

# An Examination of Social Determinants of Health and COVID-19 in Milwaukee County

Milwaukee County COVID-19 Epidemiology Intel Team

November 18, 2020

This report was updated on November 18, 2020 and includes data through November 11, 2020. Note that data for recent weeks may be under-reported due to pending test results.

## Summary

The goal of this report is to examine the distribution of COVID-19 cases, hospitalizations, deaths, and testing by race, ethnicity and neighborhood socioeconomic characteristics in Milwaukee County since the beginning of the COVID-19 pandemic. Individuals residing in Milwaukee County who were tested for COVID-19 are included in this report.

Race and ethnicity were combined into one variable whereby the Hispanic individuals of any race were categorized as Hispanic, and non-Hispanic (NH) individuals of other racial groups were categorized according to their respective racial group. Individuals were therefore categorized as Hispanic (n=48866), NH Black/African American (AA) (n=77238), NH White (n=163543), NH Asian (n=11951), NH American Indian or Alaska Native (AIAN) (n=1518), and NH Multiple Races (n=333). Asian includes Native Hawaiian or Other Pacific Islander. Individuals for whom race was identified as “other” (n=11688) or “unknown” (n=39169) are excluded from this report.

We analyzed COVID-19 distributions by the following neighborhood characteristics: median household income, proportion of “essential worker” occupations and the Social Vulnerability Index (SVI) – all at the census tract level. Maps of these measures, as well as a dot density map of the distribution of population by race/ethnicity in Milwaukee County, are included in Section 5 of this report. We obtained tract-level median household income data from the American Community Survey data for 2018 5-year estimates (years 2014-2018 data combined). The Social Vulnerability Index (SVI), developed by the Centers for Disease Control and Prevention (CDC) is an index derived from 15 census variables that is used to quantify tract-level socioeconomic status (below poverty, unemployed, income, no high school diploma), household composition, disability (age 65 or older, age 17 or younger, older than age 5 with a disability, single parent household), minority status, language (minority race/ethnicity, speaks English “less than well”), housing, and transportation (multi-unit structures, mobile homes, crowding, no vehicle, group quarters)<sup>1</sup>. The proportion of Workers in Essential Occupations in each tract is estimated using American Community Survey 5 year estimates for 2018. Essential occupations include: Healthcare practitioners & technical; Construction & extraction; Farming; Fishing & Forestry; Installation; maintenance & repair; Material moving; Production; Transportation; Office & administrative support; Sales & related; Building & grounds cleaning & maintenance; Food preparation & serving related; Healthcare support; Personal care & service; and Protective service <sup>2</sup>.

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<sup>1</sup> Centers for Disease Control and Prevention/ Agency for Toxic Substances and Disease Registry/ Geospatial Research, Analysis, and Services Program. 2020. “Social Vulnerability Index 2018 Database Wisconsin.” <https://svi.cdc.gov/data-and-tools-download.html>

<sup>2</sup> Lauren Chambers. 2020. “Data Show Covid-19 Is Hitting Essential Workers and People of Color Hardest.” [https://data.aclum.org/2020/04/07/covid-19-disproportionately-affects-vulnerable-populations-in-boston/?ms\\_aff=MA&initms\\_aff=MA&ms\\_chan=tw&initms\\_chan=tw](https://data.aclum.org/2020/04/07/covid-19-disproportionately-affects-vulnerable-populations-in-boston/?ms_aff=MA&initms_aff=MA&ms_chan=tw&initms_chan=tw)

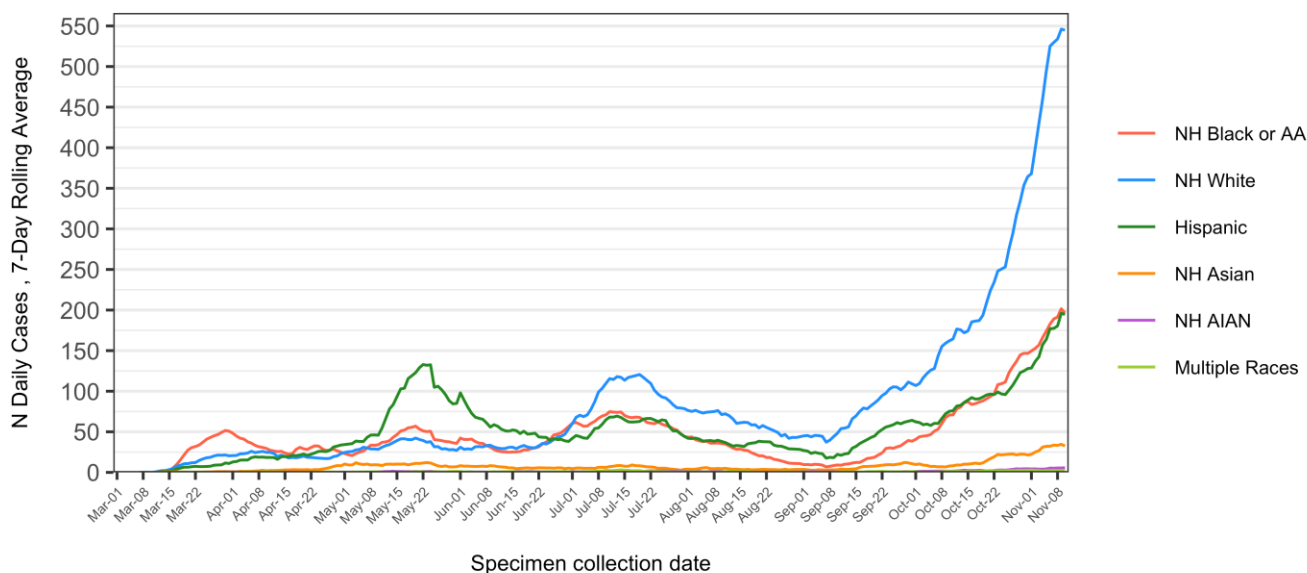
## Section 1: Confirmed Cases

We first visualized the distribution of COVID-19 cases by race/ethnicity, and neighborhood characteristics in Milwaukee County over the course of the epidemic, using crude case counts as 7-day rolling averages for enhanced visualization (section A). We then present a series of plots showing crude incidence rates with 14-day total per 100,000 residents (section B). We then present crude and age adjusted rates (section C).

### A. Daily Case Counts

**Figure 1** shows daily case counts (without a population denominator) by race/ethnicity. We observed an early surge in COVID-19 cases among the NH Black/AA population in March and April in the context of limited testing capacity. This was followed by a much larger surge among the Hispanic population in May and June, once tests became more widely available<sup>3</sup>. Smaller surges in COVID-19 cases among Black/AAs and NH Whites were also observed during that time. Beginning in early July, a similar increase in the rate was observed among NH Black/AA, NH White, and Hispanic populations, with the largest peak among NH Whites, peaking around mid-July and decreasing into August. Beginning around Labor Day (Sep 8), we have observed a recent surge in COVID-19 cases across multiple racial/ethnic groups, with the largest surge observed among the NH White population.

**Figure 1: COVID-19 Daily Case Counts by Race and Ethnicity**



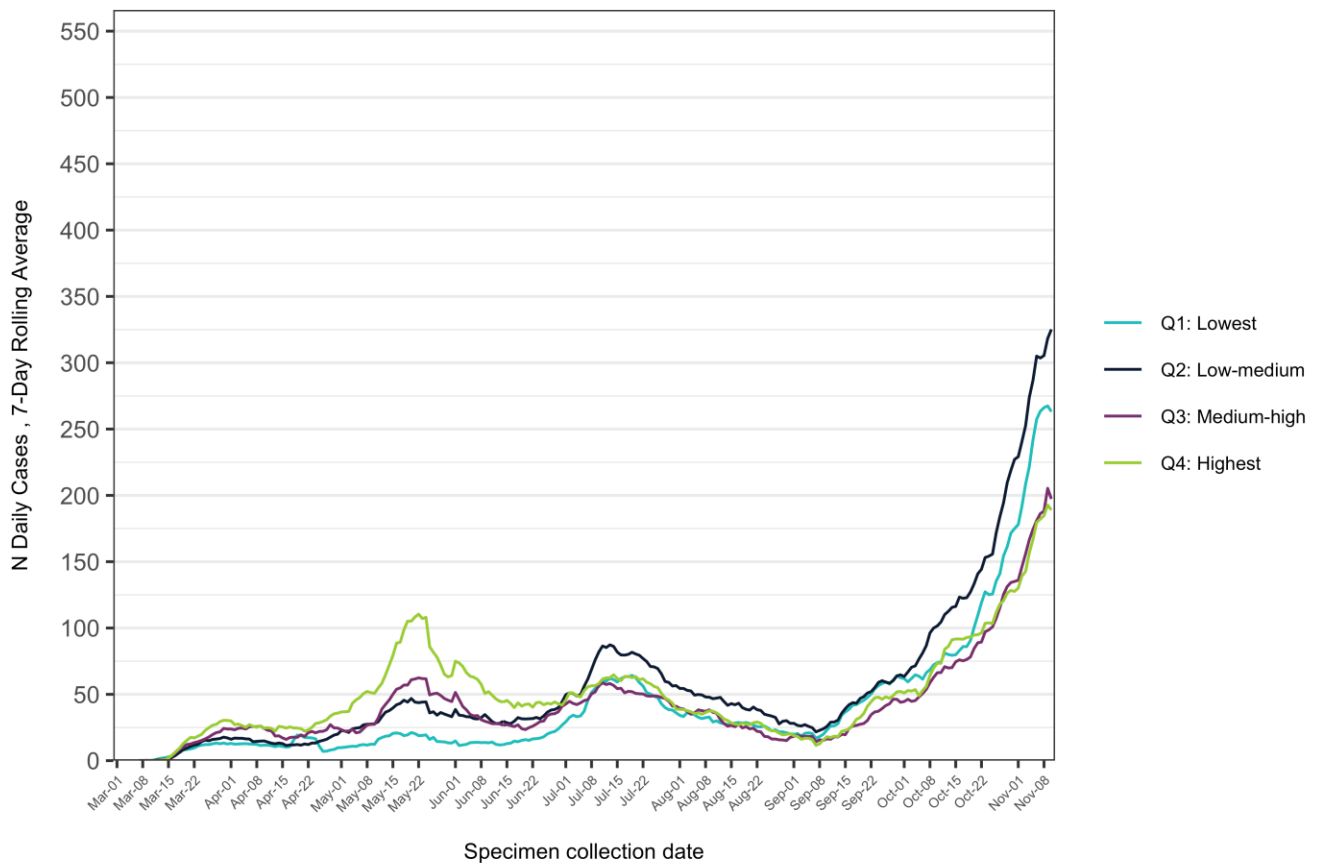
Data source: Wisconsin Electronic Disease Surveillance System (WEDSS)

Created by the Milwaukee County COVID-19 Epidemiology Intel Team

<sup>3</sup> J.Jannene. May 2020. "State Sees Biggest Hike In New COVID-19 Hospital Admissions in 30 Days"  
<https://urbanmilwaukee.com/2020/05/20/daily-wisconsin-has-highest-number-of-new-covid-19-hospital-admissions-in-over-30-days/>

In **Figure 2**, we examine the daily case counts of COVID-19 in relation to the CDC’s Social Vulnerability Index (SVI) quartiles (Q1; lowest level of social vulnerability, or least vulnerable). We observed an early surge of COVID-19 cases among those who live in tracts in the highest quartile of the SVI (i.e. the most socially vulnerable) peaking around mid-May and then in early July there was a second surge in COVID-19 cases with those living in tracts in the low-medium quartile representing the largest number of cases. After a decline in cases among all groups, another surge was observed beginning around Labor Day, with the highest burden again among those living in tracts falling in the low-medium quartile group.

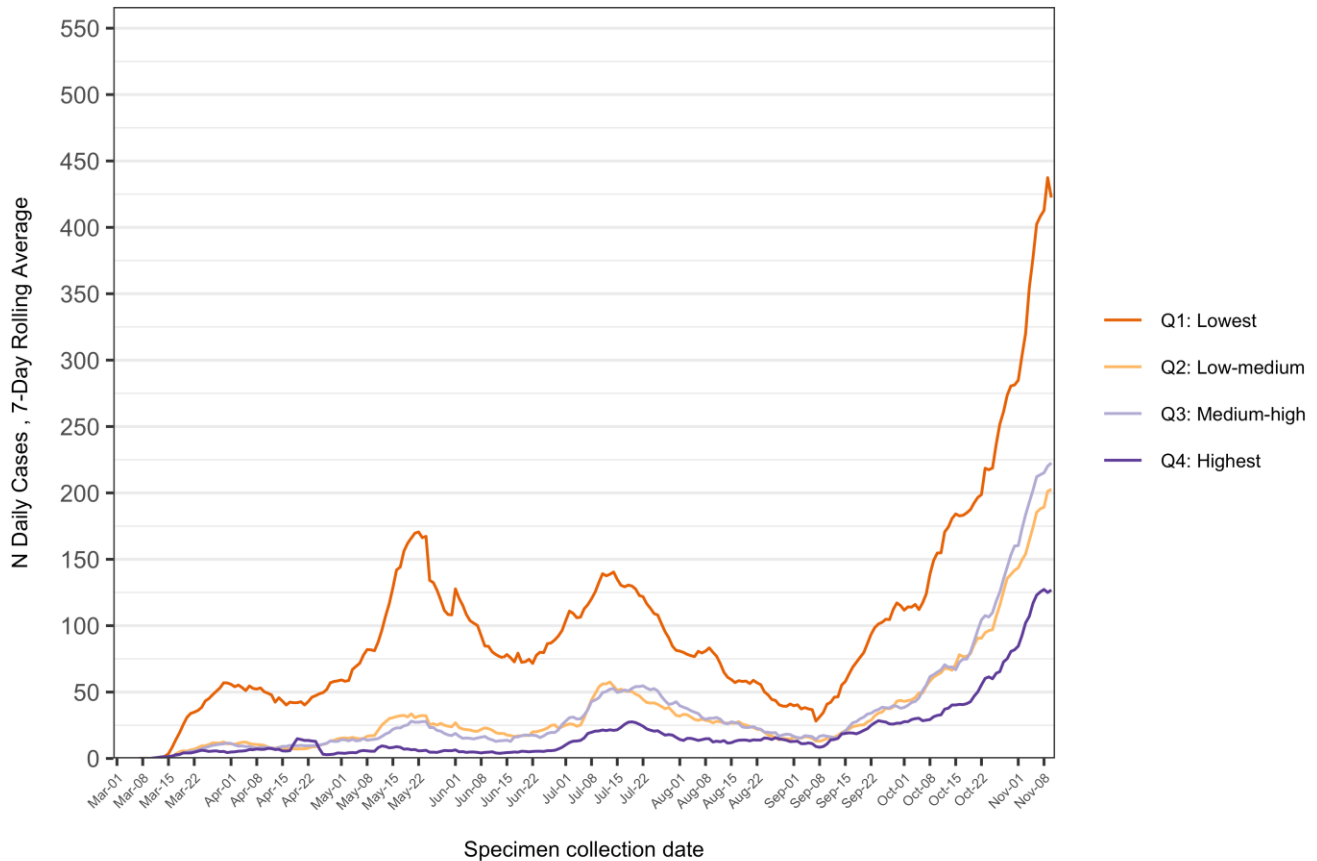
**Figure 2: COVID-19 Daily Case Counts by Social Vulnerability Index Quartile**



Data source: Wisconsin Electronic Disease Surveillance System (WEDSS)  
 Created by the Milwaukee County COVID-19 Epidemiology Intel Team

In **Figure 3**, we examined cases across median household income quartiles (Lowest: \$0 - \$48,571; Low-Medium: \$48,571 - \$59,779; Medium-High: \$59,779 - \$74,116; Highest: \$74,116 and greater). We observed a similar pattern as that shown in **Figure 2**, this time with repeated surges observed to the greatest extent among those in the lowest income quartile (i.e. poorest households) as compared to the higher income quartiles. The most recent surge, after Labor Day, has again affected the lowest income households the most.

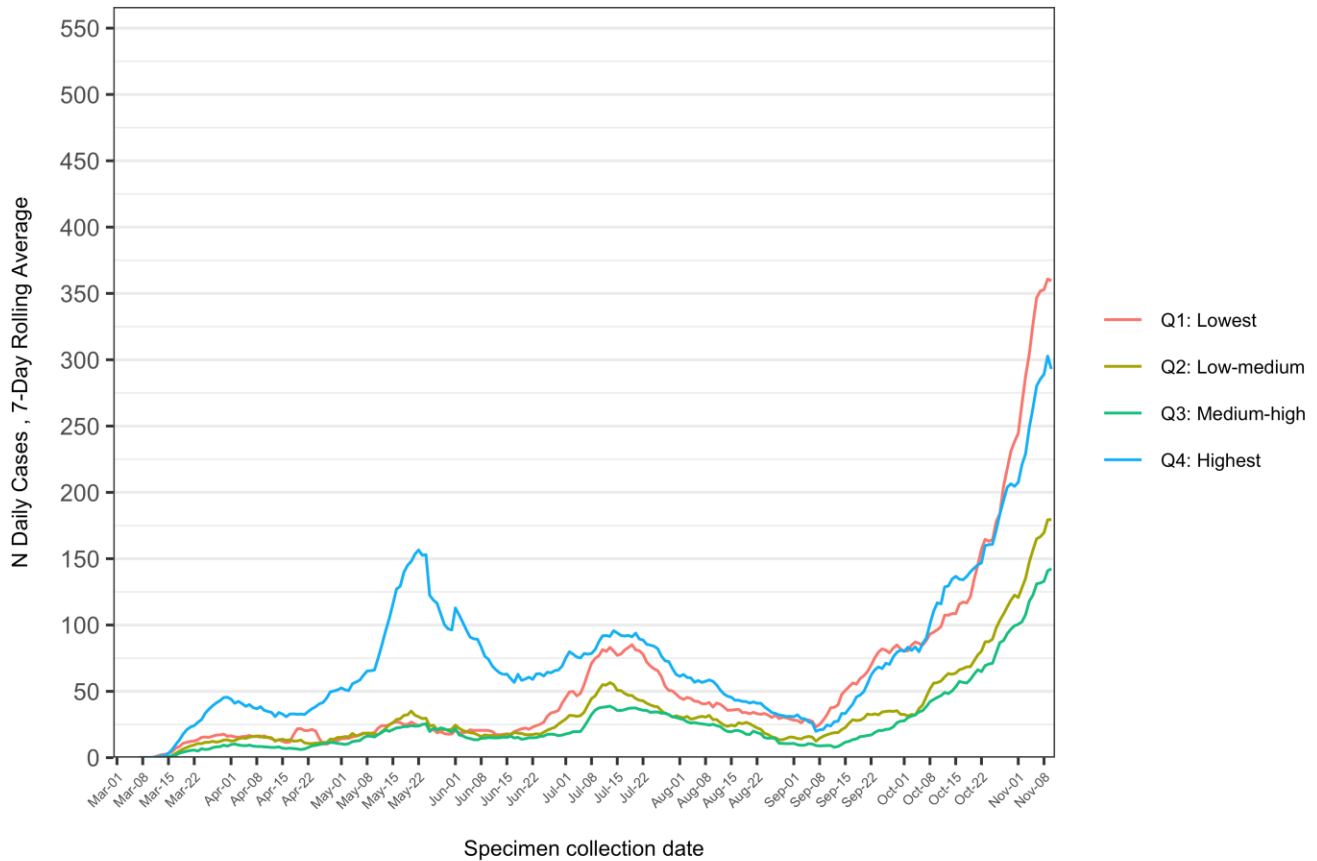
**Figure 3: COVID-19 Daily Case Counts by Median Household Income**



Data source: Wisconsin Electronic Disease Surveillance System (WEDSS)  
Created by the Milwaukee County COVID-19 Epidemiology Intel Team

In **Figure 4**, we examine the daily COVID-19 case counts by proportion of workers in essential occupations (Lowest: 0% - 65.2%; Low-Medium: 65.2% - 72.5%; Medium-High: 72.5% - 77.18%; Highest: 77.18% - 100%). We observed a similar pattern as that shown in **Figures 2 & 3**, this time with individuals living in tracts with the highest proportion of essential workers showing the most significant variation and highest daily case counts, as compared to the lower quartiles. Of note, the surges in April and mid- May occurred primarily among those in the highest quartile whereas in July and September surges occurred among individuals living tracts in all quartiles, but those living in the highest and lowest quartiles were most affected.

**Figure 4: COVID-19 Daily Case Counts by Proportion of Workers in Essential Occupations**

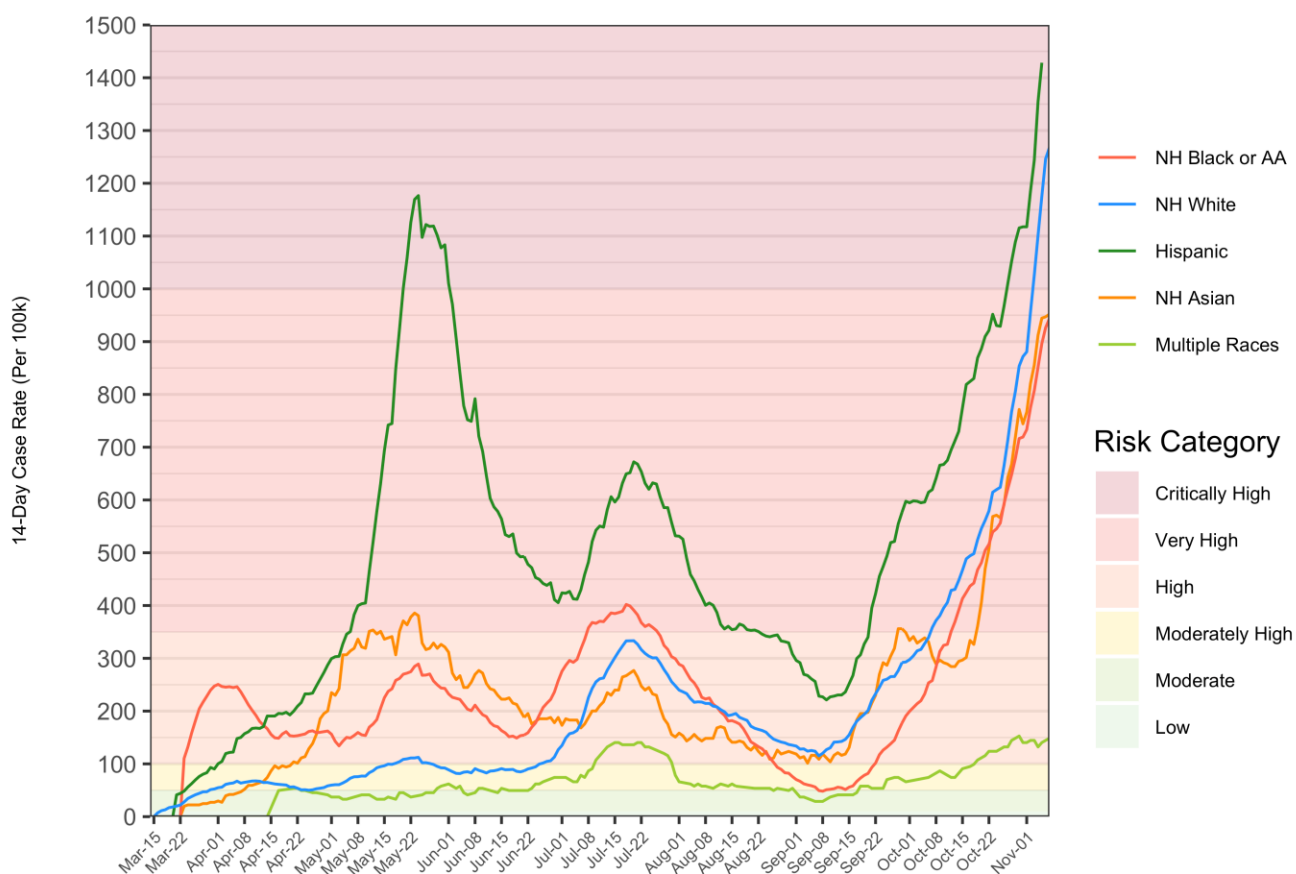


Data source: Wisconsin Electronic Disease Surveillance System (WEDSS)  
Created by the Milwaukee County COVID-19 Epidemiology Intel Team

## B. 14-Day Incidence Rates per 100,000 people

Plots showing 14-day incidence rates per 100,000 people across race/ethnic groups are presented on a backdrop showing risk categories developed by the Wisconsin Department of Health services. We overlaid the 14-Day incidence rate line over burden risk categories per 100,000 Wisconsin residents as specified: “Low”: case rate is less than or equal 10; “Moderate”: case rate is greater than 10, but less than or equal 50; “Moderately High”: case rate is greater than 50, but less than or equal to 100; “High”: case rate greater than 100, but less than or equal to 350, “Very High”: case rate greater than 350, but less than or equal to 1,000; and “Critically High”: case rate greater than 1,000. As shown in **Figure 5**, crude incidence rates by race and ethnicity have varied substantially over the course of the pandemic. The incidence among NH Black/AA populations peaked early in the context of limited testing; and it is likely that the actual COVID-19 incidence rate during this time was much higher than the rate represented here, due to limited case detection at that time. Beginning in mid-April, the incidence rate among Hispanics began to surge, surpassed the rate among NH Black/AA, and has remained the highest population-based rate among all racial and ethnic groups since then. The incidence rate among Hispanic individuals has put this group in the “Very High” or “Critically High” categories (i.e. > 350/100k population, and 1,000/100k population respectively) for COVID-19 infections since early May, briefly dipping into the “high” category from the beginning of September to the middle of that month. The rate among NH Black/AA individuals returned to the very high level in July. After a peak across all race/ethnic groups in July, all rates decreased and then began to increase in all groups again after Labor Day, with the largest surge among Hispanic individuals.

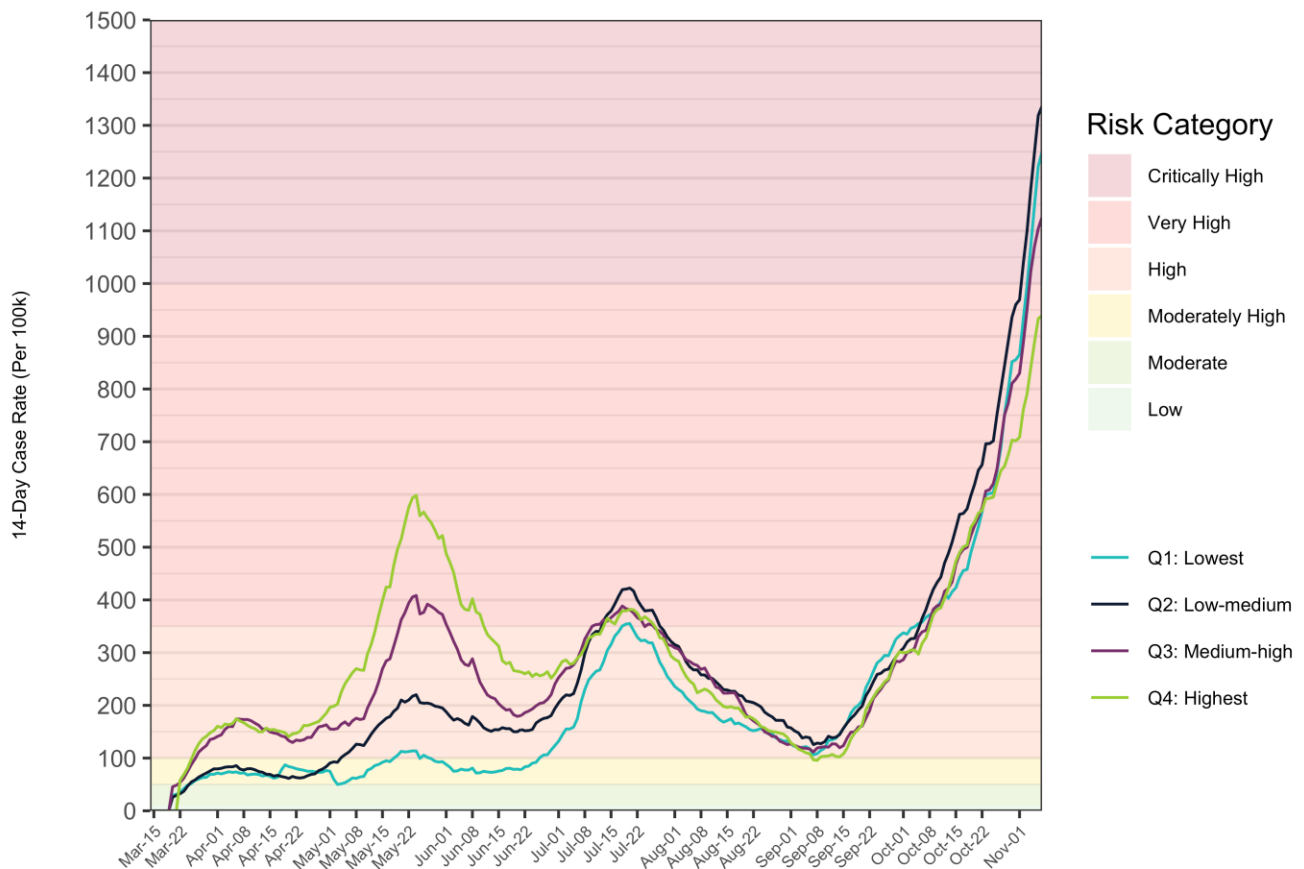
**Figure 5: 14-Day Incidence Rates by Race/Ethnicity**



Data source: Wisconsin Electronic Disease Surveillance System (WEDSS)  
Created by the Milwaukee County COVID-19 Epidemiology Intel Team

As shown in **Figure 6**, COVID-19 14-day incidence has varied by tract level SVI across the course of the pandemic. Early in the epidemic, there was a clear gradient in SVI quartiles, with higher vulnerability groups experiencing higher COVID-19 rates. However, since mid-June, rates have followed similar trajectories among all four SVI quartile groups, rising and falling together, with peaks in both May and July (in the “Very High” burden category), and the current surge reaching the “Critically High” threshold (i.e. > 1,000/100k population).

**Figure 6: 14-Day Incidences Rates by Social Vulnerability Index**

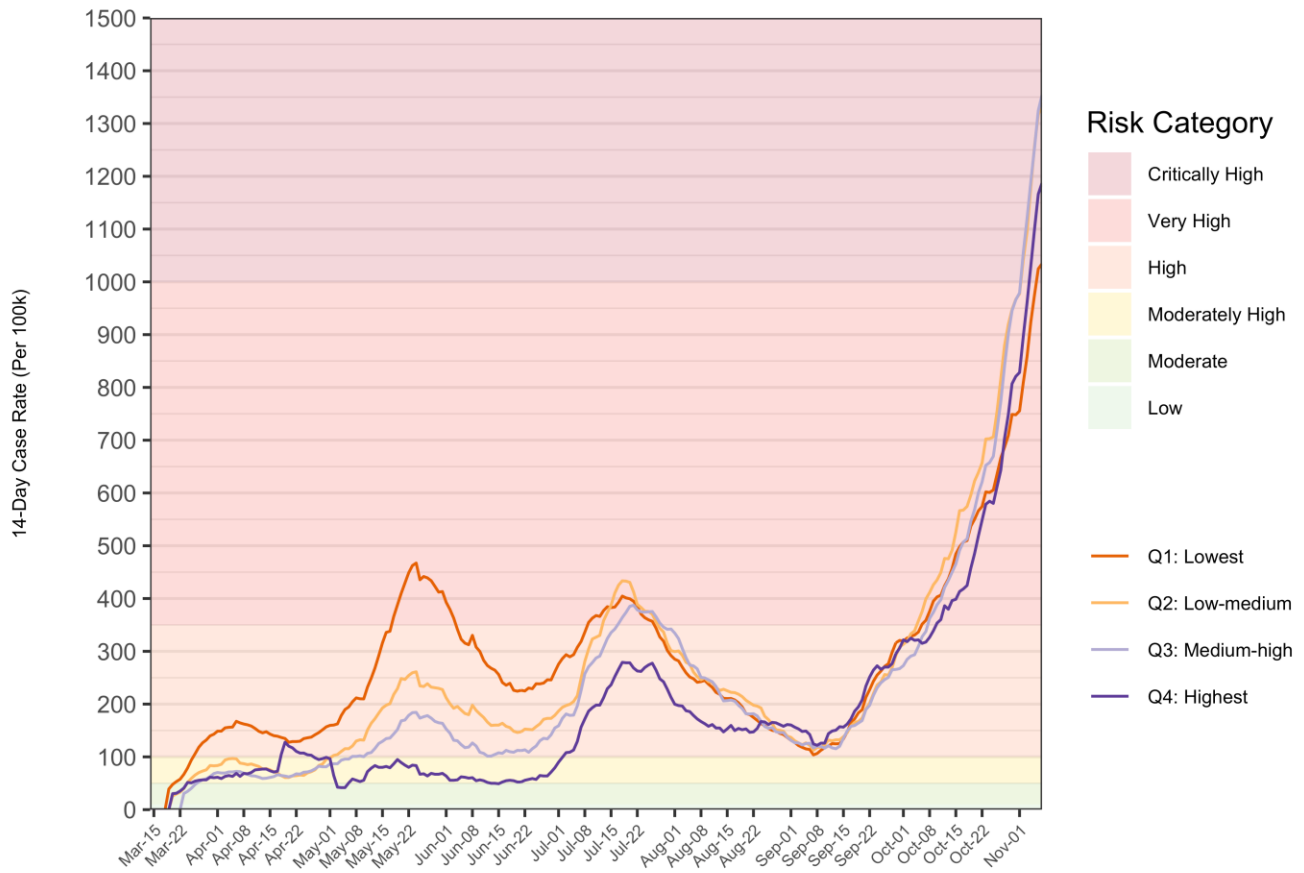


Data source: Wisconsin Electronic Disease Surveillance System (WEDSS)

Created by the Milwaukee County COVID-19 Epidemiology Intel Team

As shown in **Figure 7**, 14-day COVID-19 incidence has varied by tract median household income quartile across the pandemic in a similar pattern as observed for SVI quartile. However, the peak in cases in July showed a more apparent income gradient than that observed for quartiles of SVI. Again, rates peaked in May and July (in the “Very High” risk burden category), and the current surge has reached the “Critically High” threshold (i.e. > 1,000/100k population).

**Figure 7: 14-Day Incidence Rates by Median Household Income**



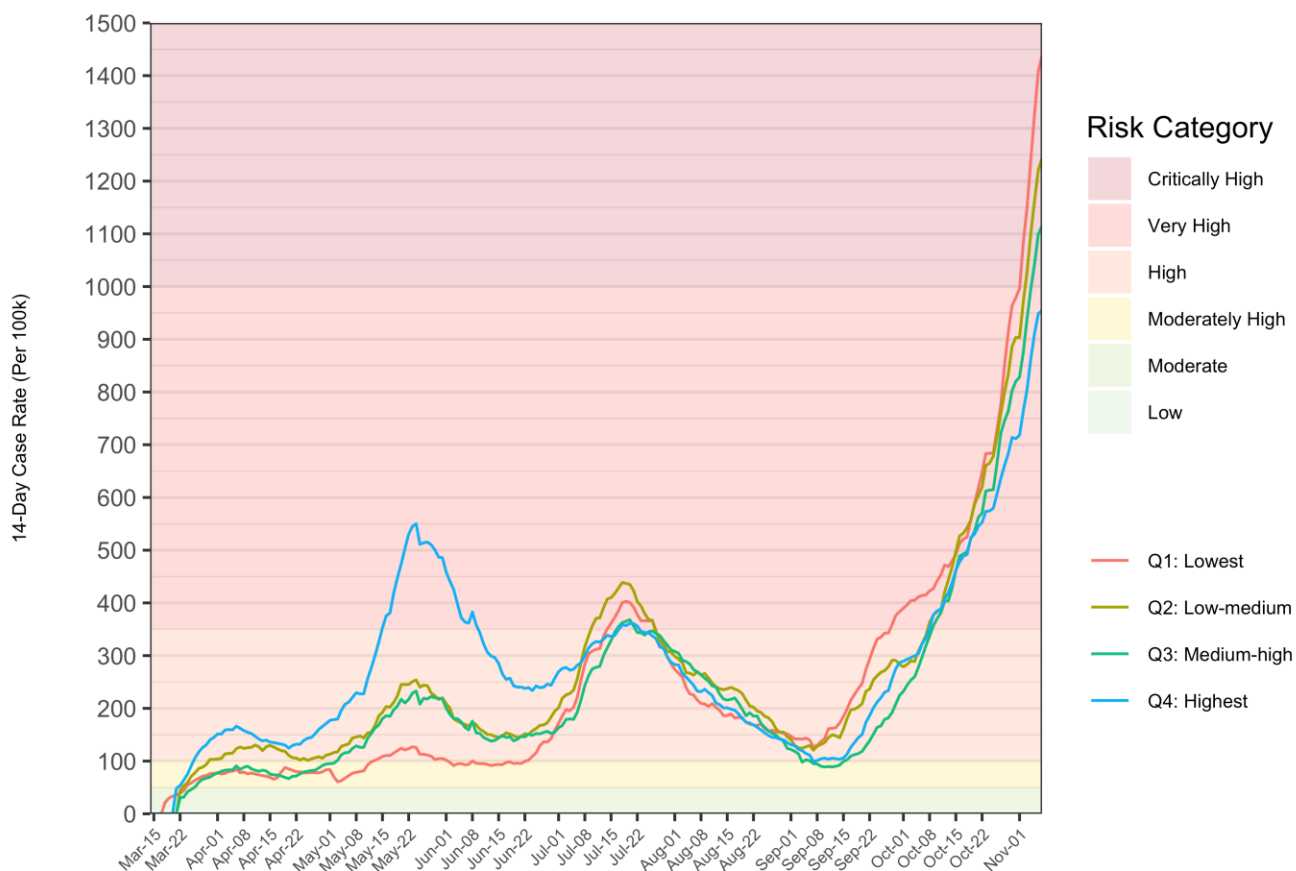
Data source: Wisconsin Electronic Disease Surveillance System (WEDSS)

Created by the Milwaukee County COVID-19 Epidemiology Intel Team



As shown in **Figure 8**, 14-day COVID-19 incidence has varied by tract proportion of essential workers. Rates among individuals living in tracts with high proportions of essential workers were highest in surges observed in April and May. In contrast, there was no gradient observed in the peak in July, and the pattern has almost reversed beginning in September, with highest rates among those living in tracts with fewer essential workers in the most recent surge.

**Figure 8: 14-Day Incidence Rates by Proportion of Workers in Essential Occupations**

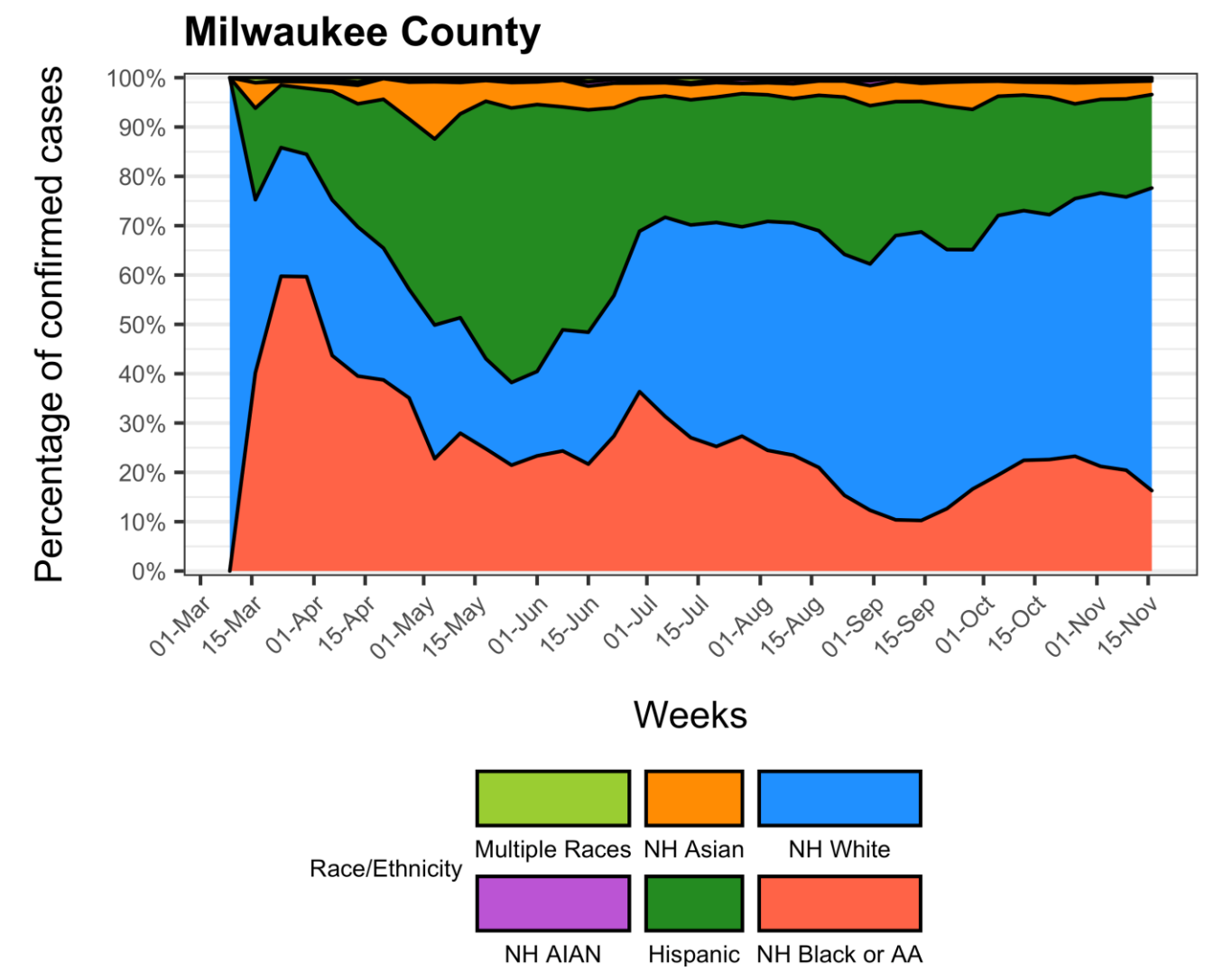


Data source: Wisconsin Electronic Disease Surveillance System (WEDSS)

Created by the Milwaukee County COVID-19 Epidemiology Intel Team

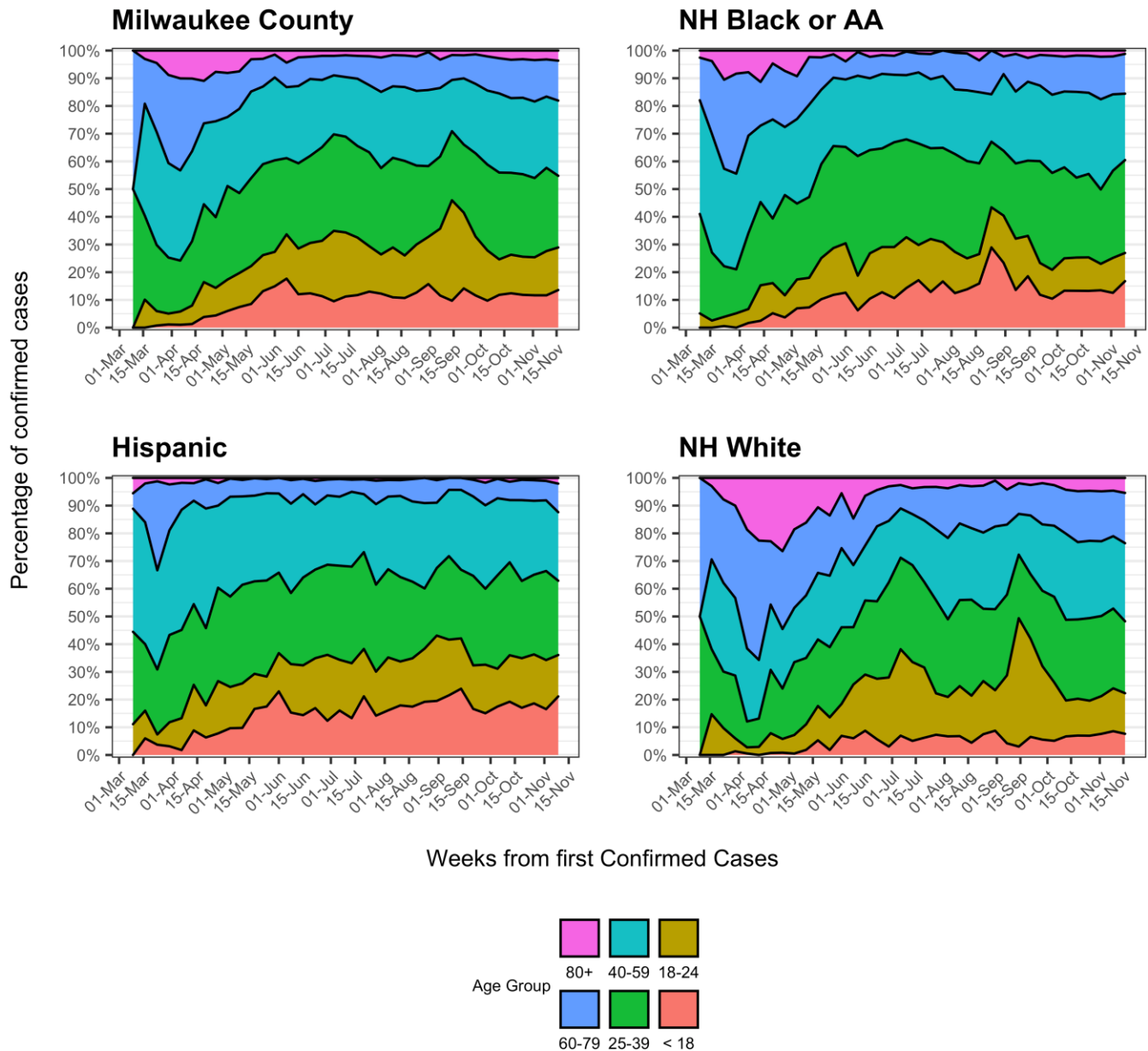
The proportional distribution of cases by race/ethnicity is presented in **Figure 9**. As shown, NH Black/African American individuals composed the largest proportion of cases early in the epidemic, followed by Hispanic individuals and then NH White individuals in most recent weeks.

**Figure 9: Proportion Plots**



It is important to note that cases among different race/ethnic groups do not follow the same age distributions. The age distribution of all Milwaukee County cases across the course of the pandemic is shown in the top plot in **Figure 10**. The age distribution for NH White individuals illustrates that the greatest proportion of cases among this group was in the oldest segments of the population near the beginning of the epidemic, while older age groups have been less affected among Hispanic individuals. The NH Black/AA population also saw a surge in cases among older individuals at the beginning of the pandemic. Most recently, all groups have seen a surge and predominance of cases among young people, ages 18-24 and 25-39 and among NH Black/AA individuals, also a surge in those aged < 18 years.

**Figure 10: Race Specific Daily Case Distributions**



Data source: Wisconsin Electronic Disease Surveillance System (WEDSS)  
Created by the Milwaukee County COVID-19 Epidemiology Intel Team

## C. Crude and Age Adjusted Rates

Crude and age-adjusted incidence rates from March 2020 to the present are presented in **Table 1**. The highest incidence rates have occurred among the Hispanic population, followed by the NH Black/AA population. The lowest population-based rates are observed among NH White individuals. Gradients in incidence were observed by median household income, social vulnerability index, and proportion of essential workers. Age adjusted rates for race/ethnicity groups were adjusted using the US standard population for 2019. Age adjusted rates are similar to crude rates per 1000 for most race/ethnic groups, though age adjustment resulted in higher rates for Hispanic and NH Black/AA populations and a lower rate for non-Hispanic Whites, indicating that the White population affected by COVID-19 is generally older than Hispanic and Black/AA populations affected <sup>4</sup>.

**Table 1: Crude and Age Adjusted Rates and Rate Ratios: Cases**

Variables	N Cases	Population	Rate Per 1k	95% CI Rate Per 1k	Rate Ratio	Age Adjusted Rate Per 1k	95% CI Age Adjusted Rates	Age Adjusted Rate Ratio
<b>Race/Ethnicity</b>								
Hispanic	13872	140575	98.68	(97.13,100.25)	2.15	108.5	(108.35,108.65)	2.83
NH AIAN	269	5552	57.89	(51.43,65.09)	1.26	52.64	(52.62,52.66)	1.38
NH Asian	1905	40777	47.10	(45.07,49.22)	1.03	48.52	(48.47,48.58)	1.27
NH Black or AA	12074	252321	48.49	(47.65,49.34)	1.06	52.42	(52.28,52.56)	1.37
NH White	22678	493723	45.93	(45.35,46.52)	REF	38.28	(38.09,38.47)	REF
<b>Social Vulnerability Index</b>								
Q1: Lowest	12268	245582	49.95	(49.10,50.83)	REF			
Q2: Low-medium	16333	277965	58.76	(57.89,59.64)	1.18			
Q3: Medium-high	12079	199818	60.45	(59.41,61.51)	1.21			
Q4: Highest	14525	230844	62.92	(61.94,63.92)	1.26			
<b>Median Household Income</b>								
Q1: Lowest	28728	466586	61.57	(60.88,62.27)	1.30			
Q2: Low-medium	10091	172303	58.57	(57.46,59.69)	1.24			
Q3: Medium-high	10619	193137	54.98	(53.97,56.01)	1.16			
Q4: Highest	5767	122183	47.20	(46.02,48.41)	REF			
<b>Proportion of Workers in Essential Occupations</b>								
Q1: Lowest	16553	321665	51.46	(50.70,52.23)				
Q2: Low-medium	9645	163301	59.06	(57.93,60.22)	1.15			
Q3: Medium-high	7332	126383	58.01	(56.73,59.32)	1.13			
Q4: Highest	21675	342860	63.22	(62.41,64.04)	1.23			
*Age adjusted rates were adjusted using the [US standard population for 2019].								

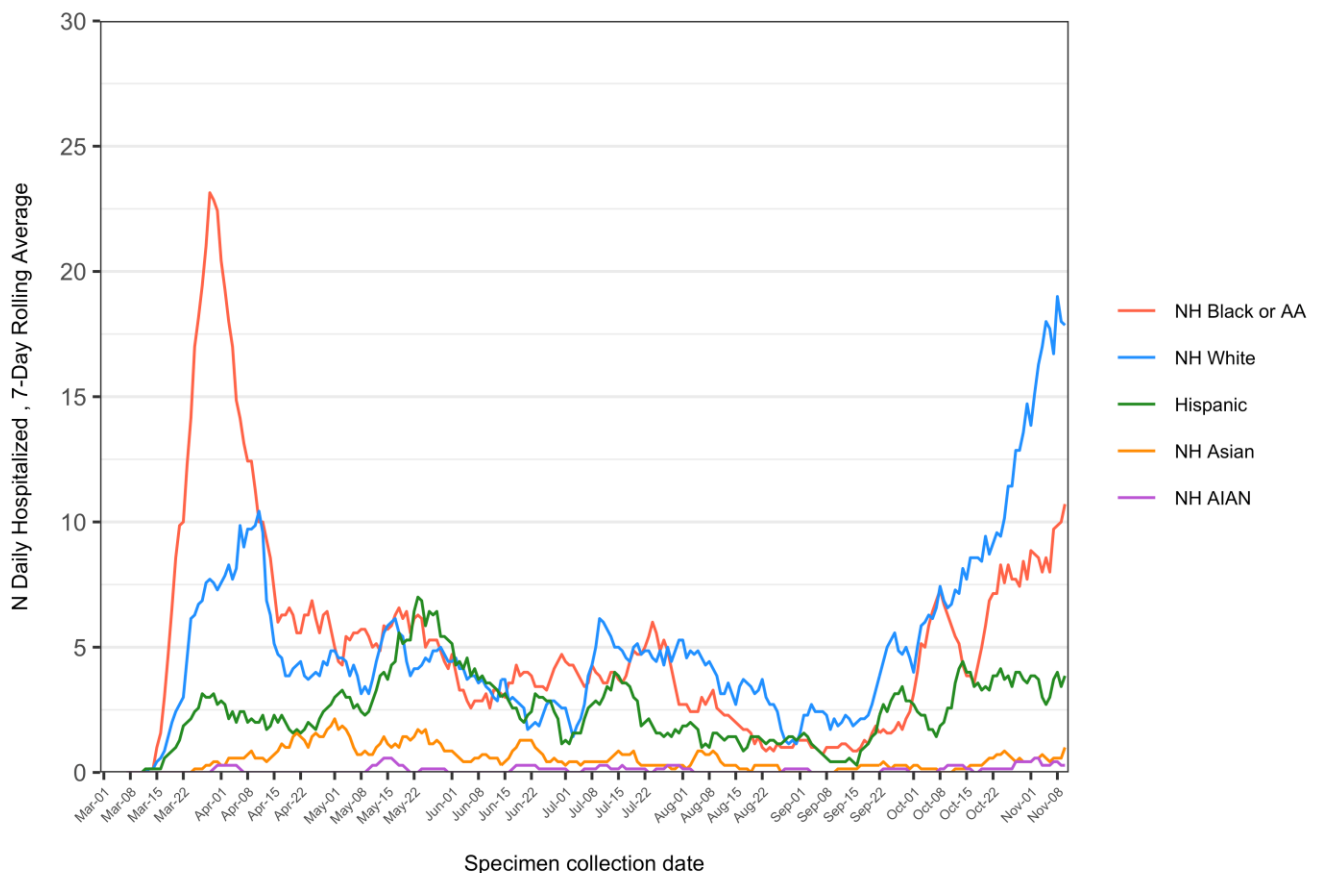
<sup>4</sup> National Center for Health Statistics. 2003. "Vintage 2019 postcensal estimates of the resident population of the United States (April 1, 2010, July 1, 2010-July 1, 2019), by year, county, single-year of age (0, 1, 2, ..., 85 years and over), bridged race, Hispanic origin, and sex." Prepared under a collaborative arrangement with the U.S. Census Bureau. [https://www.cdc.gov/nchs/nvss/bridged\\_race.htm](https://www.cdc.gov/nchs/nvss/bridged_race.htm)

## Section 2: Hospitalizations

### A. Daily Hospitalization Counts

We examined the distribution of daily COVID-19 hospitalizations by race/ethnicity and neighborhood characteristics in Milwaukee County over the course of the epidemic, using crude hospitalization counts with 7-day rolling averages for enhanced visualization. As shown in **Figure 11**, hospitalizations surged early in the epidemic, particularly among NH Black/AA individuals, with smaller surges among non-Hispanic White and Hispanic populations. A smaller surge among Hispanics occurred with a peak in late May. Hospitalizations tapered off to a low level as of early September but have since increased to levels not seen since the beginning of the epidemic.

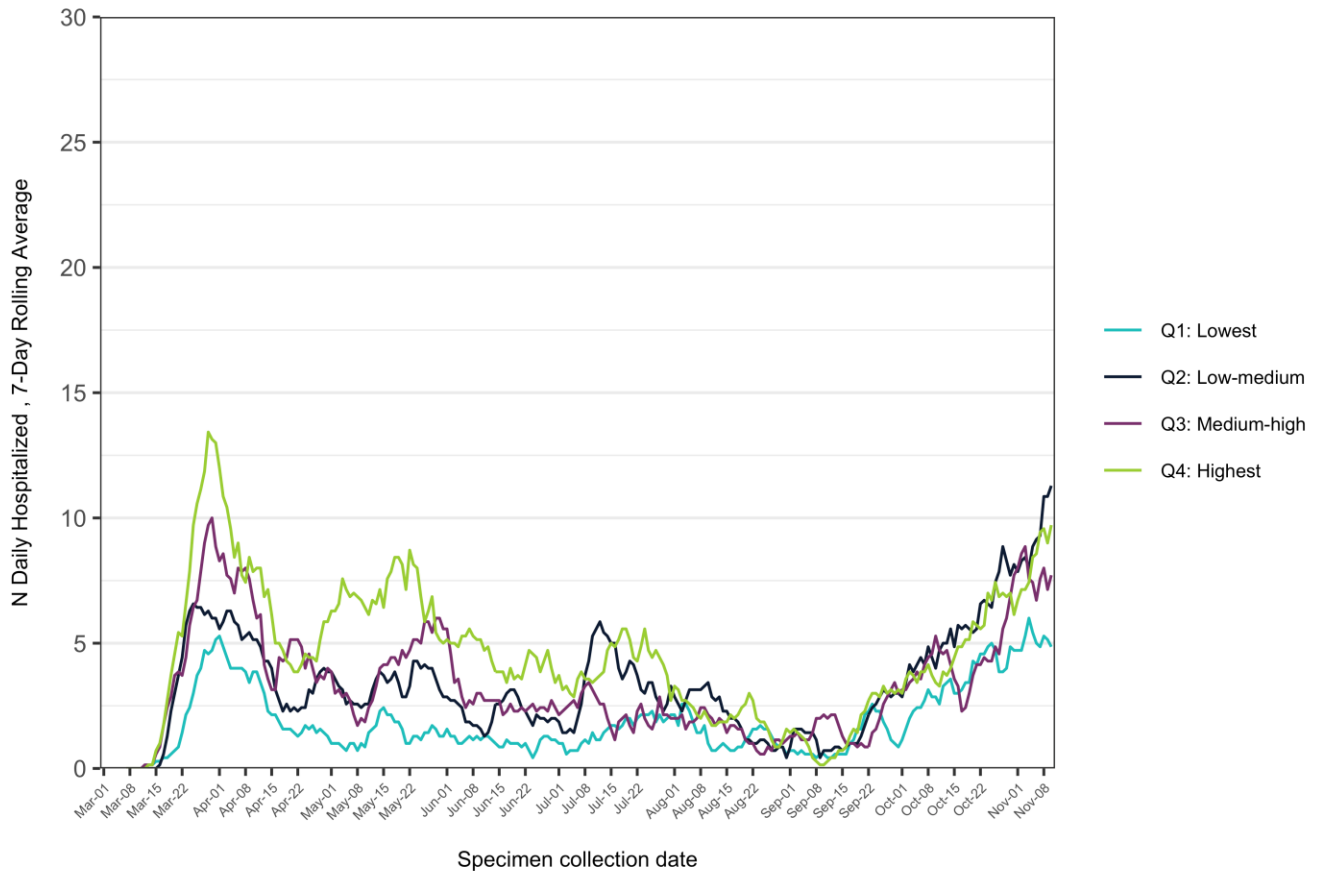
**Figure 11: COVID-19 Daily Hospitalization Counts by Race and Ethnicity**



Data source: Wisconsin Electronic Disease Surveillance System (WEDSS)  
Created by the Milwaukee County COVID-19 Epidemiology Intel Team

As shown in **Figure 12**, hospitalizations occurred most often among those living in tracts in the highest quartile of social vulnerability (i.e. the most socially vulnerable). After an initial peak in early April, hospitalizations have decreased overall, with a smaller surge in May which was again highest among those in the highest SVI quartile, and another in mid- to late-June among both those in the highest and low-medium SVI quartiles. There has been a recent surge in hospitalizations in October, with a slightly greater burden of cases among those living in tracts in the low-medium, medium-high and highest SVI quartiles.

**Figure 12: COVID-19 Daily Hospitalization Counts by Social Vulnerability Index Quartile**

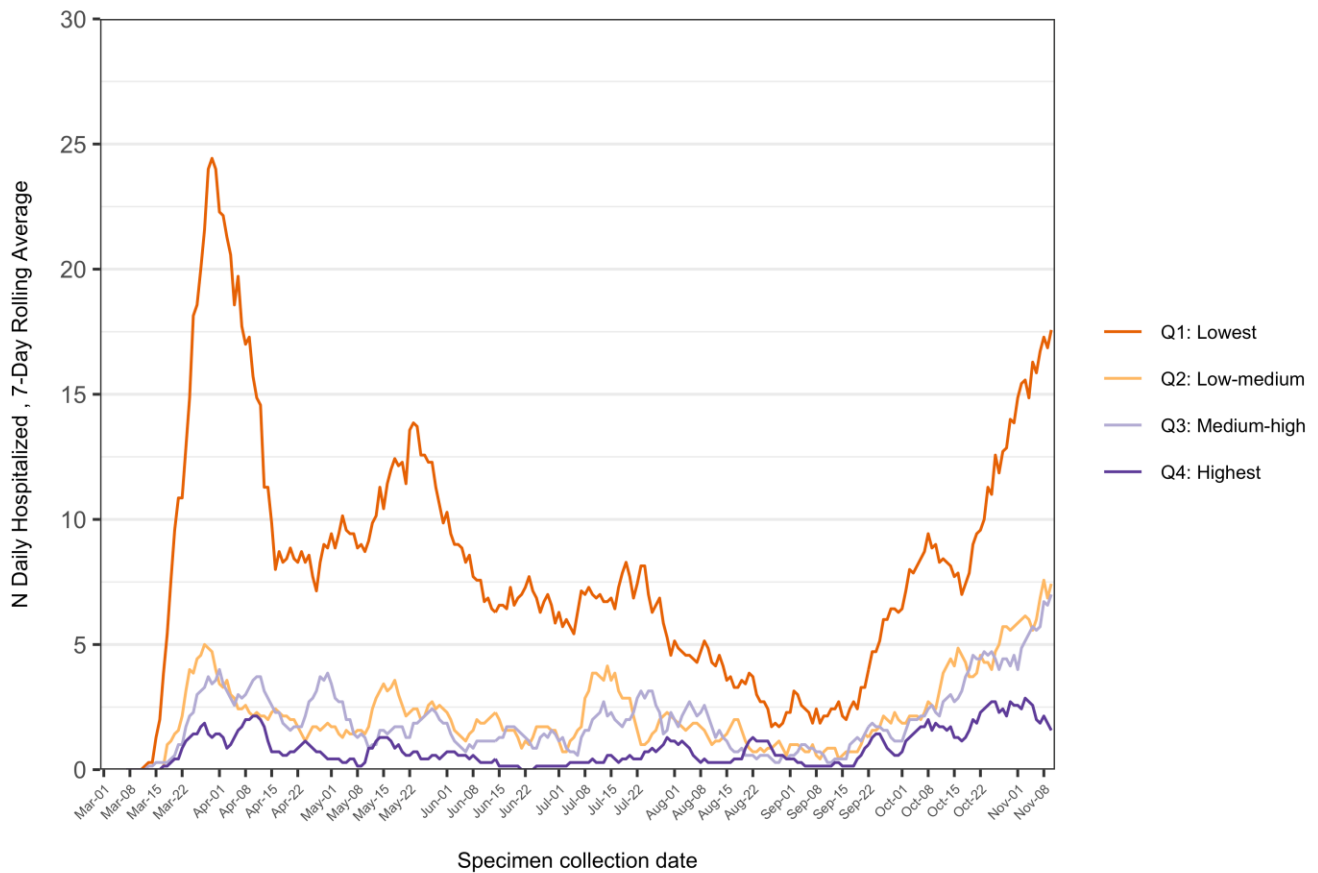


Data source: Wisconsin Electronic Disease Surveillance System (WEDSS)

Created by the Milwaukee County COVID-19 Epidemiology Intel Team

As shown in **Figure 13**, hospitalizations occurred most often among those living in tracts in the lowest income quartile.

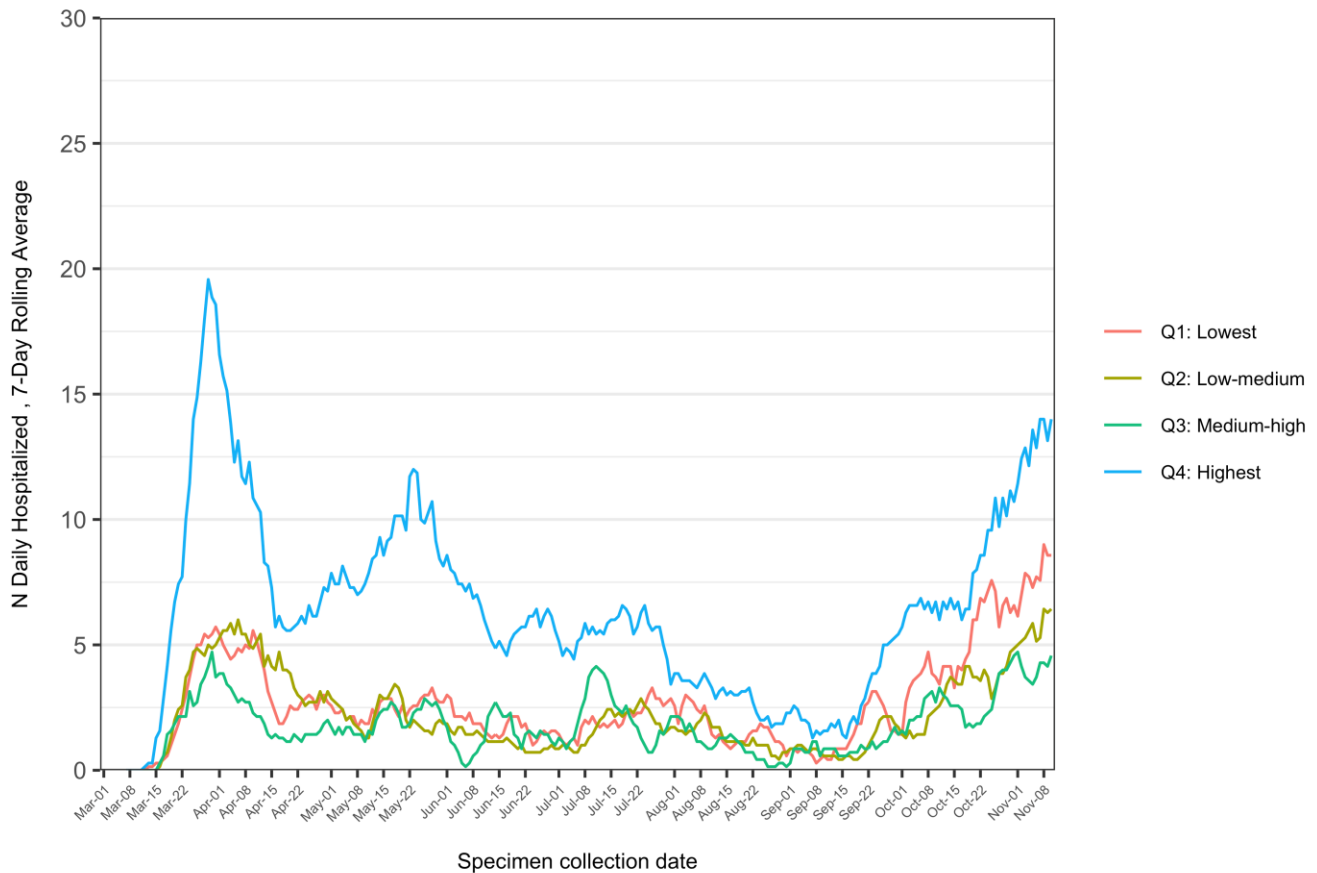
**Figure 13: COVID-19 Daily Hospitalization Counts by Median Household Income**



Data source: Wisconsin Electronic Disease Surveillance System (WEDSS)  
Created by the Milwaukee County COVID-19 Epidemiology Intel Team

As shown in **Figure 14**, hospitalizations occurred most often among those living in tracts with high proportions of essential workers. This is especially notable for the early surge that occurred mostly among Black/AAs, and the surge that peaked in mid-May, which primarily affected Hispanic individuals. However, the most recent surge beginning in September has also produced high hospitalizations among those living in areas with the highest proportion of essential workers.

**Figure 14: COVID-19 Daily Hospitalization Counts by Proportion of Workers in Essential Occupations**



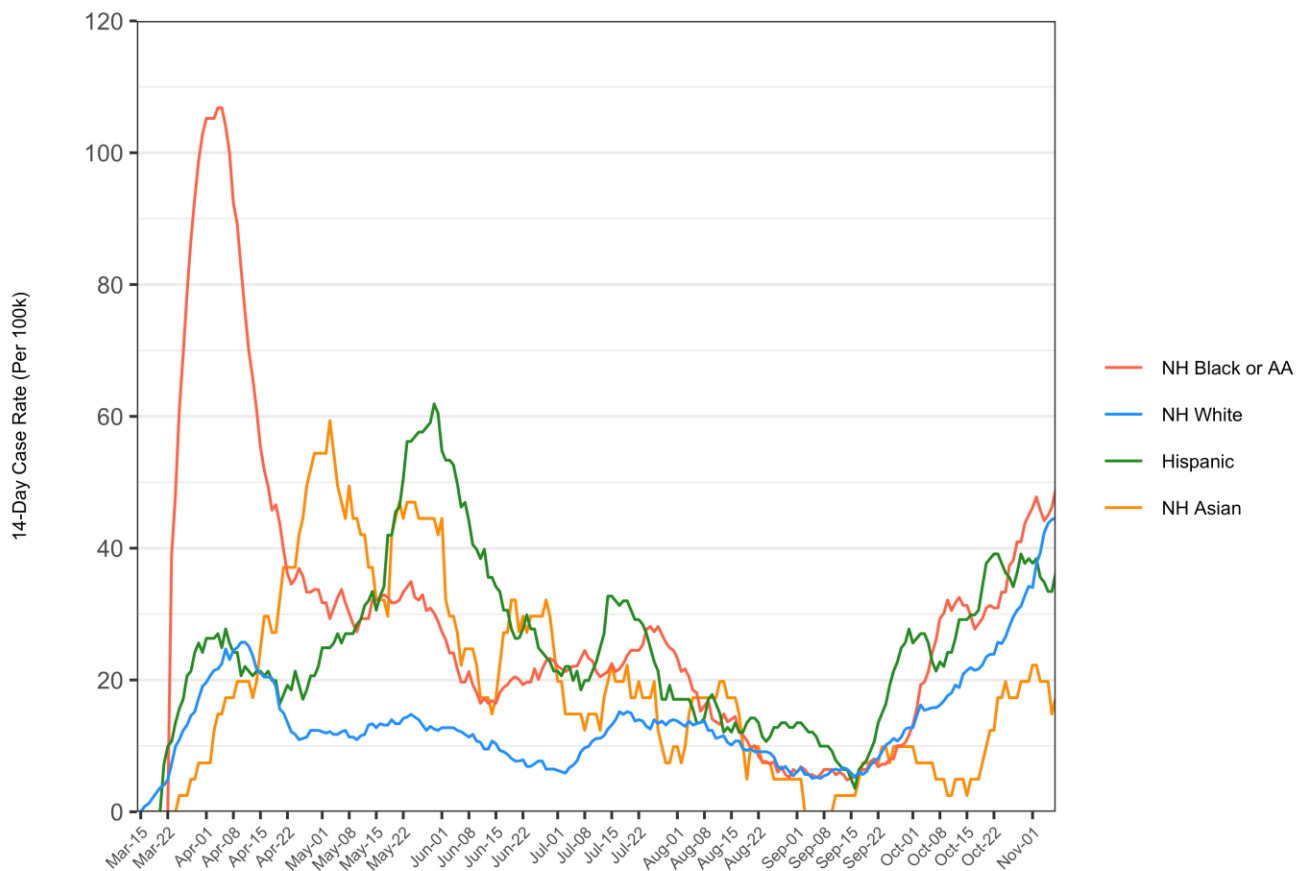
Data source: Wisconsin Electronic Disease Surveillance System (WEDSS)  
 Created by the Milwaukee County COVID-19 Epidemiology Intel Team



## B. 14-Day Hospitalization Rates per 100,000 people

**Figure 15** shows hospitalization rates per 100,000 people by race/ethnicity group, illustrating the very high initial hospitalization rates among the NH Black/AA population at the beginning of the pandemic. This was followed by surges among the Asian population peaking around May 1st, and amongst the Hispanic population peaking around June 1st. The most recent surge, beginning in September, has resulted in high hospitalization rates among NH Black/AA, Hispanic, and NH White populations. While not shown on the graph due to small numbers, hospitalizations among AIANs are also increasing.

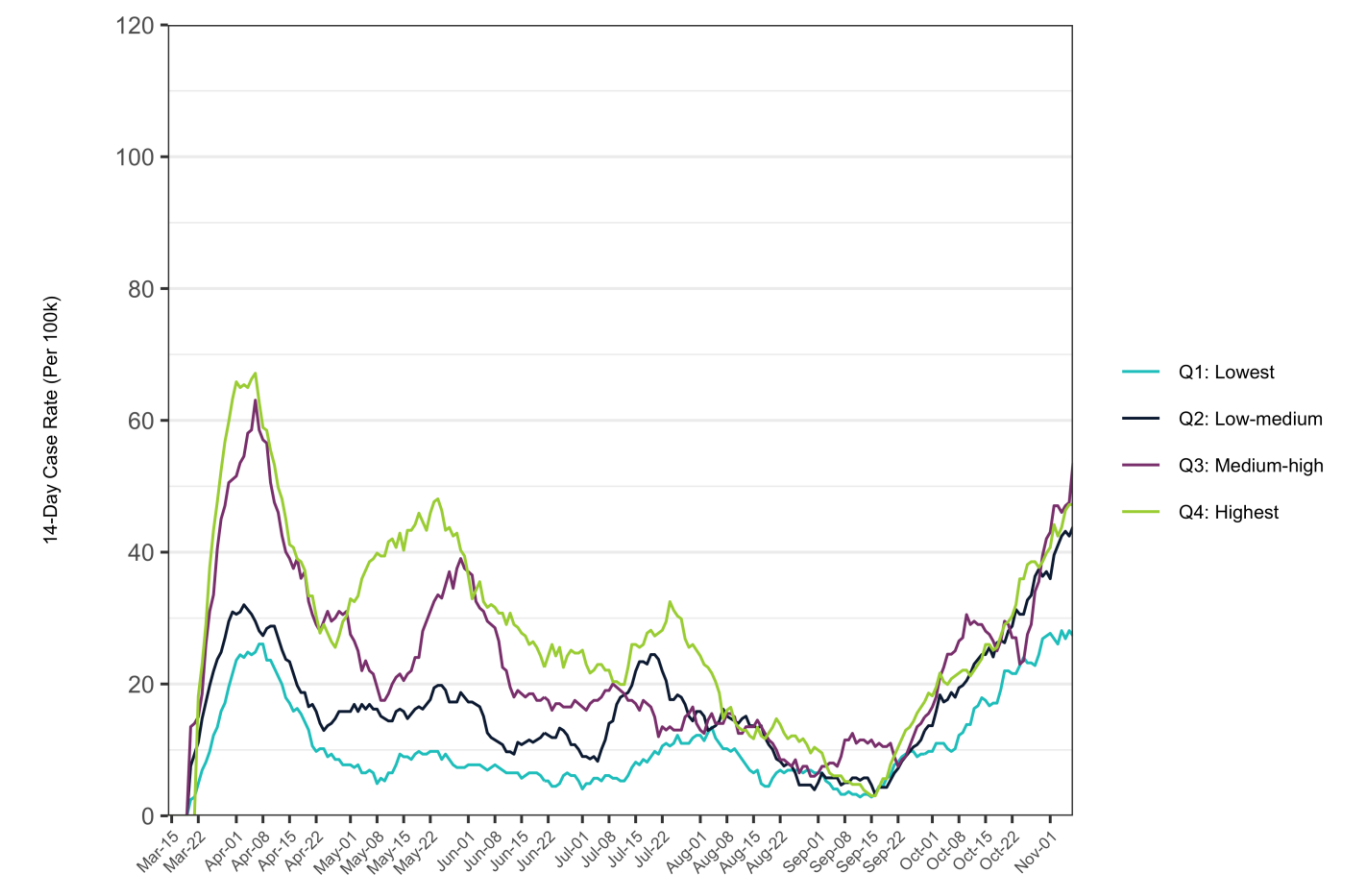
**Figure 15: 14-Day COVID-19 Hospitalization Rates by Race/Ethnicity**



Data source: Wisconsin Electronic Disease Surveillance System (WEDSS)  
Created by the Milwaukee County COVID-19 Epidemiology Intel Team

**Figure 16** shows hospitalization rates by SVI quartile, showing higher hospitalization rates among those living in tracts in the highest SVI quartiles across the pandemic, and following a similar pattern as that of race/ethnicity.

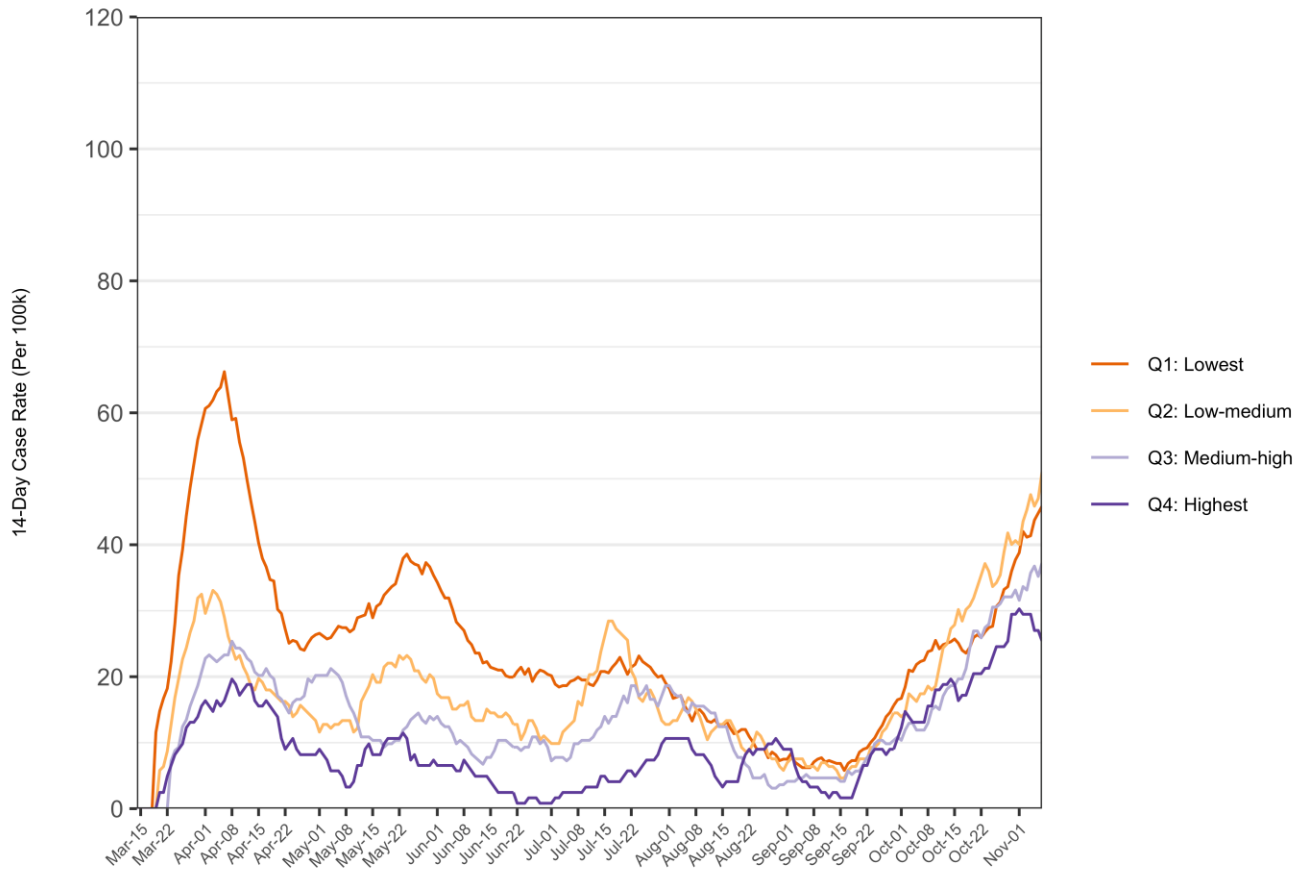
**Figure 16: 14-Day COVID-19 Hospitalization Rates by Social Vulnerability Index Quartile**



Data source: Wisconsin Electronic Disease Surveillance System (WEDSS)  
Created by the Milwaukee County COVID-19 Epidemiology Intel Team

**Figure 17** shows hospitalization rates by median household income, indicating higher hospitalization rates among those living in tracts in the lowest income quartile, until around July 8th, when the distribution of those hospitalized across quartiles of tract median household income began to even out, with the pattern of surges across the pandemic similar to other tract level indicators.

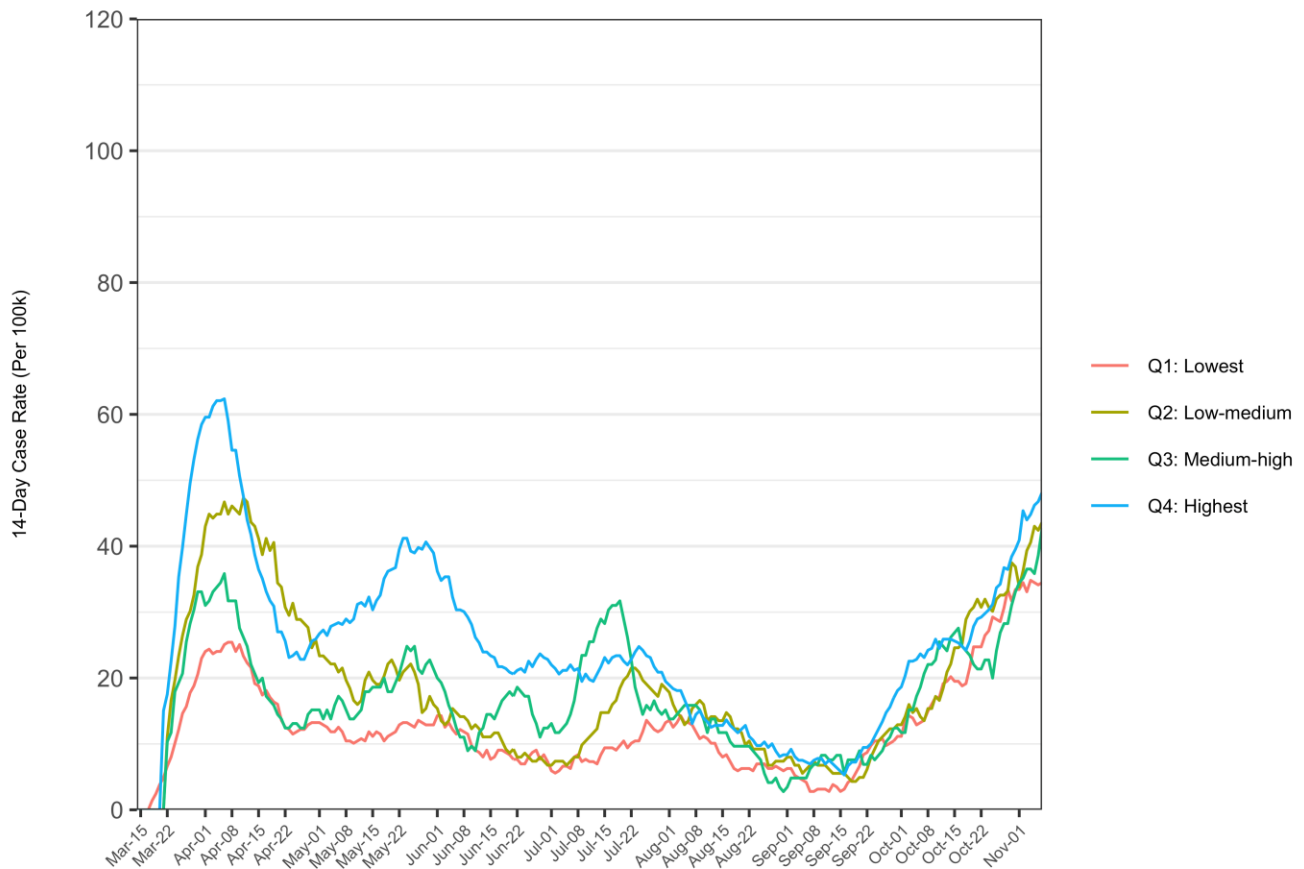
**Figure 17: 14-Day COVID-19 Hospitalization Rates by Median Household Income**



Data source: Wisconsin Electronic Disease Surveillance System (WEDSS)  
Created by the Milwaukee County COVID-19 Epidemiology Intel Team

**Figure 18** shows hospitalization rates by Proportion of Workers in Essential Occupations, indicating initially higher hospitalization rates among those who live in tracts with a greater Proportion of Workers in Essential Occupations. Similar to in **Figure 17**, the rates across individuals living in tracts of different quartiles begin to converge around July 15th, and surges followed a similar pattern as other tract level measures.

**Figure 18: 14-Day COVID-19 Hospitalization Rates by Proportion of Workers in Essential Occupations**



Data source: Wisconsin Electronic Disease Surveillance System (WEDSS)

Created by the Milwaukee County COVID-19 Epidemiology Intel Team

## C. Crude and Age Adjusted Rates

Crude & age adjusted hospitalization rates are presented in **Table 2**. NH Black/AA, Hispanic and NH AIAN populations have the highest crude & age adjusted hospitalization rates, with higher variability in the AIAN rate due to small numbers. Hospitalization rates are lowest among non-Hispanic Whites. With regard to neighborhood characteristics, a clear gradient is observed for each measure, with higher vulnerability, lower income, and higher proportion of essential workers associated with higher rates of hospitalization.

**Table 2: Crude and Age Adjusted Rates and Rate Ratios: Hospitalizations**

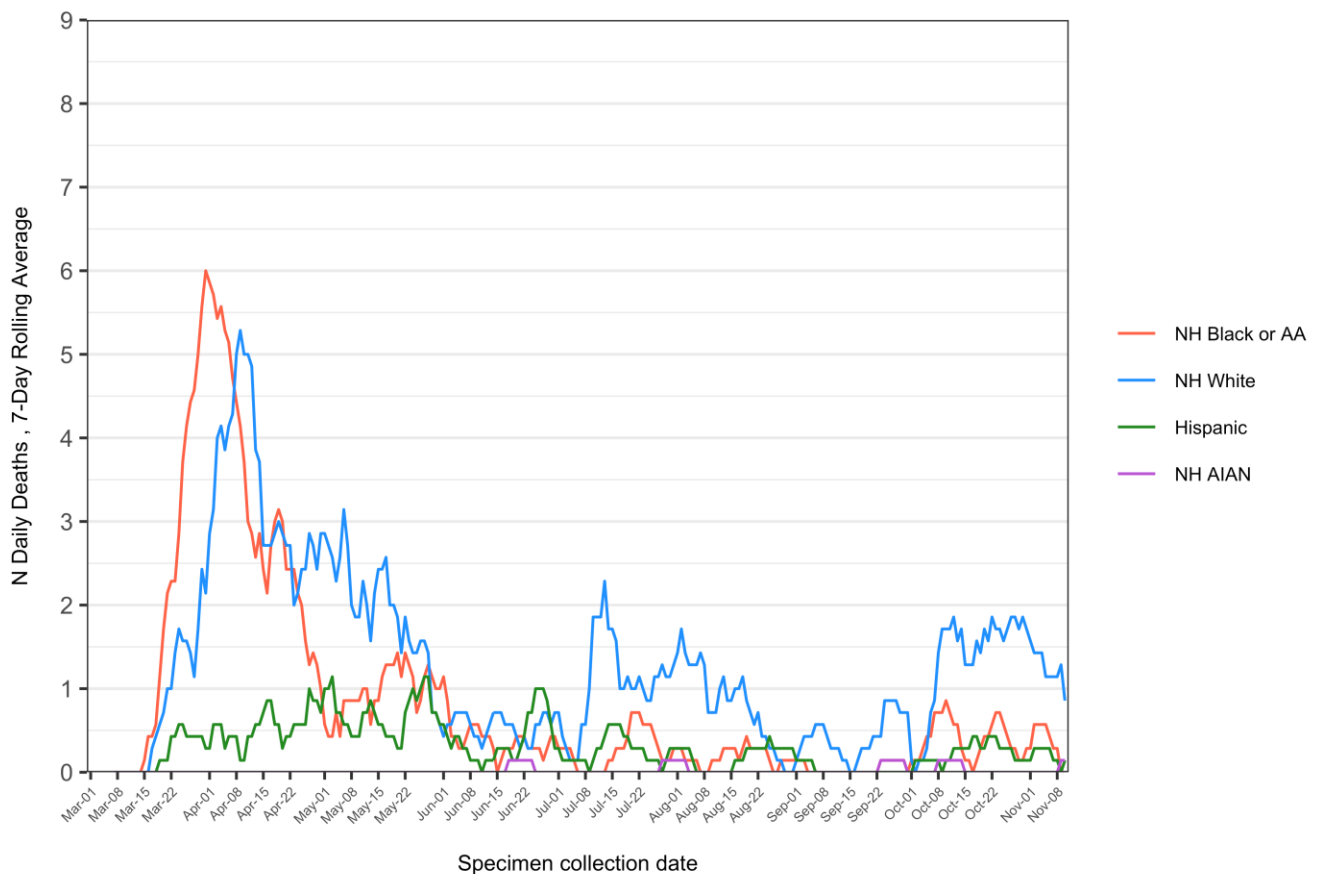
Variables	N Hospitalized Cases	Population	Rate Per 1k	95% CI Rate Per 1k	Rate Ratio	Age Adjusted Rate Per 1k	95% CI Age Adjusted Rates	Age Adjusted Rate Ratio
<b>Race/Ethnicity</b>								
Hispanic	633	140575	4.50	(4.16,4.87)	1.69	8.09	(8.05,8.12)	4.07
NH AIAN	27	5552	5.81	(3.91,8.57)	2.18	12.25	(12.25,12.26)	6.16
NH Asian	138	40777	3.41	(2.88,4.04)	1.28	5.76	(5.74,5.77)	2.89
NH Black or AA	1326	252321	5.33	(5.04,5.62)	2.00	7.11	(7.07,7.16)	3.57
NH White	1314	493723	2.66	(2.52,2.81)	REF	1.99	(1.94,2.03)	REF
<b>Social Vulnerability Index</b>								
Q1: Lowest	508	245582	2.07	(1.89,2.26)	REF			
Q2: Low-medium	913	277965	3.28	(3.08,3.51)	1.58			
Q3: Medium-high	891	199818	4.46	(4.17,4.76)	2.15			
Q4: Highest	1208	230844	5.23	(4.94,5.54)	2.53			
<b>Median Household Income</b>								
Q1: Lowest	2160	466586	4.63	(4.44,4.83)	2.59			
Q2: Low-medium	602	172303	3.49	(3.22,3.79)	1.95			
Q3: Medium-high	539	193137	2.79	(2.56,3.04)	1.56			
Q4: Highest	219	122183	1.79	(1.57,2.05)	REF			
<b>Proportion of Workers in Essential Occupations</b>								
Q1: Lowest	728	321665	2.26	(2.10,2.44)				
Q2: Low-medium	590	163301	3.61	(3.33,3.92)	1.60			
Q3: Medium-high	490	126383	3.88	(3.55,4.24)	1.72			
Q4: Highest	1712	342860	4.99	(4.76,5.24)	2.21			
*Age adjusted rates were adjusted using the [US standard population for 2019].								

## Section 3: Deaths

Deaths are defined based on WEDSS death data, as any death including COVID-19 as a primary or contributing cause. We first examine the distribution of COVID-19 deaths by race/ethnicity, and neighborhood characteristics in Milwaukee County over the course of the epidemic, using crude death counts with a 7-day rolling average for enhanced visualization. As shown in **Figure 19**, deaths peaked early among NH Black/AA, and NH White populations. We observed a smaller surge in deaths among non-Hispanic White individuals again in July, and again beginning in October.

### A. Daily Death Counts

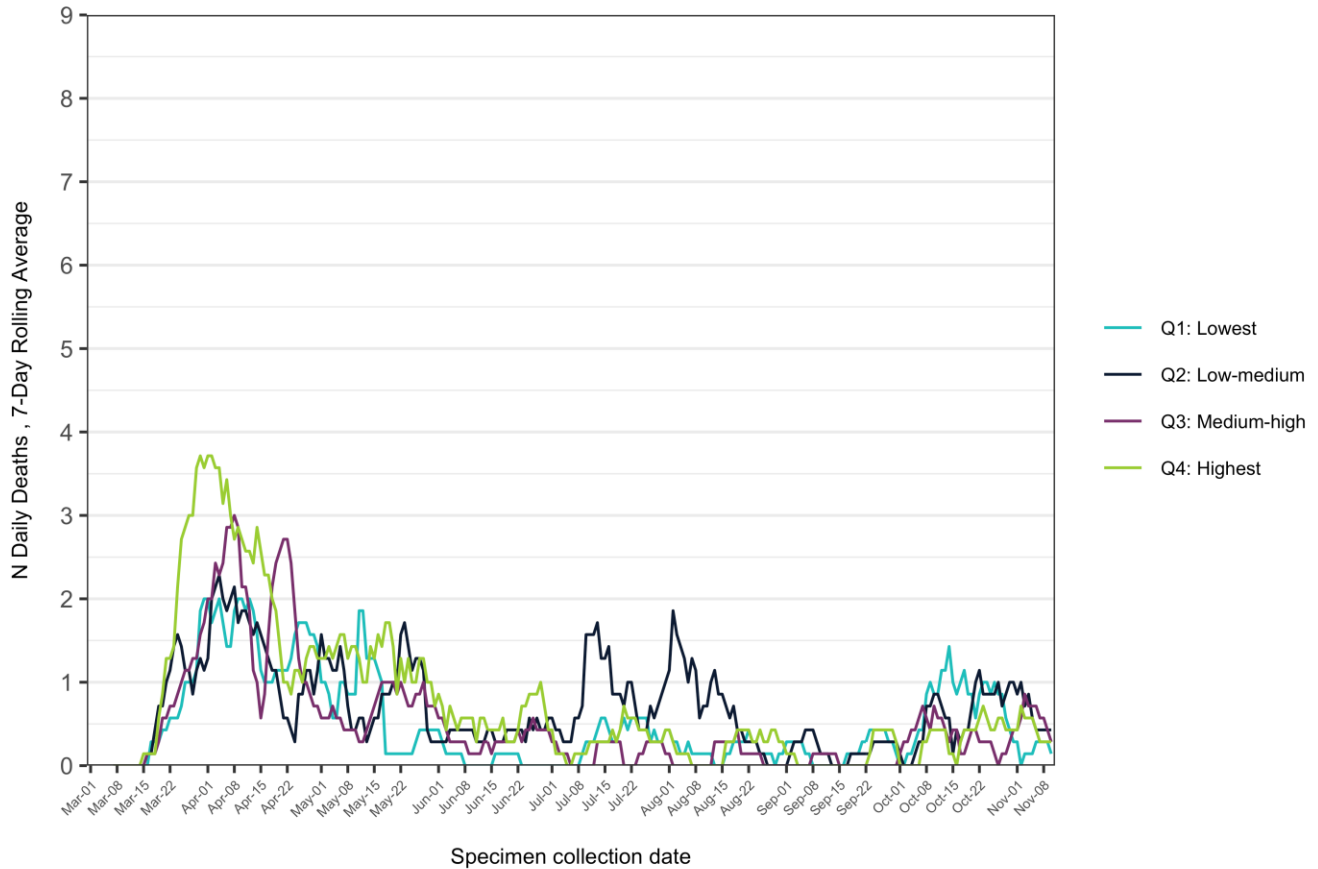
**Figure 19: COVID-19 Daily Death Counts by Race and Ethnicity**



Data source: Wisconsin Electronic Disease Surveillance System (WEDSS)  
Created by the Milwaukee County COVID-19 Epidemiology Intel Team

**Figure 20** illustrates crude deaths by quartile of SVI, showing that deaths occurred predominantly among those living in tracts in the highest quartile of the SVI with a peak early in the epidemic, but a smaller surge among those in the low-medium SVI quartile between mid-July, and mid-August.

**Figure 20: COVID-19 Daily Death Counts by Social Vulnerability Index**

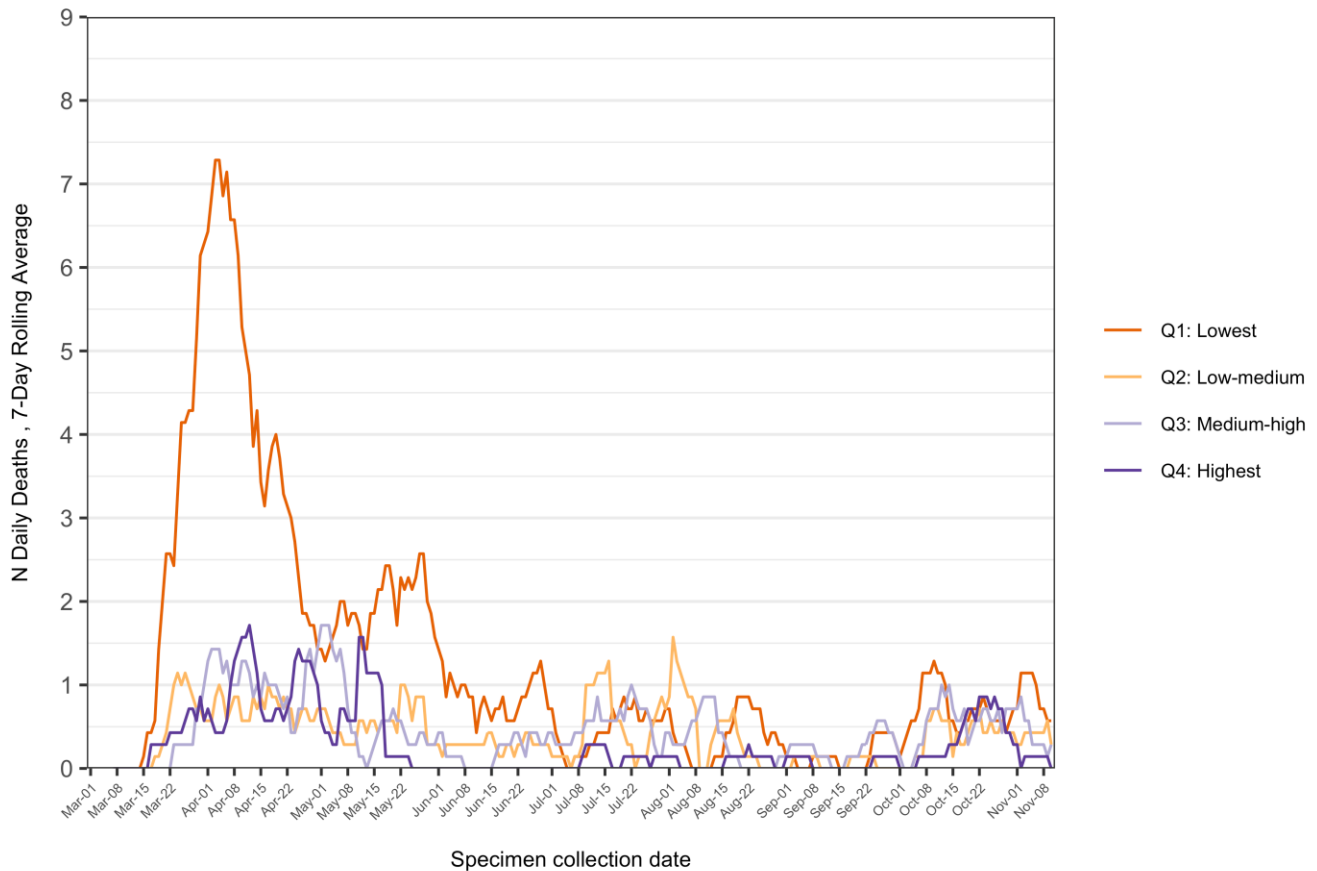


Data source: Wisconsin Electronic Disease Surveillance System (WEDSS)

Created by the Milwaukee County COVID-19 Epidemiology Intel Team

**Figure 21** illustrates daily deaths by median household income at the tract level. The earliest deaths, peaking on around April 1st, occurred among individuals living in tracts in the lowest quartile of median household income, with a second smaller peak towards the end of May in this same group. Deaths drastically decreased among individuals living in tracts in all median household income quartiles thereafter.

**Figure 21: COVID-19 Daily Death Counts by Median Household Income**

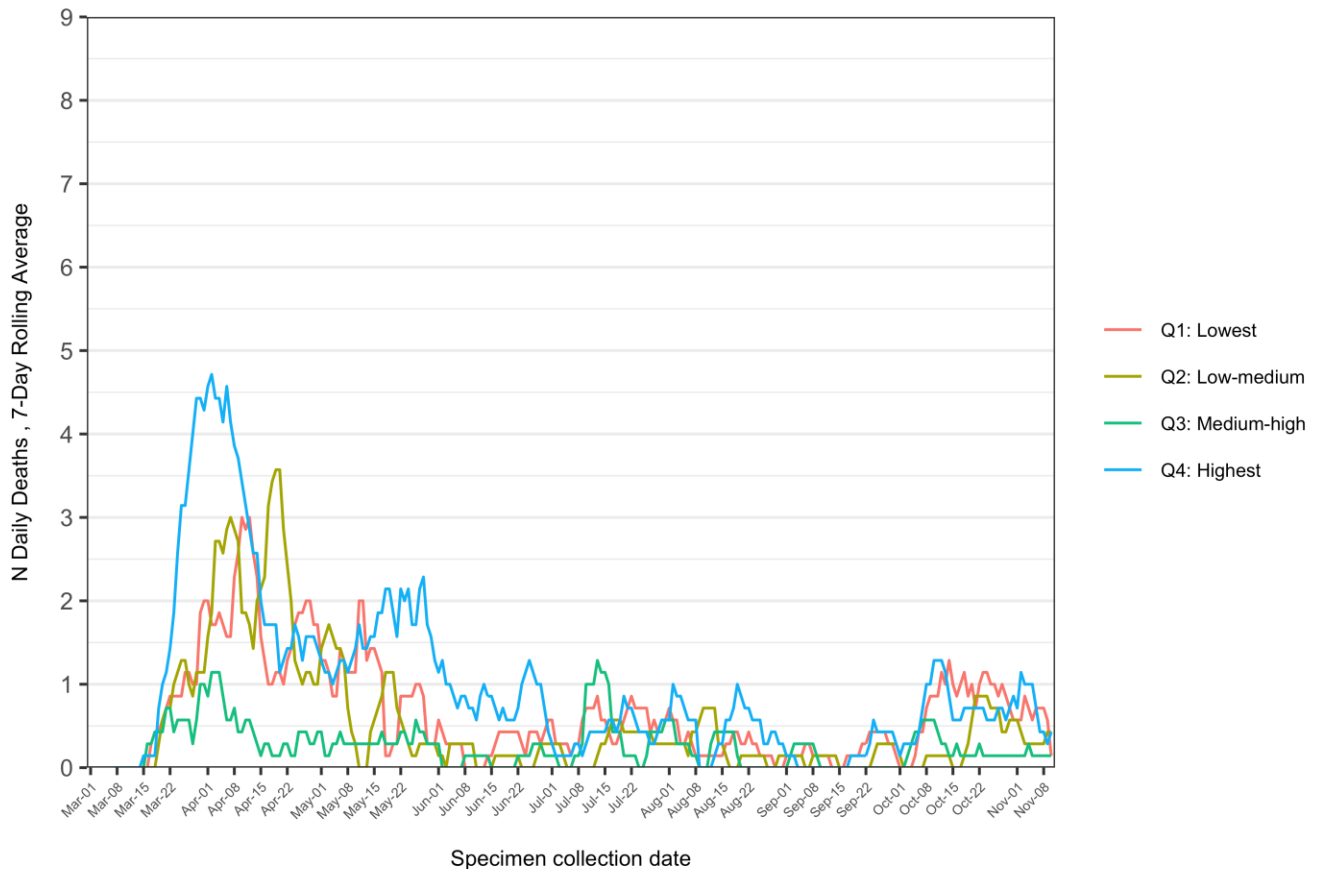


Data source: Wisconsin Electronic Disease Surveillance System (WEDSS)  
 Created by the Milwaukee County COVID-19 Epidemiology Intel Team



**Figure 22** illustrates daily deaths by tract proportion of essential workers. The earliest deaths, peaking around April 1st, occurred among individuals living in tracts in the highest quartile for proportion of essential workers, with a second smaller surge among this group in mid- to late-May. By July, the number of deaths decreased, and converged across individuals living all four quartiles.

**Figure 22: COVID-19 Daily Death Counts by Proportion of Workers in Essential Occupations**



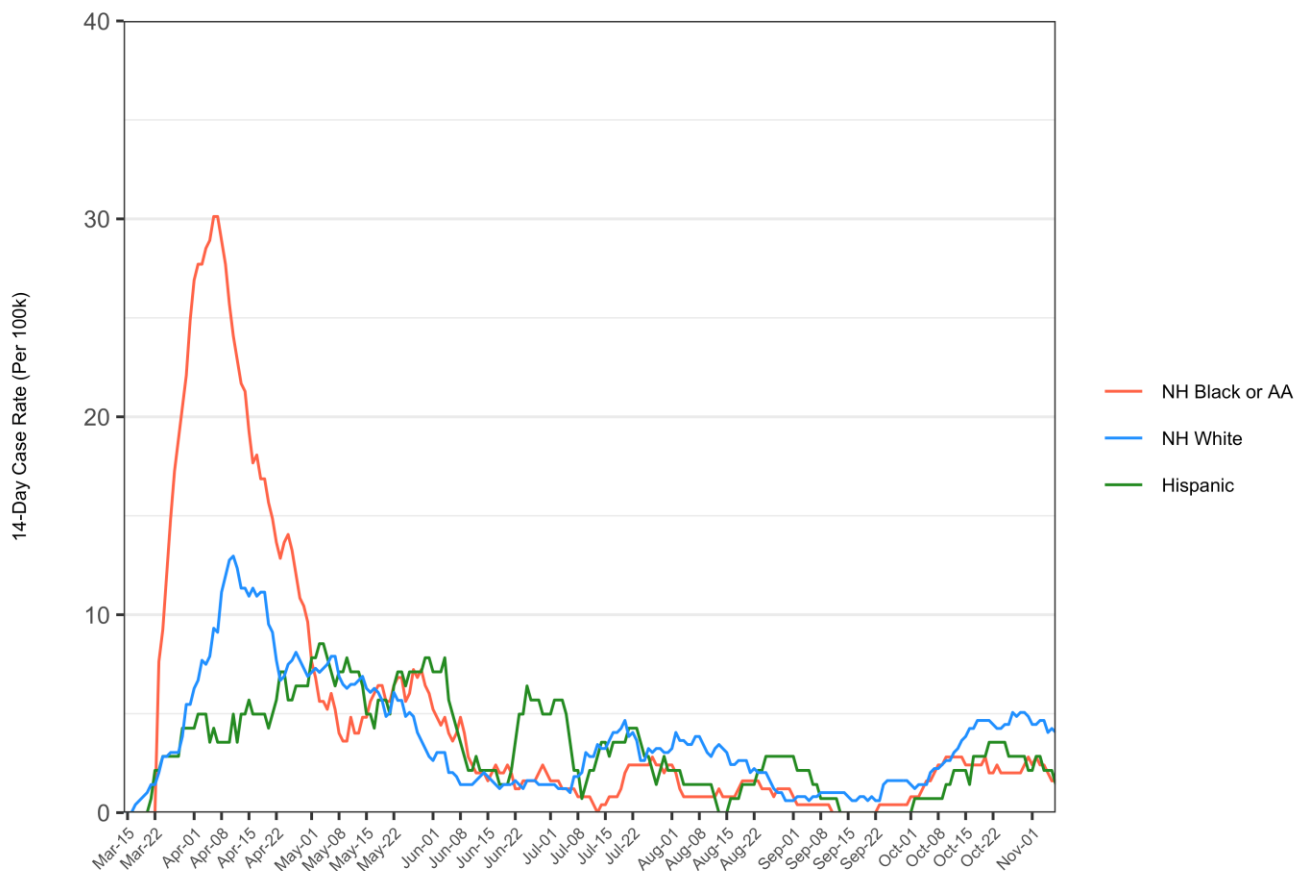
Data source: Wisconsin Electronic Disease Surveillance System (WEDSS)

Created by the Milwaukee County COVID-19 Epidemiology Intel Team

## B. 14-Day Death Rates per 100,000 people

**Figure 23** shows death rates per 100,000 persons by race/ethnicity group, illustrating the very high initial death rate among the Black/AA population at the beginning of the epidemic.

**Figure 23: 14-Day COVID-19 Death Rates by Race/Ethnicity**

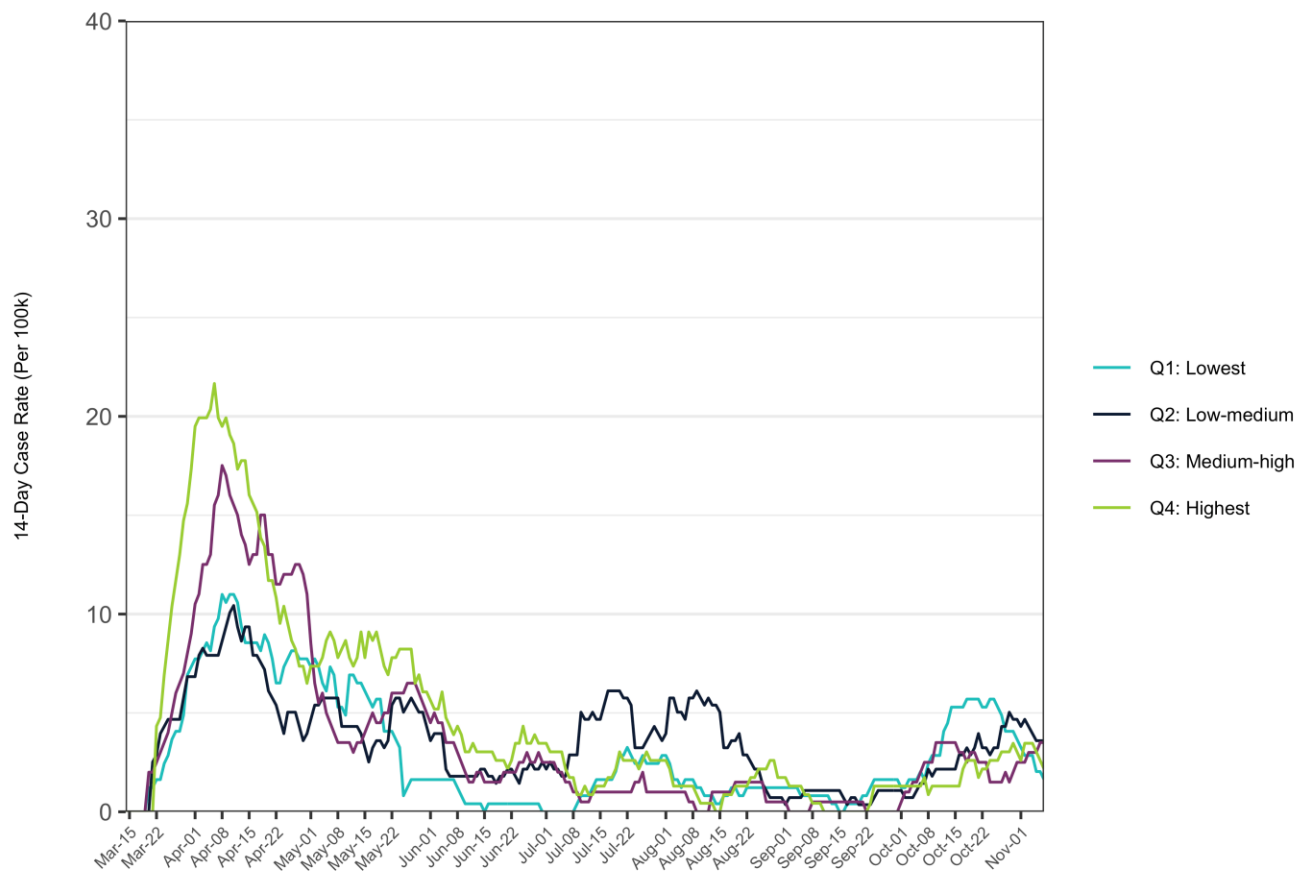


Data source: Wisconsin Electronic Disease Surveillance System (WEDSS)

Created by the Milwaukee County COVID-19 Epidemiology Intel Team

**Figure 24** shows death rates by SVI quartile, indicating higher death rates among those living in tracts falling in the highest SVI quartile early on in the pandemic, while the recent surge has shown higher deaths in the lowest SVI quartile.

**Figure 24: 14-Day COVID-19 Death Rates by Social Vulnerability Index**

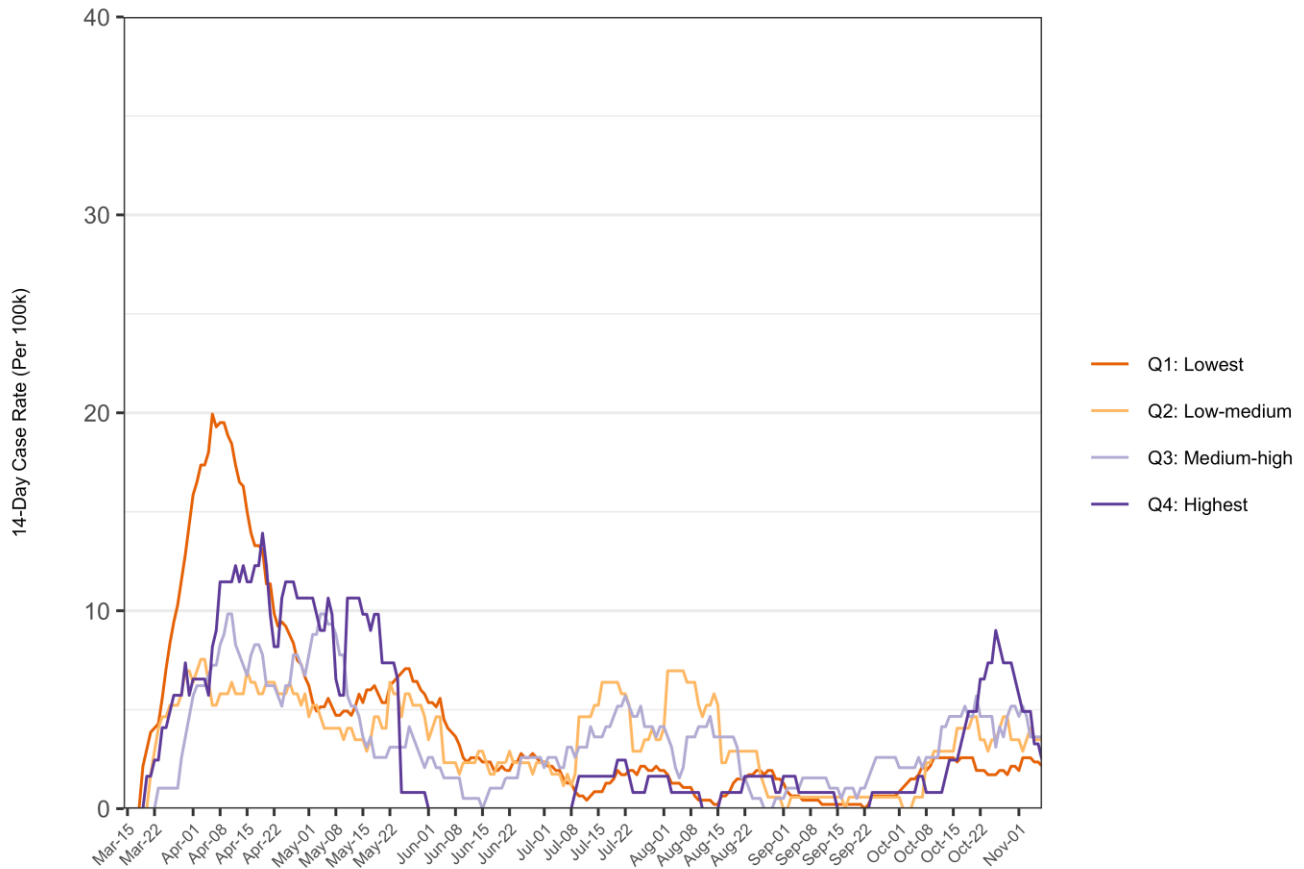


Data source: Wisconsin Electronic Disease Surveillance System (WEDSS)

Created by the Milwaukee County COVID-19 Epidemiology Intel Team

**Figure 25** shows that death rates among those living in tracts according to median household income quartiles followed a similar pattern as SVI, with initially high death rates among those living in tracts falling in the lowest quartile of median household income, and a more recent peak among those living in the highest income quartile.

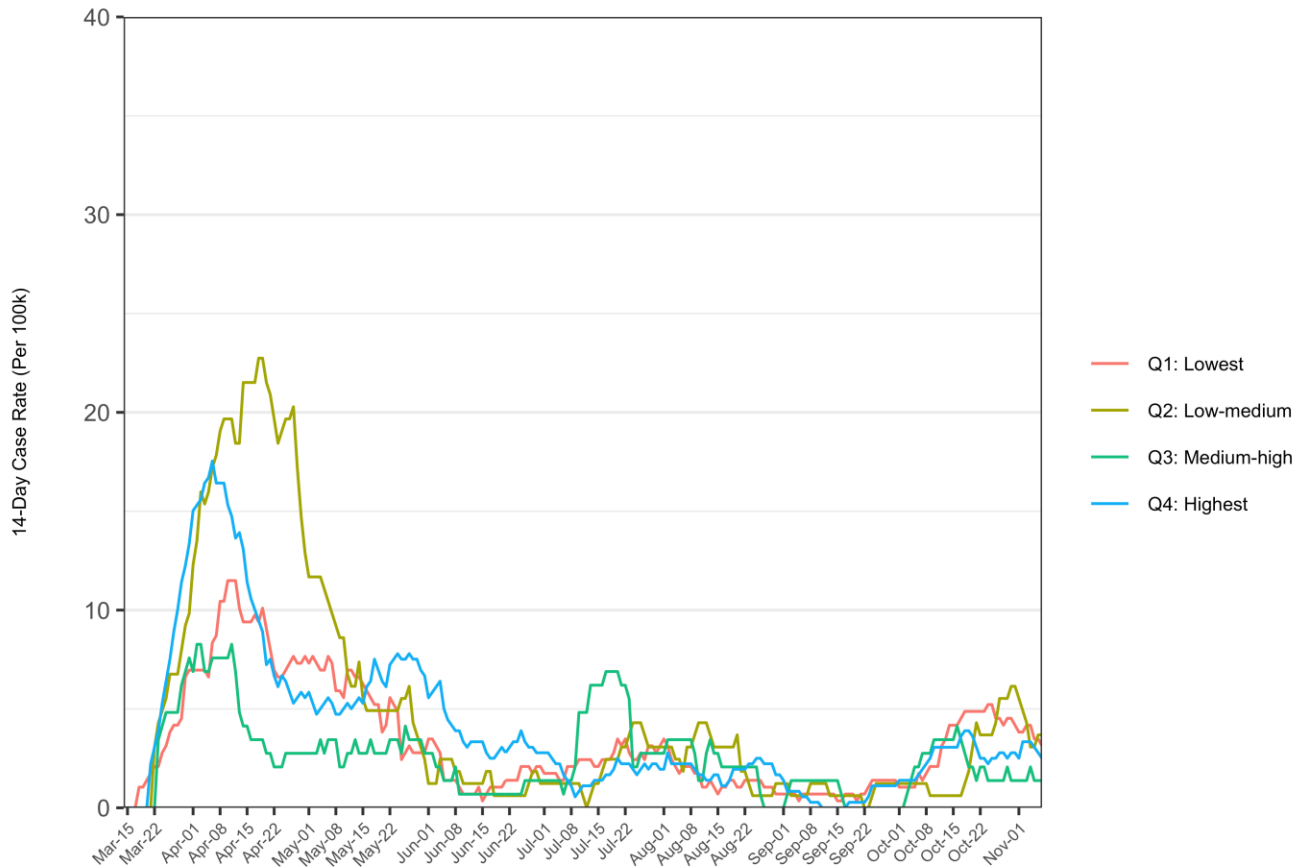
**Figure 25: 14-Day COVID-19 Death Rates by Median Household Income**



Data source: Wisconsin Electronic Disease Surveillance System (WEDSS)  
Created by the Milwaukee County COVID-19 Epidemiology Intel Team

**Figure 26** shows death rates among those living in tracts according to quartile of percentage of workers in essential occupations. High death rates occurred among all groups early on in the pandemic with the highest rates among those living in the low-median and highest quartile.

**Figure 26: 14-Day COVID-19 Death Rates by Proportion of Workers in Essential Occupations**



Data source: Wisconsin Electronic Disease Surveillance System (WEDSS)

Created by the Milwaukee County COVID-19 Epidemiology Intel Team

## C. Crude and Age Adjusted Rates

Crude and age adjusted death rates are presented in **Table 3**. The highest crude and age adjusted death rates are observed for the NH Black/AA population. NH Whites have the second highest crude rate, while Hispanics have the second highest age adjusted rate, indicating that deaths among NH Whites occurred more in older populations as compared to NH Black/AA and Hispanic populations. With regard to neighborhood characteristics, gradients that were observed for case and hospitalization rates were not observed for deaths, though the highest death rate is observed for those in the highest SVI quartile and the lowest income quartile.

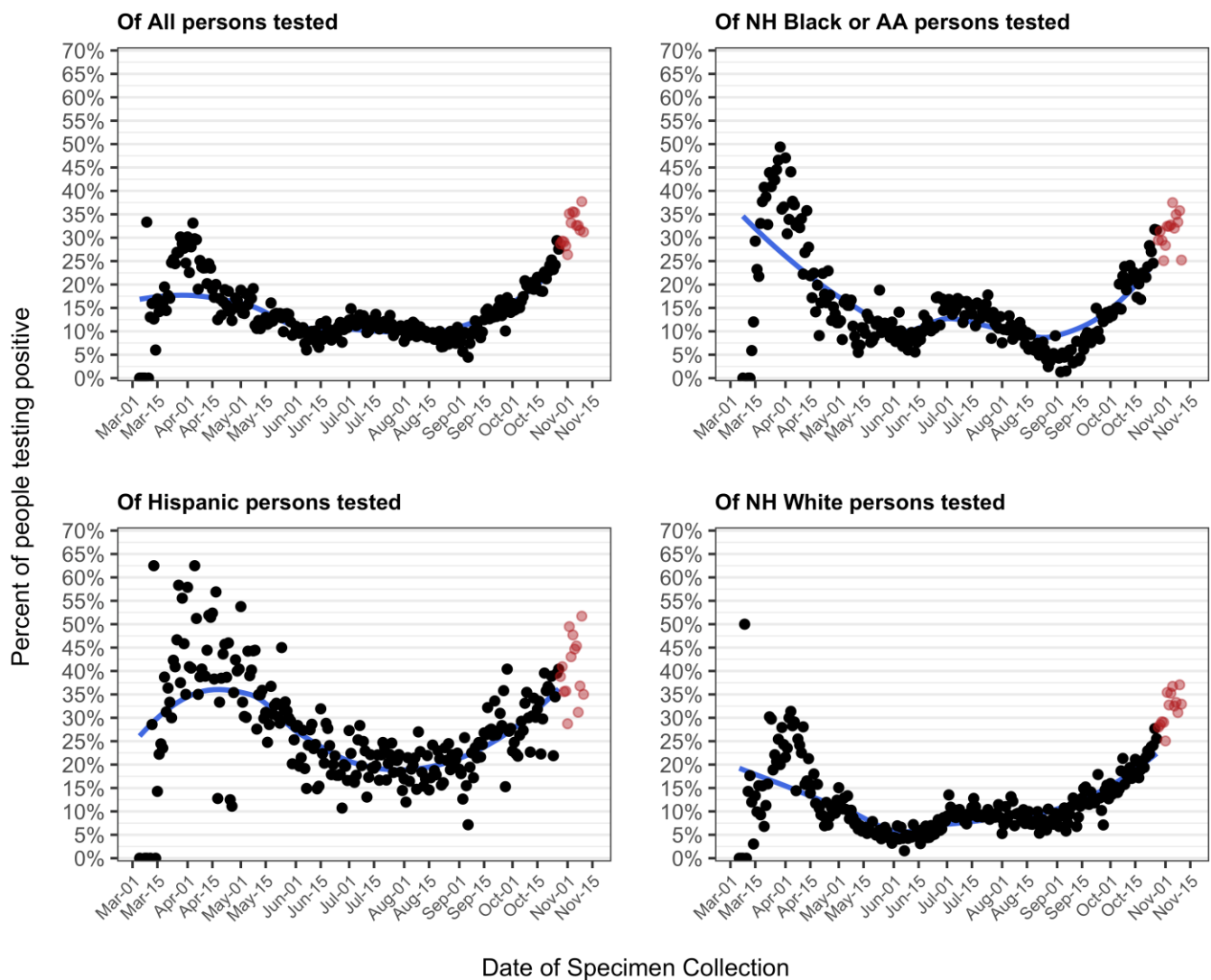
**Table 3: Crude and Age Adjusted Rates and Rate Ratios: Deaths**

Variables	N Deaths	Population	Rate Per 1k	95% CI Rate Per 1k	Rate Ratio	Age Adjusted Rate Per 1k	95% CI Age Adjusted Rates	Age Adjusted Rate Ratio
<b>Race/Ethnicity</b>								
Hispanic	79	140575	0.56	(0.45,0.70)	0.85	1.32	(1.31,1.33)	3.00
NH AIAN	<10	5552						
NH Asian	20	40777	0.49	(0.31,0.78)	0.74	1.18	(1.18,1.19)	2.68
NH Black or AA	216	252321	0.87	(0.76,0.99)	1.32	1.41	(1.40,1.43)	3.20
NH White	325	493723	0.66	(0.59,0.73)	REF	0.44	(0.42,0.46)	REF
<b>Social Vulnerability Index</b>								
Q1: Lowest	136	245582	0.55	(0.47,0.66)	REF			
Q2: Low-medium	183	277965	0.66	(0.57,0.76)	1.20			
Q3: Medium-high	133	199818	0.67	(0.56,0.79)	1.22			
Q4: Highest	201	230844	0.87	(0.76,1.00)	1.58			
<b>Median Household Income</b>								
Q1: Lowest	347	466586	0.74	(0.67,0.83)	1.21			
Q2: Low-medium	109	172303	0.63	(0.52,0.77)	1.03			
Q3: Medium-high	122	193137	0.63	(0.53,0.76)	1.03			
Q4: Highest	75	122183	0.61	(0.49,0.77)	REF			
<b>Proportion of Workers in Essential Occupations</b>								
Q1: Lowest	175	321665	0.54	(0.47,0.63)				
Q2: Low-medium	140	163301	0.86	(0.72,1.01)	1.59			
Q3: Medium-high	72	126383	0.57	(0.45,0.72)	1.06			
Q4: Highest	266	342860	0.78	(0.69,0.88)	1.44			
*Age adjusted rates were adjusted using the [US standard population for 2019].								

## Section 4: Testing

**Figure 27** illustrates the percentage of individuals tested for COVID-19 by racial and ethnic group who were ever confirmed positive for the disease. Each person who tests positive is counted in the numerator only once. The last two weeks of data are highlighted in red to indicate potential rate instability due to reporting delays. Panel A illustrates the percent of individuals confirmed positive overall. As illustrated in Panel B, the percent of NH Black/AAs confirmed positive was very high early in the pandemic, indicating an overall lack of testing in this population at precisely the time that cases among NH Black/AA residents surged. A similar pattern is seen among Hispanics, although the number of cases confirmed early in the epidemic was smaller in magnitude among this population. NH Whites also experienced a high percent of individuals tested who were confirmed positive, although this percentage ranged between 15-30% for most days early in the epidemic, while daily percent positive ranges were higher (30-50%) among NH Black/AA and Hispanic populations.

**Figure 27: Daily Percent Positive of Individuals Tested Confirmed Positive for COVID-19**

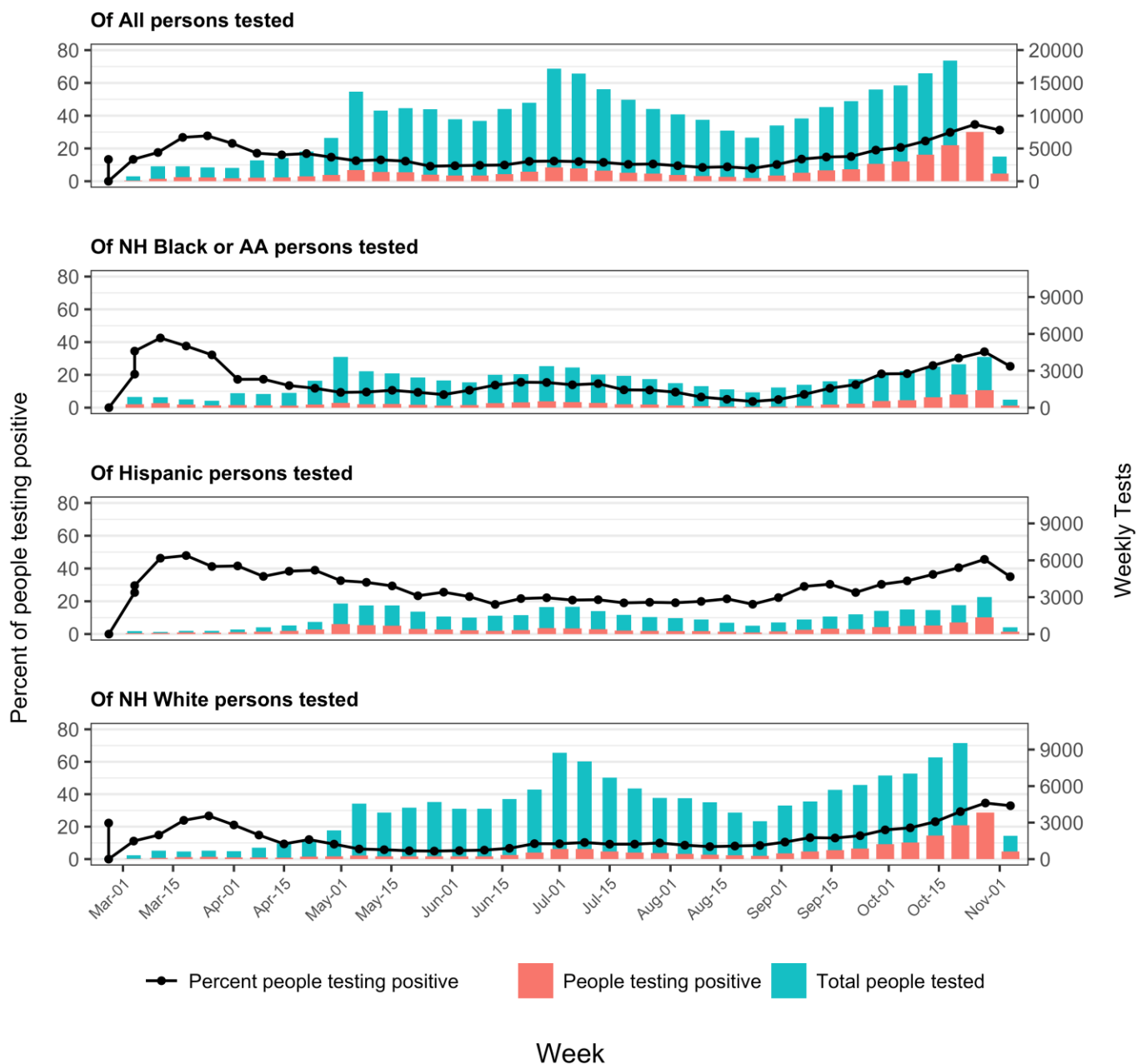


Data source: Wisconsin Electronic Disease Surveillance System (WEDSS)

Created by the Milwaukee County COVID-19 Epidemiology Intel Team

**Figure 28: All Persons Tested and Positivity Rate per Persons Tested per Week**

**Figure 28** shows the proportion of those who tested positive on the left axis along with volume tested on the right axis, over time. An individual is only counted once in the data. Note that the scales of the number of weekly tests differ between the plot for all persons versus the plots of specific race/ethnicity groups.



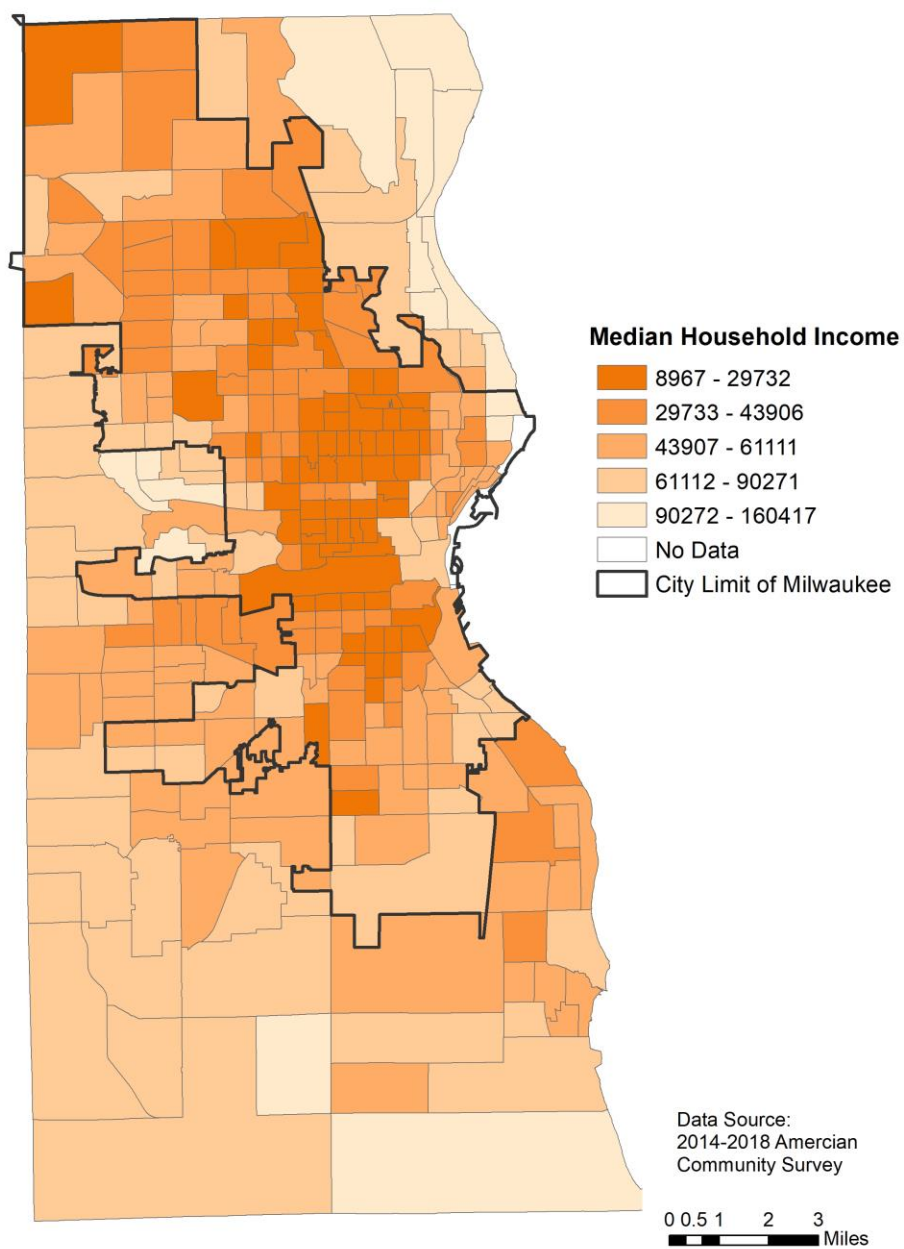
Data source: Wisconsin Electronic Disease Surveillance System (WEDSS)  
Created by the Milwaukee County COVID-19 Epidemiology Intel Team



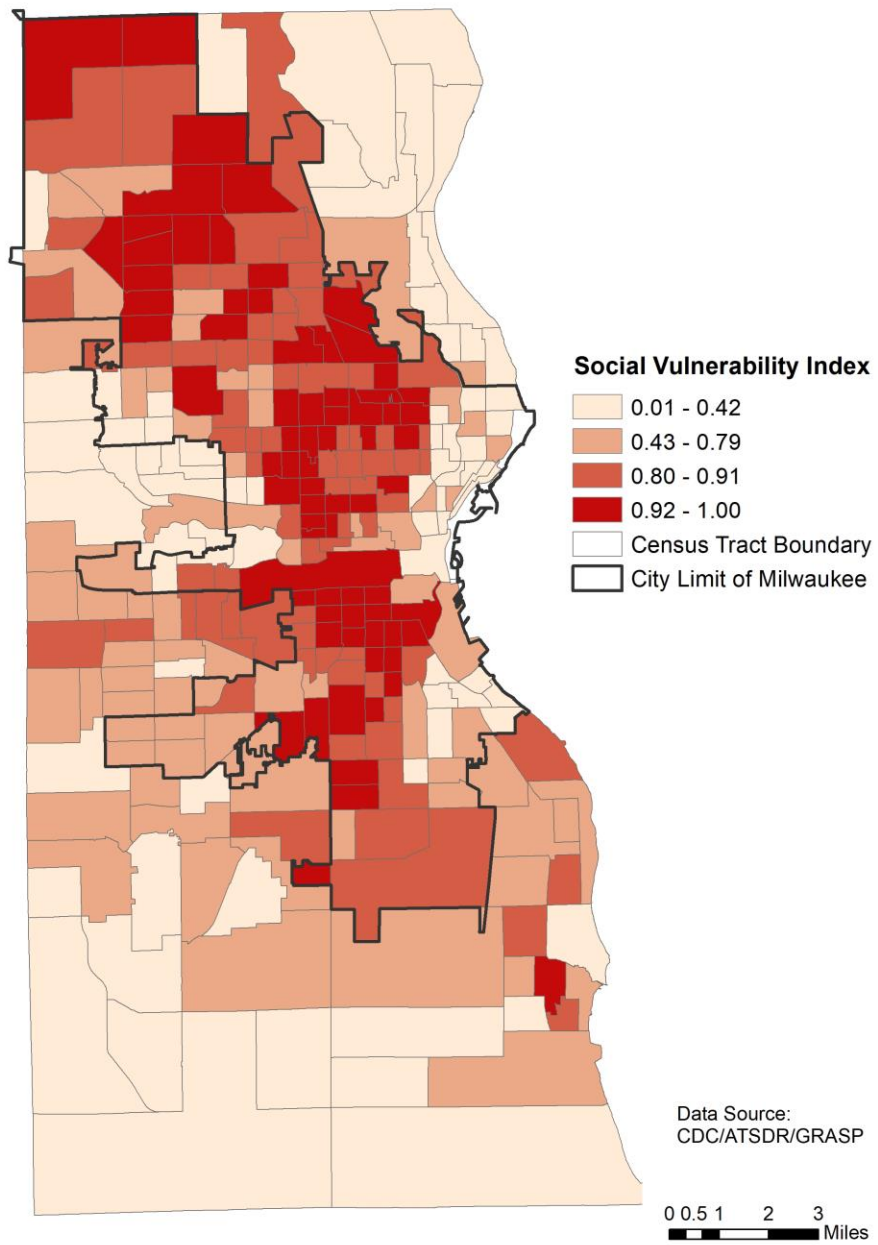
## Section 5: Maps

All are crude rate maps created using census tract level data from the US Census.

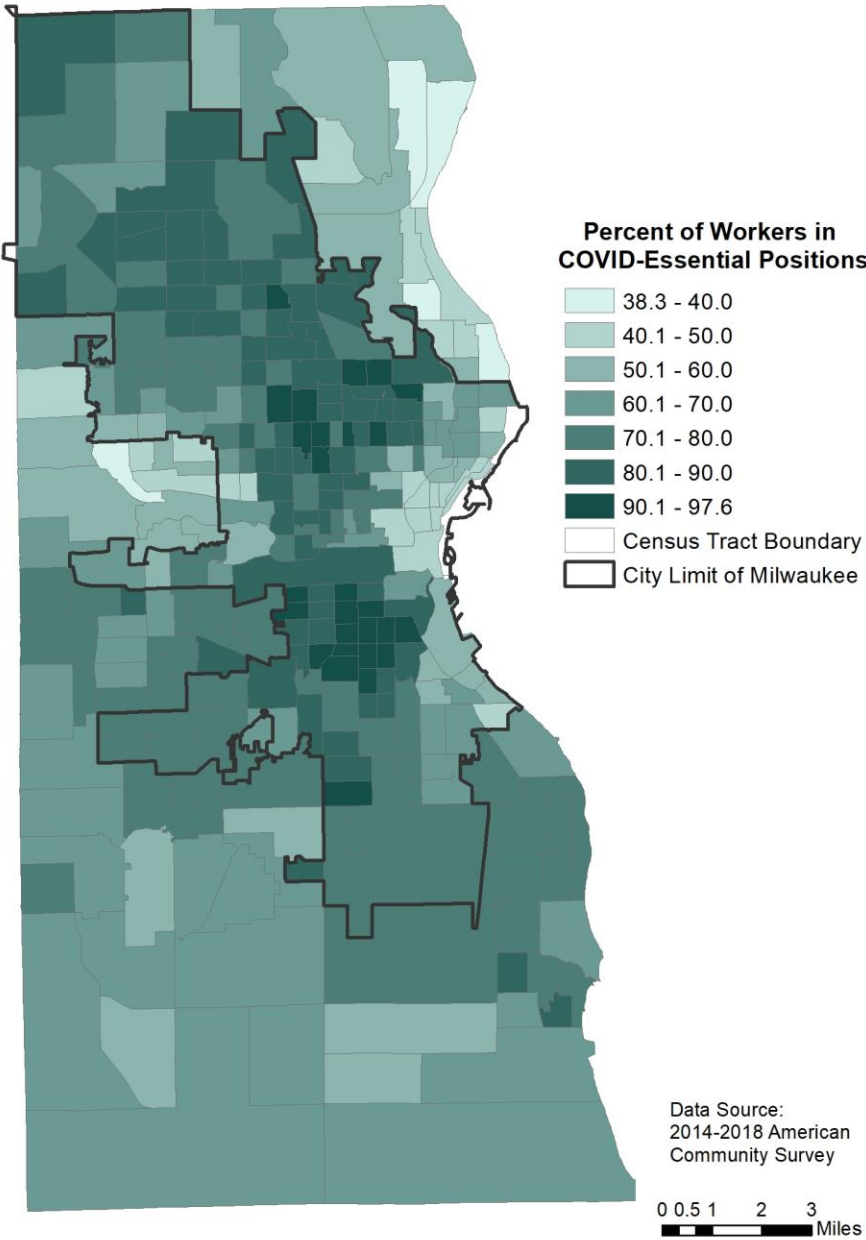
### Map 1: Median Household Income



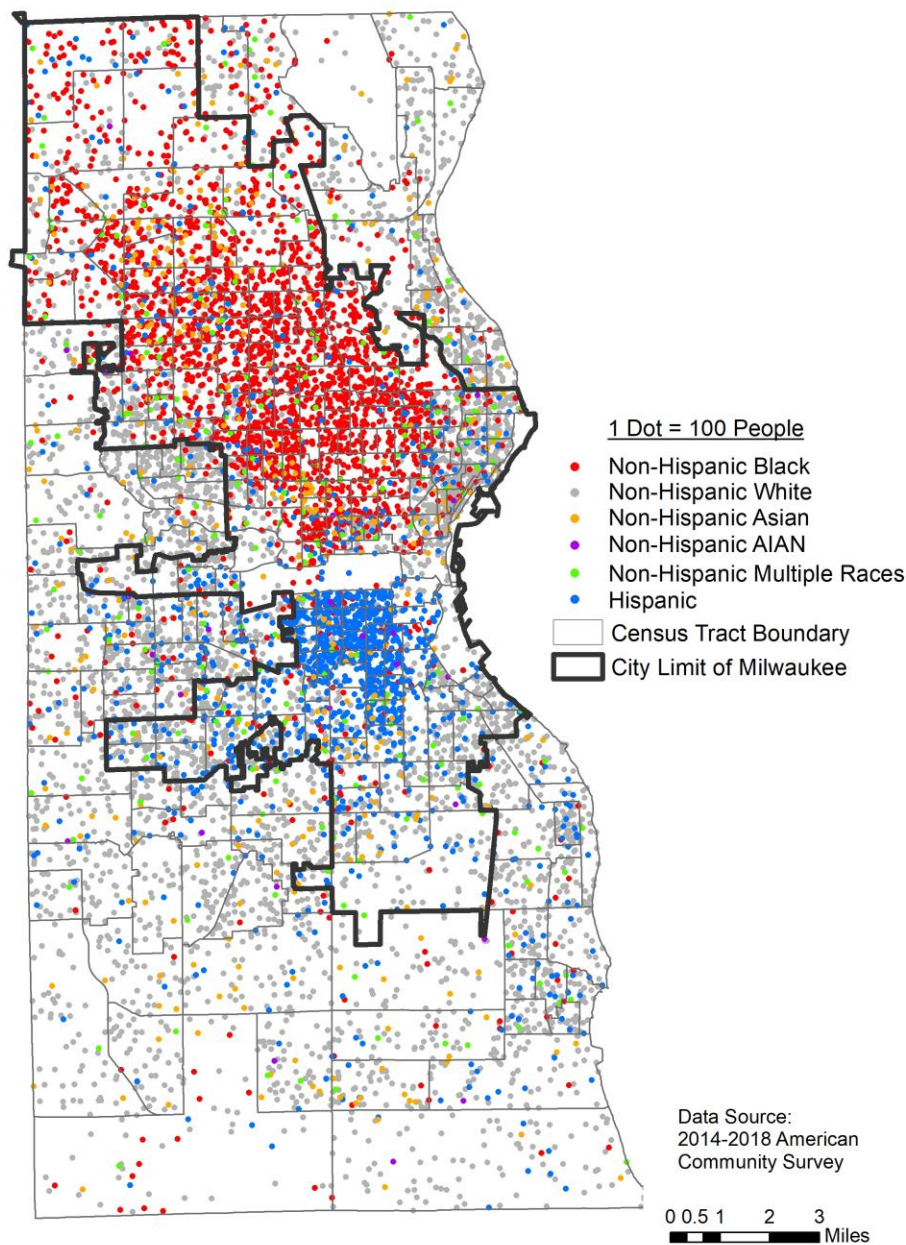
Map 2: SVI Quartile



Map 3: Percent Essential Worker



Map 4: Race/Ethnicity Dot Map



## Data Sources & Acknowledgments

This report was created by faculty and staff in the Medical College of Wisconsin (MCW) Institute for Health and Equity (IHE) in partnership with representatives from local health departments and faculty from the University of Wisconsin-Milwaukee Zilber School of Public Health. Data sources include the Wisconsin Electronic Disease Surveillance System (WEDSS), the US Census Bureau, the Milwaukee County Medical Examiner's office, the Emergency Medicine Resource, and publicly available data obtained from local health and emergency response agencies. Data from the Wisconsin Electronic Data Surveillance System (WEDSS) summarized for the week includes data from November 11, 2020 through November 17, 2020. This work was funded by the Advancing a Healthier Wisconsin Endowment at the Medical College of Wisconsin.

## Contact Information

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