

# Burden of Death Associated with SARS-CoV-2 Infection during the Pandemic in Flint, Michigan (MI): Mortality Trends over the 2-year time period

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## INTRODUCTION

- As of September 14, 2022, approximately 2.8 million cases of SARS-CoV-2 infection have been reported in MI, leading to 38,271 deaths. We aimed to study the mortality trends in patients with SARS-CoV-2 infection during the pandemic in Flint, MI over the 2-year time period from March, 2020 through February, 2022.

## METHODS

- Design: Retrospective cohort study, conducted at Hurley Medical Center - a 443-bed inner city teaching hospital in Flint, MI, 03/2020 – 02/2022. The 2-year span was further divided into 6-time periods (Table 1).
- Inclusion criteria: Adults ( $\geq 18$  years (yrs) of age) with confirmed SARS-CoV-2 infection, admitted and discharged from our facility from 03/2020 through 02/2022.
- Primary outcome: Mortality within 3 months from the positive test.**
- Statistical analysis: Bivariate analysis, multivariate logistics and linear regression analysis were used to assess association between study variables and outcomes.

## RESULTS

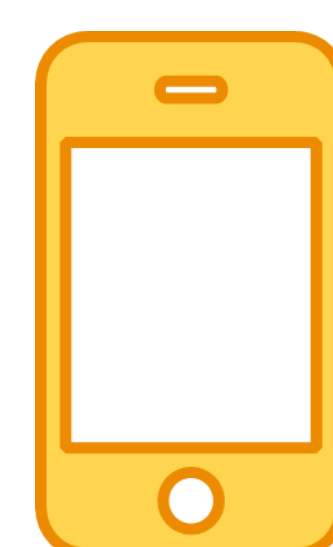
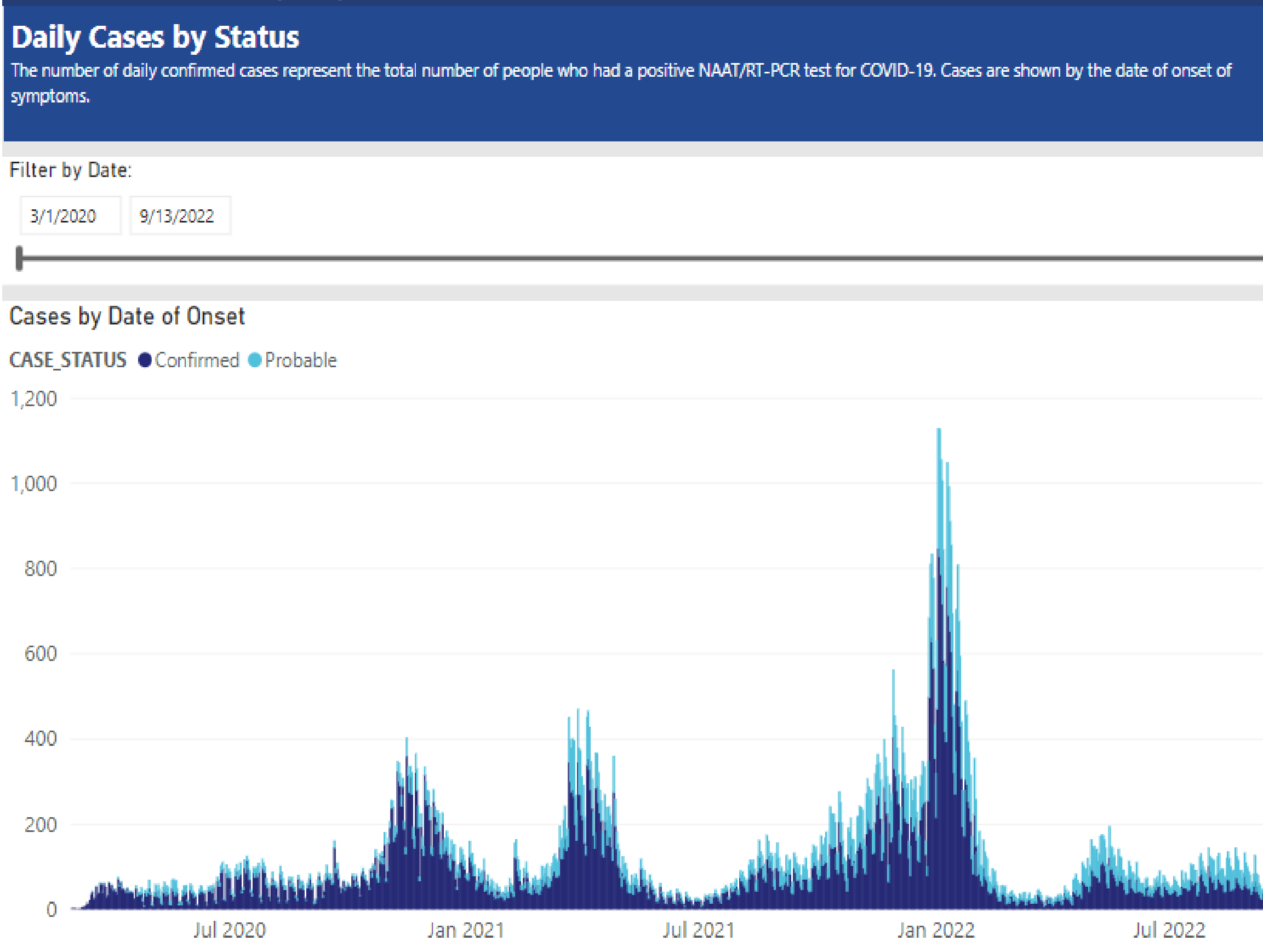
- Overall crude 90-day mortality rate was 16% (269/1668) and the In-hospital Case Fatality Rate was 14% (244/1668) (Table 1).
- Men comprised 50% (837/1668) of the cohort and were 1.5 times more likely to die than women (160 men and 109 women died) (p-value 0.001).
- A specific race was not associated with mortality (Table 2).
- Non-survivors tended to be older, mean age of 68 vs 57 yrs (p-value  $< .0001$ ). See Table 3 for mean Body Mass Index (BMI).
- Hypertension (HTN) was the most common co-morbidity (61%), and strongly associated with mortality (Table 4).
- 89% of non-survivors were unvaccinated (p-value 0.42)

## RESULTS

**Table 1: Breakdown of Time periods, 90-day mortality rate and the Predominant circulating SARS-CoV-2 strain**

Time period	90-day mortality rate % (N)	COVID-19 Vaccination % (N)	Predominant SARS-CoV-2 Strain/Variants of concern in US*
1 (March 2020 – June 2020)	23.8 (55/231)	0	SARS-CoV-2 GH strain
2 (July 2020 – October 2020)	18.7 (14/75)	0	SARS-CoV-2 GH strain
3 (November 2020 – February 2021)	16.2 (52/322)	0.6 (2/322)	Alpha (B.1.1.7 lineage)
4 (March 2021 – June 2021)	16.9 (44/260)	10.0 (26/260)	Alpha
5 (July 2021 – October 2021)	12.8 (24/187)	16.6 (31/187)	Delta (B.1.617.2)
6 (November 2021 – February 2022)	13.5 (80/593)	24.9 (148/593)	Delta (Nov, Dec)-Omicron (B.1.1.529) (Dec-onwards)
<b>Total</b>	<b>16.1 (269/1668)</b>	<b>12% of the cohort (207/1668) had received at least one dose of available COVID-19 vaccines (including single dose of Johnson and Johnson's Jansen vaccine)</b>	<b>*Estimates provided</b>

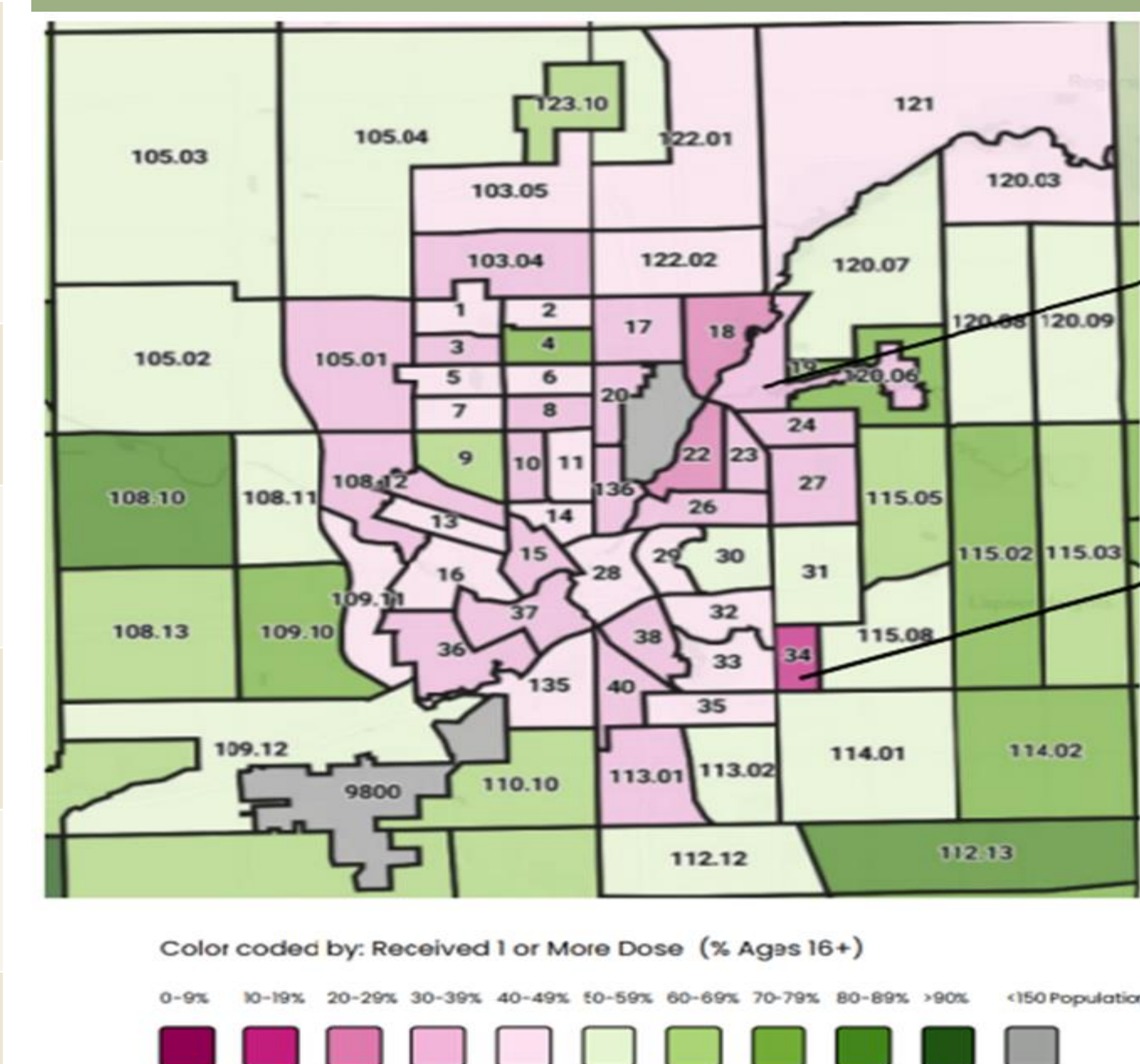
**Figure 1: Genesee county case count** (<https://www.michigan.gov/coronavirus/stats>)



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**Figure 2. Detailed map of Flint and surrounding areas COVID-19 vaccine status (as of 12/06/2021, www.gchd.us)**



**Table 2: Race and mortality**

Race	N	Sub-group mortality % (N)
African American (AA)	838	16.2 (136/838)
White/Caucasian	724	15.3 (111/724)
Others **	88	15.9 (14/88)

AA comprised of 52% and Caucasian comprised 42% of those who died (p-value 0.91)  
\*\*American Indian, Asian, Hispanic, Unknown, Other.

**Table 3: Mean BMI among survivors and non-survivors**

	N	Mean	95% Confidence Interval (CI)
Survivors	1374	31.7	31.2 – 32.2
Non-survivors	266	31.3	30.2 – 32.4
<b>Total*</b>	<b>1640</b>	<b>*BMI missing on 28 patients</b>	

**Table 4: Prevalence of co-morbidities and the mortality among the cohort**

Co-morbidities	N	Mortality % (N)	p-value
HTN	1011	71.0 (191/269)	<0.001
DM	563	40.1 (108/269)	0.017
COPD	247	20.8 (56/269)	0.004
CKD	181	15.2 (41/269)	0.014
ESRD	106	7.8 (21/269)	0.28
CAD	87	8.2 (22/269)	0.024

\*Abbreviations: ESRD – end stage renal disease, COPD – chronic pulmonary obstructive disease, CAD – coronary artery disease, CKD – chronic kidney disease, DM- diabetes, HTN – hypertension.

## DISCUSSION/CONCLUSIONS

- SARS-CoV-2 infection regardless of the circulating variants carried a significant mortality risk.
- Better supportive care-treatments, and some background immunity from prior infection or vaccination likely contributed to improving mortality over time.
- Vaccination coverage in Flint and surrounding areas remains low (Fig 2). Public health efforts should be focused at overcoming the barriers to vaccine acceptance in this high-risk unique population.