Disparities in COVID-19 Incidence, Severity, and Outcomes

Megan Wallace, DrPH, MPH

ACIP Meeting
September 22, 2020

For more information: www.cdc.gov/COVID19
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

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

Trends in Number of COVID-19 Cases in the US
January 22 to September 19, 2020

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

https://www.cdc.gov/covid-data-tracker/index.html#trends
Select Commercial Laboratories Reporting to CDC: Number of Specimens Tested and Percent Positive for SARS-CoV-2
March 29, 2020 – September 12, 2020

- Spec. tested: Age Unk
- Spec. tested: 65+ yrs
- Spec. tested: 50-64 yrs
- Spec. tested: 18-49 yrs
- Spec. tested: 5-17 yrs
- Spec. tested: 0-4 yrs
- % pos.: overall
- % pos.: 0-4 yrs
- % pos.: 5-17 yrs
- % pos.: 18-49 yrs
- % pos.: 50-64 yrs
- % pos.: 65+ yrs

Percent Positive
Specimens Tested

Week 37: 4.8%
United States COVID-19 Deaths by County
January 21 to September 20, 2020

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

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

https://www.cdc.gov/covid-data-tracker/index.html#trends
Trends in Pneumonia, Influenza and COVID-19 Mortality
Data through the week ending September 12, 2020

% of Deaths Due to Pneumonia, Influenza or COVID-19

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

https://www.cdc.gov/socialdeterminants/about.html
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

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.

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

<table>
<thead>
<tr>
<th></th>
<th>SVI Q4 vs Q1 Relative risk (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All counties</td>
<td>2.4 (2.0, 2.9)</td>
</tr>
<tr>
<td>Large metropolitan areas</td>
<td>1.8 (1.4, 2.4)</td>
</tr>
<tr>
<td>Medium and small metropolitan areas</td>
<td>2.7 (2.0, 3.7)</td>
</tr>
<tr>
<td>Non-metropolitan areas</td>
<td>15.3 (7.2, 32.3)</td>
</tr>
</tbody>
</table>

*SVI: social vulnerability index; Q=quartile

Effects became more pronounced in less urban areas.

Dasgupta et al, CDC COVID-19 Response Team: Manuscript in MMWR clearance
Risk of becoming a COVID-19 hotspot is higher among counties with certain social vulnerabilities—especially in less urban areas.

- Higher percent of racial and ethnic minority residents*
- Higher percent of housing structures with ≥ 10 units*
- Higher percent of households with more people than rooms*

*At/above versus below the national median values
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.

As of September 15, 2020

- White, Non-Hispanic: 40% of total population, 30% of cases
- Hispanic/Latino: 15% of total population, 25% of cases
- Black, Non-Hispanic: 12% of total population, 22% of cases
- Multiple/Other, Non-Hispanic: 5% of total population, 4% of cases
- Asian, Non-Hispanic: 4% of total population, 3% of cases
- American Indian/Alaska Native, Non-Hispanic: 1% of total population, 2% of cases
- Native Hawaiian/Other Pacific Islander, Non-Hispanic: 1% of total population, 1% of 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.

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.

Moore *et al*, COVID-19 State, Tribal, Local, and Territorial Response Team, August 2020 [https://www.cdc.gov/mmwr/volumes/69/wr/mm6933e1.htm](https://www.cdc.gov/mmwr/volumes/69/wr/mm6933e1.htm)
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

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

As of September 15, 2020

Data from US Census 2019 estimates.

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.

https://www.cdc.gov/covid-data-tracker/index.html#demographics
Health disparities in COVID-19 deaths varies by age group among racial and ethnic minority groups.

Differences between the percent of COVID-19 deaths and the weighted population distribution, by race/ethnicity, as of September 16

https://www.cdc.gov/nchs/nvss/vsrr/covid19/health_disparities.htm
The percentages of COVID-19 decedents who were <65 years and Hispanic or “other” race were more than twice those that were White.

Modified from: Wortham et al, 2020, [https://www.cdc.gov/mmwr/volumes/69/wr/mm6928e1.htm](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
Occupation: Black persons are more likely to be employed in essential industries and occupations that may have increased exposure to SARS-CoV-2.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Percent employment according to race/ethnicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Likely employed in essential industry</td>
<td>White</td>
</tr>
<tr>
<td></td>
<td>27</td>
</tr>
<tr>
<td>Employed in occupations with frequent exposure to infections and close proximity to others</td>
<td>8</td>
</tr>
</tbody>
</table>

Modified from: Hawkins, May 2020: [https://doi.org/10.1002/ajim.23145](https://doi.org/10.1002/ajim.23145)
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%.

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

Odds Ratios and 95% Confidence Intervals for Hospitalization among 3,481 COVID-19 Patients

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](https://doi.org/10.1111/sltb.12655)
Verdery *et al*, July 2020, [https://doi.org/10.1073/pnas.2007476117](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)

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.
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.

<table>
<thead>
<tr>
<th>Occupation category</th>
<th>White</th>
<th>Black</th>
<th>Hispanic</th>
<th>Asian</th>
<th>% Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation and material moving</td>
<td>5.33</td>
<td>10.58</td>
<td>8.65</td>
<td>4.74</td>
<td>5.25</td>
</tr>
<tr>
<td>Health-care support</td>
<td>1.76</td>
<td>5.46</td>
<td>2.41</td>
<td>1.95</td>
<td>3.70</td>
</tr>
<tr>
<td>Food preparation and serving</td>
<td>4.53</td>
<td>6.63</td>
<td>7.92</td>
<td>5.70</td>
<td>2.10</td>
</tr>
<tr>
<td>Building and ground cleaning and maintenance</td>
<td>2.62</td>
<td>4.36</td>
<td>8.16</td>
<td>1.47</td>
<td>1.76</td>
</tr>
<tr>
<td>Personal care and service</td>
<td>3.28</td>
<td>4.84</td>
<td>4.15</td>
<td>6.14</td>
<td>1.56</td>
</tr>
</tbody>
</table>

*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.

Modified from: Rogers et al, August 2020: [https://doi.org/10.1002/wmh3.358](https://doi.org/10.1002/wmh3.358)
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.

Bui et al, August 2020, DOI: http://dx.doi.org/10.15585/mmwr.mm6933e3
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.

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

\(^a\)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.

\(^b\)\(^P\) < 0.01

\(^c\)\(^P\) < 0.05