

## COMMENTARY

## Being African American and Rural: A Double Jeopardy From COVID-19

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Coronavirus disease 2019 (COVID-19) is an infectious respiratory disease caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). On March 11, 2020, the World Health Organization (WHO) declared the COVID-19 outbreak a pandemic. Currently, the United States has the highest number of officially reported COVID-19 cases and deaths in the world. As of April 6, 2020, more than two-thirds of rural US counties had been affected, including the rural southeastern states where lockdowns had been delayed.<sup>1,2</sup> Although all population groups are affected, racial/ethnic minorities have borne the brunt of the pandemic, especially African Americans.<sup>2</sup> In Louisiana, 72% of deaths related to COVID-19 are African Americans, who comprise only 32% of the population.<sup>3</sup> Similar disproportionately high death rates in African American communities are being reported in other states like Illinois, Wisconsin, Michigan, and North Carolina.<sup>4</sup>

### Historical Perspective

The effect of COVID-19 on African Americans is better understood by analyzing the racial disparities related to previous pandemics caused by other types of coronaviruses. Results from all the different studies of the 1918 Spanish Influenza pandemic indicate that African Americans had higher mortality and case fatality rates than whites.<sup>5</sup> During the 2009 H1N1 Influenza A pandemic, African Americans had the highest overall susceptibility to complications arising from the infection, followed by

whites and Hispanics.<sup>6</sup> Rural states like Oklahoma documented highest hospitalization rates for African Americans and lowest for whites.<sup>6</sup> These data are comparable to those for COVID-19, where 33% of hospitalized patients nationwide (among those whose race was known) were African American, even though the latter constitute only 13% of the US population.<sup>2</sup>

Why are African Americans at greater risk for COVID-19, as compared to other racial/ethnic groups? There are 3 possible explanations: (1) social determinants of health; (2) comorbidities and coexposures; and (3) genetic differences. Furthermore, why may rural African Americans be at even greater risk than urban African Americans? This health inequity is largely attributable to social determinants of health.

### Social Determinants of Health

The WHO defines social determinants of health as “the conditions in which people are born, grow, live, work, and age. These circumstances are shaped by the distribution of money, power, and resources at global, national and local levels.”<sup>7</sup> Relevant social determinants of health include low socioeconomic status, overcrowding, inadequate access to health care, and lack of healthy lifestyles.<sup>7</sup>

The 2010 US Census revealed that 15.1% of Americans live in poverty (defined by a household income of \$22,314 for a family of 4). African Americans have the highest poverty rate among racial/ethnic groups (27.4%),<sup>8</sup> with lower median incomes for rural than

urban African American households.<sup>9</sup> Although data for COVID-19 are not known, previous analyses indicate that influenza-related hospitalization was higher for persons residing in census tracts with a greater level of poverty.<sup>10</sup>

Many African Americans reside in small and/or multi-generational homes with extended families, use public transportation to commute to jobs and other places, and many of them are “essential” workers (like janitors and delivery workers), which means face-to-face contact with many people (often without adequate personal protective equipment). This makes social distancing and self-isolation virtually impossible, and it increases the risk of exposure to SARS-CoV-2.

The southeast, which has the highest concentration of African Americans in the country, has more cash-poor adults without health care coverage when compared to other regions.<sup>11</sup> Within this region, there are racial disparities in health care coverage that disproportionately affect African Americans.<sup>11</sup> This implies that African Americans in the southeast are less likely to afford COVID-19 screening tests and treatments than other populations nationwide. Given that about a quarter of rural hospitals may shut down due to the COVID-19 pandemic,<sup>12,13</sup> mostly in the southeast and lower Great Plains, rural African Americans will have difficulty accessing preventive and therapeutic services. Many African Americans do not have access to a primary care provider.<sup>14</sup> Without a primary care provider, they are more likely to fall victim to misinformation about COVID-19, unnecessarily use emergency rooms, or use them too late.<sup>15</sup> In New York City, African Americans without providers could not receive COVID-19-related help even from the City’s 311 nonemergency line, which was overwhelmed during the outbreak.<sup>16</sup> African Americans, particularly in the rural southeast,<sup>17</sup> are often suspicious of the health system, with a legacy of abuses such as the 1932-1972 Tuskegee syphilis study in rural Alabama, in which exclusively African American participants were allowed to die untreated.<sup>18</sup> Unfortunately, the US health system has been shown repeatedly to offer inferior care to African Americans with the same conditions and insurance as white patients, indicating a subconscious racial bias in health care.<sup>2</sup>

As compared to whites, African Americans consume less fruits and vegetables and engage in less exercise.<sup>19</sup> These lifestyle disparities, rooted in unequal access to economic and social resources, are even more pronounced for rural African Americans.<sup>20,21</sup> Although dietary risk factors for COVID-19 are not understood, frequent intake of fruits and vegetables protects against influenza-like illnesses,<sup>22</sup> and regular and moderate exercise protects against influenza-related cardiorespiratory mortality.<sup>23</sup>

## Physical Comorbidities

The likelihood of having obesity, diabetes, hypertension, and cardiovascular disease is higher for African Americans than for whites.<sup>24-27</sup> These diseases are also established risk factors for COVID-19 prevalence and mortality.<sup>28,29</sup> Further, as compared to nonrural communities, rural communities may have a greater prevalence of these conditions.<sup>30-32</sup> For example, rural African American heart disease mortality is among the highest ever recorded anywhere in the world.<sup>20</sup> These comorbidities are associated with high levels of inflammatory cytokines, which may contribute to the increased morbidity and mortality in COVID-19.<sup>33</sup>

## Coexposures

Based on a 2015 national survey, 20.9% of African American men smoke, as compared to 17.3% of white men.<sup>34</sup> Smokers have increased levels of angiotensin converting enzyme II (ACE2) receptors in their airway epithelia, which is the entry receptor for SARS-CoV-2, making smokers more susceptible to COVID-19.<sup>35</sup> Consistent with this information, smokers are 1.4 times more likely to have severe symptoms of COVID-19 and approximately 2.4 times more likely to be admitted to an ICU, need mechanical ventilation, or die, as compared to nonsmokers.<sup>36</sup> Based on a 2005-2007 national survey, marijuana use disorder is greatest among African Americans compared to other races/ethnicities.<sup>37</sup> Although not proven, it is possible that marijuana use may affect the ACE2 receptor like cigarette smoke, predisposing users to COVID-19.<sup>38</sup>

Census tracts with a higher percentage of African American population have higher levels of outdoor air pollution.<sup>39</sup> Small particulate matter of less than 2.5  $\mu\text{m}$  in aerodynamic diameter, also known as PM<sub>2.5</sub>, are particularly associated with adverse health outcomes.

In a nationwide study using data from 3,000 counties in the United States, an increase of only 1  $\text{g}/\text{m}^3$  in PM<sub>2.5</sub> was associated with a 15% increase in the COVID-19 death rate,<sup>40</sup> suggesting that long-term exposure to air pollution, particularly in African American communities, increases their vulnerability to experiencing severe COVID-19 outcomes.

## Genetic Differences

Although the genetic predisposition to COVID-19 has not been specifically studied, there is limited evidence to suggest that genetic differences underlie the racial susceptibility to viral infections. A recent study, mapping the expression quantitative trait loci (eQTLs), demonstrates that

there is extensive variation in transcriptional responses to immune challenges between individuals of African and European descent. The strongest difference in transcriptional response is observed for genes with antiviral and inflammatory-related functions.<sup>41</sup> In an in vitro study using macrophages, many of the genes showing European versus African ancestry-related transcriptional differences in isoform usage were in fact key regulators of innate immunity.<sup>42</sup> One such gene included the OAS1 gene that encodes the isoforms with varying enzymatic activity against viral infections.<sup>42</sup> This limited data may help explain the genetic basis to the predisposition to viral infections in African Americans.

## Interventions

The primary goal of the pandemic containment in rural African American communities is to reduce the SARS-CoV-2 virus transmission. The strategy of social distancing and hand hygiene needs to be stressed, using culturally appropriate messaging, with the involvement of faith-based community leaders. Identification of infected cases through ideal testing strategies and isolating contagious persons is the key. Data, however, suggest that testing in rural areas is woefully inadequate<sup>43,44</sup> and increasing surveillance in rural African American communities would require greater effort at increasing test availability and acceptance. Mandatory collection of race/ethnicity and place of residence data during testing will allow adequate resource allocation to affected communities. Innovative interventions, ones that embrace digital technologies and their ability to harness naturally occurring social networks within the African American community, have particular importance and deserve attention.<sup>45</sup> Policy solutions are needed to eliminate financial barriers to testing and treating uninsured or underinsured rural African Americans.<sup>46</sup>

## Conclusions

SARS-CoV-2 has upended normal life, as we know it, worldwide. COVID-19 has disproportionately affected African Americans. Rural African American communities, particularly in the southeast, may be at particularly high risk. Explanations for their susceptibility and vulnerability to COVID-19 include social determinants of health, comorbidities, and coexposures, and possibly genetic differences. Innovative preventive and therapeutic interventions targeting the rural African American communities are urgently needed in the fight against COVID-19.

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