



COMMENTARY

Susceptibility of Southwestern American Indian Tribes to Coronavirus Disease 2019 (COVID-19)

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doi: 10.1111/jrh.12451

Key words COVID-19, racial susceptibility, Southwestern American Indian.

On March 30, 2020, the New Mexico Governor, Michelle Lujan Grisham, informed the US President Donald Trump of the “incredible spikes” in cases of coronavirus disease 2019 (COVID-19) within the Navajo Nation in the rural Four Corners region of the American Southwest.¹ Governor Grisham noted “... a much higher hospital rate, a much younger hospital rate, a much quicker go-right-to-the-vent(ilator) rate for the population, and a doubling in every day-and-a-half” of cases, adding, that the disease “... could wipe out those tribal nations.” Although the pandemic has failed to spare any section of the US society, the American Indians of the Southwest constitute a particularly susceptible population for this disease, implying a greater risk for poor health outcomes from viral exposure.

Dikos Ntsaaigii-Náhást'éíts'áadah is the Navajo term for COVID-19, caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV2).² The Navajo Nation, home of the largest American Indian tribe, sprawls across 3 adjoining states (New Mexico, Arizona, and Utah), covering more than 17 million acres. The tribe has a registered population of over 300,000, of whom 157,000 lived on the Navajo land at the time of the 2010 census.³ As of April 4, 2020, 321 cases and 13 confirmed deaths of Navajo Nation residents from COVID-19 have been reported,³ with a per capita rate of reported cases on Navajo land more than 7 times higher than in New Mexico state. With the first case reported on March 17, 2020, there was an average increase of 40 cases daily between March 31 and April 1, 2020.⁴ The

Navajo Nation government declared a state of emergency on March 13, 2020, and closed all branches of the government and their services for the remainder of the school year.⁵ Although the region has a low population density, Jonathan Nez, President of the Navajo Nation, described the difficulty with social distancing, because “many generations live in 1 household.”⁴ Along with the Navajo Nation, Isleta Pueblo in New Mexico placed curfew restrictions.⁶ Also severely affected is the Cherokee nation in Oklahoma, where social distancing is similarly at odds with the native culture.⁷

Historical Perspective

Despite the ongoing debate and evolution of scientific understanding, it is accepted that the year 1492 triggered the start of a historical merger of the New World (Americas) and the Old World (Europe, Asia, and Africa), which introduced new infectious diseases in the New World. The results were catastrophic because the New World populations had no previous exposure and thus no natural immune defenses to these infectious organisms. The Spanish victory over the Aztec state was partly attributed to the spread of smallpox, a variola virus.⁸ Using mitochondrial DNA sampled from ancient mummies, scientists estimate that the American Indian population dropped from an all-time high 5,000 years ago to an all-time low about 500 years ago, correlating closely with the arrival of Christopher Columbus and the European

colonization of the New World.⁹ The data indicate that mortality from smallpox among the American Indians preceded the devastation from European warfare and enslavement.⁹ Although both innate and adaptive immune responses protect against respiratory viral infections, genetically regulated innate responses are particularly vital against novel virus strains not previously encountered.¹⁰ Because analysis indicates that current American Indians remain genetically similar to their pre-Columbian ancestors,⁹ though with less genetic variability, there are concerns about continued genetic susceptibility and inadequate innate immune response to novel viral infections.

During the 1918 Spanish influenza pandemic, American Indian villages across the United States sustained a staggering infection rate of 24% and the highest death rate of any racial-ethnic group, resulting in a 2% population loss.¹¹ In the 1990s, a viral illness emerged in the Four Corners region with a mortality rate at that time of 75%.¹² Later identified to be the Sin Nombre hantavirus, genetic testing suggested that the virus was native to the region and likely underwent mutations to ease transmission to humans.¹² A high percentage, about half of the initially affected population, were American Indians.¹³ The virus was later linked to the deer mouse vector (*Peromyscus maniculatus*) and no specific racial predilection was assumed.¹² During the 2009 H1N1 influenza A pandemic, the American Indian population experienced a mortality rate that was 4 times higher than in all other racial and ethnic groups combined within the United States.¹⁴

Potential Etiologic Factors

In addition to genetic links and immunological naivety, potential reasons for the American Indian susceptibility to communicable infections are the social determinants of health (ie, nonmedical factors that impact health),¹⁵ and high prevalence of concomitant physical comorbidities.^{14,16} Relevant social determinants of health include poverty, low educational status, crowded living conditions, household air pollution, lack of running water that makes washing hands challenging,⁷ inadequate access to health care due to chronic underfunding of the healthcare system and inadequate transport, and inadequate access to healthy foods. During a pandemic, a community's preventive behaviors (such as hand hygiene) and avoidance behaviors (such as avoiding hospitals if not severely sick) are influenced by social determinants, mediated by its members' ability to seek and process information.¹⁷

The Indian Health Service (IHS) has reported age-adjusted death rates for American Indian adults, which exceed that of the general US population by almost 40%.¹⁸ The 2017 Centers for Disease Control and Prevention (CDC) report notes that the 4 leading causes of death among non-Hispanic American Indians/Alaska Natives, in sequential order, are heart disease, malignancy, unintentional injuries, and diabetes mellitus.¹⁹ American Indian populations demonstrate disproportionately higher prevalence and/or mortality rates of obesity, diabetes mellitus, and cardiovascular disease than the general US population.^{18,20,21} Non-Hispanic American Indian/Alaska Native populations also have higher prevalence of current smoking compared to Whites.²² For reasons not yet known, smoking, severe obesity, diabetes mellitus, and cardiovascular disease are risk factors for greater COVID-19-related morbidity and mortality.²³⁻²⁵ Some of these comorbid states are also associated with greater morbidity and mortality during similar viral respiratory infections due to the immunomodulation by antiviral interferons and adipokines.¹⁰

Ongoing and Suggested Interventions

The COVID-19 pandemic has resulted in a surge of novel epidemiological and scientific techniques to combat this disease.² Identification of populations at high risk for COVID-19 infection, morbidity, and mortality is important in conjunction with forecasting model analyses of local spread of infection based on machine learning and artificial intelligence.² Certain American Indian groups are taking appropriate leadership steps in promoting personal hygiene, social isolation, curfew institution, quarantine housing, and culturally appropriate healthcare preparedness, in coordination with CDC guidelines. There is no approved treatment for COVID-19 but innovative use of traditional indigenous systems of care that nourish physical and spiritual well-being may be helpful.²⁶ Increasing telehealth diffusion in rural American Indian communities of the Southwest may further help protect these susceptible minority groups.²⁷

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