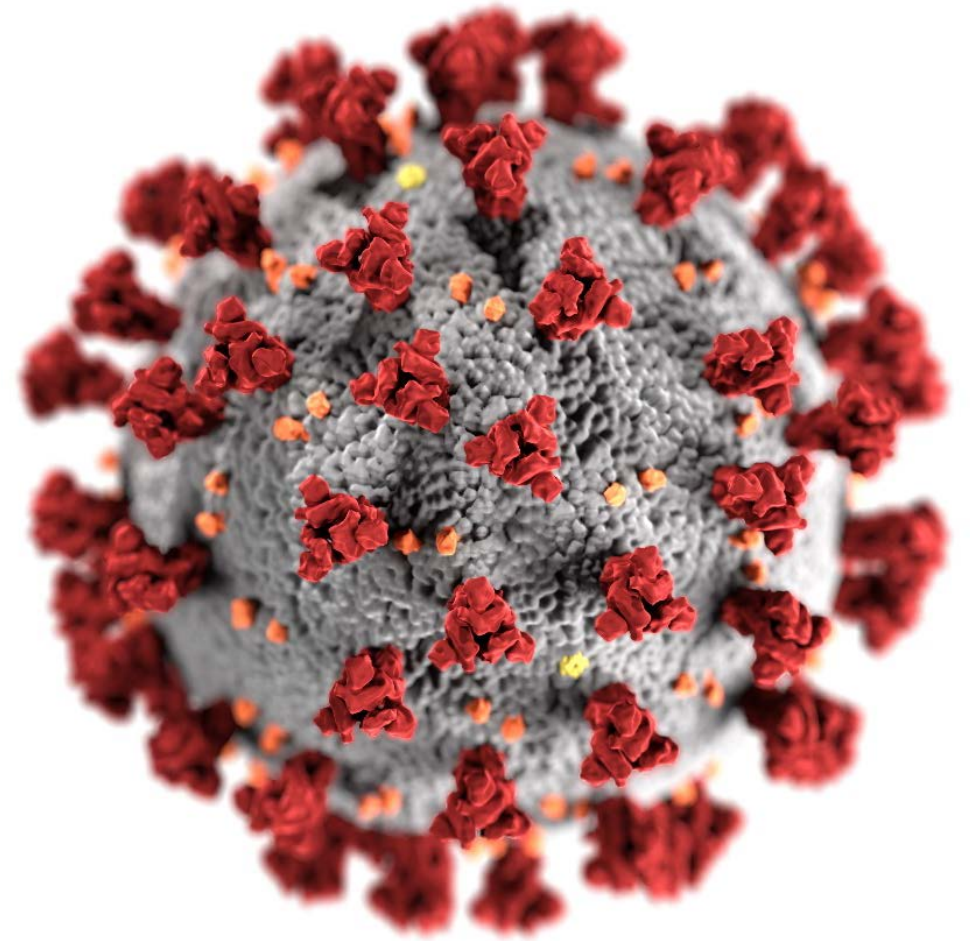


## Disparities in COVID-19 Incidence, Severity, and Outcomes

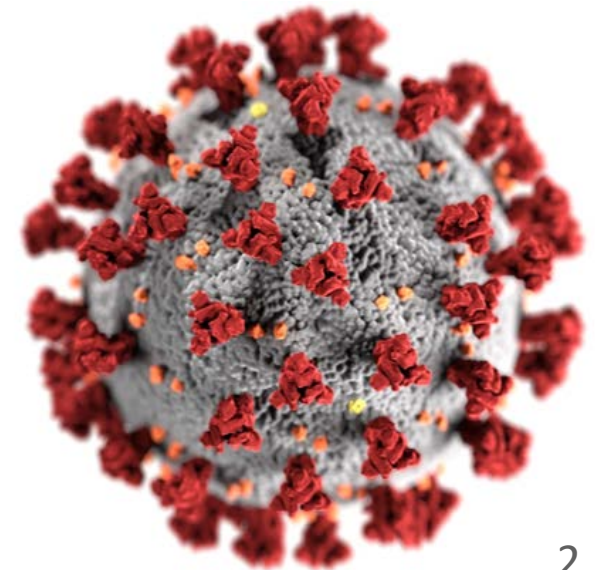
Megan Wallace, DrPH, MPH

ACIP Meeting  
September 22, 2020



# Outline

- Overview of U.S. COVID-19 epidemiology
- Disparities in COVID-19 incidence, severity, and outcomes
  - Social determinants of health
  - Racial and ethnic minority groups



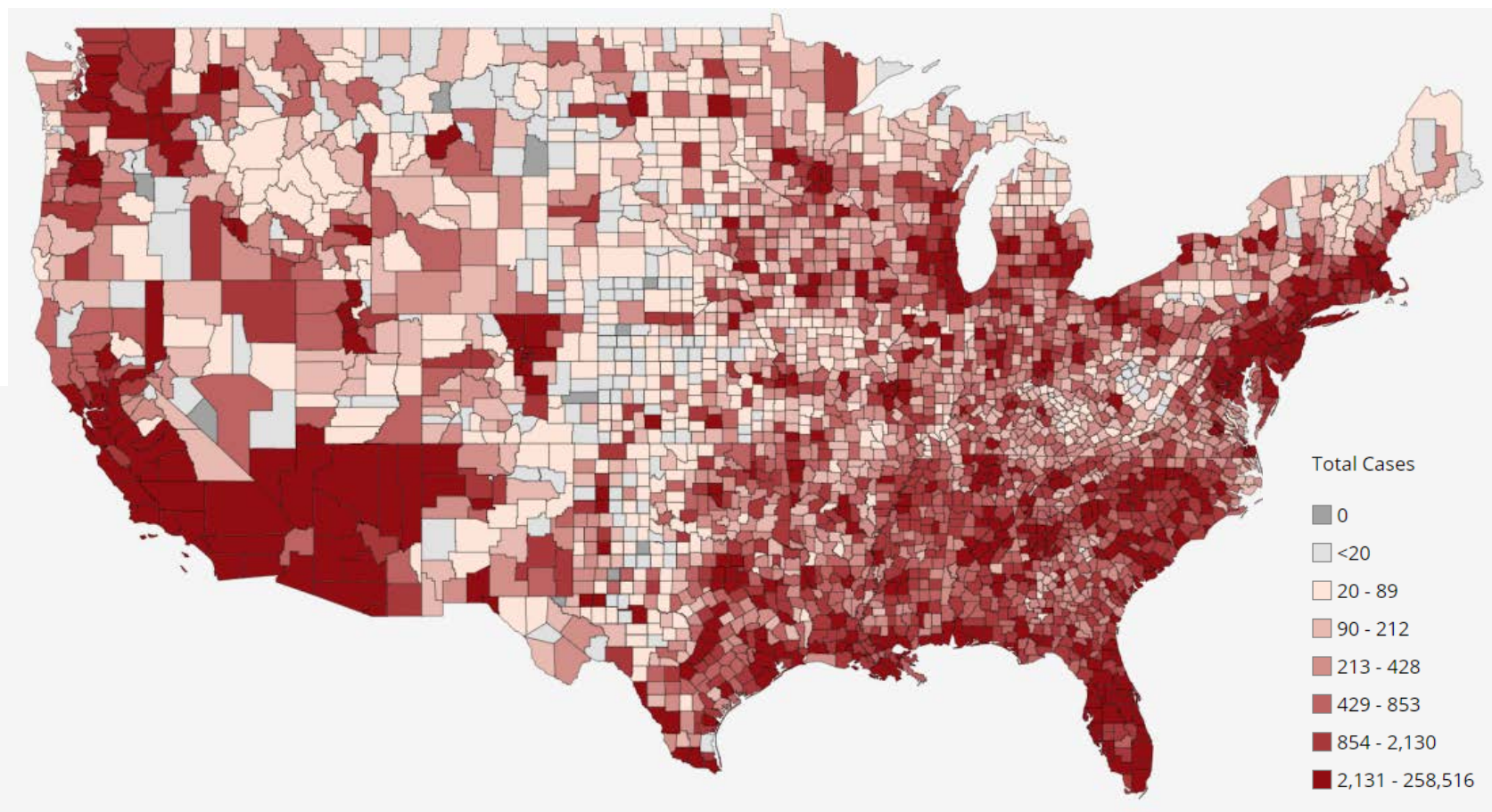
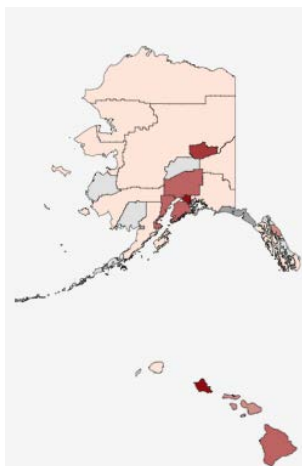
# Overview of U.S. COVID-19 Epidemiology



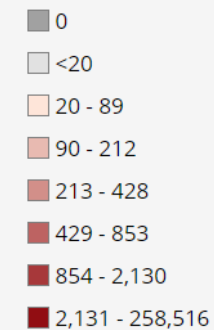
# United States COVID-19 Cases by County

January 22 to September 20, 2020

USA  
**6,748,935**  
TOTAL CASES  
+42,561 New Cases  
CDC | Updated: Sep 20 2020 2:40PM



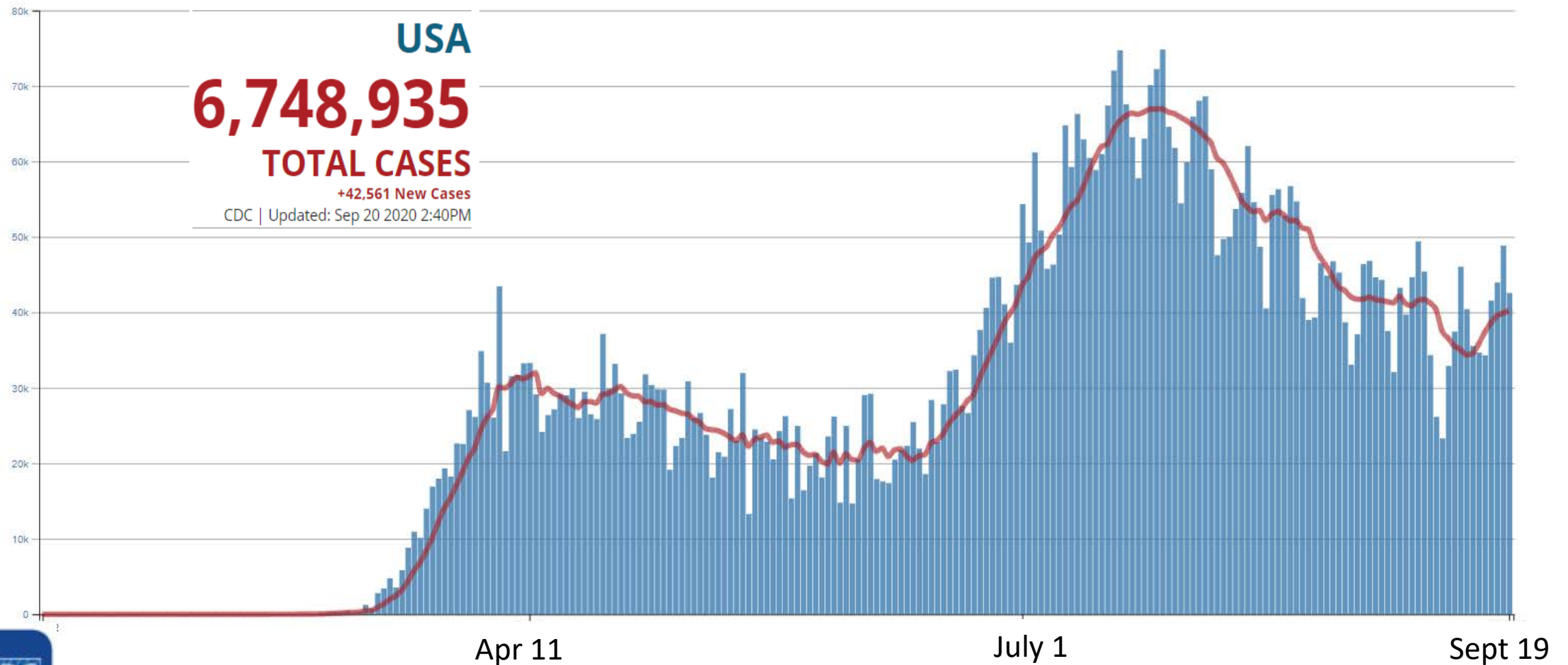
Total Cases



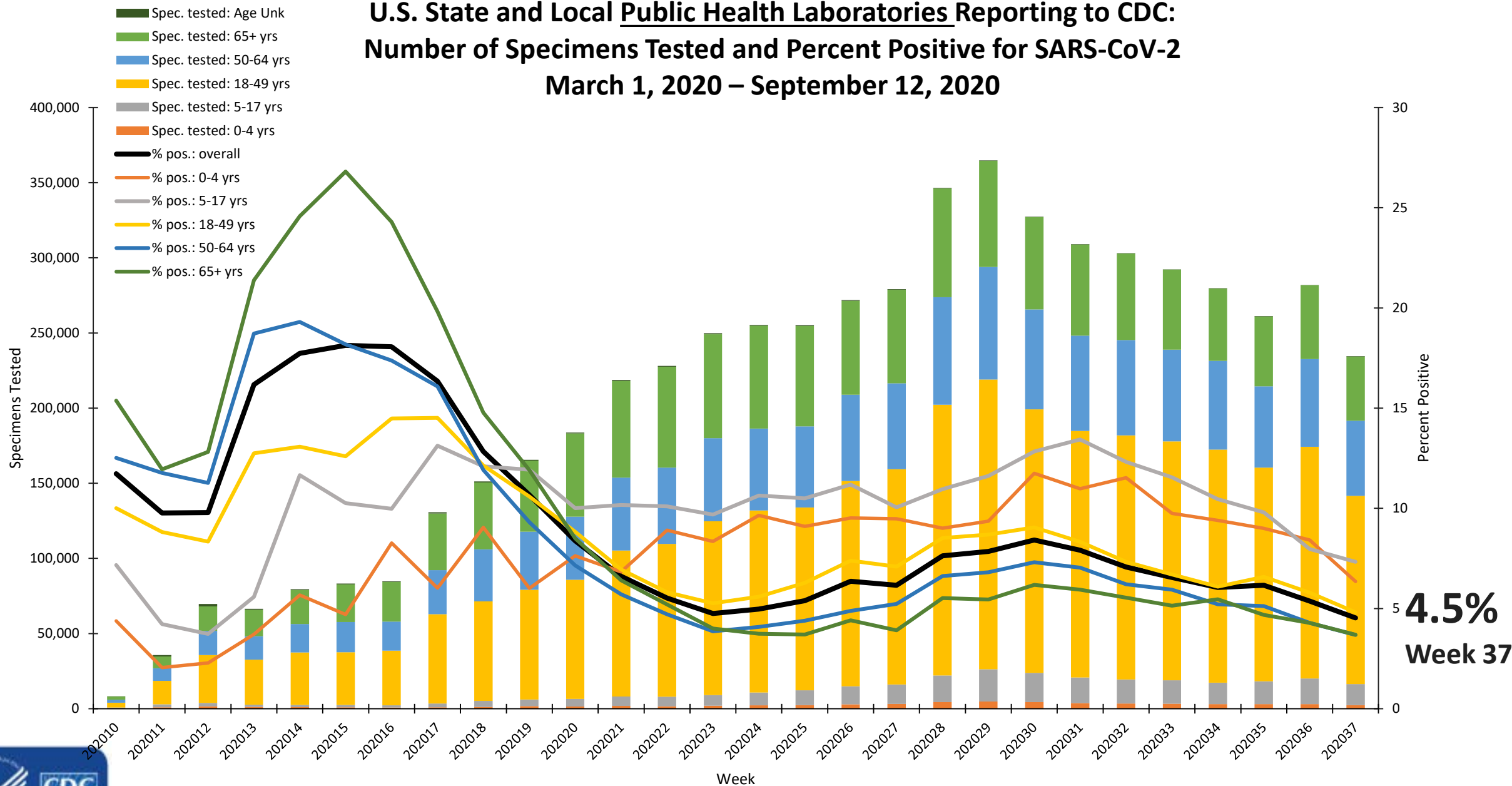


# Trends in Number of COVID-19 Cases in the US

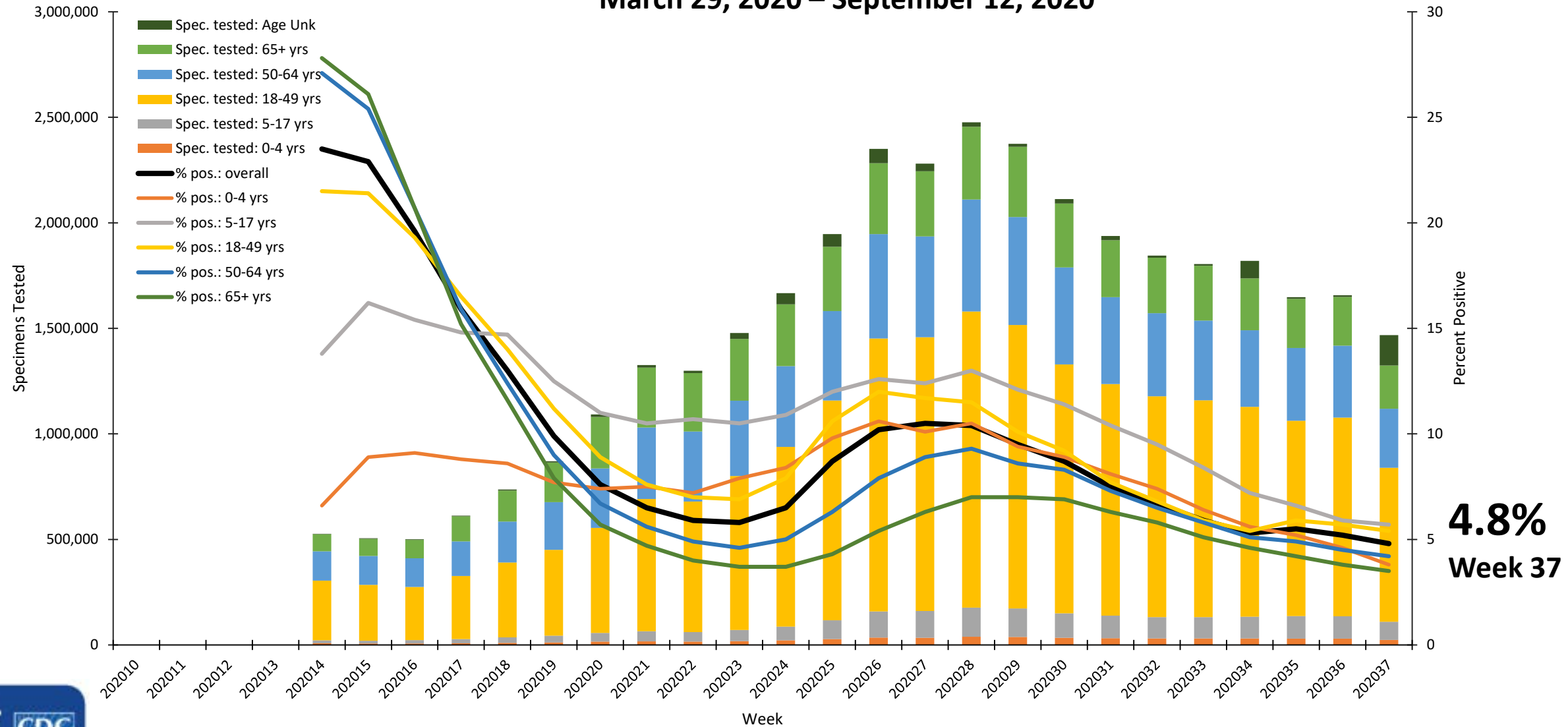
January 22 to September 19, 2020



# U.S. State and Local Public Health Laboratories Reporting to CDC: Number of Specimens Tested and Percent Positive for SARS-CoV-2 March 1, 2020 – September 12, 2020



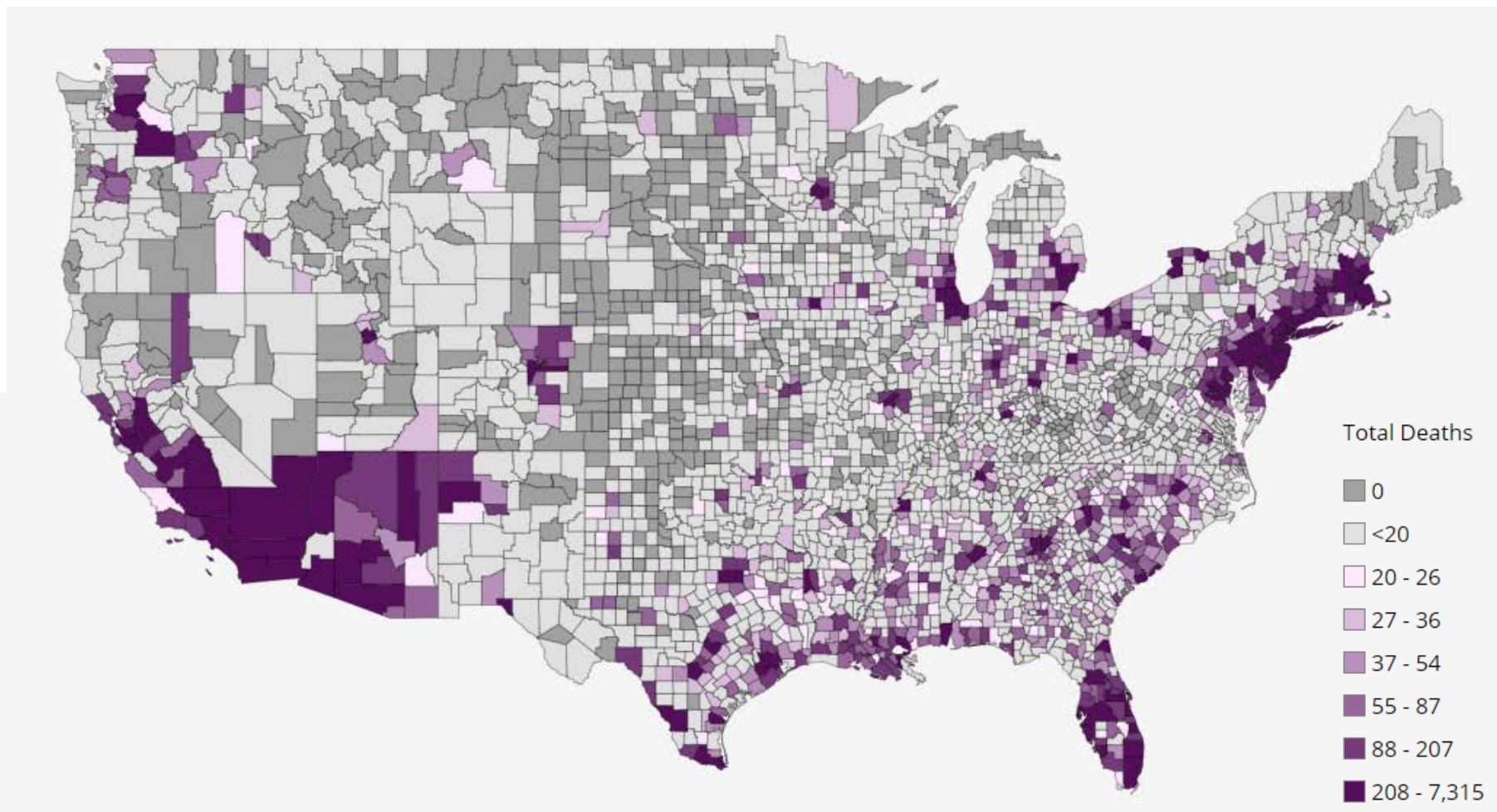
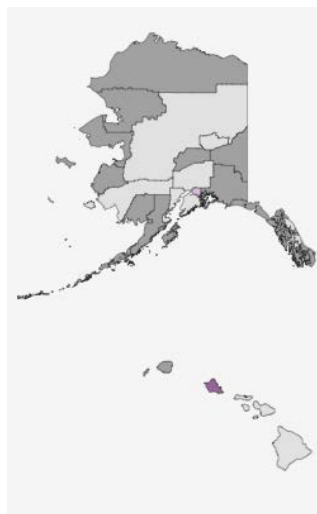
# Select Commercial Laboratories Reporting to CDC: Number of Specimens Tested and Percent Positive for SARS-CoV-2 March 29, 2020 – September 12, 2020



# United States COVID-19 Deaths by County

January 21 to September 20, 2020

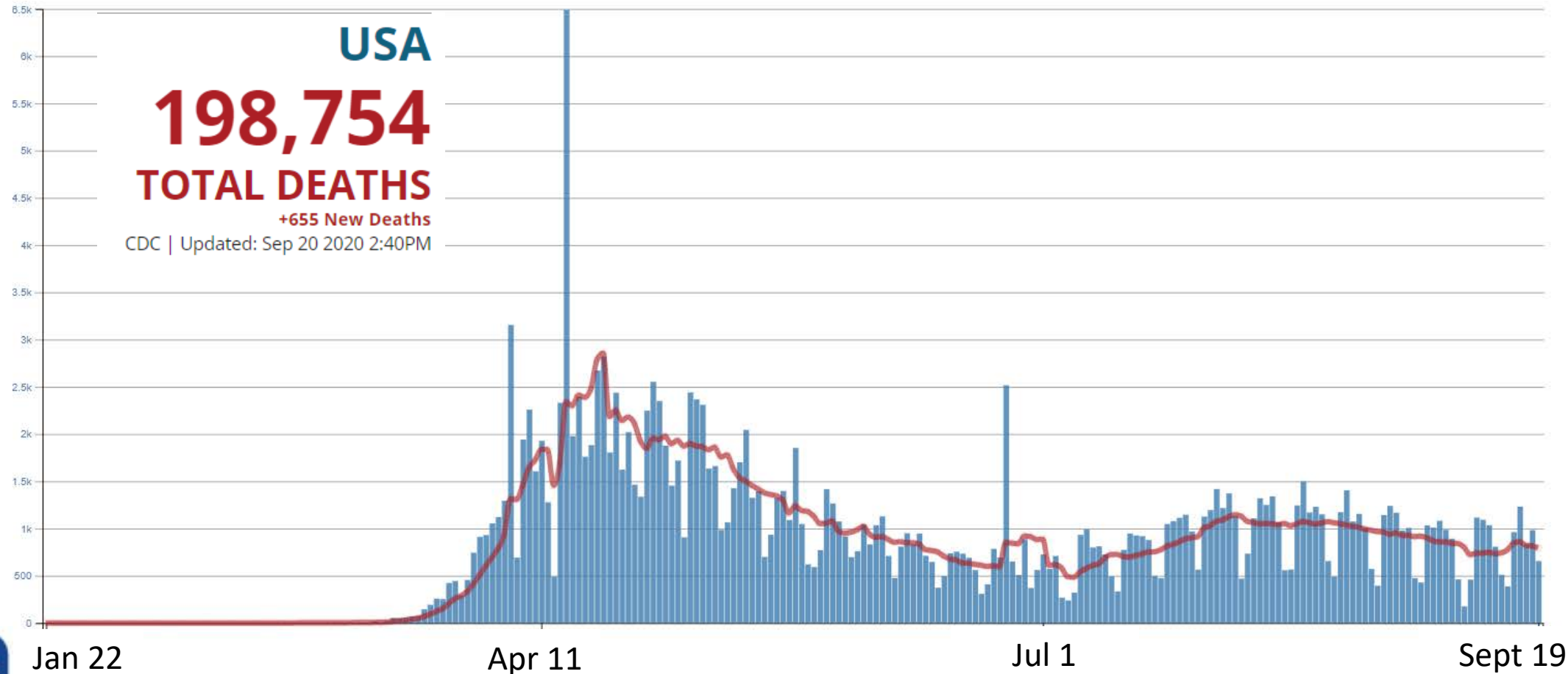
USA  
**198,754**  
**TOTAL DEATHS**  
+655 New Deaths  
CDC | Updated: Sep 20 2020 2:40PM





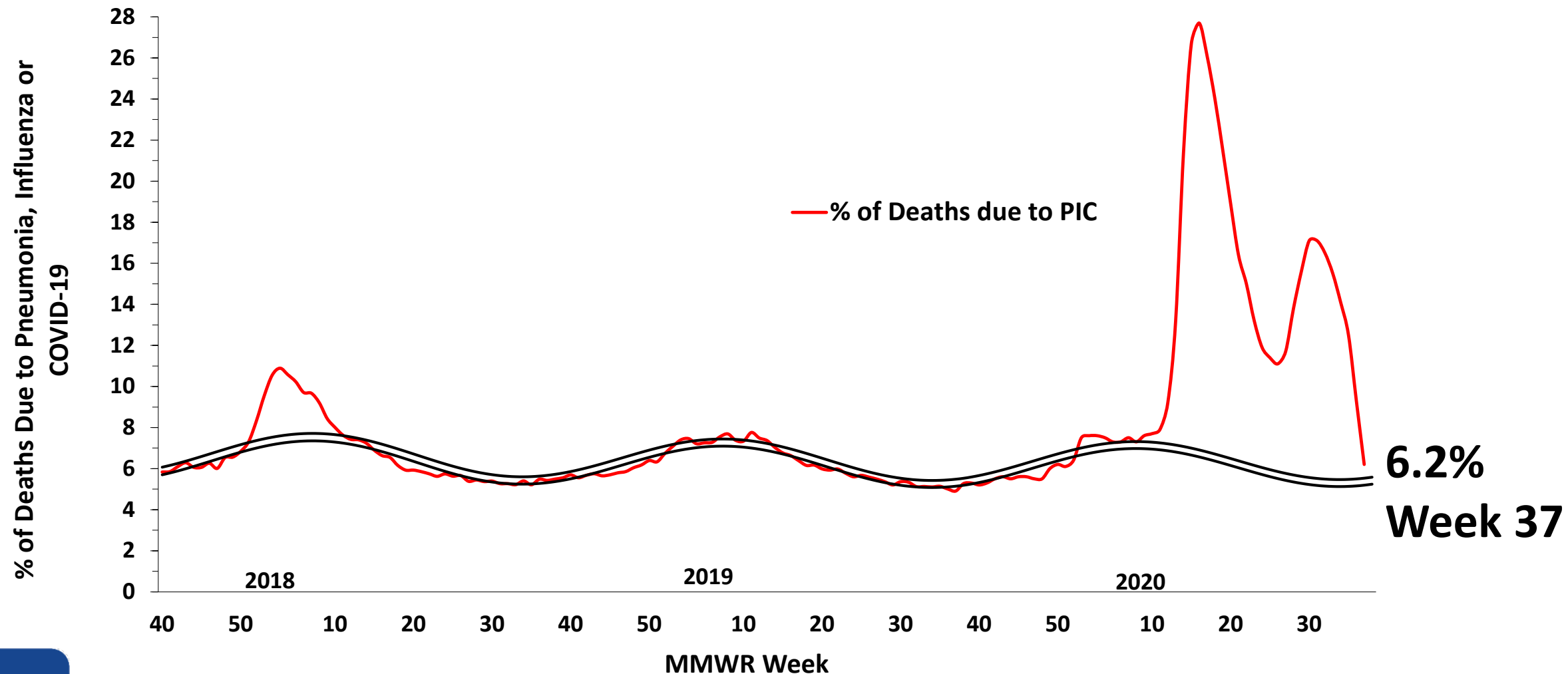
# Trends in Number of COVID-19 Deaths in the US

January 22 to September 19, 2020



# Trends in Pneumonia, Influenza and COVID-19 Mortality

Data through the week ending September 12, 2020



Source: National Center for Health Statistics Mortality Reporting System: <https://www.cdc.gov/coronavirus/2019-ncov/covid-data/covidview/index.html>



# Disparities in COVID-19 incidence, severity, and outcomes



**Social determinants of health** are conditions in the places where people live, learn, work, and play that affect a wide range of health risks and outcomes.

- Economic Stability
- Education
- Social and Community Context
- Health and Healthcare
- Housing, Neighborhood and Built Environment

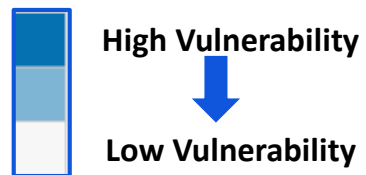




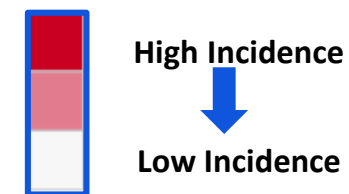
# The Social Vulnerability Index (SVI)

- Developed by CDC to identify communities that need support before, during, and after public health emergencies
- A measure of social determinants of health using U.S. Census data
- Ranks each county and census tract on 15 social vulnerability factors, and groups them into four related themes:
  - Socioeconomics
  - Housing Composition and Disability
  - Representation of Racial and Ethnic Minority Groups
  - Housing and Transportation

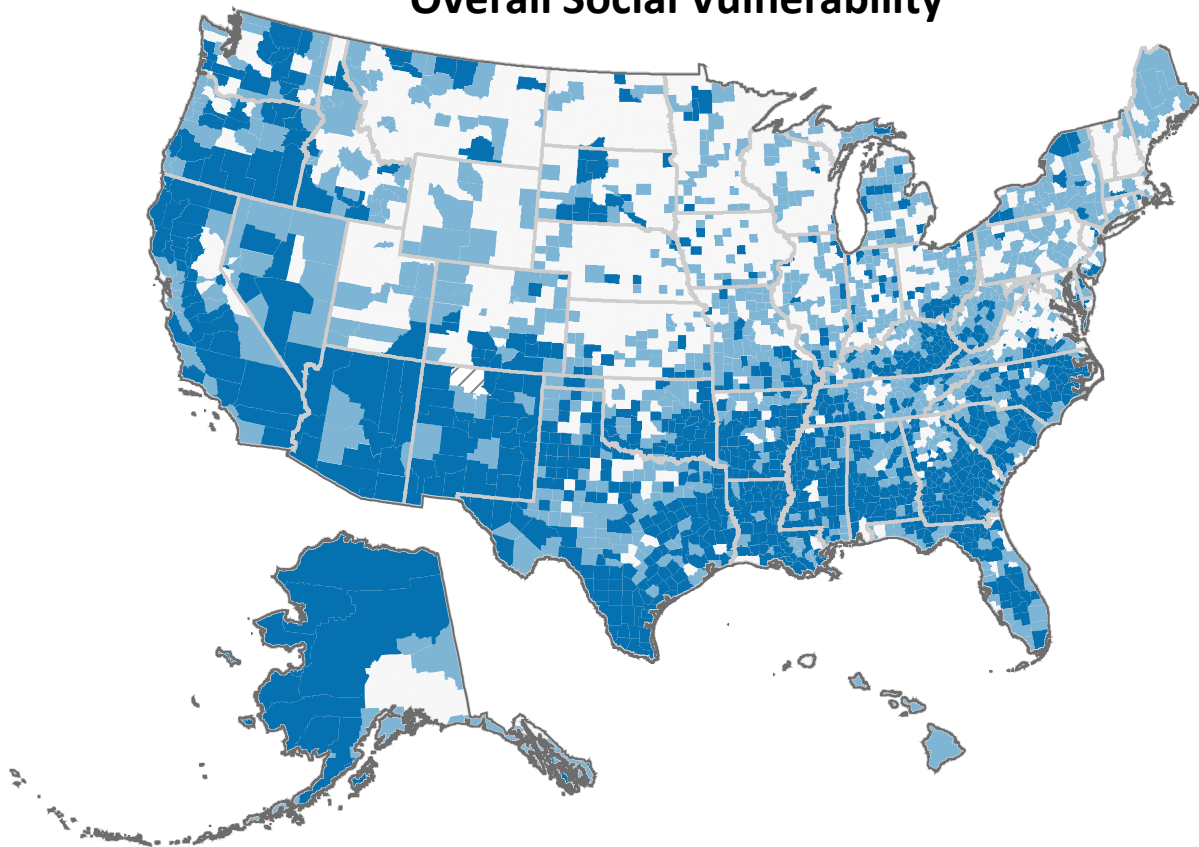




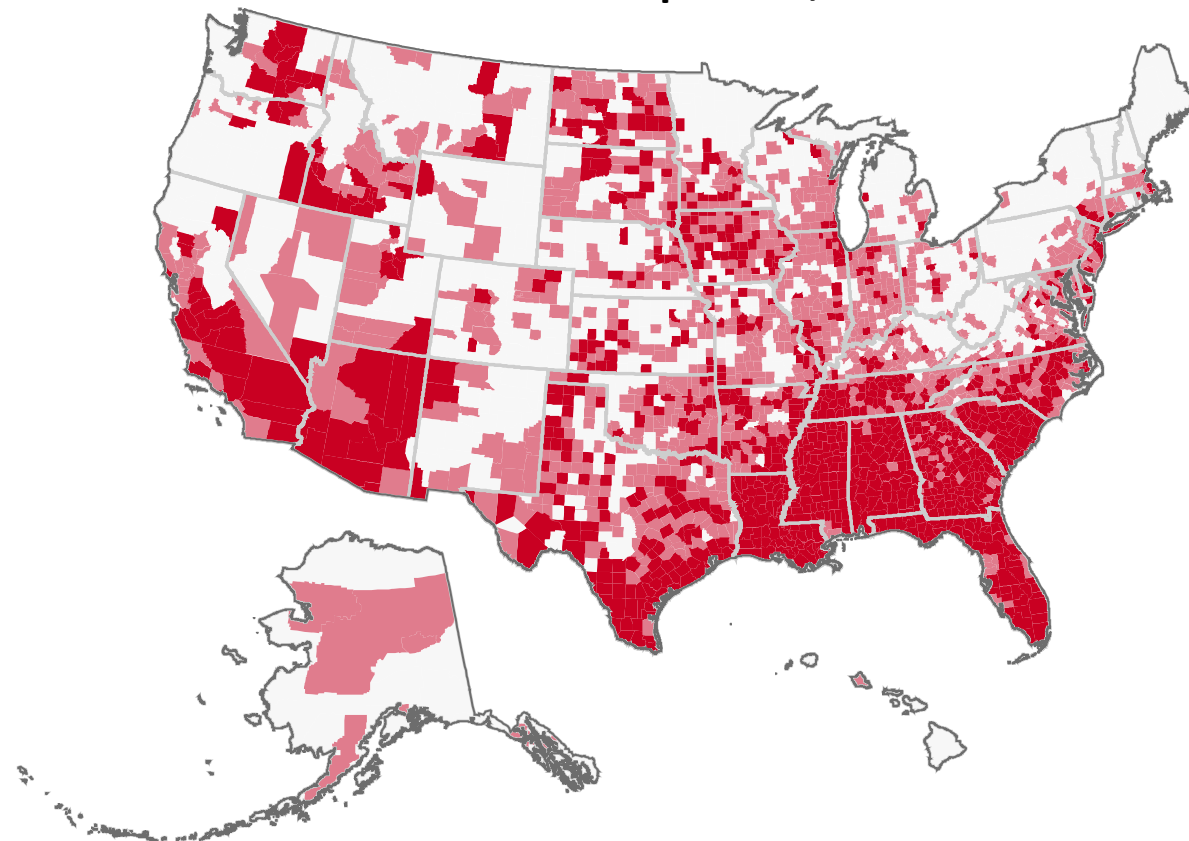
# COVID-19 Incidence and Overall Social Vulnerability by U.S. County As of September 15, 2020



Overall Social Vulnerability



COVID-19 cases per 100,000 residents



**Data sources:**  
COVID-19 case data from USA Facts, September 15, 2020  
CDC SVI 2018 for the U.S. at county level

The distribution of confirmed COVID-19 cases is complex and depends on a combination of many interacting factors, including socioeconomic conditions, underlying health, healthcare access, and testing capacity, among others. A single variable, as shown on this map, is only part of the story and should be interpreted carefully.

# Social vulnerability and risk of becoming a COVID-19 hotspot— United States, June 1-June 25, 2020

## Purpose:

Using data from the Social Vulnerability Index (SVI) and county-level COVID-19 cases:

1. Examine associations between social vulnerability and hotspot detection
2. Among hotspot counties, describe COVID-19 incidence after hotspot detection by level of social vulnerability

## Analysis:

- COVID-19 hotspots: counties with rapidly increasing COVID-19 incidence, identified using standard criteria developed by CDC
- SVI scores: categorized as quartiles (Q) based on distribution among all U.S. counties, overall and by urbanicity
  - Q1 = lowest vulnerability, Q4 = highest vulnerability



Counties with the highest social vulnerability had greater risk of being a COVID-19 hotspot compared to counties with the lowest social vulnerability.

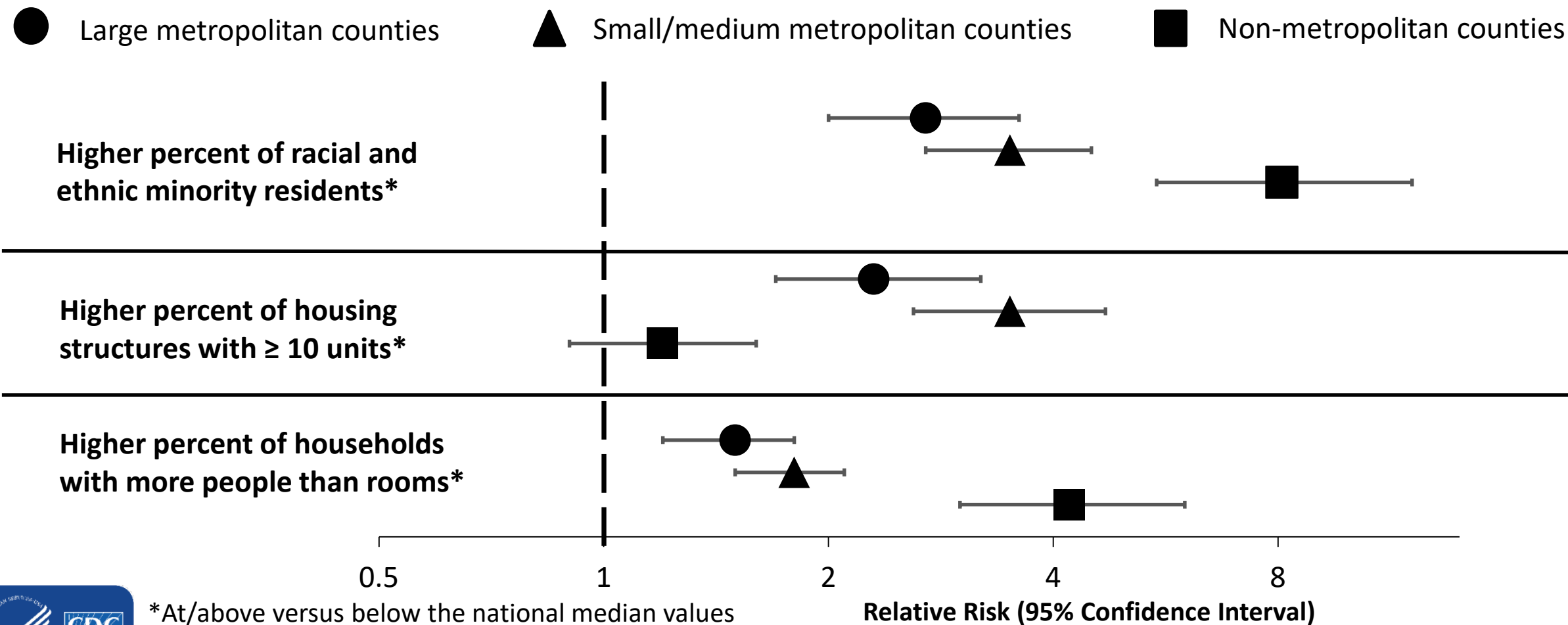
	SVI Q4 vs Q1 Relative risk (95% CI)	
All counties	2.4 (2.0, 2.9)	
Large metropolitan areas	1.8 (1.4, 2.4)	Effects became more pronounced in less urban areas
Medium and small metropolitan areas	2.7 (2.0, 3.7)	
Non-metropolitan areas	15.3 (7.2, 32.3)	

\*SVI: social vulnerability index; Q=quartile

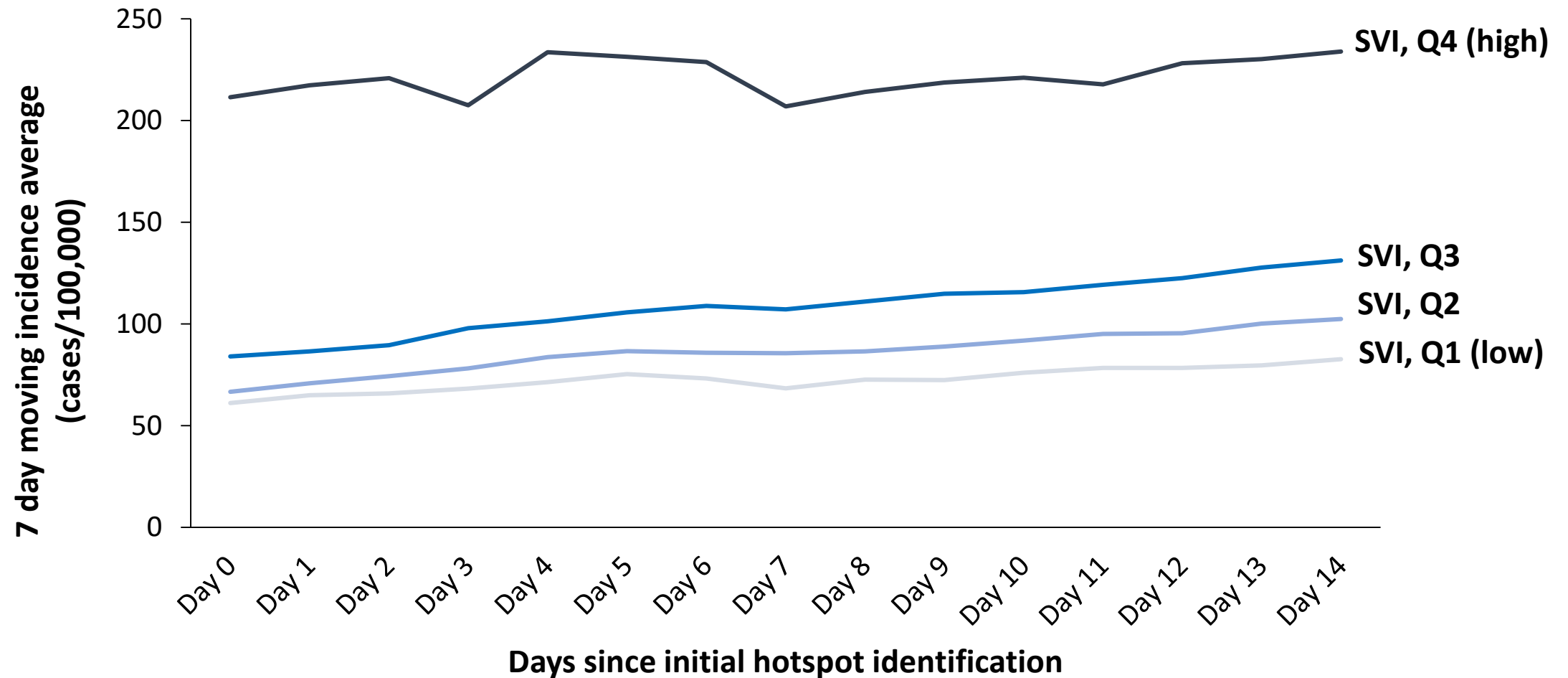




Risk of becoming a COVID-19 hotspot is higher among counties with certain social vulnerabilities—especially in less urban areas.



**Among hotspot counties, areas with the highest social vulnerabilities had markedly higher COVID-19 incidence than those with less vulnerabilities.**



\*Incidence was calculated based on 7-day moving average during the 14 days after hotspot identification to smooth expected variation in daily case counts.

†To compare incidence in hotspot and non-hotspot counties, a random sample of non-hotspot counties (1:1 ratio) was matched to hotspot counties by urbanicity and assigned the same date of reference.

§Overall social vulnerability scores were percentile rankings ranging from 0–1, with higher values indicating greater social vulnerability. Scores were categorized into quartiles based on distribution among all U.S. counties.

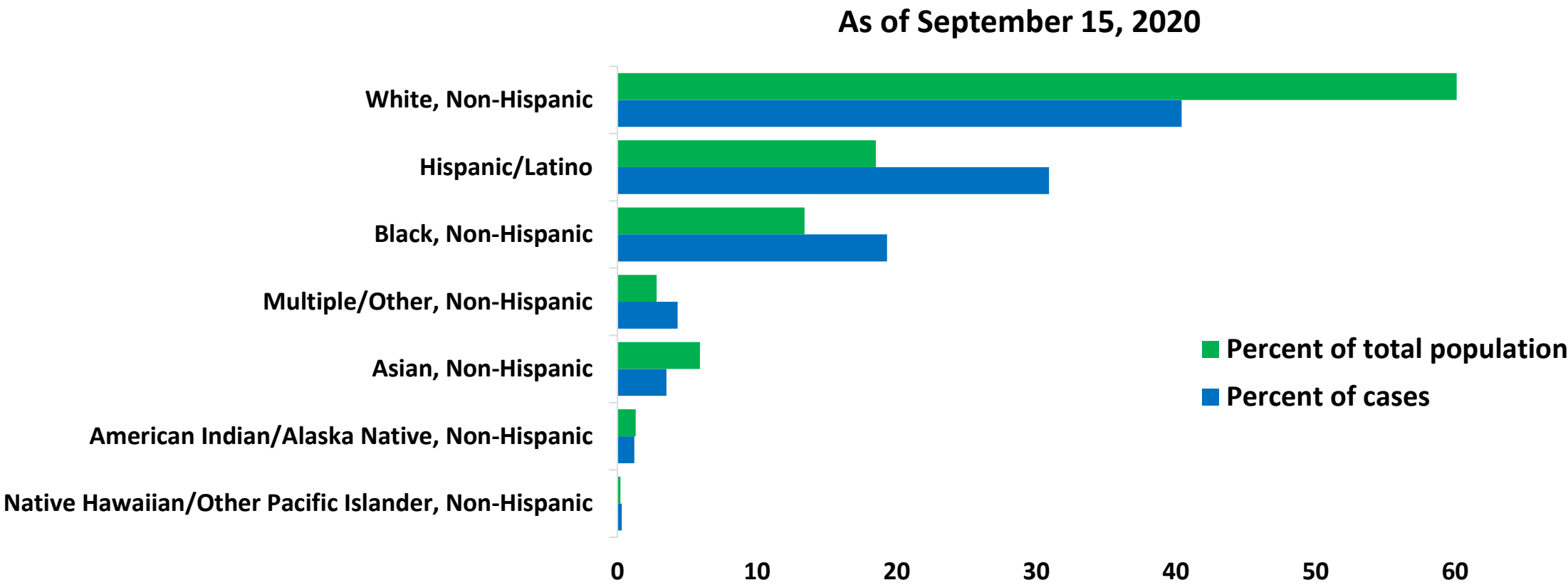


# Racial and ethnic minority groups are being disproportionately affected by COVID-19.

- Cases
- Hospitalization
- Death



Racial and ethnic minority groups represent 40% of the total U.S. population, but nearly 60% of COVID-19 cases.



\*Data from 4,909,175 cases. Race/Ethnicity was available for 2,453,808 (50%) cases.

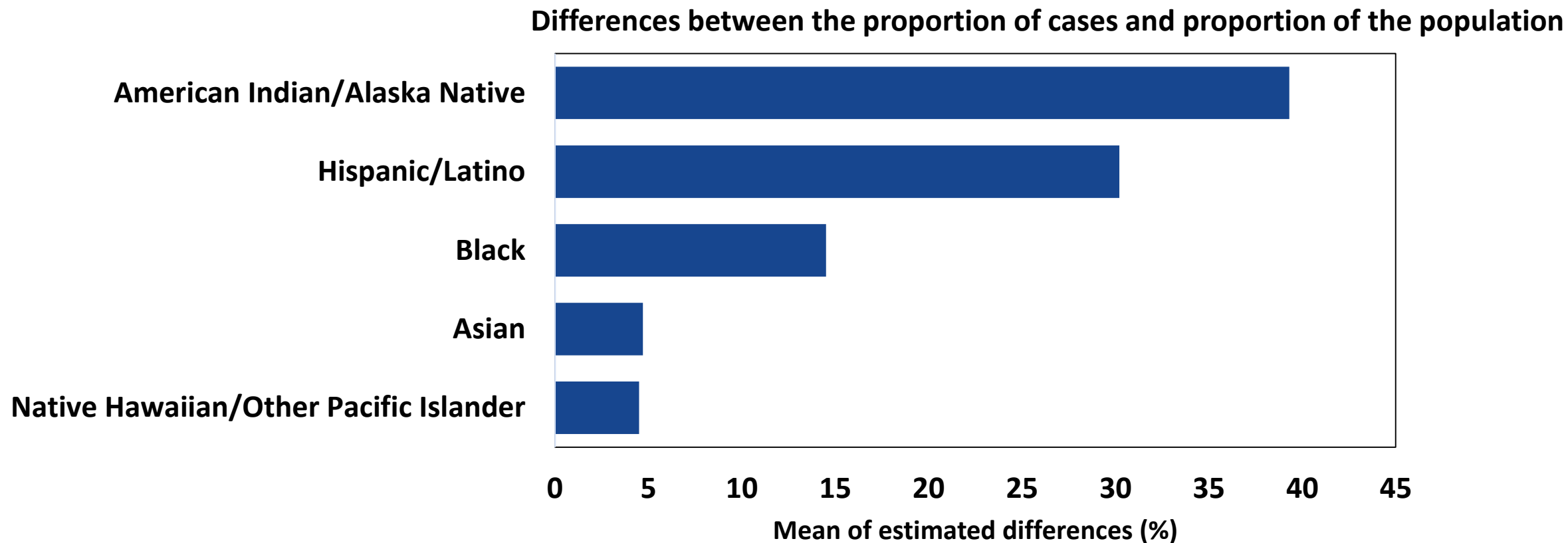


Updated as of 9/15/2020. Data are based on COVID-19 case-level data reported by state and territorial jurisdictions to the Centers for Disease Control and Prevention (CDC). The numbers are confirmed and probable COVID-19 cases as reported by U.S. states, U.S. territories, New York City, and the District of Columbia from the previous day.

U.S. Census: <https://www.census.gov/quickfacts/fact/table/US/PST045219> <https://www.cdc.gov/covid-data-tracker/index.html#demographics>



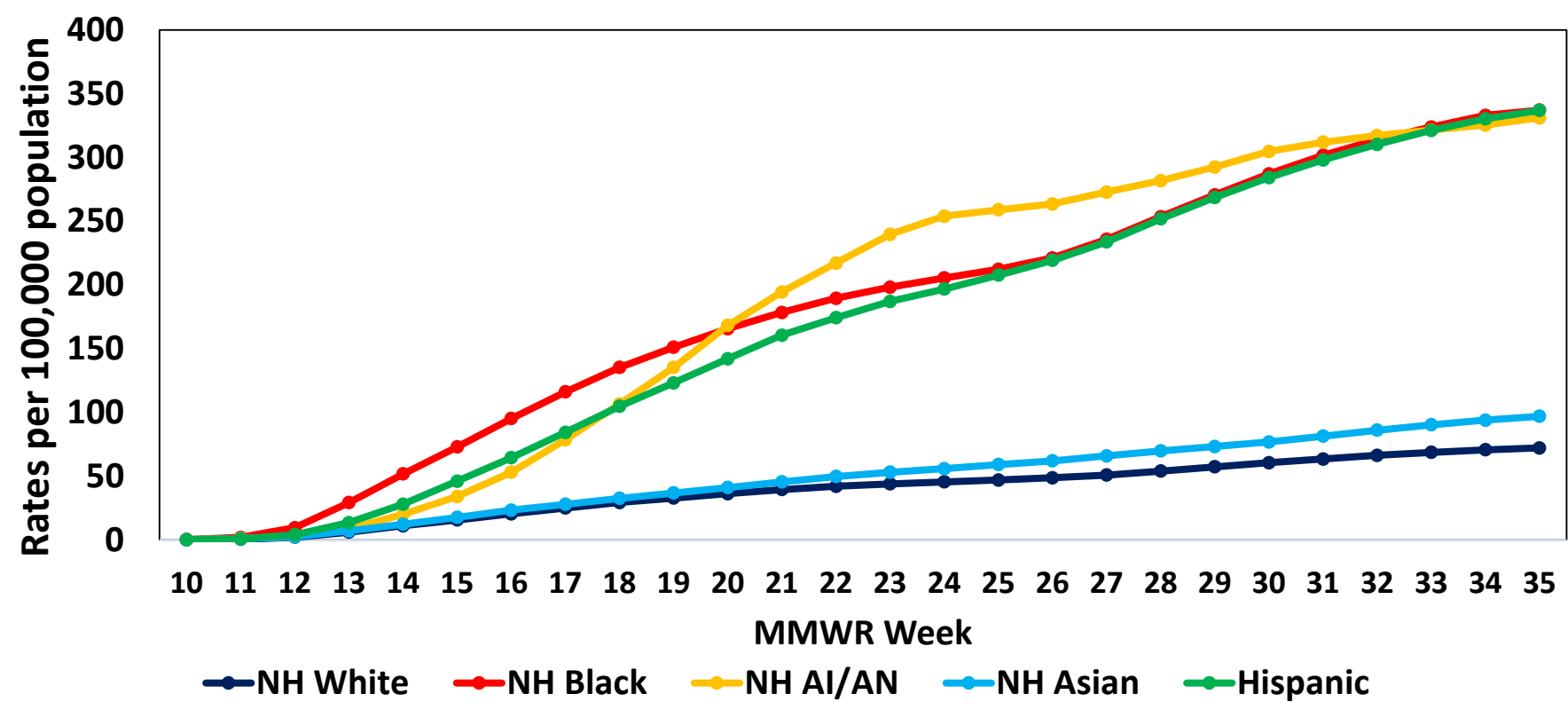
Among 79 U.S. counties identified as a hotspot, June 5–18, 2020, 76 counties had a disproportionately high number of cases among racial and ethnic minority groups.



\* The mean of the estimated differences between the proportion of cases in a given racial/ethnic group and the proportion of persons in that racial/ethnic group in the overall population among all counties with disparities identified by the analysis.

Disparities in severe COVID-19 disease are observed by differences in COVID-19 associated hospitalizations\* among racial and ethnic minority groups.

Cumulative age-adjusted rates of COVID-19 associated hospitalizations, March 6 – August 29, 2020

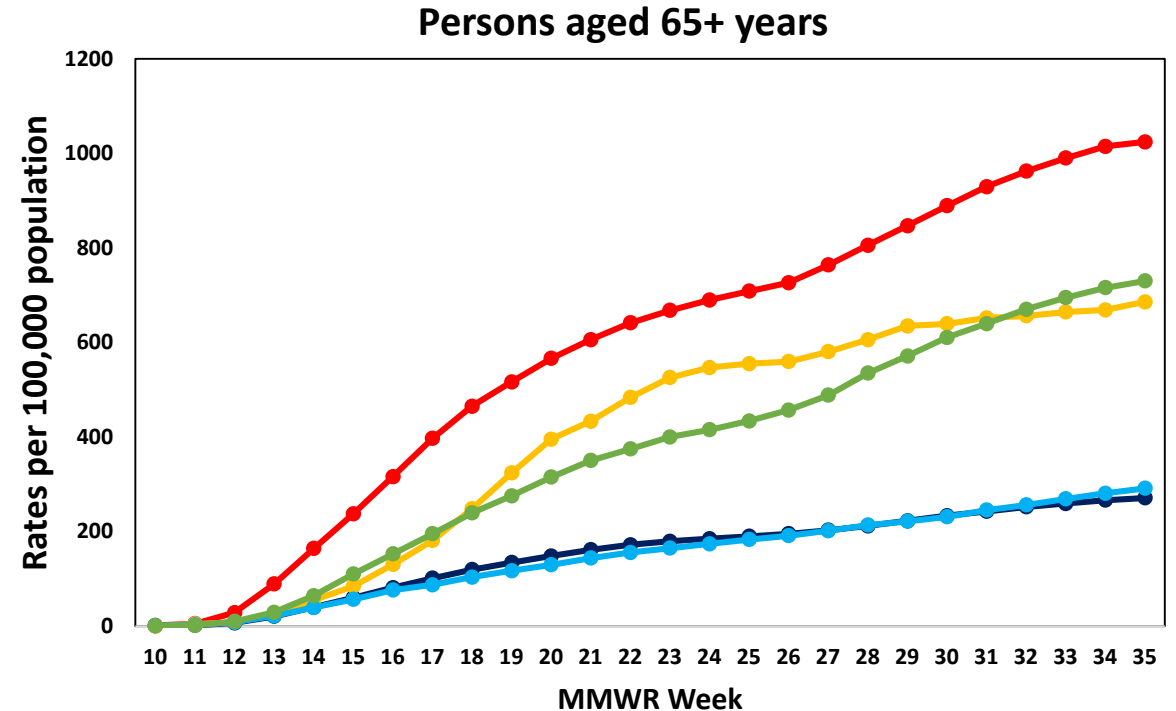
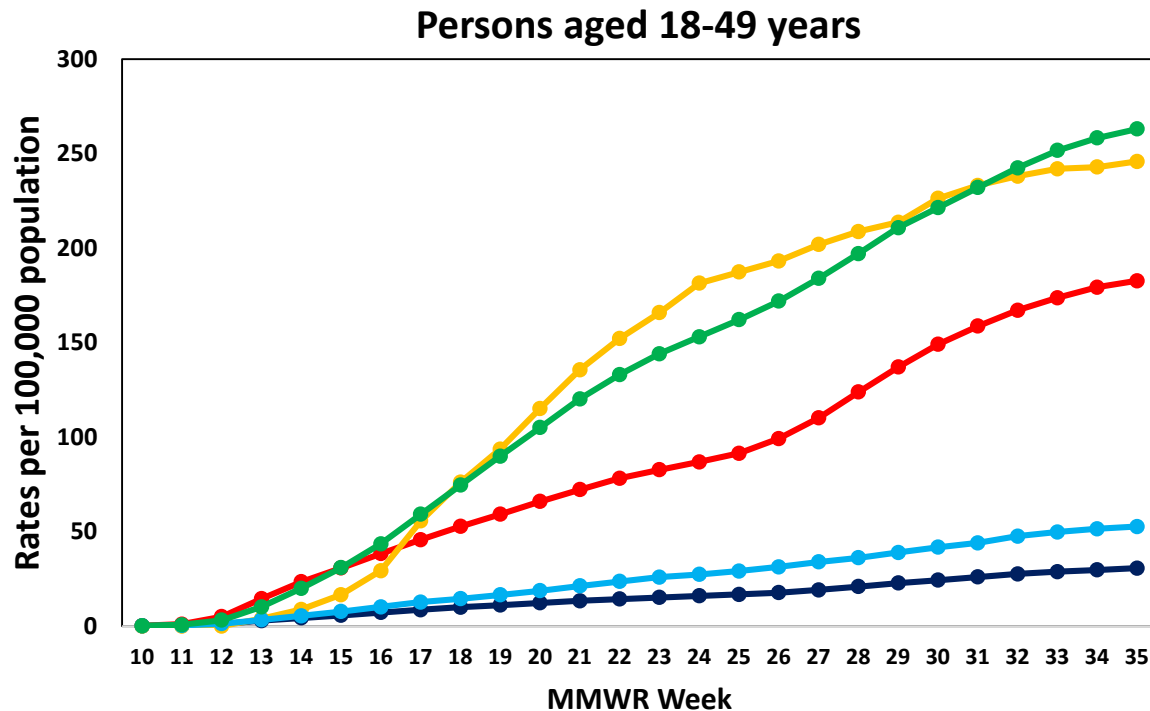


NH: Non-Hispanic  
\*COVID-19 associated hospitalizations reported to Coronavirus Disease 2019 (COVID-19)-Associated Hospitalization Surveillance Network (COVID-NET) surveillance system between March 1 and August 29, 2020. COVID-NET is a population-based surveillance system that collects data on laboratory-confirmed COVID-19-associated hospitalizations among children and adults through a network of over 250 acute-care hospitals in 14 states.



# Disparities in COVID-19 hospitalization rates among racial and ethnic minority groups occur in both young and older age groups.

Cumulative rate of COVID-19 associated hospitalizations by select age group, March 6 – August 29, 2020



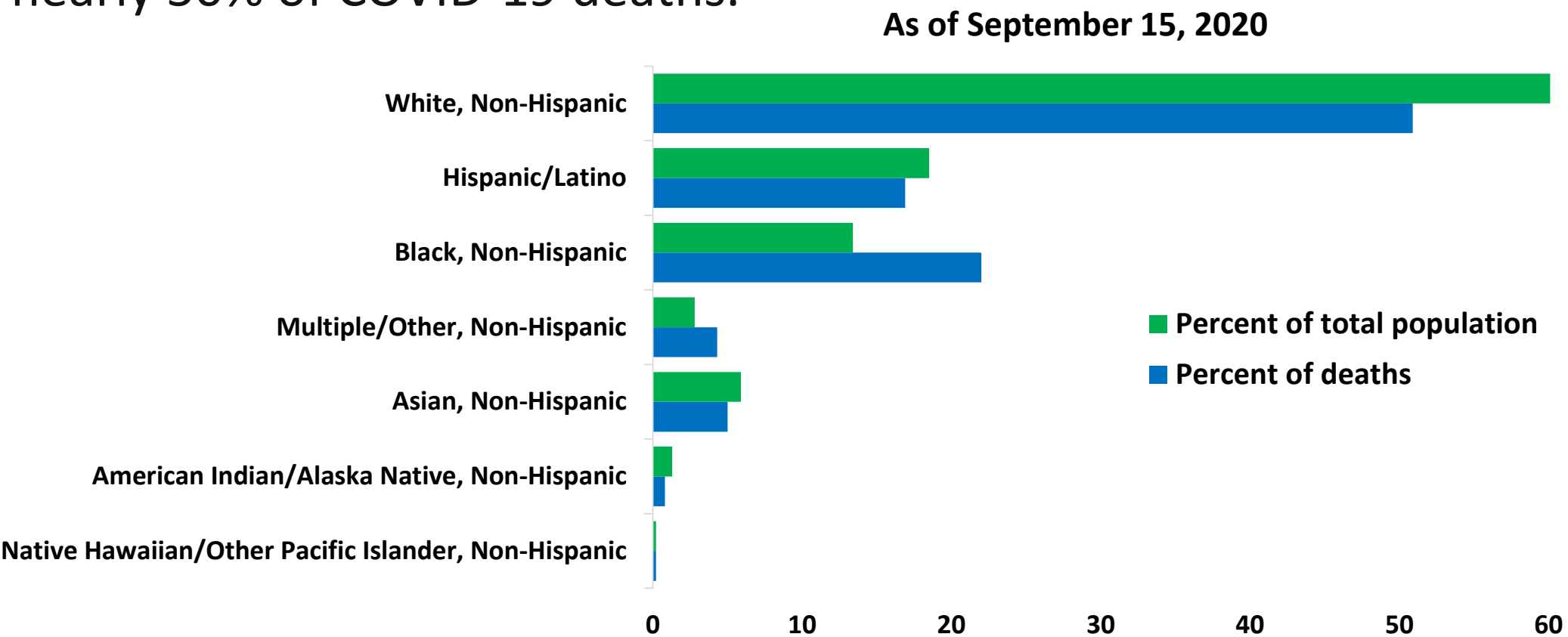
● NH White ● NH Black ● NH AI/AN ● NH Asian ● Hispanic

NH= Non-Hispanic

\*COVID-19 associated hospitalizations reported to Coronavirus Disease 2019 (COVID-19)-Associated Hospitalization Surveillance Network (COVID-NET) surveillance system between March 1 and August 29, 2020. COVID-NET is a population-based surveillance system that collects data on laboratory-confirmed COVID-19-associated hospitalizations among children and adults through a network of over 250 acute-care hospitals in 14 states.



Racial and ethnic minority groups represent 40% of the U.S. population, but nearly 50% of COVID-19 deaths.



Data from US Census 2019 estimates.

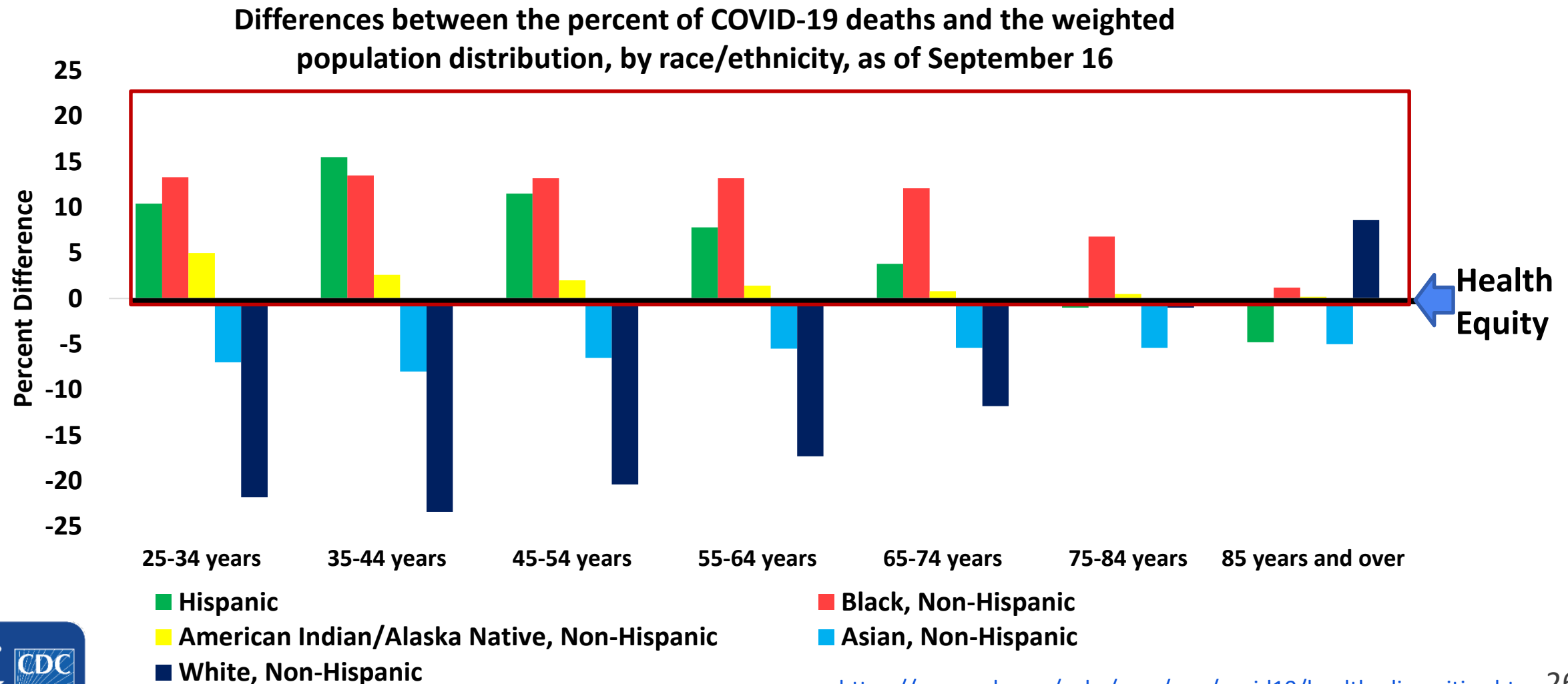
\*Data from 135,840 deaths. Race/Ethnicity was available for 111,958 (82%) deaths.



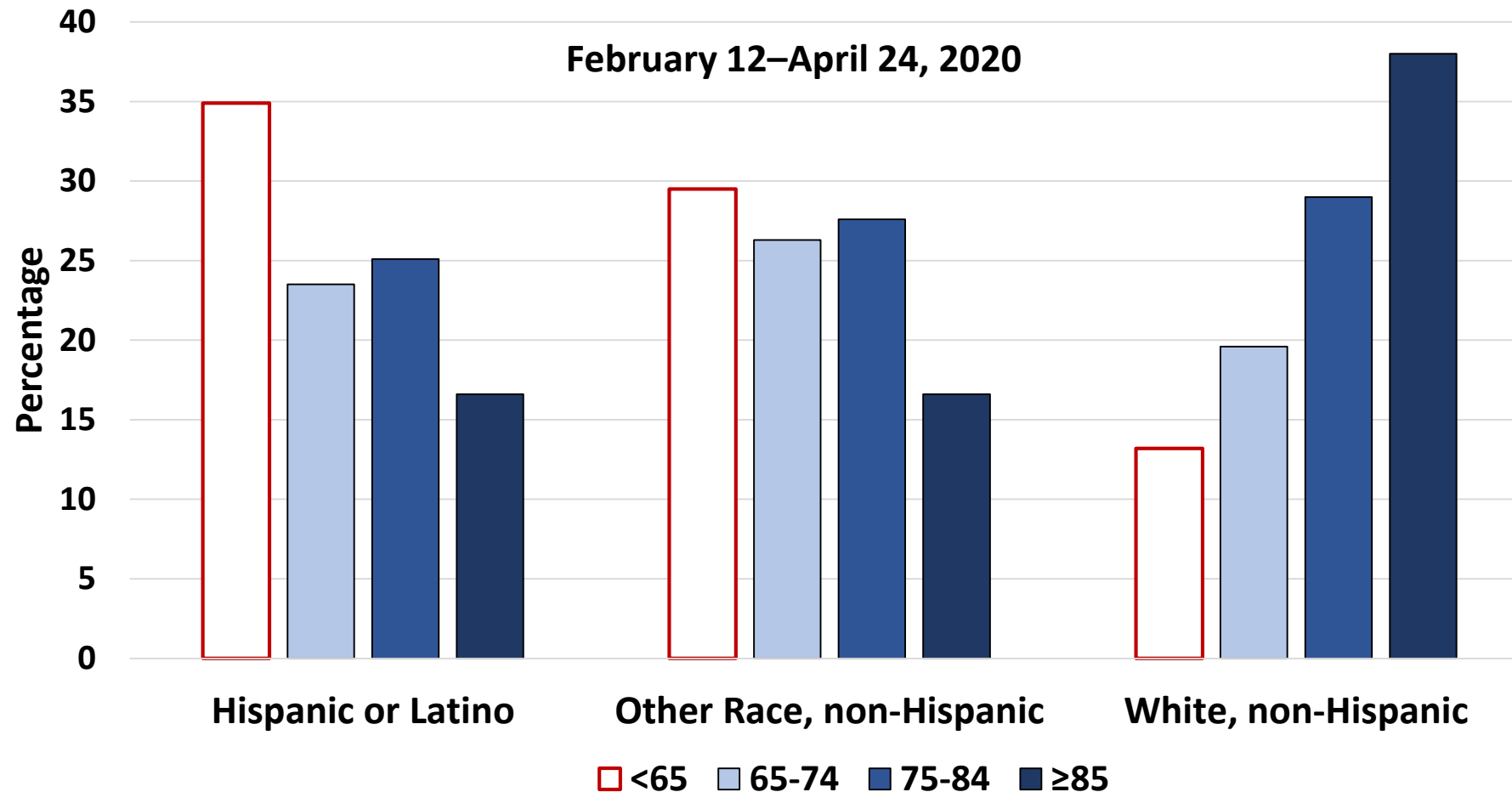
Updated as of 9/15/2020. Data are based on COVID-19 case-level data reported by state and territorial jurisdictions to the Centers for Disease Control and Prevention (CDC). The numbers are confirmed and probable COVID-19 cases as reported by U.S. states, U.S. territories, New York City, and the District of Columbia from the previous day.



# Health disparities in COVID-19 deaths varies by age group among racial and ethnic minority groups.



The percentages of COVID-19 decedents who were <65 years and Hispanic or “other” race were more than twice those that were White.



The “Other race, non-Hispanic” group includes persons who are black, white, Asian, American Indian/Alaska Native, or Native Hawaiian and other Pacific Islander;

Modified from: Wortham *et al*, 2020, <https://www.cdc.gov/mmwr/volumes/69/wr/mm6928e1.htm>



Some of the many inequities in social determinants of health that put racial and ethnic minority groups at increased risk of getting sick and dying from COVID-19 include:

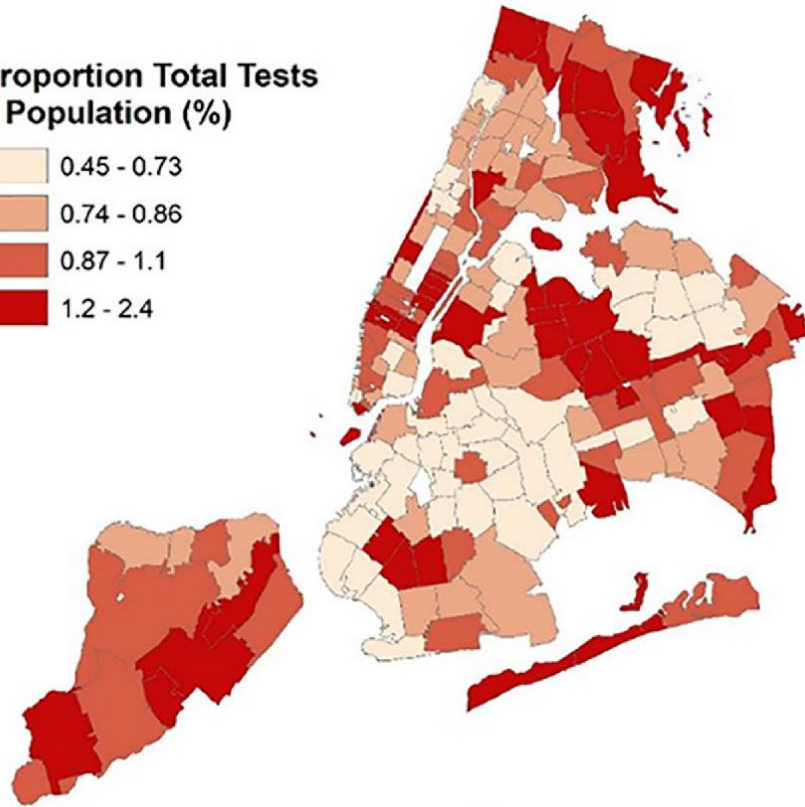
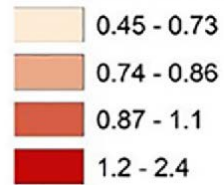
- Discrimination
- Healthcare access and utilization gaps
- Occupation in higher risk settings
- Education, income and wealth gaps
- Housing that is crowded or lacks basic services



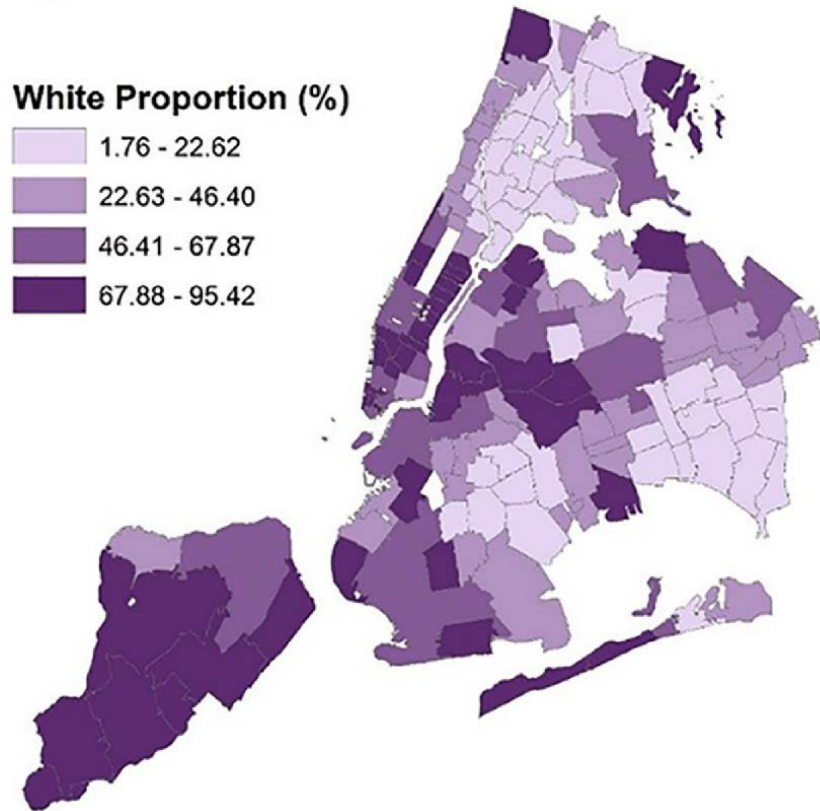
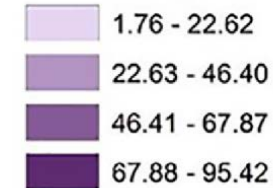
Healthcare access: In New York, the percentage of COVID-19 tests increased significantly with the increasing percentage of White residents.

March 2, 2020 – April 6, 2020

Proportion Total Tests / Population (%)



White Proportion (%)



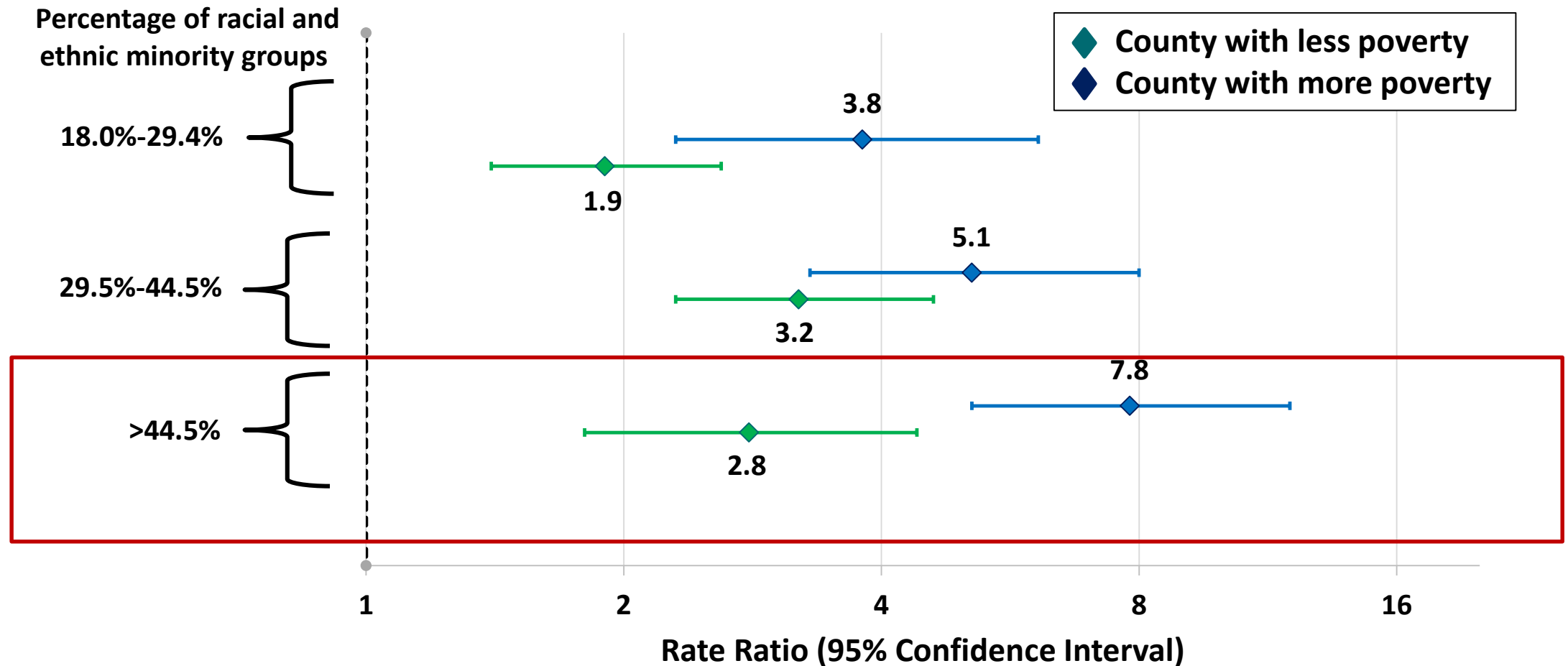
Occupation: Black persons are more likely to be employed in essential industries and occupations that may have increased exposure to SARS-CoV-2.

Variable	Percent employment according to race/ethnicity			
	White	Black	Asian	Hispanic
Likely employed in essential industry	27	38	26	27
Employed in occupations with frequent exposure to infections and close proximity to others	8	11	10	6





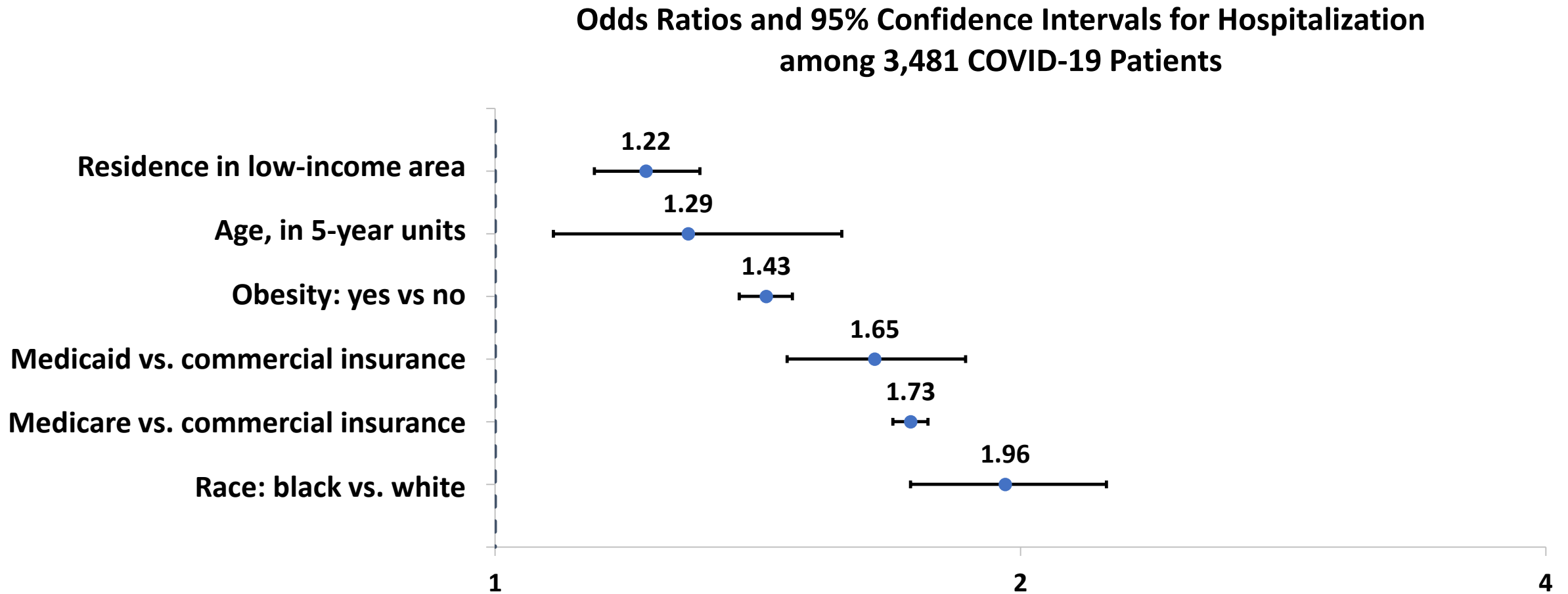
Income: Counties with the highest percentages of racial and ethnic minority groups and more-poverty had higher COVID-19 rates



Note: Adapted from Adhikari *et al.* Adjusted rate ratios (RR) compare COVID-19 incident cases per 100,000 residents in counties with more or less poverty and by racial/ethnic quartiles in the county. Reference category is county-level proportion of racial/ethnic minorities of 3.0%-17.9%.

Modified from: Adhikari *et al.*, July 2020, doi:10.1001/jamanetworkopen.2020.16938

Social determinants of health and other characteristics independently increase the odds of COVID-19 hospitalization.



Data source: Ochsner Health in Louisiana during March 1-April 11, 2020. Model includes race with the additional covariates of age, sex, Charleston Comorbidity Index score, residence in a low-income area, insurance plan, and obesity.



Racial and ethnic minority groups are disproportionately impacted by the COVID-19 pandemic.

- Black, Native American, and Hispanic persons reported elevated levels of suicidality, depressive symptoms, and fear of COVID-19.
- Non-Hispanic Black persons are more likely to experience loss of a close relative due to COVID-19 than non-Hispanic White persons.
- Non-Hispanic Black and Hispanic persons are more likely to report food insecurity during the COVID-19 pandemic.



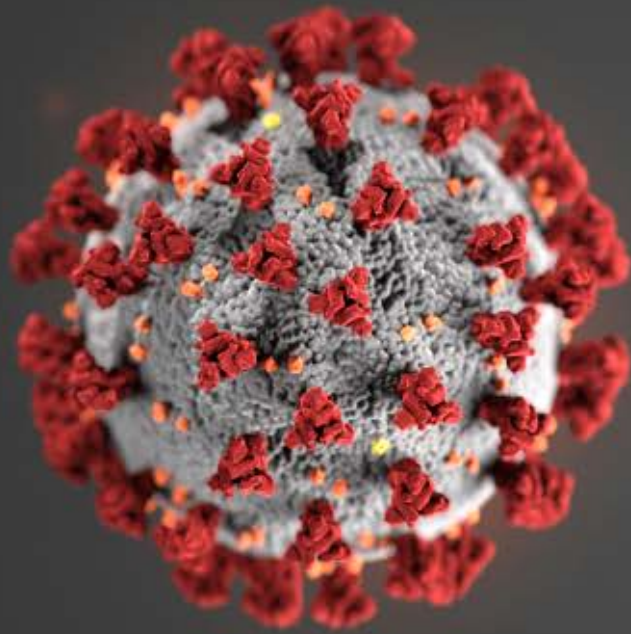
Source: Fitzpatrick *et al*, June 2020, <https://doi.org/10.1111/sltb.12655>  
Verdery *et al*, July 2020, <https://doi.org/10.1073/pnas.2007476117>  
Wolfson and Leung, June 2020, doi: 10.3390/nu12061648

# Summary



# Summary

- As of September 20, over 6.7 million cases of COVID-19 diagnosed and over 198,000 COVID-19-associated deaths reported in the United States.
- Racial and ethnic minority groups are being disproportionately affected by COVID-19, including increased risk of infection, hospitalization and death.
- Inequities in social determinants of health put racial and ethnic minority groups at increased risk of getting sick and dying from COVID-19.

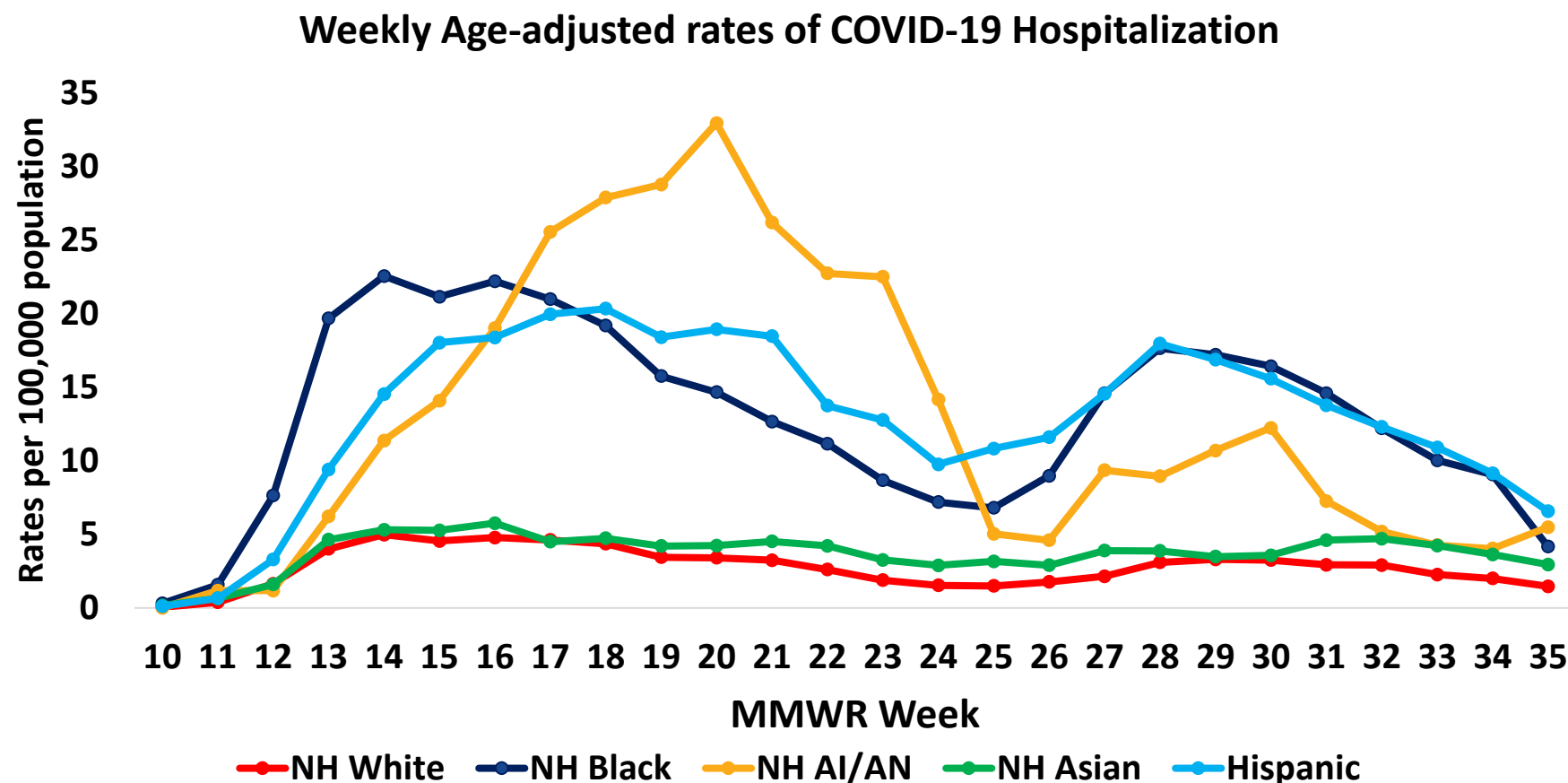


For more information, contact CDC  
1-800-CDC-INFO (232-4636)  
TTY: 1-888-232-6348 [www.cdc.gov](http://www.cdc.gov)

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.



Peaks in hospitalization rates in April and July were driven by certain racial and ethnic minority groups.



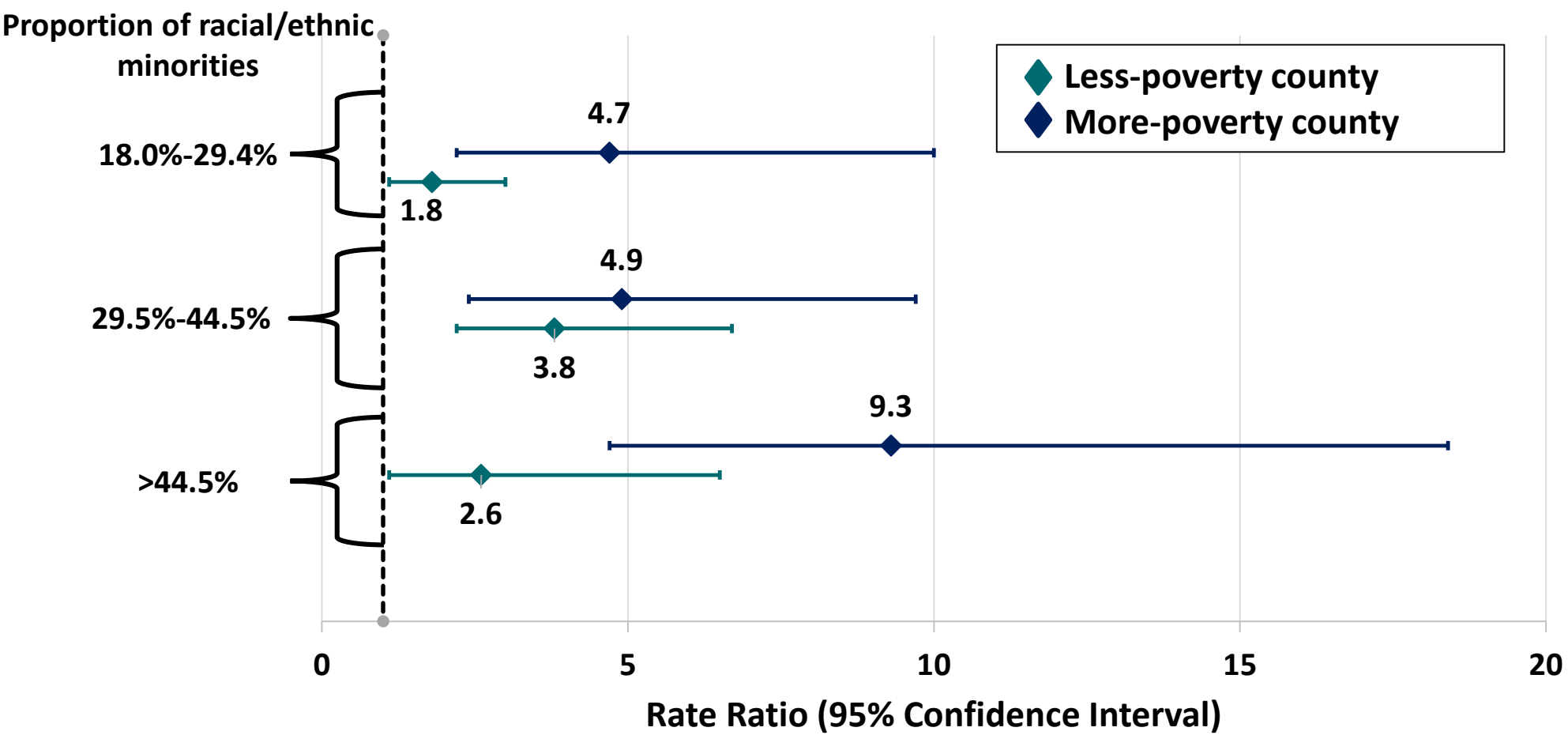
NH= Non-Hispanic

\*COVID-19 associated hospitalizations reported to Coronavirus Disease 2019 (COVID-19)-Associated Hospitalization Surveillance Network (COVID-NET) surveillance system between March 1 and August 15, 2020. COVID-NET is a population-based surveillance system that collects data on laboratory-confirmed COVID-19-associated hospitalizations among children and adults through a network of over 250 acute-care hospitals in 14 states.





Counties with the highest proportions of racial and ethnic minority groups and more poverty had higher COVID-19 death rates and than counties with highest proportions of white residents .



Note: Adapted from Adhikari *et al.* Adjusted rate ratios (RR) compare COVID-19 incident cases per 100,000 residents in counties with more or less poverty and by racial/ethnic quartiles in the county. Reference category is county-level proportion of racial/ethnic minorities of 3.0%-17.9%.

# Non-Hispanic Black persons disproportionately occupy essential occupations.

Occupation category	Weighted % occupation within racial/ethnic group				
	White	Black	Hispanic	Asian	% Difference
Transportation and material moving	5.33	10.58	8.65	4.74	5.25
Health-care support	1.76	5.46	2.41	1.95	3.70
Food preparation and serving	4.53	6.63	7.92	5.70	2.10
Building and ground cleaning and maintenance	2.62	4.36	8.16	1.47	1.76
Personal care and service	3.28	4.84	4.15	6.14	1.56

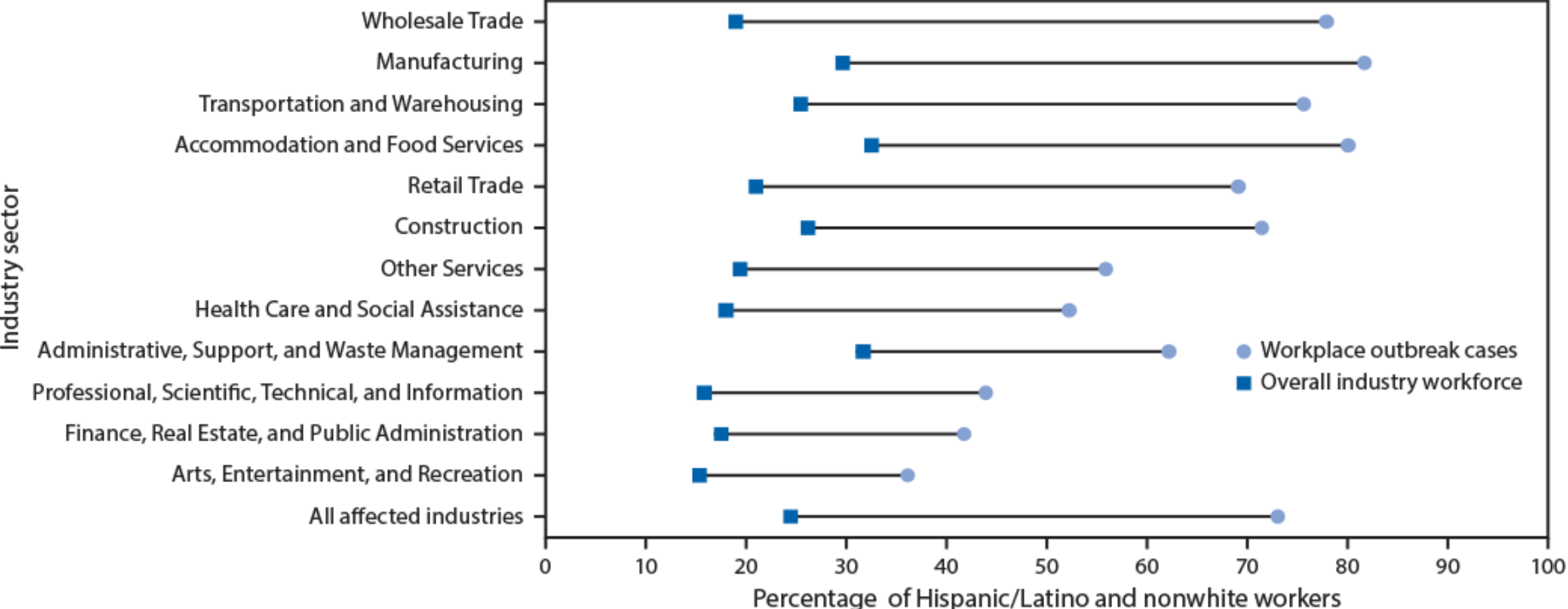
•Note: Data includes all states and the District of Columbia except Alaska, Delaware, Hawaii, Iowa, Maine, Montana, Nebraska, Nevada, New Hampshire, New Mexico, North Dakota, Oregon, South Dakota, West Virginia, and Wyoming. Armed forces occupation was excluded due to limited sample sizes.

•a All races are non-Hispanic, unless otherwise noted. Asian includes Native Hawaiians and Pacific Islanders. Other includes American Indian/Alaska Natives and multiracial individuals.

•b Percent difference in occupation prevalence between Blacks and Whites (i.e., Black % minus White % for each occupation), sorted in descending order.



# Racial and ethnic minority groups are disproportionately affected in workplace-associated COVID-19 outbreaks.



Data from 1,389 COVID-19 cases associated with workplace outbreaks during March 6–June 5, 2020, throughout Utah.



The rate of COVID-19 cases was higher on reservations, with larger shares of homes lacking complete indoor plumbing and was lower on reservations with a high percentage of English language-only households.

**Reservation Demographic and Household Variables to the Rate of COVID-19 Cases per 1000 people on US Reservations.<sup>a</sup>**

Household Variables	Rate of COVID-19 Cases per 1,000 people
Percent of homes lacking complete plumbing facilities	10.83 <sup>b</sup> (1.890)
Percent of households with ≥1 person per room	-6.395 (6.407)
Percent of households speaking English-only	- 2.431 <sup>c</sup> (1.069)

<sup>a</sup>All COVID-19 cases are current as of April 10, 2020. The analysis includes controls for state fixed-effects, percentage of American Indian residing on reservation, median age, percentage of male, median household income, percentage of households married, percentage with a Bachelor of Arts or higher education, and a constant. Standard errors are clustered at the state level.

<sup>b</sup>p < 0.01

<sup>c</sup>p < 0.05