

The Impact of the Social Determinants of Health on the Association between Cardiovascular Disease and COVID-19 Outcomes among African-Americans: A Literature Review

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Introduction

African-Americans in the United States are dying at disproportionate rates from severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the infecting viral agent that has caused the COVID-19 pandemic.

In 2020, a study of 2886 counties in the United States demonstrated that African-Americans have a higher percentage of confirmed COVID-19 cases, deaths, and mortality compared to other racial demographics. Several regression models have been attributed these findings to the social determinants of health (SDOH), but detailed discussion of the overlapping relationship between the social determinants and COVID-19 outcomes are limited.

During the pandemic, hospitals have reported increases in cardiovascular complications and mortality. Several studies have explored this increase and concluded a strong association between cardiovascular disease (CVD) and COVID-19 outcomes. When accounting for this confounder, COVID-19 has further disproportionately affected African-Americans.

African-American adults experience the highest burden of CVD comorbidities, and these statistics are repeated in severe COVID-19 outcomes in documented acute respiratory distress syndrome, myocardial infarction, and thromboembolisms. The findings in these results have similarly been attributed to the SDOH and merit investigation if the SDOH further exacerbates COVID-19 outcomes among African-Americans with pre-existing CVD.

Objectives

This literature review provides an overview of the association between CVD and increased vulnerability to COVID-19 infection, morbidity, and mortality among African-American by understanding the epidemiology of SARS-CoV-2, the virus's impact on cardiovascular health, and the SDOH that affect COVID-19 outcomes.

By understanding the impact of COVID-19 on cardiovascular systems, patients who have COVID-19 and cardiovascular comorbidities will be able to receive treatment tailored to their unique needs and reduce COVID-19 mortality. Investigating the epidemiology of COVID-19 was important to understand symptoms and how the SDOH can shape one's ability to fully engage in COVID-19 prevention efforts.

Further understanding of health disparities can guide preventative efforts by health professionals and policy makers toward confounders of disease in the event of a future pandemic.

Methods

This study accumulated sixty sources associated with COVID-19, CVD, the social determinants of health, and the relationship between each other.

Peer-reviewed publications were searched through PUBMED, Wiley Online Library, ScienceOpen, Nature Reviews Cardiology, and The Lancet, using the search terms: {COVID-19, Coronavirus incidence, CVD, racial disparities, social determinants of health, health disparities}.

Other papers were searched using the strategy "Coronavirus and cardiovascular disease", "COVID-19 and the social determinants of health", "racial disparities in COVID-19 outcomes", and "COVID-19 incidence by state." The reference lists of retrieved sources were analyzed, and the timeline of article publications ranged between 2015 and 2021.

Literature Review

Epidemiology of COVID-19

- Symptoms:** fever, fatigue, cough, sore throat, abdominal pain, pneumonia, and septic shock.
- Risk Factors:** age, pre-existing health conditions (asthma, obesity, hypertension, diabetes), socioeconomic status, race/ethnicity.
- Transmission:** propagated disease primarily spread through respiratory droplets from coughing, sneezing, talking or breathing.
- Prevention:** hand-washing, wearing a mask that covers the mouth and nose, self-quarantine.

COVID-19 and Cardiovascular Disease

- Myocardial injury:** Heart muscle's struggle to pump blood through the body. Associated with elevated troponin levels and associated with COVID-19 hospitalizations.
- Cardiac arrhythmia:** Irregular heartbeats and can escalate to atrial fibrillation, cardiac arrest, and stroke if untreated. Attributed to hypoxia and inflammatory stress. Evident in 44% of severe COVID-19 patients.
- Heart failure:** The heart cannot pump enough blood and oxygen to support other organs in the body. Associated with increased metabolic demand of COVID-19. Evident in 23% of patients.
- Hypertension:** Dangerously elevated blood pressure. Among the most significant factors contributing to disparities in both cardiovascular health and its relationship to COVID-19 outcomes.
- Thromboembolisms:** obstruction of blood vessels by a blood clot that has become dislodged. Strongly associated among obese patients. Black patients have 30-60% higher risk.

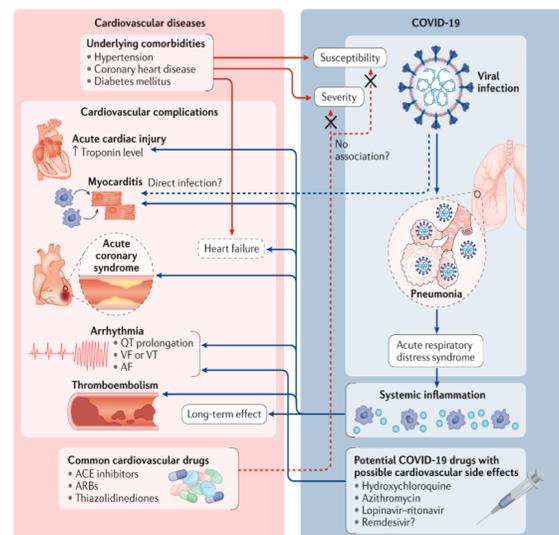
SDOH in CVD and COVID-19 Complications

The **Social Determinants of Health** describe the living environment, institutional behaviors, and access to healthcare that explain COVID-19 disparities and subsequent cardiovascular complications.

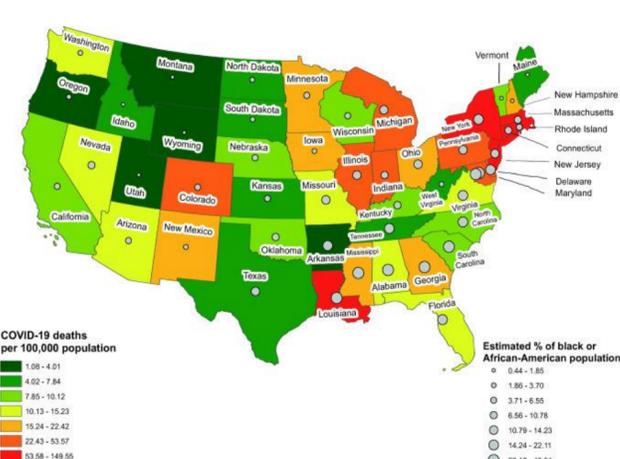
Preventing CVD involves changes in diet, lifestyle, environment, and adherence to hypotension medication. These changes include a low sodium diet, regular physical activity, and weight loss. However, the SDOH and exacerbated racial disparities during the COVID-19 pandemic make these changes more difficult.

Education and socioeconomic status are often intertwined, and they impact access to healthy foods and places to exercise to as well as hospitals that can adequately address COVID-19 complications. African-American populations are often less likely to claim higher education for affluent occupations and more likely to be ignored in hospital environments.

A double jeopardy emerges between COVID-19 and CVD that increases overall black morbidity and mortality, made worse by persistent health inequities that do not provide adequate resources to vulnerable communities that was evident before the pandemic.



Map of COVID-19 Mortality (May 2020)



Conclusion

The findings of this literature review conclude a strong association between severe cardiovascular outcomes and African-Americans with COVID-19. The most significant outcomes include myocardial injury, hypertension, and thromboembolism, and the most significant confounders within the SDOH include socioeconomic status and access to healthcare.

The findings of this review are consistent with regular reports of African-Americans believing they are considered secondary or tertiary in social, political, and hospital settings, worsened by the COVID-19 pandemic.

The pre-existing health disparities and inequities pervasive in health systems that prioritizes affluent, often white populations, has increased black morbidity and mortality from COVID-19. When accounting for cardiovascular complications of infection and preexisting CVD, these statistics become more evident due to health disparities associated with obesity, hypertension, and diabetes.

Limitations

Study limitations included a limited number of studies with raw state and county-level data for analysis of CVD among COVID-19 patients, further stratified by race. Explicit, pre-defined criteria in the selection process was not established, increasing the possibility of selection bias during investigation.

Recommendations

Efforts must be made to directly address the social determinants of health associated with both CVD and the COVID-19 pandemic. Evidence regarding disparities must be communicated to policymakers, and must maintain context of system-level disparities that may be lethal to vulnerable populations. Healthcare providers must improve health equity measures to address the needs of vulnerable populations.

Cardiovascular and healthcare-related upstream interventions that begin by targeting the impoverished and homeless communities may achieve the greatest population impact.

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