covid-19-vaccination

May 11, 2024

[7]:
```
# This Python 3 environment comes with many helpful analytics libraries␣
 ↪installed
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import plotly.express as px
from plotly.subplots import make_subplots
from datetime import datetime

# Input data files are available in the read-only "../input/" directory
# For example, running this (by clicking run or pressing Shift+Enter) will list␣
 ↪all files under the input directory

import os
for dirname, _, filenames in os.walk('/kaggle/input'):
    for filename in filenames:
        print(os.path.join(dirname, filename))
```

[1]:
```
conda install -c plotly plotly
```

```
Collecting package metadata (current_repodata.json): …working… done
Solving environment: …working… done

# All requested packages already installed.


Note: you may need to restart the kernel to use updated packages.
```

[8]:
```
covid_df = pd.read_csv("covid_19_india.csv")
```

[9]:
```
covid_df.head(10)
```

[9]:

	Sno	Date	Time	State/UnionTerritory	ConfirmedIndianNational	\
0	1	2020-01-30	6:00 PM	Kerala	1	
1	2	2020-01-31	6:00 PM	Kerala	1	
2	3	2020-02-01	6:00 PM	Kerala	2	

```
3    4  2020-02-02  6:00 PM              Kerala                          3
4    5  2020-02-03  6:00 PM              Kerala                          3
5    6  2020-02-04  6:00 PM              Kerala                          3
6    7  2020-02-05  6:00 PM              Kerala                          3
7    8  2020-02-06  6:00 PM              Kerala                          3
8    9  2020-02-07  6:00 PM              Kerala                          3
9   10  2020-02-08  6:00 PM              Kerala                          3

  ConfirmedForeignNational  Cured  Deaths  Confirmed
0                        0      0       0          1
1                        0      0       0          1
2                        0      0       0          2
3                        0      0       0          3
4                        0      0       0          3
5                        0      0       0          3
6                        0      0       0          3
7                        0      0       0          3
8                        0      0       0          3
9                        0      0       0          3
```

[7]:
```
covid_df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 18110 entries, 0 to 18109
Data columns (total 9 columns):
 #   Column                    Non-Null Count  Dtype
---  ------                    --------------  -----
 0   Sno                       18110 non-null  int64
 1   Date                      18110 non-null  object
 2   Time                      18110 non-null  object
 3   State/UnionTerritory      18110 non-null  object
 4   ConfirmedIndianNational   18110 non-null  object
 5   ConfirmedForeignNational  18110 non-null  object
 6   Cured                     18110 non-null  int64
 7   Deaths                    18110 non-null  int64
 8   Confirmed                 18110 non-null  int64
dtypes: int64(4), object(5)
memory usage: 1.2+ MB
```

[8]:
```
covid_df.describe()
```

[8]:
```
                Sno         Cured         Deaths     Confirmed
count  18110.000000  1.811000e+04   18110.000000  1.811000e+04
mean    9055.500000  2.786375e+05    4052.402264  3.010314e+05
std     5228.051023  6.148909e+05   10919.076411  6.561489e+05
min        1.000000  0.000000e+00       0.000000  0.000000e+00
25%     4528.250000  3.360250e+03      32.000000  4.376750e+03
```

```
50%     9055.500000  3.336400e+04     588.000000  3.977350e+04
75%    13582.750000  2.788698e+05    3643.750000  3.001498e+05
max    18110.000000  6.159676e+06  134201.000000  6.363442e+06
```

[10]:
```
vaccine_df = pd.read_csv("covid_vaccine_statewise.csv")
```

[11]:
```
vaccine_df.head(7)
```

[11]:
```
   Updated On  State  Total Doses Administered  Sessions   Sites   \
0  16/01/2021  India                   48276.0    3455.0   2957.0
1  17/01/2021  India                   58604.0    8532.0   4954.0
2  18/01/2021  India                   99449.0   13611.0   6583.0
3  19/01/2021  India                  195525.0   17855.0   7951.0
4  20/01/2021  India                  251280.0   25472.0  10504.0
5  21/01/2021  India                  365965.0   32226.0  12600.0
6  22/01/2021  India                  549381.0   36988.0  14115.0

   First Dose Administered  Second Dose Administered  \
0                  48276.0                       0.0
1                  58604.0                       0.0
2                  99449.0                       0.0
3                 195525.0                       0.0
4                 251280.0                       0.0
5                 365965.0                       0.0
6                 549381.0                       0.0

   Male (Doses Administered)  Female (Doses Administered)  \
0                        NaN                          NaN
1                        NaN                          NaN
2                        NaN                          NaN
3                        NaN                          NaN
4                        NaN                          NaN
5                        NaN                          NaN
6                        NaN                          NaN

   Transgender (Doses Administered)  …  18-44 Years (Doses Administered)  \
0                               NaN  …                               NaN
1                               NaN  …                               NaN
2                               NaN  …                               NaN
3                               NaN  …                               NaN
4                               NaN  …                               NaN
5                               NaN  …                               NaN
6                               NaN  …                               NaN

   45-60 Years (Doses Administered)  60+ Years (Doses Administered)  \
0                               NaN                            NaN
1                               NaN                            NaN
```

```
2                                NaN                                NaN
3                                NaN                                NaN
4                                NaN                                NaN
5                                NaN                                NaN
6                                NaN                                NaN

   18-44 Years(Individuals Vaccinated)  45-60 Years(Individuals Vaccinated)  \
0                                  NaN                                  NaN
1                                  NaN                                  NaN
2                                  NaN                                  NaN
3                                  NaN                                  NaN
4                                  NaN                                  NaN
5                                  NaN                                  NaN
6                                  NaN                                  NaN

   60+ Years(Individuals Vaccinated)  Male(Individuals Vaccinated)  \
0                                NaN                       23757.0
1                                NaN                       27348.0
2                                NaN                       41361.0
3                                NaN                       81901.0
4                                NaN                       98111.0
5                                NaN                      132784.0
6                                NaN                      193899.0

   Female(Individuals Vaccinated)  Transgender(Individuals Vaccinated)  \
0                         24517.0                                  2.0
1                         31252.0                                  4.0
2                         58083.0                                  5.0
3                        113613.0                                 11.0
4                        153145.0                                 24.0
5                        233143.0                                 38.0
6                        355402.0                                 80.0

   Total Individuals Vaccinated
0                       48276.0
1                       58604.0
2                       99449.0
3                      195525.0
4                      251280.0
5                      365965.0
6                      549381.0

[7 rows x 24 columns]
```

[12]:
```
vaccine_df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
```

```
RangeIndex: 7845 entries, 0 to 7844
Data columns (total 24 columns):
 #   Column                                Non-Null Count  Dtype
---  ------                                --------------  -----
 0   Updated On                            7845 non-null   object
 1   State                                 7845 non-null   object
 2   Total Doses Administered              7621 non-null   float64
 3   Sessions                              7621 non-null   float64
 4    Sites                                7621 non-null   float64
 5   First Dose Administered               7621 non-null   float64
 6   Second Dose Administered              7621 non-null   float64
 7   Male (Doses Administered)             7461 non-null   float64
 8   Female (Doses Administered)           7461 non-null   float64
 9   Transgender (Doses Administered)      7461 non-null   float64
 10   Covaxin (Doses Administered)         7621 non-null   float64
 11  CoviShield (Doses Administered)       7621 non-null   float64
 12  Sputnik V (Doses Administered)        2995 non-null   float64
 13  AEFI                                  5438 non-null   float64
 14  18-44 Years (Doses Administered)      1702 non-null   float64
 15  45-60 Years (Doses Administered)      1702 non-null   float64
 16  60+ Years (Doses Administered)        1702 non-null   float64
 17  18-44 Years(Individuals Vaccinated)   3733 non-null   float64
 18  45-60 Years(Individuals Vaccinated)   3734 non-null   float64
 19  60+ Years(Individuals Vaccinated)     3734 non-null   float64
 20  Male(Individuals Vaccinated)          160 non-null    float64
 21  Female(Individuals Vaccinated)        160 non-null    float64
 22  Transgender(Individuals Vaccinated)   160 non-null    float64
 23  Total Individuals Vaccinated          5919 non-null   float64
dtypes: float64(22), object(2)
memory usage: 1.4+ MB
```

[13]:
```
covid_df.drop(["Sno","Time","ConfirmedIndianNational",␣
 ↪"ConfirmedForeignNational"],inplace=True, axis=1)
```

[14]:
```
covid_df.head(7)
```

[14]:

	Date	State/UnionTerritory	Cured	Deaths	Confirmed
0	2020-01-30	Kerala	0	0	1
1	2020-01-31	Kerala	0	0	1
2	2020-02-01	Kerala	0	0	2
3	2020-02-02	Kerala	0	0	3
4	2020-02-03	Kerala	0	0	3
5	2020-02-04	Kerala	0	0	3
6	2020-02-05	Kerala	0	0	3

[15]:
```
covid_df['Date'] = pd.to_datetime(covid_df['Date'], format='%Y-%m-%d')
```

[16]:
```
covid_df.head()
```

[16]:

	Date	State/UnionTerritory	Cured	Deaths	Confirmed
0	2020-01-30	Kerala	0	0	1
1	2020-01-31	Kerala	0	0	1
2	2020-02-01	Kerala	0	0	2
3	2020-02-02	Kerala	0	0	3
4	2020-02-03	Kerala	0	0	3

[17]:
```
covid_df['Active_Cases']=covid_df['Confirmed']-(covid_df['Cured']-covid_df['Deaths'])
covid_df.tail()
```

[17]:

	Date	State/UnionTerritory	Cured	Deaths	Confirmed	Active_Cases
18105	2021-08-11	Telangana	638410	3831	650353	15774
18106	2021-08-11	Tripura	77811	773	80660	3622
18107	2021-08-11	Uttarakhand	334650	7368	342462	15180
18108	2021-08-11	Uttar Pradesh	1685492	22775	1708812	46095
18109	2021-08-11	West Bengal	1506532	18252	1534999	46719

[18]:
```
statewise = pd.pivot_table(covid_df,␣
↪values=['Confirmed','Deaths','Cured'],index= 'State/UnionTerritory' ,␣
↪aggfunc = max)
```

[19]:
```
statewise['Recovery Rate'] = statewise ['Cured']*100/ statewise['Confirmed']
```

[20]:
```
statewise['Mortality Rate'] = statewise ['Deaths']*100/ statewise['Confirmed']
```

[21]:
```
statewise = statewise.sort_values( by = 'Confirmed', ascending = False)
```

[22]:
```
statewise.style.background_gradient(cmap="cubehelix")
```

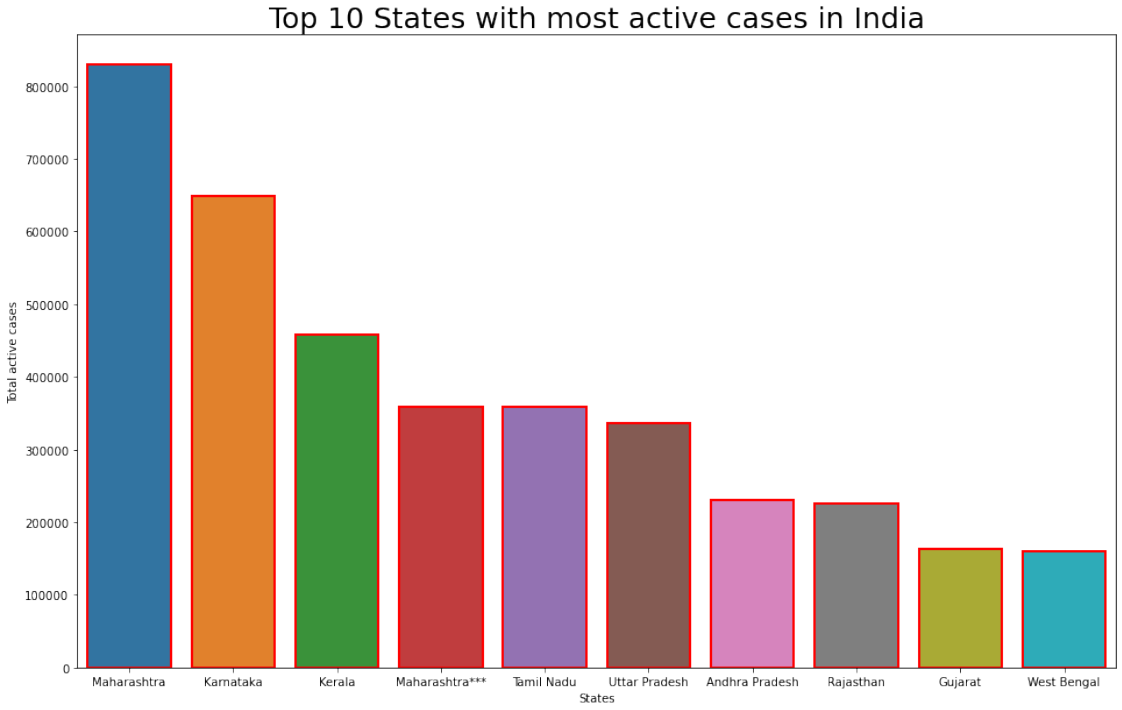
[22]:
```
<pandas.io.formats.style.Styler at 0x22dd2582610>
```

[23]:
```
#Top 10 active cases state
Top_10_active_cases = covid_df.groupby(by = 'State/UnionTerritory').
↪max()[['Active_Cases','Date']].sort_values(by ='Active_Cases', ascending=␣
↪False).reset_index()
```

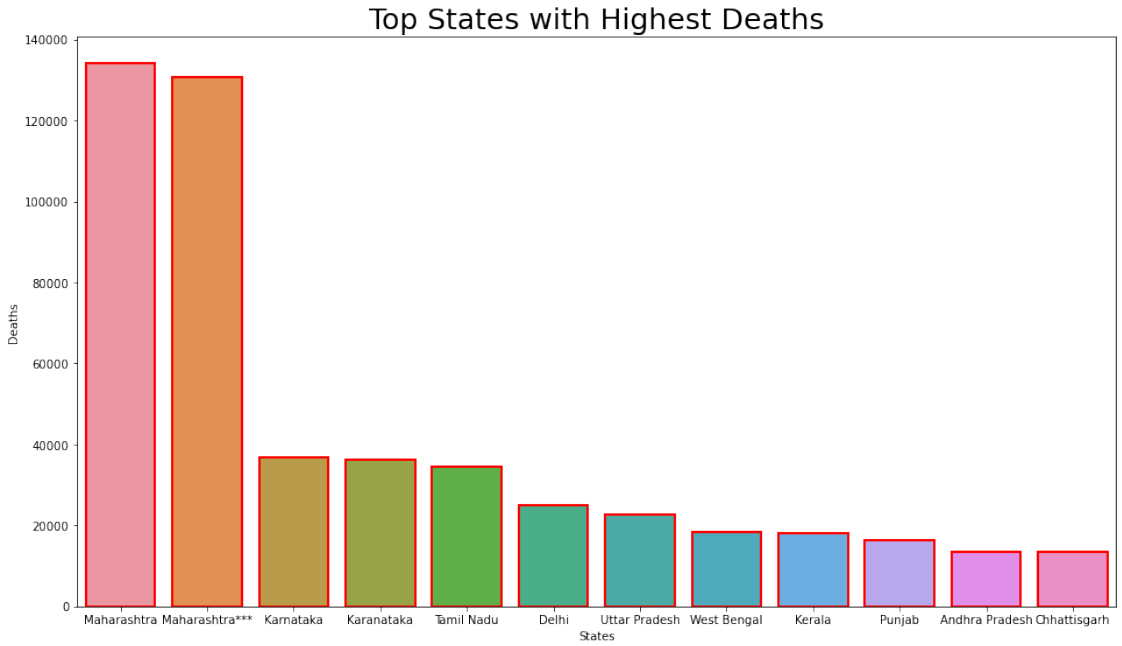
[28]:
```
fig = plt.figure(figsize=(16,10))
```

```
<Figure size 1152x720 with 0 Axes>
```

[27]:
```
Top_10_active_cases = covid_df.groupby(by = 'State/UnionTerritory').
 ↪max()[['Active_Cases','Date']].sort_values(by ='Active_Cases', ascending=␣
 ↪False).reset_index()
fig = plt.figure(figsize=(16,10))
plt.title("Top 10 States with most active cases in India",size =25)
ax= sns.barplot(data = Top_10_active_cases.iloc[:10],y =␣
 ↪'Active_Cases',x='State/UnionTerritory', linewidth=2, edgecolor='red')

plt.xlabel("States")
plt.ylabel("Total active cases")
plt.show()
```

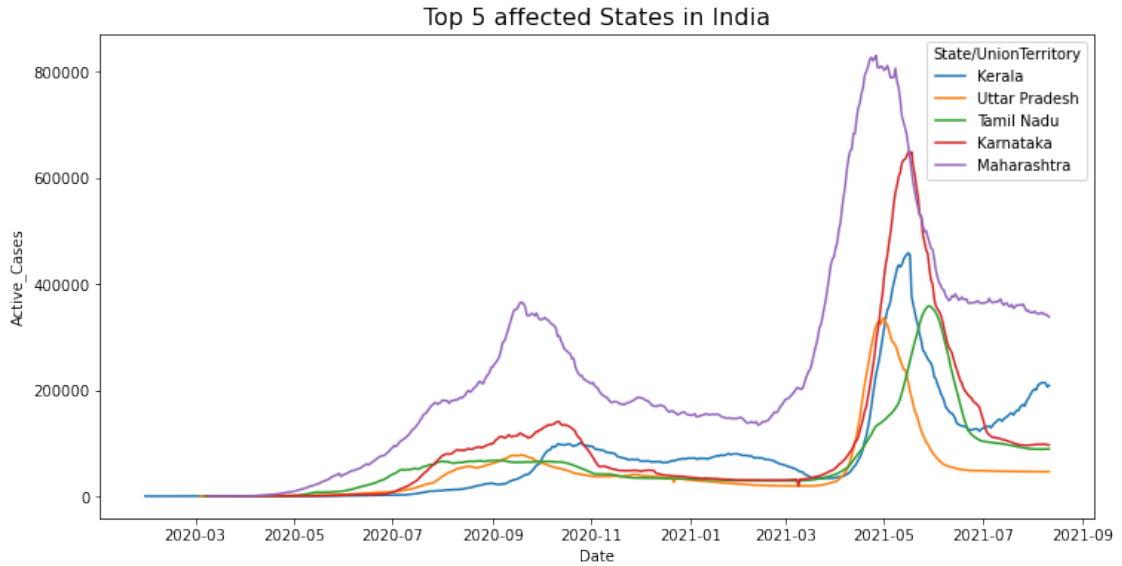


[29]:
```
Top_10_highest_deaths= covid_df.groupby(by = 'State/UnionTerritory').
 ↪max()[['Deaths','Date']].sort_values(by ='Deaths', ascending = False).
 ↪reset_index()
fig = plt.figure(figsize=(16,9))
plt.title("Top States with Highest Deaths", size=25)
ax= sns.barplot(data = Top_10_highest_deaths.iloc[:12], x='State/
 ↪UnionTerritory',y='Deaths',linewidth=2, edgecolor='red')
plt.xlabel('States')
plt.ylabel('Deaths')
plt.show()
```



[30]:
```
fig= plt.figure(figsize=(12,6))
ax = sns.lineplot(data= covid_df[covid_df['State/UnionTerritory'].
  ↪isin(['Maharashtra','Karnataka','Kerala', 'Tamil Nadu', 'Uttar Pradesh'])],␣
  ↪x='Date', y='Active_Cases',hue='State/UnionTerritory')
ax.set_title("Top 5 affected States in India", size=16)
```

[30]: Text(0.5, 1.0, 'Top 5 affected States in India')



[31]:
```
vaccine_df.head()
```

[31]:

	Updated On	State	Total Doses Administered	Sessions	Sites	First Dose Administered	Second Dose Administered	Male (Doses Administered)	Female (Doses Administered)	Transgender (Doses Administered)	…	18-44 Years (Doses Administered)	45-60 Years (Doses Administered)	60+ Years (Doses Administered)	18-44 Years(Individuals Vaccinated)	45-60 Years(Individuals Vaccinated)	60+ Years(Individuals Vaccinated)	Male(Individuals Vaccinated)
0	16/01/2021	India	48276.0	3455.0	2957.0	48276.0	0.0	NaN	NaN	NaN	…	NaN	NaN	NaN	NaN	NaN	NaN	23757.0
1	17/01/2021	India	58604.0	8532.0	4954.0	58604.0	0.0	NaN	NaN	NaN	…	NaN	NaN	NaN	NaN	NaN	NaN	27348.0
2	18/01/2021	India	99449.0	13611.0	6583.0	99449.0	0.0	NaN	NaN	NaN	…	NaN	NaN	NaN	NaN	NaN	NaN	
3	19/01/2021	India	195525.0	17855.0	7951.0	195525.0	0.0	NaN	NaN	NaN	…	NaN	NaN	NaN	NaN	NaN	NaN	
4	20/01/2021	India	251280.0	25472.0	10504.0	251280.0	0.0	NaN	NaN	NaN	…	NaN	NaN	NaN	NaN	NaN	NaN	

```
2                                NaN                         41361.0
3                                NaN                         81901.0
4                                NaN                         98111.0

   Female(Individuals Vaccinated)  Transgender(Individuals Vaccinated)  \
0                         24517.0                                  2.0
1                         31252.0                                  4.0
2                         58083.0                                  5.0
3                        113613.0                                 11.0
4                        153145.0                                 24.0

   Total Individuals Vaccinated
0                       48276.0
1                       58604.0
2                       99449.0
3                      195525.0
4                      251280.0

[5 rows x 24 columns]
```

[15]:
```
vaccine_df.rename(columns={'Updated On':'Vaccine_date'},inplace=True)
```

[33]:
```
vaccine_df.head(8)
```

[33]:
```
  Vaccine_date  State  Total Doses Administered  Sessions   Sites   \
0   16/01/2021  India                   48276.0    3455.0   2957.0
1   17/01/2021  India                   58604.0    8532.0   4954.0
2   18/01/2021  India                   99449.0   13611.0   6583.0
3   19/01/2021  India                  195525.0   17855.0   7951.0
4   20/01/2021  India                  251280.0   25472.0  10504.0
5   21/01/2021  India                  365965.0   32226.0  12600.0
6   22/01/2021  India                  549381.0   36988.0  14115.0
7   23/01/2021  India                  759008.0   43076.0  15605.0

   First Dose Administered  Second Dose Administered  \
0                  48276.0                       0.0
1                  58604.0                       0.0
2                  99449.0                       0.0
3                 195525.0                       0.0
4                 251280.0                       0.0
5                 365965.0                       0.0
6                 549381.0                       0.0
7                 759008.0                       0.0

   Male (Doses Administered)  Female (Doses Administered)  \
0                        NaN                          NaN
1                        NaN                          NaN
```

```
2                        NaN                          NaN
3                        NaN                          NaN
4                        NaN                          NaN
5                        NaN                          NaN
6                        NaN                          NaN
7                        NaN                          NaN

   Transgender (Doses Administered)  …  18-44 Years (Doses Administered)  \
0                               NaN  …                               NaN
1                               NaN  …                               NaN
2                               NaN  …                               NaN
3                               NaN  …                               NaN
4                               NaN  …                               NaN
5                               NaN  …                               NaN
6                               NaN  …                               NaN
7                               NaN  …                               NaN

   45-60 Years (Doses Administered)  60+ Years (Doses Administered)  \
0                               NaN                            NaN
1                               NaN                            NaN
2                               NaN                            NaN
3                               NaN                            NaN
4                               NaN                            NaN
5                               NaN                            NaN
6                               NaN                            NaN
7                               NaN                            NaN

   18-44 Years(Individuals Vaccinated)  45-60 Years(Individuals Vaccinated)  \
0                                  NaN                                  NaN
1                                  NaN                                  NaN
2                                  NaN                                  NaN
3                                  NaN                                  NaN
4                                  NaN                                  NaN
5                                  NaN                                  NaN
6                                  NaN                                  NaN
7                                  NaN                                  NaN

   60+ Years(Individuals Vaccinated)  Male(Individuals Vaccinated)  \
0                                NaN                       23757.0
1                                NaN                       27348.0
2                                NaN                       41361.0
3                                NaN                       81901.0
4                                NaN                       98111.0
5                                NaN                      132784.0
6                                NaN                      193899.0
7                                NaN                      267856.0
```

```
   Female(Individuals Vaccinated)  Transgender(Individuals Vaccinated)  \
0                         24517.0                                  2.0
1                         31252.0                                  4.0
2                         58083.0                                  5.0
3                        113613.0                                 11.0
4                        153145.0                                 24.0
5                        233143.0                                 38.0
6                        355402.0                                 80.0
7                        491049.0                                103.0

   Total Individuals Vaccinated
0                        48276.0
1                        58604.0
2                        99449.0
3                       195525.0
4                       251280.0
5                       365965.0
6                       549381.0
7                       759008.0

[8 rows x 24 columns]
```

[34]:
```
vaccine_df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 7845 entries, 0 to 7844
Data columns (total 24 columns):
 #   Column                                Non-Null Count  Dtype
---  ------                                --------------  -----
 0   Vaccine_date                          7845 non-null   object
 1   State                                 7845 non-null   object
 2   Total Doses Administered              7621 non-null   float64
 3   Sessions                              7621 non-null   float64
 4    Sites                                7621 non-null   float64
 5   First Dose Administered               7621 non-null   float64
 6   Second Dose Administered              7621 non-null   float64
 7   Male (Doses Administered)             7461 non-null   float64
 8   Female (Doses Administered)           7461 non-null   float64
 9   Transgender (Doses Administered)      7461 non-null   float64
 10   Covaxin (Doses Administered)         7621 non-null   float64
 11  CoviShield (Doses Administered)       7621 non-null   float64
 12  Sputnik V (Doses Administered)        2995 non-null   float64
 13  AEFI                                  5438 non-null   float64
 14  18-44 Years (Doses Administered)      1702 non-null   float64
 15  45-60 Years (Doses Administered)      1702 non-null   float64
 16  60+ Years (Doses Administered)        1702 non-null   float64
 17  18-44 Years(Individuals Vaccinated)   3733 non-null   float64
```

```
 18  45-60 Years(Individuals Vaccinated)  3734 non-null   float64
 19  60+ Years(Individuals Vaccinated)    3734 non-null   float64
 20  Male(Individuals Vaccinated)         160 non-null    float64
 21  Female(Individuals Vaccinated)       160 non-null    float64
 22  Transgender(Individuals Vaccinated)  160 non-null    float64
 23  Total Individuals Vaccinated         5919 non-null   float64
dtypes: float64(22), object(2)
memory usage: 1.4+ MB
```

[35]:
```
vaccine_df.isnull().sum()
```

[35]:
```
Vaccine_date                           0
State                                  0
Total Doses Administered             224
Sessions                             224
 Sites                               224
First Dose Administered              224
Second Dose Administered             224
Male (Doses Administered)            384
Female (Doses Administered)          384
Transgender (Doses Administered)     384
 Covaxin (Doses Administered)        224
CoviShield (Doses Administered)      224
Sputnik V (Doses Administered)      4850
AEFI                                2407
18-44 Years (Doses Administered)    6143
45-60 Years (Doses Administered)    6143
60+ Years (Doses Administered)      6143
18-44 Years(Individuals Vaccinated) 4112
45-60 Years(Individuals Vaccinated) 4111
60+ Years(Individuals Vaccinated)   4111
Male(Individuals Vaccinated)        7685
Female(Individuals Vaccinated)      7685
Transgender(Individuals Vaccinated) 7685
Total Individuals Vaccinated        1926
dtype: int64
```

[12]:
```
vaccination = vaccine_df.drop(columns=['Sputnik V (Doses Administered)',␣
↪'AEFI','18-44 Years (Doses Administered)','45-60 Years (Doses␣
↪Administered)','60+ Years (Doses Administered)'], axis=1)
```

[13]:
```
vaccination.head()
```

[13]:
```
   Updated On  State  Total Doses Administered  Sessions   Sites   \
0  16/01/2021  India                   48276.0    3455.0   2957.0
1  17/01/2021  India                   58604.0    8532.0   4954.0
2  18/01/2021  India                   99449.0   13611.0   6583.0
```

```
3  19/01/2021  India                 195525.0   17855.0   7951.0
4  20/01/2021  India                 251280.0   25472.0  10504.0

   First Dose Administered  Second Dose Administered  \
0                  48276.0                       0.0
1                  58604.0                       0.0
2                  99449.0                       0.0
3                 195525.0                       0.0
4                 251280.0                       0.0

   Male (Doses Administered)  Female (Doses Administered)  \
0                        NaN                          NaN
1                        NaN                          NaN
2                        NaN                          NaN
3                        NaN                          NaN
4                        NaN                          NaN

   Transgender (Doses Administered)   Covaxin (Doses Administered)  \
0                               NaN                         579.0
1                               NaN                         635.0
2                               NaN                        1299.0
3                               NaN                        3017.0
4                               NaN                        3946.0

   CoviShield (Doses Administered)  18-44 Years(Individuals Vaccinated)  \
0                          47697.0                                  NaN
1                          57969.0                                  NaN
2                          98150.0                                  NaN
3                         192508.0                                  NaN
4                         247334.0                                  NaN

   45-60 Years(Individuals Vaccinated)  60+ Years(Individuals Vaccinated)  \
0                                  NaN                                NaN
1                                  NaN                                NaN
2                                  NaN                                NaN
3                                  NaN                                NaN
4                                  NaN                                NaN

   Male(Individuals Vaccinated)  Female(Individuals Vaccinated)  \
0                       23757.0                         24517.0
1                       27348.0                         31252.0
2                       41361.0                         58083.0
3                       81901.0                        113613.0
4                       98111.0                        153145.0

   Transgender(Individuals Vaccinated)  Total Individuals Vaccinated
0                                  2.0                       48276.0
```

```
1                                4.0                          58604.0
2                                5.0                          99449.0
3                               11.0                         195525.0
4                               24.0                         251280.0
```

[14]:
```
male=vaccination["Male(Individuals Vaccinated)"].sum()
female=vaccination["Female(Individuals Vaccinated)"].sum()
px.pie(names=["Male","Female"], values=[male,female],title="Male and Female␣
 ↪Vaccination")
```

[39]:
```
vaccine = vaccine_df[vaccine_df.State!='India']
vaccine
```

[39]:
```
     Vaccine_date                          State  Total Doses Administered  \
212    16/01/2021  Andaman and Nicobar Islands                      23.0
213    17/01/2021  Andaman and Nicobar Islands                      23.0
214    18/01/2021  Andaman and Nicobar Islands                      42.0
215    19/01/2021  Andaman and Nicobar Islands                      89.0
216    20/01/2021  Andaman and Nicobar Islands                     124.0
…             …                            …                        …
7840   11/08/2021                  West Bengal                       NaN
7841   12/08/2021                  West Bengal                       NaN
7842   13/08/2021                  West Bengal                       NaN
7843   14/08/2021                  West Bengal                       NaN
7844   15/08/2021                  West Bengal                       NaN

      Sessions   Sites   First Dose Administered  Second Dose Administered  \
212        2.0      2.0                     23.0                       0.0
213        2.0      2.0                     23.0                       0.0
214        9.0      2.0                     42.0                       0.0
215       12.0      2.0                     89.0                       0.0
216       16.0      3.0                    124.0                       0.0
…          …        …                        …                         …
7840       NaN      NaN                      NaN                       NaN
7841       NaN      NaN                      NaN                       NaN
7842       NaN      NaN                      NaN                       NaN
7843       NaN      NaN                      NaN                       NaN
7844       NaN      NaN                      NaN                       NaN

      Male (Doses Administered)  Female (Doses Administered)  \
212                        12.0                         11.0
213                        12.0                         11.0
214                        29.0                         13.0
215                        53.0                         36.0
216                        67.0                         57.0
…                             …                            …
7840                       NaN                          NaN
```

```
7841                        NaN                          NaN
7842                        NaN                          NaN
7843                        NaN                          NaN
7844                        NaN                          NaN

      Transgender (Doses Administered)  …  18-44 Years (Doses Administered)  \
212                                0.0  …                                NaN
213                                0.0  …                                NaN
214                                0.0  …                                NaN
215                                0.0  …                                NaN
216                                0.0  …                                NaN
…                                  …  …                                  …
7840                               NaN  …                                NaN
7841                               NaN  …                                NaN
7842                               NaN  …                                NaN
7843                               NaN  …                                NaN
7844                               NaN  …                                NaN

      45-60 Years (Doses Administered)  60+ Years (Doses Administered)  \
212                                NaN                              NaN
213                                NaN                              NaN
214                                NaN                              NaN
215                                NaN                              NaN
216                                NaN                              NaN
…                                  …                                …
7840                               NaN                              NaN
7841                               NaN                              NaN
7842                               NaN                              NaN
7843                               NaN                              NaN
7844                               NaN                              NaN

      18-44 Years(Individuals Vaccinated)  \
212                                   NaN
213                                   NaN
214                                   NaN
215                                   NaN
216                                   NaN
…                                     …
7840                                  NaN
7841                                  NaN
7842                                  NaN
7843                                  NaN
7844                                  NaN

      45-60 Years(Individuals Vaccinated)  60+ Years(Individuals Vaccinated)  \
212                                   NaN                                NaN
213                                   NaN                                NaN
```

```
214                                  NaN                                  NaN
215                                  NaN                                  NaN
216                                  NaN                                  NaN
…                                    …                                    …
7840                                 NaN                                  NaN
7841                                 NaN                                  NaN
7842                                 NaN                                  NaN
7843                                 NaN                                  NaN
7844                                 NaN                                  NaN

      Male(Individuals Vaccinated)  Female(Individuals Vaccinated)  \
212                            NaN                            NaN
213                            NaN                            NaN
214                            NaN                            NaN
215                            NaN                            NaN
216                            NaN                            NaN
…                              …                              …
7840                           NaN                            NaN
7841                           NaN                            NaN
7842                           NaN                            NaN
7843                           NaN                            NaN
7844                           NaN                            NaN

      Transgender(Individuals Vaccinated)  Total Individuals Vaccinated
212                                   NaN                          23.0
213                                   NaN                          23.0
214                                   NaN                          42.0
215                                   NaN                          89.0
216                                   NaN                         124.0
…                                     …                           …
7840                                  NaN                          NaN
7841                                  NaN                          NaN
7842                                  NaN                          NaN
7843                                  NaN                          NaN
7844                                  NaN                          NaN

[7633 rows x 24 columns]
```

[41]:
```
vaccine.rename(columns={'Total Individuals Vaccinated':'Total'})
vaccine.head()
```

[41]:
```
    Vaccine_date                        State  Total Doses Administered  \
212   16/01/2021  Andaman and Nicobar Islands                      23.0
213   17/01/2021  Andaman and Nicobar Islands                      23.0
214   18/01/2021  Andaman and Nicobar Islands                      42.0
215   19/01/2021  Andaman and Nicobar Islands                      89.0
216   20/01/2021  Andaman and Nicobar Islands                     124.0
```

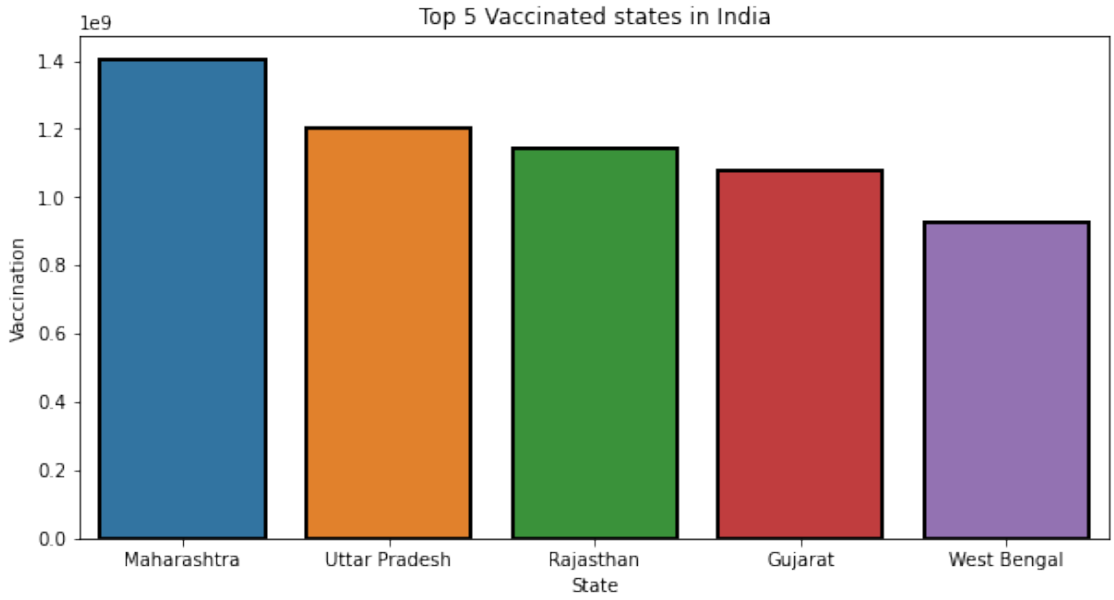
```
     Sessions   Sites   First Dose Administered  Second Dose Administered  \
212       2.0      2.0                     23.0                       0.0
213       2.0      2.0                     23.0                       0.0
214       9.0      2.0                     42.0                       0.0
215      12.0      2.0                     89.0                       0.0
216      16.0      3.0                    124.0                       0.0

     Male (Doses Administered)  Female (Doses Administered)  \
212                       12.0                         11.0
213                       12.0                         11.0
214                       29.0                         13.0
215                       53.0                         36.0
216                       67.0                         57.0

     Transgender (Doses Administered)  …  18-44 Years (Doses Administered)  \
212                               0.0  …                               NaN
213                               0.0  …                               NaN
214                               0.0  …                               NaN
215                               0.0  …                               NaN
216                               0.0  …                               NaN

     45-60 Years (Doses Administered)  60+ Years (Doses Administered)  \
212                               NaN                             NaN
213                               NaN                             NaN
214                               NaN                             NaN
215                               NaN                             NaN
216                               NaN                             NaN

     18-44 Years(Individuals Vaccinated)  45-60 Years(Individuals Vaccinated)  \
212                                  NaN                                  NaN
213                                  NaN                                  NaN
214                                  NaN                                  NaN
215                                  NaN                                  NaN
216                                  NaN                                  NaN

     60+ Years(Individuals Vaccinated)  Male(Individuals Vaccinated)  \
212                                NaN                           NaN
213                                NaN                           NaN
214                                NaN                           NaN
215                                NaN                           NaN
216                                NaN                           NaN

     Female(Individuals Vaccinated)  Transgender(Individuals Vaccinated)  \
212                             NaN                                  NaN
213                             NaN                                  NaN
214                             NaN                                  NaN
```

```
215                              NaN                                  NaN
216                              NaN                                  NaN

     Total
212   23.0
213   23.0
214   42.0
215   89.0
216  124.0

[5 rows x 24 columns]
```

[42]:
```
max_vac=vaccine.groupby('State')['Total'].sum().to_frame('Total')
max_vac=max_vac.sort_values('Total', ascending=False)[:5]
max_vac
```

[42]:
```
                      Total
State
Maharashtra    1.403075e+09
Uttar Pradesh  1.200575e+09
Rajasthan      1.141163e+09
Gujarat        1.078261e+09
West Bengal    9.250227e+08
```

[43]:
```
fig=plt.figure(figsize=(10,5))
plt.title("Top 5 Vaccinated states in India", size=12)

x = sns.barplot(data= max_vac.iloc[:10],x=max_vac.index ,y=max_vac.
 ↪Total,linewidth=2,edgecolor='black')
plt.xlabel('State')
plt.ylabel('Vaccination')
plt.show()
```

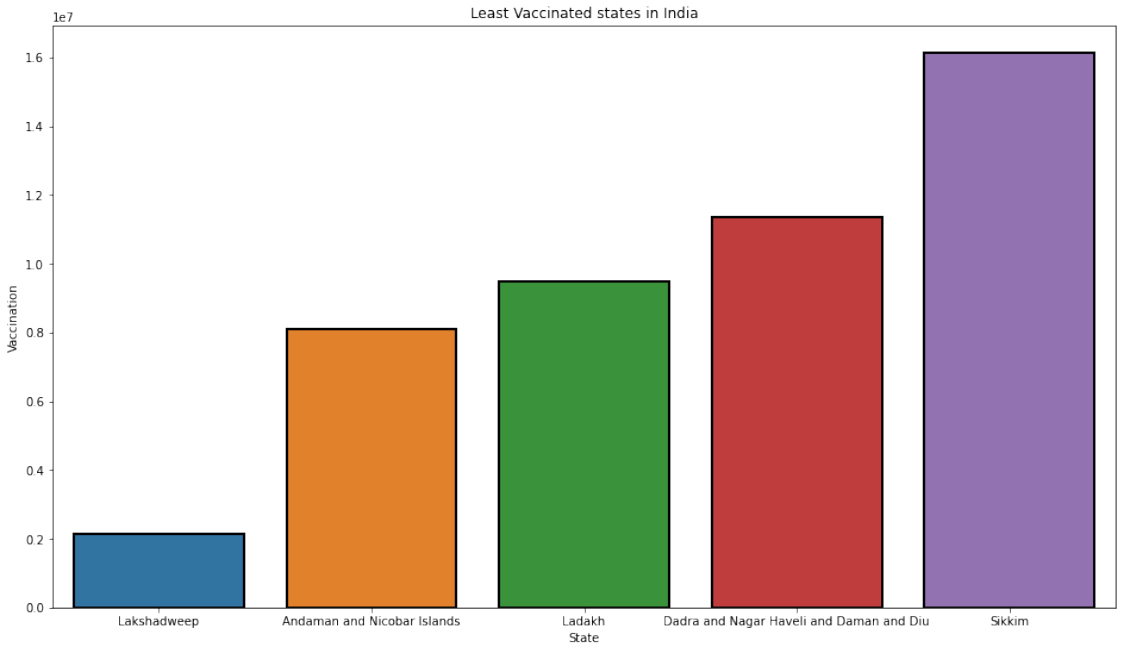


[44]:
```
min_vax=vaccine.groupby('State')['Total'].sum().to_frame('Total')
min_vax=min_vax.sort_values('Total',ascending=True)[:5]
min_vax
```

[44]:

State	Total
Lakshadweep	2124715.0
Andaman and Nicobar Islands	8102125.0
Ladakh	9466289.0
Dadra and Nagar Haveli and Daman and Diu	11358600.0
Sikkim	16136752.0

[45]:
```
fig=plt.figure(figsize=(16,9))
plt.title("Least Vaccinated states in India", size=12)

x=sns.barplot(data=min_vax.iloc[:10], x= min_vax.index,y=min_vax.Total ,␣
 ↪linewidth=2,edgecolor='black')
plt.xlabel('State')
plt.ylabel('Vaccination')
plt.show()
```


Least Vaccinated states in India
1e7
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
Vaccination
Lakshadweep
Andaman and Nicobar Islands
Ladakh
Dadra and Nagar Haveli and Daman and Diu
Sikkim
State

[ ]: