

Berlin International University of Applied Sciences

Business Analytics
Coronavirus Data Sets

Najd Kayali
Marvin Palomeque Aguilar
Oleg Ibragimov

1st semester MBA Students
31 March 2021

Course Instructor: Dr. Hasan Koç

i. Abstract

COVID-19 entered our lives more than a year ago and yet there are few signs of an end. This report analyzes different data sets, scientific journals, articles, and other sources for insights and a deeper understanding of COVID-19. The analysis results showed that women had more infections compared to men; however the number of deaths among men was higher than women; COVID-19 is dangerous for older people; and it is more contagious in comparison to Influenza, and Pneumonia. There are key measures and methods that help slow down the number of COVID-19 cases, such as testing, that this analysis will review. By analyzing the number of testing for COVID-19, one gains a better understanding and insights of the impact that testing has on reducing the number of cases for COVID-19. Finally, this report analyzes different countries with developed medical infrastructure and their performance when infection rates rapidly increase.

Keywords: Data set, COVID-19, Coronavirus, Influenza, Pneumonia, Tableau, EU CDC.

ii. Table of Contents

Abstract.....	i
Table of Contents.....	ii
1. Introduction.....	1
1.1 General Introduction.....	1
1.2 Main Problem Statement.....	1
1.3 Need and Justification for the Study.....	2
1.4 Research Aim.....	2
1.4.1 Research Objective.....	2
1.4.2 Research Questions.....	2
2. Literature Review.....	3
2.1.1. Downloadable versions of ALL data from EU CDC (collected when it is published daily on the EU CDC website)	3
2.1.2. State and county level data for coronavirus in the U.S. (Compiled by The New York Times).....	3
2.1.3. Coronavirus Second Wave? Why Are Cases Increasing?.....	3
2.1.4. COVID-19, Influenza, Pneumonia definitions.....	3
2.1.5. Data Set.....	4
2.2 Conceptual Framework.....	4
3. Research Approach.....	5
3.1. Research Strategy.....	5
3.2. Secondary Data Collection.....	5
3.2.1. Pros and Cons (in comparison to primary data collection).....	5
3.2.2. Secondary Data Collection Approach.....	5
4. Data Collection and Data Analysis.....	6
4.1. Selected Case Characteristics.....	6
4.2. Tableau.....	6
4.3. Applications and Results.....	6
4.4. Limitations.....	6
5. Discussion and Conclusion.....	6
5.1. Analyzing the relation between the coronavirus testing and the number of cases.....	6
5.1.2 Data Process	7
5.1.3 COVID-19 USA and Europe Number of Cases and Deaths.....	7
5.1.4 COVID-19 Testing vs. Positive Cases Comparison Between Europe and the USA.....	8
5.1.5 COVID-19 Positive Rate Ratio.....	10
5.2.1. Percentage of COVID-19 Cases and Deaths by Gender/Sex in the USA.	11
5.2.2. Total COVID-19 Deaths by Age Group in USA (2020).....	12
5.2.3. COVID-19, Influenza and Pneumonia Deaths by Age Group in USA (2020).....	12
5.3.1. Hospitalization and death.....	13
5.3.1. In Belgium	15
5.3.1. In France	16
5.3.1. In Italy.....	17
5.4. Conclusion.....	19

5.5. Limitations and Future Suggestions.....	21
iii. References.....	22
Appendix.....	26
Table № 1.....	26
Figure № 2.....	27
Figure № 3.....	27
Figure № 4.....	28
Figure № 5.....	28
Figure № 6.....	29
Figure № 7.....	29
Figure № 8.....	30
Figure № 9.....	30
Figure № 10.....	31
Figure № 11.....	31
Figure № 12.....	32
Figure № 13.....	32
Figure № 14.....	33
Figure № 15.....	33
Figure № 16.....	34
Figure № 17.....	34

1. Introduction

1.1 General Introduction

COVID-19 quickly disrupted our lives in 2020 and has no quick exit plan. Humanity will for a long time be influenced by the pandemic in many ways: economically - “The IMF estimates that the global economy shrunk by 4.4% in 2020” (Jones et al., 2021); socially - the mandatory mask, social distancing, contact restrictions, (Zohlnhöfer, 2020) customer behaviour - “Worldwide Google searches for “food delivery” and “local food” reached all-time highs in April” (Shveda, n.d.), and other changes. There are many prejudices about COVID-19, starting from implementation of Bill Gates’s microchips into people, (Wakefield, 2020) to real existence of Pandemic (Huo, 2020). That's why, it is important to look into the data sets, related to COVID-19, and scientific journals and articles to know the real situation.

This study looks at the numbers of COVID-19 cases compared to testing, deaths, ages, genders mostly affected by COVID-19 and health care situation in certain countries through available data sets from European Centre for Disease Prevention and Control, state and county level data for coronavirus in the U.S. and HealthData.gov, journals and articles and displayed with Tableau data visualization software. The data visualization produced in Tableau presents large data sets in an easy to understand format (Bogicevic, 2018).

1.2 Main Problem Statement

As a new virus, the world constantly learns something new about COVID-19 and the more we learn about the deadly virus, the better we are to combat it. It is key that all new information is founded in data. (*Our Team*, n.d.). Given the complexity of the data available, it is important findings are presented in a clear and understandable way so everyone can understand the reality of this deadly virus.. With the help of Tableau, it is possible to visualize a big amount of data and show it to the audience.

1.3 Need and Justification for the Study

According to www.worldometers.info as of 21 March 2021, globally there are 123,755,592 COVID-19 cases and 2,725,469 deaths (*Coronavirus Update (Live)*, n.d.). Even with this amount of cases and deaths, there is still a lot of disinformation about COVID-19. Some say that it is not just like Flu and there is no need to panic. Clear data visualization, with the help of Tableau, can give the idea of which groups of people under the strong affection of this disease.

1.4 Research Aim

This research aims to identify the impact of the COVID-19 on different populations within the United States of America (USA) and Europe infected with the coronavirus, by using different public available data sets related to COVID-19.

1.4.1 Research Objective

- Review and analyze different public available data sets of COVID-19 of the USA and Europe..
- Provide insights of rates by deaths and cases in different countries.
- View the healthcare situations that contributed with the increase of infections and death rates.

1.4.2 Research Questions

1. Analyzing the relation between the coronavirus testing and the number of cases.
2. Analyzing death rates for COVID-19 compared to Influenza and Pneumonia;
3. Review the mortality rate between men and women, and people of different ages.
4. Analyze the healthcare situations in countries where deaths in hospitals occurred more than others.

2. Literature Review

2.1.1. Downloadable versions of ALL data from EU CDC (collected when it is published daily on the EU CDC website).

This data set used for this review starts from 31 December 2019 to 29 November 2020, it contains COVID-19 information from countries around the world. Updated daily the data set includes data on confirmed cases, deaths, and testing.

2.1.2. State and county level data for coronavirus in the U.S. (Compiled by The New York Times)

This data set information used for this analysis covers 21 January 2020 to 30 November 2020. Each row contains the daily number of confirmed COVID-19 cases, probable cases, and deaths nationwide, states, U.S. territories and the District of Columbia.

2.1.3. Coronavirus Second Wave? Why Are Cases Increasing?

This article provides an expert view on what drives spikes of COVID-19 cases and insights about how different conditions, measures, and regulations influence COVID-19 surges.

2.1.4. COVID-19, Influenza, Pneumonia definitions

As this paper concentrates on data sets of COVID-19, definition of it should be given. WHO defines COVID-19 as the disease caused by a new coronavirus called SARS-CoV-2, which first occurred in Wuhan, People's Republic of China and mentioned by WHO as a new virus on 31 December 2019 (Coronavirus Disease (COVID-19), n.d.).

COVID-19 “an infectious disease caused by a coronavirus (a type of virus), that usually causes fever, tiredness, and a cough, and can also cause breathing problems. Most often the disease is not serious but it can lead to severe illness in some people.”

Definition by Cambridge dictionary (COVID-19, n.d.)

As we review the differences and similarities between COVID-19, Influenza, Pneumonia to understand which of them is most dangerous for humanity it is

important to understand them as well. “Pneumonia is a form of acute respiratory infection that affects the lungs, which can be caused by bacteria, fungi, and/or viruses.” (Pneumonia, n.d.). and “Influenza (or flu) is a highly contagious viral infection and is one of the most severe illnesses of the winter season” (Pediatric Influenza | Children’s National Hospital, n.d.).

2.1.5. Data Set.

To understand better what a data set is, it is better to look at different courses for its definition. Cambridge dictionary defines a data set as: “a collection of separate sets of information that is treated as a single unit by a computer” (Dataset, n.d.). “A Dataset is a collection of data, published or curated by a single source, and available for access or download in one or more formats.” (Developers’ Corner | Open Data Portal, n.d.). Or short definition by dictionary.com is: “a collection of data records for computer processing” (Definition of Data Set | Dictionary.Com, n.d.)

2.2 Conceptual Framework

In Figure № 1. Conceptual Framework, illustrate what outcome this research expects after taking first steps.

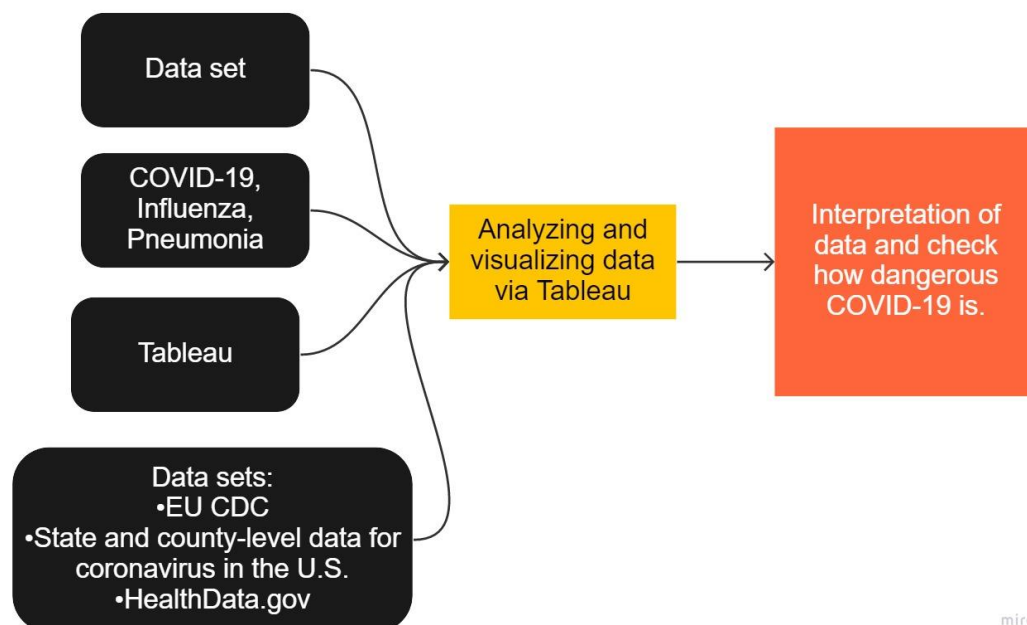


Figure № 1. Conceptual Framework

3. Research Approach

3.1. Research Strategy

Particularly for this paper, research strategy was decided to be done by secondary research, which includes academic articles, newspapers, available information from websites and data sets. Even though the topic is quite new, there are collected data sets from Europe and the USA that are publicly available and used for this paper.

3.2. Secondary Data Collection

3.2.1. Pros and Cons (in comparison to primary data collection)

There is a massive amount of ready to use data available for secondary data collection. To answer the research questions, the paper uses both qualitative and quantitative data analysis. Besides data sets, the names of which were mentioned earlier, the research group selected WHO, newspapers and academic articles.

Given the existing rich data and sensitive nature for health data, it is not feasible for the group to conduct primary research collection. It would be impossible to collect as much data by research group, as it is available in the data sets of for example EU CDC or in HealthData.gov. The main constraints of secondary data is some of the data sets are incomplete and data, which is collected by countries differs from countries and may leave gaps in our main research questions since the data was not collected specifically to answer our research objectives.

3.2.2. Secondary Data Collection Approach

At the beginning of the research, the team dove into academic articles and dictionaries, newspapers, definitions of key terms were given. Then looking at the available information in the data sets of Europe and the USA, the team reviewed how to answer their original objective around COVID-19. This helped to narrow down the cases and provide practical outcomes. Tableau was then used to analyze the massive data sets and make it more vizual for the reader to understand the impact of COVID-19.

4. Data Collection and Data Analysis

4.1. Selected Case Characteristics

For the analysis, the data sets of EU CDC, state and county level data for coronavirus in the U.S., HealthData.gov were visualized in Tableau. Analysing specific news articles and international websites (for example WHO) for better understanding numbers and background of some information.

4.2. Tableau

Tableau assumes to withdraw information from available sources and visualize it, in a way, that readers understand COVID-19 impact on our lives (by showing for example the number of cases and number of deaths).

4.3. Applications and Results

All tables are in the Appendix and provide a visualization of how COVID-19 impacted the lives of people in the USA and Europe, which category of people have to me more careful, than the others.

4.4. Limitations

One of the limitations in this research is the time interval: the start of 2020 until the end of 2020. This research does not include available information for 2021. Even though these data sets are enough to come to particular conclusions. With the use of data sets and visualizing it in Tableau, provides a deeper understanding of the problem. Other limitations are that not all groups were checked. For example, pre-existing conditions, behaviors, race and ethnicity, and living environment are not mentioned in this research.

5. Discussion and Conclusion

5.1. Analyzing the relation between the coronavirus testing and the number of cases.

This section looks into the relationship and the effect that testing has in reducing the number cases and the spread of the COVID-19. Testing is used to trace infected individuals and to alert others that came in close contact with an infected

person (*Our Team*, n.d.). This way governments can take the required measurements such as additional testing, travel restrictions to high-risk areas, stay at home order (quarantining), and the allocations of medical and non-medical resources to combat COVID-19 (*Our Team*, n.d.). For this analysis, the following data sources were used:

- Downloadable versions of ALL data from EU CDC (collected when it is published daily on the EU CDC website) (Coronavirus (COVID-19) Testing - Statistics and Research, n.d.)
- State and county level data for coronavirus in the U.S. (Compiled by The New York Times) (*GitHub - Nytimes/Covid-19-Data: An Ongoing Repository of Data on Coronavirus Cases and Deaths in the U.S.*, n.d.)

5.1.2 Data Process:

The data points used from the mentioned sources are the total number of testing, cases, and deaths, from 1 January 2020 to 31 December 2020. This data was downloaded in excel and uploaded to Tableau for analysis. For the purposes of comparability, simplicity, and accuracy, this analysis only looks at the USA and the Europe. This is because of the parameters set for this report, the regions being analyzed needed to have similar land sizes, climate, and similar culture, to consider people behavior. Also, based on the data acquired, these two regions have the most complete data set, since many countries partially reported, did not report, or started reporting their data until later in the year. This was also the case for some European countries that were included in this report, which also will have an impact on the accuracy of this analysis.

5.1.3 COVID-19 USA and Europe Number of Cases and Deaths.

On Tableau, the total number of cases and deaths were inserted on a map of the USA and Europe. This was done to give a picture of the extent of COVID-19. You can see the map for the USA and Europe on ([Figure № 2](#) and [Figure № 3](#)) that were created with Tableau: On the maps, the greener the area the lower the number and the redder the area the higher the number. Also, to make it easier for the eyes, for the United States map, only the main area of the USA was taken but in the final

count for the total number of cases and deaths, Alaska and other US territories were included.

One thing to point out is that in some cases you will not find the highest number of deaths in the same area where you have the highest number of cases. For example, for the USA, you can see that California had the highest number of cases followed by Texas and Florida, whereas New York had the highest number of deaths, followed by Texas, California, and Florida. For Europe, the highest number of cases belongs to Russia, followed by France, and the UK, and the highest number of deaths belongs to Italy, followed by the UK and France. This might be the case because of different factors that come into play such as the healthcare system, health and age of the person, and the regulations for COVID-19 that vary throughout the USA and Europe. You can find an enhanced map for both the United States and Europe on ([Figure № 8](#), [Figure № 9](#), [Figure № 10](#), and [Figure № 1](#)) for the number of cases and deaths. Next, we have a comparison between Europe and the USA ([Figure № 4](#)) where the number of testing is on blue and the number of positive cases is on yellow.

5.1.4 COVID-19 Testing vs. Positive Cases Comparison Between Europe and the USA.

On the Testing vs Positive Cases [Figure № 4](#), at the beginning of the pandemic (January to May) Europe was testing more for the COVID-19 virus than the USA. While this was helpful to trace and control the spread of COVID-19 in Europe (*Coronavirus (COVID-19) Testing - Statistics and Research*, n.d.). Other viewpoints believe the increase in testing only displays more positive cases and did little to control COVID-19. Although Europe was testing more than the USA at the beginning of the pandemic, the USA had almost the same number of COVID-19 over the same time period. By the end of December, both the USA and Europe have around the same amount of testing and positive cases. The data shows by testing more, there is an increase in COVID-19 cases, but this potentially has a positive impact in the long run to control the spread of COVID-19 (*Coronavirus (COVID-19) Testing - Statistics and Research*, n.d.). However, this chart and data analysis does not provide enough information to confirm this causation assumption. To provide a better analysis, the cumulative total number of testing and positive cases

will be broken down and grouped by month to gather more information. Below in [Figure № 5](#), you can find the USA and Europe total number testing and cases for every month.

Based on [Figure № 5](#), from January to May, Europe continued to test more for the COVID-19 compared to the USA. But in June, Europe reduced the number of tests. While no data can confirm this, qualitative research links this decrease in testing to when many countries in Europe relaxed their COVID-19 regulations ('Coronavirus', 2020). However, from July to September, Europe ramps up the number of testing and from June to July the number of cases seems to be in control. On the other hand, the USA at the beginning were testing for COVID-19 at a lower level than Europe, but they continue to increase their testing every month all the way to July. This might have been the case because at the time, the USA continued to see an increase in numbers of cases, so they needed to expand the number of tests performed to control the spread of COVID-19 virus (*Coronavirus (COVID-19) Testing - Statistics and Research*, n.d.). Then from July to September, the USA continue to test people at around the same levels, and they saw an decrease in the number cases. However, from October to December both the USA and Europe saw a spike of cases, which drove an increase of number testing as well.

This spike in COVID-19 cases might have been the outcome of people traveling and going outside more due to the relaxation of COVID-19 regulations a couple of months before and people gathering more due to the warm weather ('Coronavirus', 2020). As Dr. [Lisa Lockerd Maragakis](#), a disease specialist at Johns Hopkins Medicine stated that when someone gets exposed to COVID-19 virus, it could take couple of weeks before they get sick and get tested, and it takes even longer for other people that were exposed to get sick and get tested. This is why several cycles of infectious have to occur before an increase is recorded in the public health official data, especially when regulations are relaxed (*Coronavirus Second Wave? Why Cases Increase | Johns Hopkins Medicine*, n.d.). This could explain why the sudden spike of cases in October. On [Figure № 6](#), you can find the number of testing and cases in percentage to give you a better idea of the gravity on the spike of cases in October.

In September on [Figure № 6](#), Europe only had 5.09 million COVID-19 cases, a 21.39 % of total cases and the USA had 7.23 million COVID-19 cases, a 36.10% of total cases as of 2020. This is important to note because from October to December Europe got 18.72 million more new COVID-19 cases, a 78.61 % of total cases for 2020 and the USA got 12.8 million more new COVID-19 cases, a 63.9% of total cases for 2020. This was 470.5% increase in cases for Europe and 277% increase in cases for the USA, in only three months. These numbers are concerning, and it points out the complexity of COVID-19 virus. Also it tells us that the government needs to improve and/or increase tracing and preventative measures such as testing to control the spread of COVID-19.

5.1.5 COVID-19 Positive Rate Ratio

One ratio that can help us analyze the spread of COVID-19 and to assess the government response is the positive rate ratio (*Coronavirus (COVID-19) Testing - Statistics and Research*, n.d.). One criteria to keep in mind is that a positive rate less than 5% is an indicator that a country has the epidemic under control, by the WHO (World Health Organization) (*Coronavirus (COVID-19) Testing - Statistics and Research*, n.d.). Also, based on the positive rate ratio indicator, one can conclude that the governments could use it to identify high risk areas to allocate resources and dictate COVID-19 Regulations. Based on [Figure № 7](#) below, for the positive rate and the criteria from the WHO, you can say that from May to August, Europe had COVID-19 virus under control. This might explain why most of European countries relax their regulations around these months ('Coronavirus', 2020). On the other hand, the USA struggled to keep their positive rate under 5% throughout the year, and they were only able to keep it under 5% for June and September. This might explain why the USA continues to increase their number of tests performed, since they needed to increase their tracing to help them control the COVID-19 virus. Finally, from October to December, you can see an increase in the positive rate for both the USA and Europe. This spike might indicate that the COVID-19 virus is spreading faster than the growth of the positive cases and that the numbers of positive cases might be larger than what is reflected (*Coronavirus (COVID-19) Testing - Statistics and Research*, n.d.). Furthermore, since the positive rate ratio for both USA and Europe from October to December is above 5% this

means that they are not managing well the spread of COVID-19 and that they need to improve and/or increase their COVID-19 measures. Finally To continue to analyze the situation in the USA and Europe and to assess how governments improve, more testing in these areas will be necessary.

In conclusion, this section analysis shows the relationship between the number of testing and positive cases, and that testing has a positive impact on reducing the number of cases for COVID-19. While testing is not the solution for COVID-19, it seems like a good measure to analyze, trace and control the spread of COVID 19. As the analysis shows, testing can be used in ratios such as the positive ratio, that indicate if a government needs to improve and/or increase their measures to track and manage the spread of COVI-19. Also, through the positive rate ratio, the government can identify high risk areas so they can take appropriate measures and allocate resources where it is needed the most.

5.2.1. Percentage of COVID-19 Cases and Deaths by Gender/Sex in the USA.

The GenderSci Lab research lab, which conentrates on scientific research on sex and gender takes data from publicly-available state public health departmentsin the USA, and reports gender/sex-disaggregated data on COVID-19 cases and deaths for 50 US States and 2 US Territories (*US Gender/Sex COVID-19 Data Tracker*, n.d.). In [Figure № 12](#). “Percentage of COVID-19 Cases Gender/Sex and US State” (see [Appendix](#)), one can see gender disparities in COVID-19 cases and deaths. Although both men and women can test positive, infection amongst women are more than men, at the same time, in [Figure № 13](#). “Percentage of COVID-19 Deaths Gender/Sex and US State” - the number of deaths from COVID-19 amongst men is higher than women, more specifically, it was discovered that deaths among men is 54%, while deaths among women is 46%, according to the Wall Street journal (Kamp, 2020). In some cases, in the US, the mortality rate among men is almost double compared to women, and in others it's equal. In addition, there are different factors, like social factors, and occupational exposures, that determine why death rate is different between men and women.

Researchers from Harvard's GenderSci Lab, think that social factors may be playing the largest role behaviour and activities that women and men have in economic, social, legal , and, in this case, public health structure (Boston & Ma 02115 +1495-1000, 2020). Also, Gender analysis is essential because gender is a factor in all social and economic relations and its analysis can provide information that would improve policies and programs and ensure that both needs for men and women are met.

5.2.2. Total COVID-19 Deaths by Age Group in USA (2020)

It is not only about gender that COVID-19 affects, but also this research looks at age groups and how they are affected by it. With the use of Tableau and available the USA data set this [Figure № 14](#). "Total COVID-19 Deaths by Age Group in USA (2020)" was developed.. It idisplayes that the older people are, the more dangerous it is for them, as the death rate among older people is very high. The *Wall Street Journal* says:

"About 79% of recorded Covid-19 deaths are among people aged 65 and over, while people under age 35 account for just 1% of known deaths from the disease. Nearly a third of Covid-19 deaths has hit people who are at least 85 years old, death-certificate data shows about 188,000 deaths, the latest available." Wall Street Journal.

It does not mean that younger people are not affected at all with COVID-19. It was found that death rate is high with those people, who had comorbidities diseases, such as Diabetes (62%), hypertension (49.2%) and CAD (17.5%). Around 85% reported having one or more of those diseases (Asirvathama, n.d.).

5.2.3. COVID-19, Influenza and Pneumonia Deaths by Age Group in USA (2020).

To dispel the myth that, COVID-19 is no more dangerous than Influenza and Pneumonia, with the collected data sets and Tableau, it is possible to compare the death rates between those. [Figure № 15](#). "Total COVID-19, Influenza and Pneumonia Deaths by Age Group in USA (2020)", shows that the death rate of COVID-19 is always higher than Influenza and Pneumonia. Here to add, that Pneumonia goes right after COVID-19 and on the third place is Influenza. As it is seen from the table, the group age 65 + has the highest number of deaths.

Next [Table № 1](#). “Similarities and differences between COVID-19, Influenza and Pneumonia” is the collection from different sources and shows differences and similarities, which COVID-19, Influenza and Pneumonia have. All of them are respiratory diseases, which transmit through contact, droplets, and fomites. COVID-19 also through contact with contaminated surfaces. COVID-19 has one particular difference in symptoms “loss of taste or smell” (11Alive. 2020), and no one mentions “Runny nose” (11Alive. 2020). Difficulties in breathing is present in both COVID-19 and Pneumonia.

For prevention of all three diseases now there are vaccines, but we do not have immune systems defenses against COVID-19. As all of them are respiratory illnesses, washing hands, wearing masks and ventilation of indoor spaces help to prevent them. Risk Groups for all of them include Adults 65 or older, and people with Health problems. Except COVID-19 does not include Infants and children as a risk group, and it’s not researched yet whether it affects pregnancy. Pneumonia is also a complication of COVID-19, and the speed of transmission for COVID-19 is up to 14 days.

5.3.1.Hospitalization And Death

The reason why we have had two waves of COVID was not due to the rise in temperatures, evidenced by the fact that areas around the world with high temperatures throughout the year still had infections and fatalities, as many as the other areas with moderate and colder climate. The real reason behind the decrease in case numbers from June to September was merely due to the fact that large masses of people followed the procedures necessary to protect themselves ever since the early months of 2020 and continued to do so for the subsequent months that followed, from march onwards, in addition to the lockdowns that occurred, the shutdown of borders between provinces of the same countries and between the countries themselves, and the imposed quarantines and self isolations for prolonged periods of time.

This was followed by a renewed increase in the number of infections, leading to an increase in hospitalizations, and consequently, an increase in fatalities

during the months from September until the end of the data set reviewed. This may potentially be caused by people being tired from following all those precautions and instructions. Also, during the months were the numbers dropped, governments eased lockdowns and allowed reopening of restaurants and public places, this allowed people to go outside and socialize in open environments, which caused the inevitable increase in contact and infection, and consequently, allowed the virus to spread once again and the numbers rose again to usher the beginning of the second phase of COVID-19 from September to this date. Unless a decisive solution to the problem is made, what happened last year will happen again this year, whether it would be better or worse would depend on human behavior, which proved somewhat difficult to control.

This phenomenon was dubbed the “Pandemic Fatigue” and it was named as the main reason for having two phases so far of the coronavirus epidemic. Dr. Lisa Lockerd Maragakis, states:

“An increase in the number of COVID-19 cases or hospitalizations will not be seen a week or even two weeks later. It seems to take much longer, perhaps as many as six to eight weeks, for effects of a policy or widespread behavior change to appear in the population-level data.” (Maragakis, 2020).

Also, Devi Sridhar, director of the global health governance program at the University of Edinburgh. “Deaths and hospitalizations are a lagging indicator,” “There was no lag back in March because we only tested people who were already in the hospital. At a certain point, your I.C.U.’s are going to fill up.” The uncertainty about hospitalizations and deaths is another example of how mysterious the virus remains, even after months of intense study. And that uncertainty complicates the task for political leaders who are balancing the need to protect their citizens with a desire to avoid imposing more lockdowns (Landler, 2020).

Our team took a look at the hospital to death ratios in European countries to assess the healthcare system in general and see how well the cases were dealt with medically based on the number of fatalities of patients in the hospitals. Figure № 16. “Hospitals and Death Ratio in May 2020” shows the Hospital to death ratios in the countries of Europe, the highest ratios in May 2020 were observed in three

countries; Belgium, France, and Italy, the pandemic reached its peak point in May and then declined in numbers throughout June to September (Where the second wave of the pandemic started to happen). We thought it's best to take a look at the healthcare situations in those three countries to understand why they suffered the most from it. In [Figure № 17](#). "Hospital and Death Ratio in Belgium, France, and Italy from January 2020 to May 2020", we decided to take a closer look at how the pandemic progressed from the month of January 2020 to May 2020.

5.3.2. In Belgium:

On 25 March 2020, Belgium ranked 6th in the list of European countries with the highest numbers of casualties, while on 1 April Belgium had the third highest death toll after Italy and Spain. As of 3 April the case fatality rate of the COVID-19 disease is in Belgium similar to the neighbouring countries The Netherlands and France but much higher than in Germany. However, not all countries count the deaths in the same way. Belgium counts deaths occurring both in hospitals and elsewhere, like in care homes. Deaths with clinical symptoms of the coronavirus disease are considered as "suspicious" and are included in the figures of COVID-19 deaths, even if they were not tested. Sciensano started to publish statistics per province starting 18 March. (Gninyomo, 2020)

In April, Belgium had very high mortality figures, the highest death rate from COVID-19 in the world at that time. In Belgium, around 46% of the COVID-19 deaths occurred in hospitals and 53% occurred in care homes; and while the deaths in hospitals are all confirmed by a test, only 5% of the deaths in care homes are confirmed by a test, the other 95% being suspected cases (Gninyomo, 2020).

According to the data sets, deaths recorded had reached 7,220 deaths (Ratio is 0.224) (See Figure 16), Total hospital patients from COVID in May had reached 32,173 patients a significant drop from April, during which, the number of total hospital patients had reached 34,560 patients (See Figure 17). May 2020 - Starting 4 May 2020, Belgium began gradually to ease the lockdown measures, which were the measures taken from 18 March to combat the spread of the coronavirus. For example, as of 11 May, all shops are allowed to be open for the public but under

certain conditions (e.g. visits are limited to 30 minutes). Cafes and restaurants were allowed to be open as of 8 June.

Factors:

1. The Belgian government has been criticized for its lack of action and underestimating the danger.
2. Pharmacists complained they did not receive clear instructions from the authorities.
3. Belgium faced a shortage of personal protective equipment (PPE) such as respirators, surgical masks or face shields.
4. Hospitals such as the Centre Hospitalier Interrégional Edith Cavell (CHIREC) reported that they were in dire need of protective masks.
5. The method of counting was abysmal, some doctors complained that deaths caused by other pathologies and causes have been lumped into the COVID-19 category. (Wikipedia, 2020)

5.3.3. In France:

Many have often referred to healthcare in France, or “La Sécurité Sociale,” as among the best in the world, stating that it is high quality, very accessible and affordable for the citizens of France. Its national insurance program receives most of its funding through employer payrolls and income taxes. When someone must go in for a checkup or procedure, “La Sécurité Sociale” provides funding for 70% of the medical bill. Private insurance, known as a *mutuelle*, subsidizes a large portion of the 30% that is leftover. The majority of the population has a *mutuelle*. However, no healthcare system is perfect and every one of them comes with its flaws.

Months before the COVID-19 pandemic started, protestors were discussing the issue of better wages for healthcare workers. According to a report from Aljazeera.com, these protests have reached a boiling point due to the stress and strain of the COVID-19 pandemic. Many of the workers who peacefully protested received fines or even went to jail for breaking social distancing and gathering rules. The root causes of these protests stem from the healthcare worker’s low pay and low staff that have been decreasing yearly. Ironically, while France’s healthcare system ranks among the best in the world, its healthcare workers are among the lowest-paid among established economies. As a result, doctors and nurses are in the tough position of having to accept employment through privately owned practices instead of hospitals. (Baham, 2020)

At the end of March, radios in France aired a public appeal for donations to help fund hospitals that are struggling to care for the increasing number of COVID-19 patients in the country. The appeal stated that all such donations would be “tax deductible”, but did not explain why the French state, the sixth largest economic power in the world, is in need of the generosity of private citizens to adequately fund the country’s healthcare system during a pandemic. They were in dire need of medical equipment and even basics like masks and gloves, reports said that they even witnessed nurses wearing garbage bags and swimming goggles on their faces. The situation was even worse in French overseas departments such as Martinique, Guadeloupe, and French Guiana, where the government was forced to accept the help of Cuban doctors in the fight against coronavirus in these territories. For Reunion Island, the best the French state could do was to deliver a bunch of moldy masks. Many were shocked to see France, a country once famed for its strong social security system, fail to respond to this public health emergency efficiently. However, the French healthcare system was struggling long before the start of this pandemic (Diallo, 2020).

During early April, the numbers of deaths from coronavirus increased dramatically, with more than 10,000 people dying during that period of time. The lockdown had initially been planned for 15 days, then for 30 days, but on 13 April, Macron announced that the lockdown period would be extended until 11 May. (Wikipedia, 2020) 3.6% of infected individuals are hospitalized and 0.7% die. As of May 2020, there were 28,839 incident hospitalizations due to COVID-19 reported in France and 8,850 deaths in hospitals (See Figure 17). As a result of decades of policies that valued profit over lives, today the French healthcare system is in such a bad state that the head of ER at Paris’s prestigious Pompidou hospital, Philippe Juvin, who is also a member of the right-wing Republican Party, recently had to admit that “in terms of health, France is underdeveloped” Philippe Juvin.

In 1983, Socialist President Francois Mitterand’s government decided to follow strict austerity policies for the first time, in a move that was contrary to the core values of the Socialist Party. Since then, consecutive governments pulled

France further into austerity, stripping the healthcare system to its bare bones and leaving the country defenceless against public health threats such as pandemics. According to French economist Thomas Porcher, French hospitals lost a total of 70,000 beds in the last 15 years thanks to these austerity policies, with 4,200 beds being lost in 2018 alone. Last year, a third of the grounds of Paris's oldest hospital, Hotel Dieu, was sold to a real estate developer, which plans to transform these historic buildings into shops and restaurants. But, as the COVID-19 pandemic sadly proved, healthcare is not a business and cannot be treated as such. Cuts to this essential public service not only cost lives, but also damage the core values the French Republic claims to stand for. The choices that have been made over the last decade have been slowly but surely dismantling what used to make the country so proud. (Diallo, 2020)

5.3.4. In Italy:

In May 2020, Italy had become the first country in the European Union to register more than 30,000 coronavirus-related deaths. The daily number of confirmed new cases fell slightly to 1,327, bringing the total number of infections to 217,185. Restrictions had begun to ease around the country, but one doctor described the city of Milan as a "time bomb", according to local media. Italy has the third highest number of officially recorded coronavirus deaths in the world, after the United States and the UK - which is no longer a member of the EU. (BBC News, 2020)

- In the most affected regions, the National Healthcare Service was close to collapse—the results of years of fragmentation and decades of finance cuts, privatization, and deprivation of human and technical resources.
- The National Healthcare Service is regionally based, with local authorities responsible for the organization and delivery of health services, leaving the Italian Government with a weak strategic leadership. Over the period 2010–19, the National Healthcare Service suffered financial cuts of more than €37 billion, a progressive privatization of health-care services.

The Lombardy region has the heaviest burden of the COVID-19 pandemic, with (as of March 19, 2020) 19 884 total cases of the disease, 2168 deaths, and 1006 patients

requiring advanced respiratory support. At its standard operational level, Lombardy has a capacity of 724 intensive care beds. To tackle the medical equipment shortage, Italian Civil Protection undertook a fast-track public procurement to secure 3800 respiratory ventilators, an additional 30 million protective masks, and 67 000 severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) tests.

To avert the shortage of health workers produced by decades of inadequate recruitment practices, the Italian Government authorized regions to recruit 20 000 health workers, allocating €660 million for the purpose.

1. The Italian decentralization and fragmentation of health services seemed to have restricted timely interventions and effectiveness, and stronger national coordination should have been in place.
2. Health-care systems capacity and financing needed to be more flexible to consider exceptional emergencies.
3. In response to emergencies, solid partnerships between the private and public sector should have been institutionalized.
4. Recruitment of human resources should have been planned and financed with a long-term vision.
5. Consistent management choices and a strong political commitment were needed to create a more sustainable system for the long run.

The Lancet Public Health, 2020

In May 2020, hospital patients from COVID-19 had reached 32,115 patients (See Figure No. 17), and deaths had reached 6,699 (See Figure No.16)

5.4. Conclusion.

COVID-19 was incorporated into our lives, and it will be for sure with us for a long time. That's why it is important to collect data about COVID-19, analyze it and make decisions according to the analysis. It is shown in the research paper, what can happen, if countries don't give proper numbers (Example is what happened in Russia), this negligence in providing proper and realistic numbers and figures would only serve to cripple the process of analysis and hamper the efforts made to understand and actively provide the necessary data to figure out how to contain it and hopefully protect as many people as possible from infection.

With the use of Tableau, it was proven that testing has a positive impact on reducing the number of cases for COVID-19. Countries, which have proper numbers, can take measures properly (e.g. enforce lockdowns). However, with the example of Italy, Belgium and France, one can see that even developed countries were not really ready, because of different reasons, and they were hit hard by the Coronavirus pandemic. The pandemic revealed the truth and reality of the health care situations in those three countries, the healthcare system needs to be revised and improved in order to be up to the challenge, should the pandemic worsen or develop even further. Also, the fluctuations in the number of infected people over the months was proven to only be a consequence of human behavior and mannerisms, this is not entirely a good thing though, because it means that the virus cannot be contained by natural means like the climate, that it continues to be dangerous to people regardless of the defenses of the immune system in humans. In other words, it is highly contagious, fatal, and difficult to eliminate by natural means.

The reason why we did the analysis of the three countries, Belgium, France, and Italy was because we wanted to dig deeper into the health care systems of those three countries to better understand what went wrong, how the infection got out of hand, and how countries and governments can improve to maintain the safety of their people. Even though each country had different situations when dealing with the pandemic, a pattern was observed when researching the healthcare situations in Belgium, France, and Italy, and it can be concluded that failing to provide the necessary protective measures in hospitals, failing to improve and update the healthcare systems to eliminate any negative aspects that weren't dealt with in the past, failing to provide the necessary funds for the healthcare system and workforce, and failing to employ more people to the healthcare workforce, contributed in the spread of the disease and the increase in fatality rates in hospitals.

COVID-19 is a new disease, which is more infectious than Influenza and Pneumonia and the mortality rate is higher from it. Tableau also gave the opportunity to visualize and make conclusions about who were more affected by the disease, men or women, as well as which age groups were more affected than others.

5.5. Limitations and Future Suggestions.

The analysis is based on data available in the public domain and it is limited by dates with lack of some information. For example with the age groups in data sets, there is overlapping and no clarity with data. It shows an age range of 25-34, 30-49 and 35-44 years old. Still the information about COVID-19 collects and data sets are not full. It will take several years to have a more clear picture of COVID-19 and its effect on the health of people. This research was concentrated only on the European countries and the USA. Other countries were not included in the research. For this research paper only secondary research was utilized. No interviews or Surveys were done, as a primary research. Not all aspects had been checked due to this.

For future suggestions, it could be added to collect data more efficiently, including all information. It would be good to have a single form for the agencies and hospitals. Some data sets have information, which others do not include. Create a single form for everyone when collecting data. For example, in the research paper it was mentioned about comorbidities diseases, which was found in the articles, but not in the data sets. In the future research other groups like: pre-existing conditions, behaviors, race and ethnicity, and living environment, could be checked and see which group was hit by COVID-19 more than others.

iii. References

- 11Alive. (2020). *A doctor explains the difference between pneumonia and the coronavirus*. <https://www.youtube.com/watch?v=5o9ftXvPF7k>
- Asirvathama, E. S. (n.d.). *Who is dying from COVID-19 and when? An Analysis of fatalities in Tamil Nadu, India | Elsevier Enhanced Reader*. <https://doi.org/10.1016/j.cegh.2020.09.010>
- Baham, B. (2020, October 17). *Healthcare in France During COVID-19*. The Borgen Project. [https://borgenproject.org/healthcare-in-france/Belgium: WHO Coronavirus Disease \(COVID-19\) Dashboard](https://borgenproject.org/healthcare-in-france/Belgium: WHO Coronavirus Disease (COVID-19) Dashboard). (n.d.-b). Retrieved 21 March 2021, from <https://covid19.who.int/region/euro/country/be>
- Bogicevic, M. (2018, August 2). *10 REASONS WHY Tableau ROCKS!* Medium. <https://medium.datadriveninvestor.com/10-reasons-why-Tableau-rocks-797687ff0dd0>
- Boston, 677 Huntington Avenue, & Ma 02115 +1495-1000. (2020b, July 31). *More men than women are dying from COVID-19. Why?* News. <https://www.hsph.harvard.edu/news/features/more-men-than-women-are-dying-from-covid-19-why/>
- Chustecka, Z. (n.d.). *More Than 60 Doctors in Italy Have Died in COVID-19 Pandemic*. Medscape. Retrieved 21 March 2021, from <http://www.medscape.com/viewarticle/927753>
- Coronavirus (COVID-19) Testing—Statistics and Research*. (n.d.). Our World in Data. Retrieved 17 March 2021, from <https://ourworldindata.org/coronavirus-testing>
- Coronavirus disease (COVID-19)*. (n.d.-a). Retrieved 13 March 2021, from <https://www.who.int/news-room/q-a-detail/coronavirus-disease-covid-19>
- Coronavirus disease (COVID-19): Similarities and differences with influenza*. (n.d.-b). Retrieved 14 February 2021, from <https://www.who.int/news-room/q-a-detail/coronavirus-disease-covid-19-similarities-and-differences-with-influenza>
- Coronavirus: How lockdown is being lifted across Europe*. (2020a, July 2). BBC News. <https://www.bbc.com/news/explainers-52575313>
- Coronavirus: Italy death toll tops 30,000, highest in EU*. (2020b, May 8). BBC News. <https://www.bbc.com/news/world-europe-52594570>
- Coronavirus Second Wave? Why Cases Increase | Johns Hopkins Medicine*. (n.d.). Retrieved 17 March 2021, from <https://www.hopkinsmedicine.org/health/conditions-and-diseases/coronavirus/first-and-second-waves-of-coronavirus>
- Coronavirus Update (Live): 123,755,592 Cases and 2,725,469 Deaths from COVID-19 Virus Pandemic - Worldometer*. (n.d.). Retrieved 21 March 2021, from <https://www.worldometers.info/coronavirus/#countries>
- COVID-19*. (n.d.). Retrieved 13 March 2021, from <https://dictionary.cambridge.org/dictionary/english/covid-19>
- Covid-19: Daily hospital deaths in France remain below 100 despite easing of lockdown*. (2020, May 26). France 24.

- <https://www.france24.com/en/20200526-covid-19-daily-death-toll-continues-to-drop-in-france-despite-easing-of-lockdown>
- Covid-19 in the UK: How many coronavirus cases are there in your area? (2021, March 8). *BBC News*. <https://www.bbc.com/news/uk-51768274>
- COVID-19 Provisional Counts—Weekly Updates by Select Demographic and Geographic Characteristics*. (2021, February 11). https://www.cdc.gov/nchs/nvss/vsrr/covid_weekly/index.htm
- Covid_anlaysia*. (n.d.). Retrieved 12 February 2021, from <https://kaggle.com/sudarshanpatil/covid-anlaysia>
- Dataset*. (n.d.). Retrieved 13 March 2021, from <https://dictionary.cambridge.org/dictionary/english/dataset>
- Definition of data set | Dictionary.com*. (n.d.). *Www.Dictionary.Com*. Retrieved 13 March 2021, from <https://www.dictionary.com/browse/data-set>
- Developers' corner | Open Data Portal*. (n.d.). Retrieved 13 March 2021, from <https://data.europa.eu/euodp/developerscorner>
- Diallo, R. (n.d.). *France's COVID-19 failures are the result of decades of austerity*. Retrieved 21 March 2021, from <https://www.aljazeera.com/opinions/2020/4/20/frances-covid-19-failures-are-the-result-of-decades-of-austerity>
- Europe: Coronavirus deaths per 100,000 by country*. (n.d.). Statista. Retrieved 16 February 2021, from <https://www.statista.com/statistics/1111779/coronavirus-death-rate-europe-by-country/>
- Feuer, W. (2020, September 18). *'Pandemic fatigue' leads to resurgence of coronavirus in Europe where cases hit fresh records in France and Spain*. *CNBC*. <https://www.cnbc.com/2020/09/18/pandemic-fatigue-leads-to-resurgence-of-coronavirus-in-europe-where-france-and-spain-hit-records.html>
- Forecast: Industry revenue of "general cleaning of buildings" in Germany 2012-2024*. (n.d.). Statista. Retrieved 4 February 2021, from <https://www.statista.com/forecasts/354110/general-cleaning-of-buildings-revenue-in-germany>
- FRANCE 24 with AFP, REUTERS. (2020, April 8). *France reports 541 new coronavirus hospital deaths in 24 hours*. France 24. <https://www.france24.com/en/20200408-france-reports-541-new-coronavirus-hospital-deaths-in-24-hours>
- GitHub—Nytimes/covid-19-data: An ongoing repository of data on coronavirus cases and deaths in the U.S*. (n.d.). Retrieved 17 March 2021, from <https://github.com/nytimes/covid-19-data>
- Household Cleaners—Germany | Statista Market Forecast*. (n.d.). Statista. Retrieved 4 February 2021, from <https://www.statista.com/outlook/60020000/137/household-cleaners/germany>
- How much do you pay for a home cleaning service in Germany?* (n.d.). *Spicandspan.De*. Retrieved 5 February 2021, from <https://spicandspan.de/services>

- Huo, Y. J. (2020, August 27). Prejudice, Discrimination, and COVID-19: Excerpt from 'Together Apart'. *Social Science Space*. https://www.socialsciencespace.com/2020/08/prejudice_communication_covid/
- Iftimie, S., López-Azcona, A. F., Vallverdú, I., Hernández-Flix, S., Febrer, G. de, Parra, S., Hernández-Aguilera, A., Riu, F., Joven, J., Camps, J., Castro, A., & Group, R. S. (2020). First and second waves of coronavirus disease-19: A comparative study in hospitalized patients in Reus, Spain. *MedRxiv*, 2020.12.10.20246959. <https://doi.org/10.1101/2020.12.10.20246959>
- Is it Pneumonia? Covid? A Cold? Or the Flu? 10 Sign to Tell the Difference*. (2020, October 15). ARcare. <https://www.arcare.net/is-it-pneumonia-covid-a-cold-or-the-flu-10-sign-to-tell-the-difference/>
- Italy sees signs of hope: 'Our hospitals are starting to breathe'—The Local*. (n.d.). Retrieved 21 March 2021, from <https://www.thelocal.it/20200404/italy-sees-signs-of-hope-our-hospitals-are-starting-to-breathe/>
- Jones, L., Palumbo, D., & Brown, D. (2021, January 24). Coronavirus: How the pandemic has changed the world economy. *BBC News*. <https://www.bbc.com/news/business-51706225>
- Kamp, J. (2020, September 29). Who Is Dying From Covid-19? Why? *Wall Street Journal*. <https://www.wsj.com/articles/who-is-dying-from-covid-19-why-11601407258>
- Kobak, D. (2021). Excess mortality reveals Covid's true toll in Russia. *Significance*, 18(1), 16–19. <https://doi.org/10.1111/1740-9713.01486>
- Kohli, S., Timelin, B., Fabius, V., & Veranen, S. M. (n.d.). *How COVID-19 is changing consumer behavior –now and forever*. 6.
- Landler, M. (2020, September 24). As Virus Cases Surge in Europe, Hospitalizations Lag. But for How Long? *The New York Times*. <https://www.nytimes.com/2020/09/24/world/europe/covid-europe-hospitals-lockdowns.html>
- Learn About Pneumonia*. (n.d.). Retrieved 17 February 2021, from /lung-health-diseases/lung-disease-lookup/pneumonia/learn-about-pneumonia
- Nytimes/covid-19-data*. (2021). The New York Times. <https://github.com/nytimes/covid-19-data> (Original work published 2020)
- Oliva, A., Caputo, M., Grassi, S., Vetrugno, G., Marazza, M., Ponzanelli, G., Cauda, R., Scambia, G., Forti, G., Bellantone, R., & Pascali, V. L. (2020). Liability of Health Care Professionals and Institutions During COVID-19 Pandemic in Italy: Symposium Proceedings and Position Statement. *Journal of Patient Safety*, 16(4), e299. <https://doi.org/10.1097/PTS.0000000000000793>
- Our Team*. (n.d.). Our World in Data. Retrieved 17 March 2021, from <https://ourworldindata.org/team>
- Pediatric Influenza | Children's National Hospital*. (n.d.). Retrieved 13 March 2021, from <http://childrensnational.org/visit/conditions-and-treatments/infectious-diseases/influenza>

- Pneumonia*. (n.d.). Retrieved 17 February 2021, from <https://www.who.int/news-room/fact-sheets/detail/pneumonia>
- Preventing COVID-19*. (n.d.). Retrieved 17 February 2021, from [/lung-health-diseases/lung-disease-lookup/covid-19/prevention](https://www.who.int/news-room/fact-sheets/detail/pneumonia)
- Salje, H., Kiem, C. T., Lefrancq, N., Courtejoie, N., Bosetti, P., Paireau, J., Andronico, A., Hozé, N., Richet, J., Dubost, C.-L., Strat, Y. L., Lessler, J., Levy-Bruhl, D., Fontanet, A., Opatowski, L., Boelle, P.-Y., & Cauchemez, S. (2020). Estimating the burden of SARS-CoV-2 in France. *Science*, 369(6500), 208–211. <https://doi.org/10.1126/science.abc3517>
- Shveda, K. (n.d.). *How Covid-19 is changing food shopping*. Retrieved 7 March 2021, from <https://www.bbc.com/future/bspoke/follow-the-food/how-covid-19-is-changing-food-shopping.html>
- Symptoms of Coronavirus | CDC*. (n.d.). Retrieved 14 February 2021, from <https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html>
- The Italian health system and the COVID-19 challenge—The Lancet Public Health*. (n.d.). Retrieved 16 February 2021, from [https://www.thelancet.com/journals/lanpub/article/PIIS2468-2667\(20\)30074-8/fulltext](https://www.thelancet.com/journals/lanpub/article/PIIS2468-2667(20)30074-8/fulltext)
- Timeline of WHO's response to COVID-19*. (n.d.). Retrieved 16 February 2021, from https://www.who.int/emergencies/diseases/novel-coronavirus-2019/interactive-timeline?gclid=CjwKCAiAjp6BBhAIEiwAkO9WuhkkjQEttP7osLX8_6iUuFjG2R0ve5jr1CRVc75BslYL7C7N0TSWqhoCHE4QAvD_BwE#event-115
- US Gender/Sex COVID-19 Data Tracker*. (n.d.). GenderSci Lab. Retrieved 14 February 2021, from <https://www.genderscilab.org/gender-and-sex-in-covid19>
- Wakefield, J. (2020, June 5). How Bill Gates became the voodoo doll of Covid conspiracies. *BBC News*. <https://www.bbc.com/news/technology-52833706>
- WHO Coronavirus Disease (COVID-19) Dashboard*. (n.d.). Retrieved 16 February 2021, from <https://covid19.who.int>
- Zohlnhöfer, R. (2020, July 23). *Anti-coronavirus Measures: Large Majority Respects the Requirements*. idw - Informationsdienst Wissenschaft e.V. <https://nachrichten.idw-online.de/2020/07/23/anti-coronavirus-measures-large-majority-respects-the-requirements/>
- Landler, M. (2020, September 24). *As Virus Cases Surge in Europe, Hospitalizations Lag. But for How Long?* The New York Times. *As Virus Cases Surge in Europe, Hospitalizations Lag. But for How Long?*
- Gninyomo, Luc, (2020, September 13). The COVID-19 Pandemic in Belgium <https://www.sheenmagazine.com/the-covid-19-pandemic-in-belgium/>.

Appendix

Tables

Table № 1. Similarities and differences between COVID-19, Influenza and Pneumonia.

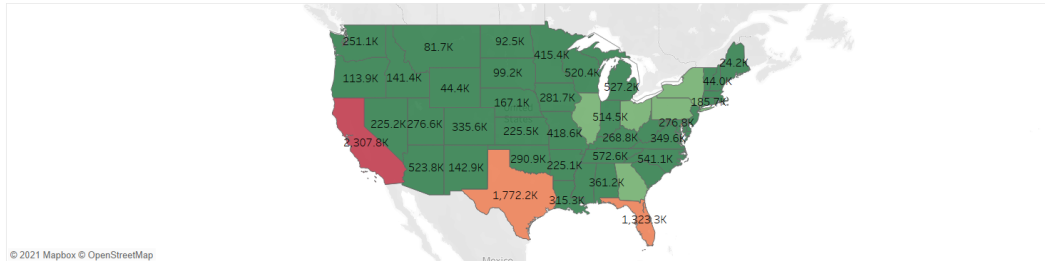
	COVID-19	Pneumonia	Influenza
Respiratory disease	☒	☒	☒
Spread by:			
Spread via contact, droplets, and fomites	☒	☒	☒
Airborne transmission	☒	☒	☒
Contact with contaminated surfaces	☒	☐	Less often
Symptoms:			
Fever	☒	☒	☒
Cough	☒	☒	☒
Muscle and joint pain	☒	☐	☐
Headache	☒	☐	☐
Runny nose	☐	☐	☒
Shortness of breath or difficulty breathing	☒	☒	☐
Diarrhea	☒	☐	☒
New loss of taste or smell	☒	☐	☐
Congestion or sore throat	☒	☐	☒
Loss of appetite, low energy, and fatigue	☒	☒	☒
Nausea and vomiting	☒	☒	☒
Confusion, especially in older people		☒	
Prevention			
Vaccines	☒	☒	☒
Immune systems defenses against disease	☐	☒	☒
Hand hygiene	☒	☒	☒
Respiratory etiquette: Wearing masks, ventilation indoor spaces	☒	☒	☒
Don't Smoke	No research	☒	
Risk Groups:			
Infants and children	☐	☒	☐
Adults 65 or older	☒	☒	☒
Health problems	☒	☒	☒
Pregnant	No research	☐	☒

Table № 1.

Figures

Figure № 2. USA's COVID-19 Virus Number Of Cases And Deaths As Of December 31, 2020

USA Number of Cases - December 2020



USA Number of Deaths - December 2020

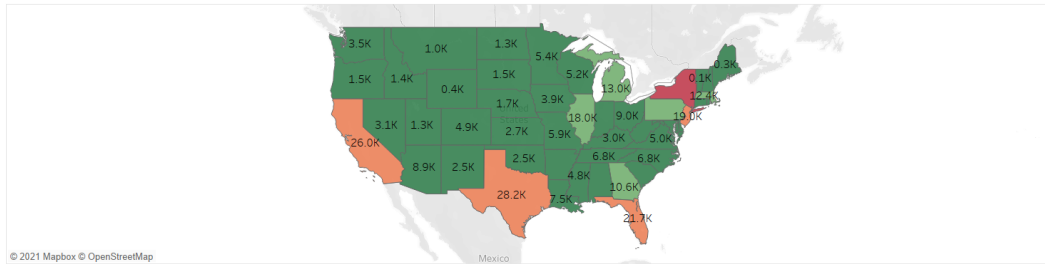
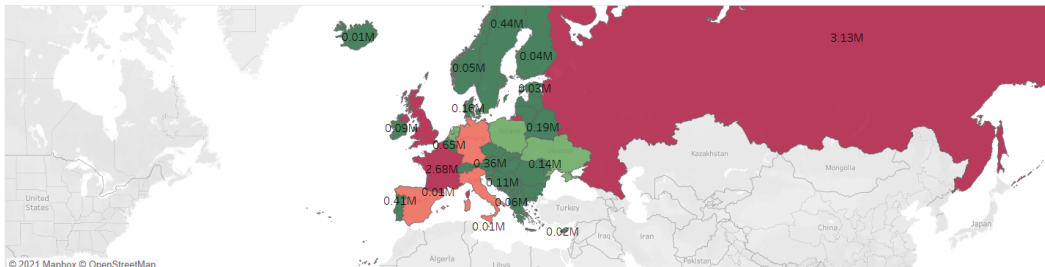


Figure № 2.

Figure № 2. Europe's COVID-19 Virus Number Of Cases And Deaths As Of December 31, 2020

Europe Number of Cases - December 2020



Europe Number of Deaths - December 2020

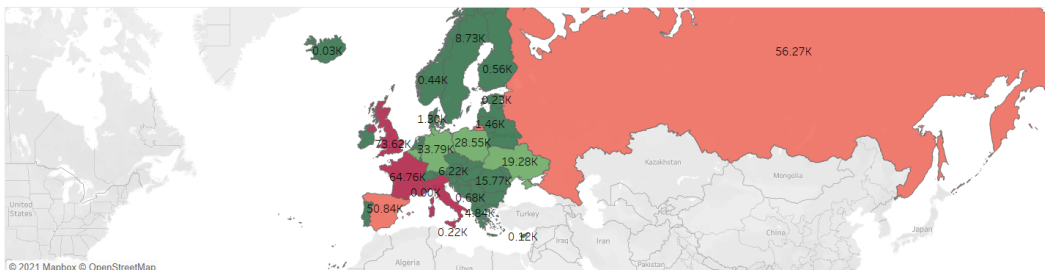
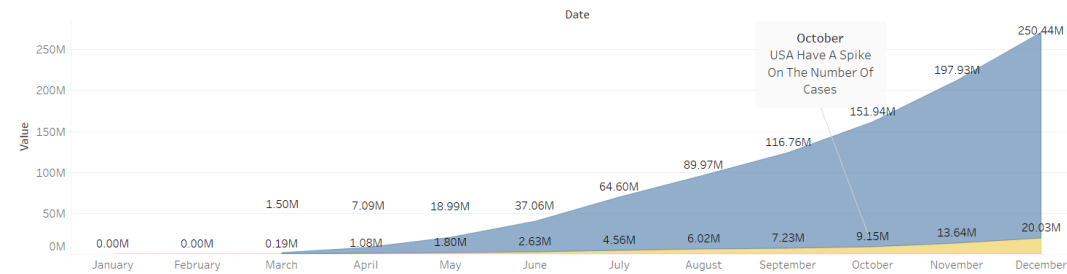


Figure № 3.

Figure № 4. Testing vs. Positive Cases For Europe And The USA For 2020.

USA Testing vs. Positive Cases.



Europe Testing vs. Positive Cases.

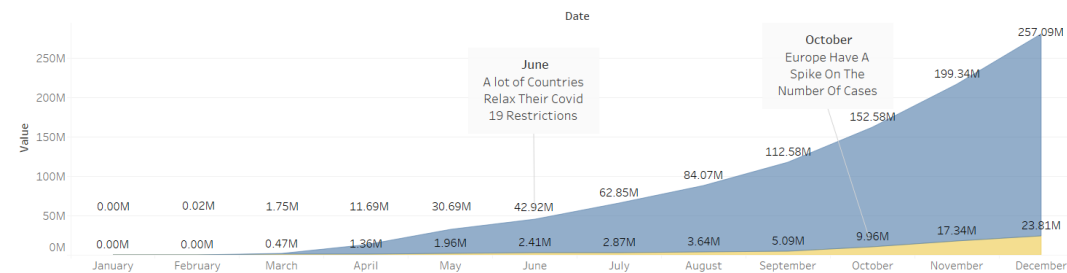
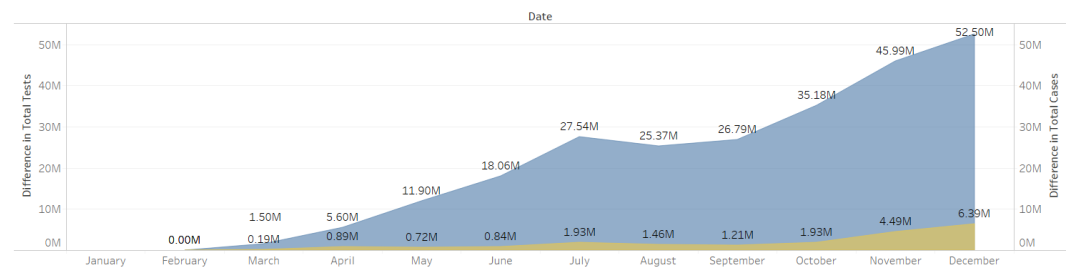


Figure № 4.

Figure № 5. Monthly Testing vs. Positive Cases For Europe And The USA For 2020

USA Monthly Number Of Testing vs. Positive Cases



EU Monthly Number Of Testing vs. Positive Cases

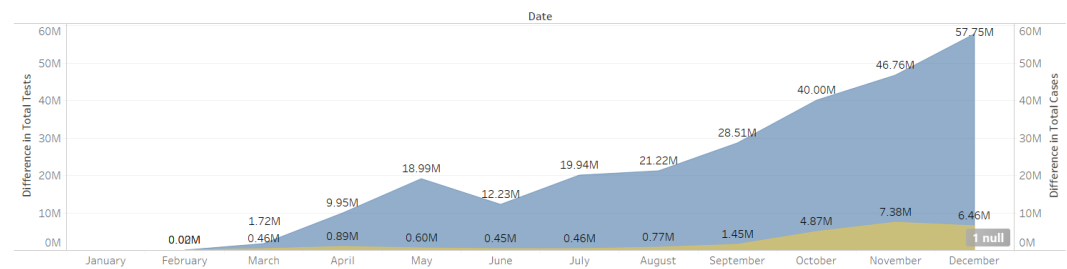


Figure № 5.

Figure № 6. Percentage Testing vs. Positive Cases For Europe And the USA For 2020.

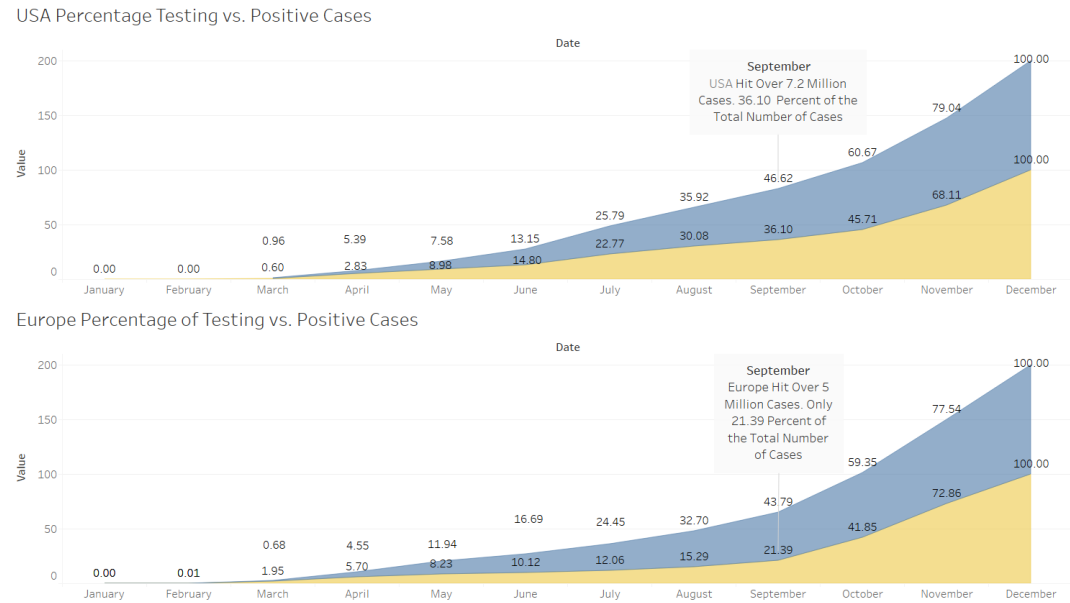


Figure № 6.

Figure № 7. Positive Rate For Europe And The USA For 2020.

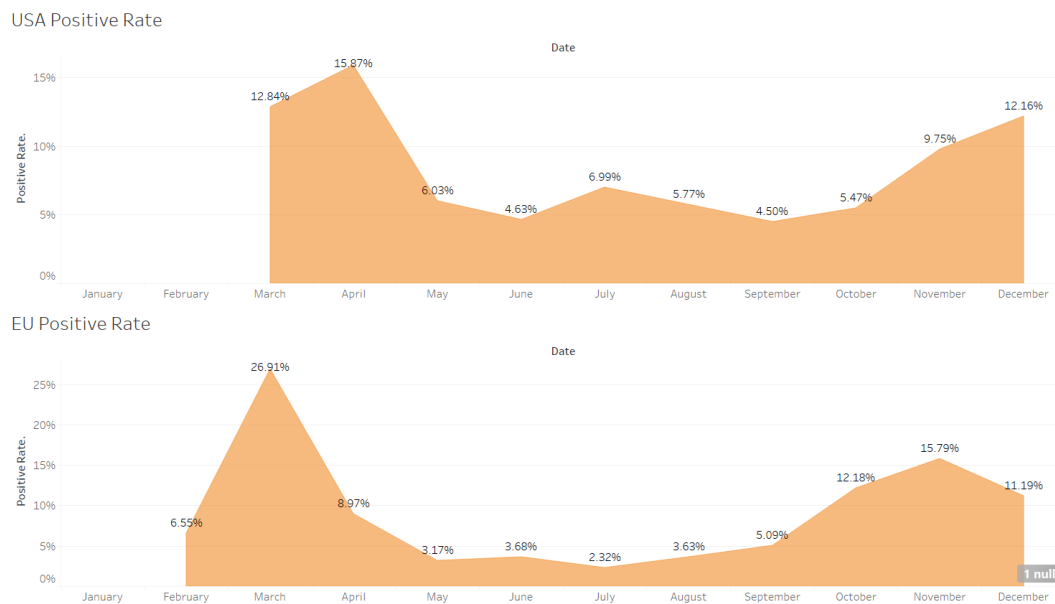


Figure № 7.

Figure № 8. USA’s COVID-19 Virus Number of Cases As Of December 31, 2020

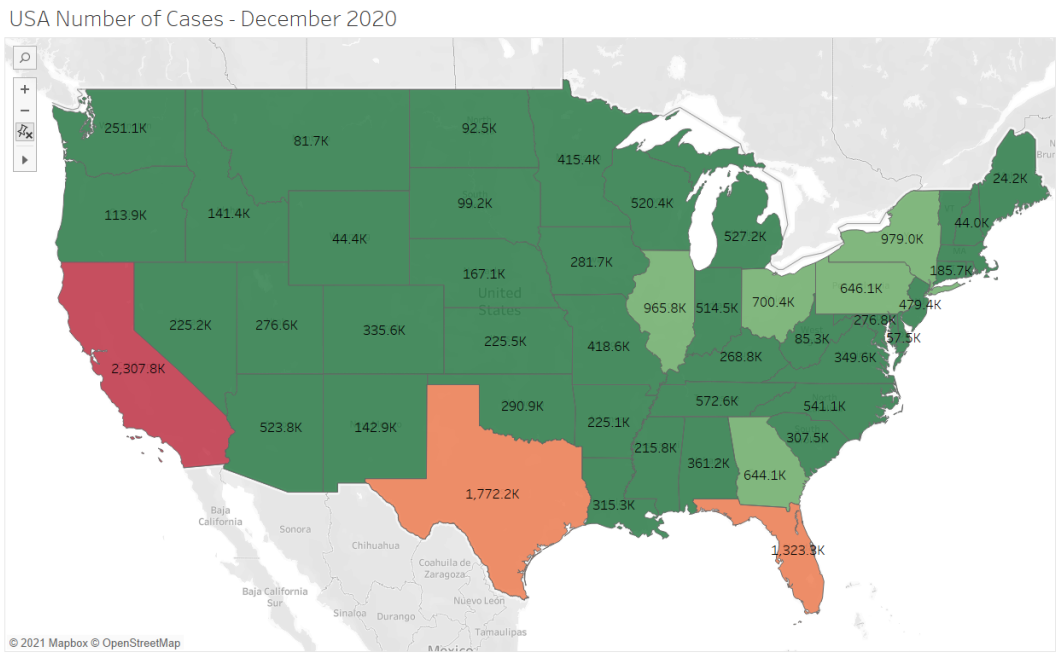


Figure № 8.

Figure № 9. USA’s COVID-19 Virus Number of Death As Of December 31, 2020

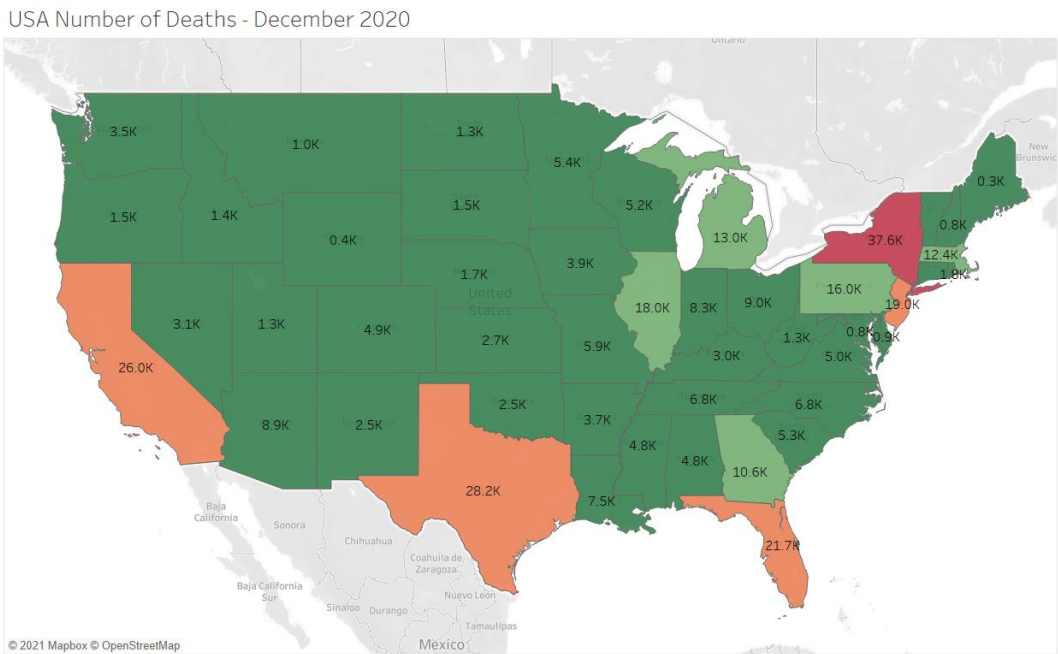


Figure № 9.

Figure № 10. Europe's COVID-19 Virus Number of Cases As Of December 31, 2020

Europe Number of Cases - December 2020

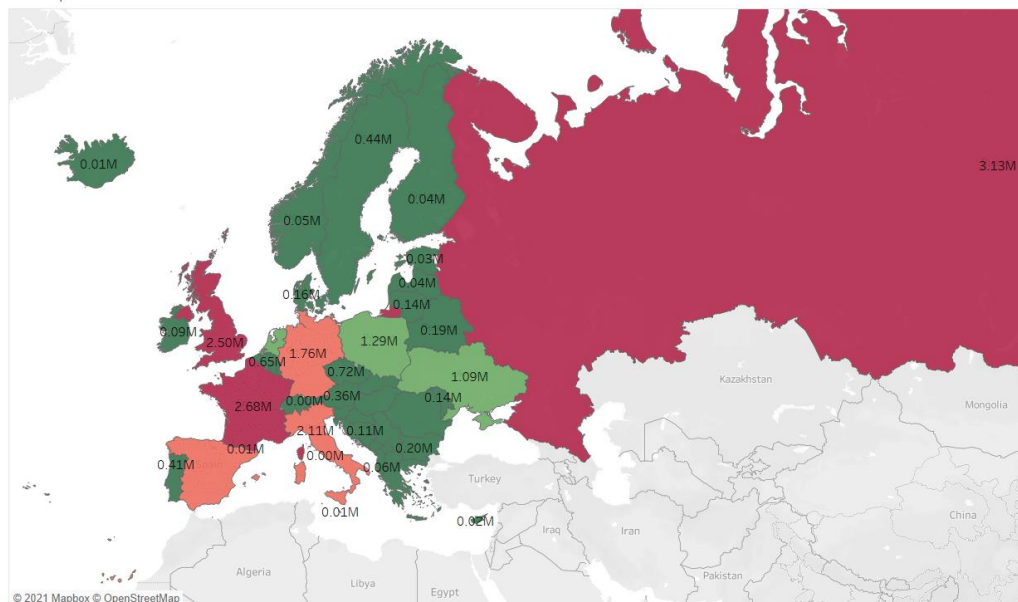


Figure № 10.

Figure № 11. Europe's COVID-19 Virus Number of Death As Of December 31, 2020

Europe Number of Deaths - December 2020

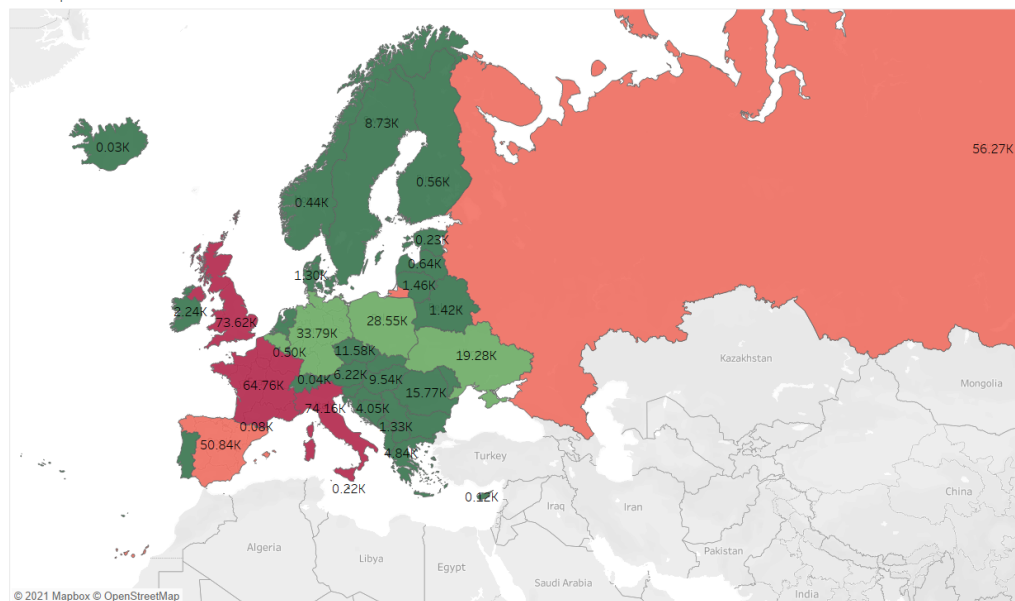


Figure № 11.

Figure № 12. Percentage of COVID-19 Cases Gender/Sex and US State

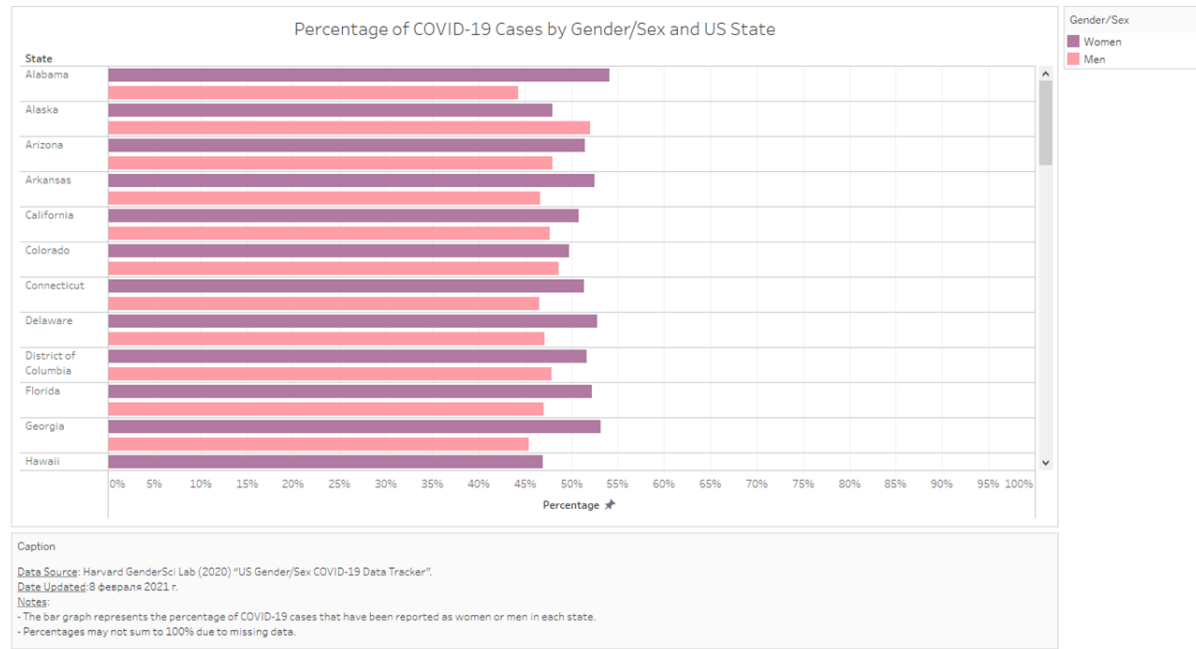


Figure № 12.

Figure № 13. Percentage of COVID-19 Deaths Gender/Sex and US State

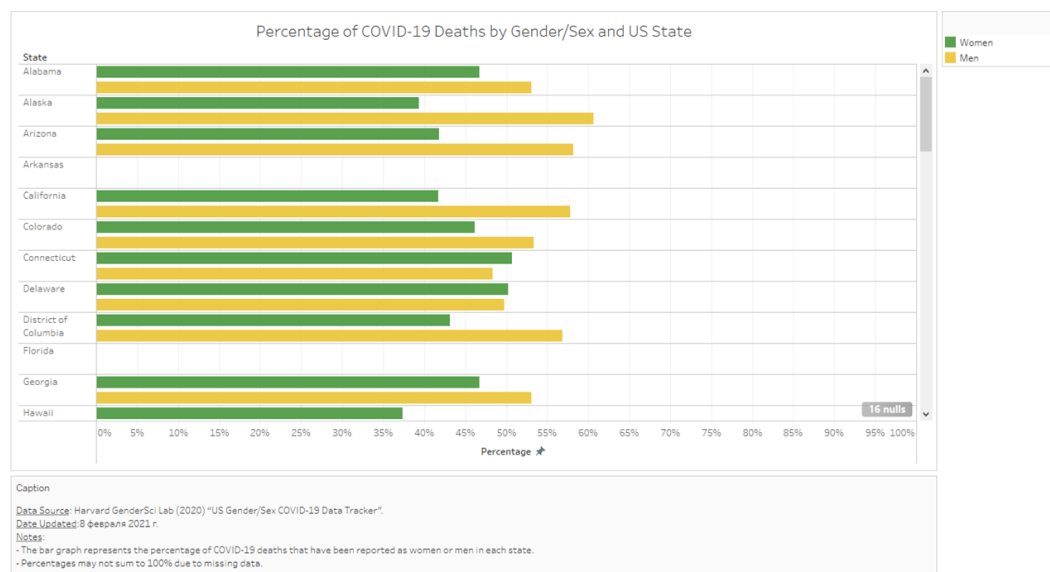


Figure № 13.

Figure № 14. Total COVID-19 Deaths by Age Group in USA (2020)

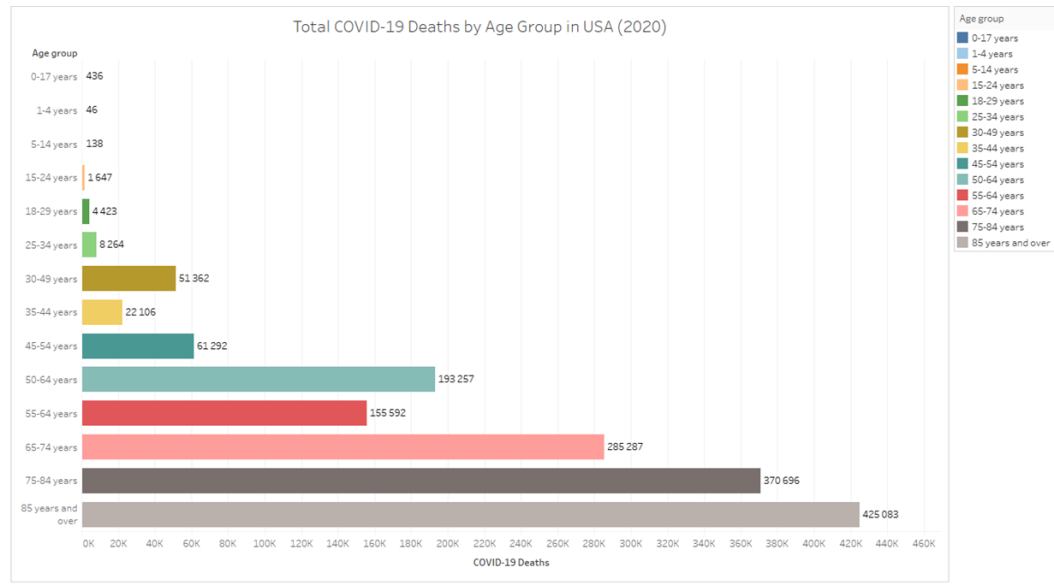


Figure № 14.

Figure № 15. Total COVID-19, Influenza and Pneumonia Deaths by Age Group in USA (2020)

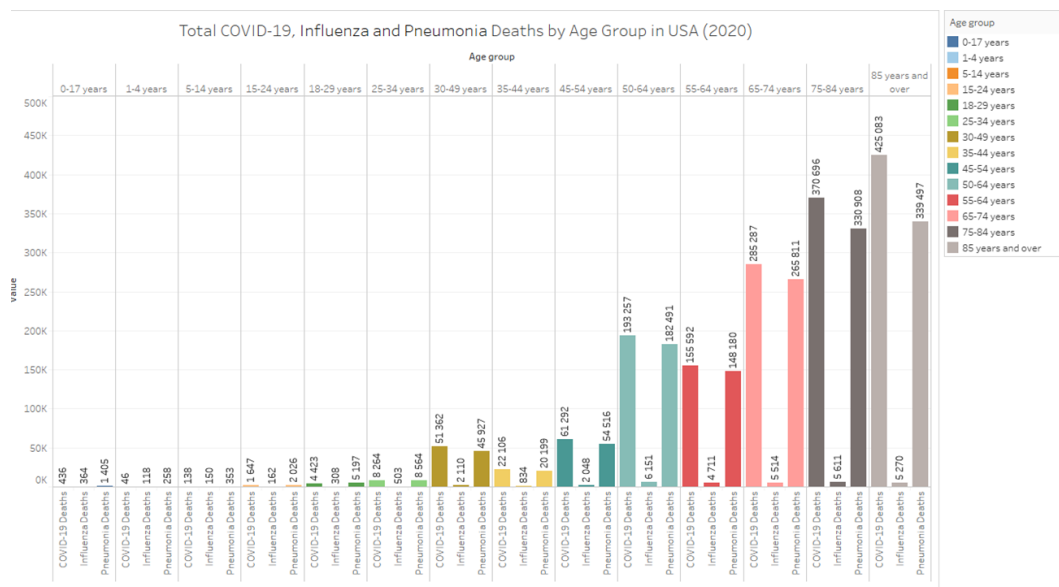


Figure № 15.

Figure № 16. Hospitals and Death Ratio in May 2020

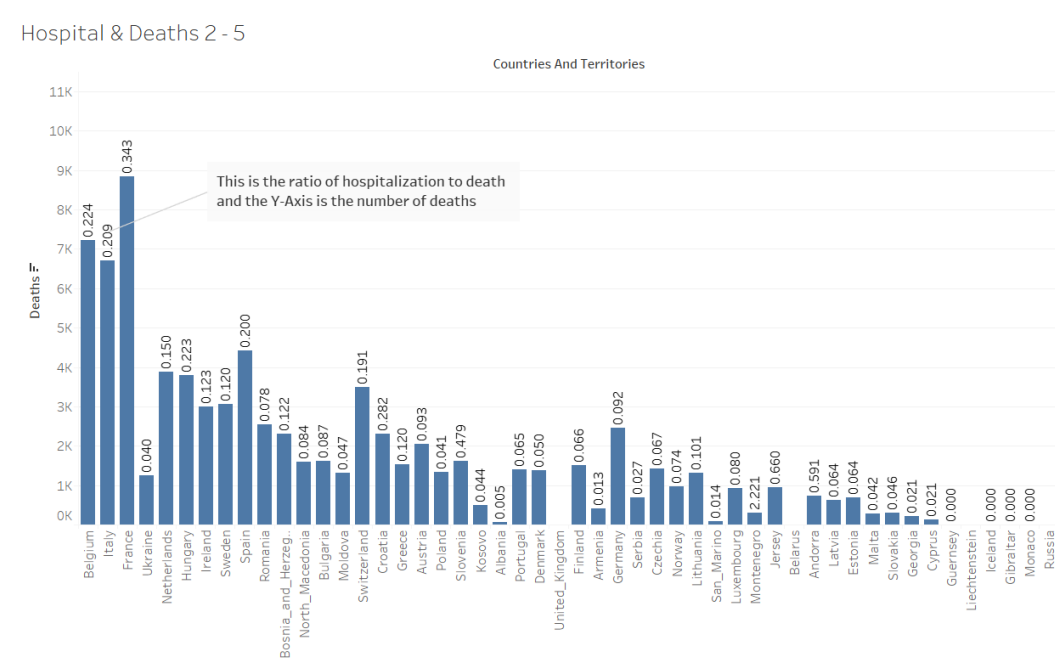


Figure № 16.

Figure № 17. Hospital and Death Ratio in Belgium, France, and Italy from January 2020 to May 2020

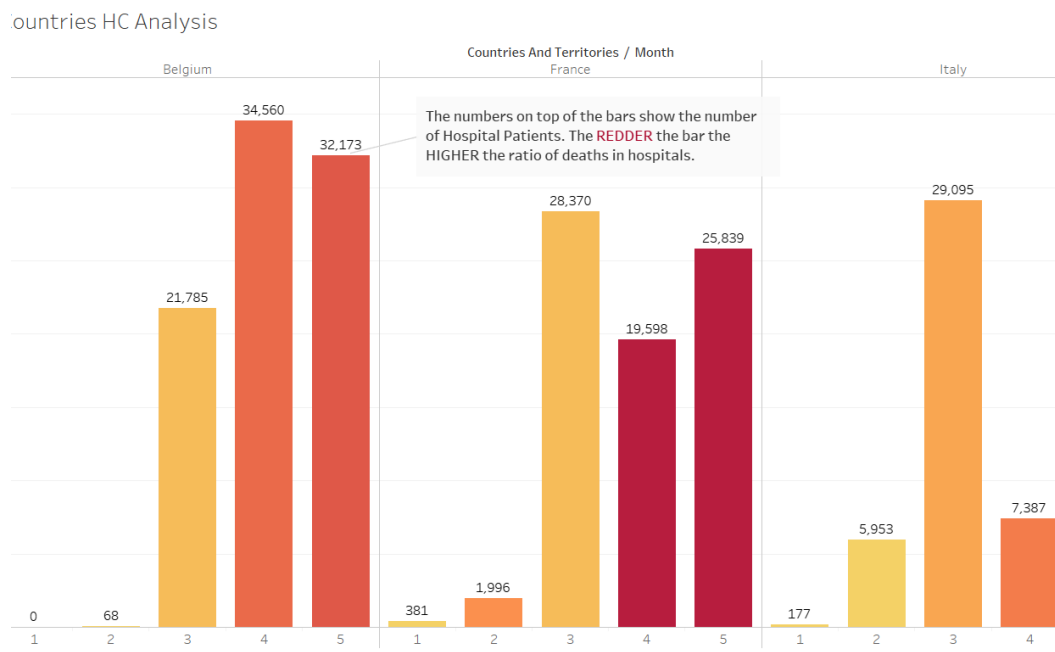


Figure № 17.