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Racial demographics and COVID-19 confirmed cases and deaths: a correlational analysis of 2886 US counties

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ABSTRACT

Background Recent news reports state that racial minority groups, such as African–Americans, are experiencing a greater COVID-19 burden, as measured by confirmed cases and deaths. Limited racial data is available on a national level.

Methods We conducted the first nationwide analysis to examine COVID-19 and race on a county level. We obtained datasets on COVID-19 cases and deaths, and racial population totals, by US county. We examined if correlations exist between the racial percentages and percentages of confirmed COVID-19 cases and deaths by county.

Results A positive correlation existed between percentages of African–Americans living in a county and who have COVID-19 ($r = 0.254$, $P < 0.0001$), who have died from COVID-19 ($r = 0.268$, $P < 0.0001$), and case mortality ($r = 0.055$, $P = 0.003$). Positive correlations also existed between percentages of Asian–Americans living in counties and these factors. Negative correlations existed between percentages of Whites living in counties and these factors.

Conclusions A weak, albeit very significant, positive relationship exists between the percentage of African–Americans living in a county and the percentage of COVID-19 confirmed cases, confirmed deaths and case mortality in the county. This is in support of many city and statewide analyses, and we urge for targeted resources towards work that further examine these racial associations.

Keywords COVID-19, race, African-Americans, disparities, socioeconomics, county

Introduction

Multiple reports in recent news state African–Americans are experiencing a greater proportion of burden due to Coronavirus 2019 (COVID-19), with African–Americans making up a disproportionate number of deaths due to COVID-19 in cities in the northeast, south, west and midwest.[1–6] A similar report has also been made for Asian–Americans.[1] Nationally, African–Americans have been reported to account for 33% of the hospitalizations due to COVID-19 despite making up 13% of the population.[4]

These statistics provide valuable insight, but nationwide analyses of COVID-19's impact by race are limited, due to the poor reporting of racial data. Nationally, over 50% of COVID-19 case data do not have race reported,[7] which make it difficult to assess whether racial disparities in COVID-19 burden exist on a countrywide level. We sought to analyze if communities with a greater proportion of African–Americans and Asian–Americans are experiencing a greater COVID-19 burden. Specifically, we examined if correlations exist between the racial percentages by US county and percentages of confirmed COVID-19 cases and deaths by county.

Methods

We obtained datasets on COVID-19 confirmed cases and deaths by county from the publicly available New York Times GitHub repository (https://github.com/nytimes/covid-19-data). We extracted the latest data available at the time of data analysis, which was from 5 May 2020. We obtained datasets on racial and population totals by county from the Centers for Disease Control and Prevention website (https://wonder.cdc.gov/wonder/help/single-race.html) for 2018.

We calculated the county racial percentages for African–Americans, Whites and Asians by dividing the number of individuals of each respectively race in the county by the total number of individuals in the county. We calculated the

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Table 1 Correlations between COVID-19 burden and racial group by county

County racial group	*County COVID-19 confirmed cases %s*[a]			*County COVID-19 death %s*[a]			*County COVID-19 case mortality %s*[a]		
	r (std. error)	*t-value*	*P-value*	*r (std. error)*	*t-value*	*P-value*	*r (std. error)*	*t-value*	*P-value*
African–American	0.254 (0.018)	14.06	**<0.0001**	0.268 (0.018)	14.88	**<0.0001**	0.0553 (0.019)	2.96	0.0031
Whites	−0.287 (0.018)	−16.01	**<0.0001**	−0.308 (0.018)	−17.33	**<0.0001**	−0.0479 (0.019)	−2.56	0.0104
Asian–Americans	0.185 (0.018)	10.08	**<0.0001**	0.211 (0.018)	11.54	**<0.0001**	0.0258 (0.019)	1.38	0.168

Three outcomes were tested: county percentages of COVID-19 confirmed cases, county percentages of COVID-19 deaths and county percentages of COVID-19 case mortality (see footnote). Three predictors were also tested: county percentages of African–Americans, Whites and Asian–Americans.

[a]County COVID-19 confirmed cases and death percentages were calculated as number of confirmed cases and deaths, respectively, per county divided by total number of individuals per county. Case mortality percentages were calculated as number of COVID-19 deaths divided by number of COVID-19 confirmed cases by county.

r: Pearson correlation coefficient, for significant correlations. Std. error: standard error for Pearson correlation coefficient. *P*-value <0.05 was considered significant (indicated by bold).

percentage of COVID-19 confirmed cases and deaths by dividing the totals reported in the New York Times dataset by the total number of individuals in the respective county (as reported in CDC datasets). We performed Pearson product-moment correlations, weighted to county population size, to test associations. All data was managed and analyzed in RStudio Version 1.2.1335.

Results

Reported data was available in 3143 US counties in our CDC dataset, of which 2886 counties (92% of all counties) had reported COVID-19 cases. For this analysis, we combined the racial population totals in the five counties in New York City, in accordance to how the New York Times dataset reported their data. We excluded COVID-19 cases in territories outside mainland USA (comprising 0.099% of the total confirmed cases and 0.018% of the total deaths) and cases in which the county was unknown (comprising 0.731% of the total confirmed cases and 0.386% of the total deaths).

Results are shown in Table 1. We found that there was a positive correlation between percentage of African–Americans living in a county and percentage who have COVID-19 in that county ($r = 0.254$, $P < 0.0001$) and percentage who have died from COVID-19 in that county ($r = 0.268$, $P < 0.0001$). There was also a positive correlation between percentage of Asian–Americans living in a county and percentage who have COVID-19 in that county ($r = 0.185$, $P < 0.0001$) and percentage who have died from COVID-19 in that county ($r = 0.211$, $P < 0.0001$). There was a negative correlation between percentage of Whites living in a county and percentage who have COVID-19 in that county ($r = -0.287$, $P < 0.0001$) and percentage who have died from COVID-19 in that county ($r = -0.308$, $P < 0.0001$). There were weak correlations between racial percentages living in a county and COVID-19 case mortality rates in those counties (number who die from COVID-19 divided by number who are infected in that county) ($r = 0.055$ and $P = 0.003$, $r = 0.026$ and $P = 0.168$ and $r = -0.0479$ and $P = 0.010$ for African–Americans, Asian–Americans and Whites, respectively).

Discussion

Main finding of this study

Overall, our findings show a weak (relatively low *r*), albeit very significant ($P < 0.0001$), positive relationship between the percentage of racial minorities (African–Americans and Asian–Americans) living in a county and the percentage of COVID-19 confirmed cases and deaths in the county. This is in support of the statewide analyses reporting African–Americans are experiencing a greater proportion of COVID-19 cases and deaths.[5,8]

What is already known on this topic

Statewide, for example in Wisconsin, African–Americans make up 6% of the population but half of the COVID-19 deaths.[9] In Chicago, African–Americans make up 30% of the population but 70% of the COVID-19 deaths.[9] Racial data is limited, however, as recent analyses include data from only 14 US states—making up roughly 10% of the US population—that report statistics by race and sex.[10] In Georgia, in a state with African–Americans comprising one-third of the population, only 40% of COVID-19 cases have race data reported, as recording and tracking race data lengthen already tedious reporting process and so may not be feasible under current circumstances.[7] Similar is true for other states, such as Arizona, Massachusetts, and Pennsylvania.[7]

What this study adds

Our analysis is unique in that we saw correlations present across all affected COVID-19 counties, which no analysis has examined to date. We additionally found correlations between case mortality rates (number of deaths divided by number of confirmed cases) and racial makeup (African–Americans

and Whites), suggesting individuals infected with COVID-19 may be more likely to die if they are from communities with higher proportions of African–Americans. As current reports solely compare racial case and death rates to population racial proportions[5] and do not examine case mortality (deaths divided by cases) by race, this is a unique finding and warrants further analysis utilizing COVID-19 patient data. While our case mortality correlations are very weak (close to $r = 0$), there has been a drastic change in the correlations over time. For example, when analyzing COVID-19 case and death data from 2 weeks prior to the data used, i.e. data from 22 April 2020, the case mortality and race correlations were not significant ($P = 0.203$, $P = 0.318$ and $P = 0.219$ for African–Americans, Asian–Americans and Whites, respectively). This is likely because new communities were still beginning to be hit with COVID-19 in early and mid-April, particularly in the Southern states (which have higher proportions of African-American),[11,12] and so case mortality rates by race had not yet stabilized. The current higher rates of case mortality in African–American communities may be due to underlying comorbidities, including lung disease and heart disease, that put patients at higher risk once they become infected.[13]

Limitations

Limitations to our work include that we could simply demonstrate correlations between a county's racial makeup and their COVID-19 burden and could not perform granular analysis on the racial makeup of COVID-19 confirmed cases. Nevertheless, our findings convey an important message that racial health disparities may exist in the context of COVID-19 burden. Community structures may underlie such disparities, including access to health care, safe living environments, and ability to halt work commitments to social distance.[14] In fact, only 19.7% of African–American workers can telework (work from home), compared to 29.9% of White workers.[15] Minority groups may also be underserved in efforts to curtail disease spread, such as access to COVID-19 testing, as in certain locations minorities make up a disproportionally low portion of individuals tested.[16]

Conclusions

The COVID-19 pandemic has disrupted daily life in communities throughout the nation and may be the most severe public health crisis in our country to date. Data is showing it is disproportionality affecting minority racial groups, with African–Americans being more likely to contract and die from the disease, but limited racial data is available nationally. This analysis confirms that on a county level, counties with higher proportions of minorities are experiencing a greater COVID-19 burden. To better achieve health equity and combat the preventable disparities in future infectious disease burden, we urge for targeted resources directed towards future work that further examines the racial impacts and associations among COVID-19 patients.

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Conflicts of interest

The authors have no conflicts of interest.

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