



# **COVID in Chelsea**

## **Results of the Analysis of Positive Cases March-August 2020**

**Presented and prepared by:  
Cristina Alonso and Patrice Basada  
October 13, 2020**

**Goal: To conduct health equity analysis to understand the impact of COVID19 in Chelsea, MA.**

- **Total number of cases: 3302**
- **Weeks 11-32 of the calendar year (March 9-August 3, 2020)**

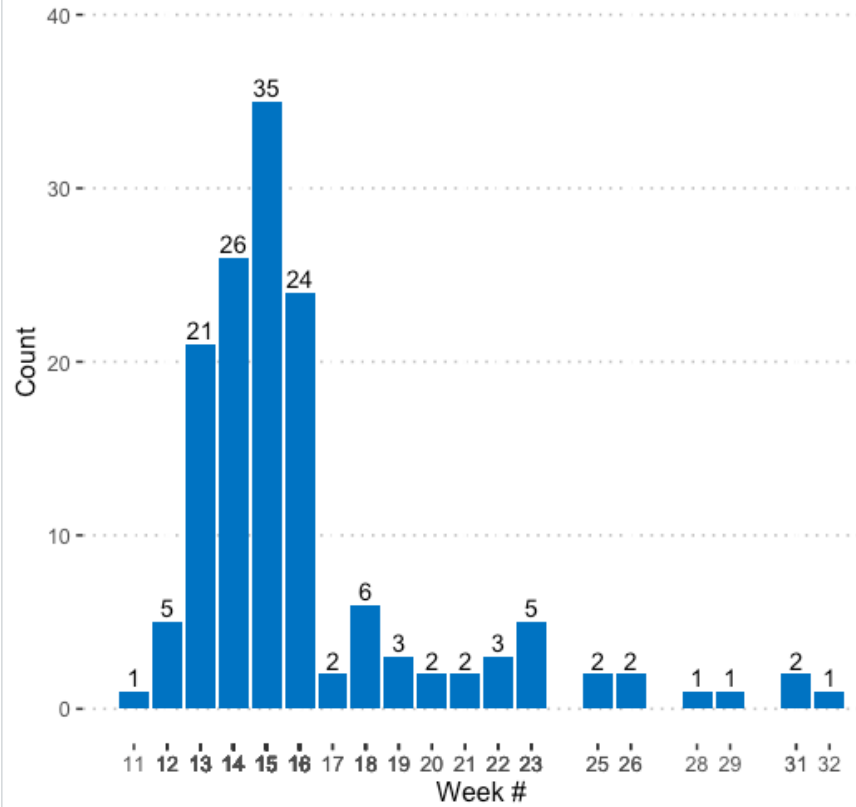
# Data Quality

- **Incomplete data:** hospital admit date but no discharge date
- **Race-ethnicity:** Other/unknown/NA are used almost interchangeably. If a person was marked as hispanic, they are often marked as "other" in race, although not always. While some hispanics were marked as "white" and others marked as "unknown". Where unknown was "marked" it was re-coded to "other".
- **Addresses:** Some address data was incomplete. Some Zip Codes were marked as NA
- **Symptoms:** A number of symptoms were marked as "unknown, ". Unclear whether "unknown" is used interchangeably with "No" or "NA". In some instances "loss of sense of smell and taste" were in the notes section, but not checked off in the symptoms box.
- **Gender:** Some cases were marked as NA.
- **Overall missing data:** Most of the missing data is on employment, race and ethnicity. These variables are key for understanding the epidemic and are not being collected consistently.
- **Variables not captured:** There is no information on how many people live in a household and no variable for "possible exposure location". These are key variables that can help stop the spread.
- **Unclear responses:** It is unclear what the difference is between NA and UNKNOWN. There is no option for "refused to answer" which is different from Lost to Follow-up or that the person does not know. Adding this response option would help understand people's trust in the contact tracing process.

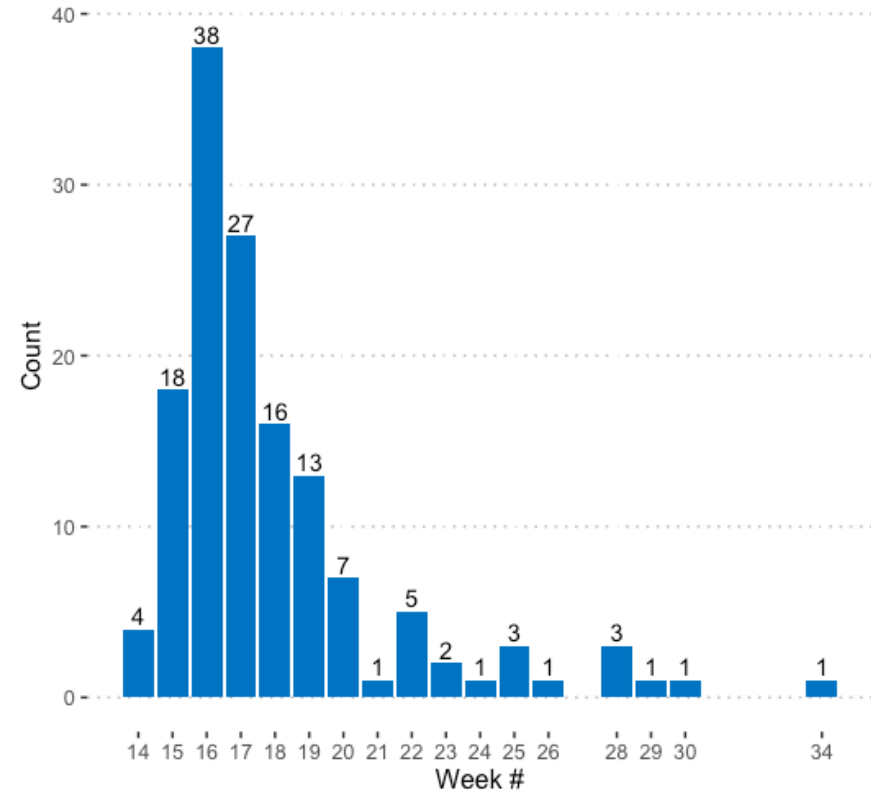
# Missing Data:

- Outcomes: 1711 (51.8%)
- Race: 570 (17.3%)
- Ethnicity: 3292 (99.7%)
- Hispanic: 642 (19.4%)
- Sex: 39 (1.2%)
- Date of symptoms onset: 2708 (82.0%)
- Hospitalization: 1945 (58.9%)
- Discharge from Hospital (among those hospitalized): 179 (62.5%)
- Employment: 2550 (77.2%)

Hospitalizations by Week



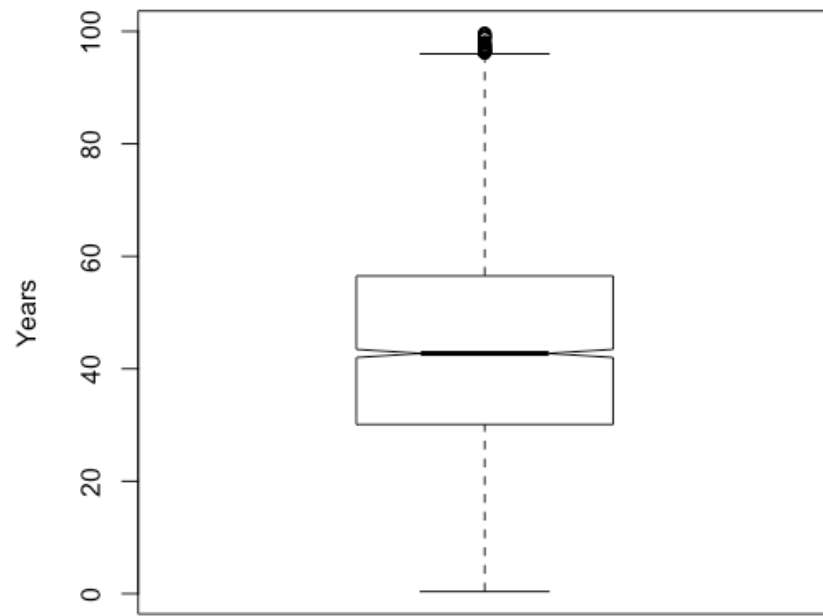
Deaths by Week



Events by weeks:

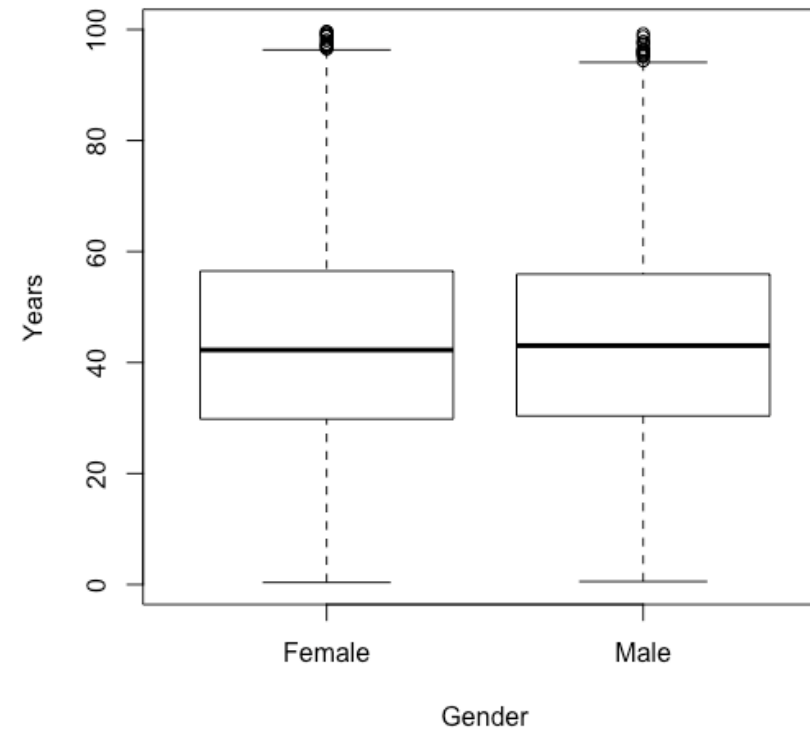
# Age of cases:

Age of Cases



Mean age of cases: 44.2 years

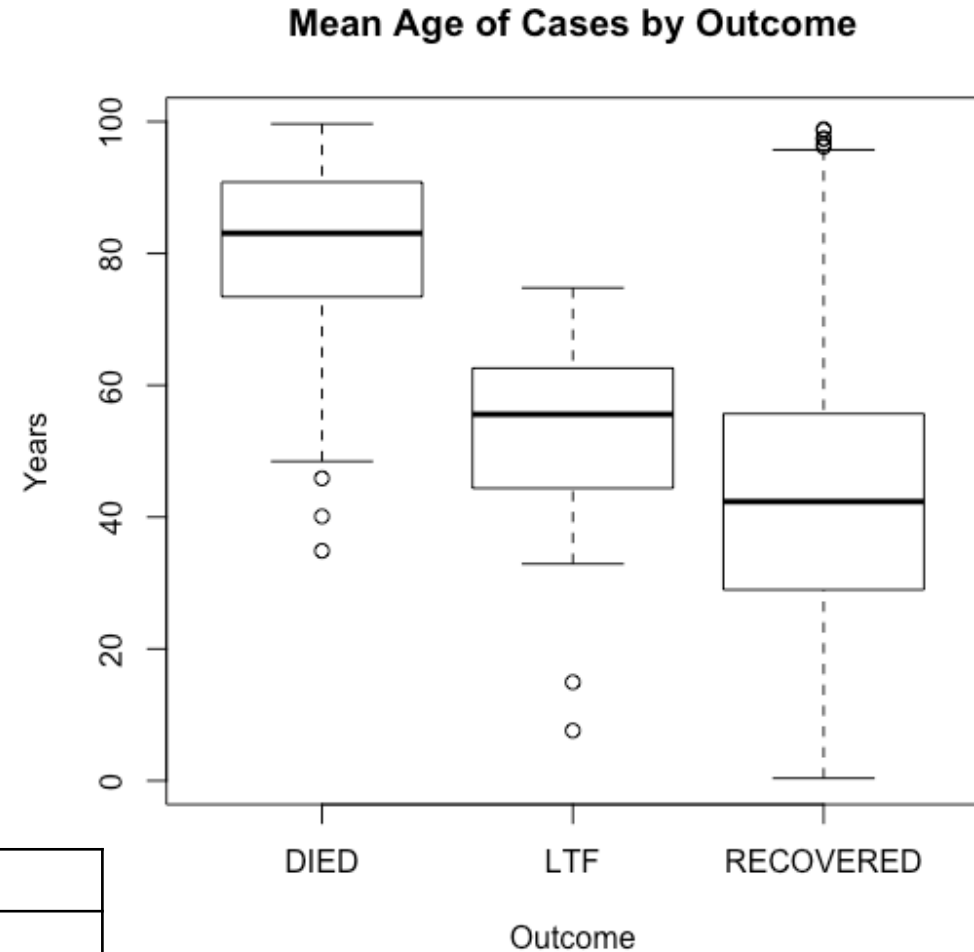
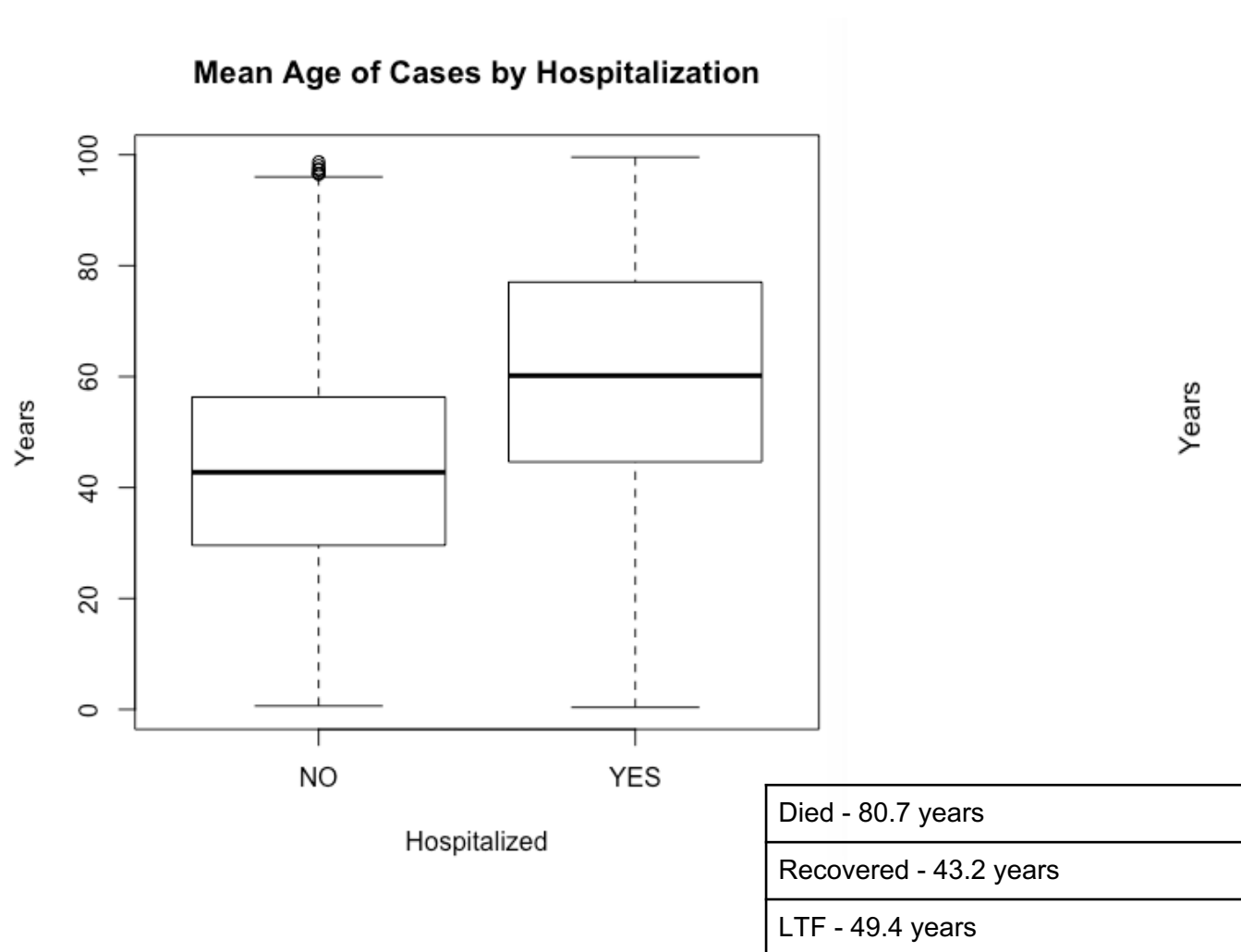
Mean Age of Cases by Gender



Female - 44.4 years

Male - 43.9 years

# Mean age of cases by outcome:



## Mortality related to gender:

	Female	Male
DIED	69	73
RECOVERED	750	662

Pearson's Chi-squared test with Yates' continuity correction

data: genderdeath

X-squared = 0.88591, df = 1, p-value = 0.3466

**There appears to be no difference in mortality rate of women as compared to men.**



# Cases by Race:

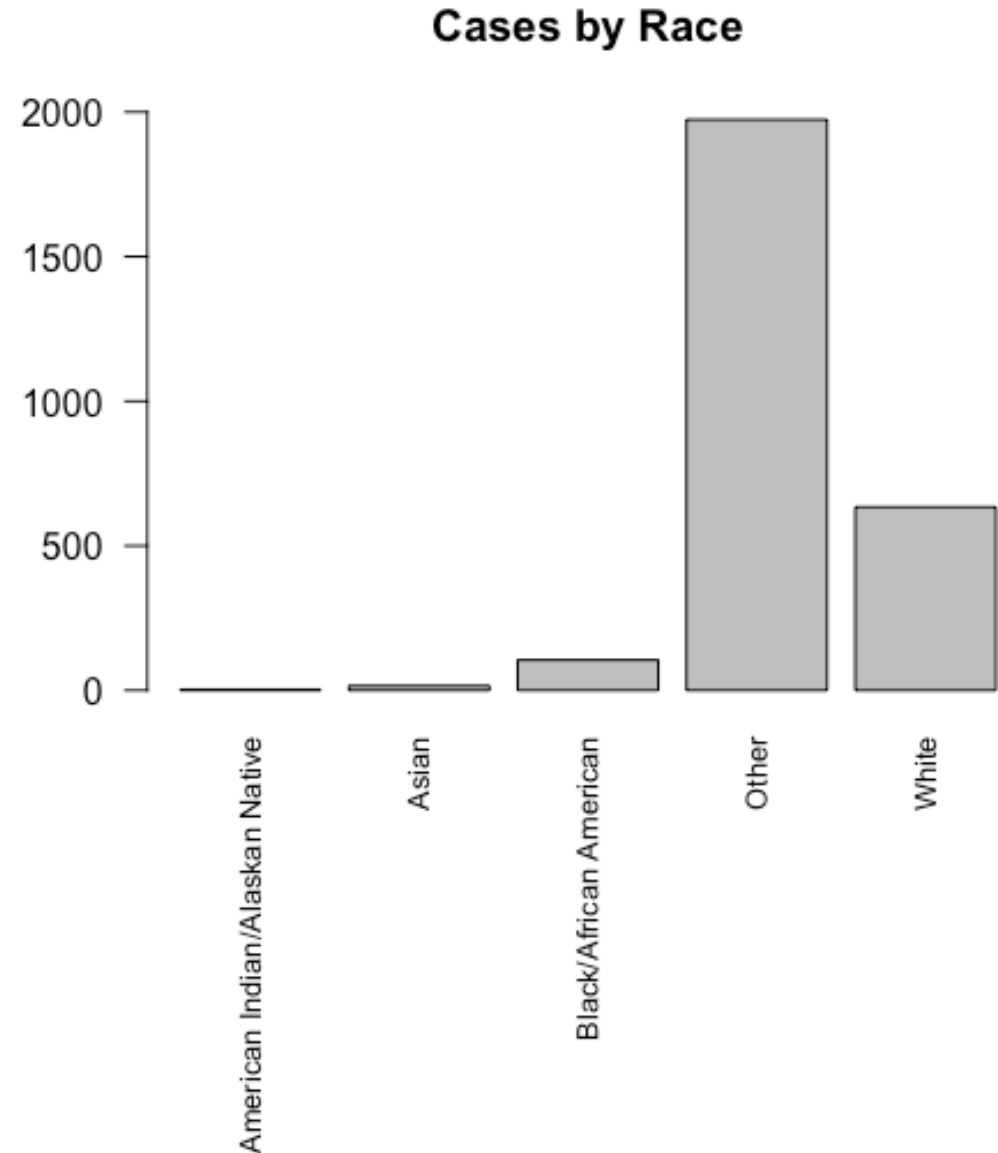
American Indian or Alaskan Native	3 (0.1%)
Asian	16 (0.6%)
Black or African American	105 (3.7%)
White	634 (22.2%)
Other	1974 (69.1%)

## Hispanic:

Yes – 1938 (59.7%)

No - 722 (22.2%)

Unknown - 642 (19.4%)



## Labs used and turnaround time:

Lab	Turnaround time	Number of Tests
BIDMC	0.00 days	392
BROAD	0.96 days	300
LAPCORP NJ	2.33 days	116
MDPH	1.56 days	149
MGH	0.41 days	1113
QUEST	2.03 days	772

- 31 labs used
- Average time between symptom onset and results in general - 7.1 days

# Clinical Characteristics:

- Hospitalized
  - Average hospitalization time: 7.9 days
- Outcomes
  - Recovered - 1434 (90.1%)
  - Died - 142 (8.9%)
  - Lost to Follow-up - 15 (0.9%)

Most frequent co-morbidities:

<b>1</b>	ASTHMA	23
<b>2</b>	CARDIAC_DISEASE	18
<b>3</b>	CHRONIC_PULMONARY_DISEASE	31
<b>4</b>	DIABETES	58
<b>5</b>	HYPERTENSION	48
<b>6</b>	PREGNANT	6

## Symptoms:

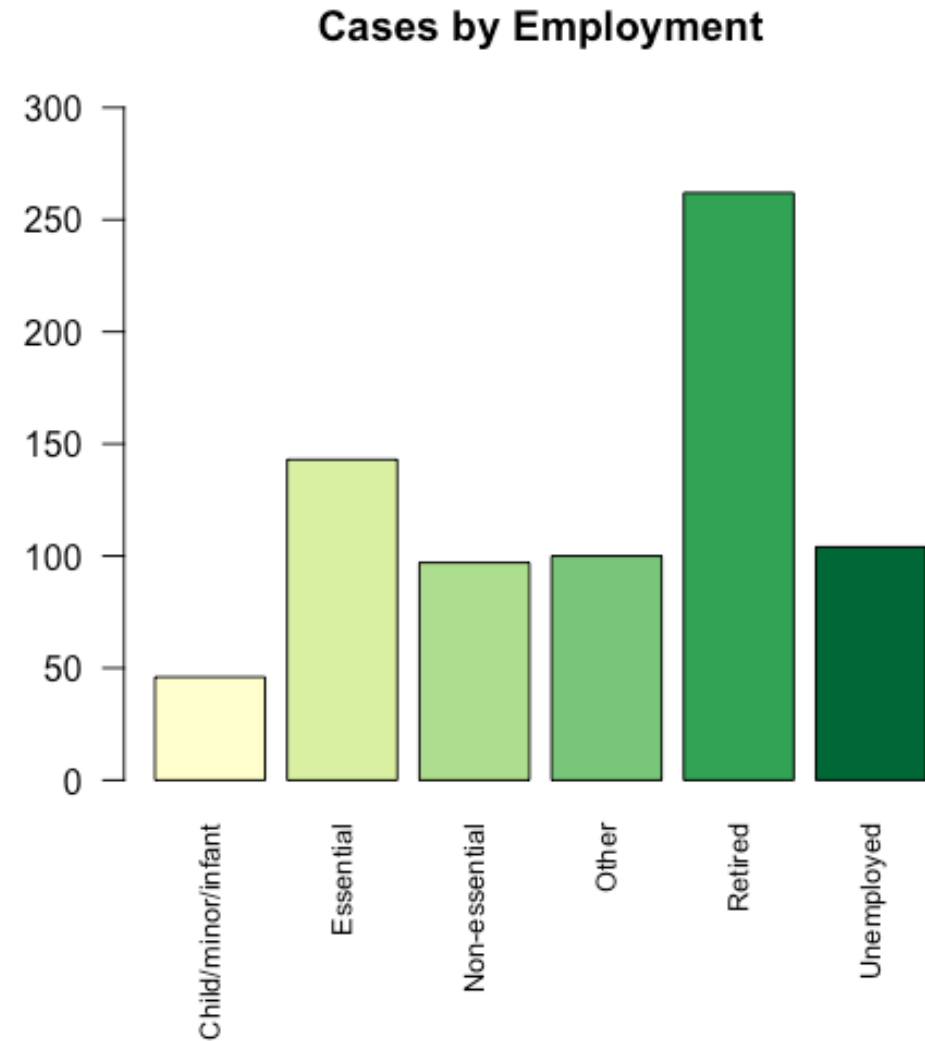
Average time between symptoms onset date and results by race/ethnicity

Asian	4.3 days
Black or African American	4.9 days
White	7.5 days
Other	6.7 days
Unknown	6.9 days
American Indian or Alaskan Native	missing
Hispanic	7.7 days

- Symptoms:
  - 865 (65.1%) had symptoms -
    - Single symptom - 92 (6.9%)
    - Multiple symptoms - 773 (58.2%)
  - **463 (34.9%) had no symptoms**

# Cases by employment:

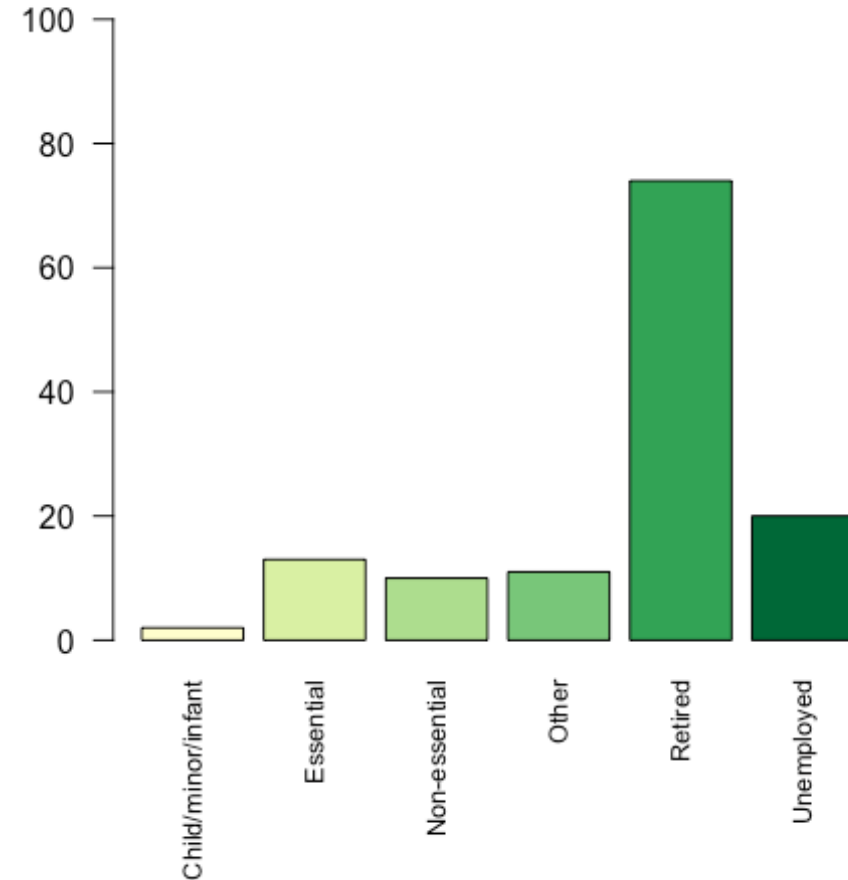
Essential	143 (19.0%)
Non-essential	97 (12.9%)
Retired	262 (34.8%)
Unemployed	104 (13.8%)
Child/minor/infant	46 (6.1%)
Other	100 (13.3%)



# Hospitalization by employment:

Essential	13 (10.0%)
Non-essential	10 (7.7%)
Retired	74 (56.9%)
Unemployed	20 (15.4%)
Child/minor/infant	2 (1.5%)
Other	11 (8.5%)

Hospitalized Cases by Employment



# Data Analysis:

- Using R we conducted logistic regressions and calculated Odds Ratios for several research questions.
- **Are symptoms related to gender, race or comorbidities?**
- **Are outcomes related to gender, race, employment, or comorbidities?**
- **Is there any variable that can explain higher risk of hospitalization?**
- **Do jobs, gender, race, or comorbidities affect the type of symptoms?**

# Are symptoms related to gender, race or comorbidities?

Coefficients:

	Estimate	Std. Error	z value	Pr(> z )
(Intercept)	2.4982	0.6005	4.160	3.18e-05 ***
Female	0.7489	0.4491	1.667	0.0954
ASIAN	15.9932	4610.2829	0.003	.9972
BLACK/AFRICAN AMERICAN	15.4749	2275.7149	0.007	0.9946
OTHER	-0.2313	0.5986	-0.386	0.6992
ASTHMA	15.7257	1483.3376	0.011	0.9915
CARDIAC DISEASE	-0.4723	1.1324	-0.417	0.6766
CHRONIC PULMONARY DISEASE	0.1537	1.0699	0.144	0.8858
DIABETES	0.7723	1.0478	0.737	0.4611
HYPERTENSION	0.5791	1.0523	0.550	0.5821
PREGNANT	15.5502	2662.8561	0.006	0.9953

**We can conclude that there is no significant difference in symptoms reported according to race, gender, or comorbidities.**



# Are outcomes related to gender, race, employment, or comorbidities?

## ODDS RATIO + 95% CI of significant variables

	<u>OR</u>	<u>2.5 %</u>	<u>97.5 %</u>
OTHER	0.11	.037	0.31
CARDIAC_DISEASE	132.6	18.4	2886.8
CHRONIC_PULMONARY_DISEASE	131.4	20.4	2707.8
DIABETES	40.3	5.7	851.1
HYPERTENSION	116.5	18.70	2388.3

- After controlling for gender and comorbidities, we conclude that compared to those who are White, those who identify as Other have 0.11 times the odds of dying ( $p < 0.05$ ).
- After controlling for gender and race, we conclude that compared to those who have no comorbidities, those who had cardiac disease had 132.6 times the odds of dying ( $p < 0.05$ ), those who had chronic pulmonary disease had 131.4 times the odds of dying ( $p < 0.05$ ), those who had diabetes had 40.3 times the odds of dying ( $p < 0.05$ ), and those who had hypertension had 116.5 times the odds of dying ( $p < 0.05$ ).

# Gender, race, employment - Do certain jobs affect the outcome of the disease?

	<u>OR</u>	<u>2.5 %</u>	<u>97.5%</u>
Retired	78.5	15.6	1434.8

- After controlling for gender and race, we conclude that compared to those who work in essential services, those who were retired had 78.5 times the odds of dying ( $p < 0.05$ ).

# Is there any variable that can explain higher risk of hospitalization?

	<u>OR</u>	<u>2.5 %</u>	<u>97.5 %</u>
Female	0.38	0.17216333	0.8305422
ASTHMA	4.54	0.80714068	22.0413209
PREGNANT	27.45	2.84959840	615.7311514
Unemployed	5.94	2.06063327	18.3640559
Retired	17.44	3.97326117	89.7731536

After controlling for comorbidities and type of employment, we conclude that females had 0.38 times the odds of hospitalization compared to men ( $p < 0.05$ ).

After controlling for gender and type of employment, we conclude that those who were pregnant had 27.45 times the odds of hospitalization compared to those with no comorbidities ( $p < 0.05$ ).

After controlling for gender and comorbidities, we conclude that those who were unemployed had 5.94 times the odds of hospitalization compared to those working in essential services ( $p < 0.05$ ) and those who were retired had 17.44 times the odds of hospitalization compared to those working in essential services ( $p < 0.05$ ).

# Do jobs, gender, race, or comorbidities affect the type of symptoms?

- No significant difference in:
  - Abdominal pain
  - Appetite loss
  - Cough
  - Chills
  - Diarrhea
  - Loss of taste and smell
  - Vomiting

# Significant differences in symptoms:

## **Chills:**

Retired persons have 0.02 times the odds of reporting chills, and child/minor/infant have 0.16 times to the odds of reporting chills compared to those who work in essential services ( $p < 0.05$ ).

## **Shortness of breath:**

“Other” race had 4.70 times the odds of reporting shortness of breath or difficulty breathing compared to those who identified themselves as White ( $p < 0.05$ ).

Those with asthma had 6.1 times the odds of reporting shortness of breath or difficulty breathing compared to those who did not report comorbidities ( $p < 0.05$ ).

## **Fever:**

Retired persons had 0.24 times the odds of reporting fever compared to those who work in essential services ( $p < 0.05$ ).

## **Headache:**

Retired persons had 0.02 times the odds of reporting a headache compared to those who work in essential services ( $P < 0.05$ ) and those who are child/minor/infant had 0.23 times the odds of reporting a headache compared to those who work in essential services ( $P < 0.05$ ).

Those with diabetes had 0.35 times the odds of reporting a headache compared to those who work in essential services ( $P < 0.05$ ).

## **Aches:**

Retired persons had 0.02 times the odds ( $P < 0.05$ ) and child/minor/infant had 0.09 times ( $P < 0.05$ ) the odds of reporting muscle aches and pain compared to those who work in essential services.

## **Sore throat:**

Retired persons had 0.05 times the odds of reporting a sore throat compared to those who work in essential services ( $P < 0.05$ ).

## Conclusions:

- Improving data quality is an important step in tracking the spread and impact of COVID
- In Chelsea, those who are most likely to get COVID are Hispanic essential workers in their 40's and retired persons.
- Retired persons and older people are more likely to be hospitalized and die of COVID
- Patients take about 1 week between onset of symptoms to testing, which may lead to increased spreading
- Almost 35% of positive cases have no symptoms

# Conclusions:

- While Hispanics are less likely to die of COVID, those with cardiac or pulmonary diseases, hypertension and diabetes are much more likely to die of COVID.
- While women are less likely than men to be hospitalized, pregnant women are highly likely to be hospitalized.
- Those with asthma, unemployed and retired persons are much more likely to be hospitalized.



**Thank you**