Stage2_Task2_Deaths

March 14, 2023

0.1 Compare the data against 3 other states. Normalize by population, use a normalization factor which is able to identify deaths, for example try per 10,000 or 100,000 (this depends on the population). Plot the values across the weeks in a line plot for the 3 states in a single graph. Describe why the rates differ across these states in the notebook. Identify the peaks, are they consistent with the US pattern?

[1]:
```
import pandas as pd
import numpy as np
import statistics
import matplotlib.pyplot as plt
```

[2]:
```
#I have selected the Albama state for analysis
selected_state_AL = "AL"
selected_state_NJ = "NJ"
selected_state_MD = "MD"
selected_state_NC = "NC"
#Reading the deaths data
deaths = pd.read_csv("../data/covid_deaths_usafacts.csv")
deaths.head()
```

[2]:

	countyFIPS	County Name	State	StateFIPS	2020-01-22	2020-01-23	\
0	0	Statewide Unallocated	AL	1	0	0	
1	1001	Autauga County	AL	1	0	0	
2	1003	Baldwin County	AL	1	0	0	
3	1005	Barbour County	AL	1	0	0	
4	1007	Bibb County	AL	1	0	0	

	2020-01-24	2020-01-25	2020-01-26	2020-01-27	…	2023-01-07	\
0	0	0	0	0	…	0	
1	0	0	0	0	…	230	
2	0	0	0	0	…	719	
3	0	0	0	0	…	103	
4	0	0	0	0	…	108	

	2023-01-08	2023-01-09	2023-01-10	2023-01-11	2023-01-12	2023-01-13	\
0	0	0	0	0	0	0	
1	230	230	230	230	230	230	

```
2         719         719         719         719         721         721
3         103         103         103         103         103         103
4         108         108         108         108         108         108

   2023-01-14  2023-01-15  2023-01-16
0           0           0           0
1         230         230         230
2         721         721         721
3         103         103         103
4         108         108         108

[5 rows x 1095 columns]
```

[3]:
```
# using the melt function so that we get the all the dates in one column and merging will be easy with enrichment data.
deaths_transpose = pd.melt(frame= deaths, id_vars=('countyFIPS','County Name','State','StateFIPS'), var_name=["Date"], value_name='Number of Deaths')
deaths_transpose = deaths_transpose[deaths_transpose['countyFIPS'] != 0]
deaths_transpose.head()
```

[3]:

	countyFIPS	County Name	State	StateFIPS	Date	Number of Deaths
1	1001	Autauga County	AL	1	2020-01-22	0
2	1003	Baldwin County	AL	1	2020-01-22	0
3	1005	Barbour County	AL	1	2020-01-22	0
4	1007	Bibb County	AL	1	2020-01-22	0
5	1009	Blount County	AL	1	2020-01-22	0

[4]:
```
deaths_selected_state = deaths_transpose[deaths_transpose["State"] ==selected_state_AL]
deaths_selected_state.head()
```

[4]:

	countyFIPS	County Name	State	StateFIPS	Date	Number of Deaths
1	1001	Autauga County	AL	1	2020-01-22	0
2	1003	Baldwin County	AL	1	2020-01-22	0
3	1005	Barbour County	AL	1	2020-01-22	0
4	1007	Bibb County	AL	1	2020-01-22	0
5	1009	Blount County	AL	1	2020-01-22	0

[5]:
```
#For the selected state Albama summing the deaths per day of all the counties.
deaths_selected_state_daily = deaths_selected_state.groupby('Date')['Number of Deaths'].sum()
deaths_selected_state_daily.head()
```

[5]:
```
Date
2020-01-22    0
2020-01-23    0
2020-01-24    0
```

```
2020-01-25    0
2020-01-26    0
Name: Number of Deaths, dtype: int64
```

[6]:
```
#Finding out the new deaths per day.
new_deaths_selected_state_daily = deaths_selected_state_daily.diff().
 ↪reset_index()
new_deaths_selected_state_daily.head()
```

[6]:

	Date	Number of Deaths
0	2020-01-22	NaN
1	2020-01-23	0.0
2	2020-01-24	0.0
3	2020-01-25	0.0
4	2020-01-26	0.0

[7]:
```
#Converting the daily to weekly analysis and finding the mean weekly.
weekly_deaths_mean_selected_state = new_deaths_selected_state_daily.copy()
weekly_deaths_mean_selected_state['Date'] = pd.
 ↪to_datetime(weekly_deaths_mean_selected_state['Date']) - pd.to_timedelta(7,␣
 ↪unit='d')
weekly_deaths_mean_selected_state = weekly_deaths_mean_selected_state.
 ↪groupby([pd.Grouper(key='Date', freq='W-SUN')])['Number of Deaths'].mean()
weekly_deaths_mean_selected_state = weekly_deaths_mean_selected_state.
 ↪reset_index()
weekly_deaths_mean_selected_state.head()
```

[7]:

	Date	Number of Deaths
0	2020-01-19	0.0
1	2020-01-26	0.0
2	2020-02-02	0.0
3	2020-02-09	0.0
4	2020-02-16	0.0

[8]:
```
#considering the given range of dates starting from monday. and weekly analsis␣
 ↪from monday to sunday.
weekly_deaths_mean_selected_state_given_range =␣
 ↪weekly_deaths_mean_selected_state[(weekly_deaths_mean_selected_state["Date"]␣
 ↪>= '2022-05-29') & (weekly_deaths_mean_selected_state["Date"] <=␣
 ↪'2023-01-02')]
weekly_deaths_mean_selected_state_given_range =␣
 ↪weekly_deaths_mean_selected_state_given_range.sort_values(by=['Date']).
 ↪reset_index(drop=True)
weekly_deaths_mean_selected_state_given_range['Date'] =␣
 ↪weekly_deaths_mean_selected_state_given_range['Date'] + pd.to_timedelta(1,␣
 ↪unit='d')
```

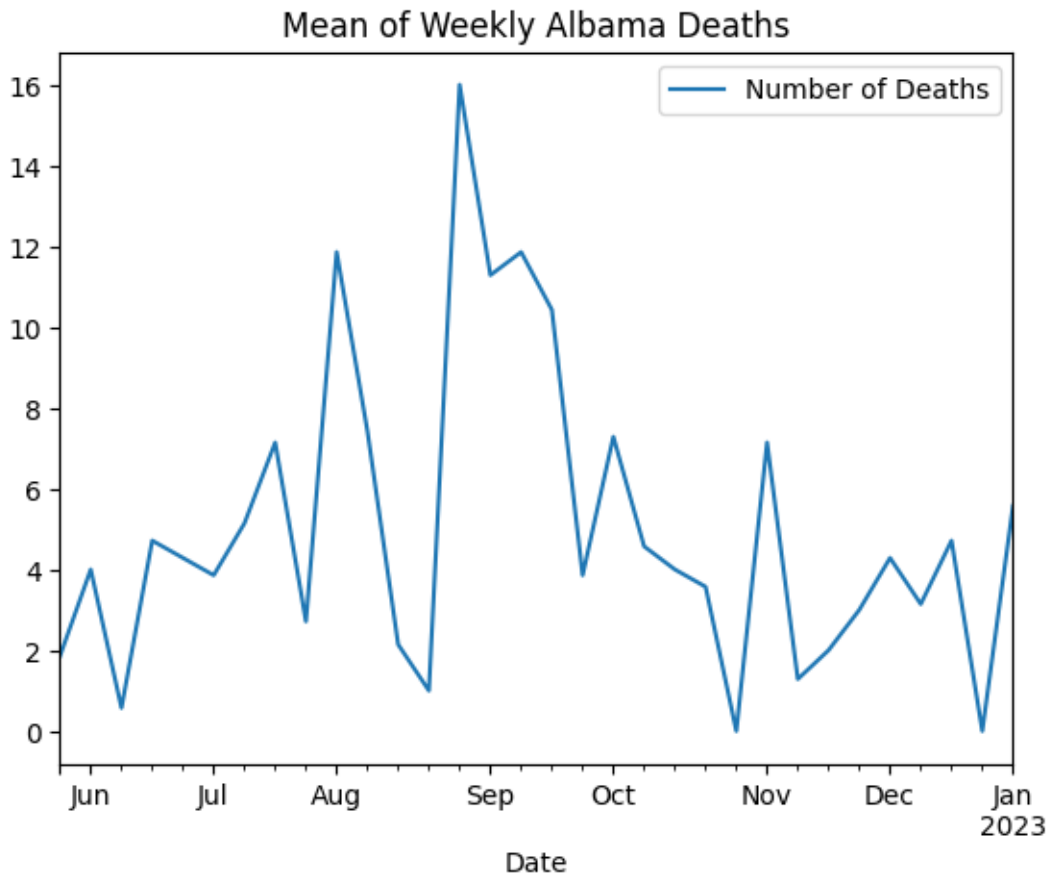
```
weekly_deaths_mean_selected_state_given_range
```

[8]:

	Date	Number of Deaths
0	2022-05-30	1.857143
1	2022-06-06	4.000000
2	2022-06-13	0.571429
3	2022-06-20	4.714286
4	2022-06-27	4.285714
5	2022-07-04	3.857143
6	2022-07-11	5.142857
7	2022-07-18	7.142857
8	2022-07-25	2.714286
9	2022-08-01	11.857143
10	2022-08-08	7.428571
11	2022-08-15	2.142857
12	2022-08-22	1.000000
13	2022-08-29	16.000000
14	2022-09-05	11.285714
15	2022-09-12	11.857143
16	2022-09-19	10.428571
17	2022-09-26	3.857143
18	2022-10-03	7.285714
19	2022-10-10	4.571429
20	2022-10-17	4.000000
21	2022-10-24	3.571429
22	2022-10-31	0.000000
23	2022-11-07	7.142857
24	2022-11-14	1.285714
25	2022-11-21	2.000000
26	2022-11-28	3.000000
27	2022-12-05	4.285714
28	2022-12-12	3.142857
29	2022-12-19	4.714286
30	2022-12-26	0.000000
31	2023-01-02	5.571429

[9]:
```
#Plotting the mean graph
weekly_deaths_mean_selected_state_given_range.plot(x='Date', y='Number of␣
↪Deaths', title = 'Mean of Weekly Albama Deaths')
```

[9]: <AxesSubplot: title={'center': 'Mean of Weekly Albama Deaths'}, xlabel='Date'>



[10]:
```
#Converting the daily to weekly analysis and finding the median weekly.
weekly_deaths_median_selected_state = new_deaths_selected_state_daily.copy()
weekly_deaths_median_selected_state['Date'] = pd.
 ↪to_datetime(weekly_deaths_median_selected_state['Date']) - pd.
 ↪to_timedelta(7, unit='d')
weekly_deaths_median_selected_state = weekly_deaths_median_selected_state.
 ↪groupby([pd.Grouper(key='Date', freq='W-SUN')])['Number of Deaths'].median()
weekly_deaths_median_selected_state = weekly_deaths_median_selected_state.
 ↪reset_index()
weekly_deaths_median_selected_state.head()
```

[10]:

	Date	Number of Deaths
0	2020-01-19	0.0
1	2020-01-26	0.0
2	2020-02-02	0.0
3	2020-02-09	0.0
4	2020-02-16	0.0

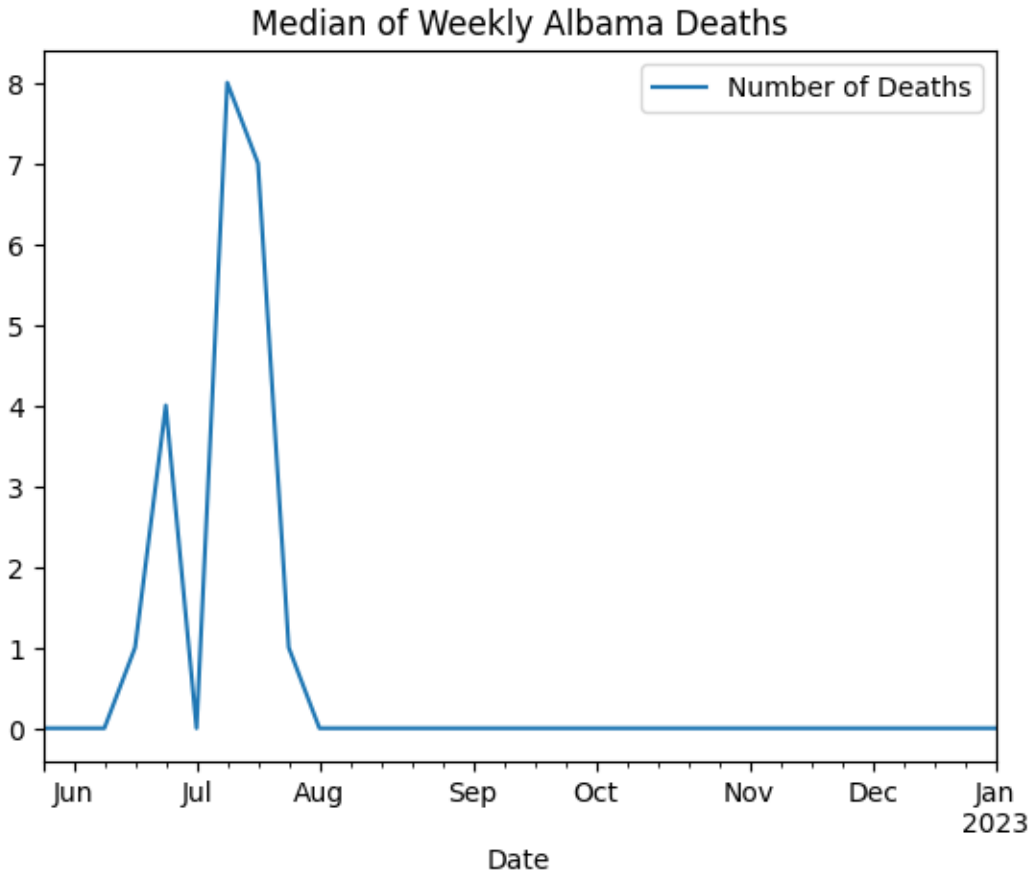
[11]:
```
#considering the given range of dates starting from monday. and weekly analsis␣
↪from monday to sunday.
weekly_deaths_median_selected_state_given_range =␣
↪weekly_deaths_median_selected_state[(weekly_deaths_median_selected_state["Date"]␣
↪>= '2022-05-29') & (weekly_deaths_median_selected_state["Date"] <=␣
↪'2023-01-02')]
weekly_deaths_median_selected_state_given_range =␣
↪weekly_deaths_median_selected_state_given_range.sort_values(by=['Date']).
↪reset_index(drop=True)
weekly_deaths_median_selected_state_given_range['Date'] =␣
↪weekly_deaths_median_selected_state_given_range['Date'] + pd.to_timedelta(1,␣
↪unit='d')
weekly_deaths_median_selected_state_given_range
```

[11]:

	Date	Number of Deaths
0	2022-05-30	0.0
1	2022-06-06	0.0
2	2022-06-13	0.0
3	2022-06-20	1.0
4	2022-06-27	4.0
5	2022-07-04	0.0
6	2022-07-11	8.0
7	2022-07-18	7.0
8	2022-07-25	1.0
9	2022-08-01	0.0
10	2022-08-08	0.0
11	2022-08-15	0.0
12	2022-08-22	0.0
13	2022-08-29	0.0
14	2022-09-05	0.0
15	2022-09-12	0.0
16	2022-09-19	0.0
17	2022-09-26	0.0
18	2022-10-03	0.0
19	2022-10-10	0.0
20	2022-10-17	0.0
21	2022-10-24	0.0
22	2022-10-31	0.0
23	2022-11-07	0.0
24	2022-11-14	0.0
25	2022-11-21	0.0
26	2022-11-28	0.0
27	2022-12-05	0.0
28	2022-12-12	0.0
29	2022-12-19	0.0
30	2022-12-26	0.0
31	2023-01-02	0.0

[12]:
```
#Plotting the median graph
weekly_deaths_median_selected_state_given_range.plot(x='Date', y='Number of␣
↪Deaths', title = 'Median of Weekly Albama Deaths')
```

[12]:
```
<AxesSubplot: title={'center': 'Median of Weekly Albama Deaths'}, xlabel='Date'>
```



[13]:
```
#Converting the daily to weekly analysis and finding the mode weekly.
weekly_deaths_mode_selected_state = new_deaths_selected_state_daily.copy()
weekly_deaths_mode_selected_state['Date'] = pd.
↪to_datetime(weekly_deaths_mode_selected_state['Date']) - pd.to_timedelta(7,␣
↪unit='d')
weekly_deaths_mode_selected_state = weekly_deaths_mode_selected_state.
↪groupby([pd.Grouper(key='Date', freq='W-SUN')])['Number of Deaths'].
↪apply(statistics.mode)
weekly_deaths_mode_selected_state = weekly_deaths_mode_selected_state.
↪reset_index()
weekly_deaths_mode_selected_state.head()
```

[13]:
```
         Date  Number of Deaths
0 2020-01-19               0.0
1 2020-01-26               0.0
2 2020-02-02               0.0
3 2020-02-09               0.0
4 2020-02-16               0.0
```

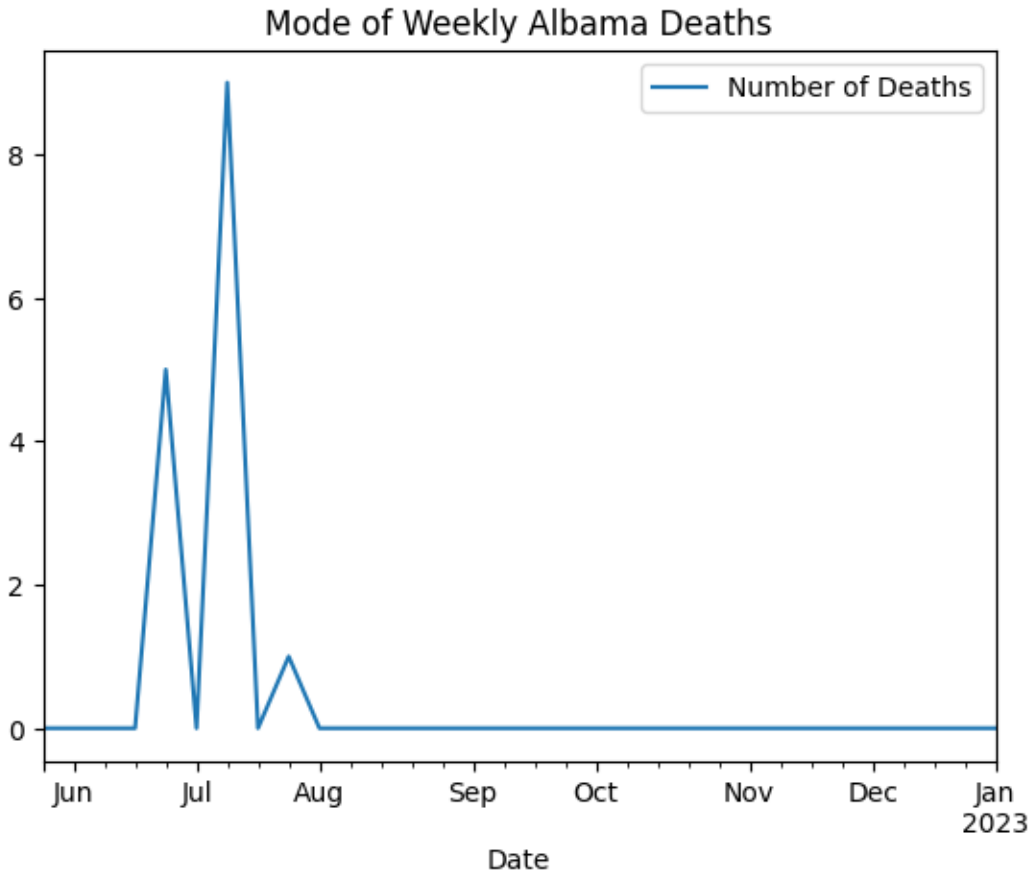
[14]:
```
#considering the given range of dates starting from monday. and weekly analsis␣
↪from monday to sunday.
weekly_deaths_mode_selected_state_given_range =␣
↪weekly_deaths_mode_selected_state[(weekly_deaths_mode_selected_state["Date"]␣
↪>= '2022-05-29') & (weekly_deaths_mode_selected_state["Date"] <=␣
↪'2023-01-02')]
weekly_deaths_mode_selected_state_given_range =␣
↪weekly_deaths_mode_selected_state_given_range.sort_values(by=['Date']).
↪reset_index(drop=True)
weekly_deaths_mode_selected_state_given_range['Date'] =␣
↪weekly_deaths_mode_selected_state_given_range['Date'] + pd.to_timedelta(1,␣
↪unit='d')
weekly_deaths_mode_selected_state_given_range
```

[14]:
```
          Date  Number of Deaths
0   2022-05-30               0.0
1   2022-06-06               0.0
2   2022-06-13               0.0
3   2022-06-20               0.0
4   2022-06-27               5.0
5   2022-07-04               0.0
6   2022-07-11               9.0
7   2022-07-18               0.0
8   2022-07-25               1.0
9   2022-08-01               0.0
10  2022-08-08               0.0
11  2022-08-15               0.0
12  2022-08-22               0.0
13  2022-08-29               0.0
14  2022-09-05               0.0
15  2022-09-12               0.0
16  2022-09-19               0.0
17  2022-09-26               0.0
18  2022-10-03               0.0
19  2022-10-10               0.0
20  2022-10-17               0.0
21  2022-10-24               0.0
22  2022-10-31               0.0
23  2022-11-07               0.0
24  2022-11-14               0.0
```

```
25 2022-11-21                0.0
26 2022-11-28                0.0
27 2022-12-05                0.0
28 2022-12-12                0.0
29 2022-12-19                0.0
30 2022-12-26                0.0
31 2023-01-02                0.0
```

[15]:
```
#Plottinf the mode graph
weekly_deaths_mode_selected_state_given_range.plot(x='Date', y='Number of␣
↪Deaths', title = 'Mode of Weekly Albama Deaths')
```

[15]: <AxesSubplot: title={'center': 'Mode of Weekly Albama Deaths'}, xlabel='Date'>



[16]:
```
#Converting the daily to weekly analysis and finding the weekly sum of cases.
weekly_deaths_sum_selected_state = new_deaths_selected_state_daily.copy()
weekly_deaths_sum_selected_state['Date'] = pd.
↪to_datetime(weekly_deaths_sum_selected_state['Date']) - pd.to_timedelta(7,␣
↪unit='d')
```

```
weekly_deaths_sum_selected_state = weekly_deaths_sum_selected_state.groupby([pd.
 ↪Grouper(key='Date', freq='W-SUN')])['Number of Deaths'].sum()
weekly_deaths_sum_selected_state = weekly_deaths_sum_selected_state.
 ↪reset_index()
weekly_deaths_sum_selected_state.head()
```

[16]:

	Date	Number of Deaths
0	2020-01-19	0.0
1	2020-01-26	0.0
2	2020-02-02	0.0
3	2020-02-09	0.0
4	2020-02-16	0.0

[17]:
```
#Adding one day so that we get weekly analysis from monday to sunday and weekly␣
 ↪analsis from monday to sunday.
weekly_deaths_sum_selected_state_given_range =␣
 ↪weekly_deaths_sum_selected_state[(weekly_deaths_sum_selected_state["Date"]␣
 ↪>= '2022-05-29') & (weekly_deaths_sum_selected_state["Date"] <=␣
 ↪'2023-01-02')]
weekly_deaths_sum_selected_state_given_range =␣
 ↪weekly_deaths_sum_selected_state_given_range.sort_values(by=['Date']).
 ↪reset_index(drop=True)
weekly_deaths_sum_selected_state_given_range['Date'] =␣
 ↪weekly_deaths_sum_selected_state_given_range['Date'] + pd.to_timedelta(1,␣
 ↪unit='d')
weekly_deaths_sum_selected_state_given_range
```

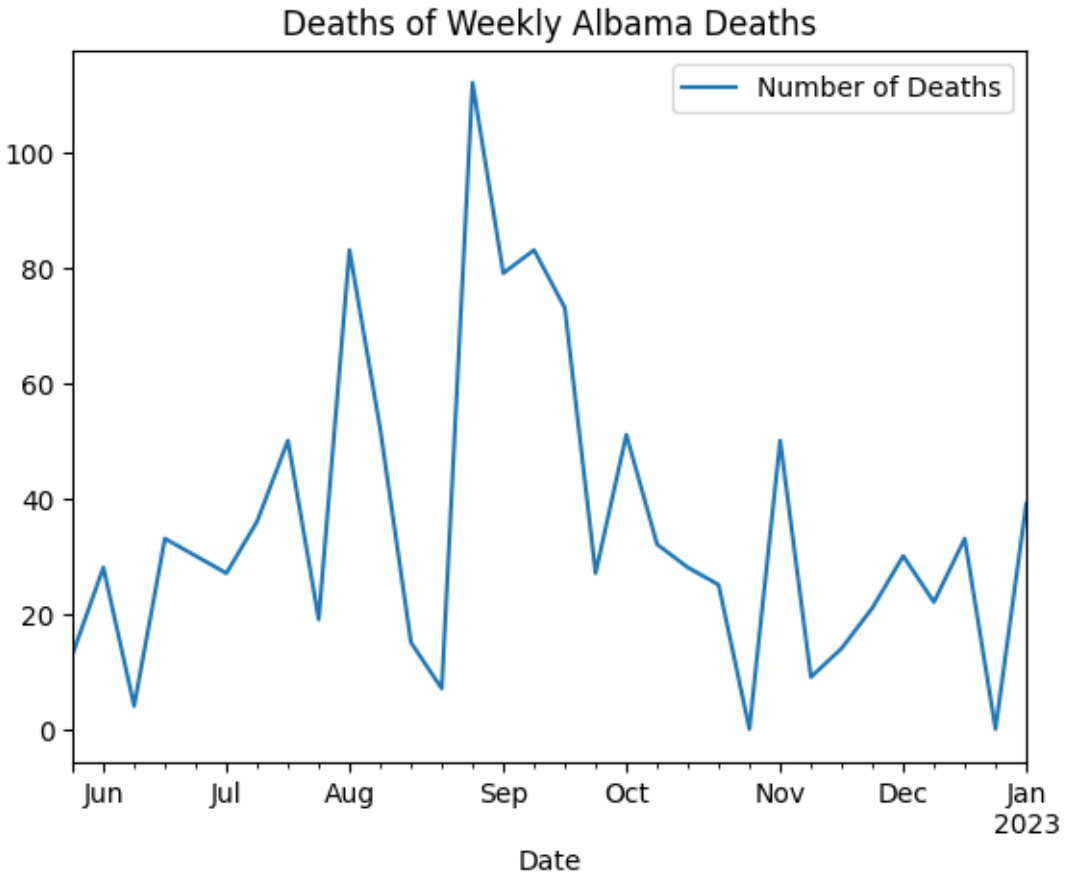
[17]:

	Date	Number of Deaths
0	2022-05-30	13.0
1	2022-06-06	28.0
2	2022-06-13	4.0
3	2022-06-20	33.0
4	2022-06-27	30.0
5	2022-07-04	27.0
6	2022-07-11	36.0
7	2022-07-18	50.0
8	2022-07-25	19.0
9	2022-08-01	83.0
10	2022-08-08	52.0
11	2022-08-15	15.0
12	2022-08-22	7.0
13	2022-08-29	112.0
14	2022-09-05	79.0
15	2022-09-12	83.0
16	2022-09-19	73.0
17	2022-09-26	27.0
18	2022-10-03	51.0

```
19 2022-10-10              32.0
20 2022-10-17              28.0
21 2022-10-24              25.0
22 2022-10-31               0.0
23 2022-11-07              50.0
24 2022-11-14               9.0
25 2022-11-21              14.0
26 2022-11-28              21.0
27 2022-12-05              30.0
28 2022-12-12              22.0
29 2022-12-19              33.0
30 2022-12-26               0.0
31 2023-01-02              39.0
```

[18]:
```
weekly_deaths_sum_selected_state_given_range.plot(x='Date', y='Number of␣
↪Deaths', title = 'Deaths of Weekly Albama Deaths')
```

[18]: <AxesSubplot: title={'center': 'Deaths of Weekly Albama Deaths'}, xlabel='Date'>



0.1.1 Week starting with 2022-08-29 has peak of deaths in alabama state with value 112. Due to state holidy it got increased.

[19]:
```
#reading the population data
population = pd.read_csv("../data/covid_county_population_usafacts.csv")
population.head()
```

[19]:
```
   countyFIPS            County Name State  population
0           0  Statewide Unallocated    AL           0
1        1001         Autauga County    AL       55869
2        1003         Baldwin County    AL      223234
3        1005         Barbour County    AL       24686
4        1007            Bibb County    AL       22394
```

[20]:
```
#Filtering the population for albama state
population_selected_state = population[population["State"] == selected_state_AL]
population_selected_state
```

[20]:
```
    countyFIPS            County Name State  population
0            0  Statewide Unallocated    AL           0
1         1001         Autauga County    AL       55869
2         1003         Baldwin County    AL      223234
3         1005         Barbour County    AL       24686
4         1007            Bibb County    AL       22394
..         …                     …   …         …
63        1125      Tuscaloosa County    AL      209355
64        1127          Walker County    AL       63521
65        1129      Washington County    AL       16326
66        1131          Wilcox County    AL       10373
67        1133         Winston County    AL       23629

[68 rows x 4 columns]
```

[21]:
```
#For the Albama state summing the population.
population_selected_state = population_selected_state.
 ↪groupby('State')['population'].sum()
population_selected_state
```

[21]:
```
State
AL    4903185
Name: population, dtype: int64
```

[22]:
```
#normalizing by population and using normalization factor to identify cases
normalized_weekly_deaths_sum_selected_state_given_range =␣
 ↪weekly_deaths_sum_selected_state_given_range.copy()
```

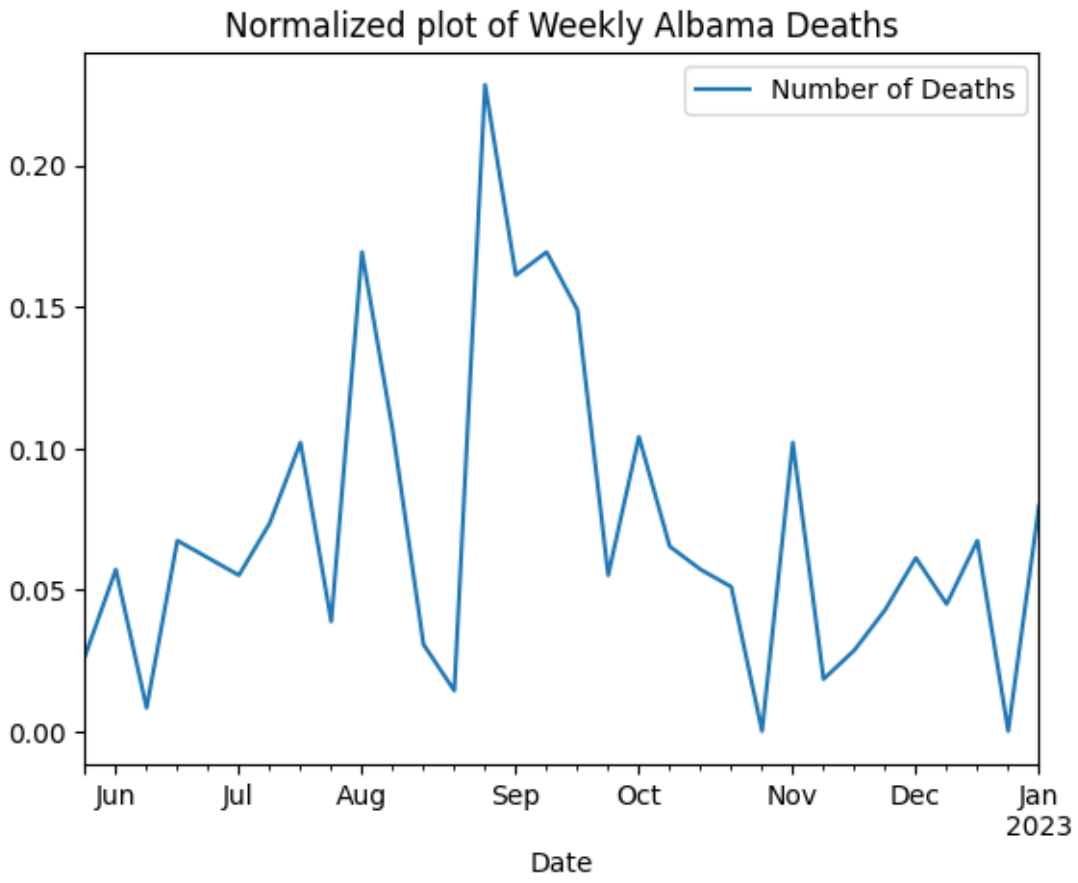
```
normalized_weekly_deaths_sum_selected_state_given_range['Number of Deaths'] =␣
↪normalized_weekly_deaths_sum_selected_state_given_range['Number of Deaths'].
↪mul(10000)
normalized_weekly_deaths_sum_selected_state_given_range['Number of Deaths'] =␣
↪normalized_weekly_deaths_sum_selected_state_given_range['Number of Deaths'].
↪div(4903185)
normalized_weekly_deaths_sum_selected_state_given_range
```

[22]:

	Date	Number of Deaths
0	2022-05-30	0.026513
1	2022-06-06	0.057106
2	2022-06-13	0.008158
3	2022-06-20	0.067303
4	2022-06-27	0.061185
5	2022-07-04	0.055066
6	2022-07-11	0.073422
7	2022-07-18	0.101975
8	2022-07-25	0.038750
9	2022-08-01	0.169278
10	2022-08-08	0.106054
11	2022-08-15	0.030592
12	2022-08-22	0.014276
13	2022-08-29	0.228423
14	2022-09-05	0.161120
15	2022-09-12	0.169278
16	2022-09-19	0.148883
17	2022-09-26	0.055066
18	2022-10-03	0.104014
19	2022-10-10	0.065264
20	2022-10-17	0.057106
21	2022-10-24	0.050987
22	2022-10-31	0.000000
23	2022-11-07	0.101975
24	2022-11-14	0.018355
25	2022-11-21	0.028553
26	2022-11-28	0.042829
27	2022-12-05	0.061185
28	2022-12-12	0.044869
29	2022-12-19	0.067303
30	2022-12-26	0.000000
31	2023-01-02	0.079540

[23]:
```
normalized_weekly_deaths_sum_selected_state_given_range.plot(x='Date',␣
↪y='Number of Deaths', title = 'Normalized plot of Weekly Albama Deaths')
```

[23]:
```
<AxesSubplot: title={'center': 'Normalized plot of Weekly Albama Deaths'},
xlabel='Date'>
```



[24]:
```
deaths_selected_state_NJ = deaths_transpose[deaths_transpose["State"] ==␣
↪selected_state_NJ].reset_index()
deaths_selected_state_NJ.head()
```

[24]:

	index	countyFIPS	County Name	State	StateFIPS	Date	\
0	1805	34001	Atlantic County	NJ	34	2020-01-22	
1	1806	34003	Bergen County	NJ	34	2020-01-22	
2	1807	34005	Burlington County	NJ	34	2020-01-22	
3	1808	34007	Camden County	NJ	34	2020-01-22	
4	1809	34009	Cape May County	NJ	34	2020-01-22	

	Number of Deaths
0	0
1	0
2	0
3	0
4	0

[25]:
```
#For the selected state Albama summing the deaths per day of all the counties.
deaths_selected_state_daily_NJ = deaths_selected_state_NJ.
 ↪groupby('Date')['Number of Deaths'].sum()
deaths_selected_state_daily_NJ.head()
```

[25]:
```
Date
2020-01-22    0
2020-01-23    0
2020-01-24    0
2020-01-25    0
2020-01-26    0
Name: Number of Deaths, dtype: int64
```

[26]:
```
#Finding out the new deaths per day.
new_deaths_selected_state_daily_NJ = deaths_selected_state_daily_NJ.diff().
 ↪reset_index()
new_deaths_selected_state_daily_NJ.head()
```

[26]:

	Date	Number of Deaths
0	2020-01-22	NaN
1	2020-01-23	0.0
2	2020-01-24	0.0
3	2020-01-25	0.0
4	2020-01-26	0.0

[27]:
```
#Converting the daily to weekly analysis and finding the mean weekly.
weekly_deaths_mean_selected_state_NJ= new_deaths_selected_state_daily_NJ.copy()
weekly_deaths_mean_selected_state_NJ['Date'] = pd.
 ↪to_datetime(weekly_deaths_mean_selected_state_NJ['Date']) - pd.
 ↪to_timedelta(7, unit='d')
weekly_deaths_mean_selected_state_NJ = weekly_deaths_mean_selected_state_NJ.
 ↪groupby([pd.Grouper(key='Date', freq='W-SUN')])['Number of Deaths'].mean()
weekly_deaths_mean_selected_state_NJ = weekly_deaths_mean_selected_state_NJ.
 ↪reset_index()
weekly_deaths_mean_selected_state_NJ.head()
```

[27]:

	Date	Number of Deaths
0	2020-01-19	0.0
1	2020-01-26	0.0
2	2020-02-02	0.0
3	2020-02-09	0.0
4	2020-02-16	0.0

[28]:
```
#considering the given range of dates starting from monday. and weekly analsis␣
 ↪from monday to sunday.
```

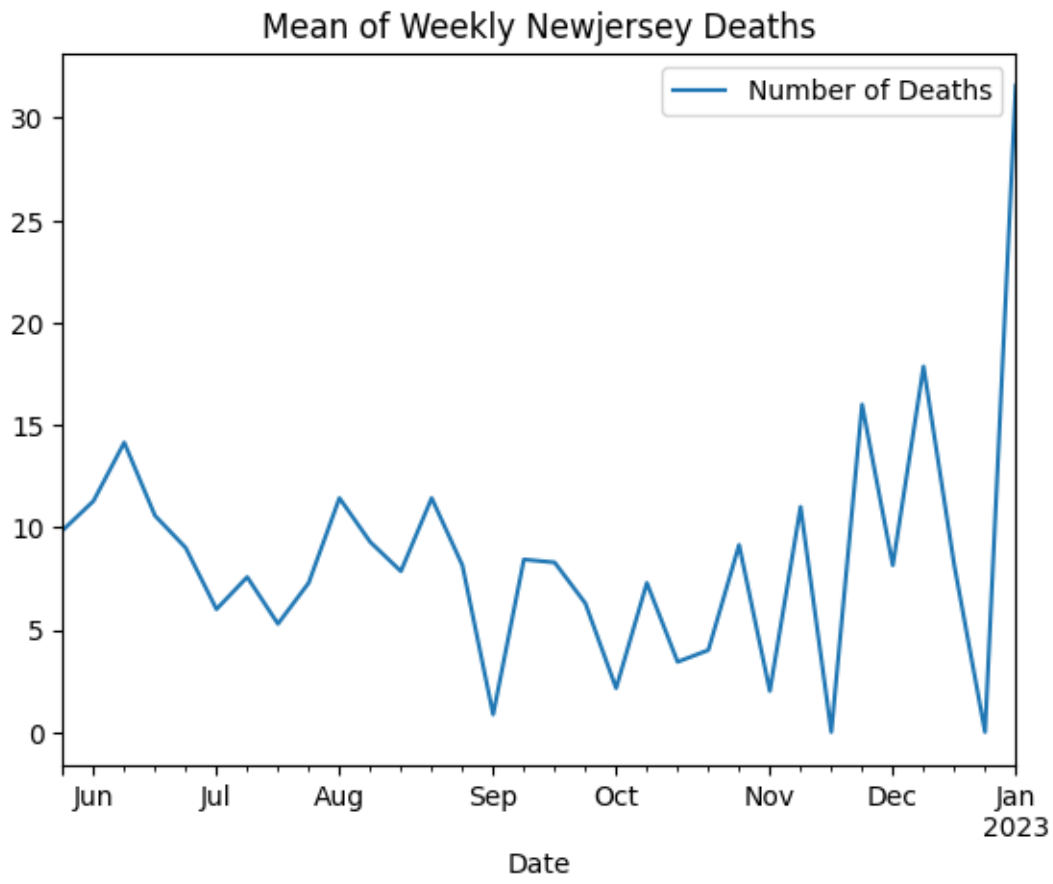
```
weekly_deaths_mean_selected_state_given_range_NJ =␣
↪weekly_deaths_mean_selected_state_NJ[(weekly_deaths_mean_selected_state_NJ["Date"]␣
↪>= '2022-05-29') & (weekly_deaths_mean_selected_state_NJ["Date"] <=␣
↪'2023-01-02')]
weekly_deaths_mean_selected_state_given_range_NJ =␣
↪weekly_deaths_mean_selected_state_given_range_NJ.sort_values(by=['Date']).
↪reset_index(drop=True)
weekly_deaths_mean_selected_state_given_range_NJ['Date'] =␣
↪weekly_deaths_mean_selected_state_given_range_NJ['Date'] + pd.
↪to_timedelta(1, unit='d')
weekly_deaths_mean_selected_state_given_range_NJ
```

[28]:

	Date	Number of Deaths
0	2022-05-30	9.857143
1	2022-06-06	11.285714
2	2022-06-13	14.142857
3	2022-06-20	10.571429
4	2022-06-27	9.000000
5	2022-07-04	6.000000
6	2022-07-11	7.571429
7	2022-07-18	5.285714
8	2022-07-25	7.285714
9	2022-08-01	11.428571
10	2022-08-08	9.285714
11	2022-08-15	7.857143
12	2022-08-22	11.428571
13	2022-08-29	8.142857
14	2022-09-05	0.857143
15	2022-09-12	8.428571
16	2022-09-19	8.285714
17	2022-09-26	6.285714
18	2022-10-03	2.142857
19	2022-10-10	7.285714
20	2022-10-17	3.428571
21	2022-10-24	4.000000
22	2022-10-31	9.142857
23	2022-11-07	2.000000
24	2022-11-14	11.000000
25	2022-11-21	0.000000
26	2022-11-28	16.000000
27	2022-12-05	8.142857
28	2022-12-12	17.857143
29	2022-12-19	8.142857
30	2022-12-26	0.000000
31	2023-01-02	31.571429

[29]:
```
#Plotting the mean graph
weekly_deaths_mean_selected_state_given_range_NJ.plot(x='Date', y='Number of␣
 ↪Deaths', title = 'Mean of Weekly Newjersey Deaths')
```

[29]:
```
<AxesSubplot: title={'center': 'Mean of Weekly Newjersey Deaths'},
xlabel='Date'>
```



[30]:
```
#Converting the daily to weekly analysis and finding the median weekly.
weekly_deaths_median_selected_state_NJ = new_deaths_selected_state_daily_NJ.
 ↪copy()
weekly_deaths_median_selected_state_NJ['Date'] = pd.
 ↪to_datetime(weekly_deaths_median_selected_state_NJ['Date']) - pd.
 ↪to_timedelta(7, unit='d')
weekly_deaths_median_selected_state_NJ = weekly_deaths_median_selected_state_NJ.
 ↪groupby([pd.Grouper(key='Date', freq='W-SUN')])['Number of Deaths'].median()
weekly_deaths_median_selected_state_NJ = weekly_deaths_median_selected_state_NJ.
 ↪reset_index()
weekly_deaths_median_selected_state_NJ.head()
```

[30]:
```
        Date  Number of Deaths
0 2020-01-19               0.0
1 2020-01-26               0.0
2 2020-02-02               0.0
3 2020-02-09               0.0
4 2020-02-16               0.0
```

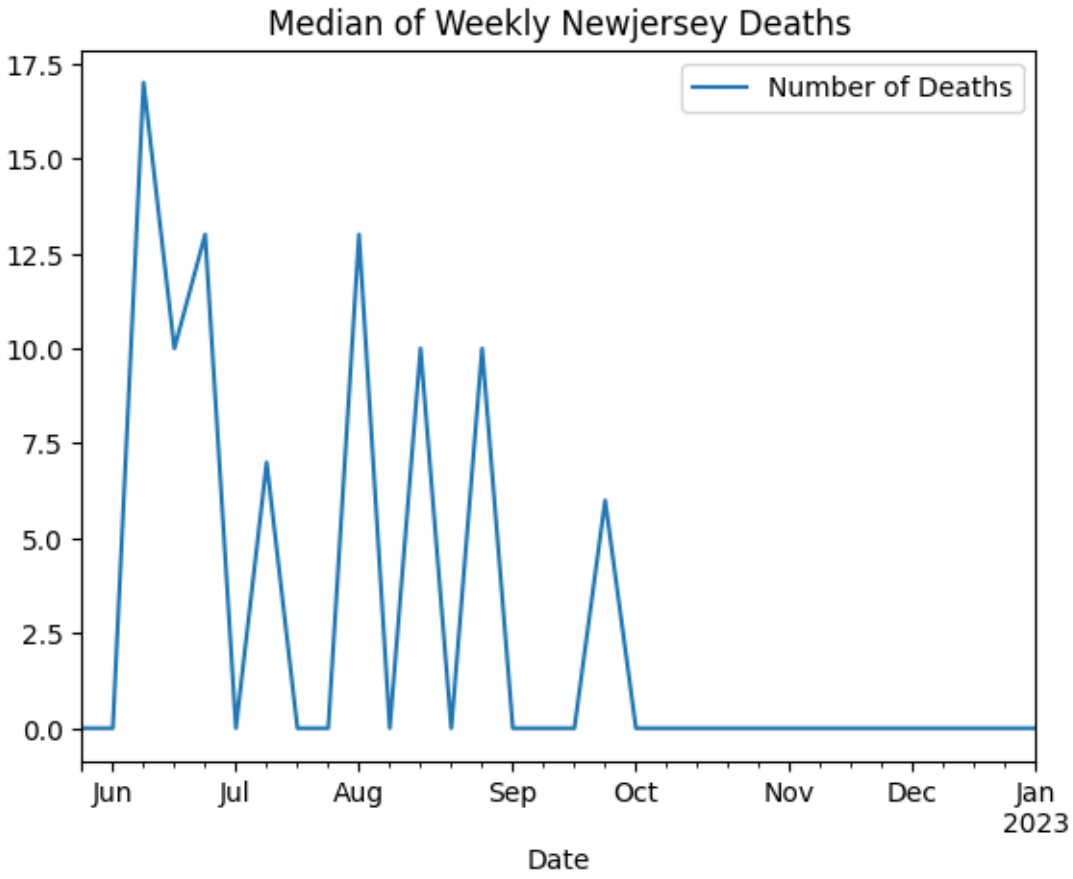
[31]:
```
#considering the given range of dates starting from monday. and weekly analsis␣
↪from monday to sunday.
weekly_deaths_median_selected_state_given_range_NJ =␣
↪weekly_deaths_median_selected_state_NJ[(weekly_deaths_median_selected_state_NJ["Date"]␣
↪>= '2022-05-29') & (weekly_deaths_median_selected_state_NJ["Date"] <=␣
↪'2023-01-02')]
weekly_deaths_median_selected_state_given_range_NJ =␣
↪weekly_deaths_median_selected_state_given_range_NJ.sort_values(by=['Date']).
↪reset_index(drop=True)
weekly_deaths_median_selected_state_given_range_NJ['Date'] =␣
↪weekly_deaths_median_selected_state_given_range_NJ['Date'] + pd.
↪to_timedelta(1, unit='d')
weekly_deaths_median_selected_state_given_range_NJ
```

[31]:
```
         Date  Number of Deaths
0  2022-05-30               0.0
1  2022-06-06               0.0
2  2022-06-13              17.0
3  2022-06-20              10.0
4  2022-06-27              13.0
5  2022-07-04               0.0
6  2022-07-11               7.0
7  2022-07-18               0.0
8  2022-07-25               0.0
9  2022-08-01              13.0
10 2022-08-08               0.0
11 2022-08-15              10.0
12 2022-08-22               0.0
13 2022-08-29              10.0
14 2022-09-05               0.0
15 2022-09-12               0.0
16 2022-09-19               0.0
17 2022-09-26               6.0
18 2022-10-03               0.0
19 2022-10-10               0.0
20 2022-10-17               0.0
21 2022-10-24               0.0
22 2022-10-31               0.0
23 2022-11-07               0.0
24 2022-11-14               0.0
```

```
25 2022-11-21                0.0
26 2022-11-28                0.0
27 2022-12-05                0.0
28 2022-12-12                0.0
29 2022-12-19                0.0
30 2022-12-26                0.0
31 2023-01-02                0.0
```

[32]:
```
#Plotting the median graph
weekly_deaths_median_selected_state_given_range_NJ.plot(x='Date', y='Number of␣
↪Deaths', title = 'Median of Weekly Newjersey Deaths')
```

[32]:
```
<AxesSubplot: title={'center': 'Median of Weekly Newjersey Deaths'},
xlabel='Date'>
```



[33]:
```
#Converting the daily to weekly analysis and finding the mode weekly.
weekly_deaths_mode_selected_state_NJ = new_deaths_selected_state_daily_NJ.copy()
```

```
weekly_deaths_mode_selected_state_NJ['Date'] = pd.
 ↪to_datetime(weekly_deaths_mode_selected_state_NJ['Date']) - pd.
 ↪to_timedelta(7, unit='d')
weekly_deaths_mode_selected_state_NJ = weekly_deaths_mode_selected_state_NJ.
 ↪groupby([pd.Grouper(key='Date', freq='W-SUN')])['Number of Deaths'].
 ↪apply(statistics.mode)
weekly_deaths_mode_selected_state_NJ = weekly_deaths_mode_selected_state_NJ.
 ↪reset_index()
weekly_deaths_mode_selected_state_NJ.head()
```

[33]:

	Date	Number of Deaths
0	2020-01-19	0.0
1	2020-01-26	0.0
2	2020-02-02	0.0
3	2020-02-09	0.0
4	2020-02-16	0.0

[34]:
```
#considering the given range of dates starting from monday. and weekly analsis␣
 ↪from monday to sunday.
weekly_deaths_mode_selected_state_given_range_NJ =␣
 ↪weekly_deaths_mode_selected_state_NJ[(weekly_deaths_mode_selected_state_NJ["Date"]␣
 ↪>= '2022-05-29') & (weekly_deaths_mode_selected_state_NJ["Date"] <=␣
 ↪'2023-01-02')]
weekly_deaths_mode_selected_state_given_range_NJ =␣
 ↪weekly_deaths_mode_selected_state_given_range_NJ.sort_values(by=['Date']).
 ↪reset_index(drop=True)
weekly_deaths_mode_selected_state_given_range_NJ['Date'] =␣
 ↪weekly_deaths_mode_selected_state_given_range_NJ['Date'] + pd.
 ↪to_timedelta(1, unit='d')
weekly_deaths_mode_selected_state_given_range_NJ
```

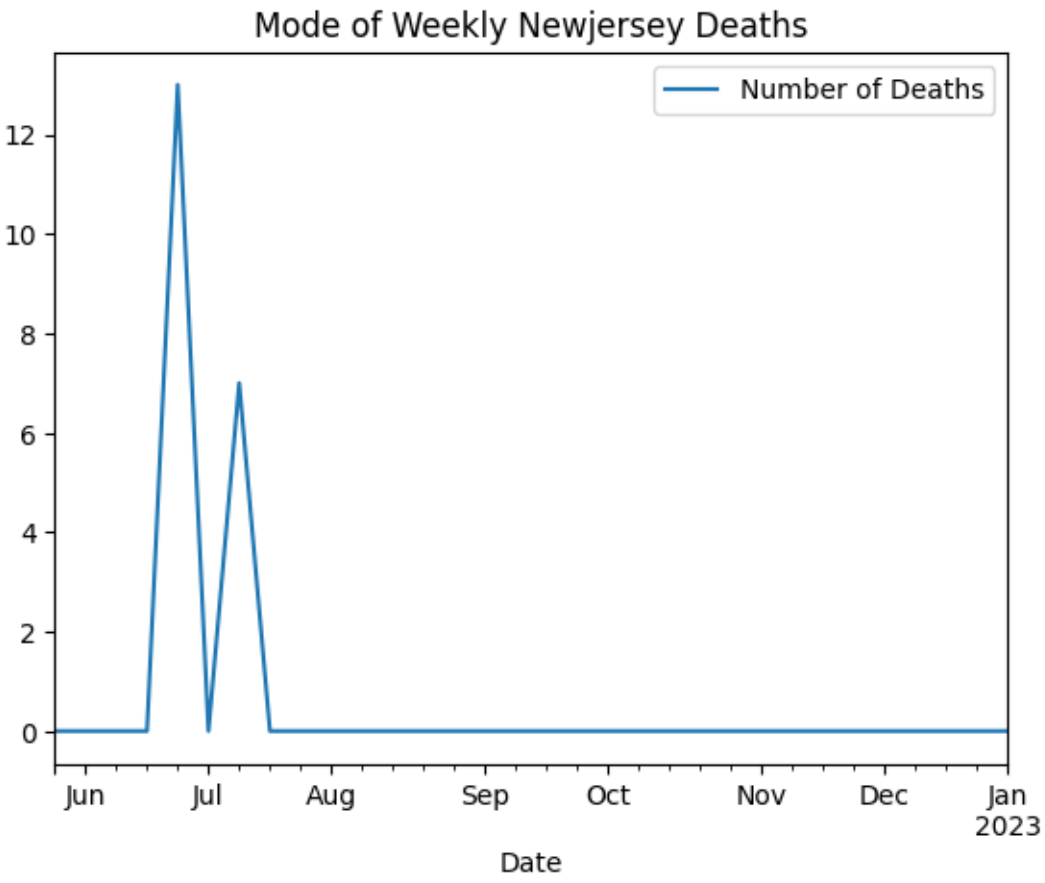
[34]:

	Date	Number of Deaths
0	2022-05-30	0.0
1	2022-06-06	0.0
2	2022-06-13	0.0
3	2022-06-20	0.0
4	2022-06-27	13.0
5	2022-07-04	0.0
6	2022-07-11	7.0
7	2022-07-18	0.0
8	2022-07-25	0.0
9	2022-08-01	0.0
10	2022-08-08	0.0
11	2022-08-15	0.0
12	2022-08-22	0.0
13	2022-08-29	0.0

```
14 2022-09-05              0.0
15 2022-09-12              0.0
16 2022-09-19              0.0
17 2022-09-26              0.0
18 2022-10-03              0.0
19 2022-10-10              0.0
20 2022-10-17              0.0
21 2022-10-24              0.0
22 2022-10-31              0.0
23 2022-11-07              0.0
24 2022-11-14              0.0
25 2022-11-21              0.0
26 2022-11-28              0.0
27 2022-12-05              0.0
28 2022-12-12              0.0
29 2022-12-19              0.0
30 2022-12-26              0.0
31 2023-01-02              0.0
```

[35]:
```
#Plottinf the mode graph
weekly_deaths_mode_selected_state_given_range_NJ.plot(x='Date', y='Number of␣
↪Deaths', title = 'Mode of Weekly Newjersey Deaths')
```

[35]:
```
<AxesSubplot: title={'center': 'Mode of Weekly Newjersey Deaths'},
xlabel='Date'>
```



[36]:
```
#Converting the daily to weekly analysis and finding the weekly sum of cases.
weekly_deaths_sum_selected_state_NJ = new_deaths_selected_state_daily_NJ.copy()
weekly_deaths_sum_selected_state_NJ['Date'] = pd.
 ↪to_datetime(weekly_deaths_sum_selected_state_NJ['Date']) - pd.
 ↪to_timedelta(7, unit='d')
weekly_deaths_sum_selected_state_NJ = weekly_deaths_sum_selected_state_NJ.
 ↪groupby([pd.Grouper(key='Date', freq='W-SUN')])['Number of Deaths'].sum()
weekly_deaths_sum_selected_state_NJ = weekly_deaths_sum_selected_state_NJ.
 ↪reset_index()
weekly_deaths_sum_selected_state_NJ.head()
```

[36]:

	Date	Number of Deaths
0	2020-01-19	0.0
1	2020-01-26	0.0
2	2020-02-02	0.0
3	2020-02-09	0.0
4	2020-02-16	0.0

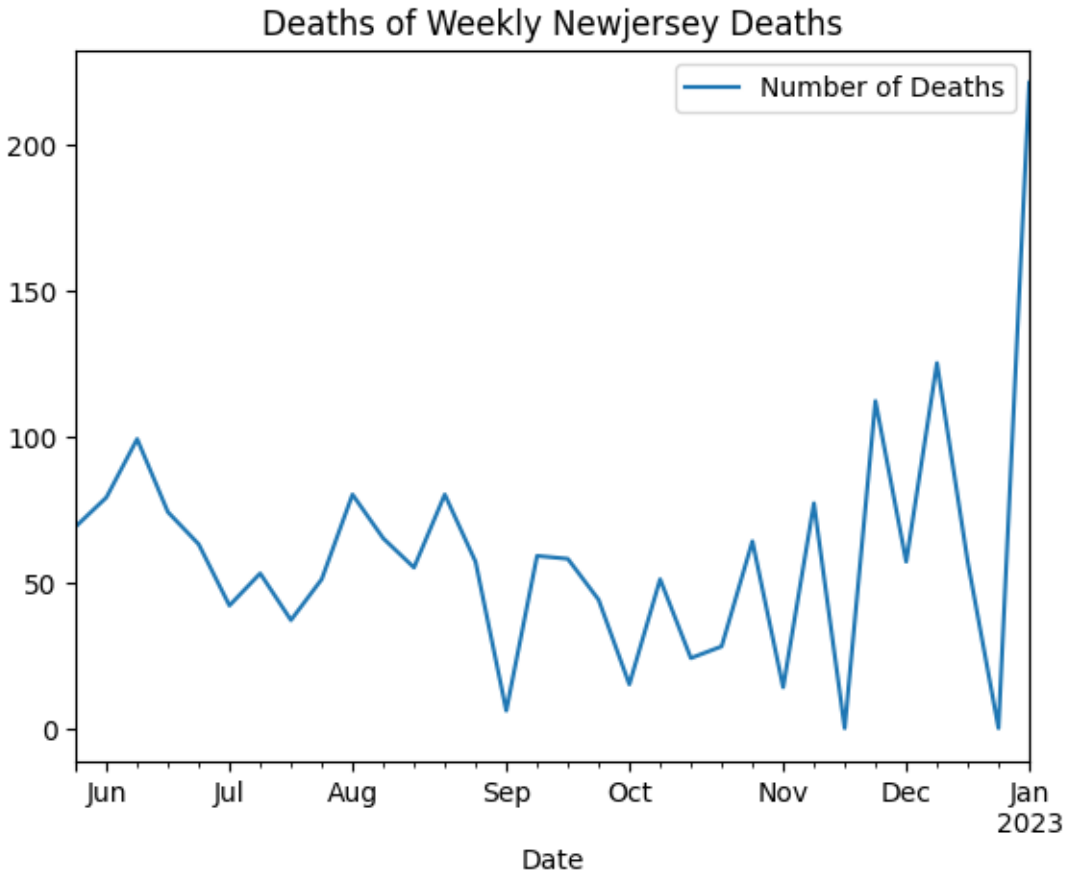
[37]:
```
#Adding one day so that we get weekly analysis from monday to sunday and weekly␣
↪analsis from monday to sunday.
weekly_deaths_sum_selected_state_given_range_NJ =␣
↪weekly_deaths_sum_selected_state_NJ[(weekly_deaths_sum_selected_state_NJ["Date"]␣
↪>= '2022-05-29') & (weekly_deaths_sum_selected_state_NJ["Date"] <=␣
↪'2023-01-02')]
weekly_deaths_sum_selected_state_given_range_NJ =␣
↪weekly_deaths_sum_selected_state_given_range_NJ.sort_values(by=['Date']).
↪reset_index(drop=True)
weekly_deaths_sum_selected_state_given_range_NJ['Date'] =␣
↪weekly_deaths_sum_selected_state_given_range_NJ['Date'] + pd.to_timedelta(1,␣
↪unit='d')
weekly_deaths_sum_selected_state_given_range_NJ
```

[37]:

	Date	Number of Deaths
0	2022-05-30	69.0
1	2022-06-06	79.0
2	2022-06-13	99.0
3	2022-06-20	74.0
4	2022-06-27	63.0
5	2022-07-04	42.0
6	2022-07-11	53.0
7	2022-07-18	37.0
8	2022-07-25	51.0
9	2022-08-01	80.0
10	2022-08-08	65.0
11	2022-08-15	55.0
12	2022-08-22	80.0
13	2022-08-29	57.0
14	2022-09-05	6.0
15	2022-09-12	59.0
16	2022-09-19	58.0
17	2022-09-26	44.0
18	2022-10-03	15.0
19	2022-10-10	51.0
20	2022-10-17	24.0
21	2022-10-24	28.0
22	2022-10-31	64.0
23	2022-11-07	14.0
24	2022-11-14	77.0
25	2022-11-21	0.0
26	2022-11-28	112.0
27	2022-12-05	57.0
28	2022-12-12	125.0
29	2022-12-19	57.0
30	2022-12-26	0.0
31	2023-01-02	221.0

[38]:
```
weekly_deaths_sum_selected_state_given_range_NJ.plot(x='Date', y='Number of␣
↪Deaths', title = 'Deaths of Weekly Newjersey Deaths')
```

[38]:
```
<AxesSubplot: title={'center': 'Deaths of Weekly Newjersey Deaths'},
xlabel='Date'>
```



0.1.2 Week starting with 2023-01-02 has a peak of deaths in newjersey state with value 212. As it was long weekend due to christmas and new year so many people gathered and had celebrations which might be reason for increased deaths.

[39]:
```
#Filtering the population for NEWJERSEY state
population_selected_state_NJ = population[population["State"] ==␣
↪selected_state_NJ].reset_index()
del population_selected_state_NJ[population_selected_state_NJ.columns[0]]

population_selected_state_NJ
```

[39]:

	countyFIPS	County Name	State	population
0	0	Statewide Unallocated	NJ	0
1	34001	Atlantic County	NJ	263670
2	34003	Bergen County	NJ	932202
3	34005	Burlington County	NJ	445349
4	34007	Camden County	NJ	506471
5	34009	Cape May County	NJ	92039
6	34011	Cumberland County	NJ	149527
7	34013	Essex County	NJ	798975
8	34015	Gloucester County	NJ	291636
9	34017	Hudson County	NJ	672391
10	34019	Hunterdon County	NJ	124371
11	34021	Mercer County	NJ	367430
12	34023	Middlesex County	NJ	825062
13	34025	Monmouth County	NJ	618795
14	34027	Morris County	NJ	491845
15	34029	Ocean County	NJ	607186
16	34031	Passaic County	NJ	501826
17	34033	Salem County	NJ	62385
18	34035	Somerset County	NJ	328934
19	34037	Sussex County	NJ	140488
20	34039	Union County	NJ	556341
21	34041	Warren County	NJ	105267

[40]:
```
#For the Albama state summing the population.
population_selected_state_NJ = population_selected_state_NJ.
 ↪groupby('State')['population'].sum()
population_selected_state_NJ
```

[40]:
```
State
NJ    8882190
Name: population, dtype: int64
```

[41]:
```
#normalizing by population and using normalization factor to identify cases
normalized_weekly_deaths_sum_selected_state_given_range_NJ =␣
 ↪weekly_deaths_sum_selected_state_given_range_NJ.copy()
normalized_weekly_deaths_sum_selected_state_given_range_NJ['Number of Deaths']␣
 ↪= normalized_weekly_deaths_sum_selected_state_given_range_NJ['Number of␣
 ↪Deaths'].mul(10000)
normalized_weekly_deaths_sum_selected_state_given_range_NJ['Number of Deaths']␣
 ↪= normalized_weekly_deaths_sum_selected_state_given_range_NJ['Number of␣
 ↪Deaths'].div(8882190)
normalized_weekly_deaths_sum_selected_state_given_range_NJ
```

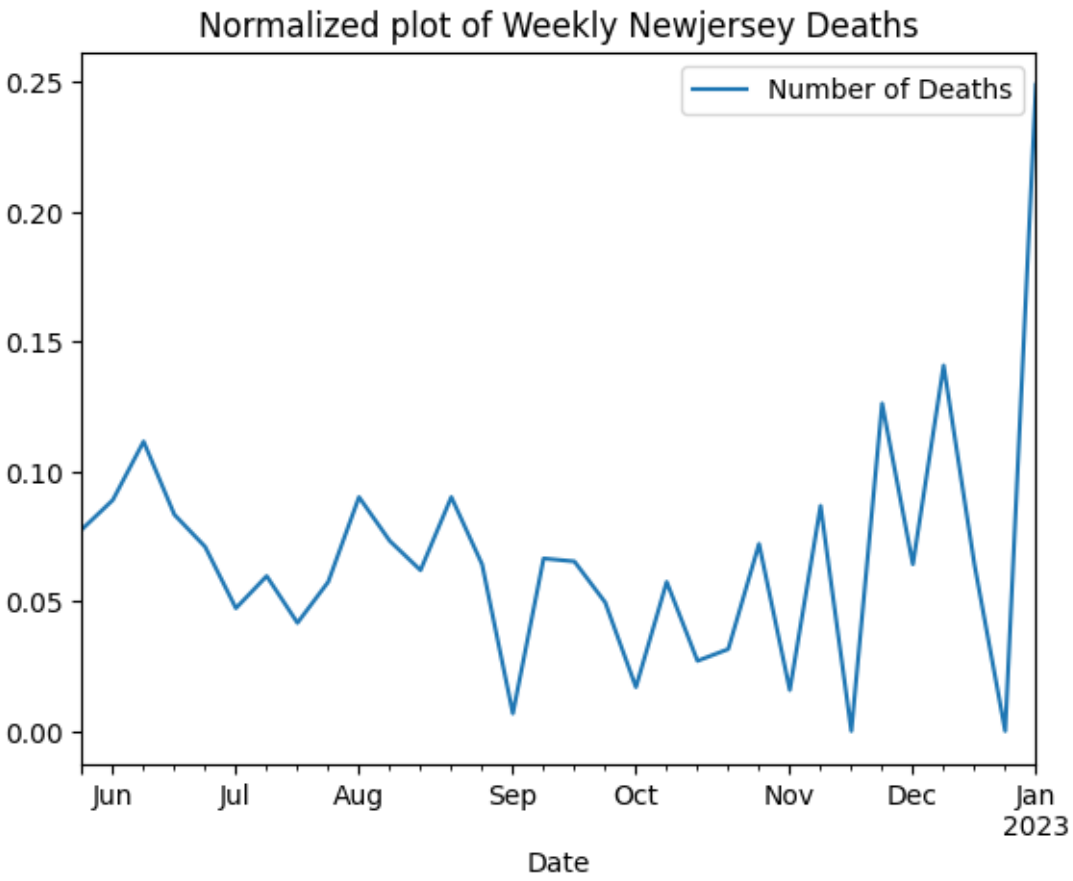
[41]:

	Date	Number of Deaths
0	2022-05-30	0.077684
1	2022-06-06	0.088942

```
2  2022-06-13          0.111459
3  2022-06-20          0.083313
4  2022-06-27          0.070928
5  2022-07-04          0.047286
6  2022-07-11          0.059670
7  2022-07-18          0.041656
8  2022-07-25          0.057418
9  2022-08-01          0.090068
10 2022-08-08          0.073180
11 2022-08-15          0.061922
12 2022-08-22          0.090068
13 2022-08-29          0.064173
14 2022-09-05          0.006755
15 2022-09-12          0.066425
16 2022-09-19          0.065299
17 2022-09-26          0.049537
18 2022-10-03          0.016888
19 2022-10-10          0.057418
20 2022-10-17          0.027020
21 2022-10-24          0.031524
22 2022-10-31          0.072054
23 2022-11-07          0.015762
24 2022-11-14          0.086690
25 2022-11-21          0.000000
26 2022-11-28          0.126095
27 2022-12-05          0.064173
28 2022-12-12          0.140731
29 2022-12-19          0.064173
30 2022-12-26          0.000000
31 2023-01-02          0.248813
```

[42]:
```
normalized_weekly_deaths_sum_selected_state_given_range_NJ.plot(x='Date',␣
↪y='Number of Deaths', title = 'Normalized plot of Weekly Newjersey Deaths')
```

[42]:
```
<AxesSubplot: title={'center': 'Normalized plot of Weekly Newjersey Deaths'},
xlabel='Date'>
```



[43]:
```
deaths_selected_state_MD = deaths_transpose[deaths_transpose["State"] ==␣
↪selected_state_MD].reset_index()
deaths_selected_state_MD.head()
```

[43]:

	index	countyFIPS	County Name	State	StateFIPS	Date	Number of Deaths
0	1214	24001	Allegany County	MD	24	2020-01-22	0
1	1215	24003	Anne Arundel County	MD	24	2020-01-22	0
2	1216	24005	Baltimore County	MD	24	2020-01-22	0
3	1217	24009	Calvert County	MD	24	2020-01-22	0
4	1218	24011	Caroline County	MD	24	2020-01-22	0

[44]:
```
#For the selected state Albama summing the deaths per day of all the counties.
deaths_selected_state_daily_MD = deaths_selected_state_MD.
 ↪groupby('Date')['Number of Deaths'].sum()
deaths_selected_state_daily_MD.head()
```

[44]:
```
Date
2020-01-22    0
2020-01-23    0
2020-01-24    0
2020-01-25    0
2020-01-26    0
Name: Number of Deaths, dtype: int64
```

[45]:
```
#Finding out the new cases per day.
new_deaths_selected_state_daily_MD = deaths_selected_state_daily_MD.diff().
 ↪reset_index()
new_deaths_selected_state_daily_MD.head()
```

[45]:

	Date	Number of Deaths
0	2020-01-22	NaN
1	2020-01-23	0.0
2	2020-01-24	0.0
3	2020-01-25	0.0
4	2020-01-26	0.0

[46]:
```
#Converting the daily to weekly analysis and finding the mean weekly.
weekly_deaths_mean_selected_state_MD = new_deaths_selected_state_daily_MD.copy()
weekly_deaths_mean_selected_state_MD['Date'] = pd.
 ↪to_datetime(weekly_deaths_mean_selected_state_MD['Date']) - pd.
 ↪to_timedelta(7, unit='d')
weekly_deaths_mean_selected_state_MD = weekly_deaths_mean_selected_state_MD.
 ↪groupby([pd.Grouper(key='Date', freq='W-SUN')])['Number of Deaths'].mean()
weekly_deaths_mean_selected_state_MD = weekly_deaths_mean_selected_state_MD.
 ↪reset_index()
weekly_deaths_mean_selected_state_MD.head()
```

[46]:

	Date	Number of Deaths
0	2020-01-19	0.0
1	2020-01-26	0.0
2	2020-02-02	0.0
3	2020-02-09	0.0
4	2020-02-16	0.0

[47]:
```
#considering the given range of dates starting from monday. and weekly analsis␣
 ↪from monday to sunday.
```

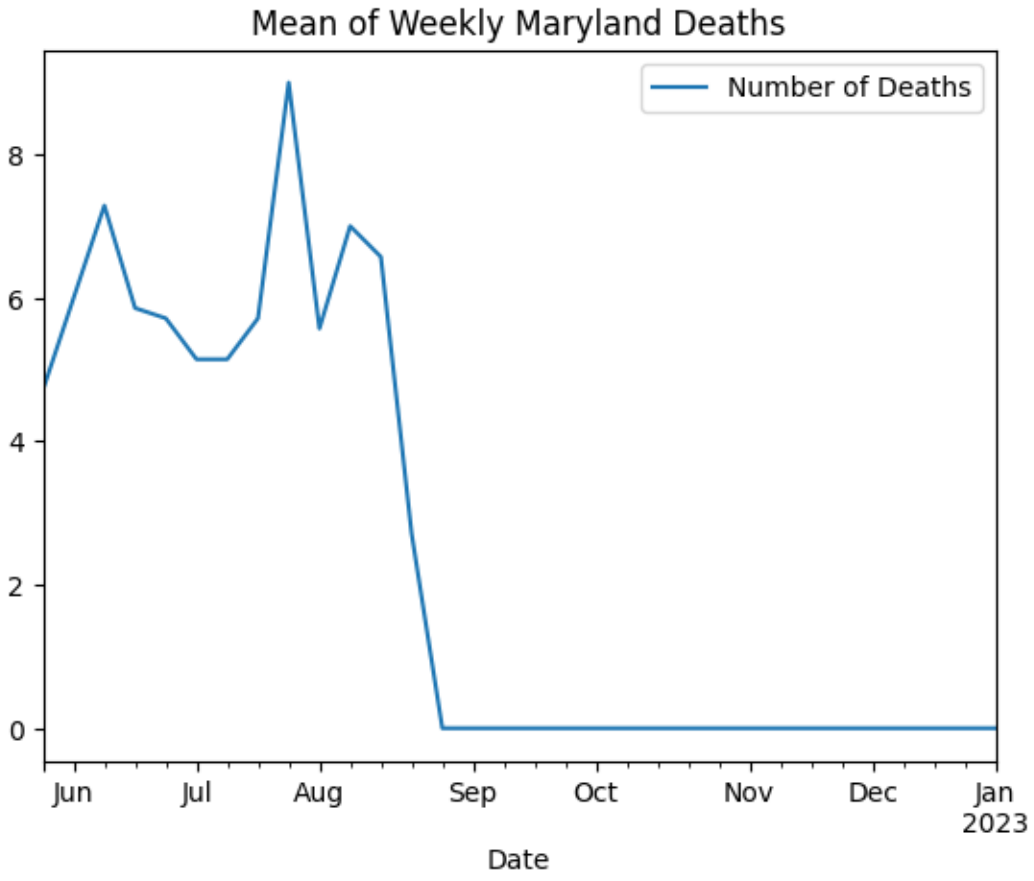
```
weekly_deaths_mean_selected_state_given_range_MD =␣
↪weekly_deaths_mean_selected_state_MD[(weekly_deaths_mean_selected_state_MD["Date"]␣
↪>= '2022-05-29') & (weekly_deaths_mean_selected_state_MD["Date"] <=␣
↪'2023-01-02')]
weekly_deaths_mean_selected_state_given_range_MD =␣
↪weekly_deaths_mean_selected_state_given_range_MD.sort_values(by=['Date']).
↪reset_index(drop=True)
weekly_deaths_mean_selected_state_given_range_MD['Date'] =␣
↪weekly_deaths_mean_selected_state_given_range_MD['Date'] + pd.
↪to_timedelta(1, unit='d')
weekly_deaths_mean_selected_state_given_range_MD
```

[47]:

	Date	Number of Deaths
0	2022-05-30	4.714286
1	2022-06-06	6.000000
2	2022-06-13	7.285714
3	2022-06-20	5.857143
4	2022-06-27	5.714286
5	2022-07-04	5.142857
6	2022-07-11	5.142857
7	2022-07-18	5.714286
8	2022-07-25	9.000000
9	2022-08-01	5.571429
10	2022-08-08	7.000000
11	2022-08-15	6.571429
12	2022-08-22	2.714286
13	2022-08-29	0.000000
14	2022-09-05	0.000000
15	2022-09-12	0.000000
16	2022-09-19	0.000000
17	2022-09-26	0.000000
18	2022-10-03	0.000000
19	2022-10-10	0.000000
20	2022-10-17	0.000000
21	2022-10-24	0.000000
22	2022-10-31	0.000000
23	2022-11-07	0.000000
24	2022-11-14	0.000000
25	2022-11-21	0.000000
26	2022-11-28	0.000000
27	2022-12-05	0.000000
28	2022-12-12	0.000000
29	2022-12-19	0.000000
30	2022-12-26	0.000000
31	2023-01-02	0.000000

[48]:
```
#Plotting the mean graph
weekly_deaths_mean_selected_state_given_range_MD.plot(x='Date', y='Number of␣
 ↪Deaths', title = 'Mean of Weekly Maryland Deaths')
```

[48]:
```
<AxesSubplot: title={'center': 'Mean of Weekly Maryland Deaths'}, xlabel='Date'>
```



[49]:
```
#Converting the daily to weekly analysis and finding the median weekly.
weekly_deaths_median_selected_state_MD = new_deaths_selected_state_daily_MD.
 ↪copy()
weekly_deaths_median_selected_state_MD['Date'] = pd.
 ↪to_datetime(weekly_deaths_median_selected_state_MD['Date']) - pd.
 ↪to_timedelta(7, unit='d')
weekly_deaths_median_selected_state_MD = weekly_deaths_median_selected_state_MD.
 ↪groupby([pd.Grouper(key='Date', freq='W-SUN')])['Number of Deaths'].median()
weekly_deaths_median_selected_state_MD = weekly_deaths_median_selected_state_MD.
 ↪reset_index()
weekly_deaths_median_selected_state_MD.head()
```

[49]:
```
         Date  Number of Deaths
0 2020-01-19               0.0
1 2020-01-26               0.0
2 2020-02-02               0.0
3 2020-02-09               0.0
4 2020-02-16               0.0
```

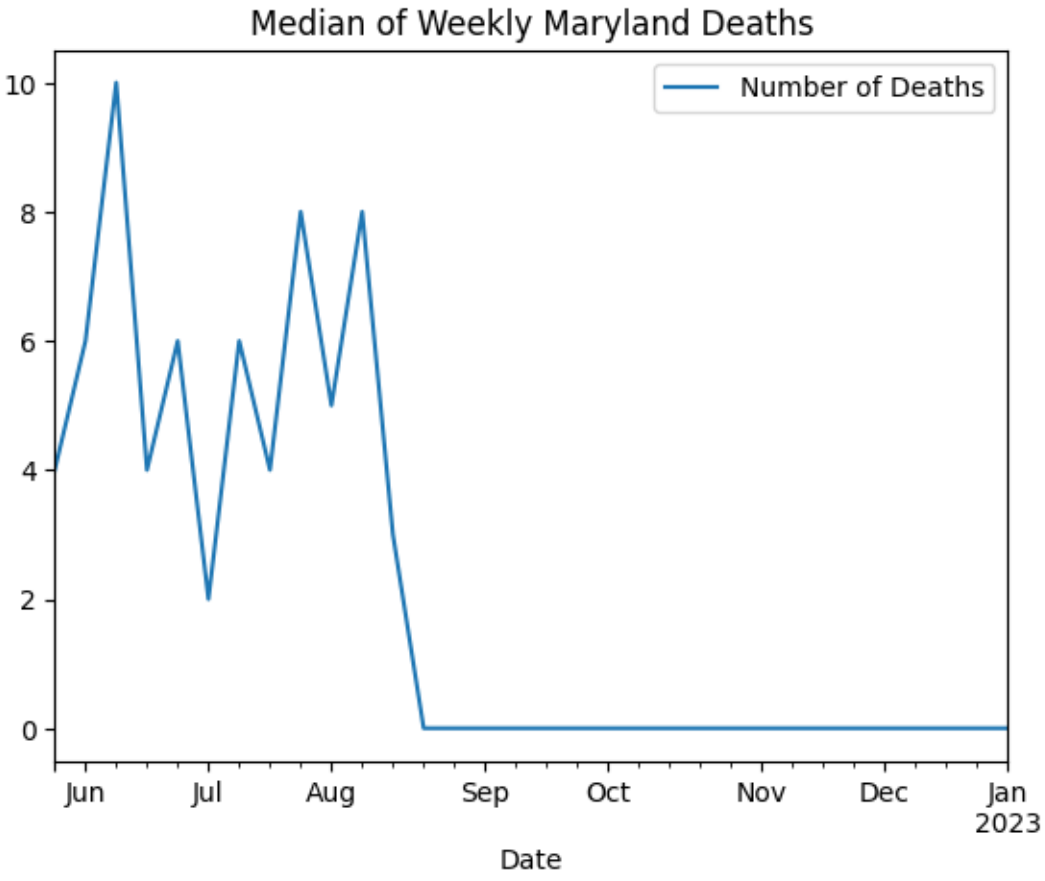
[50]:
```
#considering the given range of dates starting from monday. and weekly analsis␣
↪from monday to sunday.
weekly_deaths_median_selected_state_given_range_MD =␣
↪weekly_deaths_median_selected_state_MD[(weekly_deaths_median_selected_state_MD["Date"]␣
↪>= '2022-05-29') & (weekly_deaths_median_selected_state_MD["Date"] <=␣
↪'2023-01-02')]
weekly_deaths_median_selected_state_given_range_MD =␣
↪weekly_deaths_median_selected_state_given_range_MD.sort_values(by=['Date']).
↪reset_index(drop=True)
weekly_deaths_median_selected_state_given_range_MD['Date'] =␣
↪weekly_deaths_median_selected_state_given_range_MD['Date'] + pd.
↪to_timedelta(1, unit='d')
weekly_deaths_median_selected_state_given_range_MD
```

[50]:
```
          Date  Number of Deaths
0   2022-05-30               4.0
1   2022-06-06               6.0
2   2022-06-13              10.0
3   2022-06-20               4.0
4   2022-06-27               6.0
5   2022-07-04               2.0
6   2022-07-11               6.0
7   2022-07-18               4.0
8   2022-07-25               8.0
9   2022-08-01               5.0
10  2022-08-08               8.0
11  2022-08-15               3.0
12  2022-08-22               0.0
13  2022-08-29               0.0
14  2022-09-05               0.0
15  2022-09-12               0.0
16  2022-09-19               0.0
17  2022-09-26               0.0
18  2022-10-03               0.0
19  2022-10-10               0.0
20  2022-10-17               0.0
21  2022-10-24               0.0
22  2022-10-31               0.0
23  2022-11-07               0.0
24  2022-11-14               0.0
```

```
25 2022-11-21                0.0
26 2022-11-28                0.0
27 2022-12-05                0.0
28 2022-12-12                0.0
29 2022-12-19                0.0
30 2022-12-26                0.0
31 2023-01-02                0.0
```

[51]:
```
#Plotting the median graph
weekly_deaths_median_selected_state_given_range_MD.plot(x='Date', y='Number of␣
↪Deaths', title = 'Median of Weekly Maryland Deaths')
```

[51]:
```
<AxesSubplot: title={'center': 'Median of Weekly Maryland Deaths'},
xlabel='Date'>
```



[52]:
```
#Converting the daily to weekly analysis and finding the mode weekly.
weekly_deaths_mode_selected_state_MD = new_deaths_selected_state_daily_MD.copy()
```

```
weekly_deaths_mode_selected_state_MD['Date'] = pd.
 ↪to_datetime(weekly_deaths_mode_selected_state_MD['Date']) - pd.
 ↪to_timedelta(7, unit='d')
weekly_deaths_mode_selected_state_MD = weekly_deaths_mode_selected_state_MD.
 ↪groupby([pd.Grouper(key='Date', freq='W-SUN')])['Number of Deaths'].
 ↪apply(statistics.mode)
weekly_deaths_mode_selected_state_MD = weekly_deaths_mode_selected_state_MD.
 ↪reset_index()
weekly_deaths_mode_selected_state_MD.head()
```

[52]:

	Date	Number of Deaths
0	2020-01-19	0.0
1	2020-01-26	0.0
2	2020-02-02	0.0
3	2020-02-09	0.0
4	2020-02-16	0.0

[53]:
```
#considering the given range of dates starting from monday. and weekly analsis␣
 ↪from monday to sunday.
weekly_deaths_mode_selected_state_given_range_MD =␣
 ↪weekly_deaths_mode_selected_state_MD[(weekly_deaths_mode_selected_state_MD["Date"]␣
 ↪>= '2022-05-29') & (weekly_deaths_mode_selected_state_MD["Date"] <=␣
 ↪'2023-01-02')]
weekly_deaths_mode_selected_state_given_range_MD =␣
 ↪weekly_deaths_mode_selected_state_given_range_MD.sort_values(by=['Date']).
 ↪reset_index(drop=True)
weekly_deaths_mode_selected_state_given_range_MD['Date'] =␣
 ↪weekly_deaths_mode_selected_state_given_range_MD['Date'] + pd.
 ↪to_timedelta(1, unit='d')
weekly_deaths_mode_selected_state_given_range_MD
```

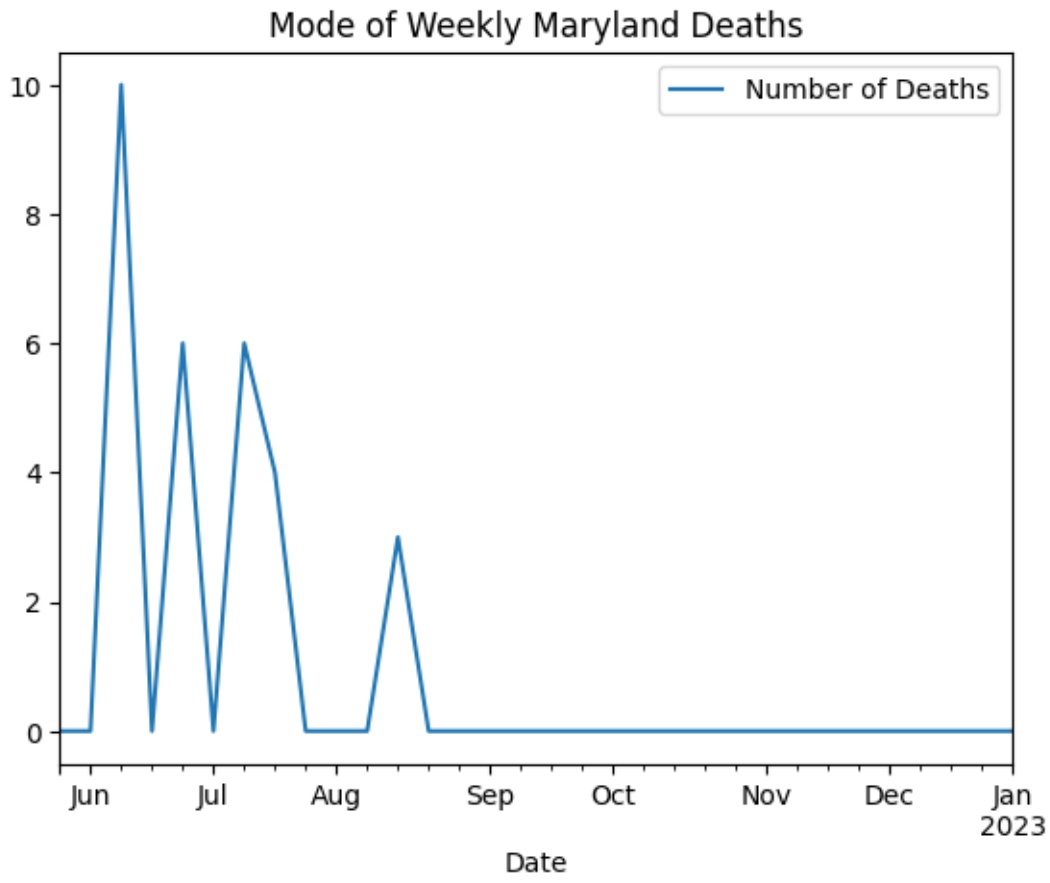
[53]:

	Date	Number of Deaths
0	2022-05-30	0.0
1	2022-06-06	0.0
2	2022-06-13	10.0
3	2022-06-20	0.0
4	2022-06-27	6.0
5	2022-07-04	0.0
6	2022-07-11	6.0
7	2022-07-18	4.0
8	2022-07-25	0.0
9	2022-08-01	0.0
10	2022-08-08	0.0
11	2022-08-15	3.0
12	2022-08-22	0.0
13	2022-08-29	0.0

```
14 2022-09-05              0.0
15 2022-09-12              0.0
16 2022-09-19              0.0
17 2022-09-26              0.0
18 2022-10-03              0.0
19 2022-10-10              0.0
20 2022-10-17              0.0
21 2022-10-24              0.0
22 2022-10-31              0.0
23 2022-11-07              0.0
24 2022-11-14              0.0
25 2022-11-21              0.0
26 2022-11-28              0.0
27 2022-12-05              0.0
28 2022-12-12              0.0
29 2022-12-19              0.0
30 2022-12-26              0.0
31 2023-01-02              0.0
```

[54]:
```
#Plottinf the mode graph
weekly_deaths_mode_selected_state_given_range_MD.plot(x='Date', y='Number of␣
↪Deaths', title = 'Mode of Weekly Maryland Deaths')
```

[54]:
```
<AxesSubplot: title={'center': 'Mode of Weekly Maryland Deaths'}, xlabel='Date'>
```



[55]:
```
#Converting the daily to weekly analysis and finding the weekly sum of cases.
weekly_deaths_sum_selected_state_MD = new_deaths_selected_state_daily_MD.copy()
weekly_deaths_sum_selected_state_MD['Date'] = pd.
 ↪to_datetime(weekly_deaths_sum_selected_state_MD['Date']) - pd.
 ↪to_timedelta(7, unit='d')
weekly_deaths_sum_selected_state_MD = weekly_deaths_sum_selected_state_MD.
 ↪groupby([pd.Grouper(key='Date', freq='W-SUN')])['Number of Deaths'].sum()
weekly_deaths_sum_selected_state_MD = weekly_deaths_sum_selected_state_MD.
 ↪reset_index()
weekly_deaths_sum_selected_state_MD.head()
```

[55]:

	Date	Number of Deaths
0	2020-01-19	0.0
1	2020-01-26	0.0
2	2020-02-02	0.0
3	2020-02-09	0.0
4	2020-02-16	0.0

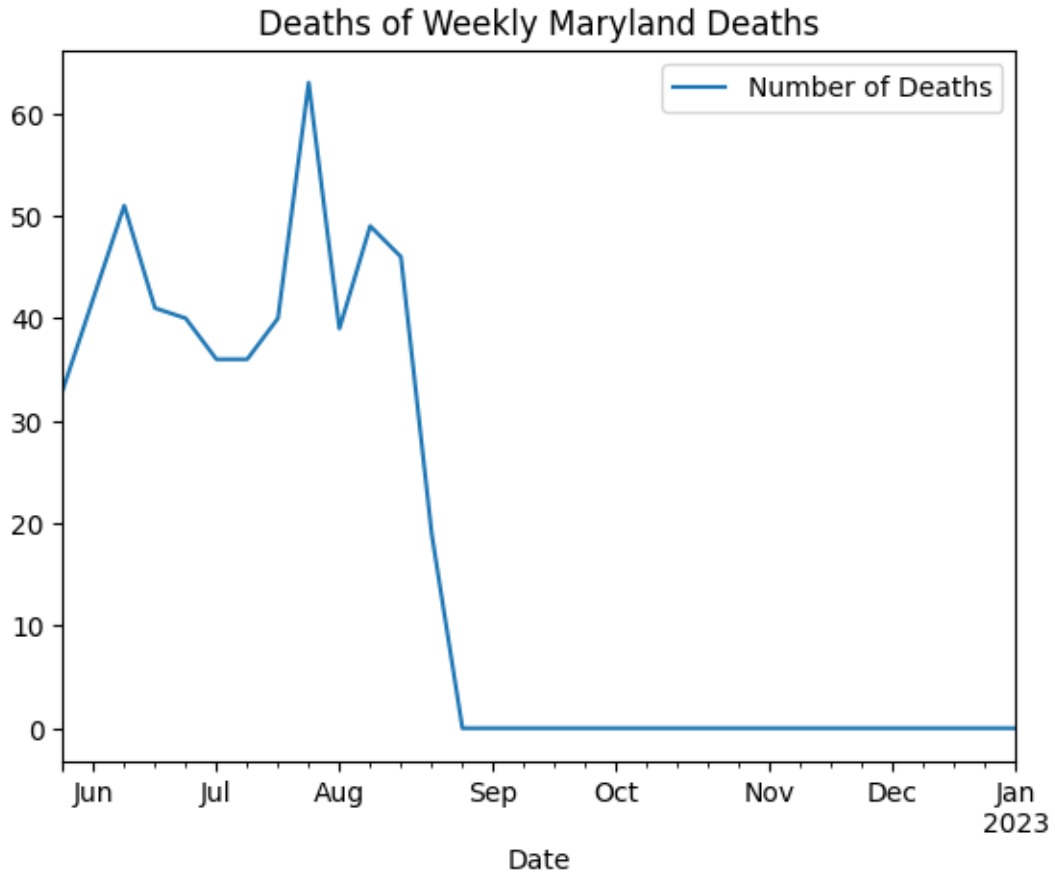
[56]:
```
#Adding one day so that we get weekly analysis from monday to sunday and weekly␣
↪analsis from monday to sunday.
weekly_deaths_sum_selected_state_given_range_MD =␣
↪weekly_deaths_sum_selected_state_MD[(weekly_deaths_sum_selected_state_MD["Date"]␣
↪>= '2022-05-29') & (weekly_deaths_sum_selected_state_MD["Date"] <=␣
↪'2023-01-02')]
weekly_deaths_sum_selected_state_given_range_MD =␣
↪weekly_deaths_sum_selected_state_given_range_MD.sort_values(by=['Date']).
↪reset_index(drop=True)
weekly_deaths_sum_selected_state_given_range_MD['Date'] =␣
↪weekly_deaths_sum_selected_state_given_range_MD['Date'] + pd.to_timedelta(1,␣
↪unit='d')
weekly_deaths_sum_selected_state_given_range_MD
```

[56]:

	Date	Number of Deaths
0	2022-05-30	33.0
1	2022-06-06	42.0
2	2022-06-13	51.0
3	2022-06-20	41.0
4	2022-06-27	40.0
5	2022-07-04	36.0
6	2022-07-11	36.0
7	2022-07-18	40.0
8	2022-07-25	63.0
9	2022-08-01	39.0
10	2022-08-08	49.0
11	2022-08-15	46.0
12	2022-08-22	19.0
13	2022-08-29	0.0
14	2022-09-05	0.0
15	2022-09-12	0.0
16	2022-09-19	0.0
17	2022-09-26	0.0
18	2022-10-03	0.0
19	2022-10-10	0.0
20	2022-10-17	0.0
21	2022-10-24	0.0
22	2022-10-31	0.0
23	2022-11-07	0.0
24	2022-11-14	0.0
25	2022-11-21	0.0
26	2022-11-28	0.0
27	2022-12-05	0.0
28	2022-12-12	0.0
29	2022-12-19	0.0
30	2022-12-26	0.0
31	2023-01-02	0.0

[57]:
```
weekly_deaths_sum_selected_state_given_range_MD.plot(x='Date', y='Number of␣
↪Deaths', title = 'Deaths of Weekly Maryland Deaths')
```

[57]:
```
<AxesSubplot: title={'center': 'Deaths of Weekly Maryland Deaths'},
xlabel='Date'>
```



0.1.3 week starting with 2022-07-25 has a peak of deaths in maryland state with value 63. Due to independence day holiday on 4th of july maybe cases have increased and after two weeks the deaths got affected.

[58]:
```
#Filtering the population for ARIZONA state
population_selected_state_MD = population[population["State"] ==␣
↪selected_state_MD].reset_index()
del population_selected_state_MD[population_selected_state_MD.columns[0]]

population_selected_state_MD
```

[58]:

	countyFIPS	County Name	State	population
0	0	Statewide Unallocated	MD	0
1	24001	Allegany County	MD	70416
2	24003	Anne Arundel County	MD	579234
3	24005	Baltimore County	MD	827370
4	24009	Calvert County	MD	92525
5	24011	Caroline County	MD	33406
6	24013	Carroll County	MD	168447
7	24015	Cecil County	MD	102855
8	24017	Charles County	MD	163257
9	24019	Dorchester County	MD	31929
10	24021	Frederick County	MD	259547
11	24023	Garrett County	MD	29014
12	24025	Harford County	MD	255441
13	24027	Howard County	MD	325690
14	24029	Kent County	MD	19422
15	24031	Montgomery County	MD	1050688
16	24033	Prince George's County	MD	909327
17	24035	Queen Anne's County	MD	50381
18	24037	St. Mary's County	MD	113510
19	24039	Somerset County	MD	25616
20	24041	Talbot County	MD	37181
21	24043	Washington County	MD	151049
22	24045	Wicomico County	MD	103609
23	24047	Worcester County	MD	52276
24	24510	Baltimore City	MD	593490

[59]:
```
#For the Albama state summing the population.
population_selected_state_MD = population_selected_state_MD.
 ↪groupby('State')['population'].sum()
population_selected_state_MD
```

[59]:
```
State
MD    6045680
Name: population, dtype: int64
```

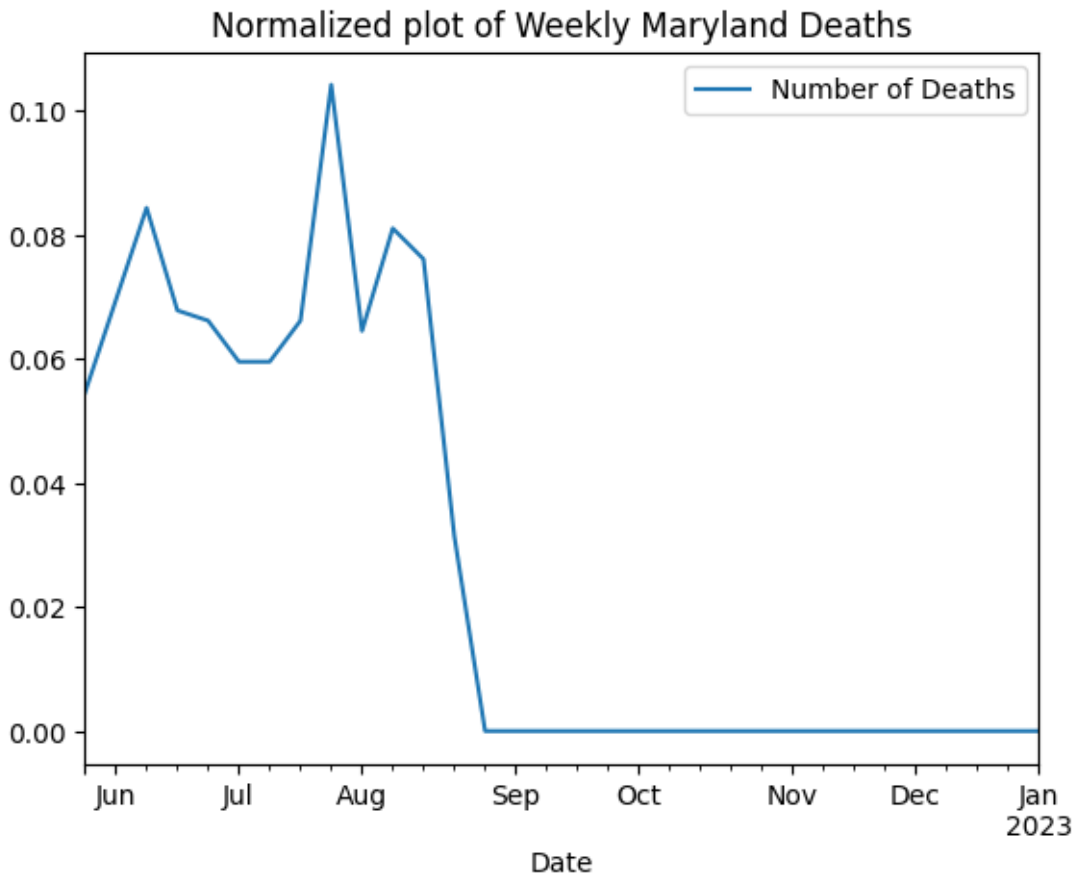
[60]:
```
#normalizing by population and using normalization factor to identify cases
normalized_weekly_deaths_sum_selected_state_given_range_MD =␣
 ↪weekly_deaths_sum_selected_state_given_range_MD.copy()
normalized_weekly_deaths_sum_selected_state_given_range_MD['Number of Deaths']␣
 ↪= normalized_weekly_deaths_sum_selected_state_given_range_MD['Number of␣
 ↪Deaths'].mul(10000)
normalized_weekly_deaths_sum_selected_state_given_range_MD['Number of Deaths']␣
 ↪= normalized_weekly_deaths_sum_selected_state_given_range_MD['Number of␣
 ↪Deaths'].div(6045680)
normalized_weekly_deaths_sum_selected_state_given_range_MD
```

[60]:

	Date	Number of Deaths
0	2022-05-30	0.054584
1	2022-06-06	0.069471
2	2022-06-13	0.084358
3	2022-06-20	0.067817
4	2022-06-27	0.066163
5	2022-07-04	0.059547
6	2022-07-11	0.059547
7	2022-07-18	0.066163
8	2022-07-25	0.104207
9	2022-08-01	0.064509
10	2022-08-08	0.081050
11	2022-08-15	0.076087
12	2022-08-22	0.031427
13	2022-08-29	0.000000
14	2022-09-05	0.000000
15	2022-09-12	0.000000
16	2022-09-19	0.000000
17	2022-09-26	0.000000
18	2022-10-03	0.000000
19	2022-10-10	0.000000
20	2022-10-17	0.000000
21	2022-10-24	0.000000
22	2022-10-31	0.000000
23	2022-11-07	0.000000
24	2022-11-14	0.000000
25	2022-11-21	0.000000
26	2022-11-28	0.000000
27	2022-12-05	0.000000
28	2022-12-12	0.000000
29	2022-12-19	0.000000
30	2022-12-26	0.000000
31	2023-01-02	0.000000

[61]:
```
normalized_weekly_deaths_sum_selected_state_given_range_MD.plot(x='Date',␣
↪y='Number of Deaths', title = 'Normalized plot of Weekly Maryland Deaths')
```

[61]:
```
<AxesSubplot: title={'center': 'Normalized plot of Weekly Maryland Deaths'},
xlabel='Date'>
```



[62]:
```
deaths_selected_state_NC = deaths_transpose[deaths_transpose["State"] ==␣
↪selected_state_NC].reset_index()
deaths_selected_state_NC.head()
```

[62]:

	index	countyFIPS	County Name	State	StateFIPS	Date	Number of Deaths
0	1924	37001	Alamance County	NC	37	2020-01-22	0
1	1925	37003	Alexander County	NC	37	2020-01-22	0
2	1926	37005	Alleghany County	NC	37	2020-01-22	0
3	1927	37007	Anson County	NC	37	2020-01-22	0
4	1928	37009	Ashe County	NC	37	2020-01-22	0

[63]:
```
#For the selected state Albama summing the deaths per day of all the counties.
deaths_selected_state_daily_NC = deaths_selected_state_NC.
 ↪groupby('Date')['Number of Deaths'].sum()
deaths_selected_state_daily_NC.head()
```

[63]:
```
Date
2020-01-22    0
2020-01-23    0
2020-01-24    0
2020-01-25    0
2020-01-26    0
Name: Number of Deaths, dtype: int64
```

[64]:
```
#Finding out the new cases per day.
new_deaths_selected_state_daily_NC = deaths_selected_state_daily_NC.diff().
 ↪reset_index()
new_deaths_selected_state_daily_NC.head()
```

[64]:

	Date	Number of Deaths
0	2020-01-22	NaN
1	2020-01-23	0.0
2	2020-01-24	0.0
3	2020-01-25	0.0
4	2020-01-26	0.0

[65]:
```
#Converting the daily to weekly analysis and finding the mean weekly.
weekly_deaths_mean_selected_state_NC = new_deaths_selected_state_daily_NC.copy()
weekly_deaths_mean_selected_state_NC['Date'] = pd.
 ↪to_datetime(weekly_deaths_mean_selected_state_NC['Date']) - pd.
 ↪to_timedelta(7, unit='d')
weekly_deaths_mean_selected_state_NC = weekly_deaths_mean_selected_state_NC.
 ↪groupby([pd.Grouper(key='Date', freq='W-SUN')])['Number of Deaths'].mean()
weekly_deaths_mean_selected_state_NC = weekly_deaths_mean_selected_state_NC.
 ↪reset_index()
weekly_deaths_mean_selected_state_NC.head()
```

[65]:

	Date	Number of Deaths
0	2020-01-19	0.0
1	2020-01-26	0.0
2	2020-02-02	0.0
3	2020-02-09	0.0
4	2020-02-16	0.0

[66]:
```
#considering the given range of dates starting from monday. and weekly analsis␣
 ↪from monday to sunday.
```

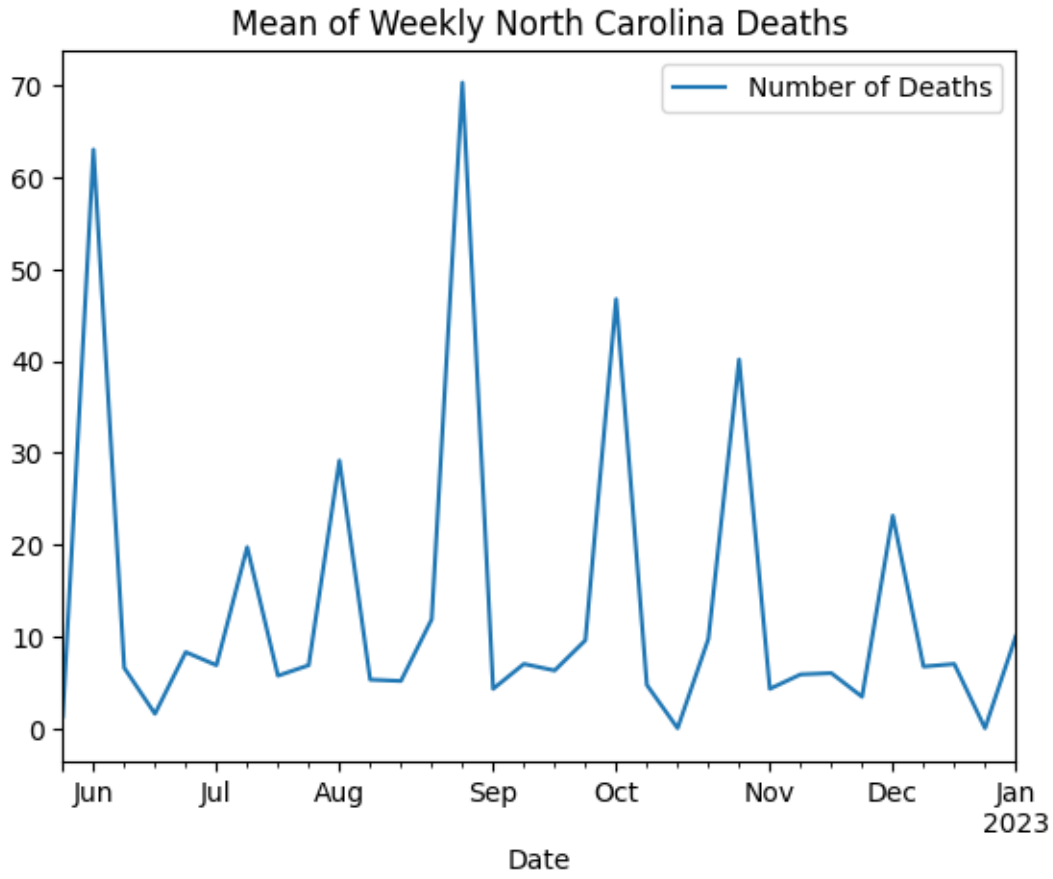
```
weekly_deaths_mean_selected_state_given_range_NC =␣
↪weekly_deaths_mean_selected_state_NC[(weekly_deaths_mean_selected_state_NC["Date"]␣
↪>= '2022-05-29') & (weekly_deaths_mean_selected_state_NC["Date"] <=␣
↪'2023-01-02')]
weekly_deaths_mean_selected_state_given_range_NC =␣
↪weekly_deaths_mean_selected_state_given_range_NC.sort_values(by=['Date']).
↪reset_index(drop=True)
weekly_deaths_mean_selected_state_given_range_NC['Date'] =␣
↪weekly_deaths_mean_selected_state_given_range_NC['Date'] + pd.
↪to_timedelta(1, unit='d')
weekly_deaths_mean_selected_state_given_range_NC
```

[66]:

	Date	Number of Deaths
0	2022-05-30	1.285714
1	2022-06-06	63.000000
2	2022-06-13	6.571429
3	2022-06-20	1.571429
4	2022-06-27	8.285714
5	2022-07-04	6.857143
6	2022-07-11	19.714286
7	2022-07-18	5.714286
8	2022-07-25	6.857143
9	2022-08-01	29.142857
10	2022-08-08	5.285714
11	2022-08-15	5.142857
12	2022-08-22	11.857143
13	2022-08-29	70.285714
14	2022-09-05	4.285714
15	2022-09-12	7.000000
16	2022-09-19	6.285714
17	2022-09-26	9.571429
18	2022-10-03	46.714286
19	2022-10-10	4.714286
20	2022-10-17	0.000000
21	2022-10-24	9.714286
22	2022-10-31	40.142857
23	2022-11-07	4.285714
24	2022-11-14	5.857143
25	2022-11-21	6.000000
26	2022-11-28	3.428571
27	2022-12-05	23.142857
28	2022-12-12	6.714286
29	2022-12-19	7.000000
30	2022-12-26	0.000000
31	2023-01-02	10.000000

[67]:
```
weekly_deaths_mean_selected_state_given_range_NC.plot(x='Date', y='Number of␣
↪Deaths', title = 'Mean of Weekly North Carolina Deaths')
```

[67]:
```
<AxesSubplot: title={'center': 'Mean of Weekly North Carolina Deaths'},
xlabel='Date'>
```



[68]:
```
#Converting the daily to weekly analysis and finding the median weekly.
weekly_deaths_median_selected_state_NC = new_deaths_selected_state_daily_NC.
↪copy()
weekly_deaths_median_selected_state_NC['Date'] = pd.
↪to_datetime(weekly_deaths_median_selected_state_NC['Date']) - pd.
↪to_timedelta(7, unit='d')
weekly_deaths_median_selected_state_NC = weekly_deaths_median_selected_state_NC.
↪groupby([pd.Grouper(key='Date', freq='W-SUN')])['Number of Deaths'].median()
weekly_deaths_median_selected_state_NC = weekly_deaths_median_selected_state_NC.
↪reset_index()
weekly_deaths_median_selected_state_NC.head()
```

[68]:
```
         Date  Number of Deaths
0 2020-01-19               0.0
1 2020-01-26               0.0
2 2020-02-02               0.0
3 2020-02-09               0.0
4 2020-02-16               0.0
```

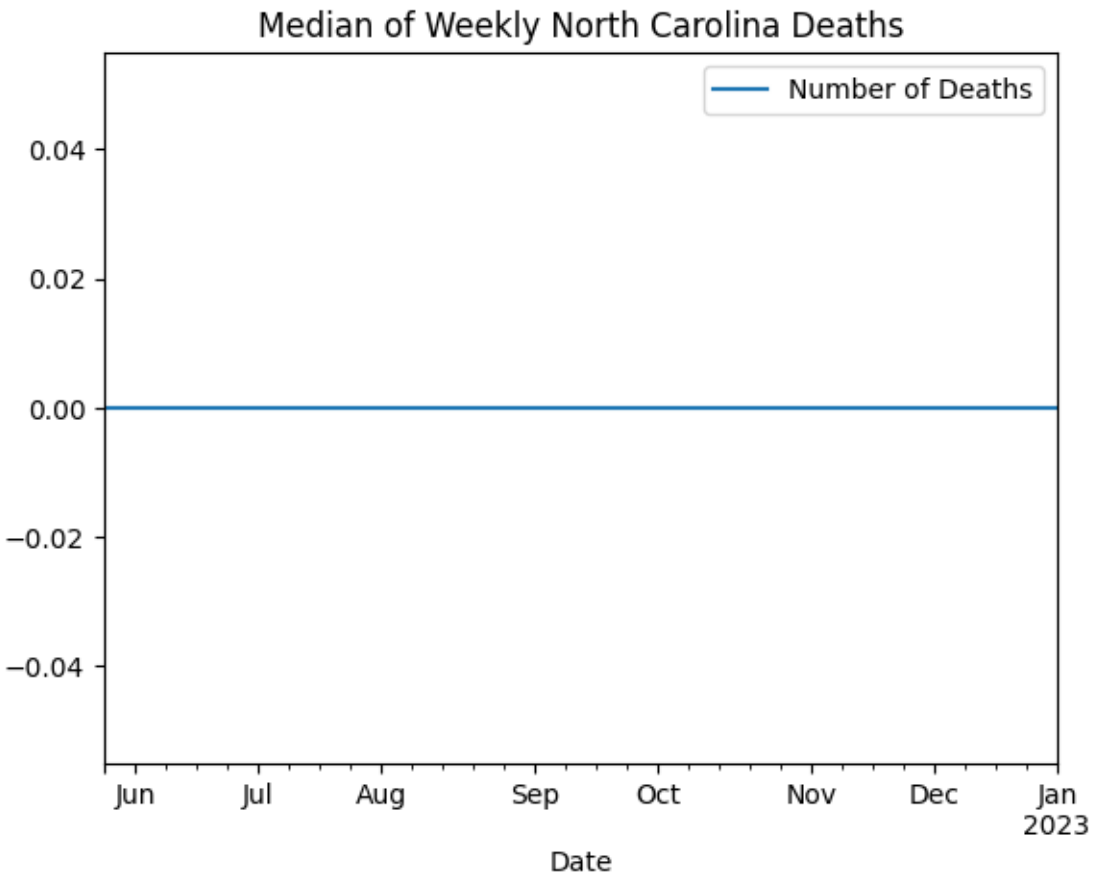
[69]:
```
#considering the given range of dates starting from monday. and weekly analsis␣
↪from monday to sunday.
weekly_deaths_median_selected_state_given_range_NC =␣
↪weekly_deaths_median_selected_state_NC[(weekly_deaths_median_selected_state_NC["Date"]␣
↪>= '2022-05-29') & (weekly_deaths_median_selected_state_NC["Date"] <=␣
↪'2023-01-02')]
weekly_deaths_median_selected_state_given_range_NC =␣
↪weekly_deaths_median_selected_state_given_range_NC.sort_values(by=['Date']).
↪reset_index(drop=True)
weekly_deaths_median_selected_state_given_range_NC['Date'] =␣
↪weekly_deaths_median_selected_state_given_range_NC['Date'] + pd.
↪to_timedelta(1, unit='d')
weekly_deaths_median_selected_state_given_range_NC
```

[69]:
```
         Date  Number of Deaths
0  2022-05-30               0.0
1  2022-06-06               0.0
2  2022-06-13               0.0
3  2022-06-20               0.0
4  2022-06-27               0.0
5  2022-07-04               0.0
6  2022-07-11               0.0
7  2022-07-18               0.0
8  2022-07-25               0.0
9  2022-08-01               0.0
10 2022-08-08               0.0
11 2022-08-15               0.0
12 2022-08-22               0.0
13 2022-08-29               0.0
14 2022-09-05               0.0
15 2022-09-12               0.0
16 2022-09-19               0.0
17 2022-09-26               0.0
18 2022-10-03               0.0
19 2022-10-10               0.0
20 2022-10-17               0.0
21 2022-10-24               0.0
22 2022-10-31               0.0
23 2022-11-07               0.0
24 2022-11-14               0.0
```

```
25 2022-11-21                0.0
26 2022-11-28                0.0
27 2022-12-05                0.0
28 2022-12-12                0.0
29 2022-12-19                0.0
30 2022-12-26                0.0
31 2023-01-02                0.0
```

[70]:
```
weekly_deaths_median_selected_state_given_range_NC.plot(x='Date', y='Number of␣
↪Deaths', title = 'Median of Weekly North Carolina Deaths')
```

[70]:
```
<AxesSubplot: title={'center': 'Median of Weekly North Carolina Deaths'},
xlabel='Date'>
```



[71]:
```
#Converting the daily to weekly analysis and finding the mode weekly.
weekly_deaths_mode_selected_state_NC = new_deaths_selected_state_daily_NC.copy()
weekly_deaths_mode_selected_state_NC['Date'] = pd.
↪to_datetime(weekly_deaths_mode_selected_state_NC['Date']) - pd.
↪to_timedelta(7, unit='d')
```

```
weekly_deaths_mode_selected_state_NC = weekly_deaths_mode_selected_state_NC.
 ↪groupby([pd.Grouper(key='Date', freq='W-SUN')])['Number of Deaths'].
 ↪apply(statistics.mode)
weekly_deaths_mode_selected_state_NC = weekly_deaths_mode_selected_state_NC.
 ↪reset_index()
weekly_deaths_mode_selected_state_NC.head()
```

[71]:

	Date	Number of Deaths
0	2020-01-19	0.0
1	2020-01-26	0.0
2	2020-02-02	0.0
3	2020-02-09	0.0
4	2020-02-16	0.0

[72]:
```
#considering the given range of dates starting from monday. and weekly analsis␣
 ↪from monday to sunday.
weekly_deaths_mode_selected_state_given_range_NC =␣
 ↪weekly_deaths_mode_selected_state_NC[(weekly_deaths_mode_selected_state_NC["Date"]␣
 ↪>= '2022-05-29') & (weekly_deaths_mode_selected_state_NC["Date"] <=␣
 ↪'2023-01-02')]
weekly_deaths_mode_selected_state_given_range_NC =␣
 ↪weekly_deaths_mode_selected_state_given_range_NC.sort_values(by=['Date']).
 ↪reset_index(drop=True)
weekly_deaths_mode_selected_state_given_range_NC['Date'] =␣
 ↪weekly_deaths_mode_selected_state_given_range_NC['Date'] + pd.
 ↪to_timedelta(1, unit='d')
weekly_deaths_mode_selected_state_given_range_NC
```

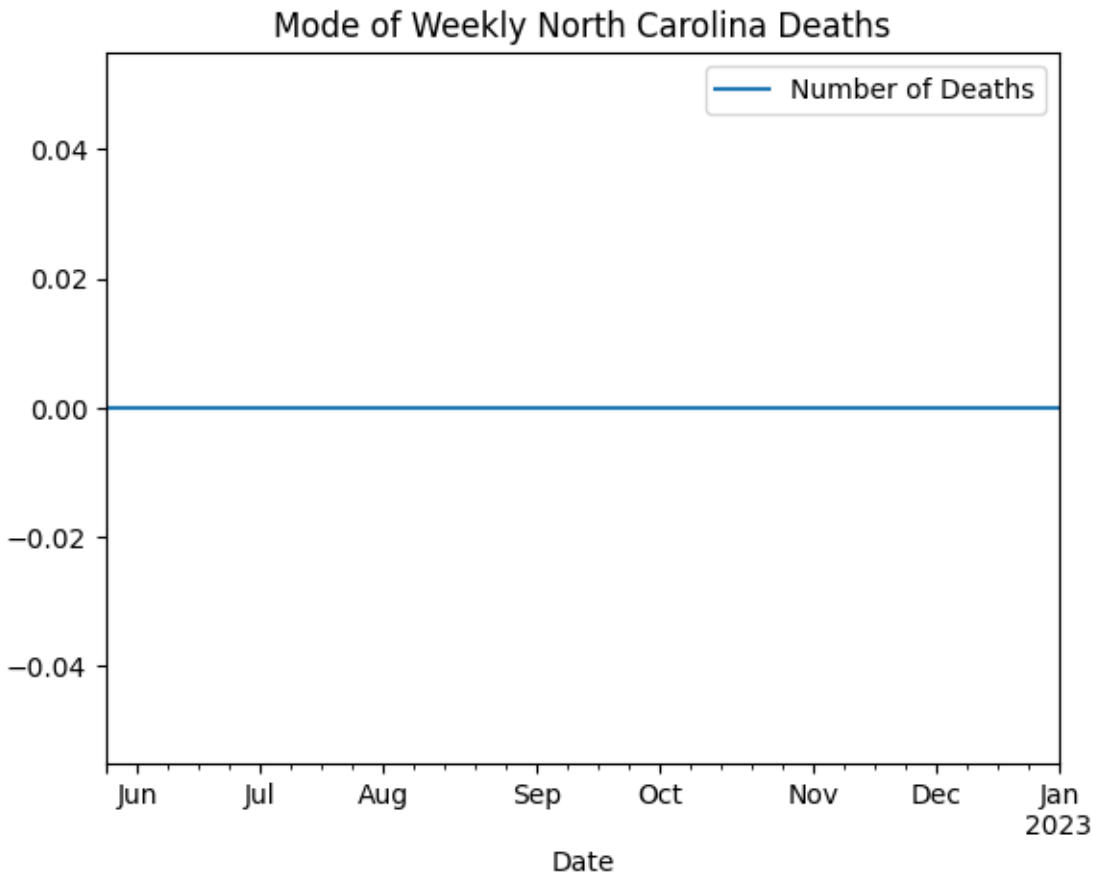
[72]:

	Date	Number of Deaths
0	2022-05-30	0.0
1	2022-06-06	0.0
2	2022-06-13	0.0
3	2022-06-20	0.0
4	2022-06-27	0.0
5	2022-07-04	0.0
6	2022-07-11	0.0
7	2022-07-18	0.0
8	2022-07-25	0.0
9	2022-08-01	0.0
10	2022-08-08	0.0
11	2022-08-15	0.0
12	2022-08-22	0.0
13	2022-08-29	0.0
14	2022-09-05	0.0
15	2022-09-12	0.0
16	2022-09-19	0.0
17	2022-09-26	0.0

```
18 2022-10-03                0.0
19 2022-10-10                0.0
20 2022-10-17                0.0
21 2022-10-24                0.0
22 2022-10-31                0.0
23 2022-11-07                0.0
24 2022-11-14                0.0
25 2022-11-21                0.0
26 2022-11-28                0.0
27 2022-12-05                0.0
28 2022-12-12                0.0
29 2022-12-19                0.0
30 2022-12-26                0.0
31 2023-01-02                0.0
```

[73]:
```
weekly_deaths_mode_selected_state_given_range_NC.plot(x='Date', y='Number of␣
↪Deaths', title = 'Mode of Weekly North Carolina Deaths')
```

[73]:
```
<AxesSubplot: title={'center': 'Mode of Weekly North Carolina Deaths'},
xlabel='Date'>
```



[74]:
```
#Converting the daily to weekly analysis and finding the weekly sum of cases.
weekly_deaths_sum_selected_state_NC = new_deaths_selected_state_daily_NC.copy()
weekly_deaths_sum_selected_state_NC['Date'] = pd.
 ↪to_datetime(weekly_deaths_sum_selected_state_NC['Date']) - pd.
 ↪to_timedelta(7, unit='d')
weekly_deaths_sum_selected_state_NC = weekly_deaths_sum_selected_state_NC.
 ↪groupby([pd.Grouper(key='Date', freq='W-SUN')])['Number of Deaths'].sum()
weekly_deaths_sum_selected_state_NC = weekly_deaths_sum_selected_state_NC.
 ↪reset_index()
weekly_deaths_sum_selected_state_NC.head()
```

[74]:

	Date	Number of Deaths
0	2020-01-19	0.0
1	2020-01-26	0.0
2	2020-02-02	0.0
3	2020-02-09	0.0
4	2020-02-16	0.0

[75]:
```
#Adding one day so that we get weekly analysis from monday to sunday and weekly␣
 ↪analsis from monday to sunday.
weekly_deaths_sum_selected_state_given_range_NC =␣
 ↪weekly_deaths_sum_selected_state_NC[(weekly_deaths_sum_selected_state_NC["Date"]␣
 ↪>= '2022-05-29') & (weekly_deaths_sum_selected_state_NC["Date"] <=␣
 ↪'2023-01-02')]
weekly_deaths_sum_selected_state_given_range_NC =␣
 ↪weekly_deaths_sum_selected_state_given_range_NC.sort_values(by=['Date']).
 ↪reset_index(drop=True)
weekly_deaths_sum_selected_state_given_range_NC['Date'] =␣
 ↪weekly_deaths_sum_selected_state_given_range_NC['Date'] + pd.to_timedelta(1,␣
 ↪unit='d')
weekly_deaths_sum_selected_state_given_range_NC
```

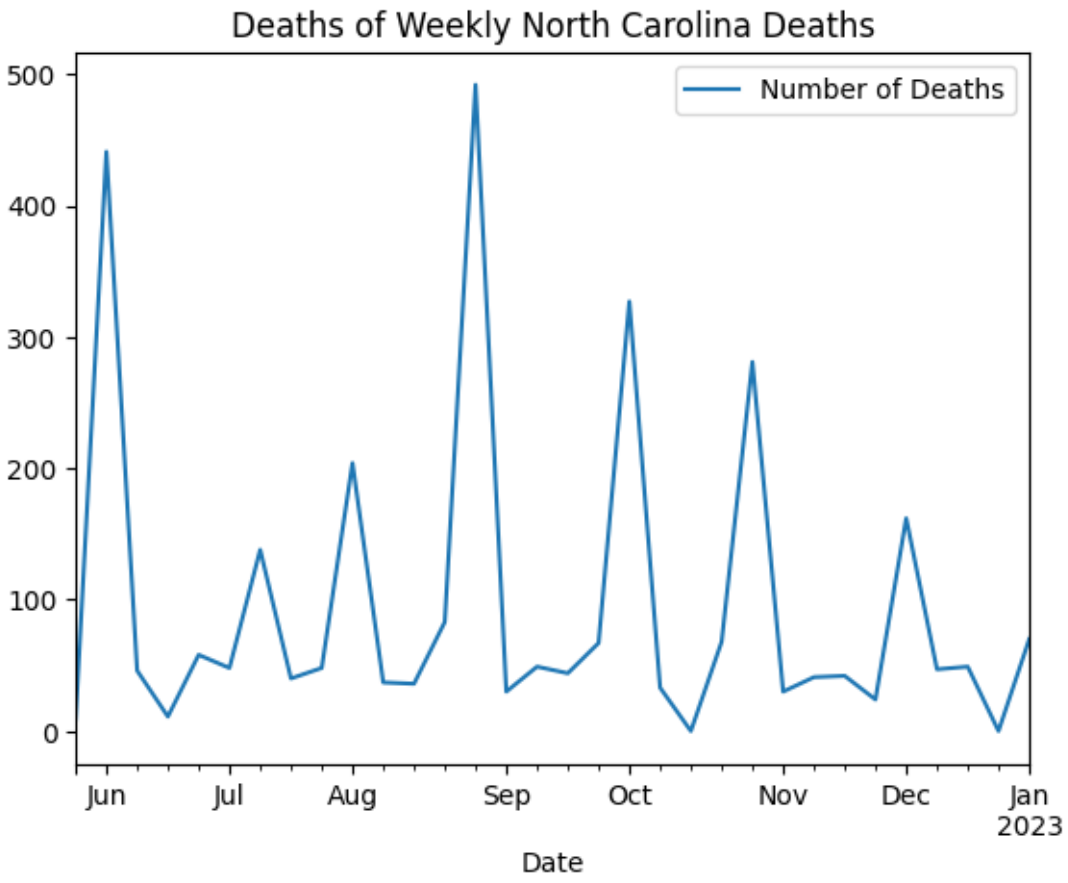
[75]:

	Date	Number of Deaths
0	2022-05-30	9.0
1	2022-06-06	441.0
2	2022-06-13	46.0
3	2022-06-20	11.0
4	2022-06-27	58.0
5	2022-07-04	48.0
6	2022-07-11	138.0
7	2022-07-18	40.0
8	2022-07-25	48.0
9	2022-08-01	204.0
10	2022-08-08	37.0
11	2022-08-15	36.0

```
12 2022-08-22              83.0
13 2022-08-29             492.0
14 2022-09-05              30.0
15 2022-09-12              49.0
16 2022-09-19              44.0
17 2022-09-26              67.0
18 2022-10-03             327.0
19 2022-10-10              33.0
20 2022-10-17               0.0
21 2022-10-24              68.0
22 2022-10-31             281.0
23 2022-11-07              30.0
24 2022-11-14              41.0
25 2022-11-21              42.0
26 2022-11-28              24.0
27 2022-12-05             162.0
28 2022-12-12              47.0
29 2022-12-19              49.0
30 2022-12-26               0.0
31 2023-01-02              70.0
```

[76]:
```
weekly_deaths_sum_selected_state_given_range_NC.plot(x='Date', y='Number of␣
↪Deaths', title = 'Deaths of Weekly North Carolina Deaths')
```

[76]:
```
<AxesSubplot: title={'center': 'Deaths of Weekly North Carolina Deaths'},
xlabel='Date'>
```



0.1.4 week starting with 2022-08-29 has a peak in northcarolina state with value 492. Due to holiday the deaths may have increased.

[77]:
```
#Filtering the population for NorthCarolina state
population_selected_state_NC = population[population["State"] ==␣
 ↪selected_state_NC].reset_index()
del population_selected_state_NC[population_selected_state_NC.columns[0]]
population_selected_state_NC
```

[77]:

	countyFIPS	County Name	State	population
0	0	Statewide Unallocated	NC	0
1	37001	Alamance County	NC	169509
2	37003	Alexander County	NC	37497
3	37005	Alleghany County	NC	11137
4	37007	Anson County	NC	24446
..	…	…	…	…
96	37191	Wayne County	NC	123131
97	37193	Wilkes County	NC	68412

```
98        37195          Wilson County    NC       81801
99        37197          Yadkin County    NC       37667
100       37199          Yancey County    NC       18069

[101 rows x 4 columns]
```

[78]:
```
#For the Albama state summing the population.
population_selected_state_NC = population_selected_state_NC.
 ↪groupby('State')['population'].sum()
population_selected_state_NC
```

[78]:
```
State
NC    10488084
Name: population, dtype: int64
```

[79]:
```
#normalizing by population and using normalization factor to identify cases
normalized_weekly_deaths_sum_selected_state_given_range_NC =␣
 ↪weekly_deaths_sum_selected_state_given_range_NC.copy()
normalized_weekly_deaths_sum_selected_state_given_range_NC['Number of Deaths']␣
 ↪= normalized_weekly_deaths_sum_selected_state_given_range_NC['Number of␣
 ↪Deaths'].mul(10000)
normalized_weekly_deaths_sum_selected_state_given_range_NC['Number of Deaths']␣
 ↪= normalized_weekly_deaths_sum_selected_state_given_range_NC['Number of␣
 ↪Deaths'].div(10488084)
normalized_weekly_deaths_sum_selected_state_given_range_NC
```

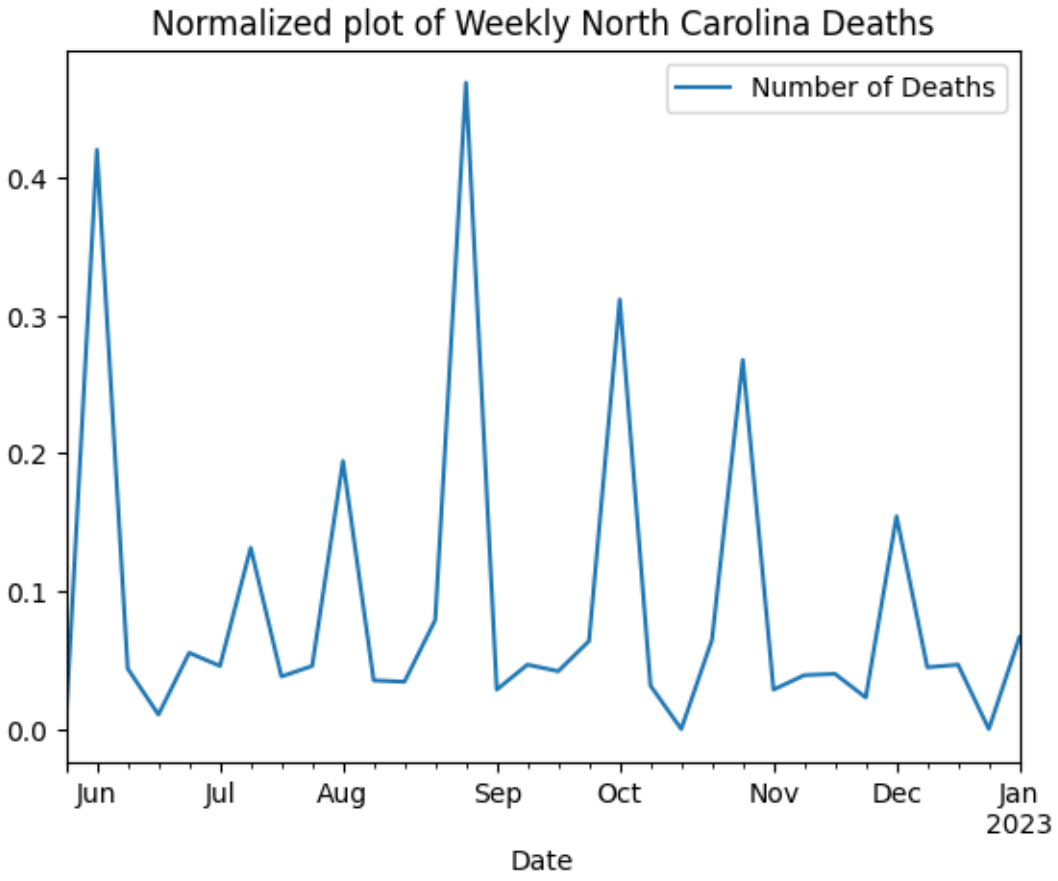
[79]:

	Date	Number of Deaths
0	2022-05-30	0.008581
1	2022-06-06	0.420477
2	2022-06-13	0.043859
3	2022-06-20	0.010488
4	2022-06-27	0.055301
5	2022-07-04	0.045766
6	2022-07-11	0.131578
7	2022-07-18	0.038139
8	2022-07-25	0.045766
9	2022-08-01	0.194506
10	2022-08-08	0.035278
11	2022-08-15	0.034325
12	2022-08-22	0.079137
13	2022-08-29	0.469104
14	2022-09-05	0.028604
15	2022-09-12	0.046720
16	2022-09-19	0.041952
17	2022-09-26	0.063882
18	2022-10-03	0.311782
19	2022-10-10	0.031464

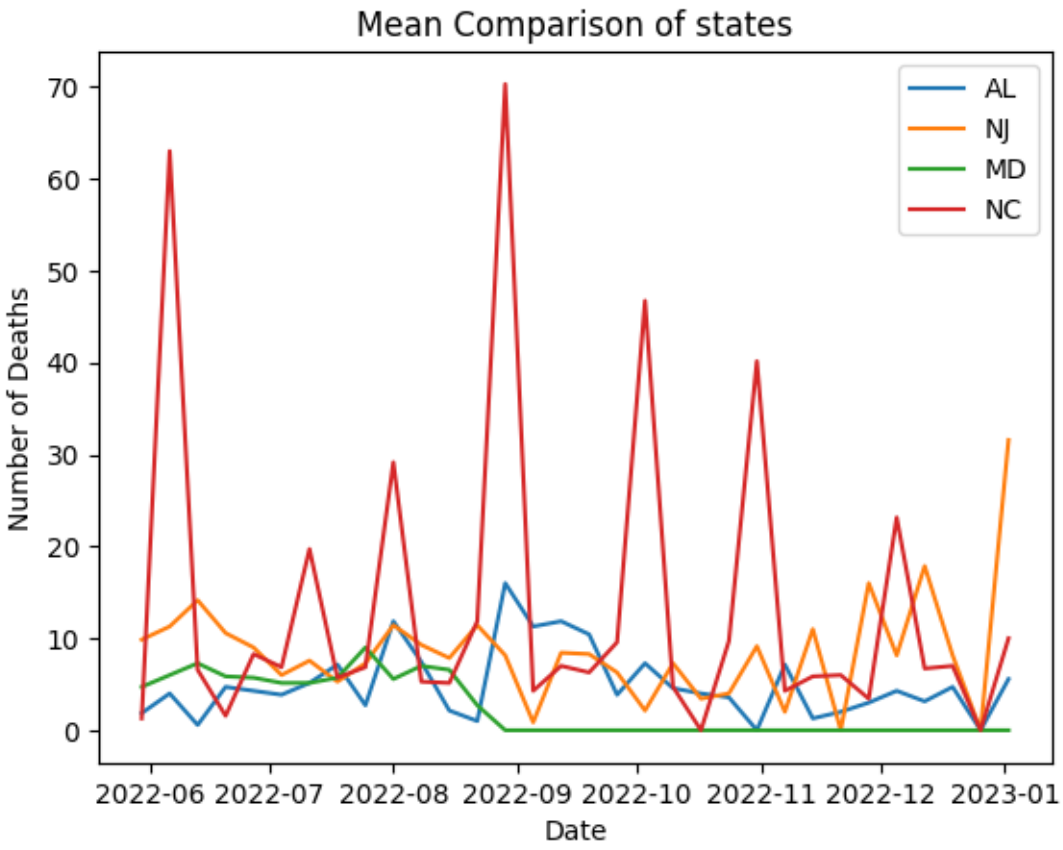
```
20 2022-10-17          0.000000
21 2022-10-24          0.064835
22 2022-10-31          0.267923
23 2022-11-07          0.028604
24 2022-11-14          0.039092
25 2022-11-21          0.040045
26 2022-11-28          0.022883
27 2022-12-05          0.154461
28 2022-12-12          0.044813
29 2022-12-19          0.046720
30 2022-12-26          0.000000
31 2023-01-02          0.066742
```

[80]:
```
normalized_weekly_deaths_sum_selected_state_given_range_NC.plot(x='Date',␣
↪y='Number of Deaths', title = 'Normalized plot of Weekly North Carolina␣
↪Deaths')
```

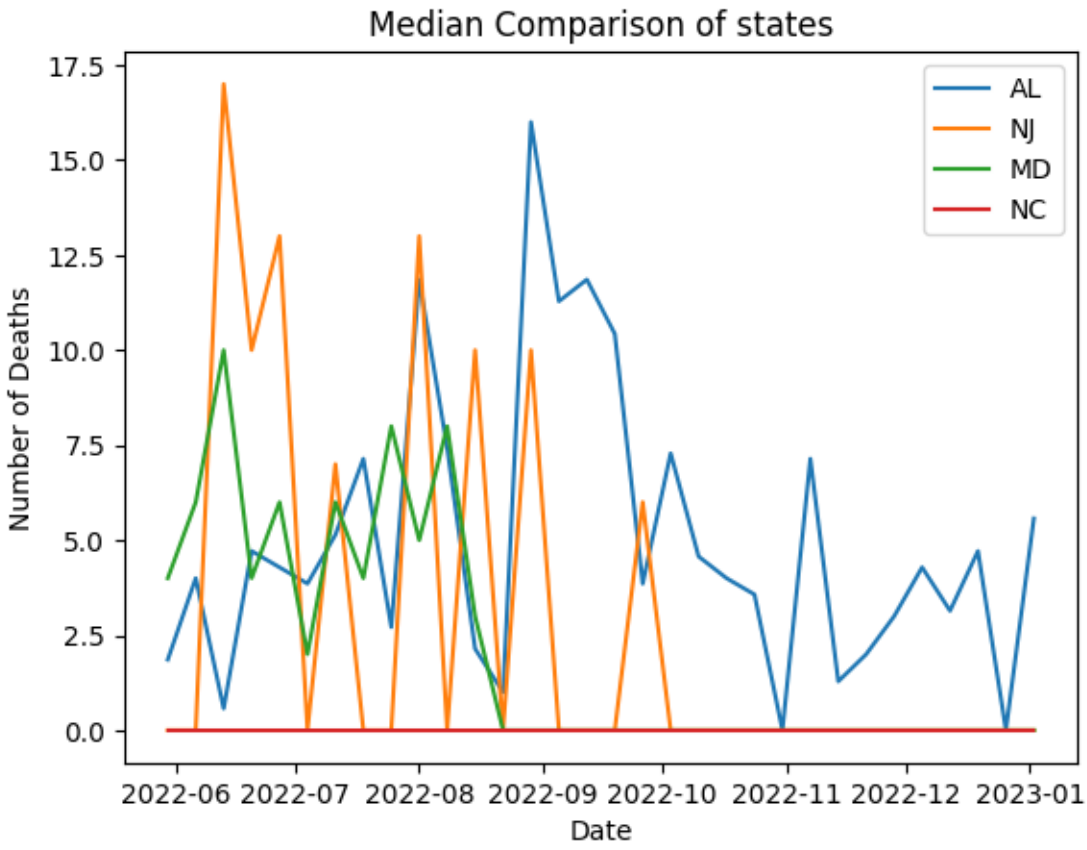
[80]:
```
<AxesSubplot: title={'center': 'Normalized plot of Weekly North Carolina
Deaths'}, xlabel='Date'>
```



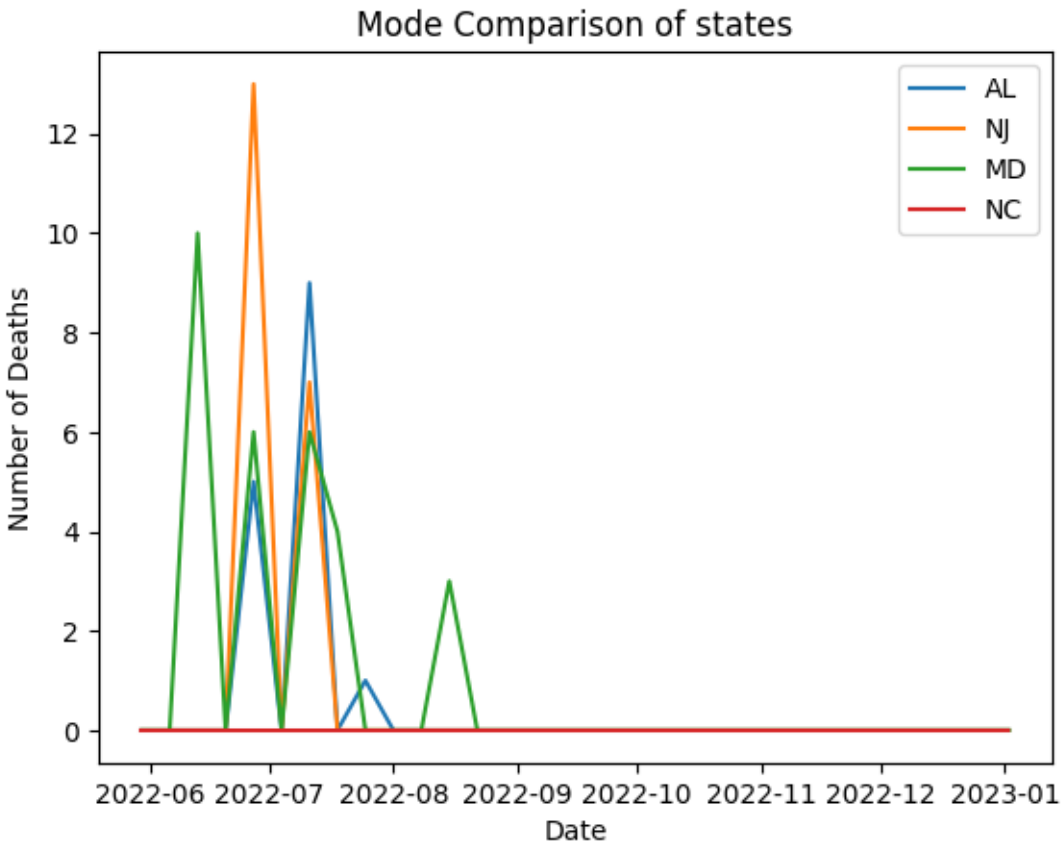
[81]:
```
#Mean plot comparision of three states with alabama state.
plt.plot(weekly_deaths_mean_selected_state_given_range['Date'],␣
 ↪weekly_deaths_mean_selected_state_given_range['Number of Deaths'],␣
 ↪label='AL')
plt.plot(weekly_deaths_mean_selected_state_given_range_NJ['Date'],␣
 ↪weekly_deaths_mean_selected_state_given_range_NJ['Number of Deaths'],␣
 ↪label='NJ')
plt.plot(weekly_deaths_mean_selected_state_given_range_MD['Date'],␣
 ↪weekly_deaths_mean_selected_state_given_range_MD['Number of Deaths'],␣
 ↪label='MD')
plt.plot(weekly_deaths_mean_selected_state_given_range_NC['Date'],␣
 ↪weekly_deaths_mean_selected_state_given_range_NC['Number of Deaths'],␣
 ↪label='NC')
plt.title('Mean Comparison of states')
plt.xlabel('Date')
plt.ylabel('Number of Deaths')
plt.legend()
plt.show()
```



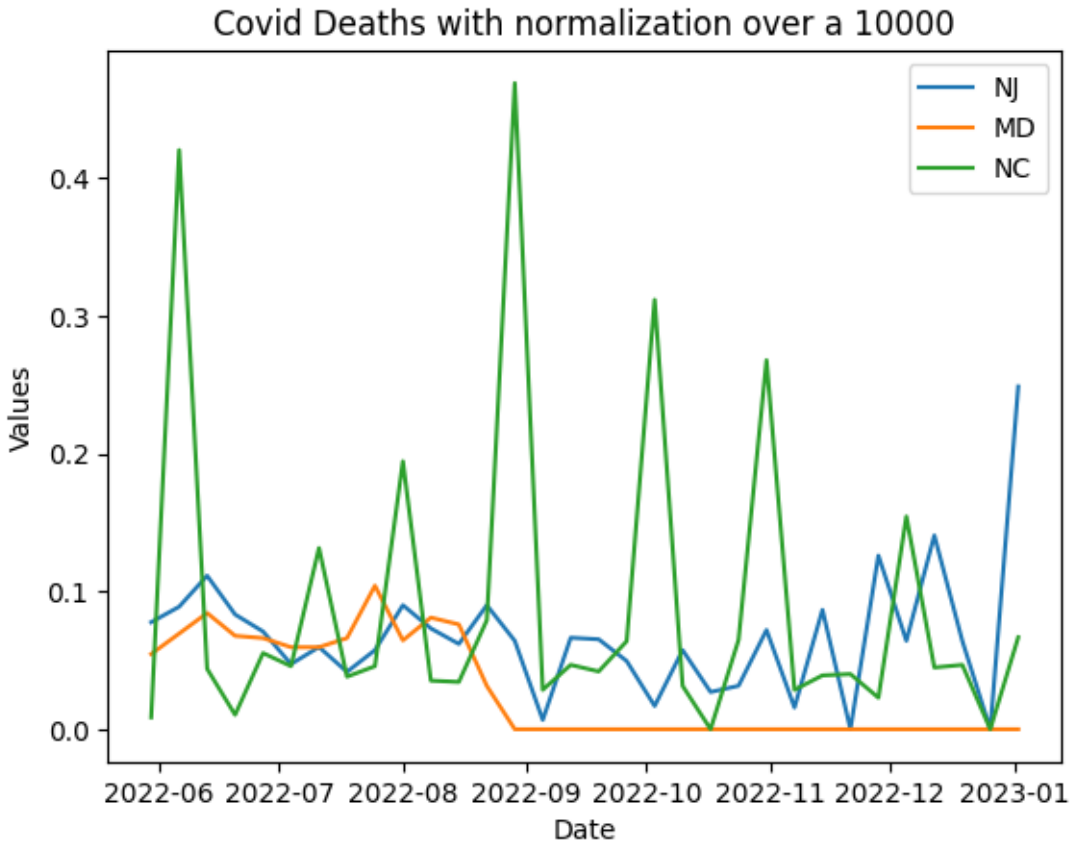
[82]:
```
#Median plot comparision of three states with alabama state.
plt.plot(weekly_deaths_median_selected_state_given_range['Date'],␣
 ↪weekly_deaths_mean_selected_state_given_range['Number of Deaths'],␣
 ↪label='AL')
plt.plot(weekly_deaths_median_selected_state_given_range_NJ['Date'],␣
 ↪weekly_deaths_median_selected_state_given_range_NJ['Number of Deaths'],␣
 ↪label='NJ')
plt.plot(weekly_deaths_median_selected_state_given_range_MD['Date'],␣
 ↪weekly_deaths_median_selected_state_given_range_MD['Number of Deaths'],␣
 ↪label='MD')
plt.plot(weekly_deaths_median_selected_state_given_range_NC['Date'],␣
 ↪weekly_deaths_median_selected_state_given_range_NC['Number of Deaths'],␣
 ↪label='NC')
plt.title('Median Comparison of states')
plt.xlabel('Date')
plt.ylabel('Number of Deaths')
plt.legend()
plt.show()
```



[83]:
```
#Mode plot comparision of three states with alabama state.
plt.plot(weekly_deaths_mode_selected_state_given_range['Date'],␣
 ↪weekly_deaths_mode_selected_state_given_range['Number of Deaths'],␣
 ↪label='AL')
plt.plot(weekly_deaths_mode_selected_state_given_range_NJ['Date'],␣
 ↪weekly_deaths_mode_selected_state_given_range_NJ['Number of Deaths'],␣
 ↪label='NJ')
plt.plot(weekly_deaths_mode_selected_state_given_range_MD['Date'],␣
 ↪weekly_deaths_mode_selected_state_given_range_MD['Number of Deaths'],␣
 ↪label='MD')
plt.plot(weekly_deaths_mode_selected_state_given_range_NC['Date'],␣
 ↪weekly_deaths_mode_selected_state_given_range_NC['Number of Deaths'],␣
 ↪label='NC')
plt.title('Mode Comparison of states')
plt.xlabel('Date')
plt.ylabel('Number of Deaths')
plt.legend()
plt.show()
```



[84]:
```
#Normalized Plots of the three States.
plt.plot(normalized_weekly_deaths_sum_selected_state_given_range_NJ['Date'],␣
 ↪normalized_weekly_deaths_sum_selected_state_given_range_NJ['Number of␣
 ↪Deaths'], label='NJ')
plt.plot(normalized_weekly_deaths_sum_selected_state_given_range_MD['Date'],␣
 ↪normalized_weekly_deaths_sum_selected_state_given_range_MD['Number of␣
 ↪Deaths'], label='MD')
plt.plot(normalized_weekly_deaths_sum_selected_state_given_range_NC['Date'],␣
 ↪normalized_weekly_deaths_sum_selected_state_given_range_NC['Number of␣
 ↪Deaths'], label='NC')
plt.title('Covid Deaths with normalization over a 10000')
plt.xlabel('Date')
plt.ylabel('Values')
plt.legend()
plt.show()
```



[85]:
```
#For the selected state Albama summing the cases per day of all the counties.
deaths_transpose = deaths_transpose.groupby('Date')['Number of Deaths'].sum()
deaths_transpose.head()
```

[85]:
```
Date
2020-01-22    1
2020-01-23    1
2020-01-24    1
2020-01-25    1
2020-01-26    1
Name: Number of Deaths, dtype: int64
```

[86]:
```
#Finding out the new deaths per day.
new_deaths_country_daily = deaths_transpose.diff().reset_index()
new_deaths_country_daily.head()
```

[86]:

	Date	Number of Deaths
0	2020-01-22	NaN
1	2020-01-23	0.0
2	2020-01-24	0.0
3	2020-01-25	0.0
4	2020-01-26	0.0

[87]:
```
#Converting the daily to weekly analysis and finding the sum weekly.
weekly_deaths_sum_country = new_deaths_country_daily.copy()
weekly_deaths_sum_country['Date'] = pd.
 ↪to_datetime(weekly_deaths_sum_country['Date']) - pd.to_timedelta(7, unit='d')
weekly_deaths_sum_country = weekly_deaths_sum_country.groupby([pd.
 ↪Grouper(key='Date', freq='W-SUN')])['Number of Deaths'].sum()
weekly_deaths_sum_country = weekly_deaths_sum_country.reset_index()
weekly_deaths_sum_country.head()
```

[87]:

	Date	Number of Deaths
0	2020-01-19	0.0
1	2020-01-26	0.0
2	2020-02-02	1.0
3	2020-02-09	0.0
4	2020-02-16	1.0

[88]:
```
#Adding one day so that we get weekly analysis from monday to sunday and weekly␣
 ↪analsis from monday to sunday.
weekly_deaths_country_given_range =␣
 ↪weekly_deaths_sum_country[(weekly_deaths_sum_country["Date"] >=␣
 ↪'2022-05-29') & (weekly_deaths_sum_country["Date"] <= '2023-01-02')]
weekly_deaths_country_given_range = weekly_deaths_country_given_range.
 ↪sort_values(by=['Date']).reset_index(drop=True)
weekly_deaths_country_given_range['Date'] =␣
 ↪weekly_deaths_country_given_range['Date'] + pd.to_timedelta(1, unit='d')
weekly_deaths_country_given_range
```

[88]:

	Date	Number of Deaths
0	2022-05-30	1226.0
1	2022-06-06	2062.0
2	2022-06-13	1771.0
3	2022-06-20	1540.0
4	2022-06-27	2478.0
5	2022-07-04	5225.0
6	2022-07-11	1220.0
7	2022-07-18	1831.0
8	2022-07-25	1901.0
9	2022-08-01	2346.0
10	2022-08-08	2125.0
11	2022-08-15	1962.0
12	2022-08-22	-948.0
13	2022-08-29	-7218.0
14	2022-09-05	1958.0
15	2022-09-12	1947.0
16	2022-09-19	2107.0
17	2022-09-26	1569.0
18	2022-10-03	2171.0
19	2022-10-10	1872.0
20	2022-10-17	1551.0
21	2022-10-24	1803.0
22	2022-10-31	1484.0
23	2022-11-07	424.0
24	2022-11-14	1357.0
25	2022-11-21	1549.0
26	2022-11-28	2153.0
27	2022-12-05	1962.0
28	2022-12-12	1681.0
29	2022-12-19	1027.0
30	2022-12-26	2031.0
31	2023-01-02	1218.0

[89]:
```
#For the country summing the population.
population_country = population['population'].sum()
population_country
```

[89]: 328239523

[90]:
```
#normalizing by population and using normalization factor to identify cases
normalized_weekly_deaths_sum_country_given_range =␣
 ↪weekly_deaths_country_given_range.copy()
normalized_weekly_deaths_sum_country_given_range['Number of Deaths'] =␣
 ↪normalized_weekly_deaths_sum_country_given_range['Number of Deaths'].
 ↪mul(10000)
```

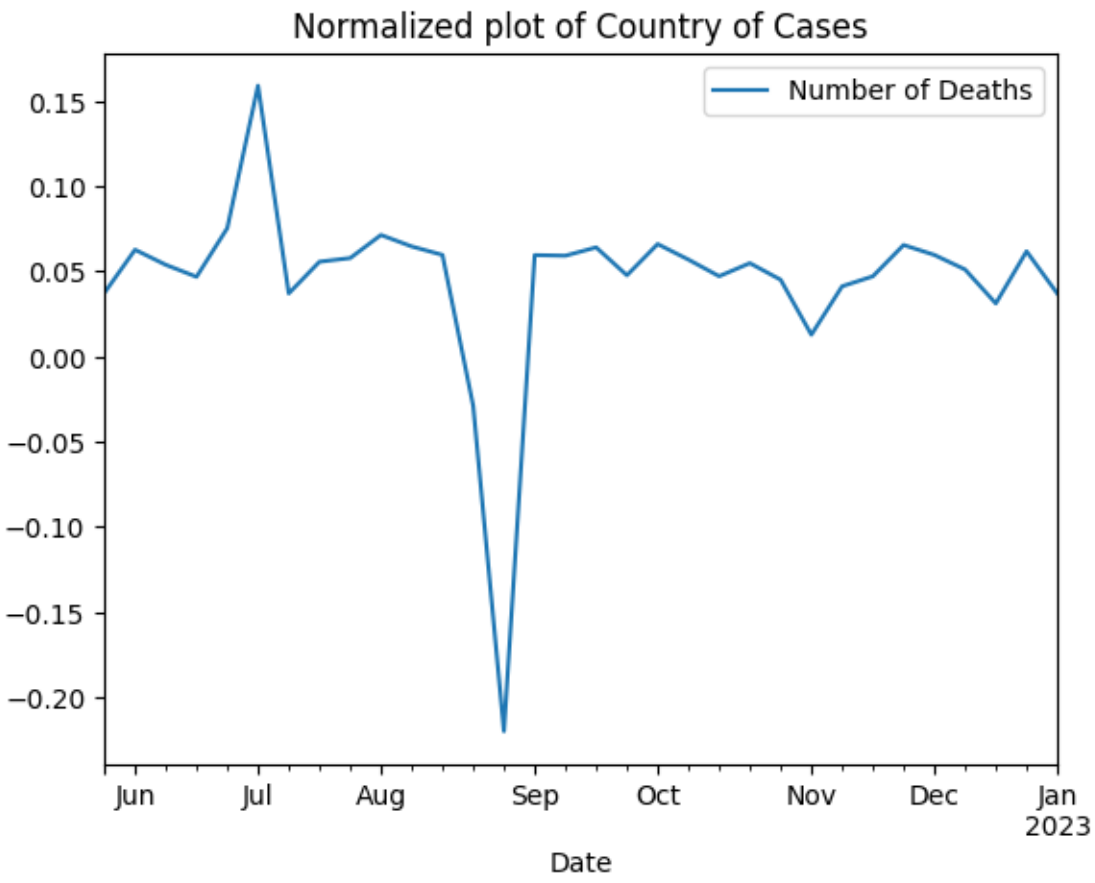
```
normalized_weekly_deaths_sum_country_given_range['Number of Deaths'] =␣
↪normalized_weekly_deaths_sum_country_given_range['Number of Deaths'].
↪div(328239523)
normalized_weekly_deaths_sum_country_given_range
```

[90]:

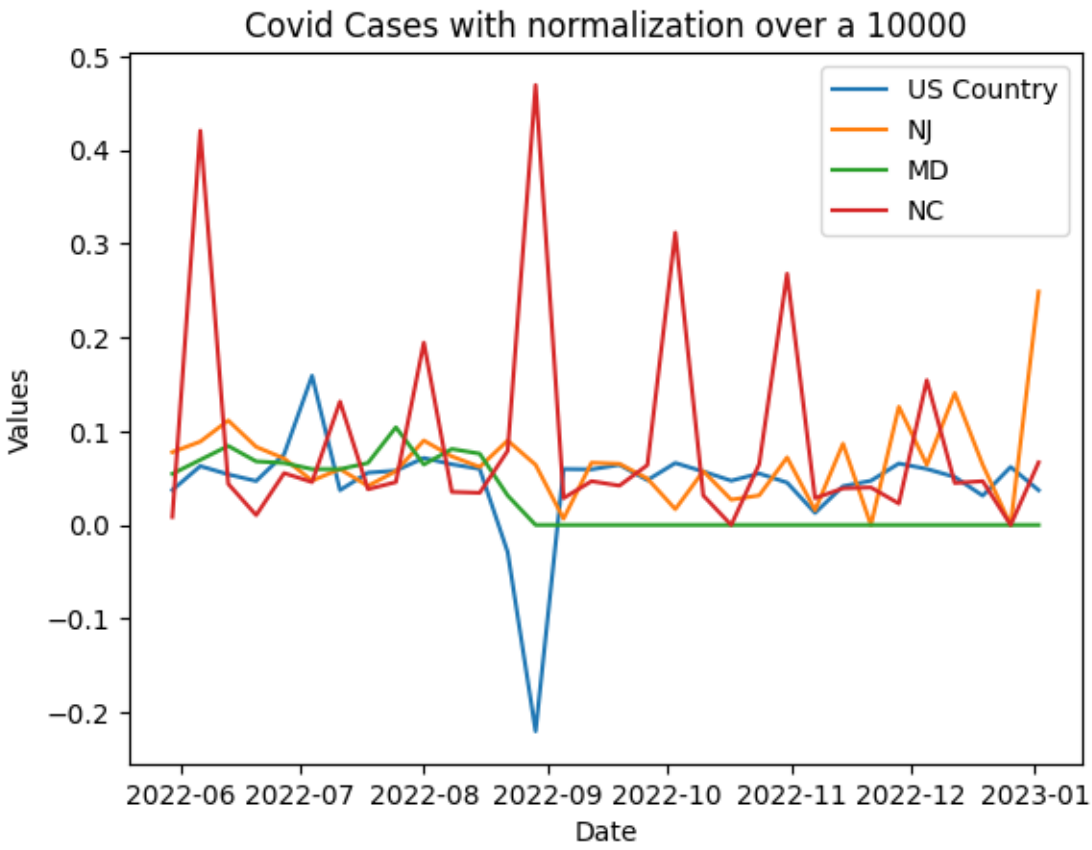
	Date	Number of Deaths
0	2022-05-30	0.037351
1	2022-06-06	0.062820
2	2022-06-13	0.053955
3	2022-06-20	0.046917
4	2022-06-27	0.075494
5	2022-07-04	0.159183
6	2022-07-11	0.037168
7	2022-07-18	0.055782
8	2022-07-25	0.057915
9	2022-08-01	0.071472
10	2022-08-08	0.064739
11	2022-08-15	0.059773
12	2022-08-22	-0.028881
13	2022-08-29	-0.219900
14	2022-09-05	0.059652
15	2022-09-12	0.059316
16	2022-09-19	0.064191
17	2022-09-26	0.047800
18	2022-10-03	0.066141
19	2022-10-10	0.057032
20	2022-10-17	0.047252
21	2022-10-24	0.054929
22	2022-10-31	0.045211
23	2022-11-07	0.012917
24	2022-11-14	0.041342
25	2022-11-21	0.047191
26	2022-11-28	0.065592
27	2022-12-05	0.059773
28	2022-12-12	0.051213
29	2022-12-19	0.031288
30	2022-12-26	0.061876
31	2023-01-02	0.037107

[91]:
```
normalized_weekly_deaths_sum_country_given_range.plot(x='Date', y='Number of␣
↪Deaths', title = 'Normalized plot of Country of Cases')
```

[91]:
```
<AxesSubplot: title={'center': 'Normalized plot of Country of Cases'},
xlabel='Date'>
```



[92]:
```
#Normalied Plot of US country and the three states.
plt.plot(normalized_weekly_deaths_sum_country_given_range['Date'],␣
 ↪normalized_weekly_deaths_sum_country_given_range['Number of Deaths'],␣
 ↪label='US Country')
plt.plot(normalized_weekly_deaths_sum_selected_state_given_range_NJ['Date'],␣
 ↪normalized_weekly_deaths_sum_selected_state_given_range_NJ['Number of␣
 ↪Deaths'], label='NJ')
plt.plot(normalized_weekly_deaths_sum_selected_state_given_range_MD['Date'],␣
 ↪normalized_weekly_deaths_sum_selected_state_given_range_MD['Number of␣
 ↪Deaths'], label='MD')
plt.plot(normalized_weekly_deaths_sum_selected_state_given_range_NC['Date'],␣
 ↪normalized_weekly_deaths_sum_selected_state_given_range_NC['Number of␣
 ↪Deaths'], label='NC')
plt.title('Covid Cases with normalization over a 10000')
plt.xlabel('Date')
plt.ylabel('Values')
plt.legend()
plt.show()
```



0.1.5 **Some of the Values in the data are negative when we take the daily new deaths we are getting negative value. So the States are following the country trends but not so closey excluding near the negative ones.**

0.1.6 **NC and NJ have same polulation but NJ have significantly low death rate compared to NC, this is because of non-availability of data. For some dates deaths are zero in NJ but when I researched about it, Nj did have deaths and actually higher than NC.**