The Impact of Race/Ethnicity on COVID-19 Infection and Death Rates at the State and Local Level

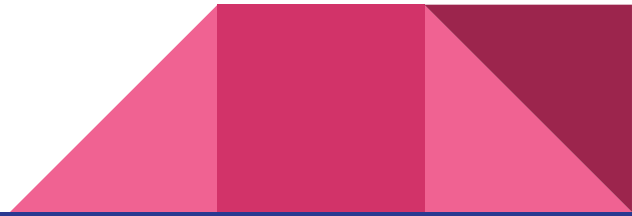
Zac Cheatle, Jiuhe (Rosa) Zhu, Jose Diaz, Daniel Karpowicz, Elaine Cheung

Research Questions

1. What impact did race/ethnicity have on COVID infection and death rates in Illinois?

2. What impact did race/ethnicity have on COVID infection and death rates in Chicago?

3. Illinois vs. Chicago Comparison



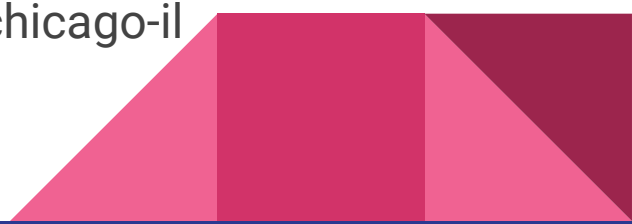
Datasets Used

1. COVID Tracking Project API (Illinois COVID Data): https://covidtracking.com/data/api2.Chicago

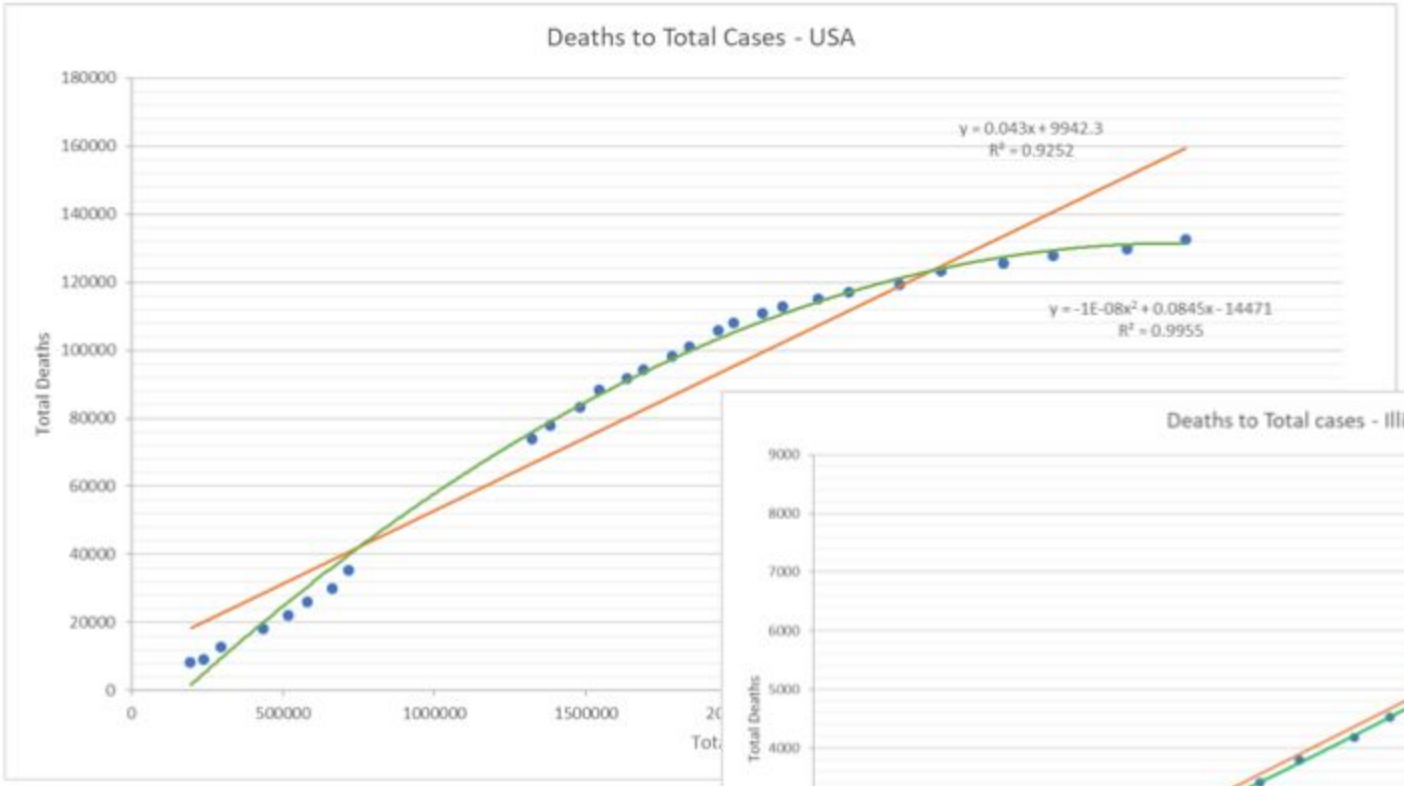
2. Illinois Census Data: https://datausa.io/profile/geo/illinois

3. Chicago COVID Data: https://data.cityofchicago.org/Health-Human-Services/COVID-19-Daily-Cases-and-Deaths/naz8-j4nc

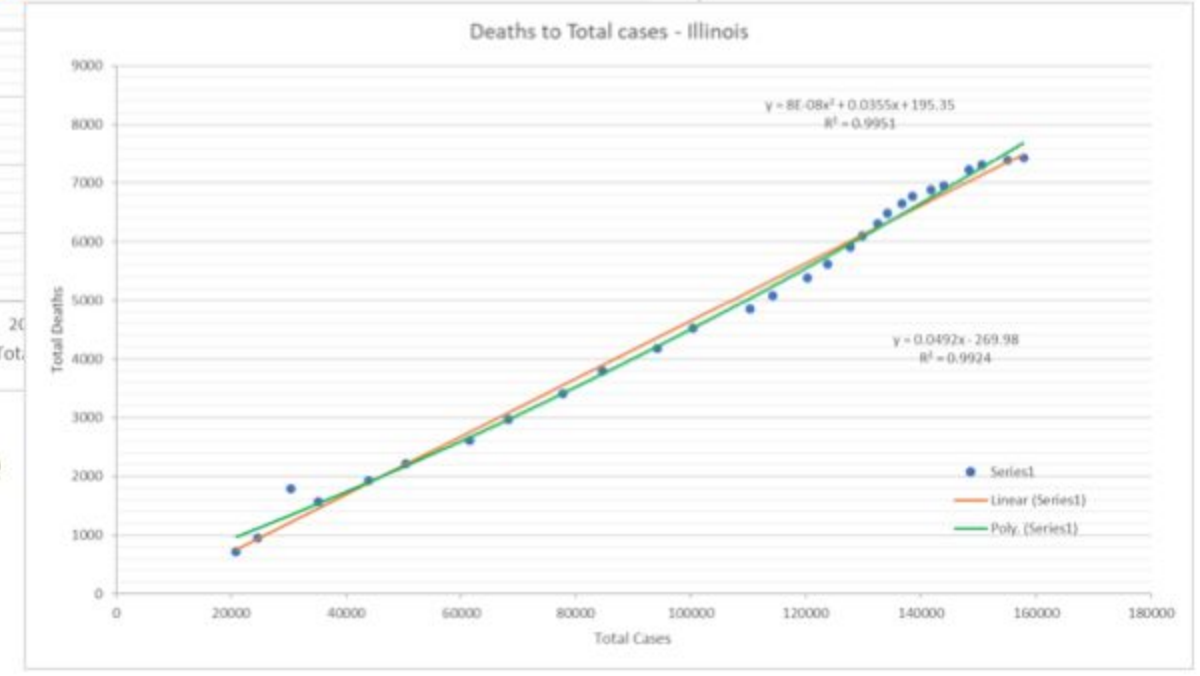
4. Chicago Census Data: https://datausa.io/profile/geo/chicago-il



Illinois COVID-19 Infection and Death Rates by Race/Ethnicity



Illinois follows a different behavior than USA. **Deaths are growing faster in Illinois**



Poly-line describes better the behavior of the real data

$R^2 = 0.9955$

Impact of race/ethnicity on the number of COVID-19 infection and death rates
State of Illinois

Main findings – Tendencies, correlation and behavior

Each race tells a different story on COVID-19 infection and death rates.

WHITES:

.- % of cases were decreasing but suddenly began to rise – average: 21.3%
.- % of deaths is growing faster –from 1.2% to 2.2%

BLACKS:

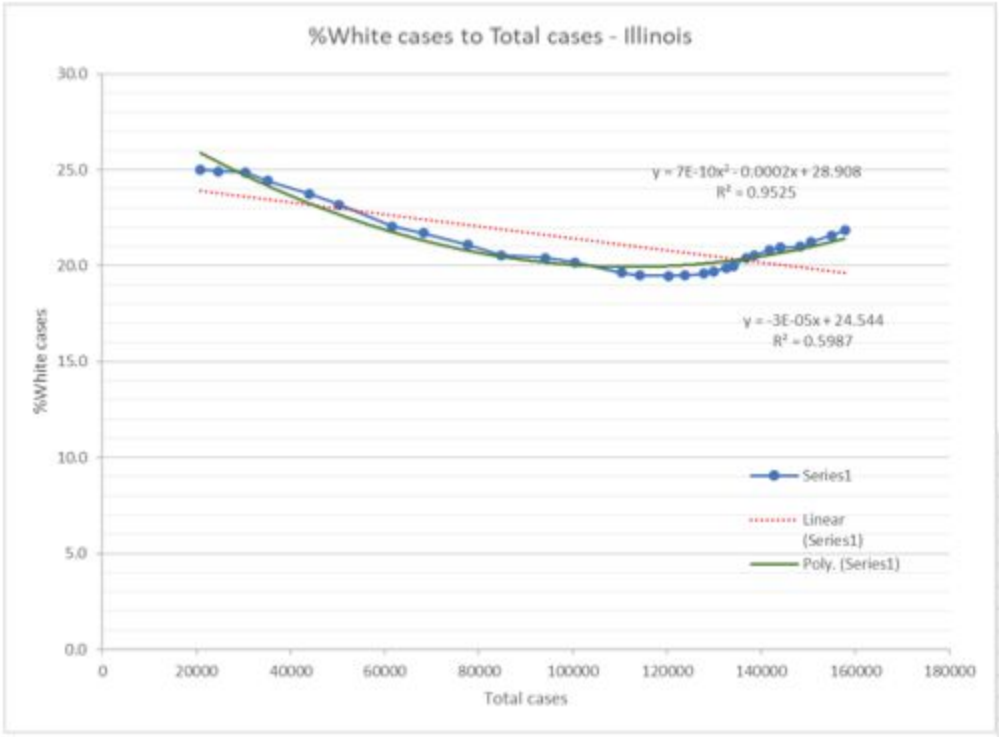
.- % of cases is decreasing and seems to stabilize – average: 18.7%
.- % of deaths are stabilizing – average: 1.4%

LATIN:

.- % of cases are growing – **from 12.1% to 32.6%**
.- % of deaths are growing – from 0.3% to 1%

ASIAN:

.- % of cases are decreasing – from 3.3% to 2.8%
.- % of deaths are stable – average: 0.2%



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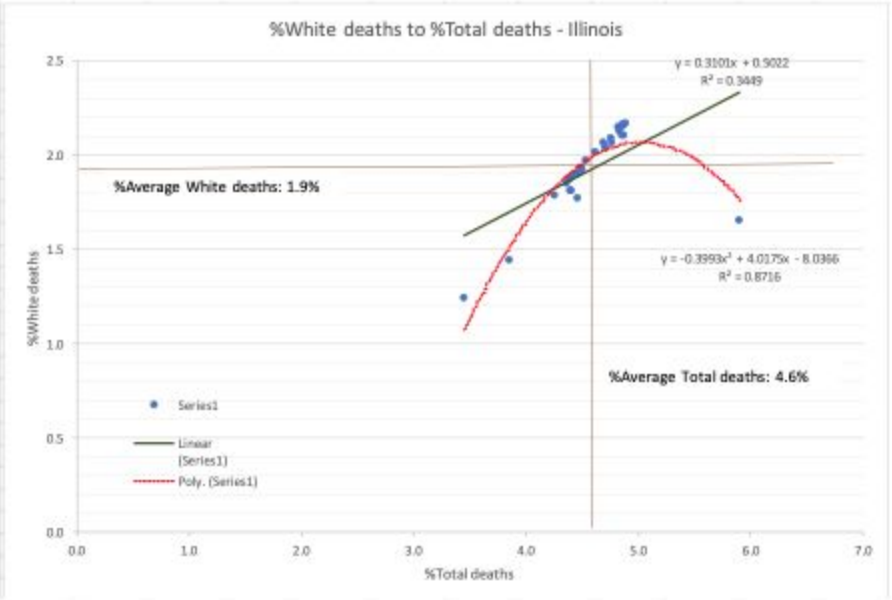

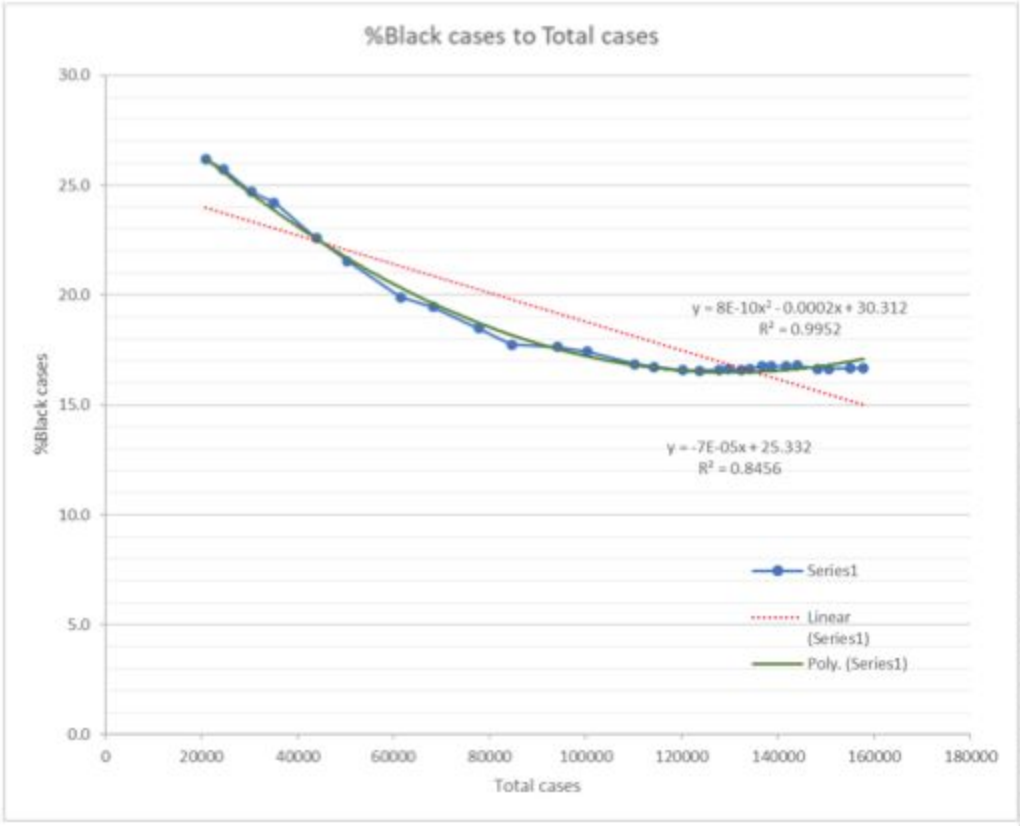

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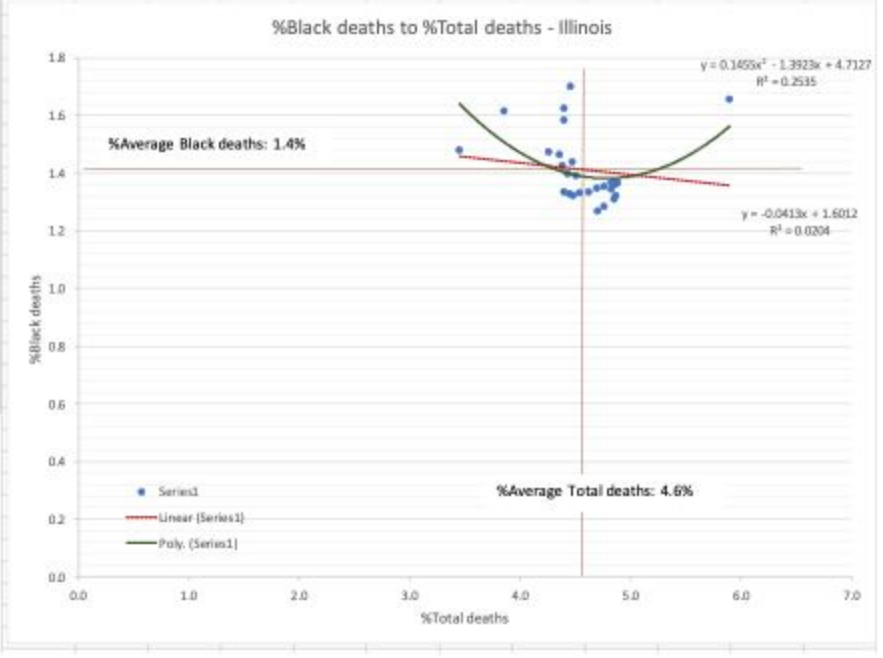
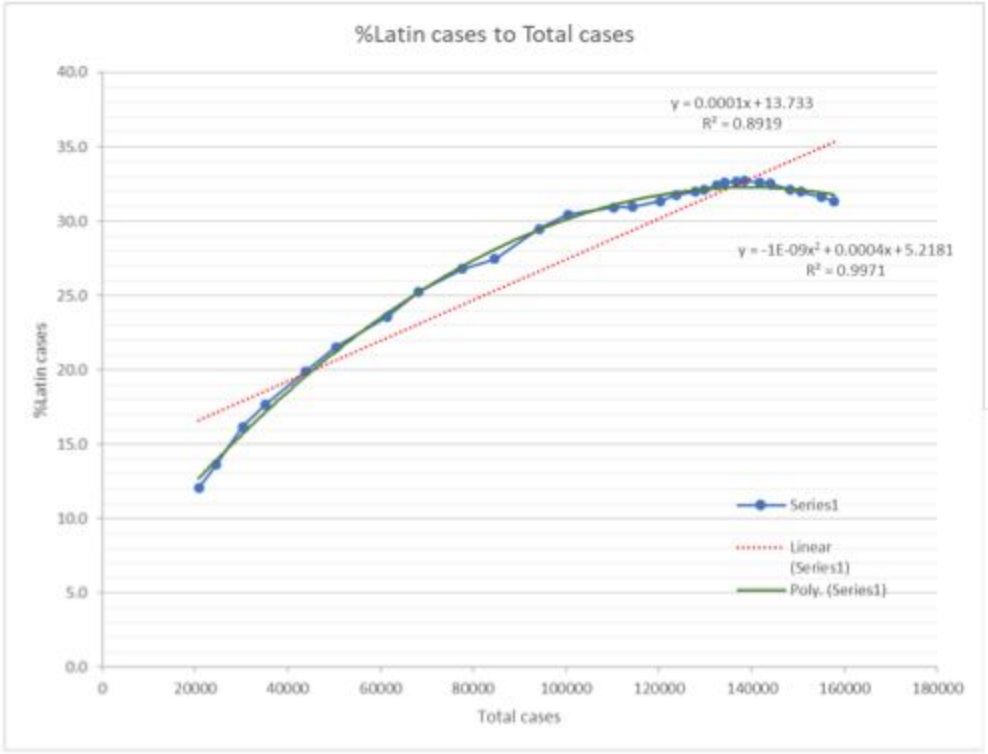
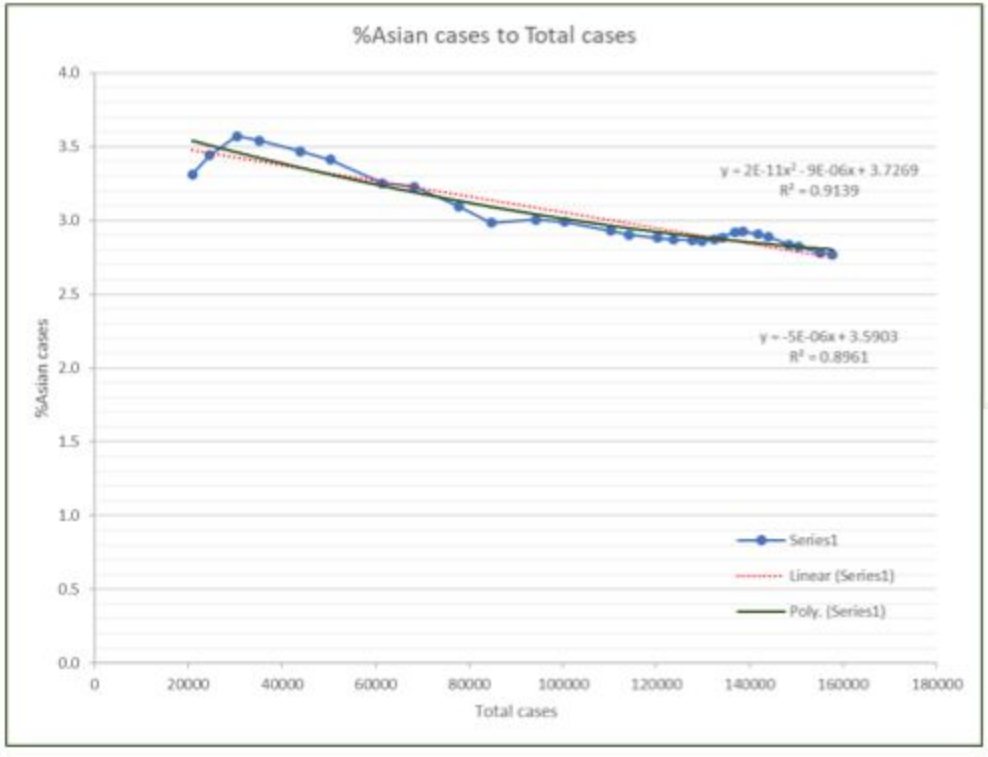




LATIN:

.- % of cases are growing – **from 12.1% to 32.6%**
.- % of deaths are growing – from 0.3% to 1%



ASIAN:

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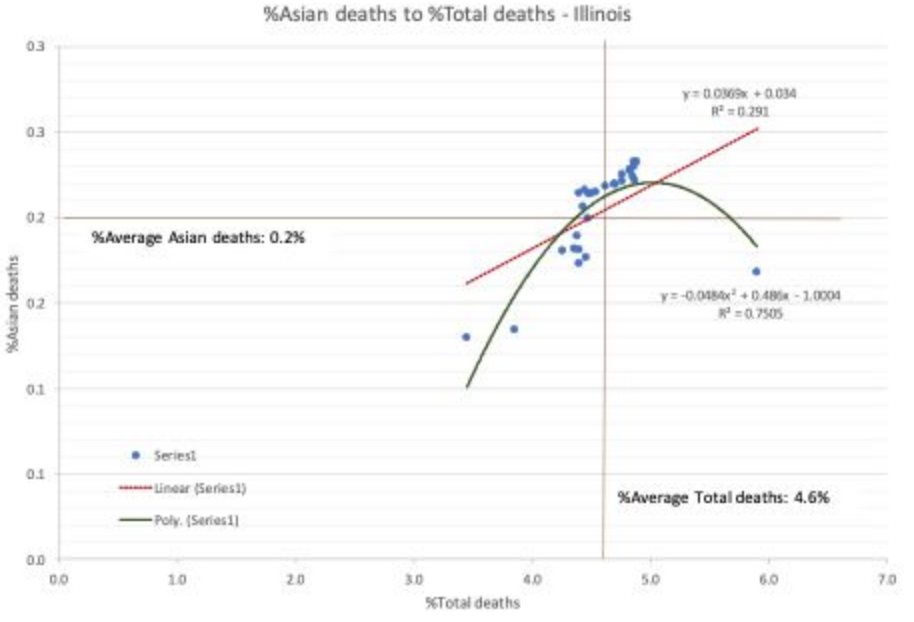
.- % of deaths are stable – average: 0.2%

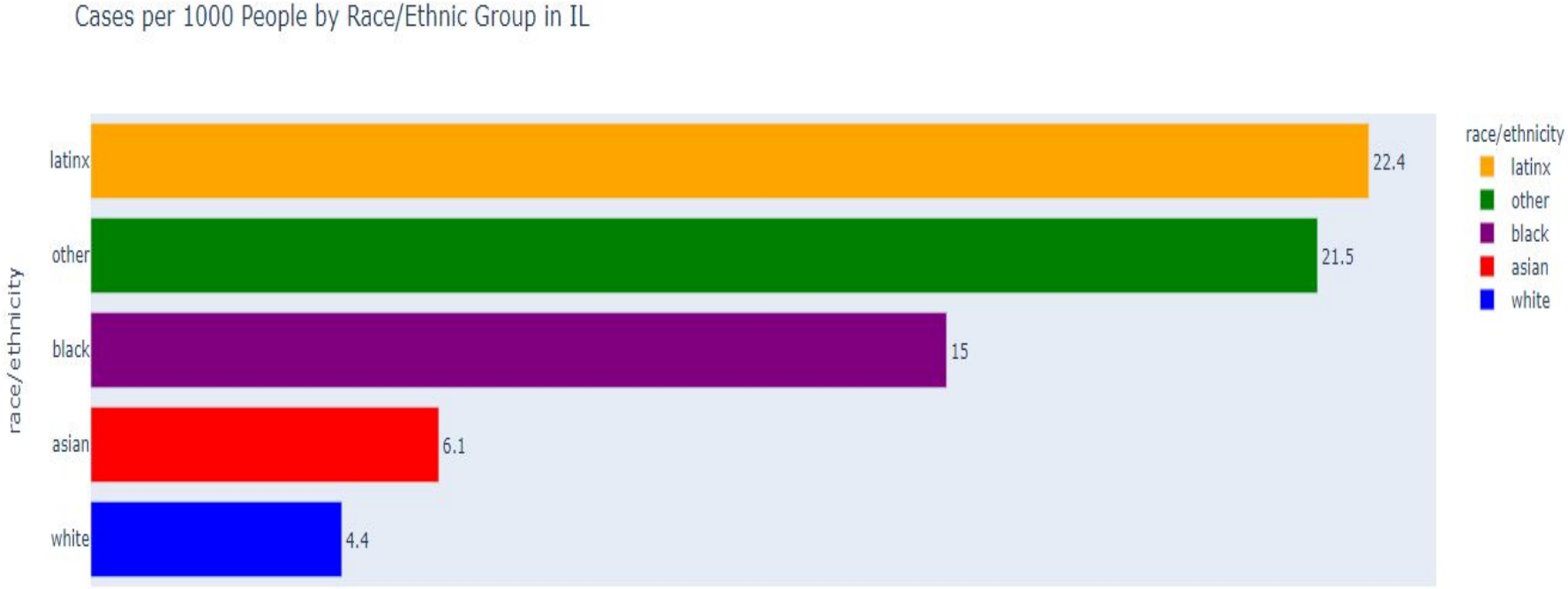


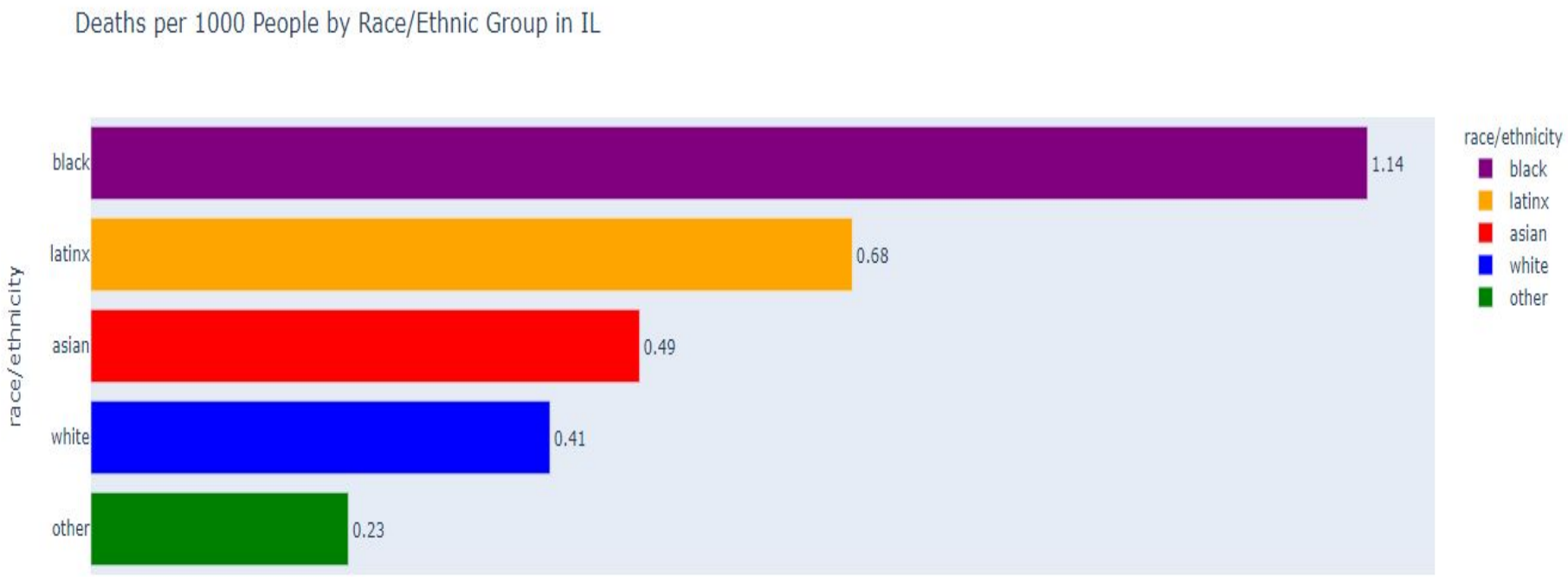
More Analysis

Merged Illinois COVID-19 tracking dataset with Illinois Census data to determine the rates of COVID-19 infection and death by race/ethnicity relative to the race/ethnicity breakdown of the population

a. Population by Race/Ethnic Category in Illinois
b. Cases per 1000 people in Race/Ethnic Category in Illinois
c. Deaths per 1000 people in Race/Ethnic Category in Illinois


Population by Race/Ethnic Group in IL
race/ethnicity
white
latinx
black
asian
other
7.8M
2.2M
1.8M
710k
300k
race/ethnicity
white
latinx
black
asian
other


Cases per 1000 People by Race/Ethnic Group in IL
race/ethnicity
latinx
other
black
asian
white
22.4
21.5
15
6.1
4.4
race/ethnicity
latinx
other
black
asian
white


Deaths per 1000 People by Race/Ethnic Group in IL
race/ethnicity
black
latinx
asian
white
other
1.14
0.68
0.49
0.41
0.23
race/ethnicity
black
latinx
asian
white
other

Chicago COVID-19 Infection and Death Rates by Race/Ethnicity

Data Exploration and Cleanup Process

Data Retrieval

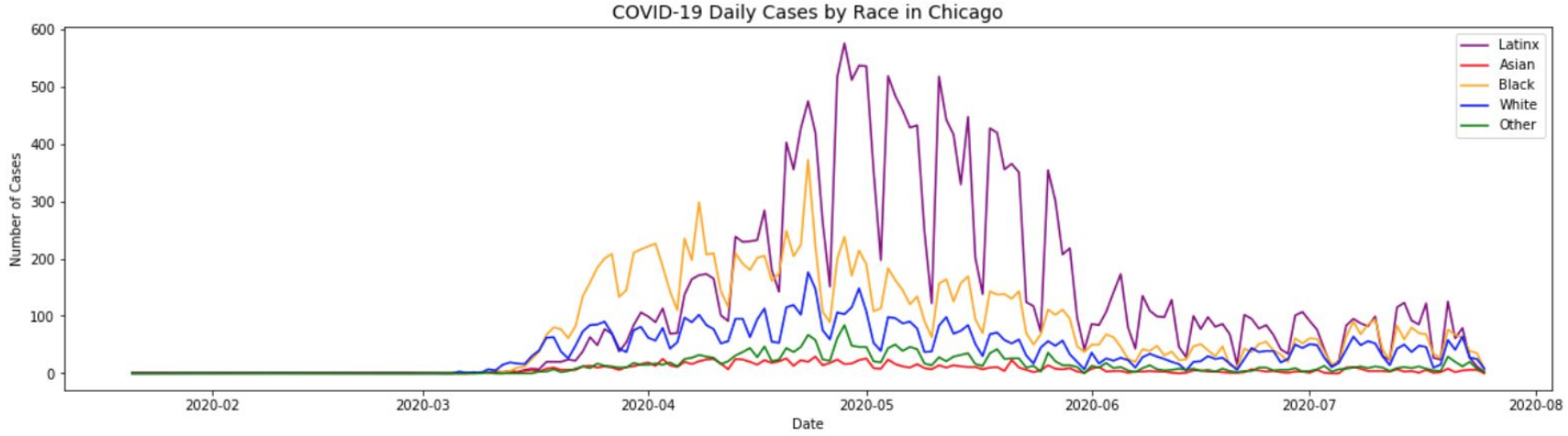
- Retrieved the data from **COVID-19 Daily Cases and Deaths** through Soda API and saved the dataset into “covid_chicago.csv” file
- Created data frames by extracting corresponding columns from covid_chicago.csv

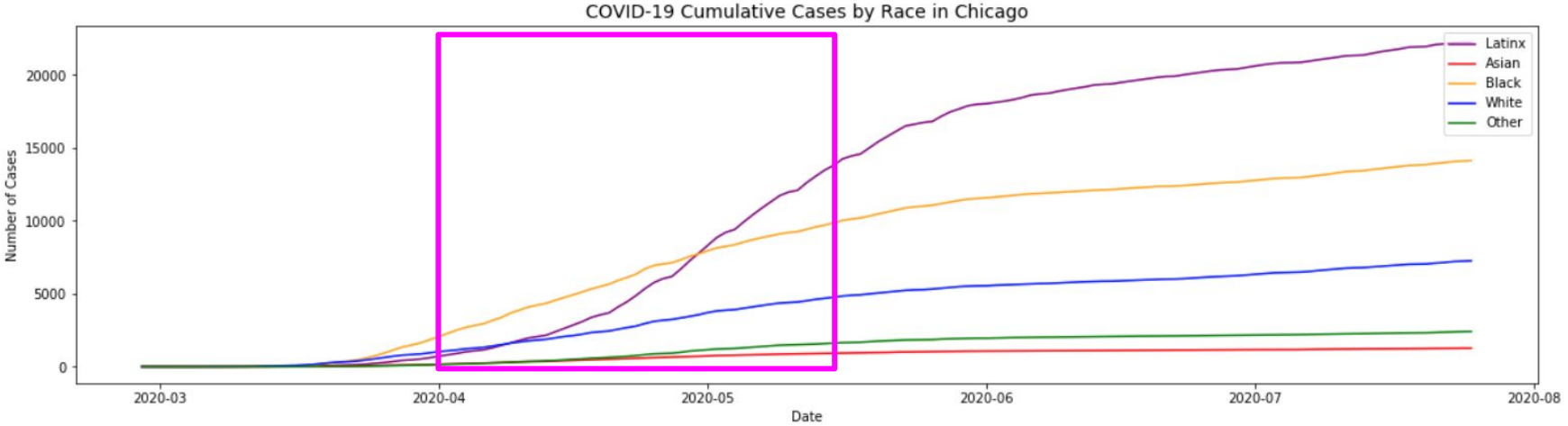
Data Cleaning

- Dropped rows containing any empty cells

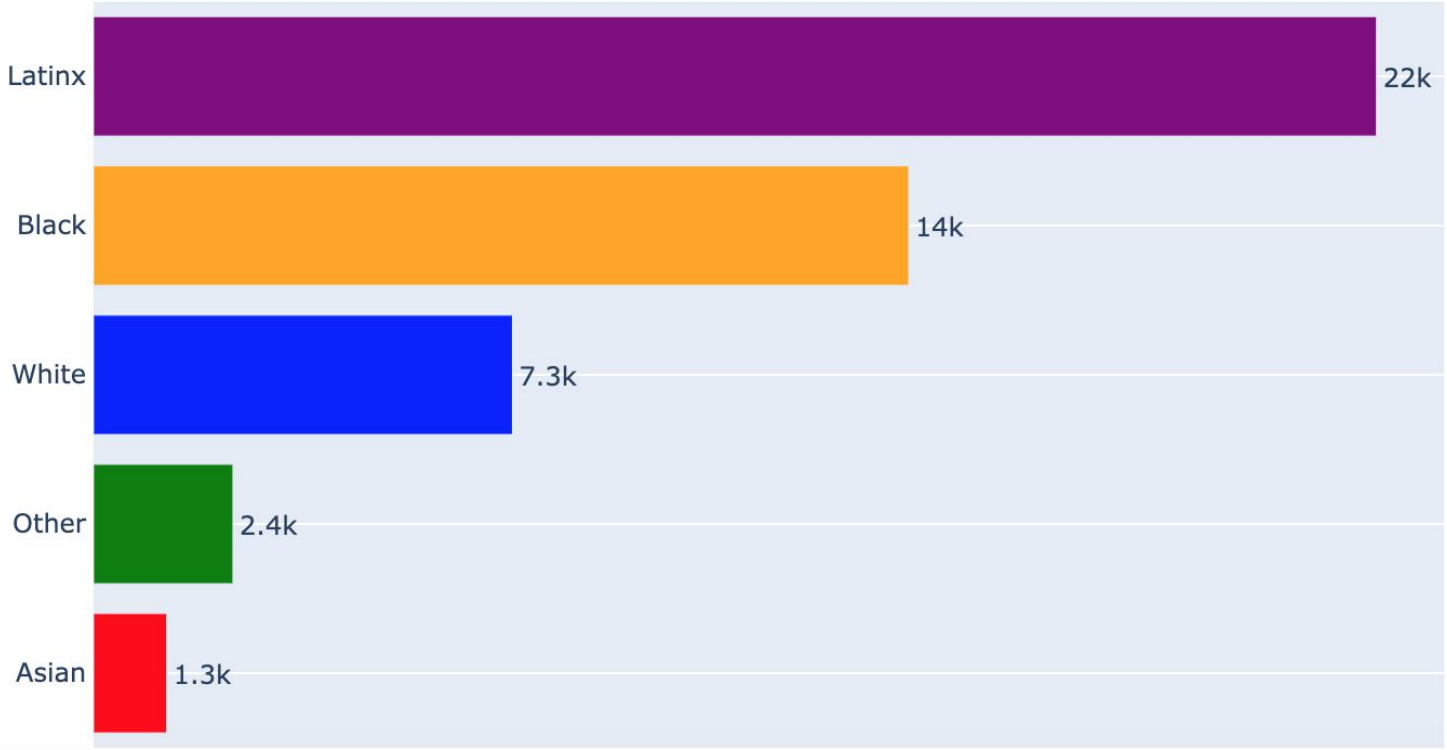
Data Formatting

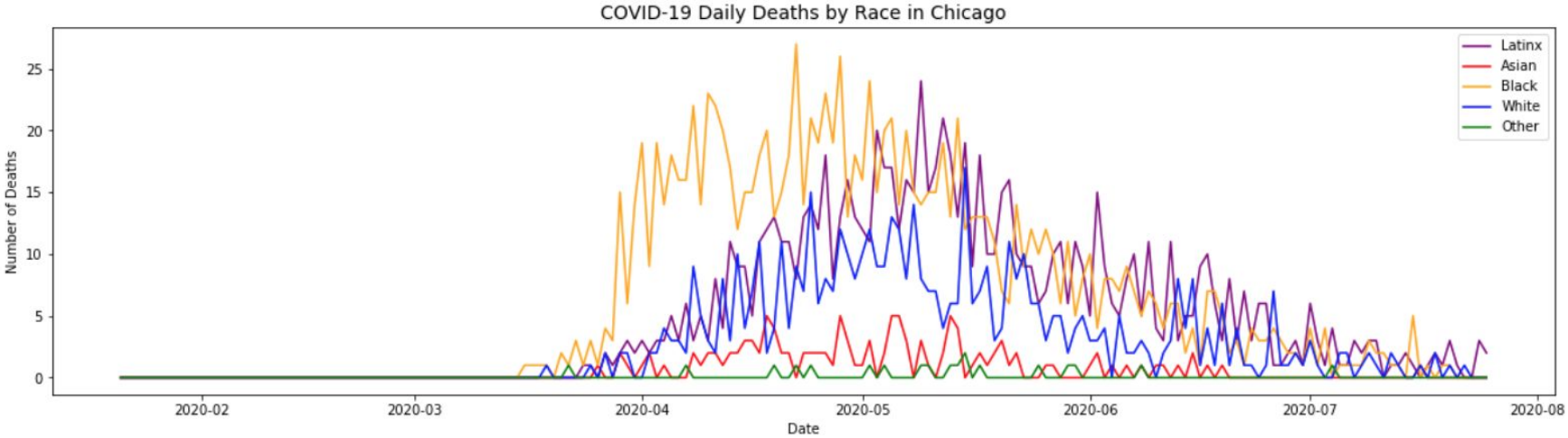
- Changed data type from **str** to **int**
- Removed **time** from **date&time** variable

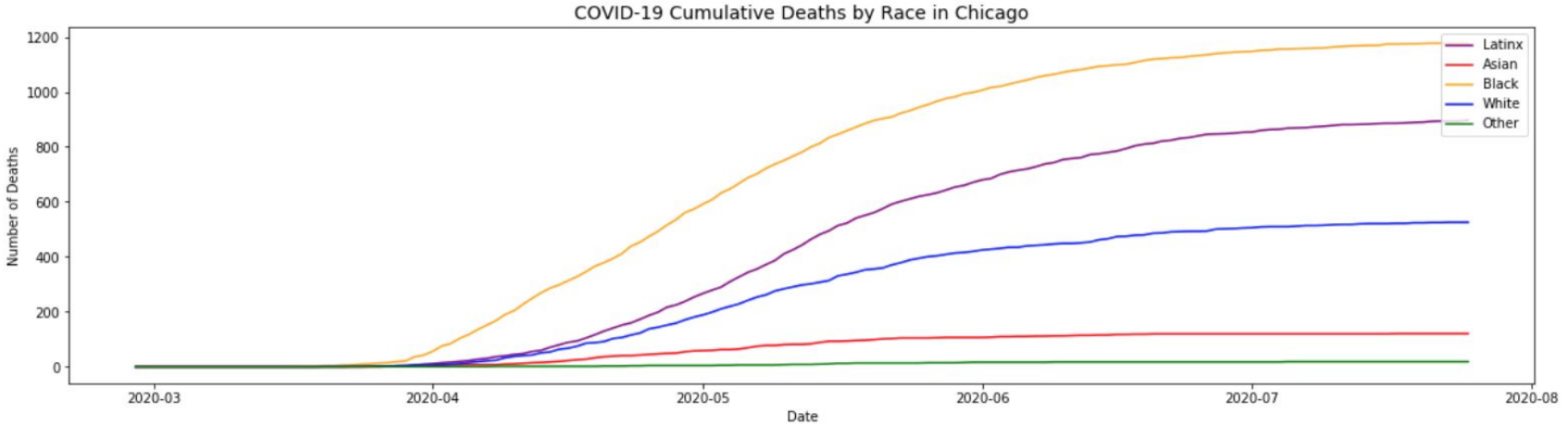

COVID-19 Daily Cases by Race in Chicago
Number of Cases
Date
Latinx
Asian
Black
White
Other
0
100
200
300
400
500
600
2020-02
2020-03
2020-04
2020-05
2020-06
2020-07
2020-08


COVID-19 Cumulative Cases by Race in Chicago
Number of Cases
Date
Latinx
Asian
Black
White
Other
0
5000
10000
15000
20000
2020-03
2020-04
2020-05
2020-06
2020-07
2020-08

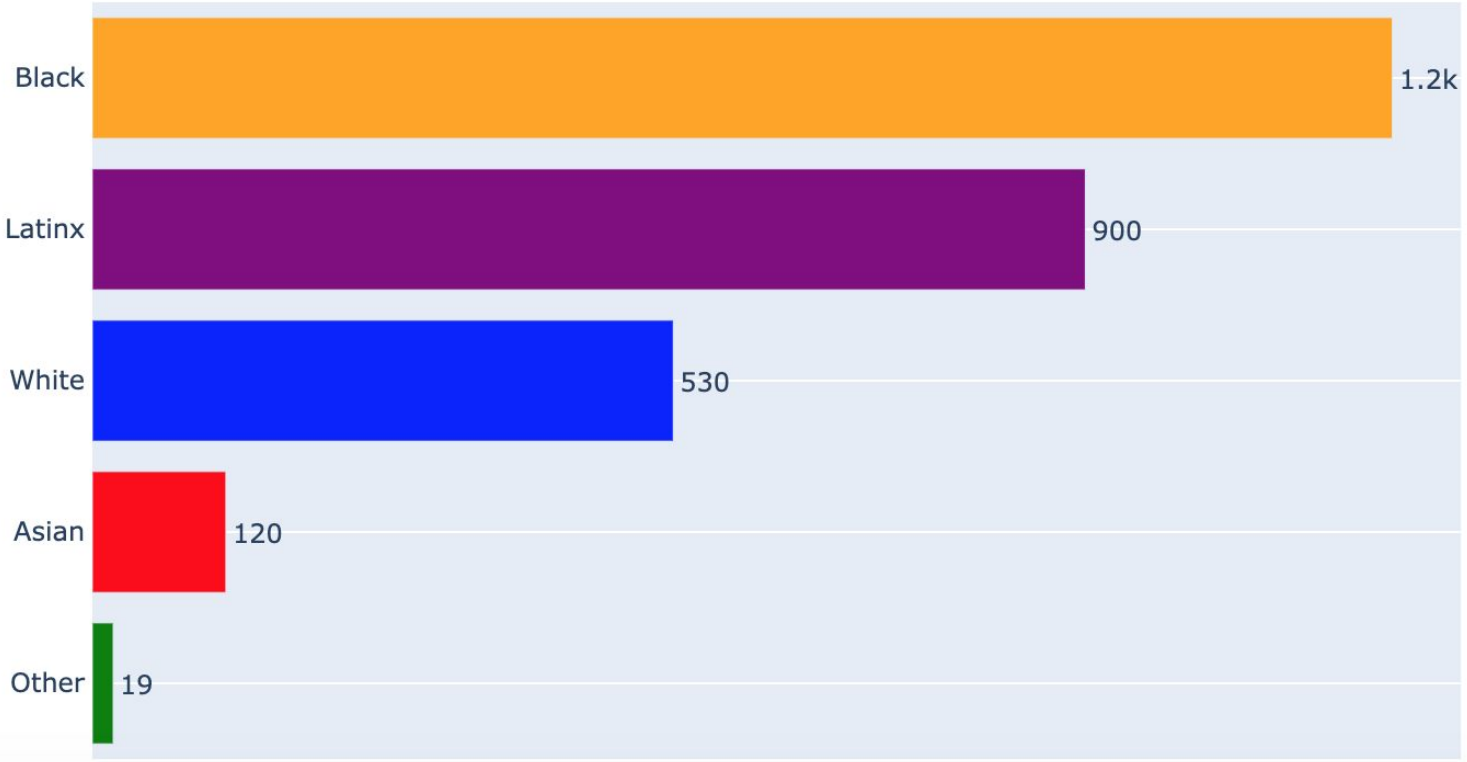
COVID-19 Cases by Race in Chicago




COVID-19 Daily Deaths by Race in Chicago
Number of Deaths
Date
Latinx
Asian
Black
White
Other
0
5
10
15
20
25
2020-02
2020-03
2020-04
2020-05
2020-06
2020-07
2020-08


COVID-19 Cumulative Deaths by Race in Chicago
Number of Deaths
Date
Latinx
Asian
Black
White
Other
0
200
400
600
800
1000
1200
2020-03
2020-04
2020-05
2020-06
2020-07
2020-08

COVID-19 Deaths by Race in Chicago



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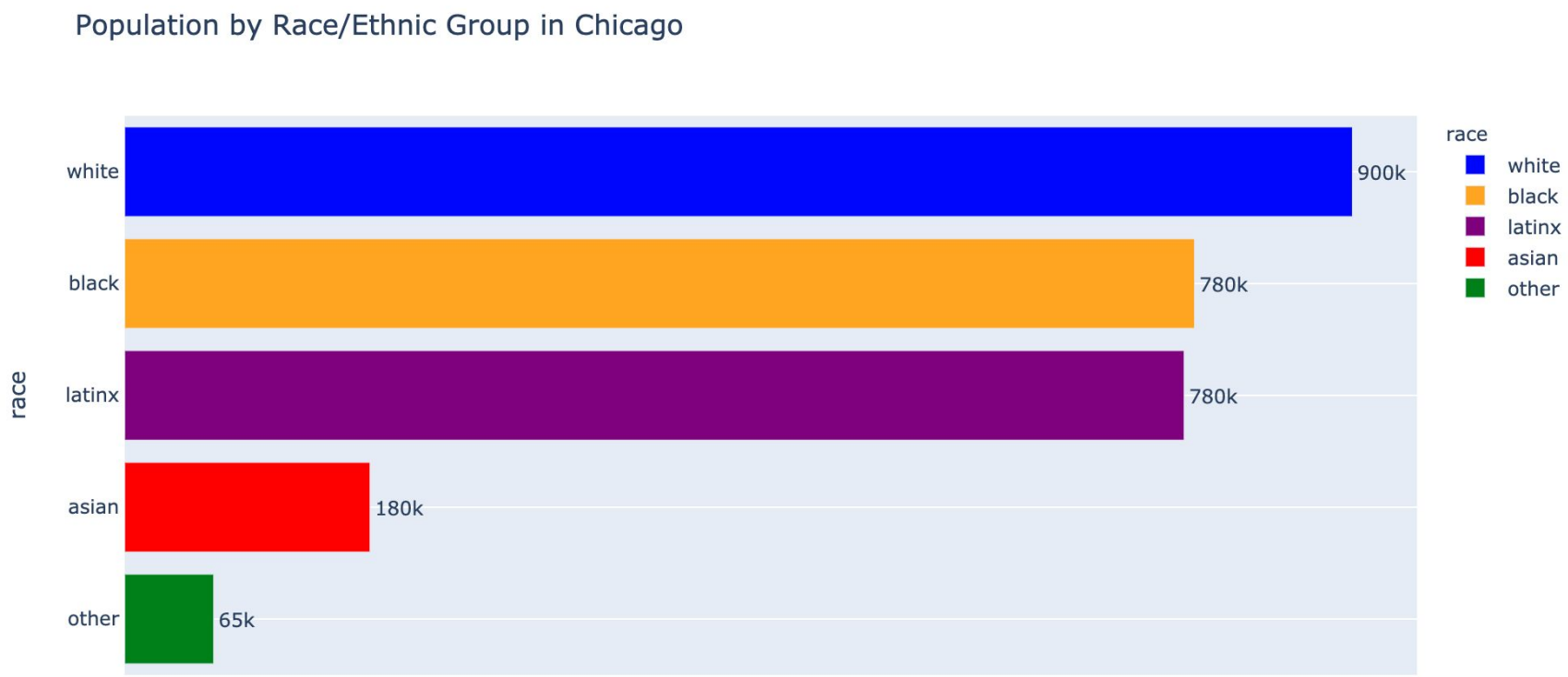
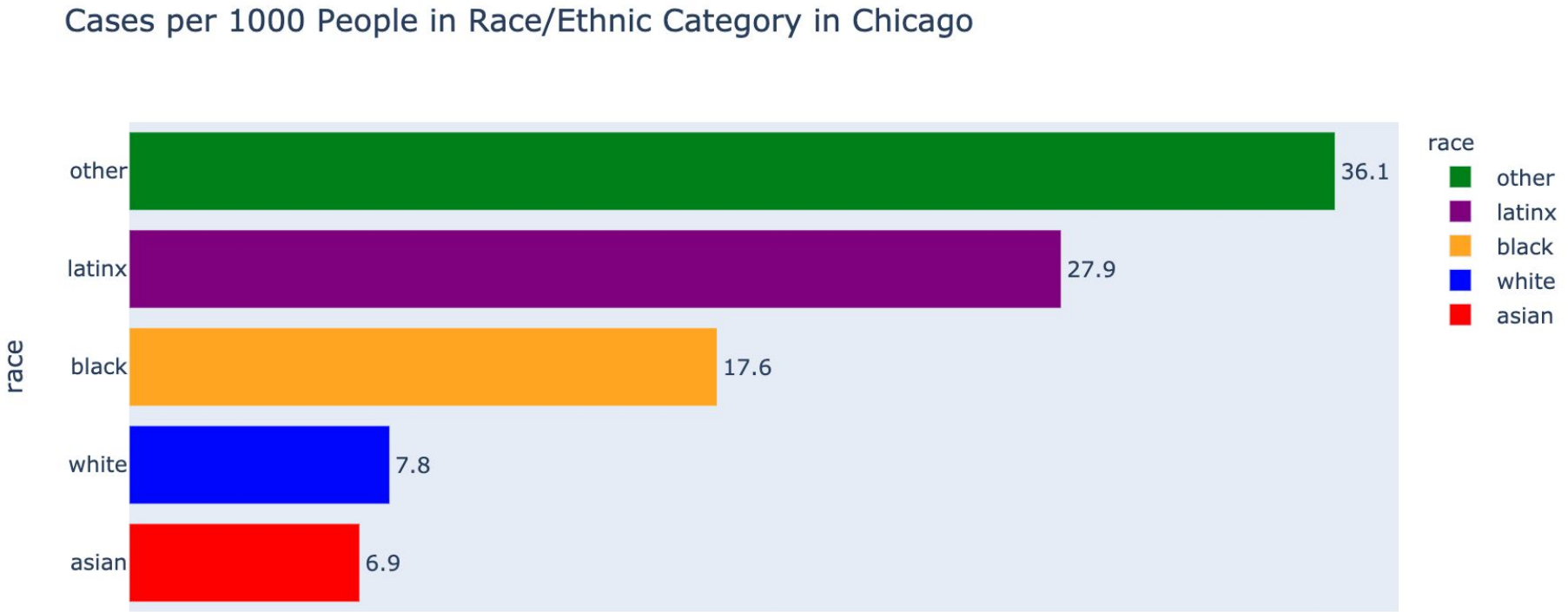
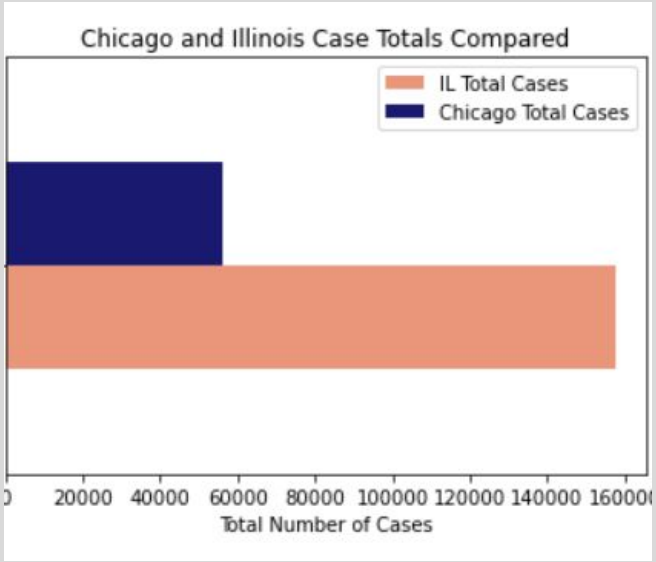

Population by Race/Ethnic Group in Chicago
race
white
black
latinx
asian
other
900k
780k
780k
180k
65k
race
white
black
latinx
asian
other

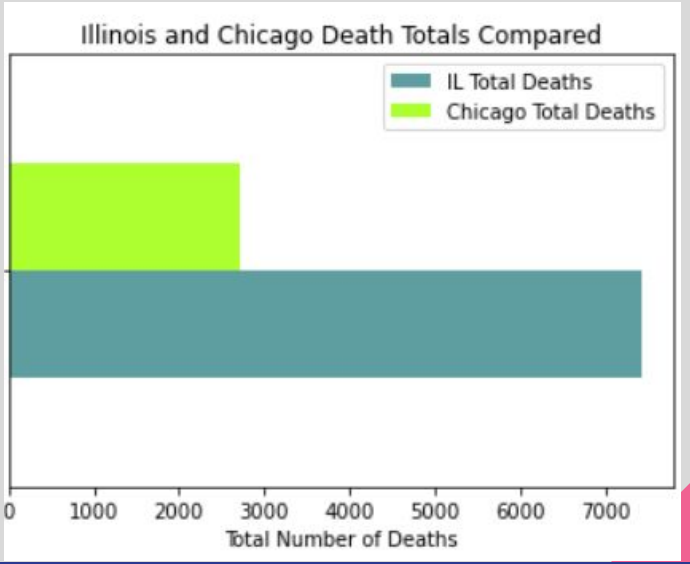

Cases per 1000 People in Race/Ethnic Category in Chicago
race
other
latinx
black
white
asian
36.1
27.9
17.6
7.8
6.9
race
other
latinx
black
white
asian

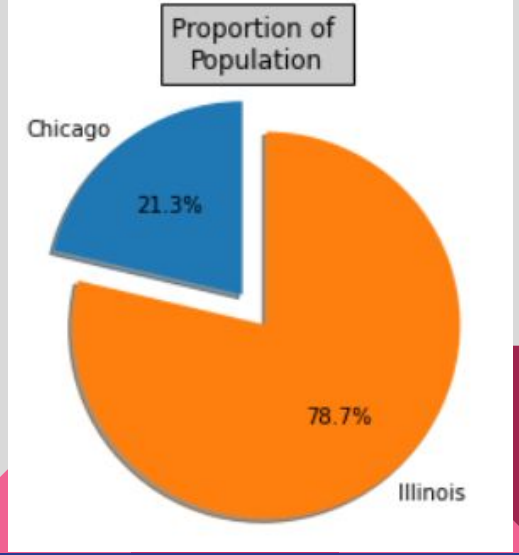

Deaths per 1000 People in Race/Ethnic Category in Chicago
race
black
latinx
asian
white
other
1.5
1.14
0.67
0.58
0.31
race
black
latinx
asian
white
other

State vs. City: Population Dynamics

- **Major Takeaway:** Despite only constituting 21.3% of the Illinois population, Chicago represented 35.7% of total cases and 36.6% of total deaths in Illinois.
- Discussion:
  - Do urban centers create environments more conducive to the spread of the virus?
    - Is it that urban centers are less prepared as suggested by KFF Health Tracker System (ref: https://www.healthsystemtracker.org/brief/urban-and-rural-differences-in-coronavirus-pandemic-preparedness/)

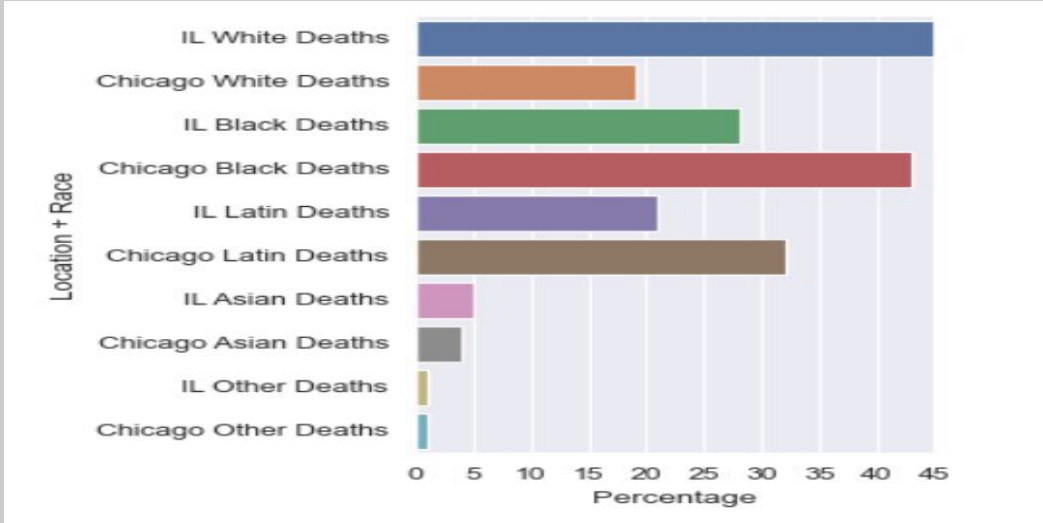


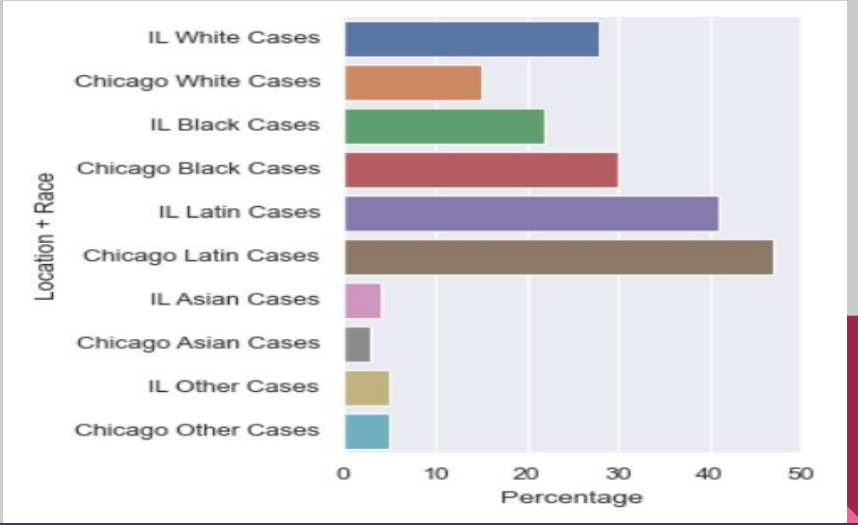




State vs. City: Racial Disparities

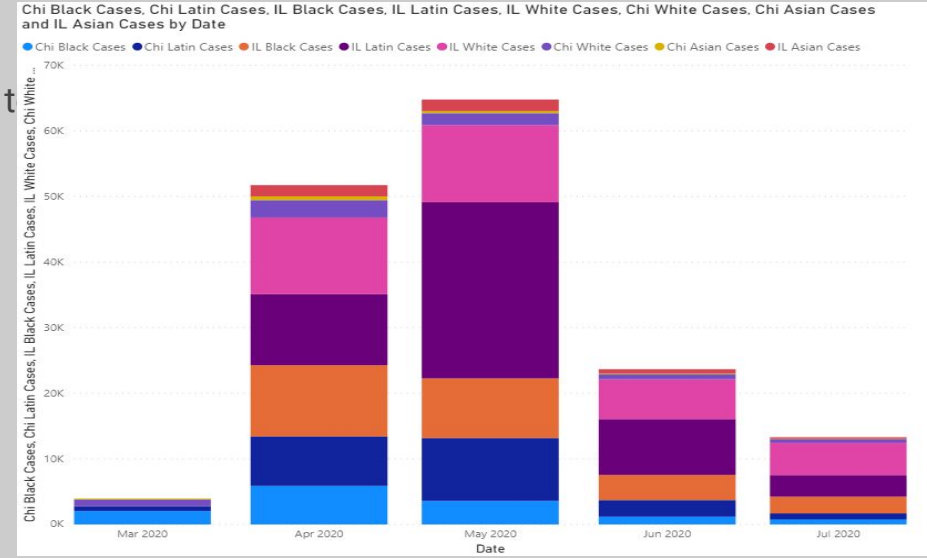
- **Major Takeaway:** Racial disparities are amplified in urban centers. This is made clearer when comparing against the state data and visualizations. For instance, black residents of Chicago represented 43% of the city's COVID19 deaths despite only constituting 30% of the city's population. We do not see a similar effect on the state level.
- Discussion:
  - Is this related to the acknowledged disparity between health facilities and outcomes for various racial groups in the city? (ref: https://today.uic.edu/new-report-details-chicagos-racial-ethnic-disparities)
    - How does a public health crisis like COVID19 help us identify and address pre existing disparities?



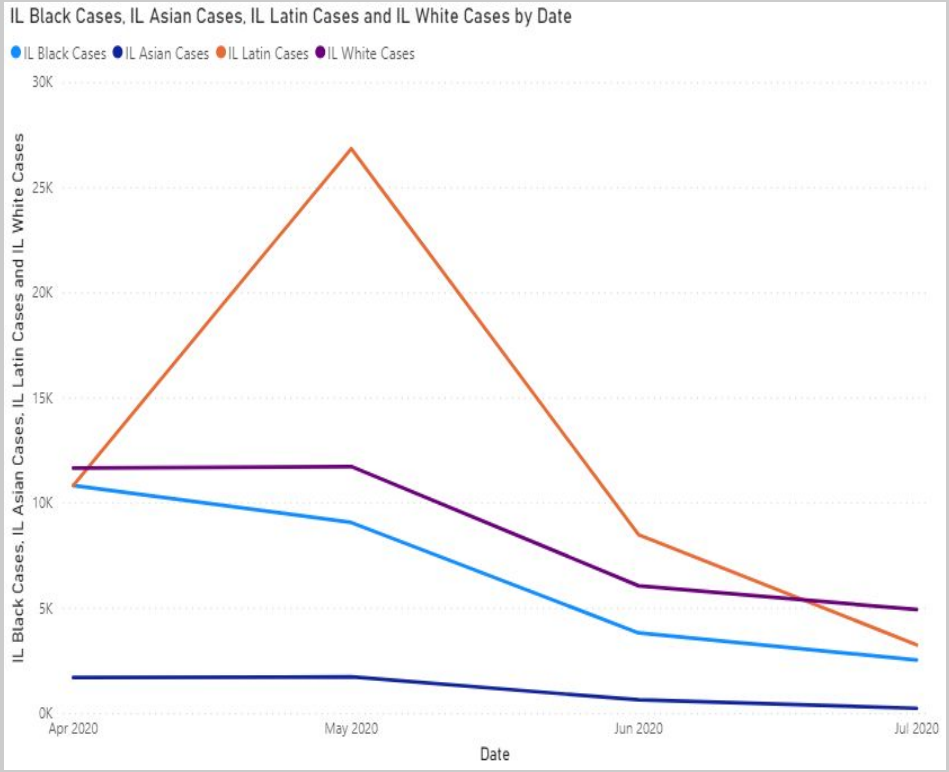


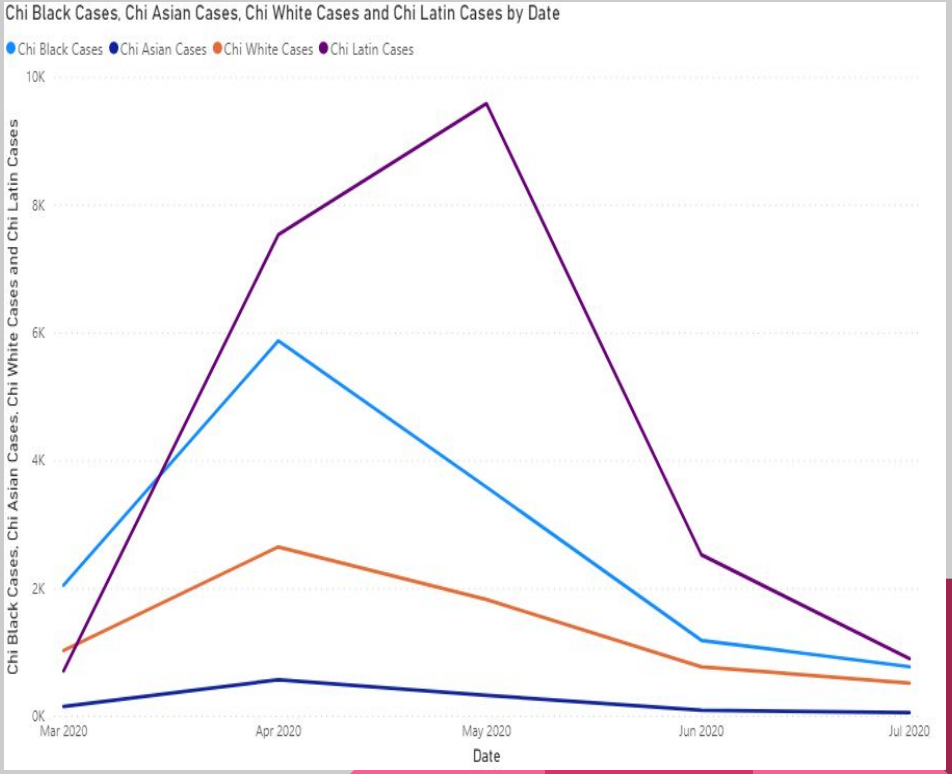
State vs. City: Case Trends

- **Major Takeaway:** The Latin community experienced significant spikes in COVID19 cases from the outset for both Chicago and Illinois data sets. Also, it is interesting t note that the spike we see in Chicago Black cases is not reflected in the Illinois data set.
- Discussion:
  - In general, the trend lines suggest that our efforts are indeed flattening the curve in terms of case numbers. However, many fear that we may see a resurgence in cases and the data from John Hopkins (ref: https://coronavirus.jhu.edu/data/new-cases-50-states) suggests Illinois along with many other states are beginning to see that resurgence manifest in data.



State vs. City: Additional Visualizations





IN SUMMATION

- Urban centers have a disproportionate impact on COVID19 Cases and Deaths.
  - For a variety of reasons, the virus appears to impact Chicago more heavily than Illinois.

- Racial disparities are amplified in urban centers.
  - In particular, the Black and Latin communities here in Chicago have suffered a considerably greater impact than the city White population.

- The trend lines for Chicago and Illinois suggest we have been somewhat successful in terms of flattening the curve. However, only by consistently monitoring and modeling the data, we can make informed policy decisions related to COVID19 at state and local levels.

- COVID19 data is still quite novel and rife with potential discoveries. Government officials and policymakers would do right to carefully consider the data from the fallout of this health crisis to positively impact future health and development planning throughout the United States.

THANK YOU!