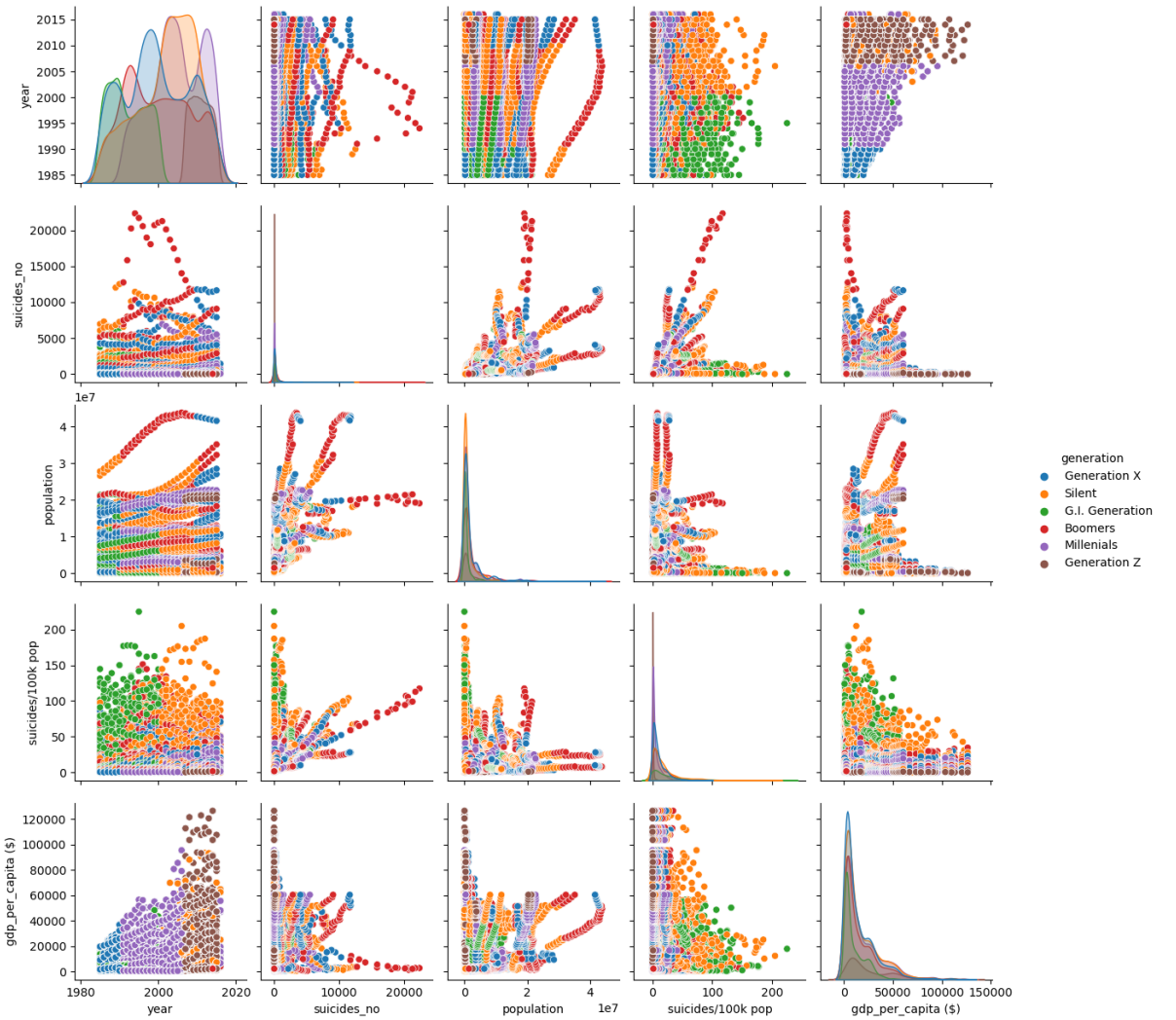


In [51]:
```
# Sum suicide by country, sex and age
data_csa = data.groupby(["country","sex","age"]).sum()["suicides_no
data_csa = data_csa[:605]
```

In [52]:
```
# Visualization with Swarm Plot
plt.figure(figsize=(10,8))
sns.swarmplot(x="sex", y="suicides_no",hue="age", data=data_csa)
plt.show()
```

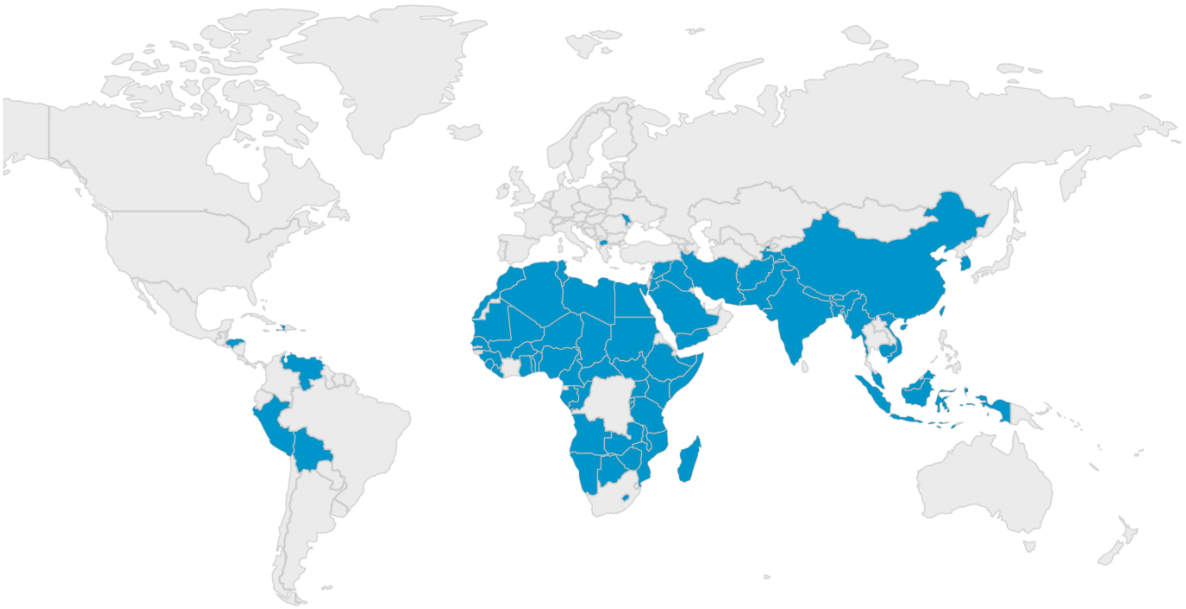


In [53]:
```
sns.pairplot(data, hue="generation")
plt.show()
```



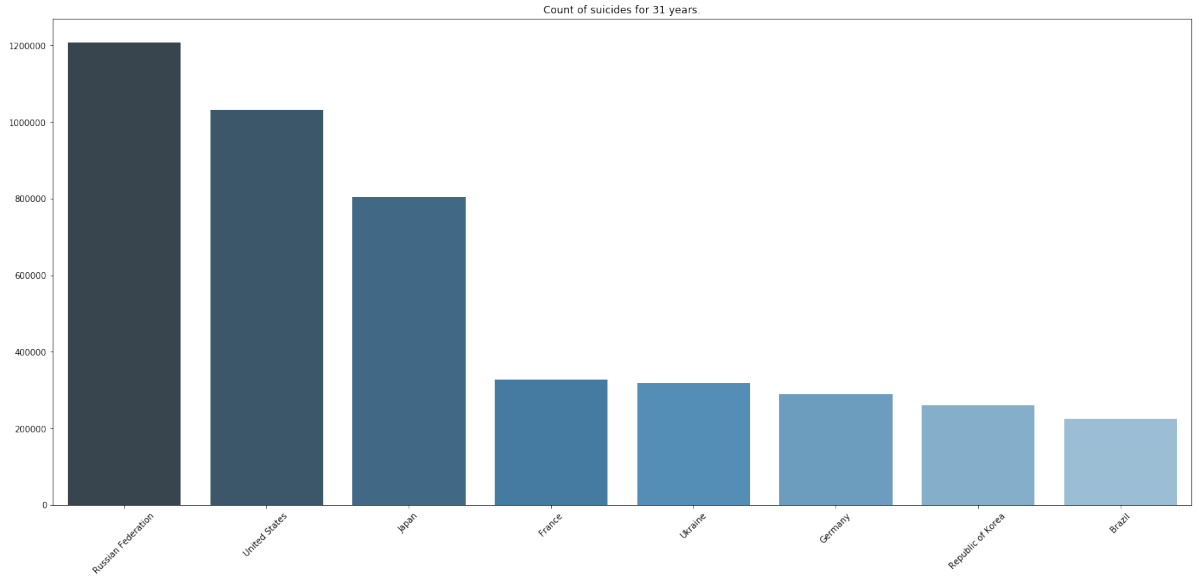
In [5]:
```
from IPython.display import Image
Image('missed countries.png')
```

Out[5]:



Count of suicides for 31 years. Note that not all countries are included in this list! This is extremely important.

In [6]:
```
suic_sum = pd.DataFrame(data['suicides_no'].groupby(data['country']
suic_sum = suic_sum.reset_index().sort_index(by='suicides_no', asce
most_cont = suic_sum.head(8)
fig = plt.figure(figsize=(20, 10))
plt.title('Count of suicides for 31 years.')
sns.set(font_scale=2)
sns.barplot(y='suicides_no', x='country', data=most_cont, palette="
plt.xticks(rotation=45)
plt.ylabel('');
plt.xlabel('')
plt.tight_layout()
```



In [7]:
```
from mpl_toolkits.basemap import Basemap
concap = pd.read_csv('../input/world-capitals-gps/concap.csv')
concap.head()
```

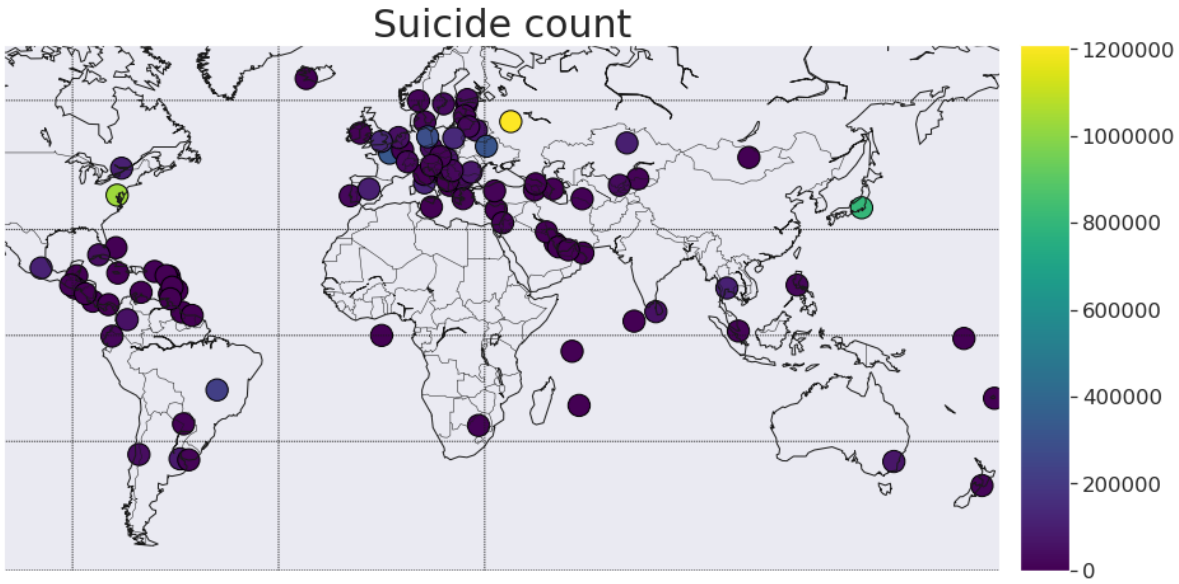
Out[7]:

	CountryName	CapitalName	CapitalLatitude	CapitalLongitude	CountryCode	ContinentNa
0	Somaliland	Hargeisa	9.550000	44.050000	NaN	A
1	South Georgia and South Sandwich Islands	King Edward Point	-54.283333	-36.500000	GS	Antarc
2	French Southern and Antarctic Lands	Port-aux-Français	-49.350000	70.216667	TF	Antarc
3	Palestine	Jerusalem	31.766667	35.233333	PS	
4	Aland Islands	Mariehamn	60.116667	19.900000	AX	Eu

In [8]:
```
def reg(x):
    if x == 'Russia':
        res = 'Russian Federation'
    else:
        res = x
    return res
concap['CountryName'] = concap['CountryName'].apply(reg)

data_full = pd.merge(concap[['CountryName', 'CapitalName', 'Capital
         suic_sum,left_on='CountryName',right_on='country')
```

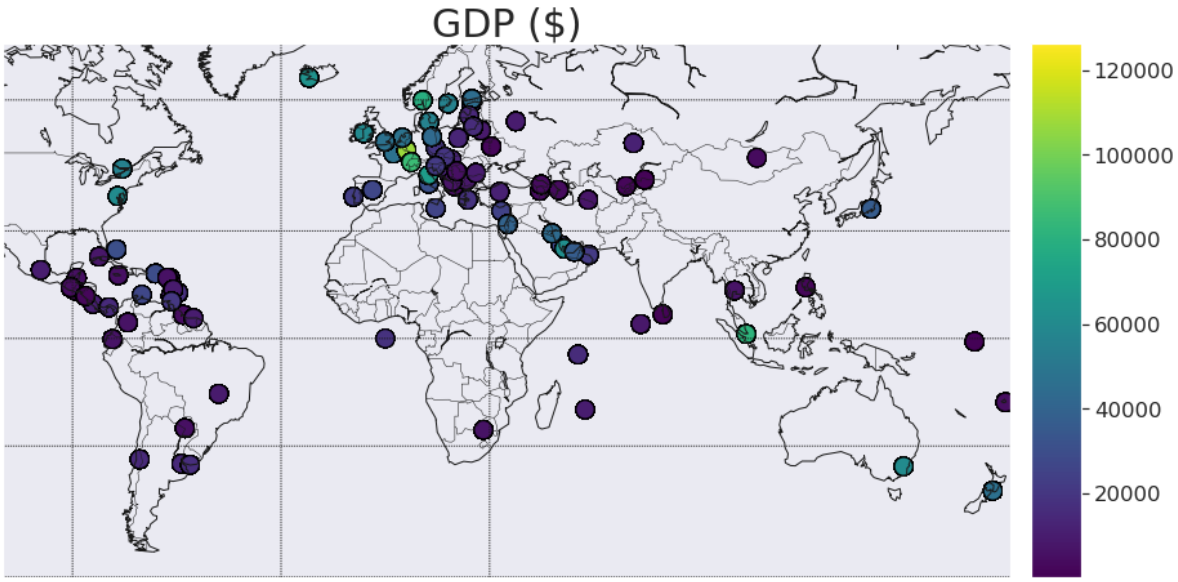
Consider it on the map. I will remind you, that many big (by population) countries aren't included in this dataset.

In [9]:
```
def mapWorld(col1, size2, title3, label4, metr=100, colmap='hot'):
    m = Basemap(projection='mill', llcrnrlat=-60, urcrnrlat=70,
            llcrnrlon=-110, urcrnrlon=180, resolution='c')
    m.drawcoastlines()
    m.drawcountries()
    m.drawparallels(np.arange(-90, 91., 30.))
    m.drawmeridians(np.arange(-90, 90., 60.))
    lat = data_full['CapitalLatitude'].values
    lon = data_full['CapitalLongitude'].values
    a_1 = data_full[col1].values
    if size2:
        a_2 = data_full[size2].values
    else: a_2 = 1
    m.scatter(lon, lat, latlon=True, c=a_1, s=metr*a_2, linewidth=1

    cbar = m.colorbar()
    cbar.set_label(label4,fontsize=30)
    plt.title(title3, fontsize=30)
    plt.show()
sns.set(font_scale=1.5)
plt.figure(figsize=(15,15))
mapWorld(col1='suicides_no', size2=False, title3='Suicide count', l
```



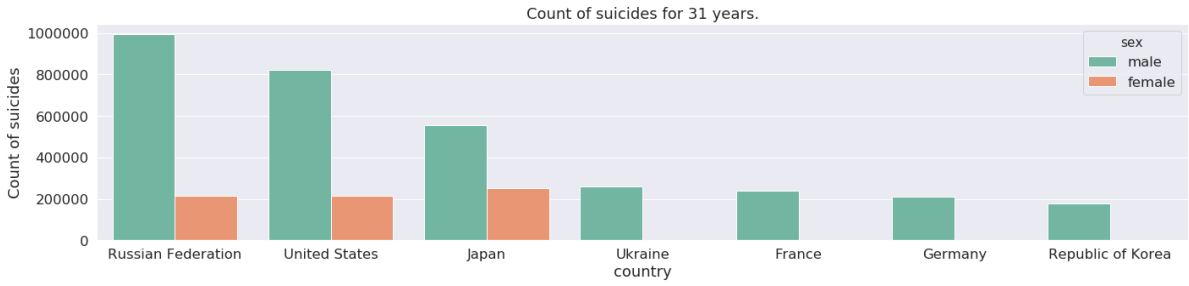
Compare it with map - gdp_per_capita ($)

In [10]:
```
data_full = pd.merge(concap[['CountryName', 'CapitalName', 'Capital
         data,left_on='CountryName',right_on='country')
plt.figure(figsize=(15,15))
mapWorld(col1='gdp_per_capita ($)', size2=False,title3='GDP ($)',la
```



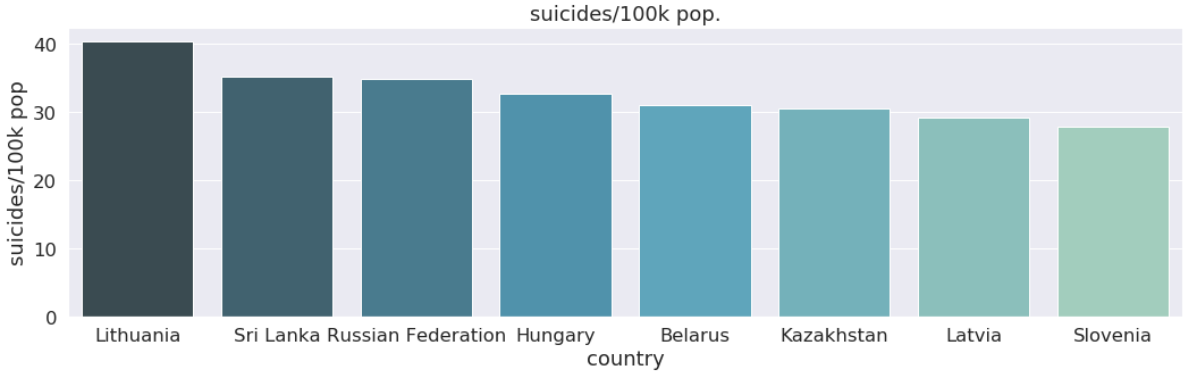
Consider same barplot with with gender difference:

In [11]:
```
suic_sum_m = data['suicides_no'].groupby([data['country'],data['sex
suic_sum_m = suic_sum_m.reset_index().sort_index(by='suicides_no',a
most_cont_m = suic_sum_m.head(10)
most_cont_m.head(10)
fig = plt.figure(figsize=(20,5))
plt.title('Count of suicides for 31 years.')
sns.set(font_scale=1.5)
sns.barplot(y='suicides_no',x='country',hue='sex',data=most_cont_m,
plt.ylabel('Count of suicides')
plt.tight_layout()
```



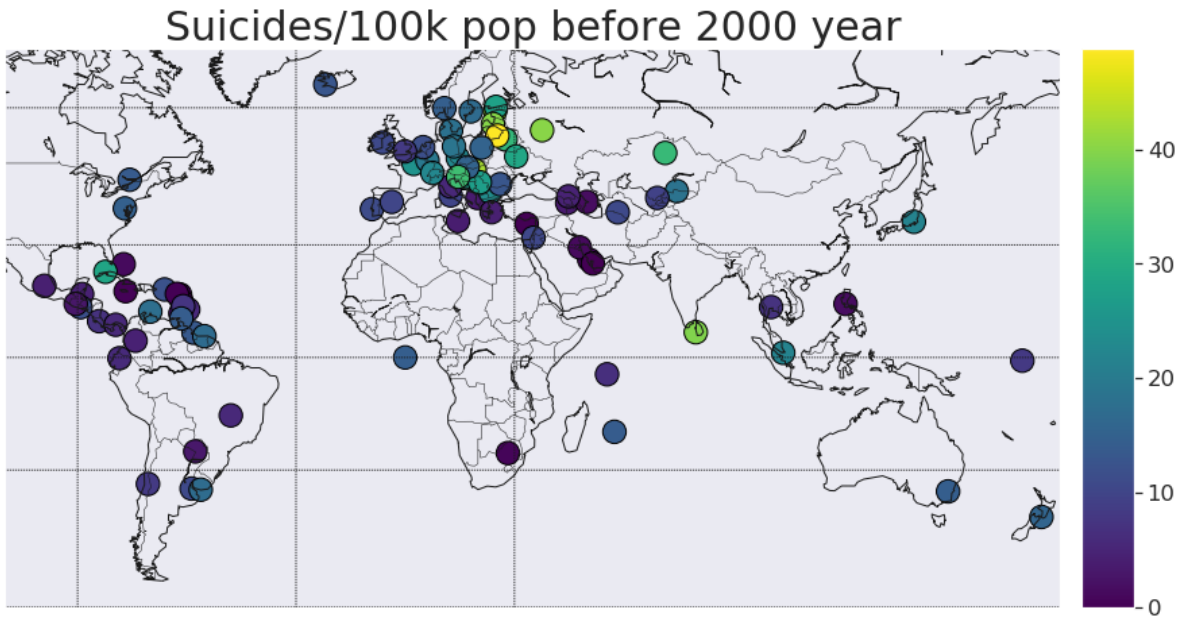
Compare this with statistics - suicides/100k pop.

In [12]:
```
suic_mean = pd.DataFrame(data['suicides/100k pop'].groupby(data['co
suic_mean = suic_mean.reset_index()
suic_mean_most = suic_mean.sort_index(by='suicides/100k pop',ascend

fig = plt.figure(figsize=(15,5))
plt.title('suicides/100k pop.')
#sns.set(font_scale=1.5)
sns.barplot(y='suicides/100k pop',x='country',data=suic_mean_most,p
plt.ylabel('suicides/100k pop')
plt.tight_layout()
```

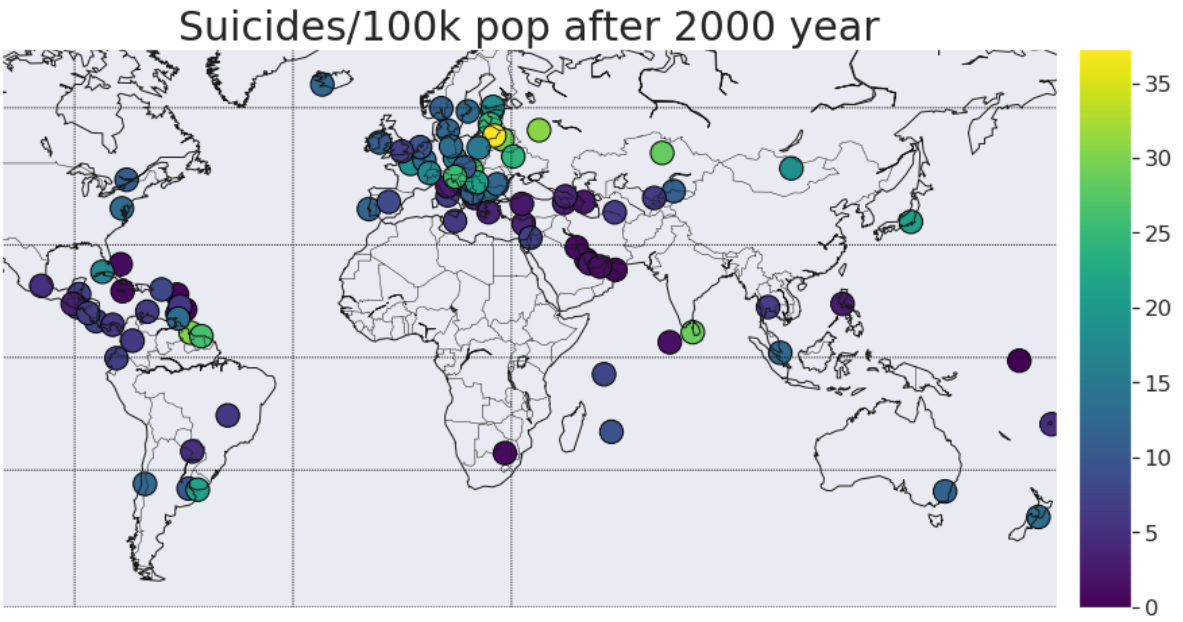


Let's divide data into old and new:

In [13]:
```
past = data[data['year']<2000]
mean = pd.DataFrame(data_past['suicides/100k pop'].groupby(data_past
mean = suic_mean.reset_index()
full = pd.merge(concap[['CountryName', 'CapitalName', 'CapitalLatitu
    suic_mean,left_on='CountryName',right_on='country')
igure(figsize=(15,15))
rld(col1='suicides/100k pop', size2=False,title3='Suicides/100k pop
```

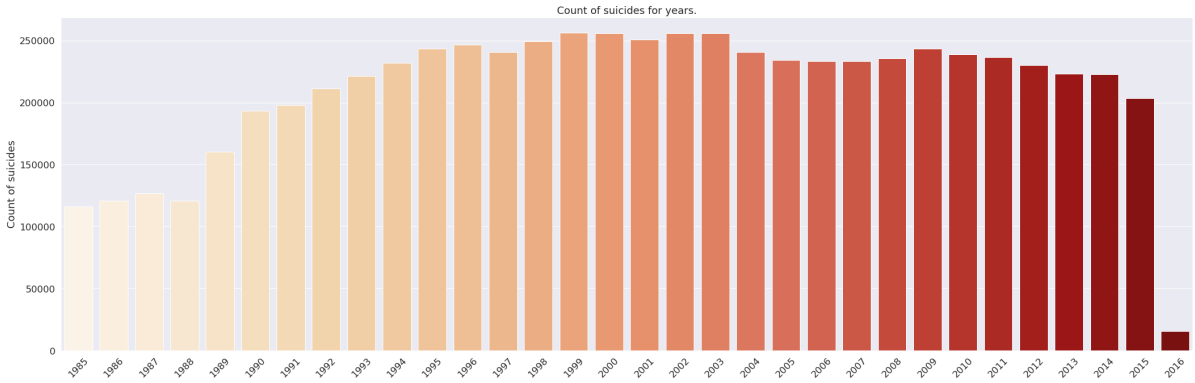


In [14]:
```
data_last = data[data['year'] > 2000]
suic_mean = pd.DataFrame(data_last['suicides/100k pop'].groupby(dat
suic_mean = suic_mean.reset_index()
data_full = pd.merge(concap[['CountryName', 'CapitalName', 'Capital
         suic_mean,left_on='CountryName',right_on='country')
plt.figure(figsize=(15,15))
mapWorld(col1='suicides/100k pop', size2=False,title3='Suicides/100
```



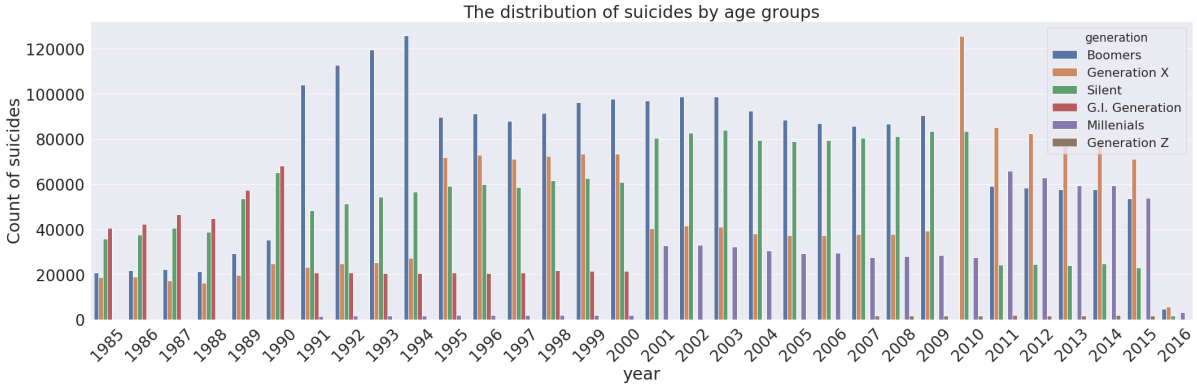
Here we can see count of suicides by year distribution:

In [15]:
```
suic_sum_yr = pd.DataFrame(data['suicides_no'].groupby(data['year']
suic_sum_yr = suic_sum_yr.reset_index().sort_index(by='suicides_no'
most_cont_yr = suic_sum_yr
fig = plt.figure(figsize=(30,10))
plt.title('Count of suicides for years.')
sns.set(font_scale=2.5)
sns.barplot(y='suicides_no',x='year',data=most_cont_yr,palette="OrR
plt.ylabel('Count of suicides')
plt.xlabel('')
plt.xticks(rotation=45)
plt.tight_layout()
```



What is the most critical age group?

In [16]:
```
suic_sum_yr = pd.DataFrame(data['suicides_no'].groupby([data['gener
suic_sum_yr = suic_sum_yr.reset_index().sort_index(by='suicides_no'
most_cont_yr = suic_sum_yr
fig = plt.figure(figsize=(30,10))
plt.title('The distribution of suicides by age groups')

sns.set(font_scale=2)
sns.barplot(y='suicides_no',x='year',hue='generation',data=most_con
plt.ylabel('Count of suicides')
plt.xticks(rotation=45)
plt.tight_layout()
```

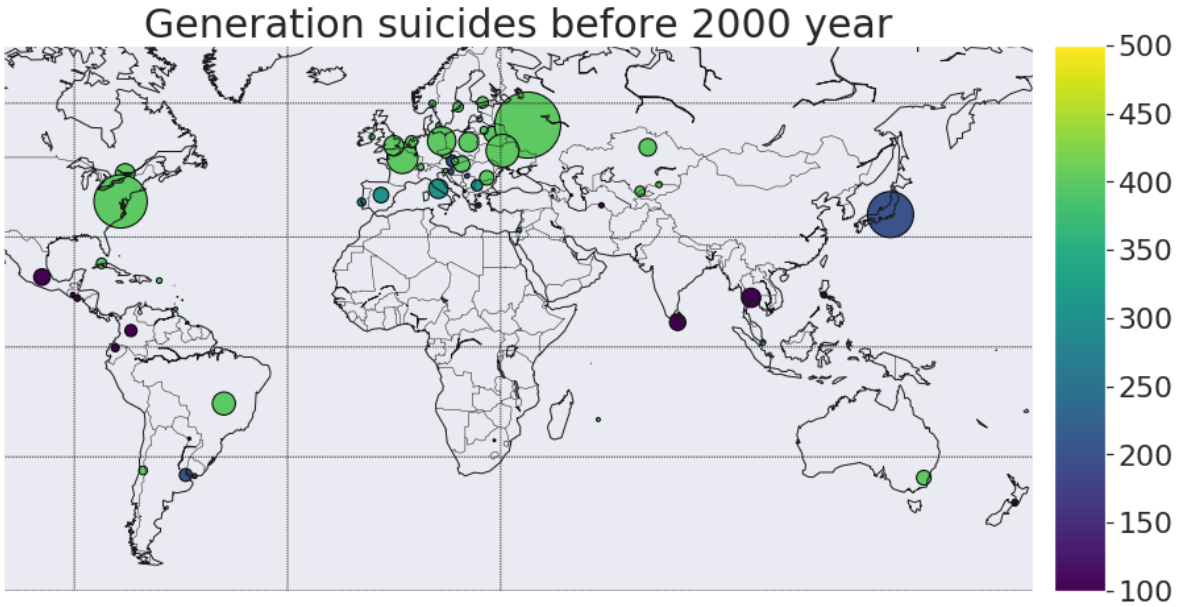


In [17]:
```
suic_sum_yr = pd.DataFrame(data['suicides_no'].groupby([data['gener
suic_sum_yr = suic_sum_yr.reset_index().sort_index(by='suicides_no'
most_cont = suic_sum_yr

data_full = pd.merge(concap[['CountryName', 'CapitalName', 'Capital
         most_cont,left_on='CountryName',right_on='country')
```

For this map, color - generation, size - suicides_no

In [18]:
```
data_new = data[data['year']<2000]
title_map = 'Generation suicides before 2000 year'
data_gener = pd.DataFrame(data_new['suicides_no'].groupby([data_new
age_max = pd.DataFrame(data_gener['suicides_no'].groupby(data_gener
gen_full = pd.merge(age_max,data_gener,left_on=['suicides_no','coun

data_full = pd.merge(concap[['CountryName', 'CapitalName', 'Capital
         gen_full,left_on='CountryName',right_on='country')
data_full.dropna(inplace=True)

def gener(x):
    dic_t = {'Generation X':100,'Silent':200,'G.I. Generation':300,
    return dic_t[x]
data_full.generation = data_full.generation.apply(gener)
print(" Generation X:100 \n Silent:200 \n G.I. Generation:300 \n Bo
plt.figure(figsize=(15,15))
mapWorld(col1='generation', size2='suicides_no', title3=title_map,l
```

```
 Generation X:100
 Silent:200
 G.I. Generation:300
 Boomers:400
 Millenials:500
 Generation Z:600
```



In [19]:
```
data_new = data[data['year']>=2000]
title_map = 'Generation suicides after 2000 year'
data_gener = pd.DataFrame(data_new['suicides_no'].groupby([data_new
age_max = pd.DataFrame(data_gener['suicides_no'].groupby(data_gener
gen_full = pd.merge(age_max,data_gener,left_on=['suicides_no','coun

data_full = pd.merge(concap[['CountryName', 'CapitalName', 'Capital
         gen_full,left_on='CountryName',right_on='country')
data_full.dropna(inplace=True)

def gener(x):
    dic_t = {'Generation X':100,'Silent':200,'G.I. Generation':300,
    return dic_t[x]
data_full.generation = data_full.generation.apply(gener)
print(" Generation X:100 \n Silent:200 \n G.I. Generation:300 \n Bo
plt.figure(figsize=(15,15))
mapWorld(col1='generation', size2='suicides_no', title3=title_map,l
```

```
 Generation X:100
 Silent:200
 G.I. Generation:300
 Boomers:400
 Millenials:500
 Generation Z:600
```