1.Introduction

Aim of the project is to analyse the covid cases and deaths worldwide

```
-Source = Data set is taken from data.europa.eu
-Description = The dataset contains the latest available public dat
a on COVID-19 including a daily situation update, the epidemiologic
al curve and the global geographical distribution (EU/EEA and the U
K, worldwide).
```

2.Analysis Questions

Q1: What is the average of covid cases and deaths in afghanistan & pakistan?

Q2: What are top 5 countries with the most number of cases & deaths?

Q3: Which continent has the most number of covid cases & deaths?

Q4: What is the percentage of deaths in relation to cases worldwide?

Q5: Which are the top 3 countries with the least death percentage in relation to cases?

Q6: In which countries the number of covid cases have dropped to zero by latest date?

Q7: Which are the top 5 countries where the number of cases are still High?

3.Data Acquisition & Cleaninig

```
-Reading the dataset
-Droping Unnecessary data
-Cleaning the dataset, if needed.
```

In [1]:

```
# Importing all the necessary modules
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
```

In [2]:

```
data = pd.read_csv("data-sets\covid-19-data.csv")
data.head(10)
```

Out[2]:

	dateRep	day	month	year	cases	deaths	countriesAndTerritories	ge
0	20/11/2020	20	11	2020	282	5	Afghanistan	
1	19/11/2020	19	11	2020	0	0	Afghanistan	
2	18/11/2020	18	11	2020	383	13	Afghanistan	
3	17/11/2020	17	11	2020	65	6	Afghanistan	
4	16/11/2020	16	11	2020	163	9	Afghanistan	
5	15/11/2020	15	11	2020	205	12	Afghanistan	
6	14/11/2020	14	11	2020	66	10	Afghanistan	
7	13/11/2020	13	11	2020	360	14	Afghanistan	
8	12/11/2020	12	11	2020	146	4	Afghanistan	
9	11/11/2020	11	11	2020	0	0	Afghanistan	

In [3]:

```
#Droping the unnecessary columns
data.drop(columns=["day", "month", "year", "geoId",
                          "countryterritoryCode", "popData2019", "Cumulative
data.head(10)
```

Out[3]:

	dateRep	cases	deaths	countriesAndTerritories	continentExp
0	20/11/2020	282	5	Afghanistan	Asia
1	19/11/2020	0	0	Afghanistan	Asia
2	18/11/2020	383	13	Afghanistan	Asia
3	17/11/2020	65	6	Afghanistan	Asia
4	16/11/2020	163	9	Afghanistan	Asia
5	15/11/2020	205	12	Afghanistan	Asia
6	14/11/2020	66	10	Afghanistan	Asia
7	13/11/2020	360	14	Afghanistan	Asia
8	12/11/2020	146	4	Afghanistan	Asia
9	11/11/2020	0	0	Afghanistan	Asia

In [4]:

```
#Renaming some columns
newColumns = {
    "dateRep": "date",
    "continentExp": "continent"
}
data.rename(columns=newColumns, inplace=True)
data.head(10)
```

Out[4]:

	date	cases	deaths	countriesAndTerritories	continent
0	20/11/2020	282	5	Afghanistan	Asia
1	19/11/2020	0	0	Afghanistan	Asia
2	18/11/2020	383	13	Afghanistan	Asia
3	17/11/2020	65	6	Afghanistan	Asia
4	16/11/2020	163	9	Afghanistan	Asia
5	15/11/2020	205	12	Afghanistan	Asia
6	14/11/2020	66	10	Afghanistan	Asia
7	13/11/2020	360	14	Afghanistan	Asia
8	12/11/2020	146	4	Afghanistan	Asia
9	11/11/2020	0	0	Afghanistan	Asia

In [5]:

```
data.shape
```

Out[5]:

```
(56722, 5)
```

In [6]:

```
#Locating & Removing any unnecessary or empty rows
#Any NAN (Not a Number) values ?
data.isna().sum()
```

Out[6]:

```
date                        0
cases                       0
deaths                      0
countriesAndTerritories     0
continent                   0
dtype: int64
```

In [7]:

```
#Any Null values ?
data.isnull().sum()
```

Out[7]:

```
date                        0
cases                       0
deaths                      0
countriesAndTerritories     0
continent                   0
dtype: int64
```

-- The Dataset does not contain any NAN or Null values, thus not much cleaning needed.

In [61]:

```
# Describing The data set
data.shape, data.dtypes, data.columns, data.describe()
```

Out[61]:

```
((56722, 5),
 date                           datetime64[ns]
 cases                                   int64
 deaths                                  int64
 countriesAndTerritories                object
 continent                              object
 dtype: object,
 Index(['date', 'cases', 'deaths', 'countriesAndTerritories',
'continent'], dtype='object'),
                cases        deaths
 count   56722.000000  56722.000000
 mean     1004.632665     23.992084
 std      5655.692923    125.423305
 min     -8261.000000  -1918.000000
 25%         0.000000      0.000000
 50%        14.000000      0.000000
 75%       231.000000      4.000000
 max    188020.000000   4928.000000)
```

The Final Dataset contains

```
-Columns (5) = date, covid cases, deaths, countries, continent,
-Rows (56722)
```

4.Exploratory Analysis

```
-Performing Data Analytics for each of the 7 Questions
-Mandatory Usage = conditions, sorting, grouping, statistical comma
nds
```

Q1. What is the average of covid cases and deaths in afghanistan & pakistan?

In [9]:

```
pak_afghan_data = data.loc[(data["countriesAndTerritories"] == "Afghanistan'
pak_afghan_data = pak_afghan_data.sort_values(by=["cases", "deaths"], ascend
pak_afghan_data.head(20)
```

Out[9]:

	date	cases	deaths	countriesAndTerritories	continent
1	19/11/2020	0	0	Afghanistan	Asia
9	11/11/2020	0	0	Afghanistan	Asia
22	29/10/2020	0	0	Afghanistan	Asia
35	16/10/2020	0	0	Afghanistan	Asia
40	11/10/2020	0	0	Afghanistan	Asia
53	28/09/2020	0	0	Afghanistan	Asia
60	21/09/2020	0	0	Afghanistan	Asia
63	18/09/2020	0	0	Afghanistan	Asia
88	24/08/2020	0	0	Afghanistan	Asia
93	19/08/2020	0	0	Afghanistan	Asia
101	11/08/2020	0	0	Afghanistan	Asia
102	10/08/2020	0	0	Afghanistan	Asia
110	02/08/2020	0	0	Afghanistan	Asia
113	30/07/2020	0	0	Afghanistan	Asia
130	13/07/2020	0	0	Afghanistan	Asia
187	17/05/2020	0	0	Afghanistan	Asia
230	04/04/2020	0	0	Afghanistan	Asia
238	27/03/2020	0	0	Afghanistan	Asia
243	22/03/2020	0	0	Afghanistan	Asia
245	20/03/2020	0	0	Afghanistan	Asia

In [10]:

```python
pak_afghan_mean = pak_afghan_data.groupby("countriesAndTerritories").mean()
print("The Average of covid cases and deaths In Pakistan & Afghanistan \n")
pak_afghan_mean
```

```
The Average of covid cases and deaths In Pakistan & Afghanist
an
```

Out[10]:

countriesAndTerritories	cases	deaths
Afghanistan	139.661392	5.221519
Pakistan	1148.489097	23.554517

Q2: What are top 5 countries with the most number of cases & deaths?

In [11]:

```python
top5_cases = data.groupby("countriesAndTerritories").sum()
top5_cases = top5_cases.sort_values(by="cases", ascending=False)
top5_cases.head(5)
```

Out[11]:

countriesAndTerritories	cases	deaths
United_States_of_America	11717827	252555
India	9004365	132162
Brazil	5981767	168061
France	2086288	47127
Russia	2015608	34850

Q3: Which continent has the most number of covid cases & deaths?

In [12]:

```
top_continent = data.groupby("continent").sum()
top_continent.sort_values(by=["cases", "deaths"], ascending=False).head(1)
```

Out[12]:

	cases	deaths
continent		
America	24420595	695490

Q4: What is the percentage of deaths in relation to cases worldwide?

In [13]:

```
def percent(df, country):
    for i, j in df.iterrows():
        if(country in j["countriesAndTerritories"]):
            if(j["cases"] != 0):
                return j["deaths"] / j["cases"] * 100


death_percent = data.drop(["date", "continent"], axis=1).groupby("countries
death_percent["Deaths-Percent"] = death_percent["countriesAndTerritories"].
```

In [14]:

```
# Deaths Percent of all 214 countries worldwide
death_percent.reset_index()
death_percent
```

Out[14]:

	countriesAndTerritories	cases	deaths	Deaths-Percent
0	Afghanistan	44133	1650	3.738699
1	Albania	30623	657	2.145446
2	Algeria	71652	2224	3.103891
3	Andorra	6066	76	1.252885
4	Angola	13922	332	2.384715
...	...	...	...	...
209	Wallis_and_Futuna	2	0	0.000000
210	Western_Sahara	766	1	0.130548
211	Yemen	2086	608	29.146692
212	Zambia	17350	356	2.051873
213	Zimbabwe	9046	265	2.929472

214 rows × 4 columns

Q5: Which are the top 3 countries with the least death percentage in relation to cases?

In [15]:

```
top3_least_death_perc = death_percent.sort_values(by="Deaths-Percent", ascen
top3_least_death_perc.head(3)
```

Out[15]:

	countriesAndTerritories	cases	deaths	Deaths-Percent
162	Saint_Kitts_and_Nevis	19	0	0.0
164	Saint_Vincent_and_the_Grenadines	84	0	0.0
139	New_Caledonia	30	0	0.0

Q6: In which countries the number of covid cases have dropped to zero by latest date?

In [16]:

```
#Convert date to dateType to be able to sort it
data["date"] = pd.to_datetime(data.date, format="%d/%m/%Y")
#Sorting out with dates from latest to past dates.
data.sort_values(by="date", inplace=True, ascending=False)
data
latest_date = data["date"][0]
latest_date
```

Out[16]:

```
Timestamp('2020-11-20 00:00:00')
```

In [17]:

```
survived_countries = data.groupby(["date","countriesAndTerritories"]).sum()
survived_countries.sort_values(by=["date", "cases"], ascending=[0, 1], inpla
survived_countries.reset_index(inplace=True)
survived_countries = survived_countries.loc[(survived_countries["date"] == 
survived_countries
```

Out[17]:

	date	countriesAndTerritories	cases	deaths
0	2020-11-20	Anguilla	0	0
1	2020-11-20	Antigua_and_Barbuda	0	0
2	2020-11-20	Bahamas	0	0
3	2020-11-20	Benin	0	0
4	2020-11-20	Bhutan	0	0
5	2020-11-20	Bonaire, Saint Eustatius and Saba	0	0
6	2020-11-20	British_Virgin_Islands	0	0
7	2020-11-20	Brunei_Darussalam	0	0
8	2020-11-20	Burundi	0	0
9	2020-11-20	Cambodia	0	0
10	2020-11-20	Cameroon	0	0
11	2020-11-20	Cape_Verde	0	0
12	2020-11-20	Congo	0	0
13	2020-11-20	Djibouti	0	0
14	2020-11-20	Equatorial_Guinea	0	0
15	2020-11-20	Falkland_Islands_(Malvinas)	0	0
16	2020-11-20	Faroe_Islands	0	0
17	2020-11-20	Fiji	0	0
18	2020-11-20	French_Polynesia	0	0
19	2020-11-20	Gambia	0	0
20	2020-11-20	Greenland	0	0
21	2020-11-20	Grenada	0	0
22	2020-11-20	Guernsey	0	0
23	2020-11-20	Guinea	0	0

	date	countriesAndTerritories	cases	deaths
24	2020-11-20	Guinea_Bissau	0	0
25	2020-11-20	Holy_See	0	0
26	2020-11-20	Honduras	0	0
27	2020-11-20	Iran	0	0
28	2020-11-20	Laos	0	0
29	2020-11-20	Lesotho	0	0
30	2020-11-20	Madagascar	0	0
31	2020-11-20	Mali	0	0
32	2020-11-20	Marshall_Islands	0	0
33	2020-11-20	Mauritius	0	0
34	2020-11-20	Mongolia	0	0
35	2020-11-20	Montserrat	0	0
36	2020-11-20	New_Caledonia	0	0
37	2020-11-20	Nicaragua	0	0
38	2020-11-20	Northern_Mariana_Islands	0	0
39	2020-11-20	Papua_New_Guinea	0	0
40	2020-11-20	Russia	0	0
41	2020-11-20	Rwanda	0	0
42	2020-11-20	Saint_Kitts_and_Nevis	0	0
43	2020-11-20	San_Marino	0	0
44	2020-11-20	Sierra_Leone	0	0
45	2020-11-20	Solomon_Islands	0	0
46	2020-11-20	Somalia	0	0
47	2020-11-20	South_Sudan	0	0
48	2020-11-20	Sudan	0	0
49	2020-11-20	Taiwan	0	0
50	2020-11-20	Timor_Leste	0	0
51	2020-11-20	Turks_and_Caicos_islands	0	0
52	2020-11-20	United_Republic_of_Tanzania	0	0
53	2020-11-20	Vanuatu	0	0
54	2020-11-20	Western_Sahara	0	0

Q7: Which are the top 5 countries where the number of cases are still High?

In [18]:

```
high_case_countries = data.sort_values(by="cases", ascending=False)
high_case_countries = high_case_countries.loc[(high_case_countries["date"] =
high_case_countries.head(5)
```

Out[18]:

	date	cases	deaths	countriesAndTerritories	continent
54177	2020-11-20	188020	2018	United_States_of_America	America
24561	2020-11-20	45882	584	India	Asia
26747	2020-11-20	36176	653	Italy	Europe
7343	2020-11-20	35918	606	Brazil	America
41696	2020-11-20	23975	637	Poland	Europe

5.Data Visualization

```
-Visualization with 3 Types of Charts
```

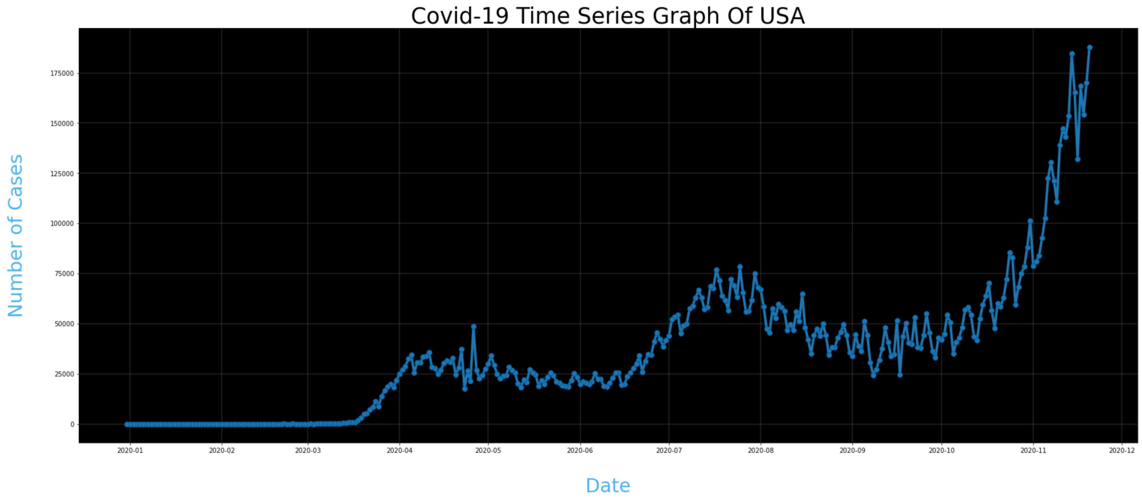
Showing a time series graph for USA

In [19]:

```
#No: of cases over time
us_data = data.loc[data["countriesAndTerritories"] == "United_States_of_Amer
X = us_data.date
Y = us_data.cases

plt.figure(figsize=(30,12))
ax = plt.axes()
ax.grid(linewidth=0.4, color='#8f8f8f')

ax.set_facecolor("black")
ax.set_title("Covid-19 Time Series Graph Of USA", size=35)
ax.set_xlabel('\nDate',size=30,color='#4bb4f2')
ax.set_ylabel('Number of Cases\n',
              size=30,color='#4bb4f2')

ax.plot(X,Y,
        color='#1F77B4',
        marker='o',
        linewidth=4,
        markersize=8,
        markeredgecolor='#035E9B')
```

Out[19]:

```
[<matplotlib.lines.Line2D at 0x21489886ec8>]
```

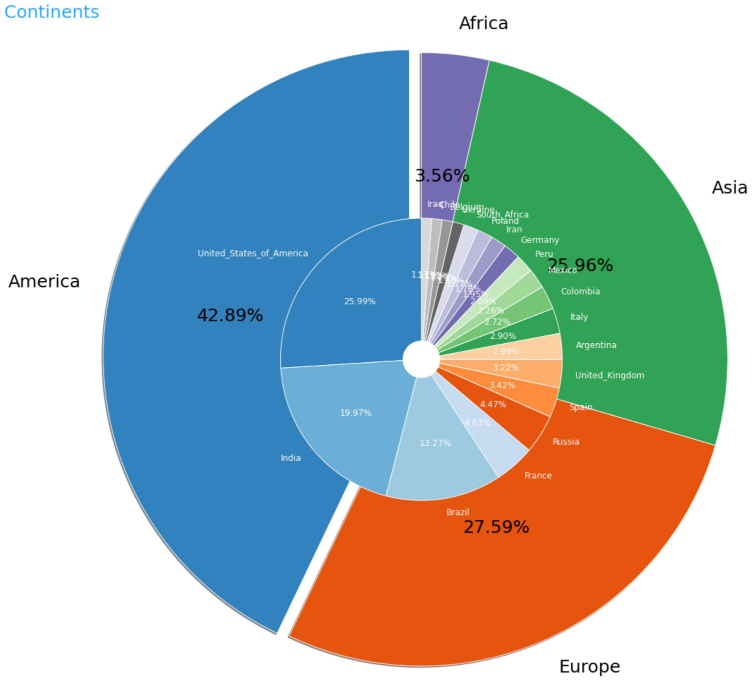


Showing a Pie chart of most high case countries and continents

In [20]:

```
at_most_cases = 500000
#Outer chart shows continents
continent_cases = data.groupby(["continent"]).sum()
continent_cases.sort_values(by="cases", ascending=False, inplace=True)
continent_cases = continent_cases.loc[continent_cases["cases"] > at_most_cas
out_continent_vals = continent_cases.cases
out_continent_names = continent_cases.reset_index()
out_continent_names = out_continent_names.continent

#Inner chart shows countries
country_cases = data.groupby(["countriesAndTerritories"]).sum()
country_cases.sort_values(by="cases", ascending=False, inplace=True)
country_cases = country_cases.loc[country_cases["cases"] > at_most_cases]
inn_country_vals = country_cases.cases
inn_country_names = country_cases.reset_index()
inn_country_names = inn_country_names.countriesAndTerritories

fig, ax = plt.subplots()
size = 2
cmap = plt.get_cmap("tab20c")
outer_colors = cmap(np.arange(4)*4)
inner_colors = cmap(np.arange(20))

ax.set_title('Pie plot for All High Case Countries & Continents', y=2.7, x=
ax.pie(out_continent_vals, radius=5, labels=out_continent_names, colors=oute
       shadow=True, explode=(0.2,0,0,0), autopct='%1.2f%%' , wedgeprops=dict

ax.pie(inn_country_vals, radius=2.3, labels=inn_country_names, colors=inner_
       wedgeprops=dict(width=size, edgecolor='w'), autopct='%1.2f%%', starta
plt.show()
```

Pie plot for All High Case Countries & Continents



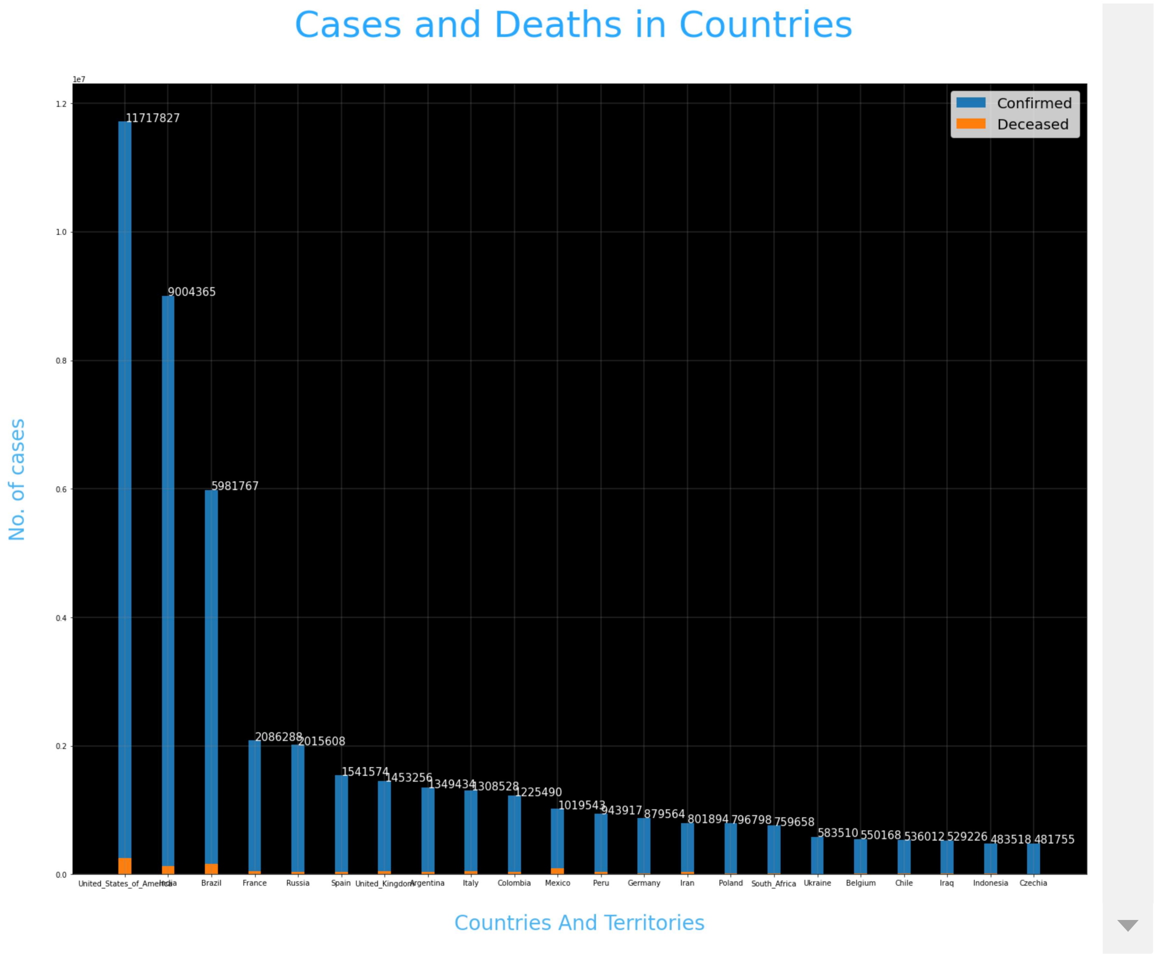
Showing a stacked Bar chart of Countries over no: of cases and deaths

In [66]:

```
country_cases_deaths = data.groupby(["countriesAndTerritories"]).sum()
country_cases_deaths.sort_values(by="cases", ascending=False, inplace=True)
country_cases_deaths = country_cases_deaths.loc[country_cases_deaths["cases'

country_cases = country_cases_deaths.cases.values
country_deaths = country_cases_deaths.deaths.values

country_cases_deaths.reset_index(inplace=True)
X = country_cases_deaths.countriesAndTerritories.values
# X

plt.figure(figsize=(25, 20))
ax= plt.axes()

ax.set_facecolor('black')
ax.grid(linewidth=0.4, color='#8f8f8f')

ax.set_xlabel('\nCountries And Territories', size=28,
              color='#4bb4f2')


ax.set_ylabel('No. of cases\n',size=28,
              color='#4bb4f2')

ax.set_title('Cases and Deaths in Countries \n',
             size=50,color='#28a9ff')

plt.bar(X,country_cases, width=0.3, align="center")
plt.bar(X,country_deaths, width=0.3, align="center")

for i,j in zip(X,country_cases):
    ax.annotate(str(int(j)),
                xy=(i,j+3),
                color='white',
                size='15')

plt.legend(['Confirmed','Deceased'],
           fontsize=20)
```

Out[66]:

```
<matplotlib.legend.Legend at 0x2149e3b45c8>
```



6.Executive Summary

```
-Highlights of all the key findings
-Recommendations and justifications
```

After analyzing the data it was found out that the most covid effected countries are USA, India, Brazil and these countries still have been getting new covid cases as of the datasets latest date. It was also found out that the death percentage in relation to covid cases is relatively low as the most deaths are also in the top 3 effected countries. The Data also shows the coutries which have least to no recorded cases by the latest date, which suggests lots of coutries are surviving out of the covid phase. The charts also describe the overall scenerio of the worldwide covid cases. The data set can also be used to make some other types of analysis for further understanding of the data and can also be visualized in different ways to gather more information. but the overall analysis has proven to be informative.

7.References

1. Dataset Reference = European Centre for Disease Prevention and Control

```
    -link = https://data.europa.eu/euodp/en/data/dataset/covid-
19-coronavirus-data
```