

COVI-19 in Florida: A Pandemic of the unvaccinated Florida Residents

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Abstract

Executive summary — On March 1, 2020, the first two official cases of the coronavirus (COVID-19) were reported in the Manatee and Hillsborough counties of Florida, and later confirmed by the CDC on March 2, 2020. However, state records later indicated that as many as 171 Florida residents across 40 counties had shown symptoms of the coronavirus as early as January 2020, though official diagnostic guidelines had not been instituted by the Center for Disease control (CDC). As of the date of this report, official state records indicated a total of 2283,315 cases, with some 95,210 hospitalizations and 36,869 deaths statewide.

Several efforts have been made by the state's administration to curtail the spread, including lockdown orders, mandatory masks, and social distancing. Various vaccines authorized for emergency use by the FDA have also been administered in Florida since December 14, 2020, with an official 15,488 COVID-19 shots administered as of the date of this report, accounting for only about 42% of the state's population.

In this project, we argue from a data standpoint that, the COVID-19 pandemic has shifted to a pandemic of the unvaccinated. Specifically, we show that Florida counties with the highest new infections and consequent new deaths are those with the strongest vaccine hesitancy. We show that, following FDA approval of various vaccine for emergency use, the number of reported new cases and deaths within the state of Florida significantly dropped. We note a glaring spike in new cases, for the period running from end of June 2021, into the month of July 2021, and attribute this to vaccine hesitancy in most Florida counties. This period has one of the least numbers of new deaths in all counties, an indication that the vaccine is effective at preventing death.

We conclude by predicting from the data trends that if all Florida residents were to be vaccinated, the number of new infections, hospitalization, and consequent deaths from COVID -19 will greatly diminish, and life may return to normal.

1.0. Introduction

In December 2019, an outbreak of pneumonia of unknown origin was reported in a Chinese town of Wuhan in the Hubei province of China. Though cases of this strange pneumonia were initially epidemiologically linked to a seafood market in Wuhan, inoculation of respiratory samples into human airway epithelial cells led to the isolation of the novel respiratory virus. Further genome analysis revealed the virus to be a novel coronavirus, related to SARS-CoV. Thus, the new virus was named “Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV-2). This virus causes a disease, which is now commonly called COVID-19, to emphasize the genome (COVID) of the virus that causes it, as well as the year of its outbreak (2019).

The rapid global spread of the SARS-CoV-2 virus and the numerous deaths resulting from the disease it causes (COVID_19) led the world health organization to declare it a pandemic on March 12, 2020. The first case of the outbreak in the USA was reported on January 20th, 2020, as government declared the outbreak a public health emergency. The first cases in Florida were announced by Governor Ron DeSantis on March 1, 2021, as he declared the pandemic a public health emergency. They included a 63 year old woman from Manatee County who had contact with someone who tested positive and a 29 year old man from Hillsborough County who had travelled to Italy. In response to the outbreak, the Florida state administration under Governor Ron DeSantis put in place several measures to curtail the spread of the virus. Key measures included a statewide lockdown, including closure of bars, restaurants, and schools, resorting to online classes for most schools and the cancellation of all public outdoor events that entail many people coming together. Also, compulsory wearing of safety masks and the maintenance of social distanced were imposed in most public places. Since after the first cases, the number of cases has drastically increased throughout the state, with several deaths and hospitalizations. As of the date of this report, official state records indicated a total of over 2283,315 cases, with over 95,210 hospitalizations and over 36,869 deaths statewide. On the December 4, 2019, Florida began administering various FDA approved vaccines for emergency use. As of the date of this report, over 15,488 COVID-19 shots administered as of the date of this report, accounting for only about 42% of the state’s population.

COVID-19 is mainly transmitted via respiratory routes, when people inhale droplets and particles release by infected people as they breath, talk, cough, sneeze, or sing [1]. The infected are more likely to transmit the virus when physically close to others, though such infections can also occur

over long distances, particularly where there is poor air circulation, such as indoors [2,3]. Symptoms of COVID-19 are variable, but often include fever, cough, headache, fatigue, breathing difficulties and loss of taste and smell. These symptoms may begin to manifest one to fourteen days after exposure to the virus. While some people develop very severe symptoms, others only show mild symptoms while most are asymptomatic. Complications of the virus include severe pneumonia, viral sepsis, acute respiratory distress syndrome, kidney failure amongst other disease. The virus is more severe in elderly people with underlying health conditions including high blood pressure, heart disease, diabetes, and lungs diseases.

While many Floridians are making strides towards getting the vaccines, several myths related to the vaccine has led to a strong vaccine hesitancy from others. In this research project, we attempt from a data standpoint to examine the effect of the virus on new infections and consequent new deaths in all 67 counties in the state of Florida. Specifically, we intend to student the trend of new infections and deaths since after the advent of the vaccines and answer the following specific research questions:

1. How has the advent of the vaccine affected new infections and new deaths?
2. Which Florida counties have the highest vaccine hesitancy to the COVID -19 vaccine.
3. OF the infections in all counties, which counties have the highest deaths?
4. Is there a correlation between strong COVID -19 vaccine hesitancy and new cases and deaths?

We will then conclude by making a projection based on the trends of our results.

2.0. Methodology

We analyze COVID-19 related data available in various data repository using Power BI.

2.1. Data Source

The data used in this project comes from either the center for disease control (CDC) [COVID-19 webpage](#) or [the John Hopkins COVID-19 case tracker](#). Most of the data is not specific to Florida, so we employ the structure query language (SQL) to query the data repository and get Florida specific data, which we then analyze using power BI. We downloaded three data tables from these sites. Which we used in building our power BI data source as follows:

1. Florida confirmed COVID cases and Deaths, by County, time series.

2. COVID-19 Vaccination in the USA, Florida specific data, by County.
3. COVID 19 Vaccine hesitancy by county.

2.2. Data Dictionary.

The columns described in this data dictionary are mostly the once used in our visualizations.

Table 1: Florida confirmed COVID cases and Deaths, by County, time series.

Column Name	Type	Description
Date	date	Time stamp of when data was reported
Total_population	decimal	Total population of the County from census ACSS
County	string	Name of the county in Florida
Cumulative cases	integer	Cumulative count of confirmed cases
Commutative cases per 100,000	integer	Cumulative count of confirmed cases/ 100,000 pips
Commutative deaths	integer	Cumulative count of confirmed deaths
Commutative deaths per 100,000	integer	Cumulative count of confirmed deaths/100,000 pips
New cases	decimal	Count of new cases for that day
New deaths	decimal	Count of new deaths for that day
New cases 7 days rolling average	decimal	Average of counts of cases for last 7 days
New deaths 7 days rolling average	decimal	Average of counts of deaths for the last 7 days.

Table 2: COVID-19 Vaccination in the USA, Florida specific data, by County.

Column Name	Type	Description
County	string	Name of the county in Florida
Series complete yes	integer	Total Number of people fully vaccinated
Series Complete pop pct	decimal	% Of population fully vaccinated
Series complete X plus	integer	Total number of people aged X+ fully vaccinated
Series complete X plus pop pct	integer	% Of population age X+, fully vaccinated
Completeness pct	decimal	Reported percentage of fully vaccinated people
Administered Dose 1 Recip	integer	Number of people with at least one dose
Administered Dose 1 pop pct	decimal	% Of population who have received at least 1 dose
Administered Dose 1 Recip X plus	integer	Total number of people age X+ with at least a dose
SVI CTGY	string	Social Vulnerability index category

Table 3: COVID 19 Vaccine hesitancy by county.

Column	Type	Description
County	string	Name of the county in Florida.
Estimated hesitant	Decimal	% Of people who probably will not get vaccine
Estimated hesitant unsure	Decimal	% Of people who are not sure if they will get
Estimated strong hesitant	Decimal	% Of people who are certain will not get
SVI	Decimal	Social vulnerability index (0 lowest, 1, highest)

To form the power BI data source, these tables were linked via the county column. (See attached zip folder for power BI data source.

3.0. Data Analysis

The data analysis for this project was done in Microsoft power BI. Details of all analysis and visual produced are in the attached zip folder.

3.1. Data Cleaning

To clean the data, we mainly employed the power BI processes of data transformation and column selection. For each table, we selected the columns of interest to us, renaming others to make them consistent with the other tables. Details of these processes are shown in the attached zip folder containing the power BI file.

3.2. Results

3.2.1. Time series Analysis of New COVID-19 infections and Seven-day average for various Florida counties.

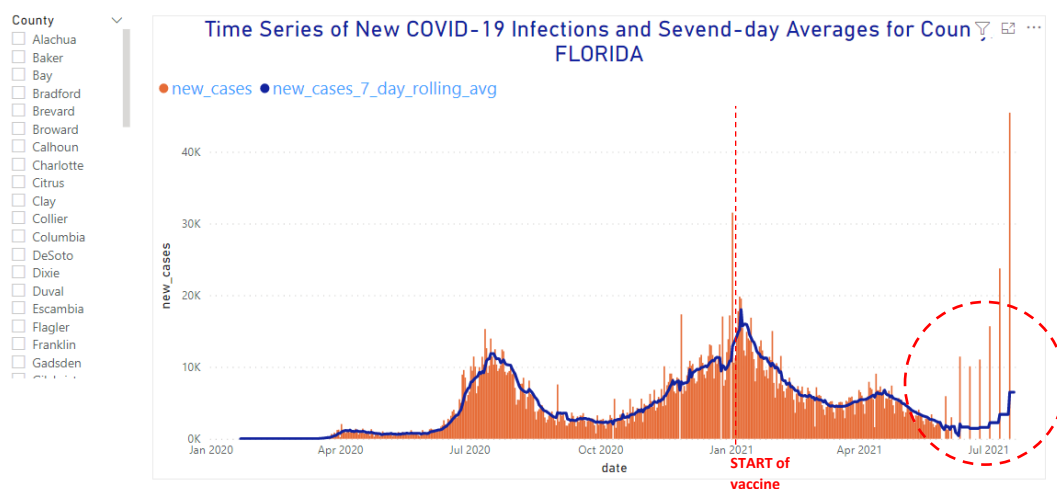


Figure 1: Time Series of New COVID-19 cases and a 7-day rolling average for each County.

The goal of this visualization is to have a feel of the trend of new infections over time. The seven day rolling average helps us to better compare different Counties. The visualization comes with a side menu, from which to select the counties. Also, it has a dynamic title (Created from the measure named Title), which changes reflect the selected County.

3.2.2. Time series Analysis of New COVID-19 deaths and Seven-day rolling average for various Florida counties

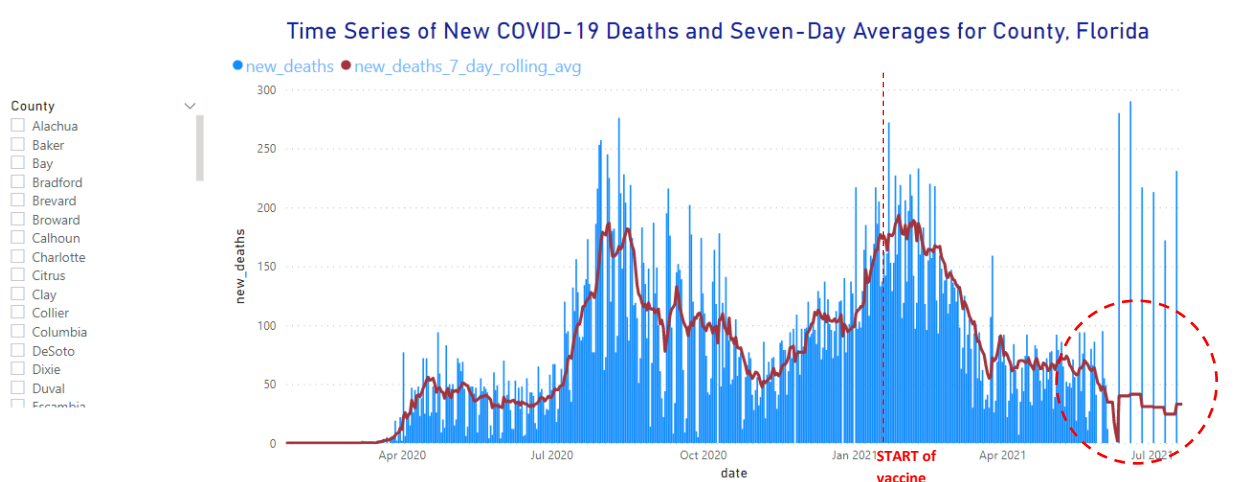


Figure 2: Time Series of New COVID-19 deaths and a 7-day rolling average for each County.

The goal of this visualization is to have a feel of the trend of new deaths over time. The seven day rolling average helps us to better compare different Counties. The visualization comes with a side menu, from which to select the counties. Also, it has a dynamic title (Created from the measure named Title2), which changes reflect the selected County.

3.2.3. Time Series Comparison of New Seven Day Rolling Averages of COVID-19 Infections and Deaths by County.

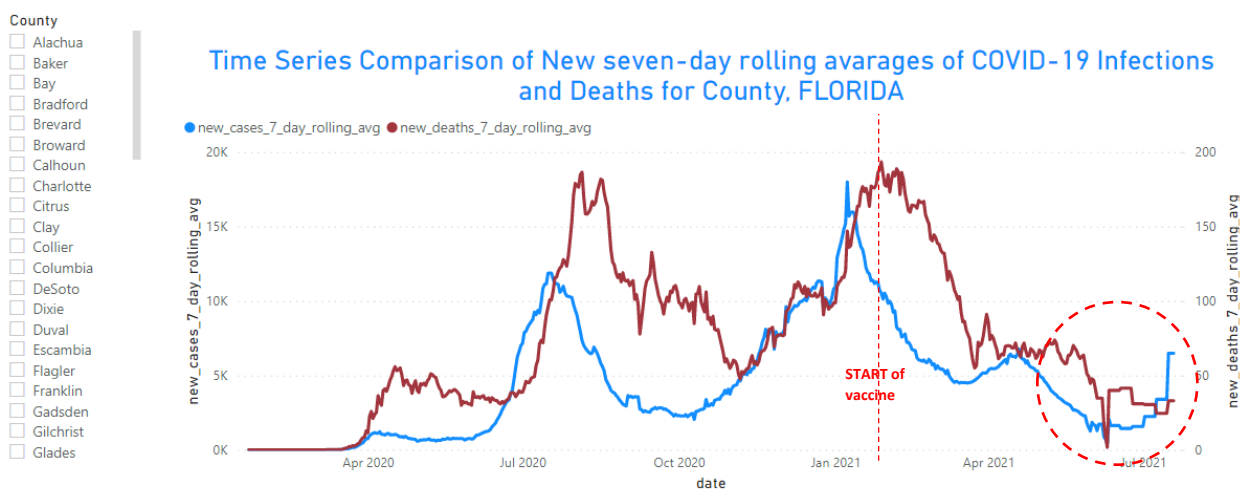


Figure3: Time Series Comparison of New Seven Day Rolling Averages of COVID-19 Infections and Deaths by County

The goal of this visual is to see how the seven days rolling averages of new cases compare to the seven day rolling averages of new deaths in the period after the introduction of vaccines.

3.2.4. Comparison of Number of Fully vaccinated individual to total population and new deaths

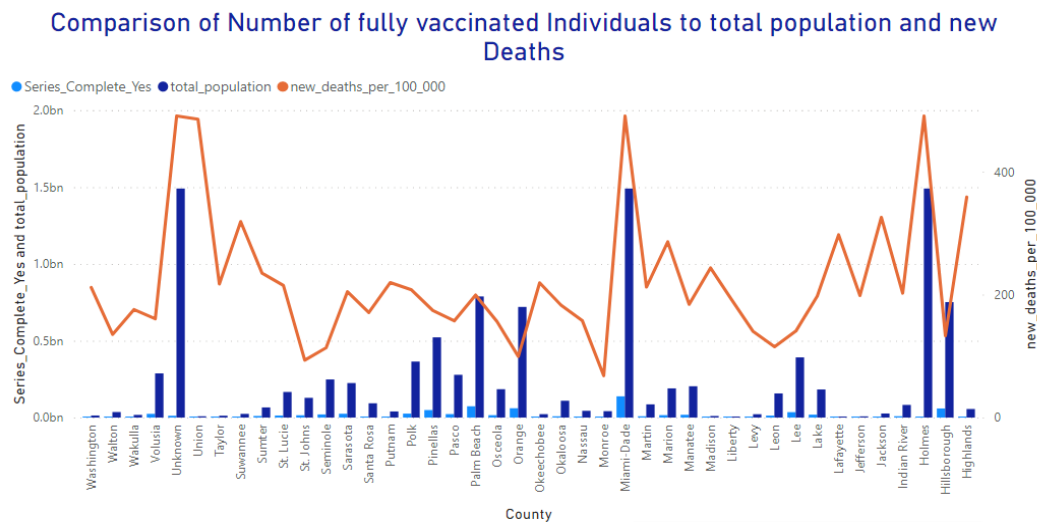


Figure 4: Comparison of Number of Fully vaccinated individual to total population and new deaths

The goal of this visual is to compare the trends in new COVID-19 related deaths to the number of fully vaccinated individuals for various states.

4.0 Discussion and Conclusion

There are a few points which stand clear from the datasets and visualizations.

- From the time series data, we notice a sharp fall in the number of new COVID-19 infections and deaths from its peak around February 2021. This period corresponds to the period when the FDA approved various vaccines for emergency use. This downwards trend continues till around April 2021, when there is a small spike of new cases and deaths. We can confidently say that the introduction of vaccines for emergency use greatly reduced the number of new infections and deaths, thus contributing to this downwards trends. The new COVI-19 variants that was discovered around April 2021 in the United Kingdom, may account for the small spike around April 2021, but the downwards trend continued till around July 2021.
- It is important to note that, the month of July 2021, is witnessing a spike in new cases and deaths. This can be attributed to the strong vaccine hesitancy notices in a handful of the counties. The number of new deaths dropped to a minimum around the end of June 2021, but quickly spiked in July 2021.
- Counties with strong vaccine hesitancy, tend to witness more deaths relative to their populations size than counties with low hesitancy.

In conclusion, there is clear evidence from the data that the vaccine is effective at preventing new infections and consequently deaths, as clearly noticeable from the visuals. But then, those who have not yet vaccinated still stand a high risk of not only catching the virus, but also transmitting it to the already vaccinated. Thus, the future of the pandemic lies in the hands of the unvaccinated. Everyone is encouraged to take the vaccine to continue to lower the trends of new infections and deaths.

References

1. ["Symptoms of Coronavirus". U.S. Centers for Disease Control and Prevention \(CDC\). 22 February 2021. Archived from the original on 4 March 2021. Retrieved 4 March 2021.](#)
2. Grant MC, Geoghegan L, Arbyn M, Mohammed Z, McGuinness L, Clarke EL, Wade RG (23 June 2020). ["The prevalence of symptoms in 24,410 adults infected by the novel coronavirus \(SARS-CoV-2; COVID-19\): A systematic review and meta-analysis of 148 studies from 9 countries". PLOS ONE. 15 \(6\): e0234765. Bibcode:2020PLoSO..1534765G.](#)
3. Islam MA (November 2020). ["Prevalence of Headache in Patients With Coronavirus Disease 2019 \(COVID-19\): A Systematic Review and Meta-Analysis of 14,275 Patients". Frontiers in Neurology. 11: 562634. doi:10.3389/fneur.2020.562634. PMC 7728918. PMID 33329305.](#)
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