

**Questions considering to answer/explore :**

- How the major epidemics/pandemics are distributed around the world?
- Which pandemic(s) caused the most deaths?
- What is the repartition of epidemics by regions through the years?
- How many people get tested every week by country in Europe to COVID-19? How many of them are positive?
- In which European country are there the most notifications about the cases and deaths to COVID-19?
- Which age group by European country present the most cases of COVID-19?
- In the big European countries which regions are the most affected daily and weekly by COVID-19?
- How do the number of deaths and cases of COVID-19 evolve in each country through the time?
- In the world, how many deaths and cases are registered per country due to COVID-19?
- In which European /EEA country(ies) are there the most deaths registered by day due to COVID-19?
- In which American counties, people are used to wear their mask when they are going out?
- Which European hospitals do admit more COVID-19 cases and are the most occupied?
- In which European country the national positivity rate to COVID-19 is the highest?
- How does the administration of the different vaccines of COVID-19 evolve through the weeks in the Europeans/EEA countries and by age groups?

**Audience and actionable intelligence to provide, Problem statement :**

Problem Statement	Audience	Actionable Intelligence
Learning about major epidemics/pandemics in human history interactively.	Students, learners, epidemiologists, anyone looking for statistics related to epidemics.	Map with overlaid pie charts of diseases per regions and epidemics filtering capability.  Bar charts of population lost per epidemics with region filtering capability.
Learning about major epidemics/pandemics in human history interactively and chronologically.	Students, learners, epidemiologists/researchers, anyone looking for statistics related to epidemics.	Animated and interactive map of all epidemics known in the history so far.
Get statistics about number of people tested and affected by COVID-19 in European countries.	Travelers, European citizens, decision/policy makers ...	Dual density map of COVID-19 cases in European countries with week and country filtering capabilities.
Finding insight about the distribution of the number of cases and deaths to COVID-19 per continent through the weeks and according to the 14-day notification rate of COVID-19 cases/deaths per 100 000	Travelers, researchers, policy makers, ...	Dual axis bar chart of COVID-19 cases and deaths per continent animated using weeks number and filtered

inhabitants.		using 14-day notification rate.
Getting an insight about how people affected by COVID-19 are distributed by specific age groups.	European policy makers and citizens.	Map overlaid by a pie chart of new COVID-19 cases distributed among age groups and animated by the week number of the year.
Finding which regions in a given European country are more affected by COVID-19 on a daily or weekly basis.	European citizens and policy makers.	<ul style="list-style-type: none"> <li>-Tree map of the daily number of new covid-19 cases per subnational regions with country and dates range filtering capabilities.</li> <li>-Bubble map of the weekly number of new covid-19 cases per subnational regions with country and week of year filtering capabilities.</li> </ul>
Looking for the trend of the evolution of COVID-19 cases, deaths and cumulative counts.	World citizens and policy makers.	<ul style="list-style-type: none"> <li>Line charts of COVID-19 cases, deaths and cumulative counts through the time with countries and territories filtering capability.</li> <li>-Trellis chart of COVID-19 cases and deaths by year quarter with continent and countries/territories filtering capabilities.</li> </ul>
Finding the European country having the more/less deaths due to COVID-19 in a date range.	European policy makers and citizens.	Heatmap of COVID-19 deaths in European countries with date range filtering capability.
Finding the US county where there are the most people frequently/always/never/sometimes/rarely wearing face masks.	Policy makers, Entrepreneurs, ...	Dual-Axis Scatterplots and horizontal bar chart of average mask use rates per US Counties Always rate filtering slider.
Looking for a hospital with a low occupancy rate.	Policy makers, hospitals managers, Entrepreneurs, citizens ...	Geo Bubble chart of hospital admissions with bubbles having the size of mean of number of admissions and filterable

		by a range of dates and a specific indicator.
Find the European countries with the highest population lost rates.	Policy makers, citizens	Bar chart of the ratio of national cases (7-day notification) divided by the population size per European countries.
How COVID-19 vaccine are distributed per country, age groups and through the time?	Policy makers, citizens, epidemiologist...	Bar chart of number of vaccine doses received per European countries clustered using vaccine types, animated using week of year and filtered using age groups.
Which restrictive measures due to COVID-19 is in place a given European country	Travelers, policy makers, citizens	Scatterplot on maps displaying in tooltips while hovering the restriction measure in place for a filtered range of dates.

### Brief Report on Exploratory Data Analysis:

#### Major Epidemics Dataset:

This dataset contains 19 pandemics and 8 features in its original source on Wikipedia. After collection, cleaning and enrichment, it contains 1748 rows and 20 columns: splitting columns like dates/confidence intervals in two new columns and rows duplication for pandemics spread over multiple locations in the world made the dataset grow in size.

Among columns having missing values in this dataset, we note:

Variable	Missing
Death toll upper	45.08
Global population lost lower	32.32
Global population lost upper	54.92
Regional population lost Region affected the most	89.87
Regional population lost lower	89.87
Regional population lost note	89.93
Regional population lost upper	89.99

The following tables provide descriptive statistics about the continuous and categorical variables in our dataset respectively.

	Date Start	Date end	Death toll lower	Death toll upper	Global population lost lower	Global population lost upper	Rank	Regional population lost lower	Regional population lost upper
count	1748.00	1748.00	1748	960	1183.00	788.00	1748.00	177.00	175.00
mean	1839.37	1858.73	13137443	54006771	0.00	0.01	8.87	0.28	0.59
std	300.46	303.25	19101603	65391372	0.00	0.02	5.71	0.04	0.05
min	165.00	180.00	1000000	2500000	0.00	0.00	1.00	0.01	0.02
25%	1855.00	1890.00	1000000	4000000	0.00	0.00	4.00	0.25	0.60
50%	1918.00	1958.00	3500000	15000000	0.00	0.00	9.00	0.30	0.60
75%	1968.00	1969.00	17000000	100000000	0.00	0.02	11.00	0.30	0.60
max	2019.00	2021.00	75000000	200000000	0.03	0.06	18.00	0.50	0.80

	Date	Death toll	Disease	Epidemics/pandemics	Global population lost	Global population lost note	Location	Locations Split	Regional population lost	Regional population lost Region affected the most	Regional population lost note
count	1748	1748	1748	1748	1748	1748	1748	1748	1748	177	176
unique	19	16	13	19	13	6	10	201	10	5	5
top	1968 – 1969	1–4 million	Plague	Hong Kong flu	[Note 2]	Worldometer, estimated	Worldwide	Italy	–	Europe	Sciencemag
freq	196	392	197	196	392	588	1568	13	1568	171	106

### **Pandemics Chronology Dataset:**

This dataset contains 246 pandemics and 6 features in its original source on Wikipedia. After collection, cleaning and enrichment, it contains 5964 rows and 11 columns: splitting columns like dates/confidence intervals in two new columns and rows duplication for pandemics spread over multiple locations in the world made the dataset grow in size.

Among columns having missing values in this dataset, we note:

Variable	Missing
Ref.	6.71
Date end	12.79
Death toll (estimate) lower	20.34
Death toll (estimate) upper	80.58

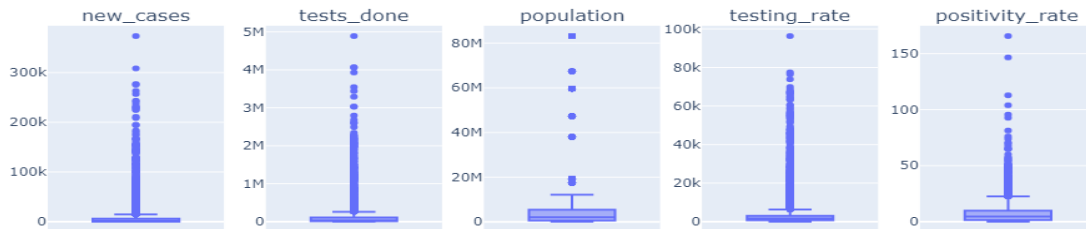
The following table provide descriptive statistics about the variables in our dataset.

	Event	Date	Location	Disease	Death toll (estimate)	Ref.	Date Start	Date end	Location splitted	Death toll (estimate) lower	Death toll (estimate) upper
count	5964	5964	5964	5964	5964	5564	5964	5201	5964	4751	1158
unique	246	210	178	68	183	229			344		
top	1557 influenza pandemic	2009–2010	Worldwide	Cholera	Unknown	[181][194][195]			United States		
freq	200	213	3724	712	1070	392			116		
mean							1799.889	1812.53374		4250405820	58628794.45
std							353.967997	361.582493		17842634103	73704079.74
min							-1350	-426		0	940
25%							1826	1848		3930	4000000
50%							1915	1930		500000	15000000
75%							2000	2004		14000000	100000000
max							2021	2021		6.00001E+11	200000000

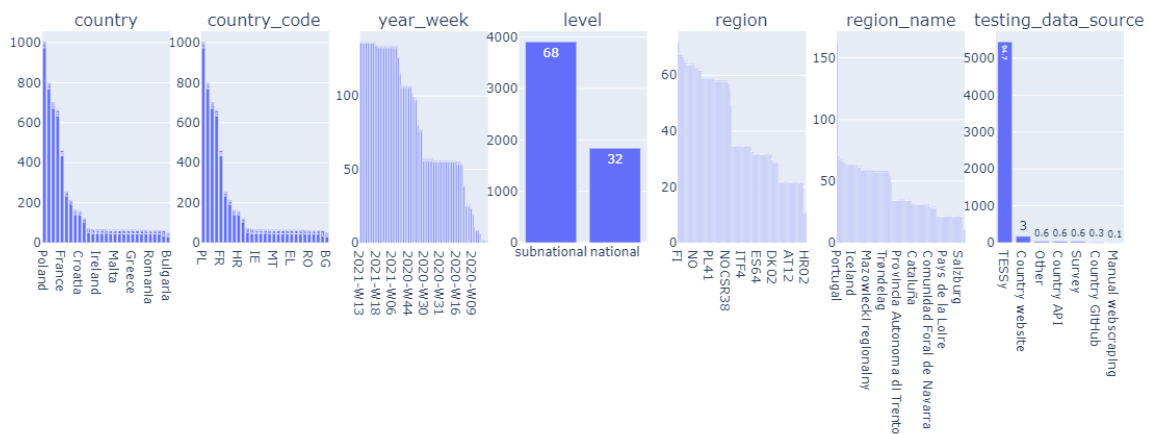
### Testing for covid 19 by week and country Dataset:

This dataset contains 5751 rows and 12 columns and is mostly provided by TESSy as shown in the below plot:

Side By Side Subplots of COVID-19 testing data continuous variables



Side By Side Bar/Pie charts of COVID-19 testing data categorical variables

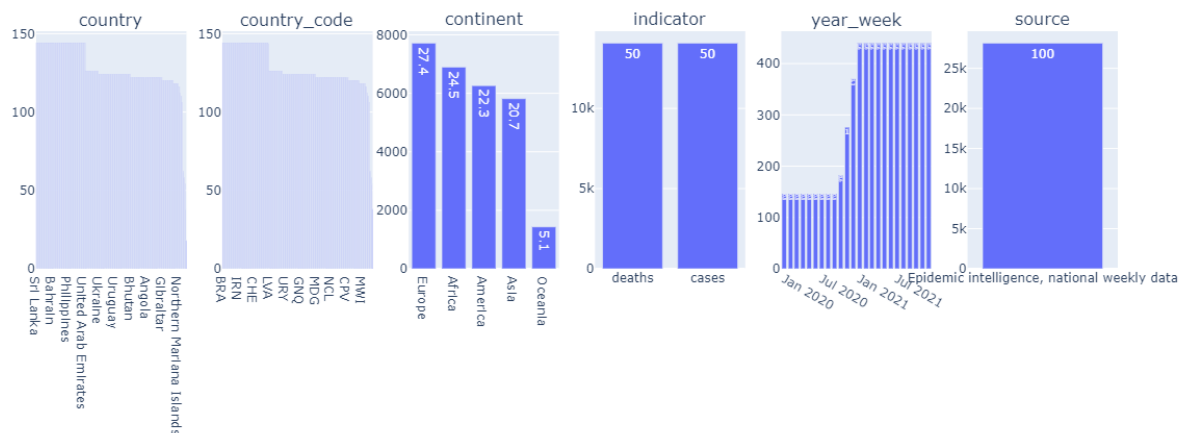


We can notice that most of the people tested come from Poland, France and Croatia. Most of the data are collected at a subnational level. Also, it is worth mentioning that positivity rate data are missing for Cyprus (2020-W11), Romania (2020-W12 and W13) and Slovakia(2021-W08). Maybe tests haven't been run in these countries during the mentioned periods.

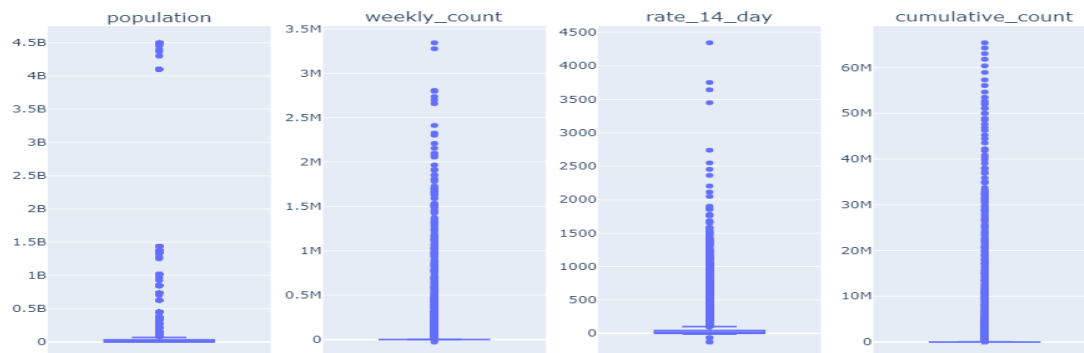
### **14-day notification rate of new COVID-19 cases and deaths Dataset:**

This dataset contains 28150 rows and 10 columns and is mostly provided by Epidemic Intelligence as shown in the below plot:

Side By Side Bar/Pie charts of 14-day notification rate of new COVID-19 cases and deaths qualitative vars.



Side By Side Subplots of 14-day notification rate of new COVID-19 cases and deaths quantitative vars.

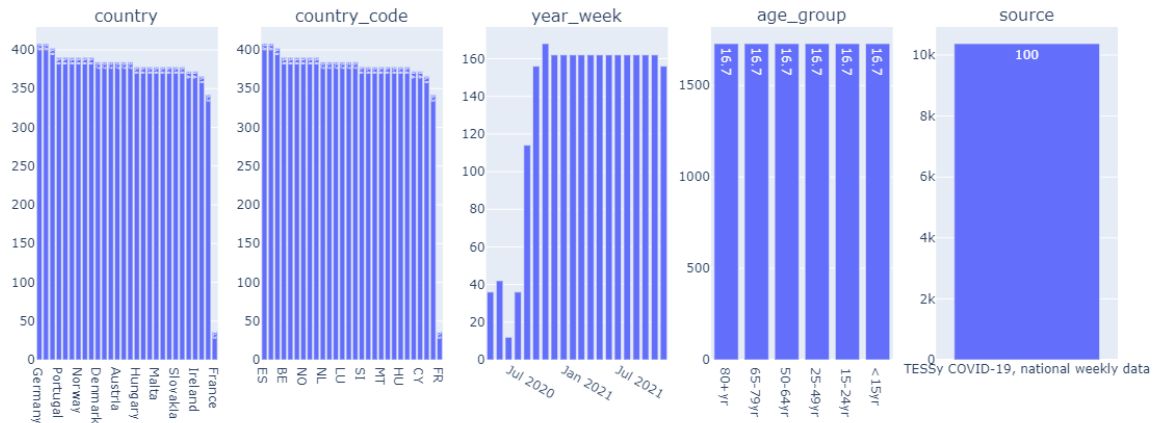


The above boxplots reveal the presence of outliers in continuous variables. This could be explained by the fact that the data are coming from various regions not having the same reality. We also noticed the presence of missing data in country\_code, continent, population and rate\_14\_day columns.

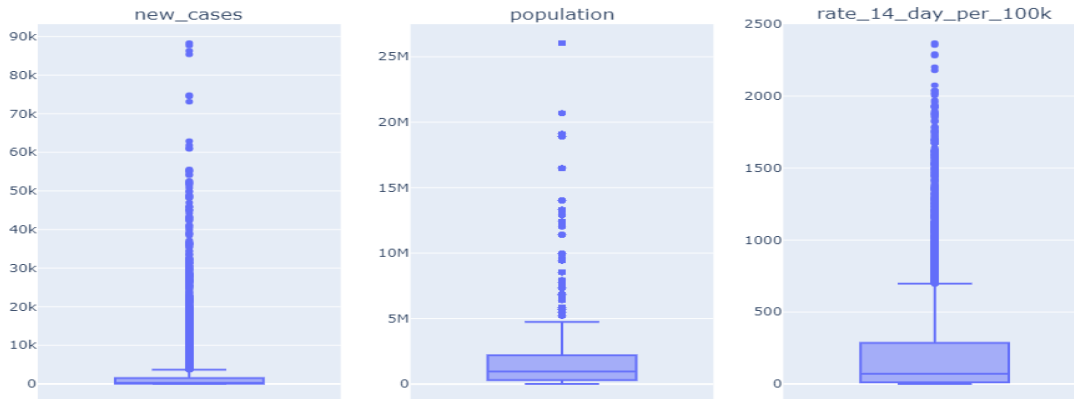
### **14-day age-specific notification rate of new COVID-19 cases Dataset:**

This dataset contains 10374 rows and 8 columns and is mostly provided by TESSy as shown in the below plot:

Side By Side Bar/Pie charts of 14-day age-specific notification rate of new COVID-19 cases qualitative vars.



Side By Side Subplots of 14-day age-specific notification rate of new COVID-19 cases quantitative vars.

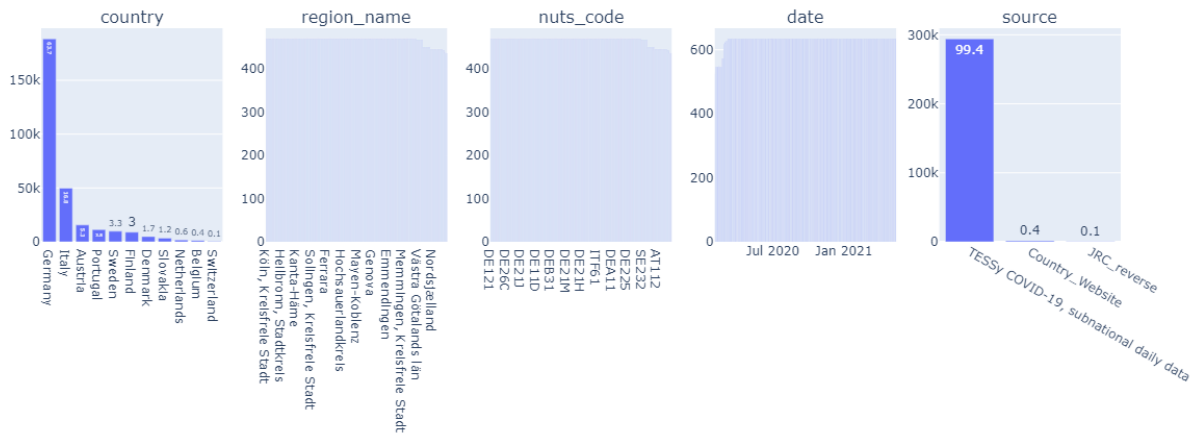


The above boxplots reveal the presence of outliers in continuous variables. This could be explained by the fact that the data are coming from various regions not having the same reality. Also, it is worth mentioning that rate\_14\_day\_per\_100k data are missing (156) for some countries, some age groups during certain weeks. Maybe during these weeks in those countries, no one in these age groups, no one affected got noticed.

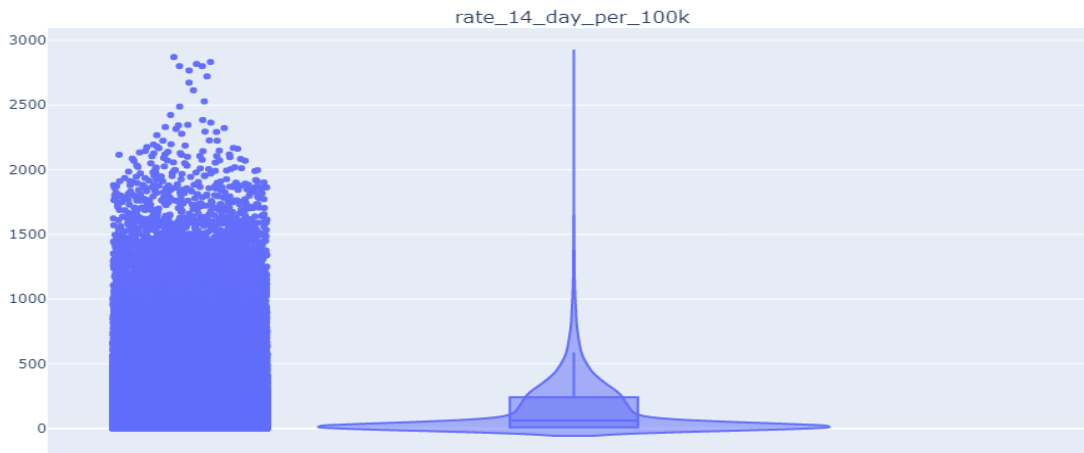
## Daily subnational 14-day notification rate of new COVID-19 cases Dataset:

This dataset contains 295877 rows and 6 columns and is mostly provided by TESSy as shown in the below plot:

Side By Side Bar charts of daily subnational 14-day notification rate of new COVID-19 cases



Side By Side Subplots of daily subnational 14-day notification rate of new COVID-19 cases quantitative vars.



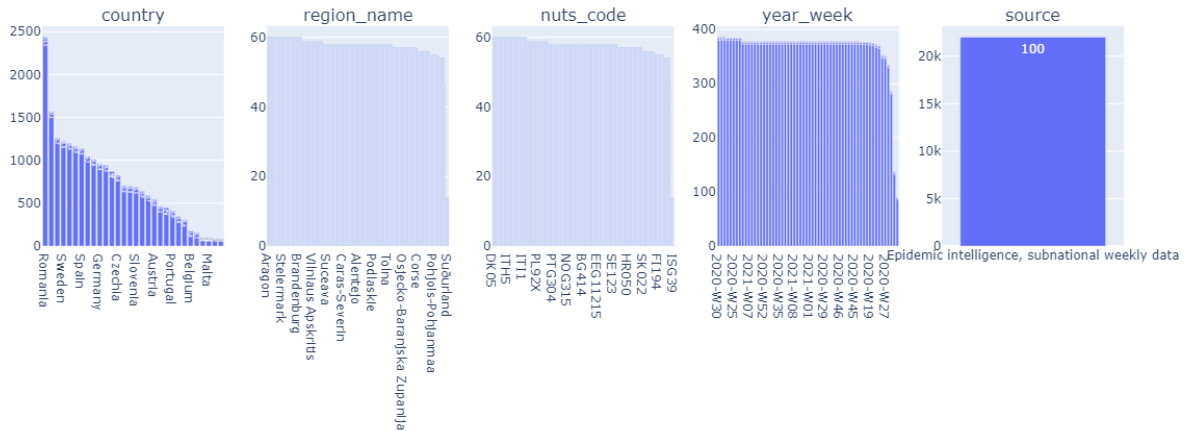
The violin plot above shows us that in `rate_14_day_per_100k`, there are few outliers. Also, we notice that in this variable, there are 2.77% of observations missing.



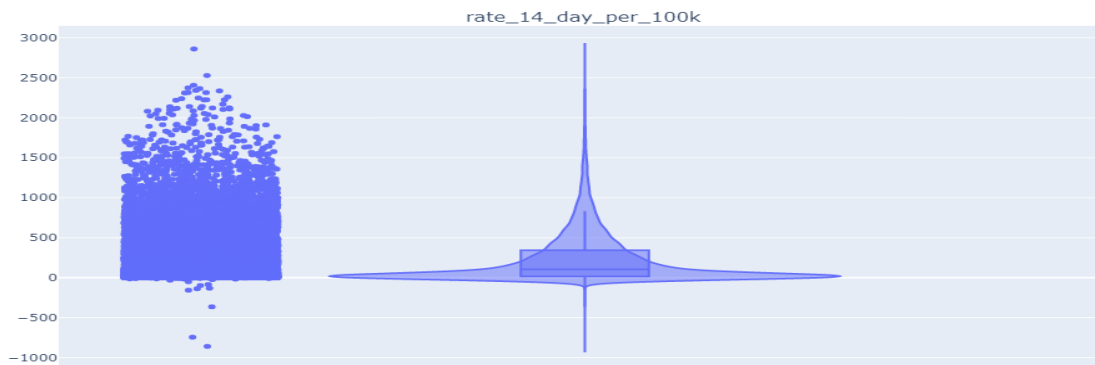
## Weekly subnational 14-day notification rate of new COVID-19 cases Dataset:

This dataset contains 22001 rows and 6 columns and is mostly provided by Epidemic Intelligence as shown in the below plot:

Side By Side Bar charts of weekly subnational 14-day notification rate of new COVID-19 cases qualitative vars



Side By Side Subplots of weekly subnational 14-day notification rate of new COVID-19 cases quantitative vars

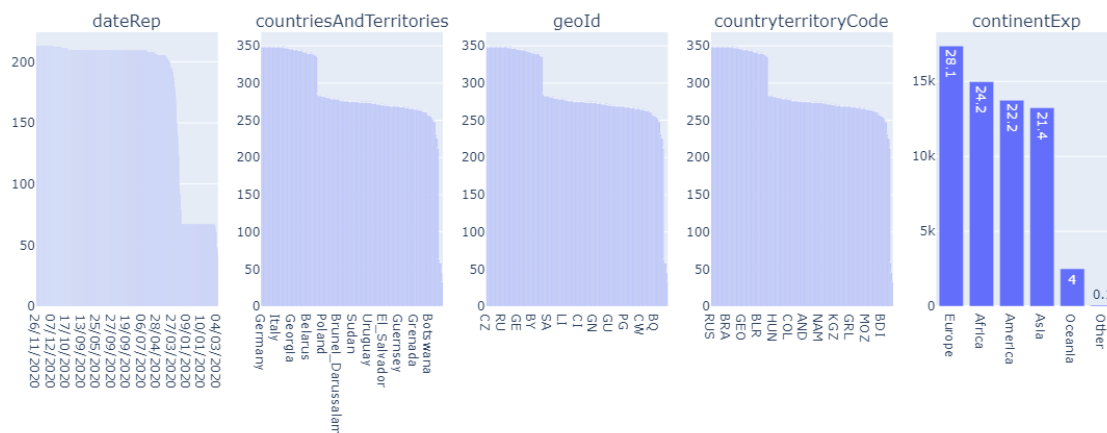


The violin plot above shows us that in rate\_14\_day\_per\_100k, there are few outliers. Also, we notice that in this variable, there are 1.76% of observations missing.

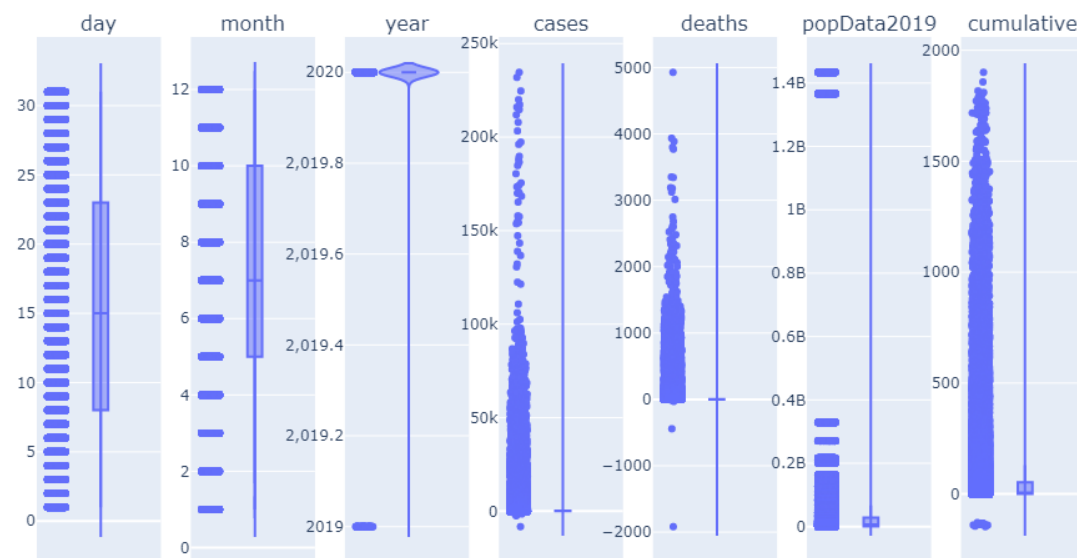
## Historical data (to 14 December 2020) on the daily number of new reported COVID-19 cases and deaths worldwide Dataset:

This dataset contains 61800 rows and 12 columns and is mostly for European countries as shown in the below plot:

Side By Side Bar charts of Historical data (to 14 December 2020) on the daily number of new reported COVID-19 cases and deaths v



Side By Side Subplots of Historical data (to 14 December 2020) on the daily number of new reported COVID-1

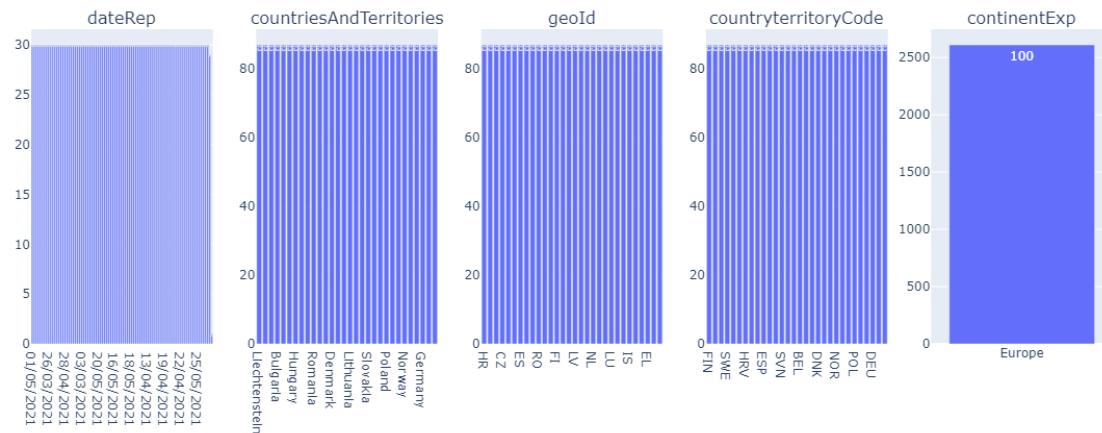


The violin plot above shows us that in cases, there are few outliers. Also, we notice missing values in geoid (0.44%), countryterritoryCode (0.20%), popData2019 (0.20%) and Cumulative\_number\_for\_14\_days\_of\_COVID-19\_cases\_per\_100000 (4.65%) variables.

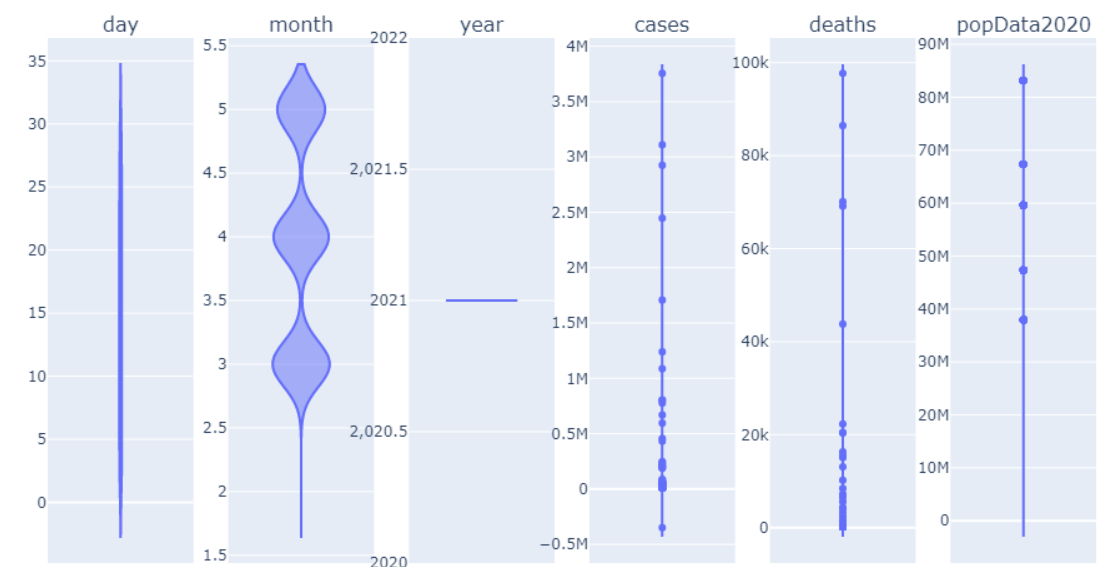
### Daily number of new reported COVID-19 cases and deaths by EU/EEA country Dataset:

This dataset contains 2610 rows and 11 columns and is only collected European countries as shown in the below plot:

Side By Side Bar charts of Daily number of new reported COVID-19 cases and deaths by EU\_EEA country qualitative vars



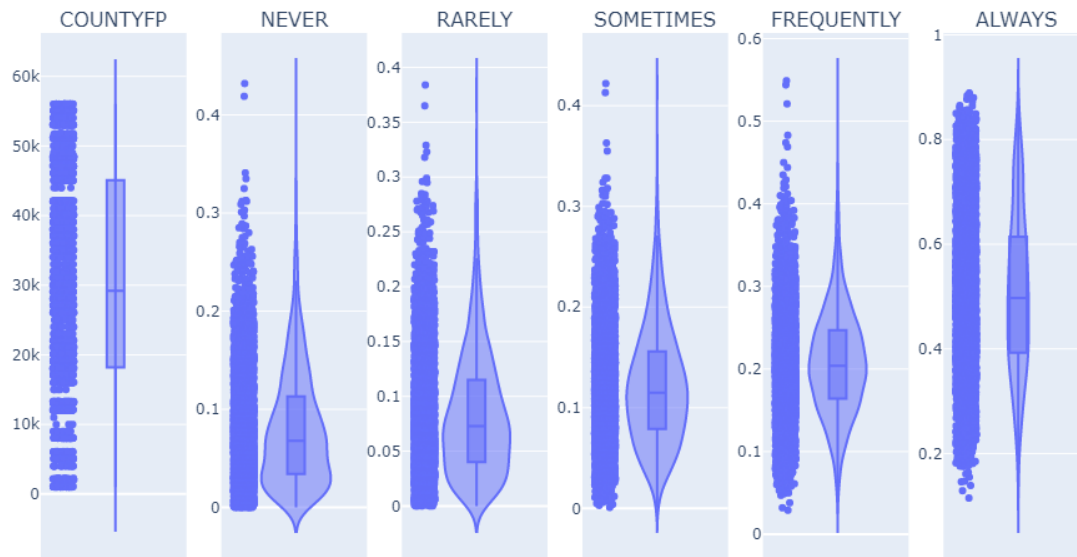
Side By Side Subplots of Daily number of new reported COVID-19 cases and deaths by EU\_EEA country quant



The violin plots above reveal that data are collected for March, April and May 2021. Also, the number of COVID-19 cases, deaths and population size in 2020 per countries and territories seems to be distinct per country.

## Mask-Wearing Survey Dataset:

Side By Side Subplots of Mask-Wearing Survey

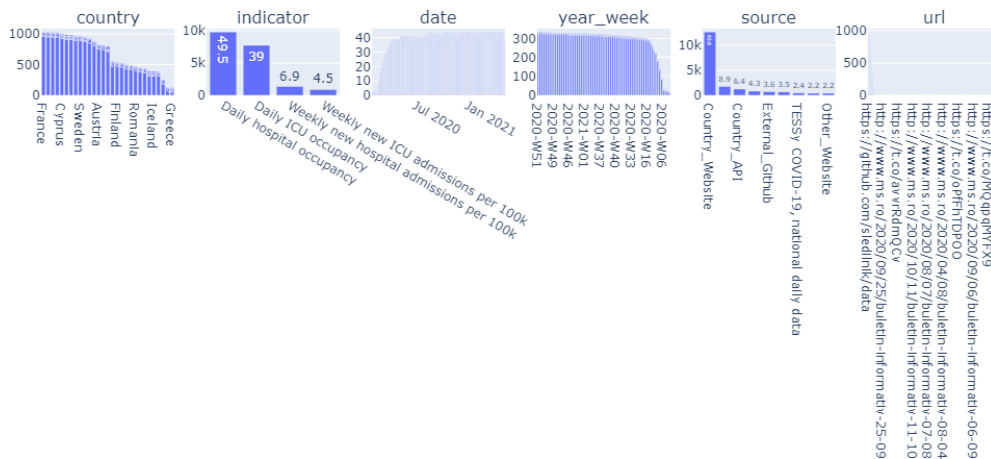


The dataset is composed of 3142 rows and 6 variables, all quantitative. In the above violin plots, we can notice that in the US counties, the mean of people always wearing a face mask when going out is greater than the one of those never wearing one.

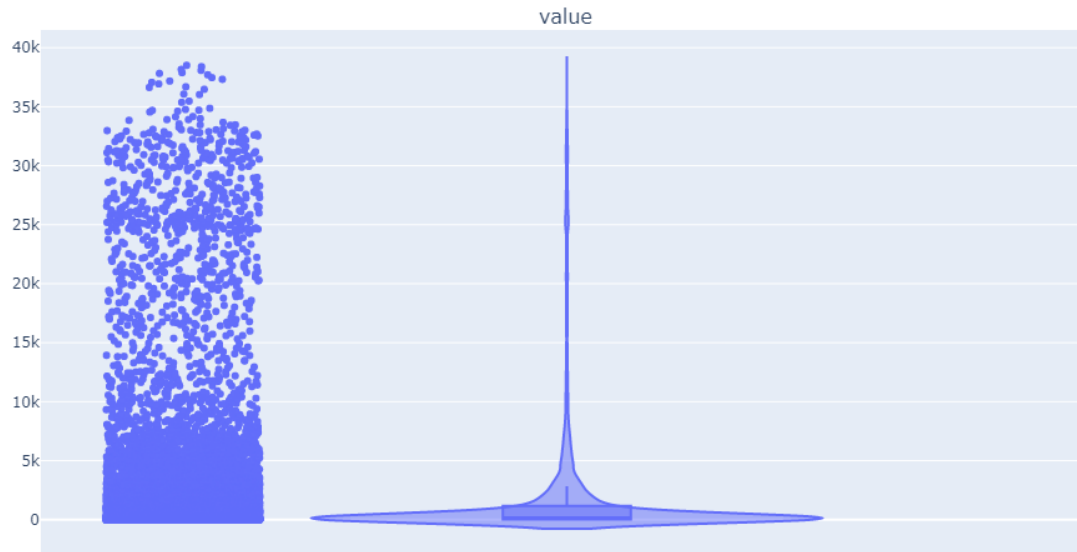
## Hospital and ICU admission rates and current occupancy for COVID-19 Dataset:

This dataset contains 19783 rows and 7 columns and is only collected European countries as shown in the below plot:

Side By Side Bar charts of Hospital and ICU admission rates and current occupancy for COVID-19 qualitative vars



Side By Side Subplots of Hospital and ICU admission rates and current occupancy for COVID-19 quantitative v

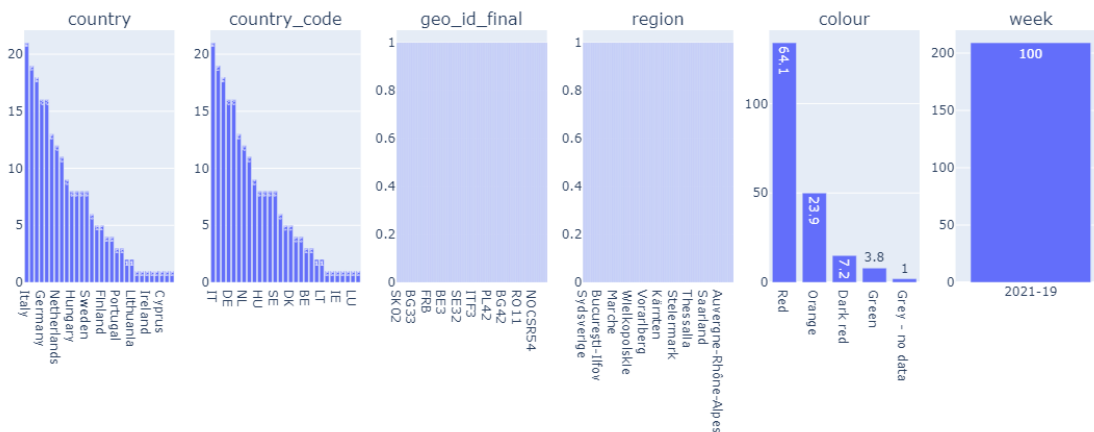


We can notice the presence of few outliers in the value feature. Also, there are missing values in date (11.46%), value (1.14%), source (2.49%) and url (8.97%) variables.

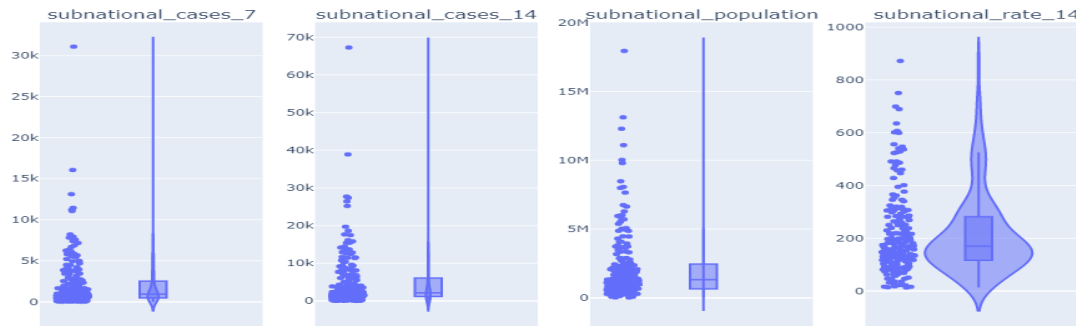
**Maps in support of the Council Recommendation on a coordinated approach to the restriction of free movement in response to the COVID-19 pandemic in the EU/EEA Dataset:**

This dataset contains 209 rows and 18 columns and is only collected 19<sup>th</sup> week of 2021 as shown in the below plot:

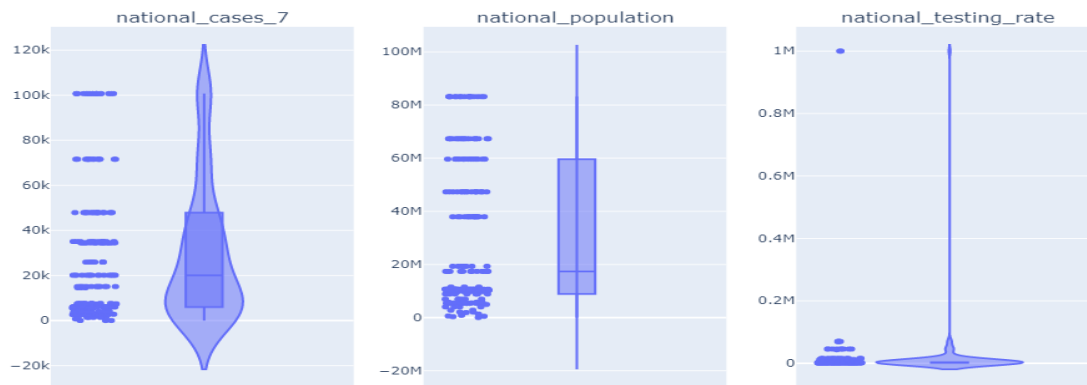
Side By Side Bar charts of Map dataset qualitative vars



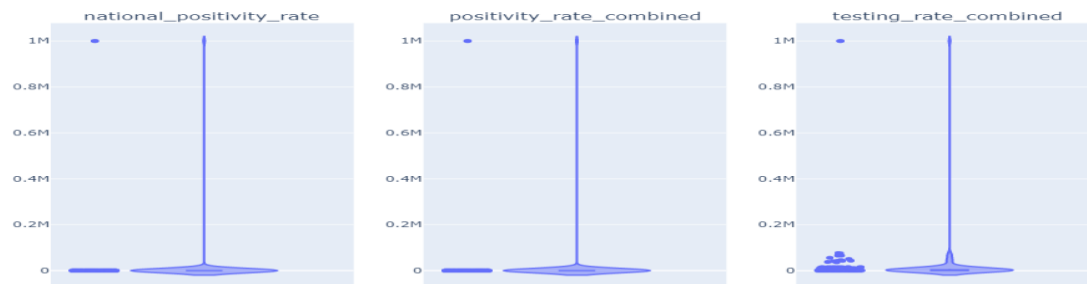
Side By Side Subplots of Map dataset quantitative vars. 1



Side By Side Subplots of Map dataset quantitative vars. 2



Side By Side Subplots of Map dataset quantitative vars. 3



At the exception of few outliers in continuous features, the positivity rate to covid-19 appears to be low during the week where the data were collected. Data are completely missing in col0 column and country code is missing for Liechtenstein country.

This dataset contains 38438 rows and 12 columns and is mostly collected for European countries as shown in the below plot:

Figure 1 displays five bar charts illustrating the distribution of COVID-19 cases across different categories:

- YearWeekISO:** Shows the number of cases per week from 2021-W18 to 2021-W21. The y-axis ranges from 0 to 2000. Cases peak around 2021-W18 and then generally decline.
- Region:** Shows the number of cases per region. The y-axis ranges from 0 to 1000. The regions are ordered by descending case count, with SF33 having the highest count.
- ReportingCountry:** Shows the number of cases per country. The y-axis ranges from 0 to 14k. The countries are ordered by descending case count, with PL (Poland) having the highest count.
- TargetGroup:** Shows the number of cases per target group. The y-axis ranges from 0 to 7000. The groups are ordered by descending case count, with ALL (All) having the highest count.
- Vaccine:** Shows the number of cases per vaccine type. The y-axis ranges from 0 to 10k. The vaccines are ordered by descending case count, with COM (Comirnaty) having the highest count.

The figure consists of three subplots arranged horizontally, each showing a different variable's distribution:

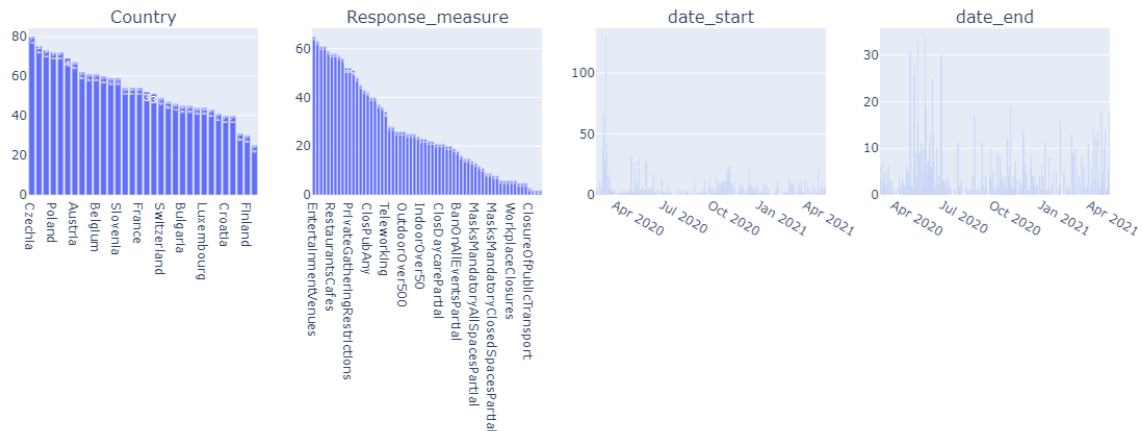
- NumberDosesReceived:** A scatter plot with a density plot overlay. The x-axis represents the number of doses received, ranging from 0 to 5M. The y-axis represents density. The data is highly right-skewed, with a large peak near 0 and a long tail extending towards 5M.
- Population:** A box plot showing the distribution of population. The x-axis represents population, ranging from 0 to 80M. The y-axis represents density. The distribution is relatively symmetric and centered around 35M.
- Denominator:** A box plot showing the distribution of the denominator. The x-axis represents the denominator, ranging from 0 to 70M. The y-axis represents density. The distribution is highly right-skewed, with a large peak near 0 and many outliers extending up to 70M.

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## Country response measures to COVID-19 Dataset:

This dataset contains 1705 rows and 4 columns and is mostly collected for European countries as shown in the below plot:

Side By Side Bar charts of Country response measures to COVID-19 qualitative vars



We also noticed that 24.69 % of date\_end values are missing. It is probably due to the fact the end date of the end of the restrictive measure is unknown.

**15 Information Dashboards, process of development, description, audience, purpose, information, link between them** (What actionable insights the dashboard provides and which actions this may lead to, and whom should have this information (your audience)? How decision-making processes can benefit from these dashboards, and how these dashboards may lead to improved decision making?):

## Major Epidemics Dashboard:



**Process of development:** Built using **Major Epidemics** dataset.

**Description:** Map with overlaid pie charts of diseases per regions, diseases and epidemics filtering capability, and sized using lower bound of deaths per regions.

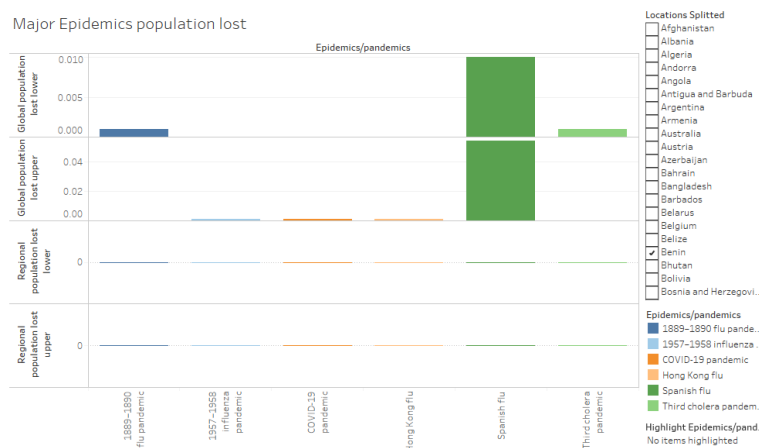
**Audience:** Anyone desiring to learn more about epidemics in the world.

**Purpose:** Getting an overview of the distribution of epidemics in the world.



**Information:** Distribution of Epidemics by country in the world since the time they have been tracked.

### Major Epidemics population lost Dashboard:



**Process of development:** Built using **Major Epidemics** dataset.

**Description:** Bar charts of population lost per epidemics with region filtering capability.

**Audience:** Anyone desiring to learn more about epidemics in the world.

**Purpose:** Getting an overview of the distribution of population lost due to epidemics in the world.

**Information:** Distribution of population lost due to Epidemics in a country/the world since the time they have been tracked.

### Pandemics Chronology Dashboard:



**Process of development:** Built using **Pandemics Chronology** dataset.

**Description:** Animated (by date start) and interactive map of all epidemics known in the history so far.

**Audience:** Anyone desiring to learn more about epidemics in the world.

**Purpose:** Getting an overview of epidemics in the world through the years.

**Information:** Heatmap of Epidemics spreading in the world during a specific year.

### European countries weekly testing COVID-19 Dashboard:



**Process of development:** Built using **Testing for covid 19 by week and country** dataset.

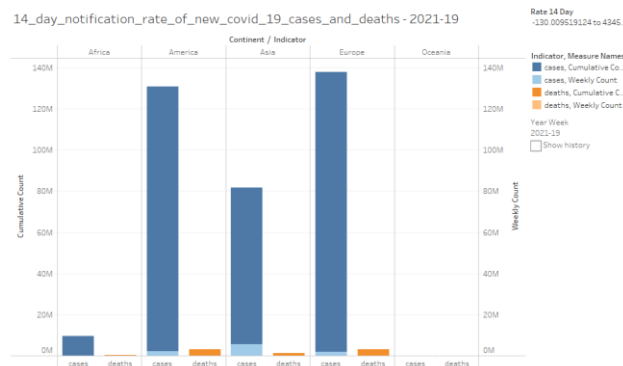
**Description:** Dual density map of COVID-19 cases in European countries with week and country filtering capabilities.

**Audience:** Citizens and policy makers.

**Purpose:** Getting an overview of COVID-19 epidemic in European countries.

**Information:** Positivity rate to covid-19 per week in European countries.

### European countries 14-day notification of new COVID-19 cases and deaths Dashboard:



**Process of development:** Built using **14-day notification rate of new COVID-19 cases and deaths** dataset.

**Description:** Dual axis bar chart of COVID-19 cases and deaths per continent animated using weeks number and filtered using 14-day notification rate.

**Audience:** Citizens and policy makers.

**Purpose:** Getting an idea of how evolved/evolves deaths and cases of COVID-19 in the different continents through the weeks.

**Information:** Distribution of cases and deaths of COVID-19 through the weeks by continents.

### European countries age-specific 14-day notification of new COVID-19 cases and deaths Dashboard:



**Process of development:** Built using 14-day age-specific notification rate of new COVID-19 cases dataset.

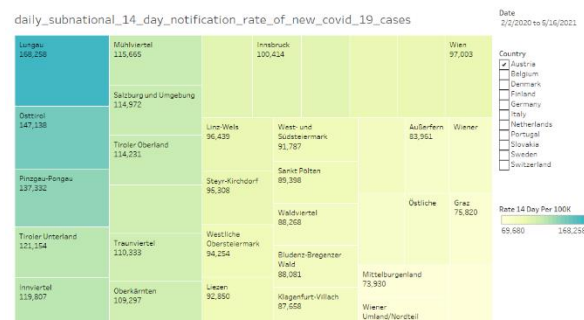
**Description:** Map overlaid by a pie chart of new COVID-19 cases distributed among age groups and animated by the week number of the year.

**Audience:** European policy makers and citizens.

**Purpose:** Getting an insight about how people affected by COVID-19 are distributed by specific age groups.

**Information:** Distribution of cases and deaths of COVID-19 through the weeks by European countries and specific age groups.

### European countries daily 14-day subnational notification of new COVID-19 cases Dashboard:



**Process of development:** Built using **daily subnational 14-day notification rate of new COVID-19 cases** dataset.

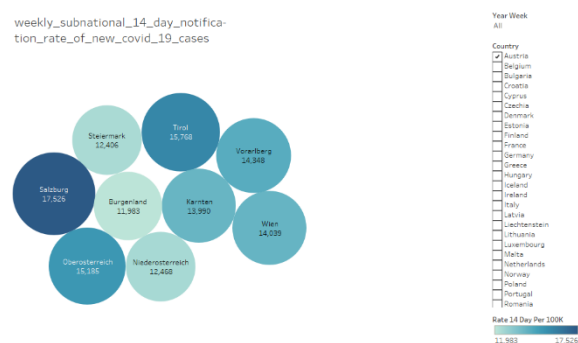
**Description:** -Tree map of the daily number of new covid-19 cases per subnational regions with country and dates range filtering capabilities.

**Audience:** European policy makers and citizens.

**Purpose:** Finding which regions in a given European country are more affected by COVID-19 on a daily basis.

**Information:** Distribution of cases of COVID-19 through the days by European countries regions.

### European countries 14-day weekly subnational notification of new COVID-19 cases Dashboard:



**Process of development:** Built using **weekly subnational 14-day notification rate of new COVID-19 cases** dataset.

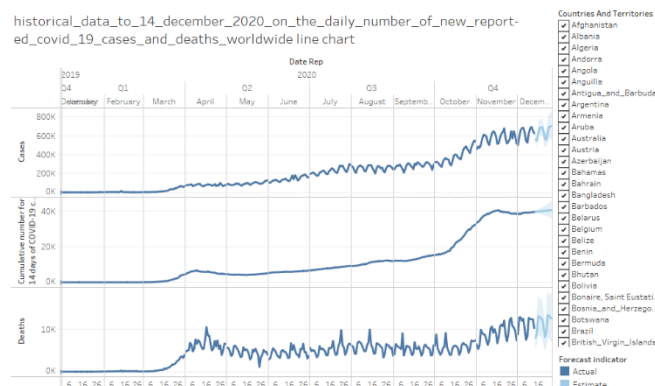
**Description:** Bubble map of the weekly number of new covid-19 cases per subnational regions with country and week of year filtering capabilities.

**Audience:** European policy makers and citizens.

**Purpose:** Finding which regions in a given European country are more affected by COVID-19 on a weekly basis.

**Information:** Distribution of cases of COVID-19 through the weeks by European countries regions.

### European countries historical trend of COVID-19 cases Dashboard:



**Process of development:** Built using **historical data (to 14 December 2020)** on the daily number of new reported COVID-19 cases and deaths worldwide dataset.

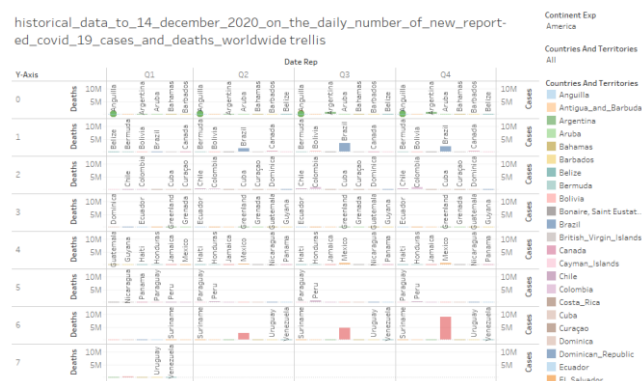
**Description:** Line charts of COVID-19 cases, deaths and cumulative counts through the time with countries and territories filtering capability.

**Audience:** World citizens and policy makers.

**Purpose:** Looking for the trend of the evolution of COVID-19 cases, deaths and cumulative counts.

**Information:** Evolution of cases and deaths due to COVID-19 through the days by World countries regions.

### European countries historical cases and deaths of COVID-19 cases Dashboard:



**Process of development:** Built using **historical data (to 14 December 2020)** on the daily number of new reported COVID-19 cases and deaths worldwide dataset.

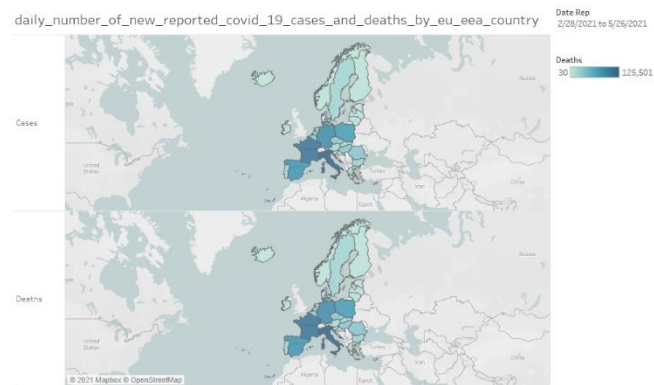
**Description:** Trellis chart of COVID-19 cases and deaths by year quarter with continent and countries/territories filtering capabilities.

**Audience:** World citizens and policy makers.

**Purpose:** Looking for the trend of the evolution of COVID-19 cases, deaths and cumulative counts.

**Information:** Finding the countries having cases and deaths due to COVID-19 the highest through the days by Continent.

## Daily number of new reported covid-19 cases and deaths by EU/EEA countries:



**Process of development:** Built using **daily number of new reported COVID-19 cases and deaths by EU/EEA country** dataset.

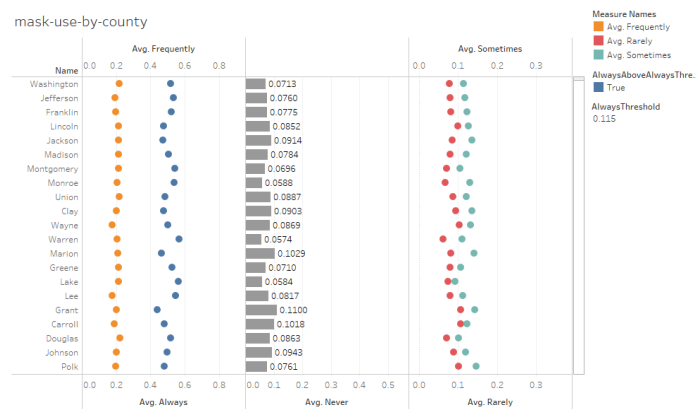
**Description:** Heatmap of COVID-19 deaths in European countries with date range filtering capability.

**Audience:** European policy makers and citizens.

**Purpose:** Finding the European country having the more/less deaths due to COVID-19 in a date range.

**Information:** Finding the countries having the most deaths due to COVID-19 daily in European countries.

## Mask use by counties dashboard:



**Process of development:** Built using **mask use by county** dataset.

**Description:** Dual-Axis Scatterplots and horizontal bar chart of average mask use rates per US Counties Always rate filtering slider.

**Audience:** Policy makers, Entrepreneurs, ...

**Purpose:** Finding the US county where there are the most people frequently / always / never / sometimes / rarely wearing face masks.

**Information:** Finding US counties where people are used to wear mask when getting out.

## Hospital and ICU admission rates and current occupancy for COVID-19 Dashboard:



**Process of development:** Built using hospital and ICU admission rates and current occupancy for COVID-19 dataset.

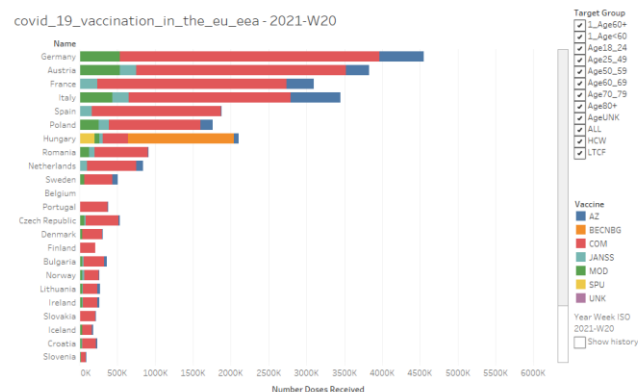
**Description:** Geo Bubble chart of hospital admissions with bubbles having the size of mean of number of admissions and filterable by a range of dates and a specific indicator.

**Audience:** Policy makers, hospitals managers, Entrepreneurs, citizens ...

**Purpose:** Looking for a hospital with a low occupancy rate.

**Information:** Providing on hovering and filtering hospital/ICU with low occupancy rate.

## Vaccination in EU/EEA countries Dashboard:



**Process of development:** Built using COVID-19 vaccination in the EU/EEA dataset.

**Description:** Bar chart of number of vaccine doses received per European countries clustered using vaccine types, animated using week of year and filtered using age groups.

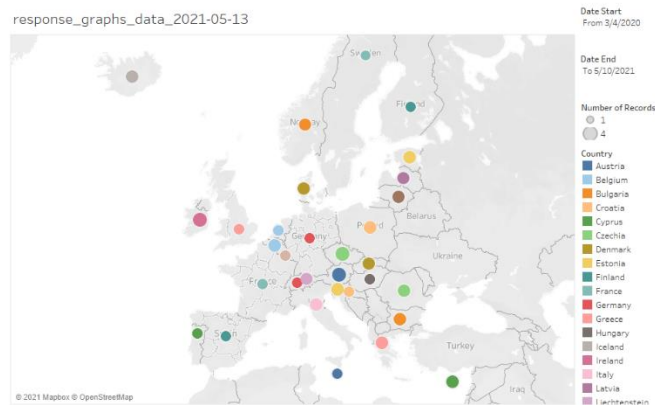
**Audience:** Policy makers, citizens, epidemiologist...

**Purpose:** Finding how COVID-19 vaccine are distributed per country, age groups and through the time

**Information:** Providing the list of countries in Europe where people are the most vaccinate to COVID-19.

Which restrictive measures due to COVID-19 is in place a given European country	Travelers, policy makers, citizens	Scatterplot on maps displaying in tooltips while hovering the restriction measure in place for a filtered range of dates.
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### Response graph to COVID-19 in European Countries Dashboard:



**Process of development:** Built using **country response measures to COVID-19** dataset.

**Description:** Scatterplot on maps displaying in tooltips while hovering the restriction measure in place for a filtered range of dates.

**Audience:** Travelers, policy makers, citizens

**Purpose:** Looking for which restrictive measures due to COVID-19 is in place a given European country

**Information:** Restrictive measures in place in a given European country due to COVID-19



## Part II

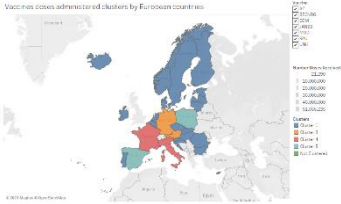

### Predictive Analytics and Visualization of Insights

Four sets of variables where there might be relationship between the variables, and where exploring and understanding these relationships might lead to actionable insights:

Dataset	Variables	Insights
Major Epidemics	Location Splitted and Distinct count of Epidemics or Pandemics	Cluster of regions more and less affected by pandemics.
Pandemics Chronology	Date Start, Death toll lower and Death toll upper.	Trends in deaths estimates due to epidemics from 1800 to present
Testing for covid 19 by week and country	Year week, Positivity rate, New Cases, and Testing rate.	Forecasts of covid-19 new cases for the next 11 months.
14-day age-specific notification rate of new COVID-19 cases	Age Group, New Cases, Population and Rate 14 Day Per 100K	Distribution of the proportion of new cases of covid per age group.
Daily subnational 14-day notification rate of new COVID-19 cases	Date and Rate 14 Day Per 100K	Average Rate 14 Day Per 100K forecast by region for the next 7 months.
Historical data (to 14 December 2020) on the daily number of new reported COVID-19 cases and deaths worldwide	Cumulative number for 14 days of COVID-19 cases per 100000, Cases, Deaths and Date Rep	Forecast of Cumulative number for 14 days of COVID-19 cases per 100000, Cases and Deaths for the next five months.
Mask use by Country	State, Never and Always	Clusters of never mask use rates and always mask use rates.
Hospital and ICU admission rates and current occupancy for COVID-19	Country and Value	Clusters of hospitals covid admission rates
COVID-19 vaccination in the EU/EEA	Number of Doses Received and Name	Heatmap of clusters of number of vaccine doses received
Response measures to COVID-19	Country and Sum of Number of Measures per country	Heatmap of clusters of number of restrictive measures.

## Dashboard of predictive / prescriptive (or other) data analytics approaches

Dashboard	Statistical Modeling	Justification
	K-means of epidemics number	Great technique for aggregating regions in the world based on the number of epidemics spread in the world in each region.
	Five number summary and OLS regression.	Five number statistics provide an overview of the numeric features and the OLS regression is used to estimate the parameter of the trend's lines.
	Exponential Smoothing.	Adequate for forecasting future date values based on historical ones.
	Reference bands (average, maximum)	This helps to quickly detects age groups above average.
	Exponential Smoothing.	Adequate for forecasting future date values based on historical ones.
	Exponential Smoothing.	Adequate for forecasting future date values based on historical ones.
	K-means of ALWAYS mask use rate	Great technique for aggregating counties in US based on the mask ALWAYS use rates.
	K-means of ALWAYS mask use rate	Great technique for aggregating counties in US based on the mask ALWAYS use rates.

Dashboard	Statistical Modeling	Justification
 <p>Vaccine doses administered clusters by European countries</p>	<p><b>K-means of vaccine administered doses</b></p>	<p><b>Great technique for aggregating European countries based on vaccine administered doses.</b></p>
 <p>Cluster of Number of Restrictive measures by European Country</p>	<p><b>K-means of number of restrictive measures implemented</b></p>	<p><b>Great technique for aggregating European countries based on number of restrictive measures implemented.</b></p>