A7: Project Report

Analysis of COVID-19 and Education in Essex County, New Jersey

Github Repository: https://github.com/aaliyahfiala42/COVID-19-Education

Aaliyah Hänni

December 14th, 2021

Introduction

In Essex County, New Jersey effective March 18th, 2020 all schools in the State of New Jersey were closed for the remaining school year (*School responses in New Jersey to the coronavirus (COVID-19) pandemic*). The impacts of school closures on the students who now have a gap in their education is still largely unknown and unresearched.

For my analysis, I would like to first explore how the COVID-19 pandemic impacted Essex County, New Jersey and then focus on looking at how this then affected students of the public education system in this county. This is important to know how students were impacted, to know what obstacles they need to overcome, and for educators who are going to be working with this group of students in the future. The results of thai analysis can be used to guide educators and education administrators in making the decisions on how to deal with students who have been impacted, and how to handle events like this in the future.

Personally, I am interested in this topic because my two younger siblings were significantly affected by the introduction of COVID-19 into our community. One sibling struggled tremendously, where previously he was one of the best performing students in his grade. My other sibling, in middle school, actually thrived when the school moved to an online platform and found that he was able to learn more and be more productive. I thought it was interesting how this one event could impact two brothers so differently. This has motivated me to explore the overall impact of the COVID-19 pandemic on students.

Background/Related Work

The research question that I would like to answer in this analysis is: How did the COVID-19 pandemic impact public school students in Essex County, New Jersey? This is a very broad question and there are several ways of measuring the impact of the pandemic on the educational system. Thus, I can break down my initial question into a summary of three measures that aim to answer the higher level question of impact. I decided to look at the change in school enrollment, test scores, and graduation rates, and compare each measure

to historical data to see how COVID-19 impacted the school year varied in school performance.

When reviewing previous work performed on this topic I came across the article, "Effects of COVID-19 on school enrollment" by Pinka Chatterji and YueLin. Chatterji and Lin found that the impact on COVID-19 on nation-wide public schools was that, "... the pandemic reduced school enrollment by about 2 percent during April 2020" (Chatterji et. al, 2021). This decrease in national school enrollment, led me to believe that I would find similar results in Essex County, New Jersey. Another study found that, when comparing reading and math test scores for k-12 students in fall 2019 to fall 2020, "...[i]n reading, on average, the achievement percentiles of students in fall 2020 were similar to those of same-grade students in fall 2019..", while in math, "[s]tudent achievement was lower than the pre-COVID-19 performance by same-grade students in fall 2019, and students showed lower growth in math across grades 3 to 8 relative to peers in the previous, more typical year." (Kuhfeld et. al, 2020) The latest national report on graduation rates, focused primarily on highlighting the all time high graduation rates of 2019 and listed impacts on COVID-19 and different highschool groups. Although they predicted that the 2020 national high-school graduation rate would not reach its goal of 90%, the authors did not provide any analysis on what the actual 2020 national graduation rates were (*2021 building a grad nation report,* 2021).

Methodology

I initially began by looking at how COVID-19 affected the entire county. I created a visualization to show the cumulative count of all confirmed COVID-19 cases in Essex County, New Jersey. To better show the rate of the number of confirmed cases, I then created another graph to show the number of new daily cases in Essex County, New Jersey. This allowed me to begin to understand how COVID-19 impacted the entire county, and what the overall infection rate was like. I then used this information to help motivate and design how this large spike in cases impacted the educational system.

To tackle my research question of analyzing the impact of the COVID-19 pandemic on the public education system, I planned to utilize 3 key metrics of education: school enrollment, test scores, and graduation rates. Comparing the enrollment rates over the last three gives a sense of how many students are actually going to school. Looking at test scores allows us to gauge how students are performing and if their learning has been impacted by the absence of education. Graduation rates show the overall school completion, and if students are still completing on time. I plan to use these three metrics to assist in answering the high-level question of how students were impacted and obtain a sense of in what way in regards to these selected metrics.

School Enrollment

To analyze school enrollment, I used data for the previous three school years containing data of the total number of students enrolled by grade for each school, organized by county. For my analysis, I aggregated the total number of enrolled students for each grade in the district. Using the resulting data, I developed a visualization to display the total county school enrollment for each year, segregated by grade, to show each grade was impacted. This will highlight the change in average school enrollment during the COVID-19 pandemic.

Test Scores

For reviewing test scores, I used the ACT, SAT, & PSAT average test scores in various subjects, for the previous three school years, for each school. I aggregated the average test scores for Essex County, New Jersey for each of the three tests, by subject, for each school year. Using the resulting data, I designed a bar plot of the average county test scores for each year, segregated by the different tests and subjects. This can then be used to show the impact of COVID-19 on average test scores.

Graduation Rates

To review graduation rates, I used a dataset containing the historical 4-year and 5-year graduation rate for the previous five school years, for each school. I used this dataset to compute the average graduation rate, for both 4-year and 5-year cohorts, for Essex County, New Jersey, for each school year available. Using the resulting dataset, I then plotted the 4 and 5-year graduation rates for Essex County, New Jersey over the last four years, to compare how graduation rates were impacted in the 2019-2020 school year, with the introduction of COVID-19.

All three summary metrics were then combined into a single interactive dashboard which can be used to analyze the overall impact of COVID-19 on education. A dashboard summarizing key education metrics over time, allows the user to explore on average how schools were impacted by the resulting school closures due to the COVID-19 pandemic. The dashboard will be created using Tableau, and published on Tableau public, to be freely available to the public.

Findings

Visualizing the number of confirmed COVID-19 cases and the new daily case count in Essex County, New Jersey, we can see that the number of cases is exceedling high. There is a large spike in the number of cases of COVID-19 in March 2020, which helps to explain the motivation for educators to make the hard decision of closing all schools for the remainder of the year. We can see that after a steep decline during the summer, there is yet another spike in the number of new cases when schools reopen in the fall of 2020.
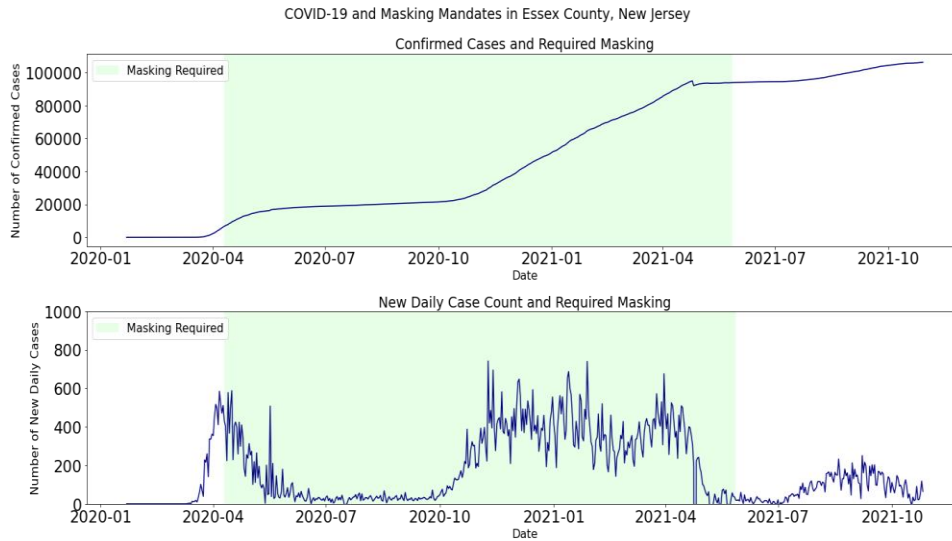
Figure 1: COVID-19 Confirmed Cases and New Daily Case Count in Essex County, New Jersey

Student Enrollment

Reviewing student enrollment, on average there was not a significant change between grades for the varying school years. The three grades that displayed the most change were grades 3, 6, and 7. When comparing the 2018-2019 and 2019-2020 school years, Grade 3 displayed an average decrease of 7 students per school, Grade 6 had an average decrease of 2 students per school, and Grade 7 actually had an average increase of 1 student per school. Overall, these results did not show any significant change in the average school enrollment over the last 3 school years, and COVID-19 does not seem to have an impact on the 2019-2020 average school enrollment.
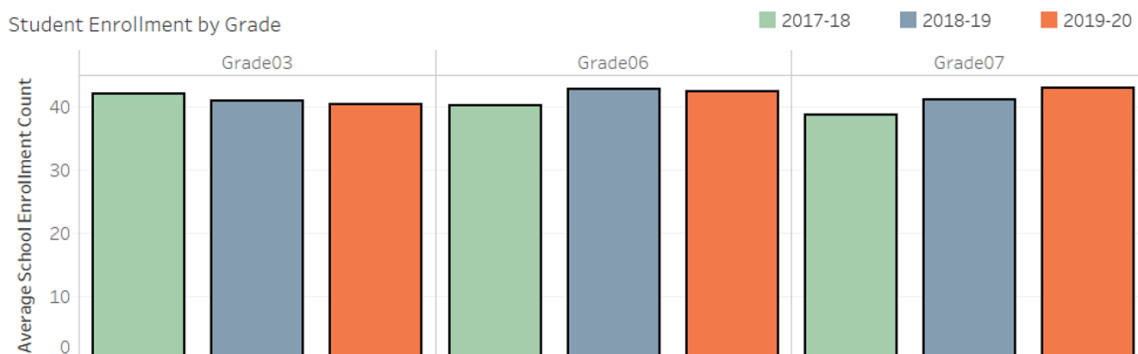

Figure 2: Student Enrollment by Grade

This visualization is filtered to display the grades with the greatest change in average school enrollment, grades 3, 6, and 7.

Test Scores

Overall, there does not appear to be any significant change in average school test scores for schools in Essex County, New Jersey. When comparing the 2019-2020 COVID-19 impacted school year to the previous two school years, there weren't really any clear distinctions. The group with the largest change in test score was the math subject. When comparing average test scores for 2018-2019 and 2019-2020, I found that the average ACT score decreased by 0.29, the average SAT score decreased by 5.09, while the average PSAT actually increased by 1.99.
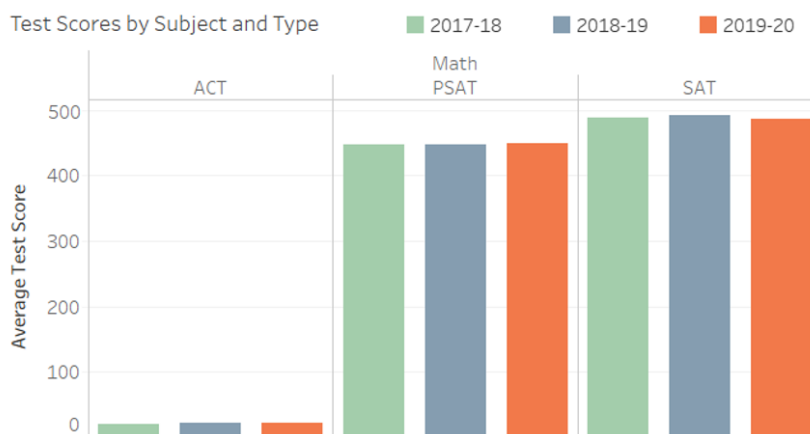

Figure 3: Average Math Test Scores by School Year

Graduation Rates

Overall, graduation rates show a steady upward trend over the last 5 years. The 2019-2020 COVID-19 pandemic impacted school year did not appear to disrupt this trend. Comparing the 2019 and 2020 graduation rates, the data shows a slight increase of 0.7% in average graduation rate for schools in Essex County, New Jersey.
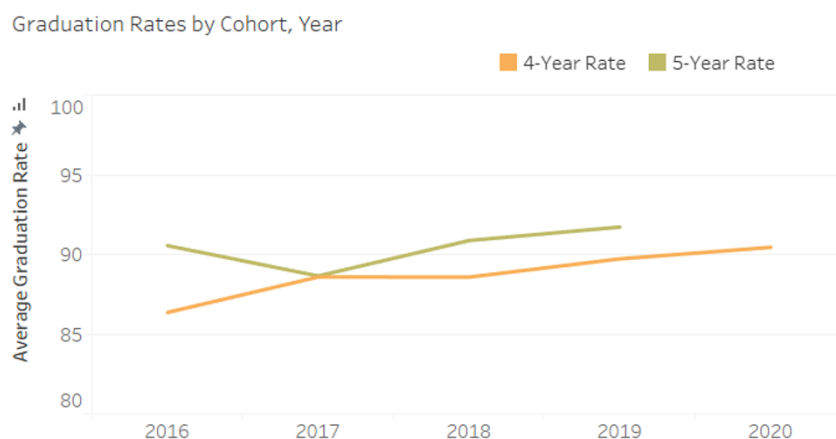

Fig 4: Graduation Rates for 4-Year and 5-Year Cohorts, 2016-2020.

Accumulating all of the above metrics into a final dashboard, there does not appear to be any significant change in the education when comparing previous school years to the 2019-2020 COVID-19 impacted school year.
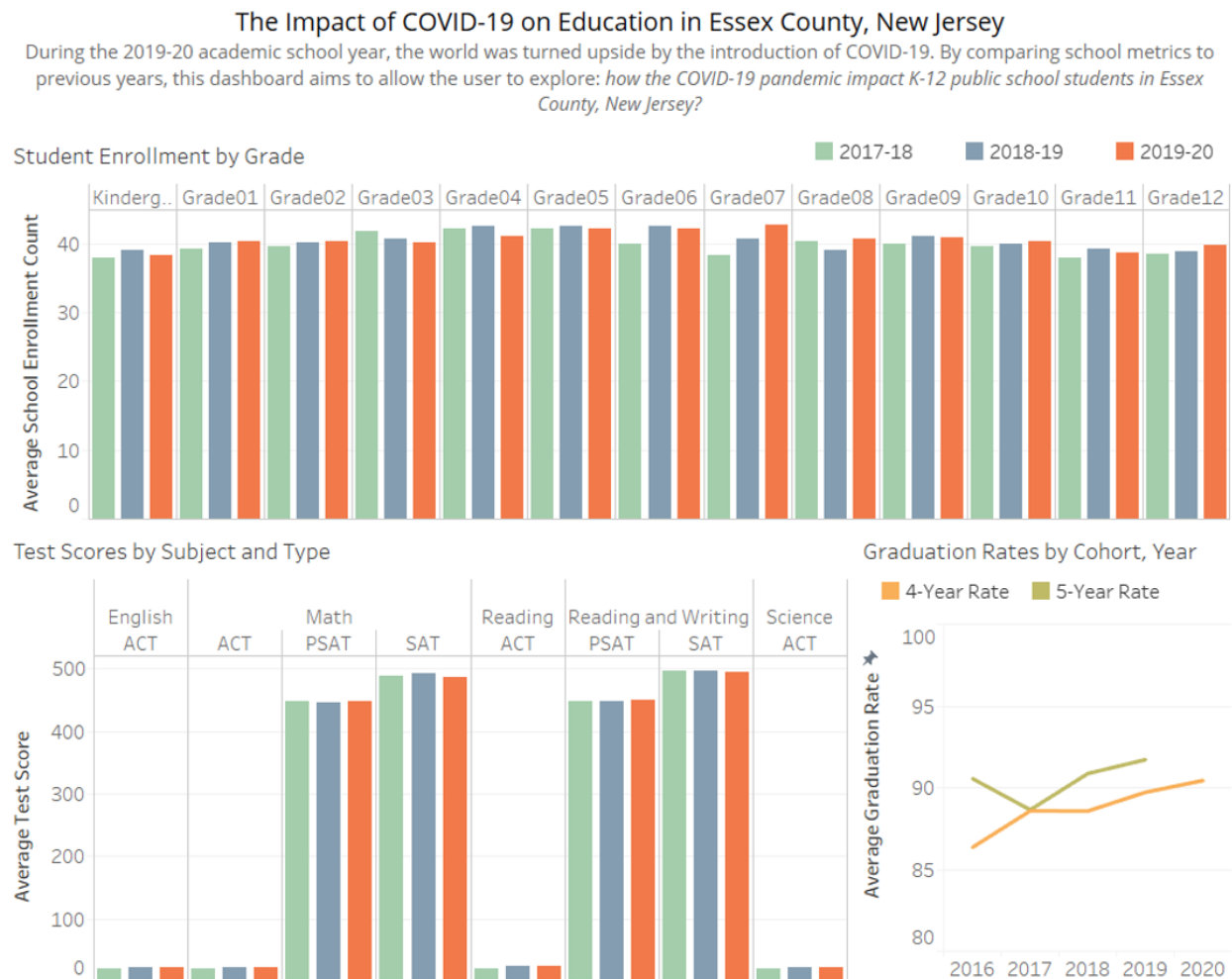

Figure 5: Final Dashboard, 'Impact of COVID-19 on Education in Essex County, New Jersey' that is published on Tableau Public: *https://public.tableau.com/views/TheImpactofCOVID-19onEducationinEssexCountyNewJersey*

Discussion/Implications

The analysis that I performed above is significant because it is important for educators and education policymakers to understand the impacts of school closures, to help them with better decision making in the future. This also helps guide educators and education policy makers to understand what efforts will be needed in order to help students reach their benchmarks after a leave of absence, such as more assistance and tutoring fors specific subjects or investment in helping student graduation.

Although I was not able to find any significant results in the impact of COVID-19 on education, when comparing the 2019-2020 school year to previous years, the analysis that I performed can be applied in the future, as more data becomes available. Incorporating the 2020-2021 and future academic years into my dashboard would allow users to investigate the long term impacts of school closures and pandemics.

Limitations

There were many potential issues and limitations to the dataset that I used. Due to the COVID-19 pandemic, there were cancellations of several tests and changes in testing requirements. Unfortunately, this was not well documented and varied significantly between schools. Another known issue in the dataset is delays in graduation and changes in graduation requirements due to COVID-19. This is also not well documented, and varies greatly between school, and individuals. Overall, schools administered different policies when it came to how they handled the pandemic, and it is difficult to take into account these variances when aggregating to an average level for the county.

Ideally this analysis would contain data from the 2020-2021 school year and beyond, to review how COVID-19 continues to impact education. Currently, the only data publicly available goes up to the 2019-2020 school year. Another limitation to the data is this only reviews the public school data, as private and homeschooled students do not have their data so easily available.

Conclusion

The purpose of this analysis is to review how the COVID-19 pandemic impacted K-12 public school students in Essex County, New Jersey. To measure the impact of COVID-19 on the county level, I reviewed the historical data for school enrollment, test scores, and graduation rates. Overall, I did not find any significant differences in the overall changes in these metrics. As the only data currently available is up to the 2019-2020 school year, it is likely that the effects of COVID-19 are not yet shown. It is important to further this analysis as more data becomes available, to continue to monitor the long term effects of COVID-19 on education. Knowing how the closures of schools and the overall introduction of a pandemic impacts students, assists in making decisions about how to assist current students and what to do in the future if similar events occur.

References

2021 building a grad nation report. America's Promise. (n.d.). Retrieved December 10, 2021, from https://www.americaspromise.org/report/2021-building-grad-nation-report.

Centers for Disease Control and Prevention. (n.d.). *U.S. state and territorial public mask mandates from April 10, 2020 through August 15, 2021 by County by day*. Centers for Disease Control and Prevention. Retrieved December 10, 2021, from https://data.cdc.gov/Policy-Surveillance/U-S-State-and-Territorial-Public-Mask-Mandates-Fro/62d6-pm5i.

Chatterji, P., & Li, Y. (2021, May 7). *Effects of covid-19 on school enrollment*. Economics of Education Review. Retrieved December 10, 2021, from https://www.sciencedirect.com/science/article/pii/S0272775721000479.

Kuhfeld, M., Soland, J., Tarasawa, B., Johnson, A., Ruzek, E., & Lewis, K. (2020, December 3). *How is covid-19 affecting student learning?* Brookings. Retrieved December 10, 2021, from https://www.brookings.edu/blog/brown-center-chalkboard/2020/12/03/how-is-covid-19-affecting-student-learning/.

School responses in New Jersey to the coronavirus (COVID-19) pandemic. Ballotpedia. (n.d.). Retrieved December 10, 2021, from https://ballotpedia.org/School_responses_in_New_Jersey_to_the_coronavirus_(COVID-19)_pandemic#Timeline_by_school_year.

Data Sources

- Mask-Wearing Survey Data by Josh Katz, Margot Sanger-Katz and Kevin Quealy: https://github.com/nytimes/covid-19-data/tree/master/mask-use.
- New Jersey State School Performance Report: https://rc.doe.state.nj.us/
- U.S. State and Territorial Public Mask Mandates From April 10, 2020 through August 15, 2021 by County by Day: https://data.cdc.gov/Policy-Surveillance/U-S-State-and-Territorial-Public-Mask-Mandates-Fro/62d6-pm5i
- COVID-19 data from John Hopkins University: https://www.kaggle.com/antgoldbloom/covid19-data-from-john-hopkins-university