



Social and Physical Environment Disparities Contribute to Mortality Outcomes during the COVID-19 Pandemic in the United States

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Abstract

Demographic patterns suggest that fatalities from COVID-19 are disproportionately high in Black and Hispanic communities in the United States. This short commentary postulates that disparities in social & economic status and physical environment, with their resultant inequities, may also be contributing to high fatality rates. The top ten counties in the United States with the highest COVID-19 fatalities (as of January 1, 2021) from the Johns Hopkins University Coronavirus resource center were compared to county-level population size, racial demographics, socioeconomic status and physical environment factors. We conclude by recommending a multi-pronged response approach with coordination between health systems and local governments using county-level data to identify social disparity 'hotspots' where extra resources can be allocated and targeted interventions can be implemented.

Keywords: COVID-19; Social Determinants of Health; Socioeconomic Status; Physical Environment; Vulnerable Populations

Background

Numerous clinical factors are now recognized as risk factors for COVID-19 mortality. (1)(2) Concurrently, demographic patterns suggest that fatalities are disproportionately high in non-Hispanic Black and Hispanic (BH) communities in the United States (US). (3-5) We hypothesized that disparities in social & economic status (SES) and physical environment (PE), with their resultant inequities, may be contributing to the high fatalities. These factors have been known to contribute to the upstream determinants of many clinical outcomes in non-COVID-19 circumstances. Therefore, we performed a rapid analysis of the ten counties with the most COVID-19 deaths with their SES and PE rankings, population size and racial composition to test this proposition. (6)

Methods

We examined a total of ten US counties with the highest COVID-19 fatalities (as of January 1, 2021) from the Johns Hopkins University Coronavirus resource centre. (4) County-level population size, racial demographics, SES and PE factors from the publicly available Robert Wood Johnson Foundation (RWJF) County Health Rankings (5) were compared to fatality case numbers.

Results

Among the counties with high fatalities, Cook (IL), Harris (TX), Wayne (MI), Miami-Dade (FL), Bronx (NYS), Maricopa (CA), Kings (NY) and Los Angeles (CA) have the poorest SES or PE rankings in their respective states (Figure 1). All counties except one (Queens) are among the worst counties based on SES and PE ranking in their respective states (SES and PE scores >50). Between 44-86% of the populations in these counties are BH. Additionally, among all counties examined, these have the highest population size (Figure 2). Los Angeles, the county with the most deaths in the US, has both a high BH population percentage (57%) and the largest population (> 10 million) among all counties examined. While Queens and NY (Manhattan) have mid-range SES and PE scores (QU 37; 39 & NY 50; 52, respectively) they have some of the highest population sizes in New York State.

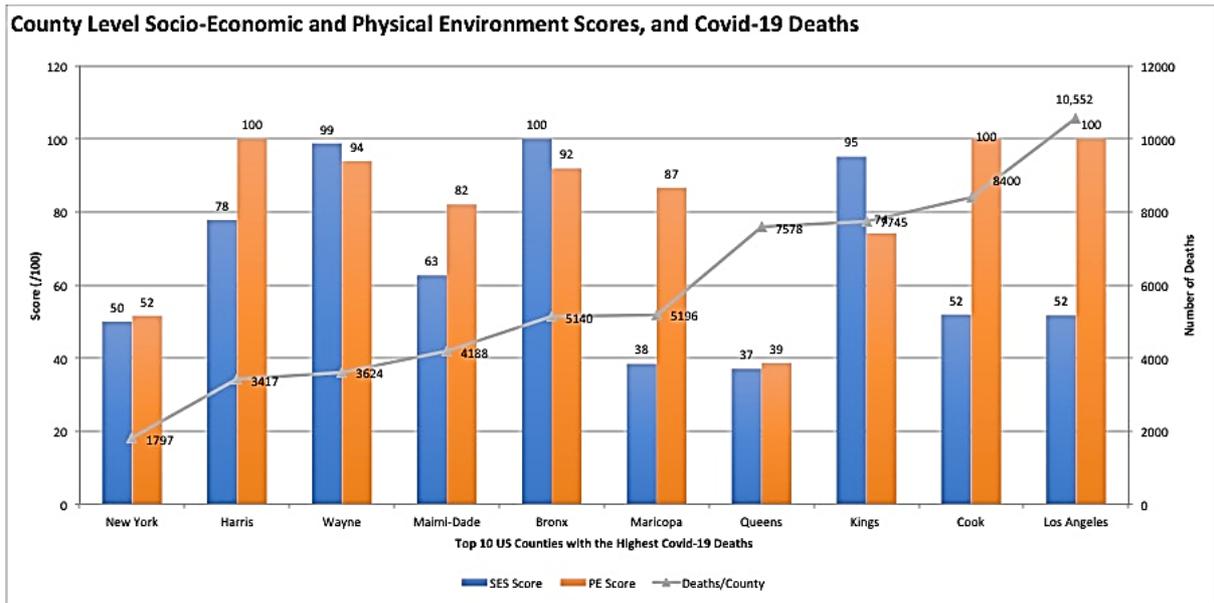


Figure 1: Social & Economic (SE) and Physical Environment Scores (PES) in Ten Counties with the Largest Numbers of COVID-19 Fatalities¹

¹ All data is current as of January 1, 2021. In order to standardize county-level rankings between different states, their SES and PE scores were scaled from 0-100 (higher numbers indicating worse scores). The RWJF rankings use county-level measures from a variety of national and state data sources (such as US census bureau, state education department, etc.) and combines them with scientifically-informed weights.⁶ Some metrics that contribute to the SES rankings include education level (high school/college), unemployment status, presence of income inequality, single parent households and social associations. The PE score is derived from factors such as air pollution, housing problems, long commute times and more. A score of >50 suggests a county's SES or PE is among the worst performing (bottom half in ranking) counties in the state for those factors; a score of 100 indicates the county is the worst ranking county in the state for SES or PE.

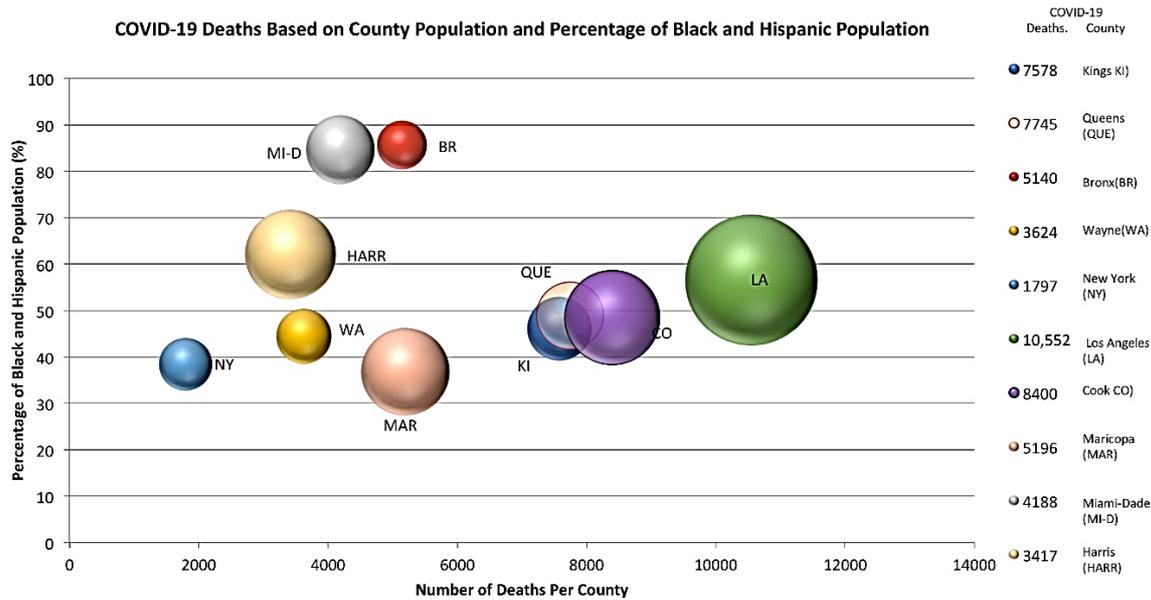


Figure 2: Total Number of COVID-19 Deaths/County against the Proportion of non-Hispanic Black and Hispanic Populations and the County Population in Ten US counties with the Largest Number of COVID-19 Deaths²

Discussion

- While this rapid analysis was limited by its ecological design and the unavailability of granular demographic data for COVID-19 fatalities, this evidence suggests that US counties with high COVID-19 fatalities have a combination of poor SES and PE factors, high populations and proportions of BH populations.
- SES and PE factors predispose communities to increased social vulnerability (decreased reserve to respond to a hazard) and higher rates of medical conditions, which in turn may make people more susceptible to COVID-19 mortality. It is likely that poorly-educated and non-English speaking communities have higher risks of being exposed to the illness if they lack sufficient knowledge about the pandemic. Large population sizes, poor physical environments and inter-generational living dwellings may also contribute to rapid spread of infection and subsequent death in these high-risk communities.
- A multi-pronged approach with coordination between health systems and local governments is needed. Electronic medical records can be used by health systems to identify patients with high-risk clinical factors and flag SES/PE risk factors. Local governments can simultaneously use census-level language and race data to pinpoint hotspots where resources should be re-directed. Measures such as aggressive door-to-door testing, contact tracing and education campaigns with appropriate language translation services by community and public health workers are needed. To help prevent

² Proportion of non-Hispanic Black and Hispanic Population in percentage of total county population. Size of bubble is proportionate to population size in the county.

delays in access to physicians in these high-risk communities, health systems could expand telehealth access through local vendors. At this moment, the SES and PE factors are impacting access to and uptake of effective vaccines and therapeutics and distribution to these high-risk communities should be prioritized.

- The COVID-19 pandemic presents an opportunity to address social inequities in high-risk communities to prevent further large-scale fatality and resurgence. Using county level data, local and state governments can identify social disparity 'hotspots' where they can allocate extra resources and implement targeted interventions for vaccine distribution. Targeted campaigns in these counties is a necessity to provide accurate public health messaging, designed to resonate with predominantly Black and Hispanic communities or communities with poor SES or PE scores. As granular fatality data becomes available, we can gain a greater insight into the contributing death factors and adjust interventions and policies accordingly.

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