Covid 19 - efectivness of measures taken (enforced) by Czech Republic

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Abstract

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1. Introduction

The COVID-19 pandemic, also known as the coronavirus pandemic, is an infectious disease caused by the SARS-CoV-2 virus.

COVID-19 affects different people in different ways. Most infected people will develop mild to moderate illness and recover without hospitalization. However, except common symptons such as fever, cough, tiredness, loss of taste or smell, etc. this disease could have also serious symptoms: difficulty breathing or shortness of breath, loss of speech or mobility, confusion or chest pain. On average it takes 5–6 days from when someone is infected with the virus for symptoms to show, however it can take up to 14 days.

The virus can spread from an infected person's mouth or nose in small liquid particles when they cough, sneeze, speak, sing or breathe. These particles range from larger respiratory droplets to smaller aerosols. It is important to practice respiratory etiquette, for example by coughing into a flexed elbow, and to stay home and self-isolate until you recover if you feel unwell. [1].

The beginning of the COVID-19 epidemic dates back to 31 December 2019, when first cases were reported in the People's Republic of China. In the Czech Republic, the first three cases of infection with the novel coronavirus were confirmed on 1 March 2020.

The continuing global spread of COVID-19 had seriously jeopardized human mental health. To reduce the damage of COVID-19 pandemic to people's mental health, you should protect yourself and others from infection by staying at least 1 metre apart from others, wearing a properly fitted mask, and washing your hands or using an alcohol-based rub frequently. The Czech ministry had to enforced rules or guidelines to limit the spread of COVID-19. Was those rules and measures effective? That is the purpose of this work - find out, whether the measures had impact ...

2. Related Work

The fast-acting and deadly nature of SARS-CoV-2 have prompted scientists and media outlets to produce thousands of visualizations to convey the pandemic risk. [2]
Many line charts of COVID-19 data also include forecasts using a wide range of modeling techniques to show predicted COVID-19 trends. All forecasts inherently include uncertainty, and there are multiple ways to visualize the uncertainty associated with COVID-19 forecasts. Effectively designed visualizations can be powerful tools for communicating health risks, particularly those that include probability, which can be highly challenging for many people to understand.

Because of an increasing numbers of patients with Covid 19 disease urgent need emerged for a tool which would make it possible to present important reports, and which would be based on valid data sources only. Therefore, a team of government experts together with researchers [3] focused on the design and development of a web application was intended to provide a regularly updated overview of COVID-19 epidemiology in the Czech Republic to the general public.

After the first epidemic wave, in 2021, Simunek [4] presented the main impacts of the COVID-19 movement restrictions on the road traffic in the Czech

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Republic, measured during the first epidemic wave, i.e., from 12 March to 17 May 2020. From collected data, they analyzed, they found out that during the first three weeks of the state of emergency, people followed government regulations and restrictions and changed their travel behavior accordingly. However, following this period, the traffic gradually returned to the prepandemic state.

Another study, which was carried out by Bruthans et al [5], looks at cardiovascular mortality and morbidity in the Czech Republic.

Visualizations and analyses on Covid-19 and the issued government restrictions have been carried out not only in the Czech Republic.

[6] published an excellent review of some 60-plus articles addressing the pandemic during the early months of the outbreak, categorizing the research efforts into five different research foci: Spatio-temporal analyses, Data Mining, Web-based mapping, Health and Social geography, and Environmental variables.

Another dashboard, that has been created in Power BI, maps the progression of Covid-19 disease in the LA. Dashboard is available online - see https://doi.org/10.22201/igg.25940694e.2020.2.74.160 [7]

3. Methods

The lack of visualizations and analysis regarding specific populations and at specific scales concerned us and roused our interest in creating maps to satiate our curiosity and to provide data for audiences that shared our specific interests.

The COVID-19 dashboard featuring case data by date, and/or county in Czech republic created using a connection to publicly available data shared by XXX via xxx . The second purpose of this dashboard is to allow users to rapidly analyze local data trends, perhaps following school openings/closings, changes in the status of businesses, or other government-mandated measures.

To create maps and dashboards we decided to use Microsoft's Power BI software.

3.1. Data source

To create our visualizations and analyses, we identified several sources of data. Upon closer examination of the datasets, we found that they are still the same data, just with an increment of data for another time period. For this reason, we decided to use only the dataset with

the most recent date i.e. dataXYZdatumXYZ.

3.2. Visualizations types

Since the tables were connected in the "Model" tool, it was only a matter of selecting the appropriate visualizations from the list in the Report window. We chose to make four separate tabs of visualizations. First two shows s graduated point map depicting total cases (positive tested or dead) by color (See dashboard). We calculated the case rate with the standard formula for disease rates using the density of regions in Czech Republic. In Power BI software we simply used the division equation that pulled the cumulative cases per place per date and divided that variable by the population data (density) from the regions ('okresy') table.

A similar graphic, that showed deaths is included on the second tab. Since the stacked graph, which shows the number of deaths including the displayed milestones, takes up a small part of the dashboard and is not so easy to read, a button has been added to easily click through to the next page, where the detail of this graph can be found.

3.3. Limitations

Although we consider our experience with Power BI successful, there are some limitations to the software and to the maps we constructed. The main problem with Power BI is the limited base map of cities pre-packaged with the software. To overcome this limitation, we used a JSON file with predefined polygons which are representing regions and counts in Czech Republic. These JSON files were accessible via Github. Another example is, that Power BI includes no provision for adding a scale bar, a north arrow, or color-legend (when using metrics recounted with density). That was solved by simply adding a picture with the color legend that was used.

4. Results

The map allows visitors to select individual regions from a map, which prompts dynamically linked graphs and tables to display data for only that region.

5. Discussion

In view of the deteriorating situation, on 12 March 2020, the Czech government declared a state of emergency for the entire Czech Republic and adopted radical emergency measures under the Emergency Management Act,2 which resulted in a fundamental restriction

of the free movement and assembly of persons in the Czech Republic.

6. Future Work

Blah blah blah

Acknowledgement

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Dashboard: https://www.gg.25940694e.2020.2.74.160