Analyze and Visualize Data for COVID-19: Denmark

Declaration:

I declare that this report was composed by myself, that the work contained herein is my own except where explicitly stated otherwise in the text, and that this work has not been submitted for any other degree or processional qualification except as specified

Signed…Balram Kokkula……..

Date……06/05/2020……

Introduction:

The purpose of this note is to describe the general panorama of the current situation in DENMARK with the most affected countries, this can serve for people to take useful social and health measures to stop the spread of covid-19.

Since late December 2019, an outbreak of a novel coronavirus disease (covid-19; previously known as 2019-nCoV) was reported in Wuhan, China, which has subsequently affected 210 countries worldwide. In general, covid-19 is an acute resolved disease but it can also be deadly, with a 18.37% case fatality rate (1). Severe disease onset might result in death due to massive alveolar damage and progressive respiratory failure. As of **April 30**, 2020(1), about 3.32 M cases have been confirmed and over 234 k deaths and 1.05 M cases recovered.

Symptoms:

People may be sick with the virus for 1 to 14 days before developing symptoms. The most common symptoms of coronavirus disease (COVID-19) are fever, tiredness, and dry cough. Most people (about 80%) recover from the disease without needing special treatment (2).

- Cough
- Fever
- Tiredness
- Difficulty in breathing(severe cases)

Recommendations:

Interrupt human-to-human transmission including reducing secondary infections among close contacts and health care workers, preventing transmission amplification events, and preventing further international spread (2).

- Identify, isolate and care for patients early, including providing optimized care for infected patients;

- Identify and reduce transmission from the animal source;
- Address crucial unknowns regarding clinical severity, the extent of transmission and infection, treatment options, and accelerate the development of diagnostics, therapeutics, and vaccines;
- Communicate critical risk and event information to all communities and counter misinformation;
- Minimize social and economic impact through multisectoral partnerships

Data:

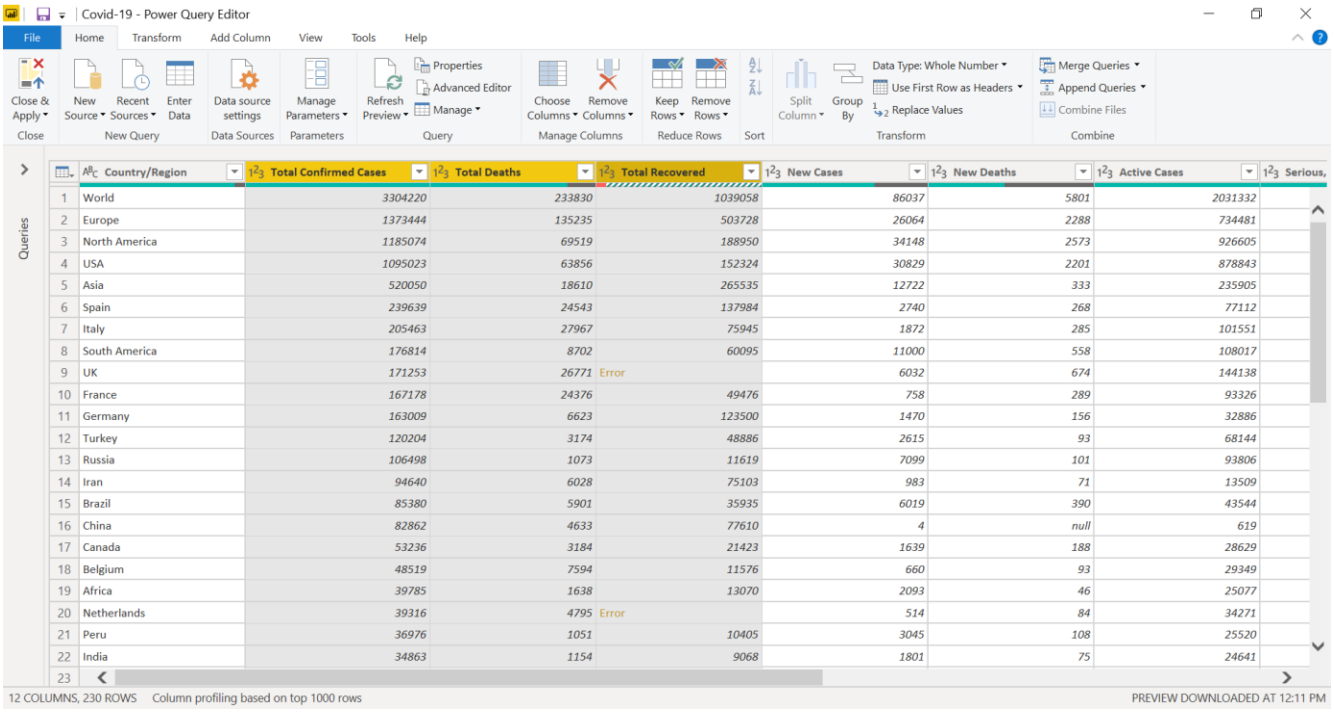
Novel Corona Virus (Covid-19) epidemiological data since 22 January 2020. Data loading from the worldometer website (1) from various sources including the World Health Organization (WHO) (3), ECDC (4) , John Hopkins school of engineering(5). The data is updated twice on a daily basis.

Fields available in the data include **Country/Region, Total Confirmed cases, Total Deaths, Total Recovered, New Cases, New Deaths, Active Cases, Serious, Critical, Tot Cases/ 1M pop, Deaths/ 1M pop, Total Tests, Tests/ 1M pop.**

Details on the data set is as follows:

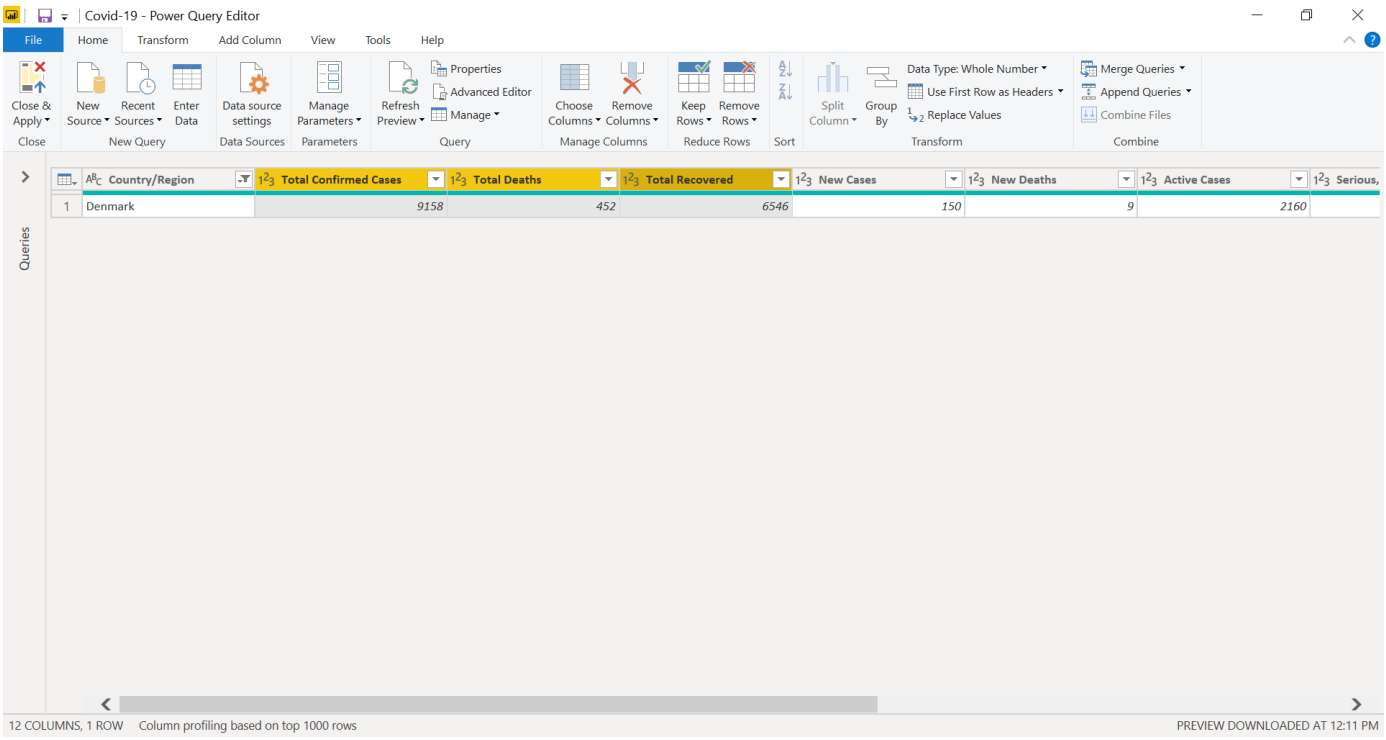
Daily reports data: This csv file contains information on the affected countries which helps to identify the virus spread, information on total confirmed cases, total number of deaths and total recoveries across countries. My assigned country DENMARK are provided for analysis.

Global COVID-19 dataset



	Country/Region	Total Confirmed Cases	Total Deaths	Total Recovered	New Cases	New Deaths	Active Cases	Serious,
1	World	3304220	233830	1039058	86037	5801	2031332	
2	Europe	1373444	135235	503728	26064	2288	734481	
3	North America	1185074	69519	188950	34148	2573	926605	
4	USA	1095023	63856	152324	30829	2201	878843	
5	Asia	520050	18610	265535	12722	333	235905	
6	Spain	239639	24543	137984	2740	268	77112	
7	Italy	205463	27967	75945	1872	285	101551	
8	South America	176814	8702	60095	11000	558	108017	
9	UK	171253	26771	Error	6032	674	144138	
10	France	167178	24376	49476	758	289	93326	
11	Germany	163009	6623	123500	1470	156	32886	
12	Turkey	120204	3174	48886	2615	93	68144	
13	Russia	106498	1073	11619	7099	101	93806	
14	Iran	94640	6028	75103	983	71	13509	
15	Brazil	85380	5901	35935	6019	390	43544	
16	China	82862	4633	77610	4	null	619	
17	Canada	53236	3184	21423	1639	188	28629	
18	Belgium	48519	7594	11576	660	93	29349	
19	Africa	39785	1638	13070	2093	46	25077	
20	Netherlands	39316	4795	Error	514	84	34271	
21	Peru	36976	1051	10405	3045	108	25520	
22	India	34863	1154	9068	1801	75	24641	
23								

Denmark COVID-19 dataset



	Country/Region	Total Confirmed Cases	Total Deaths	Total Recovered	New Cases	New Deaths	Active Cases	Serious,
1	Denmark	9158	452	6546	150	9	2160	

Software:

With the rapid spread in the novel corona-virus across countries, the World Health Organisation (WHO)(3) and the several countries have published latest results on the impact of COVID-19 over the past few months. I have been going through many sources and articles to understand the fatality trend and I was excited to come across this data source and decided to see some visualization on the same. The aim here is to understand how visualization helps to derive informative insights from data sources.

For the visualization part, I am using Microsoft Power BI software (6). Power BI is a business intelligence service by Microsoft that provides users with tools for Aggregation, Analysis, Data-Sharing, and Visualization. Power BI is a visualization tool which supports a number of interactive, high-quality graphs and is a great tool for data science beginners.

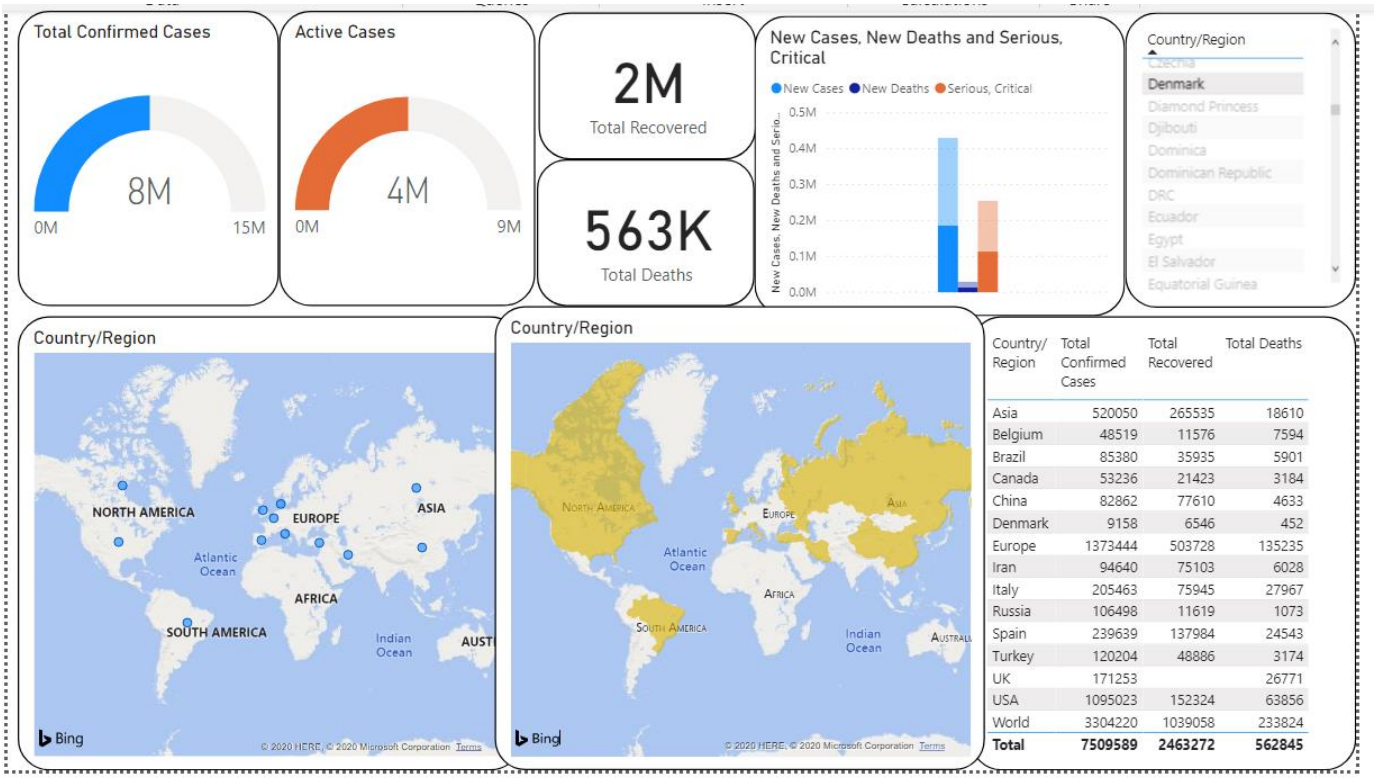
Important notes: Data as of **30 April** has been used for the below analysis. Please refrain from using the data or insights derived from the analysis for medical guidance or use of the same in commerce. It is solely for learning purpose. Another important aspect of showing my key findings is to use only a set of charts that infer key insight from the data.

Analysis (Jan 22 to April 30) :

1. The global impact of COVID-19 with my assign country Denmark.
2. Descriptive/Temporal analysis on infected, mortality and recovery rates with my assign country and its continent and the world.
3. Geospatial Analysis on spread of COVID-19 with my assign country and its continent and the world.

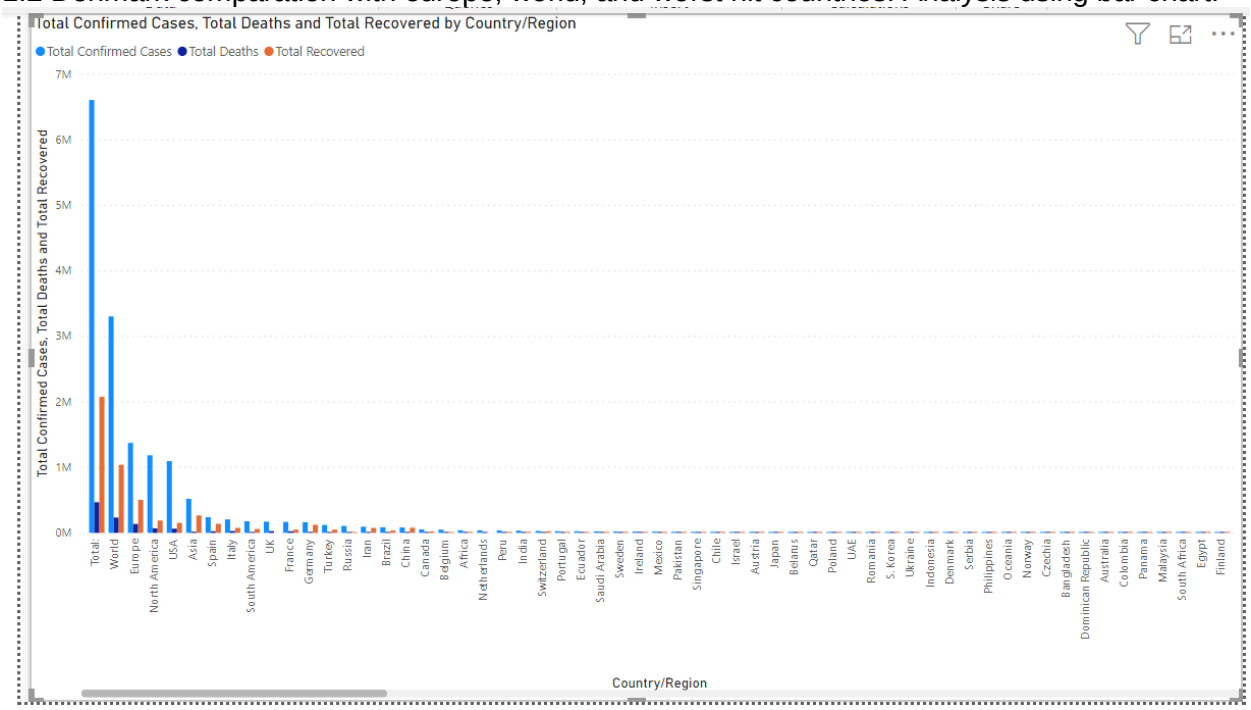
1. The **global impact of COVID-19** with my assign country Denmark.

1.1 To understand the impact of the virus on a geographical landscape, I used the Power BI dashboard for various plots. Denmark comparation with Europe, World, and 12 worst hit countries.

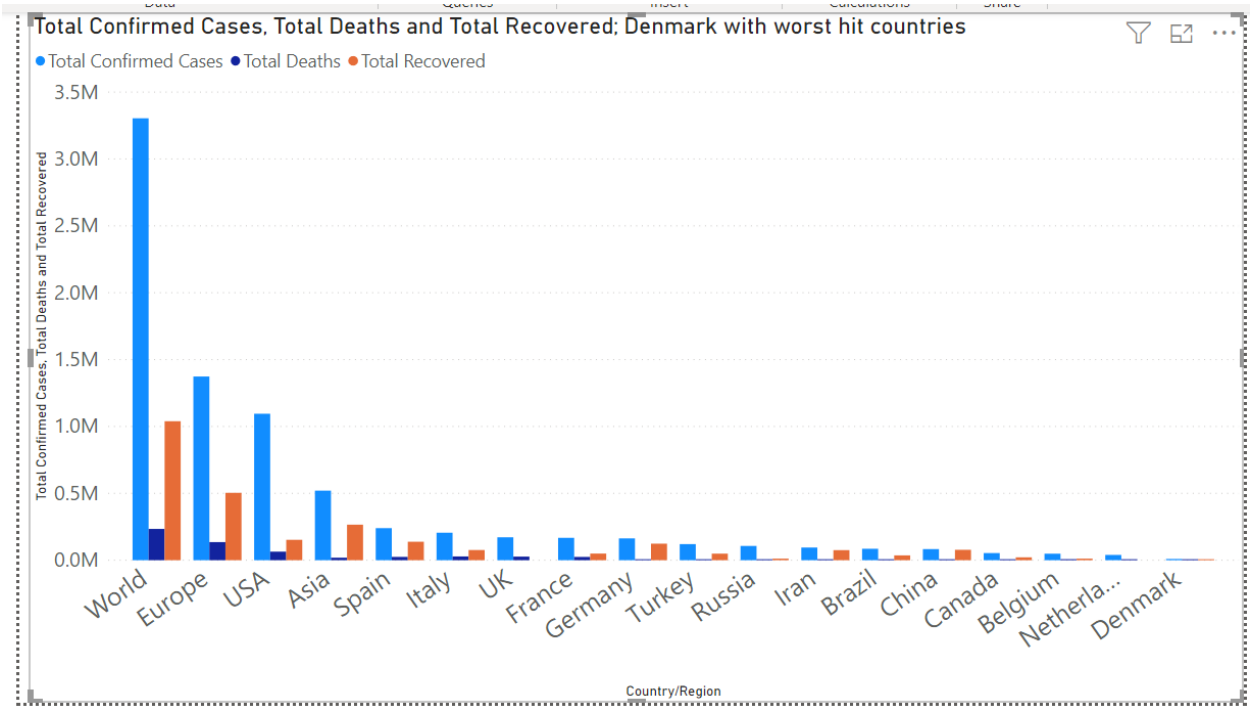


Country/ Region	Total Confirmed Cases	Total Recovered	Total Deaths
Asia	520050	265535	18610
Belgium	48519	11576	7594
Brazil	85380	35935	5901
Canada	53236	21423	3184
China	82862	77610	4633
Denmark	9158	6546	452
Europe	1373444	503728	135235
Iran	94640	75103	6028
Italy	205463	75945	27967
Russia	106498	11619	1073
Spain	239639	137984	24543
Turkey	120204	48886	3174
UK	171253		26771
USA	1095023	152324	63856
World	3304220	1039058	233824
Total	**7509589**	**2463272**	**562845**

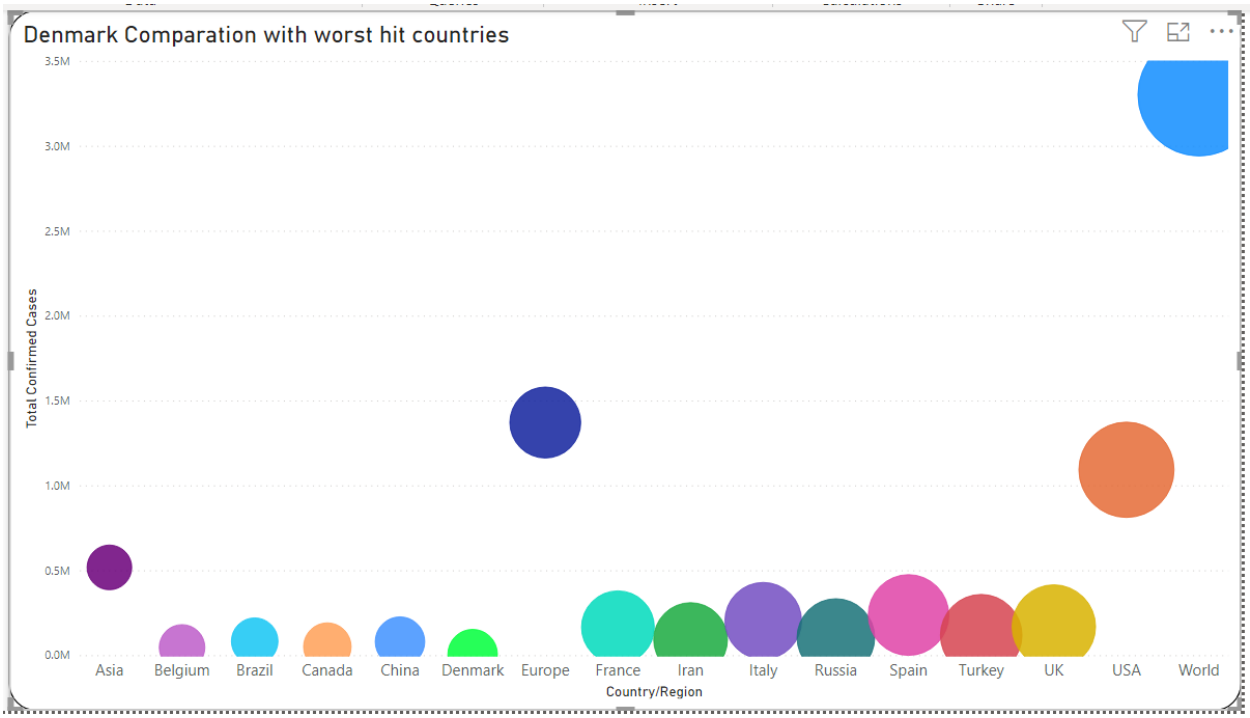
1.2 Denmark comparation with europe, world, and worst hit countries. Analysis using bar chart.



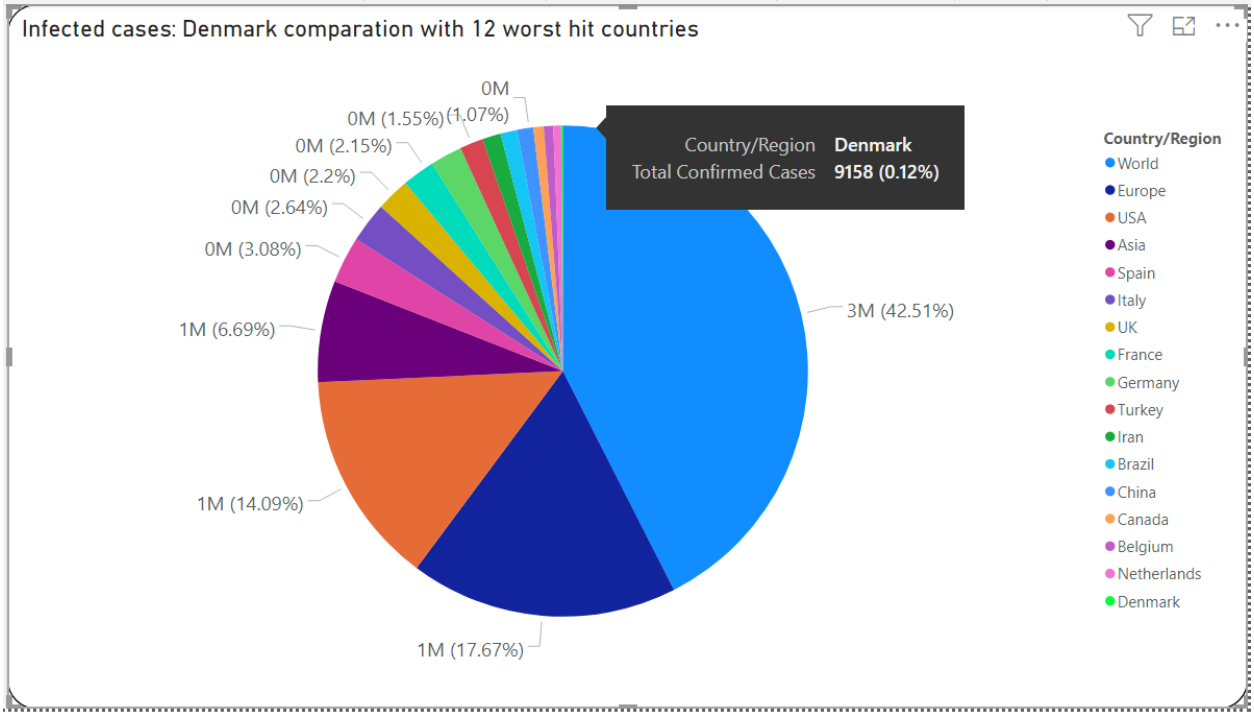
1.3 Denmark comparation with europe, world, and 12 worst hit countries. Analysis using bar charts



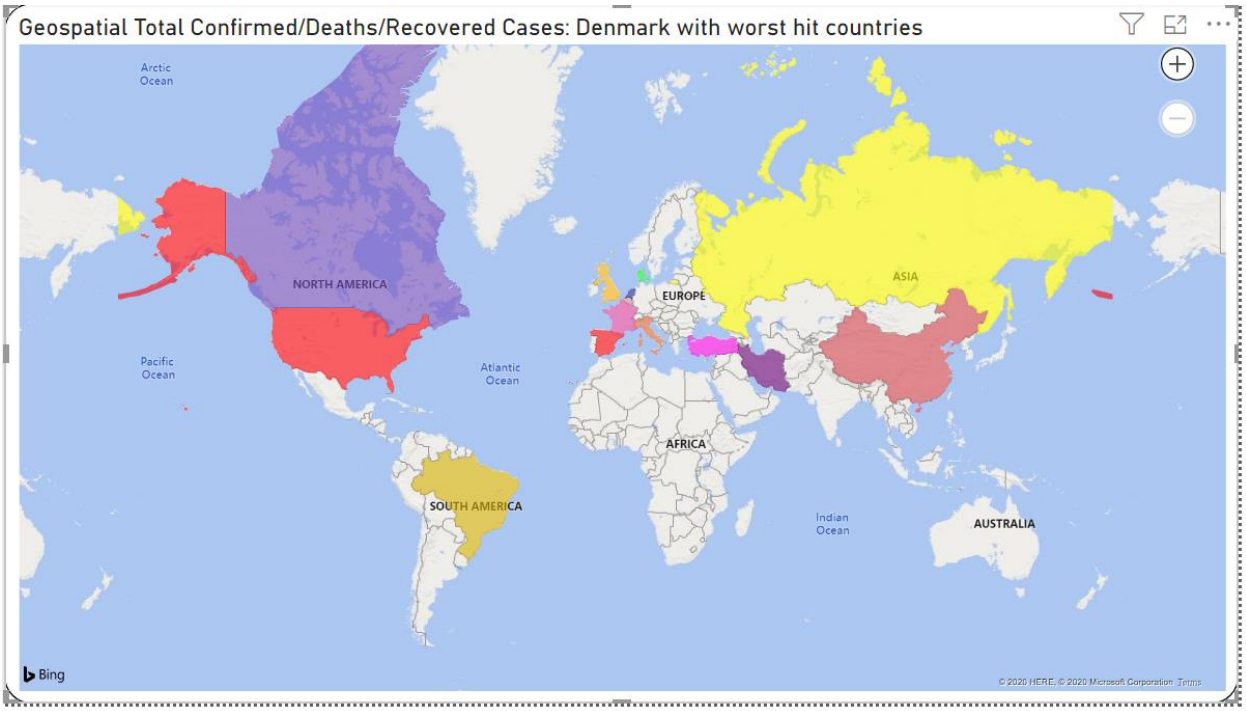
1.4 Confirmed cases: analysis using Scatter plot



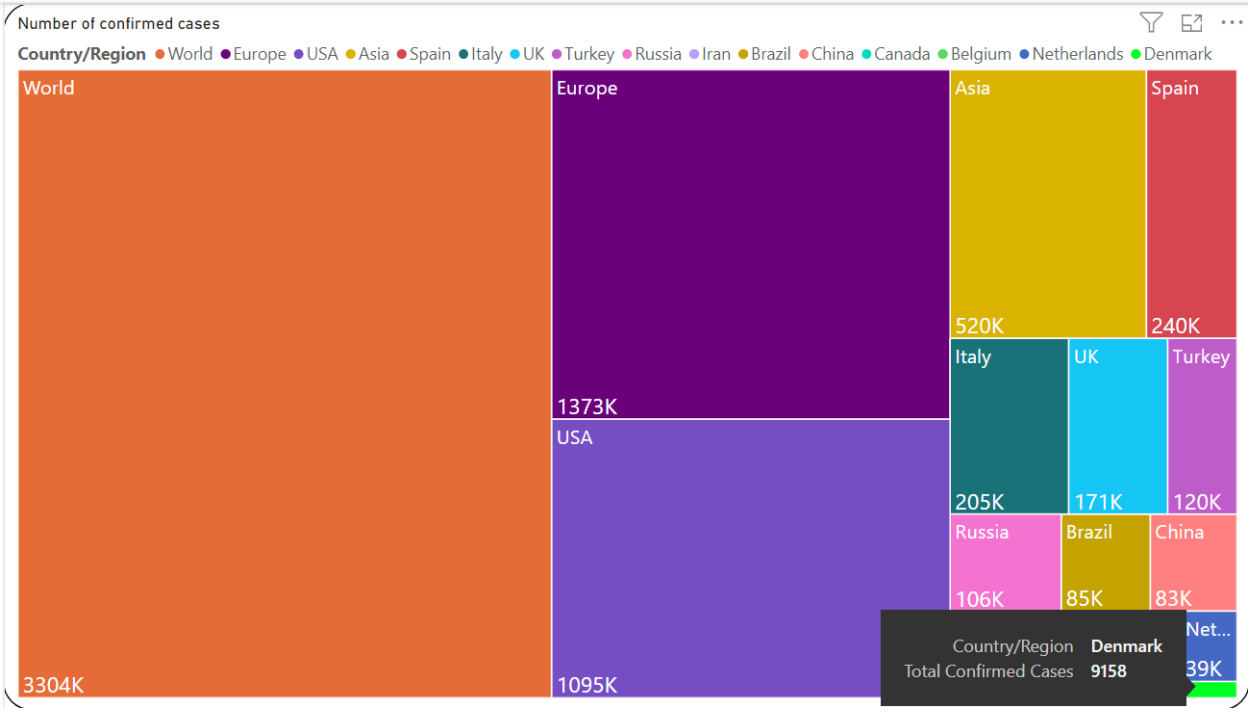
1.5 Confirmed cases using pie chart.



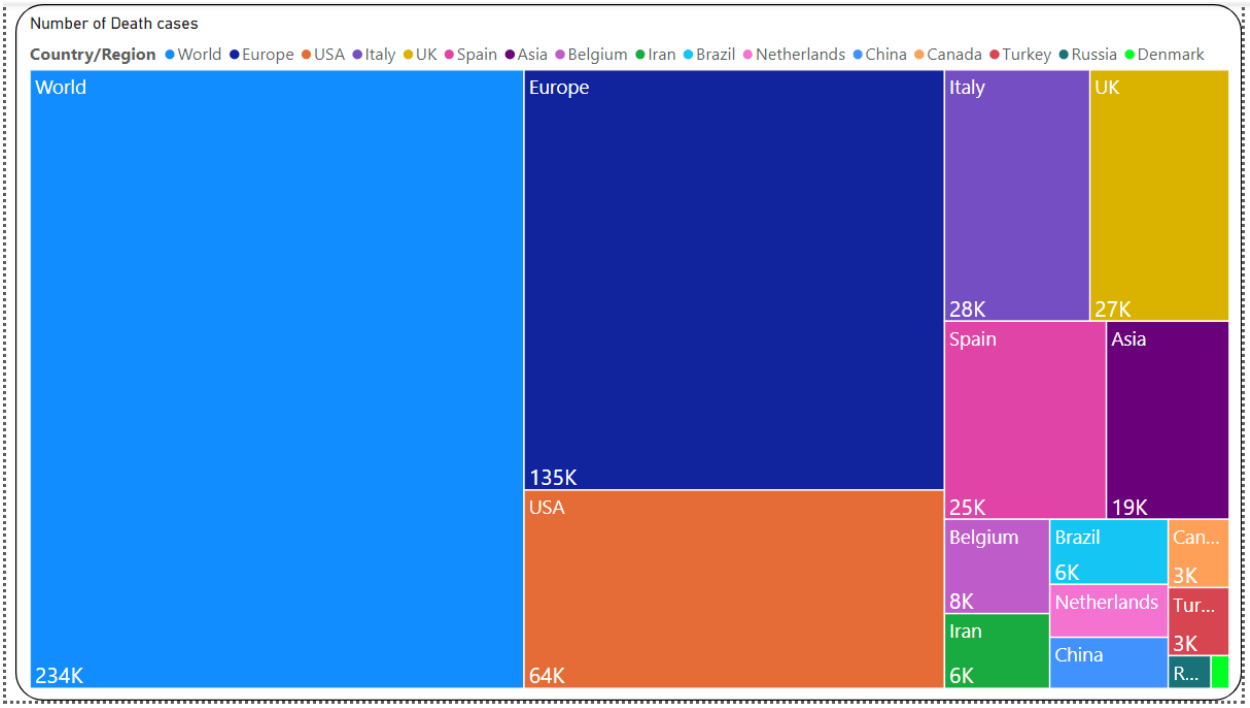
1.6 Denmark comparation with europe, world, and worst hit countries. Analysis using filled maps.



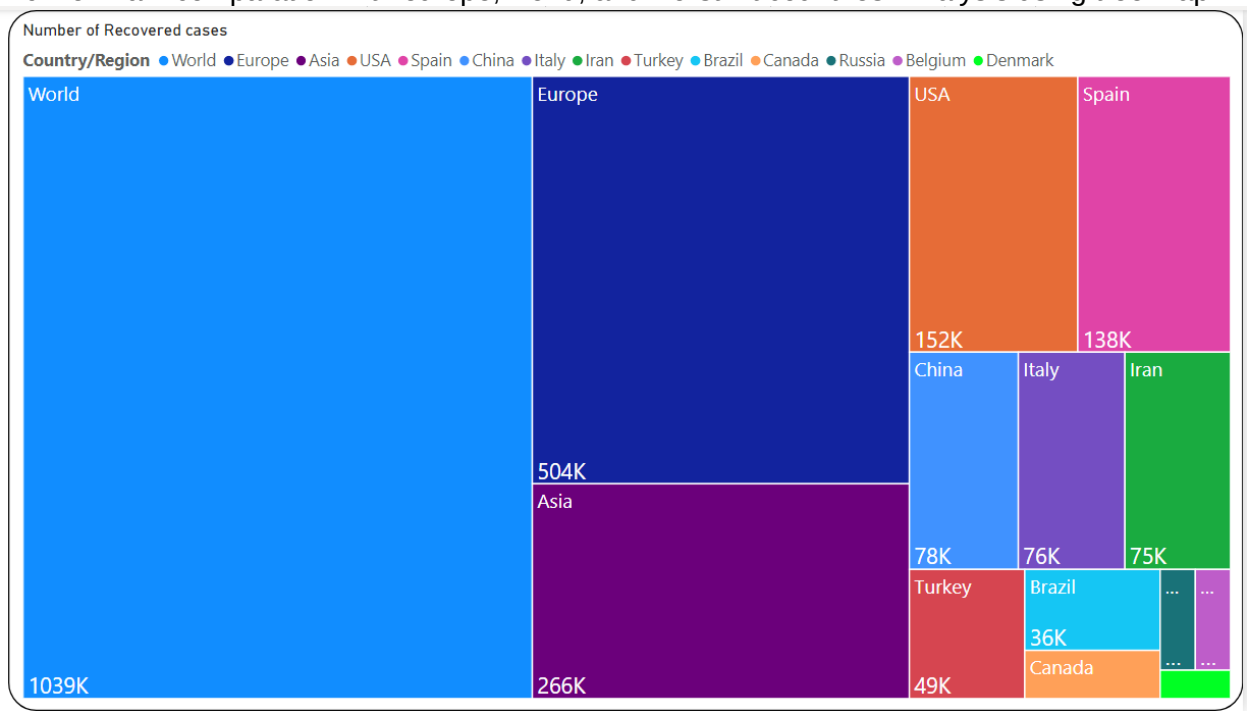
1.7 Denmark comparation with europe, world, and worst hit countries. Analysis using tree map.



1.8 Denmark comparation with europe, world, and worst hit countries. Analysis using tree map.



1.9 Denmark comparation with europe, world, and worst hit countries. Analysis using tree map.



Observation:

1. From the dashboard and charts, we can see the disease has infected a larger number of people in USA, Spain, Italy, UK, France Russia, Denmark and China where the virus was first discovered.

2. USA stand high hits impact of virus .As of **April 30**, 2020(1), about 1.1 M cases have been confirmed and over 63k deaths and 152k cases recovered followed by Spain and Italy etc.

3. Even though the infected cases is high in chain, we can observe that the number of deaths are considerably low and we can also see there has been a lot of recovered patients to this date.

4. As of **April 30**, 2020(1), Denmark hits about 9158 cases have been confirmed and over 452 deaths and 6546 cases recovered.

5. As of April 30,2020 (7), Denmark 166846 Tests complete with confirmed cases 8960. Faroe Islands 6730 tests complete and 187 cases confirmed positive. Green land 1230 tests complete and 11 cases confirmed positive.

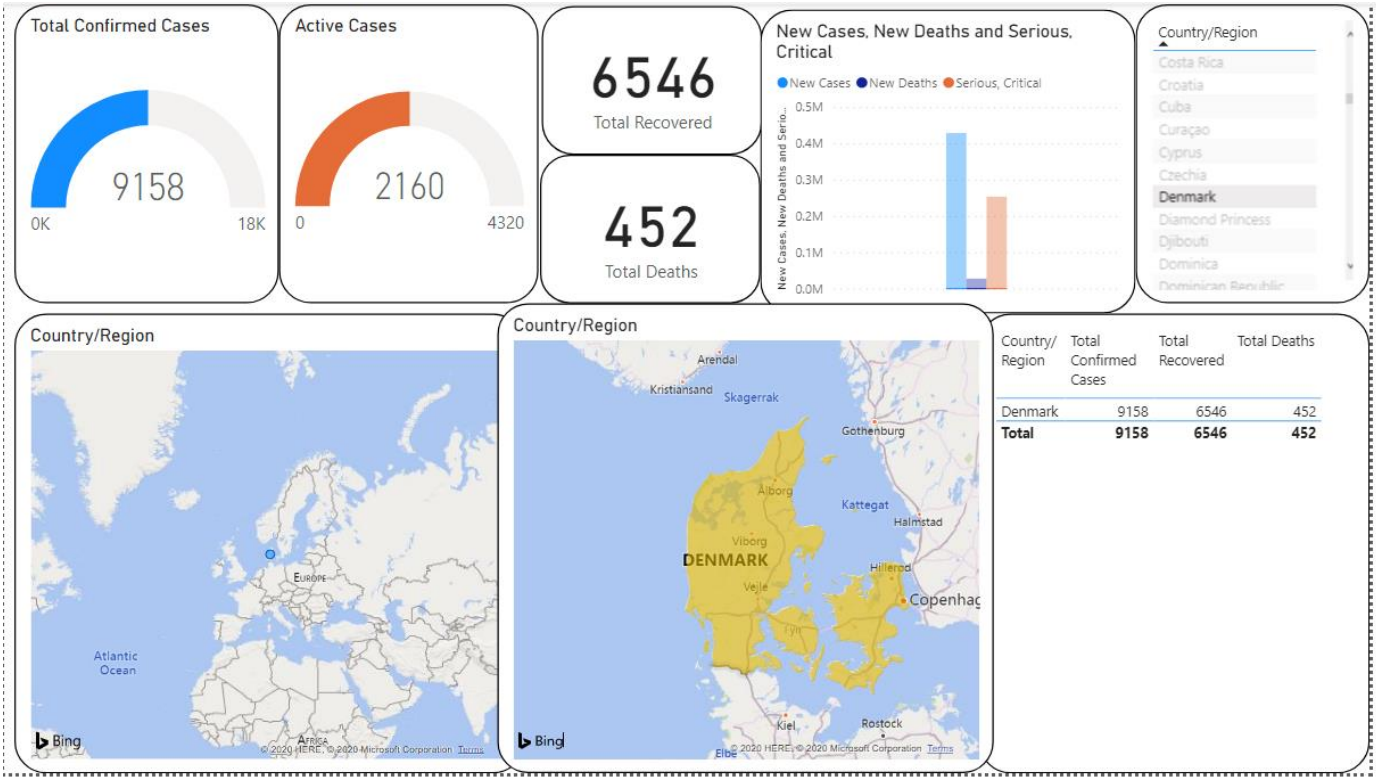
6. Using tree map analysis,the recovery rate across countries gives a wider scope of how countries are mitigating the outbreak. Here, the different levels of hierarchy comes from the data set in order, Country/Region, total confirmed cases, total deaths and total recovered cases.

2. Descriptive/Temporal analysis on infected, mortality and recovery rates. Denmark with its neighbours, continent and the world.

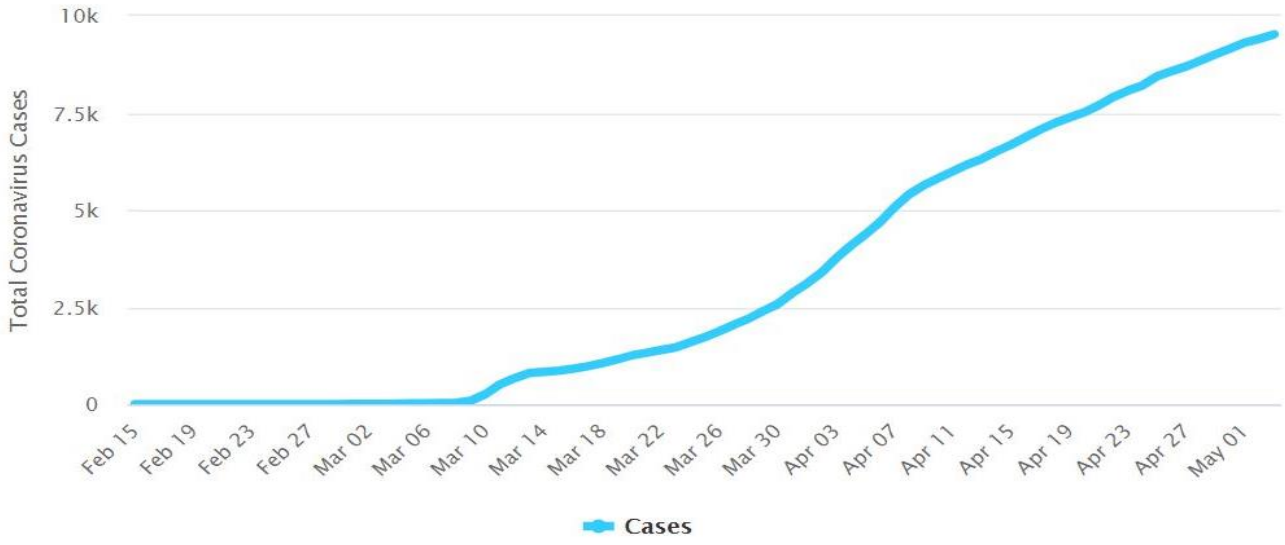
It is crucial to show how rapidly the virus has spread in different countries in a short span of time. Time line analysis(5) would require some pre-processing on the original data to be visualized in power BI query editor.

2.1 Power BI Dashboard: Denmark analysis,The ongoing covid19 pandemic was first confirmed to have spread to Denmark(1) on 27 Feb 2020. As of 30 April 2020, there have been 9158

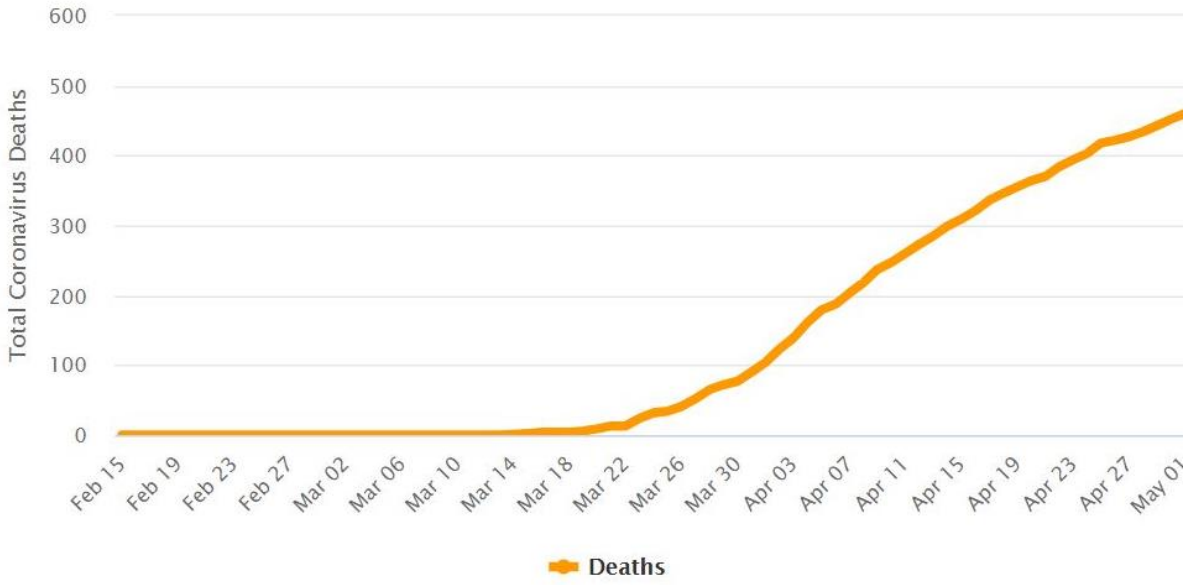
confirmed cases. Among these 452 patients died, 6546 have recovered.



2.2 Total coronavirus cases in Denmark (1)- analysis using line trend chart. First confirmed case trigger in Denmark is feb27th and rises slowly till march 6th with cases 21. By march10th infected cases rises to 91 and after cases raised gradually high and end up with 9158 confirmed cases by april 30th.

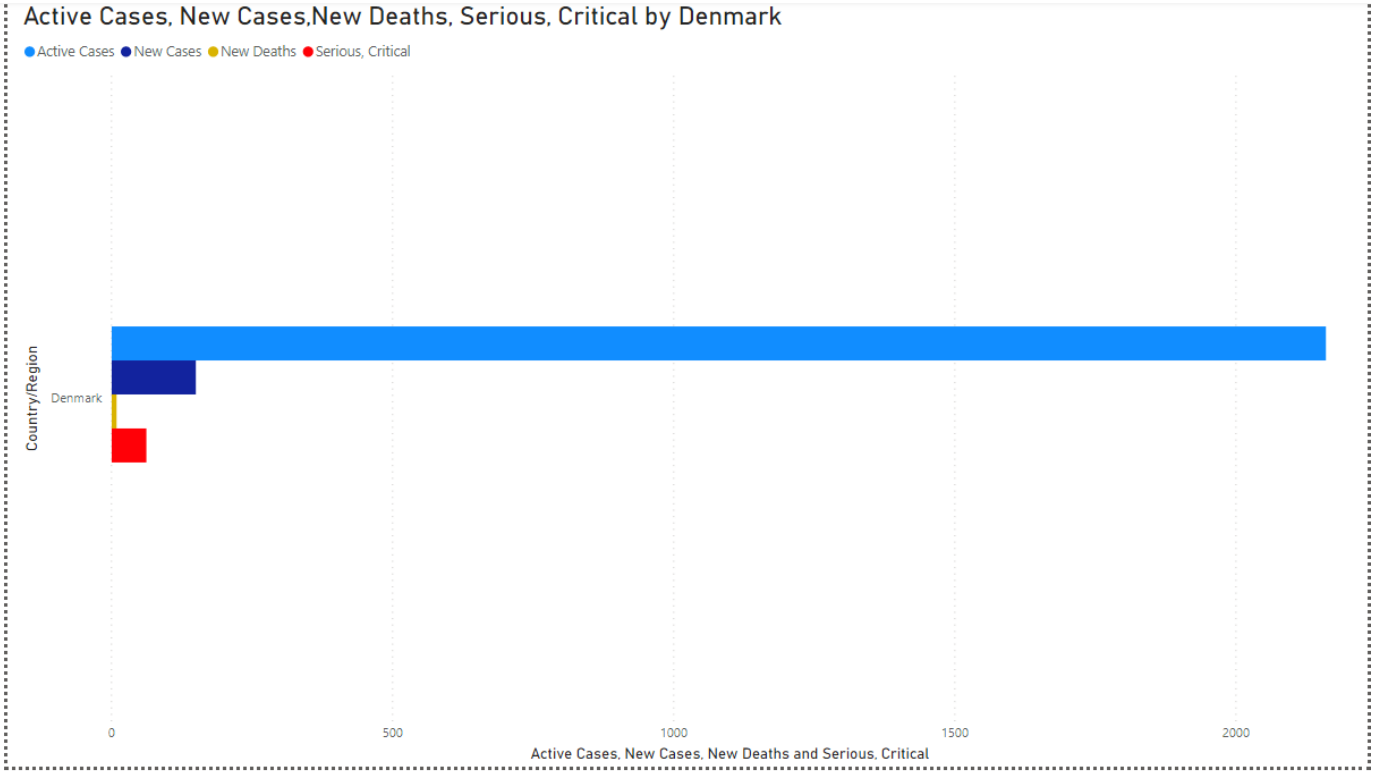


2.3 Total coronavirus deaths in Denmark (1)- analysis using line trend chart. From Feb 27 to march 13 chart is flat with zero deaths. First death trigger on march14 after graph is trending slowly till march22 deaths are 13. After march22 steep rise in deaths happen gradually increasing and end with 452 death case by April 30.

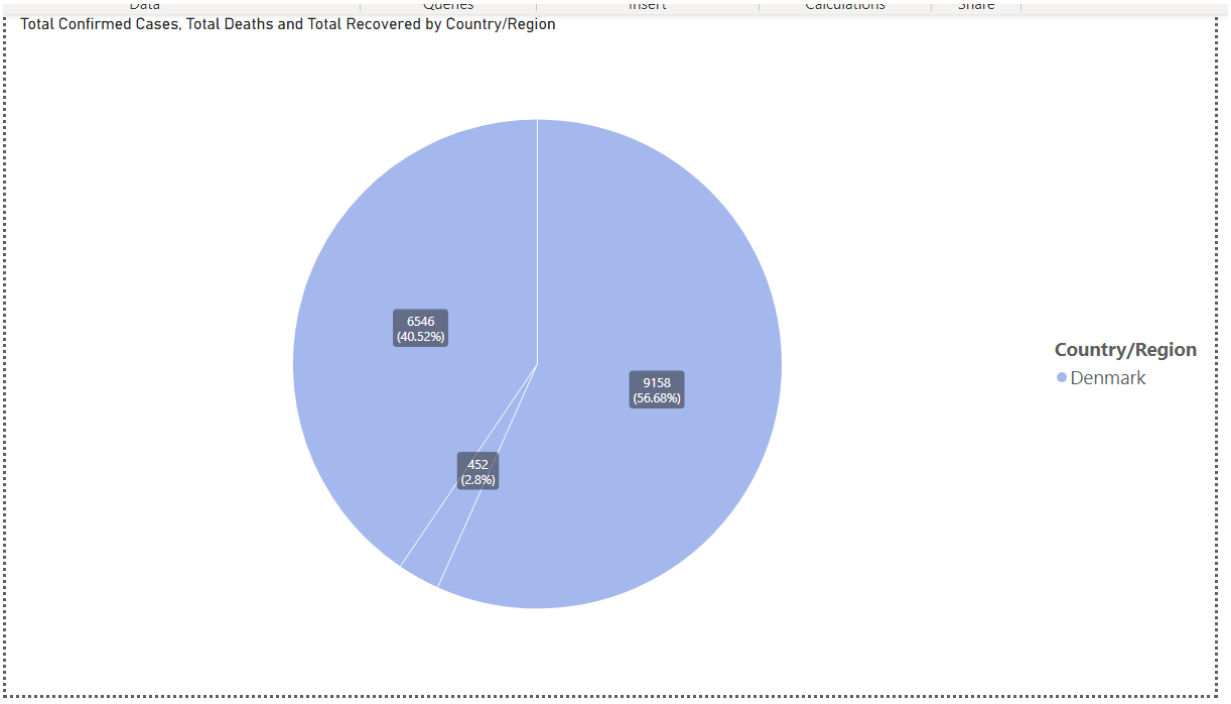


2.4 Outcome of cases(Recovery or Death) in Denmark (1)- analysis using line trend chart, total recovery outcome cases rate as on April 30 is 93.54% and total death outcome rate is 6.46%.

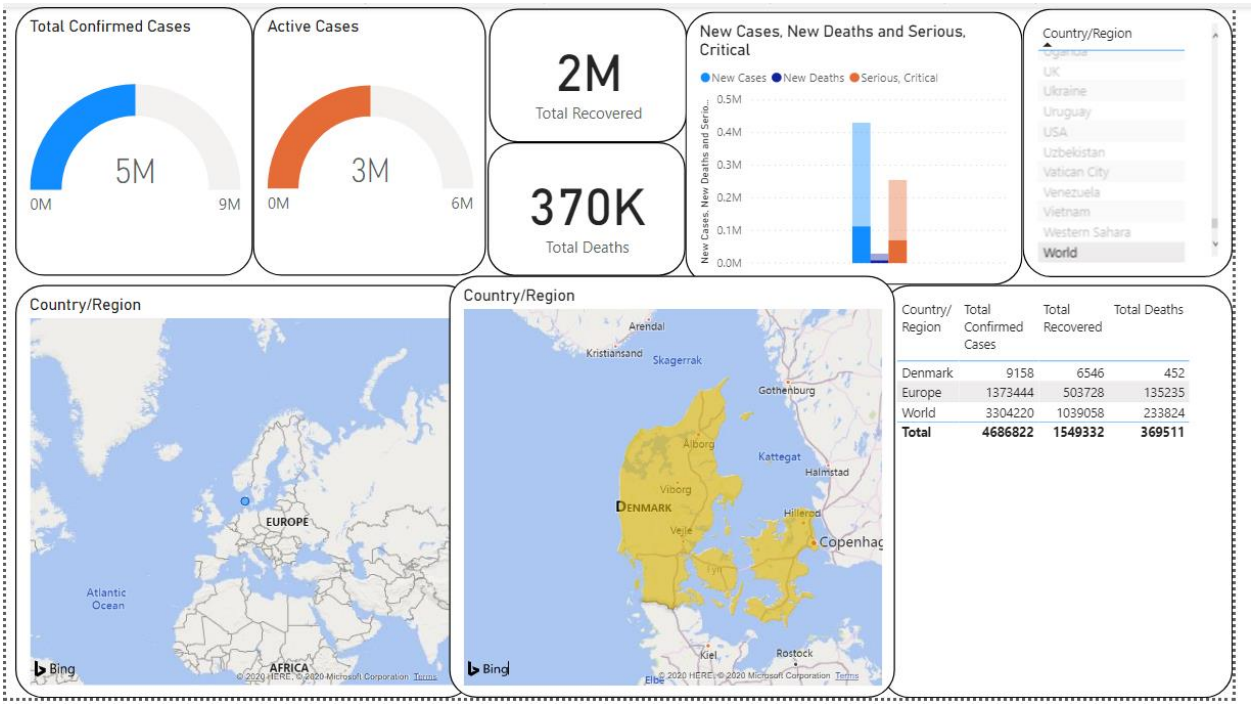
2.5 Denmark analysis using bar chart. On april 30th total active cases are 2160, new cases 150, new deaths 9 and serious critical cases 62.



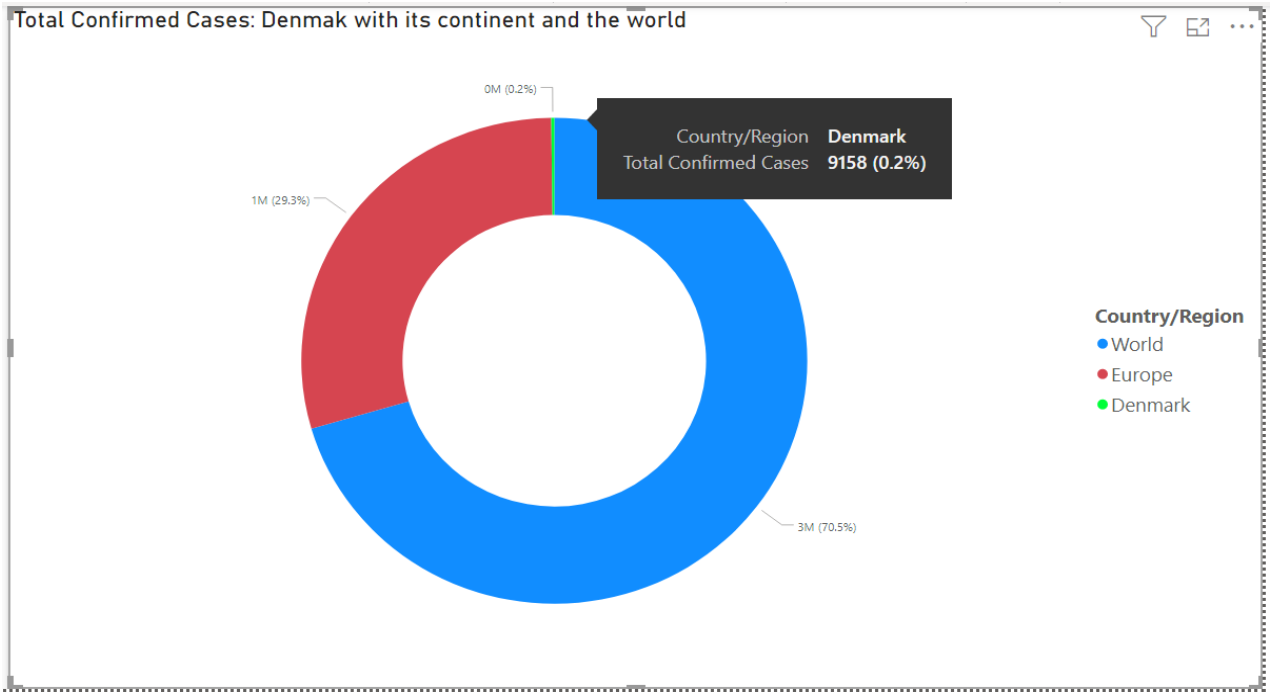
2.6 Denmark Analysis using Pie Chart. 56.68 percentage infection rate with confirmed cases, 2.8 percentage death rate 40.52 percentage recovery rate.



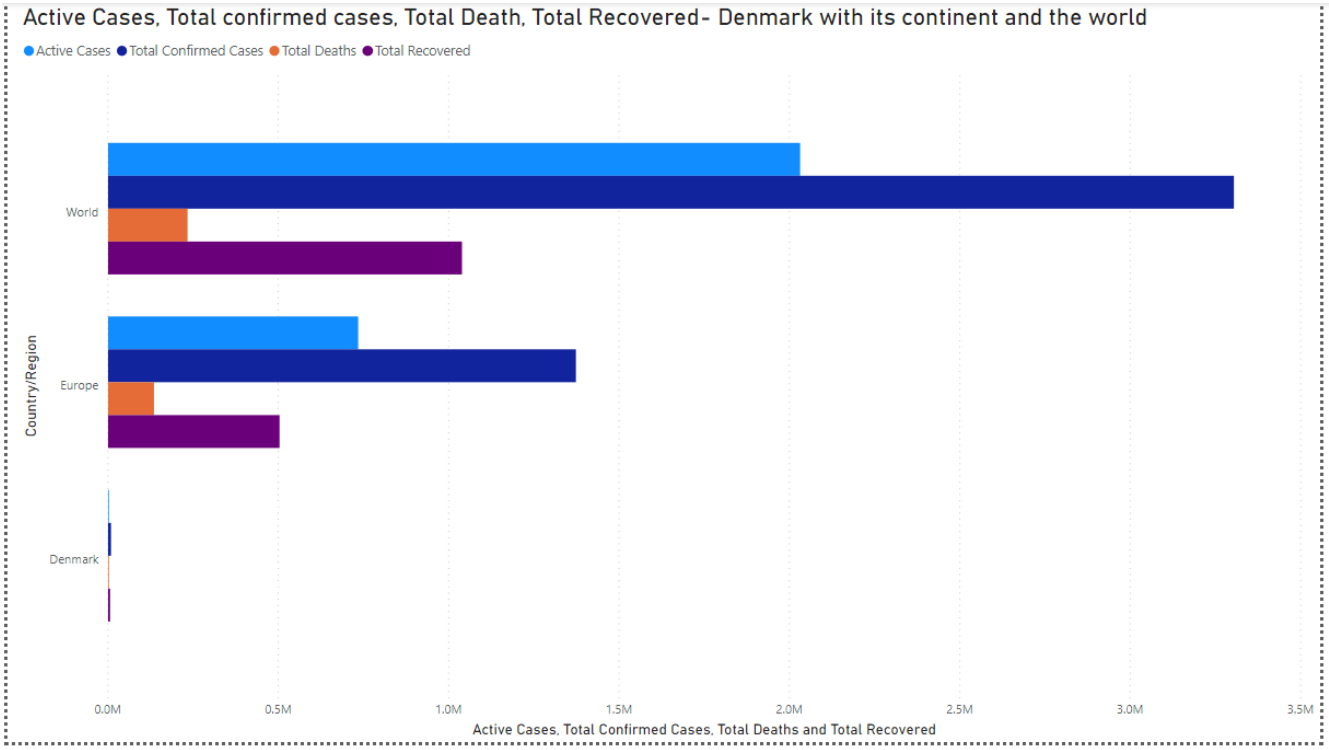
2.7 Power BI dashboard: Denmark comparation with its continent and the world. As of 30th April, Denmark confirmed cases 9158, death cases 452 and recovered cases 6546.Europe confirmed cases 1373k, death cases 135k and recovered cases 503k. World confirmed cases 3304k, death cases 233k and recovered cases 1039k.



2.8 Denmark comparation with its continent and the world- analysis using donot chart. Denmark confirmed cases percentage rate is 0.2, Europe confirmed cases percentage rate is 29.3 and world confirmed cases percentage rate is 70.5.



2.9 Denmark comparation with its continent and the world- analysis using bar chart.

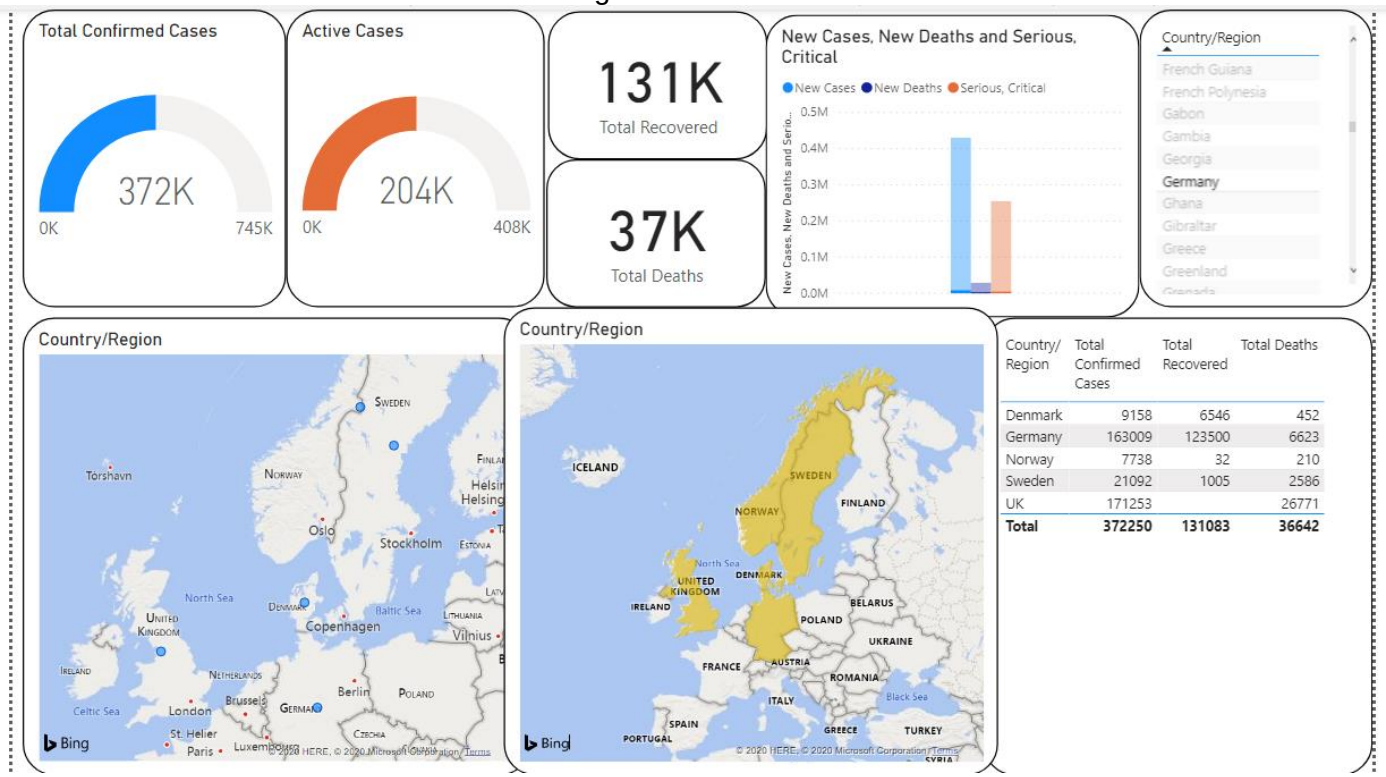


2.10 Denmark comparation with its continent and the world- analysis using Table chart.

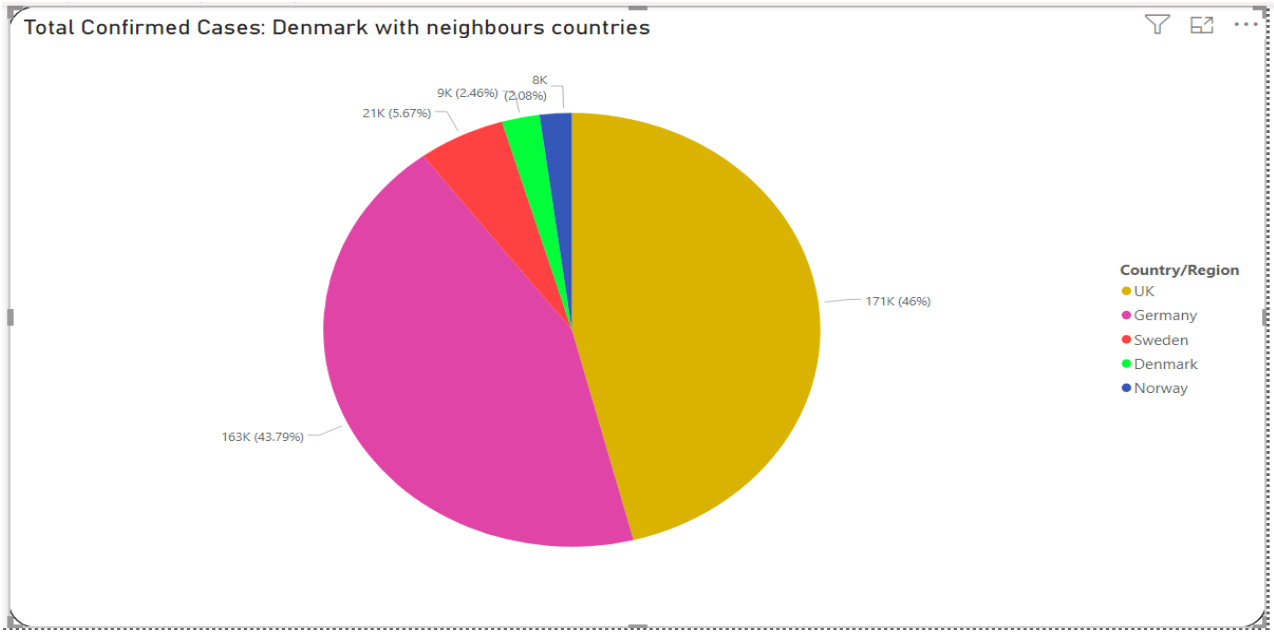
Country/Region	Active Cases	Total Confirmed Cases	Total Deaths	Total Recovered
Denmark	2160	9158	452	6546
Europe	734481	1373444	135235	503728
World	2031338	3304220	233824	1039058
Total	**2767979**	**4686822**	**369511**	**1549332**

Denmark is the smallest of the Scandinavian countries. The neighbours are Germany (to the south), Sweden (to the east), Norway (to the north) and the United Kingdom (to the west).

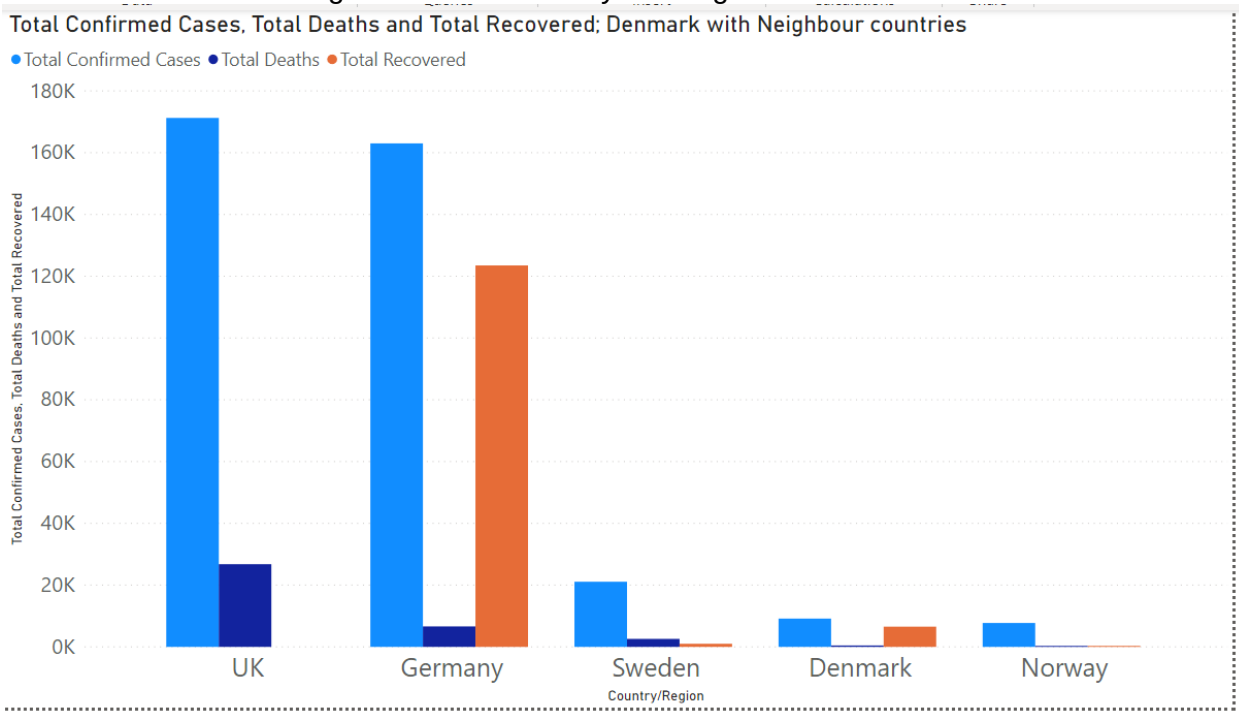
2.11 Power BI Dasboard: Denmark with its neighbours countries



2.12 Denmark with its neighbor countries- analysis using pie chart. Denmark infection rate is 2.46%. Norway infection rate is 2.08%. Sweden infection rate is 5.67%. Norway infection rate is 43.79%. UK infection rate is 46.0%.

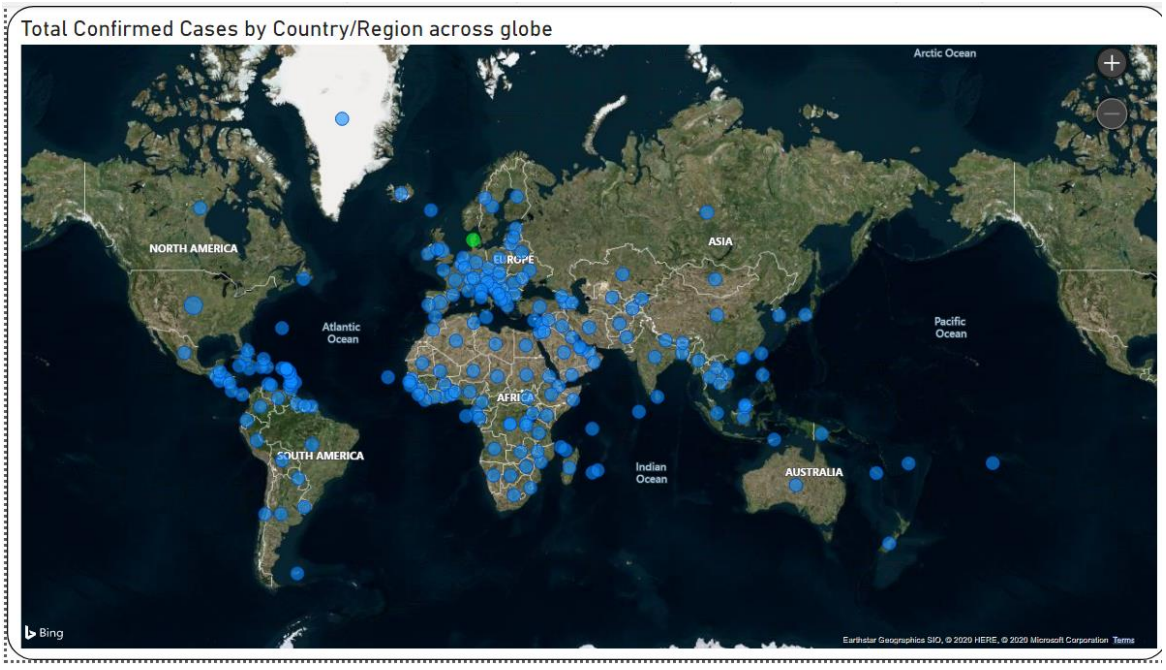


2.13 Denmark with its neighbor countries- analysis using Bar chart

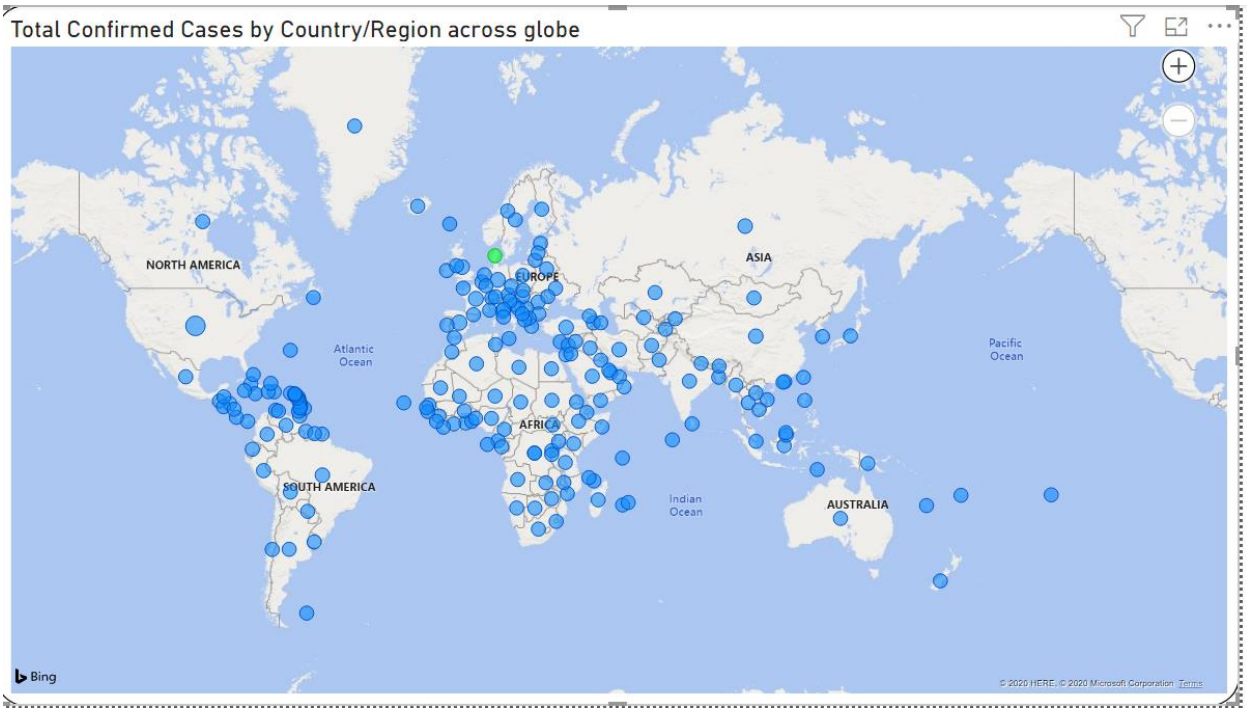


3. Geospatial Analysis on spread of COVID-19 with my assign country Denmark and its continent and the world. Here I have used various charts to show how information can be mined from data sources.

3.1 Total confirmed cases analysis with Geospatial aerial map.



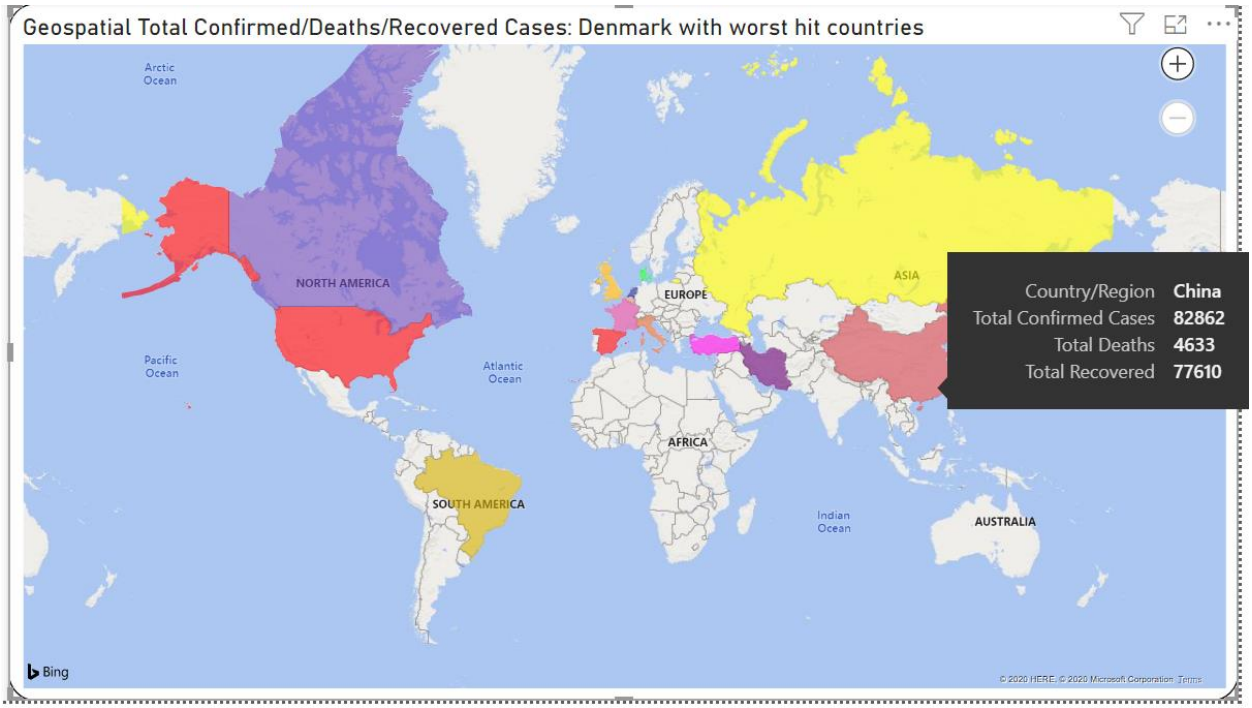
3.2 Total confirmed cases analysis with Geospatial map



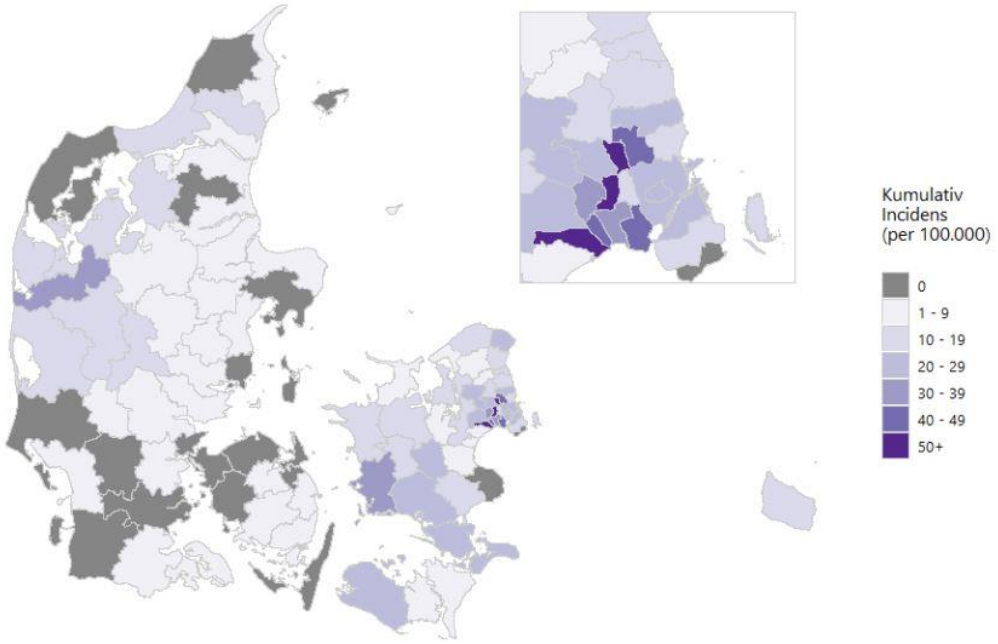
3.3 Total Death cases analysis with Geospatial map

3.4 Total Recovered cases analysis with Geospatial map

3.5 Total confirmed/Deaths/Recovered cases Denmark with worst hit countries analysis with Geospatial map.



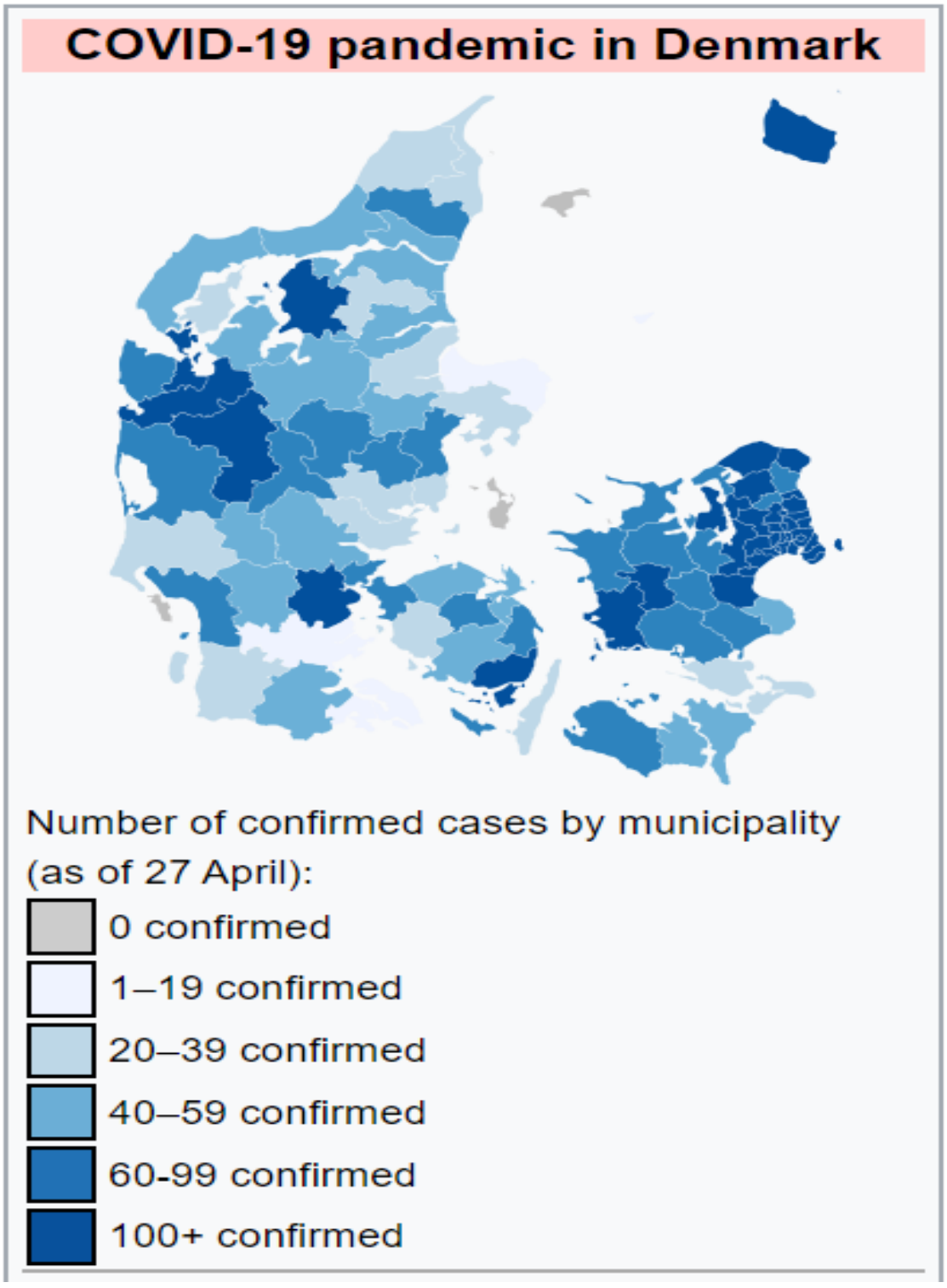
3.6 Confirmed COVID-19 infected per 100,000 inhabitants (cumulative incidence) distributed by municipalities. Last 7 days (7)



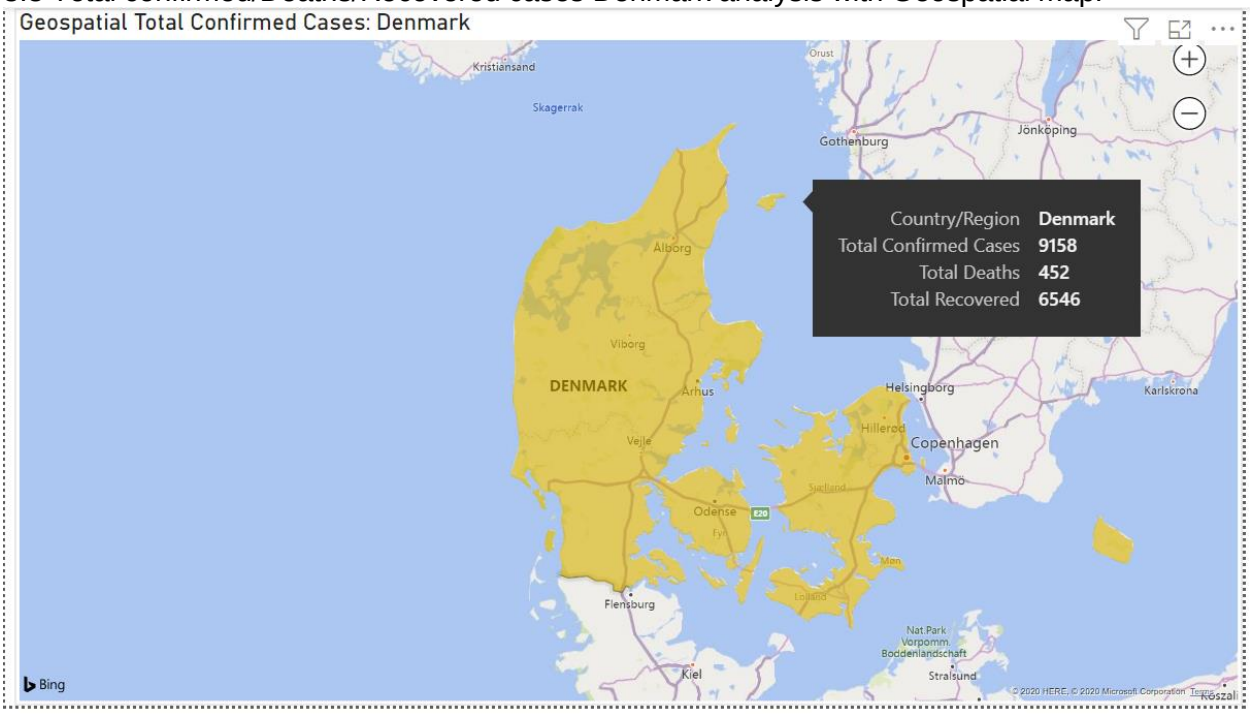
COVID-19: Tested and infected persons, infected infections and deaths (7)

	People tested	Infected persons ✱	Transient infections	Death
Denmark	166,846	8960	6,546	452
Faroe Islands	6730	187	180	0
Greenland	1230	11	11	0
EU, EEA and UK	-	1373444	-	135235
globally	-	3304220	-	233824

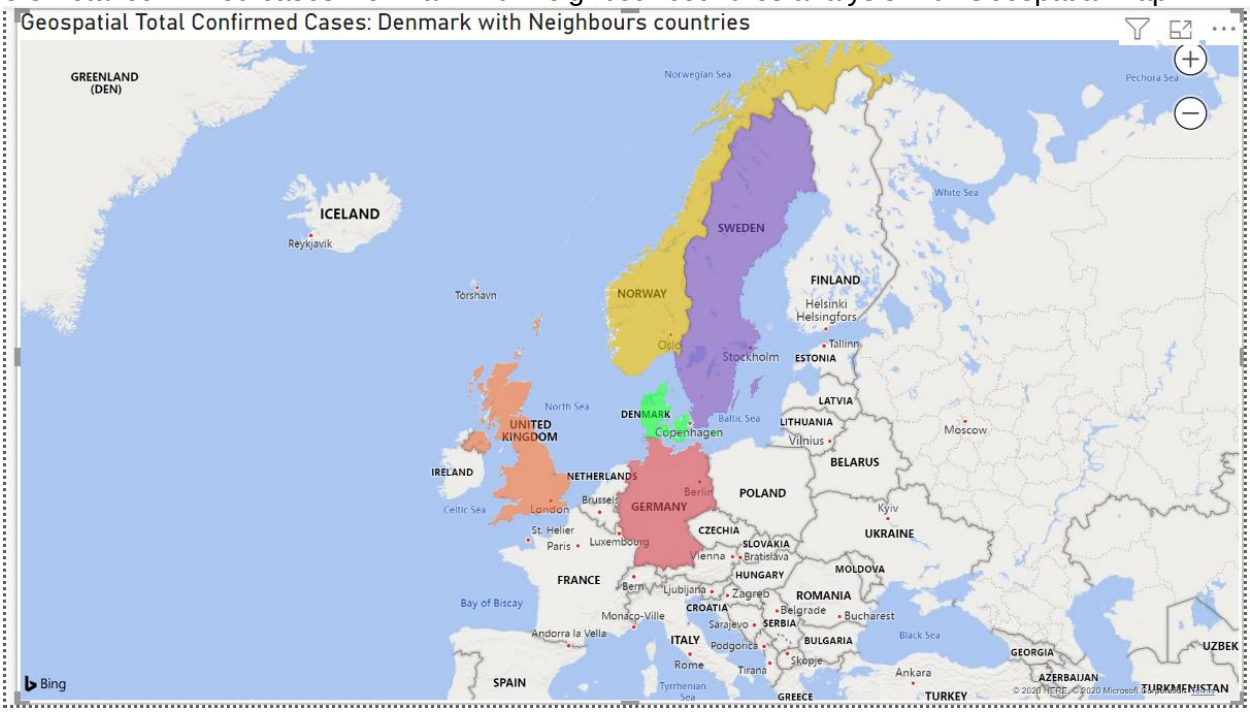
3.7 Covid-19 pandemic in Denmark (8)



3.8 Total confirmed/Deaths/Recovered cases Denmark analysis with Geospatial map.



3.8 Total confirmed cases Denmark with neighbour countries analysis with Geospatial map.



Conclusion:

Evidently covid-19 is spreading faster and has a slightly increasing mortality rate in Denmark, This assignment article gives a detailed analysis of how covid-19 has impacted Denmark and the world and how the derived insights can be used for downstream analysis. The charts can also be applied to other scenarios to infer key data insights. All of the graphs were created using Power BI Desktop(6). Power BI is a wonderful visualization tool for building interactive plots. The rate at which the coronavirus infection is spreading in Denmark has increased since the country opened schools and kindergartens, but not enough to stop the decline in the number of people infected.

According to a new analysis from Denmark's infectious diseases agency SSI (9), the so-called reproduction rate has increased from 0.6 to 0.9, still below the crucial figure of 1, which means that each infected person on average infects on average one other over the course of their illness. There is no indication that there is an actual acceleration of the epidemic, the agency wrote in a status report. If the reproduction rate is above one,that means the number of infected in a society will grow, if it is slightly below, the number will decline.

Our conclusion is that the number of admissions as a result of Covid-19 in Denmark has now stabilized at about 20 to 40 admissions per day(9), and that the reproduction rate is not decreasing to the same extent as we saw in the period before Easter. it said.

The new analysis(9) may lead Denmark's politicians to exercise more caution as they decide which parts of Denmark's lockdown to lift next, as the rate is extremely close to increasing above one, meaning the curve will once again begin to turn upwards.

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