# Location Matters: Geographic Disparities and Impact of Coronavirus Disease 2019 (COVID-19)

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* This perspective was written on behalf of the Infectious Diseases Society of America (IDSA) Inclusion, Diversity, Access, and Equity (IDA&E) Task Force

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Running Title: COVID19 and Geographic Disparities

Article Main Point: Discussion and recommendations for addressing the significant disparities and challenges faced in access to testing, COVID-19 pandemic messaging, and provision of care based on geographic location, especially in communities of color, rural areas, and areas of low income.

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**Abstract**

The COVID-19 pandemic in the United States has revealed major disparities in the access to testing and messaging about the pandemic based on the geographic location of individuals, particularly in communities of color, rural areas, and areas of low income. This geographic disparity, in addition to deeply rooted structural inequities, have posed additional challenges to adequately diagnose and provide care for individuals of all ages living in these settings. We describe the impact that COVID-19 has had on geographic disparate populations in the United States and share our recommendations to what might be done to ameliorate the current situation.

**Keywords**: COVID-19, SARS-CoV2, geographic disparity, racial disparity, rural settings

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## Introduction

Coronavirus disease 2019 (COVID-19) has emerged as the worst global pandemic in the last 100 years, with almost 27 million diagnosed cases and over 880,000 deaths as of September 6, 2020.[1] COVID-19 has exerted a devastating toll across all communities. However, disparity exists between low and middle-high income geographies in the level of care available to patients with COVID-19. An analysis of deaths in Massachusetts found an increase in excess deaths in the early days of COVID-19.[2] Mortality was 40% greater in cities and towns "with higher poverty, higher household crowding, higher percentage of populations of color, and higher racialized economic segregation" compared to those with the lowest levels of those measures.[2] A striking example of the impact of geography on COVID-19 disease is the Navajo Nation, which has reported the highest per capita COVID-19 rate in the United States with a rate of 2,304 cases per 100,000 people compared to New York State, New Jersey, or the United States with rates of 1,806 cases/100,000, 1,668 cases/100,000, and 605 cases/100,000, respectively.[1] In Memphis, data reveal that most COVID-19 testing occurs in the predominantly white and well-off suburbs, not the majority African American, lower-income neighborhoods.[3,4] Further, testing rates are lowest in states designated as being unhealthy (based on factors such as life expectancy, population living at or below the poverty level, and number of low birth weight infants). This approach is problematic because the populations in these states have higher rates of chronic conditions that increase the risk of serious complications and death from COVID-19, such as heart disease, chronic respiratory diseases, and diabetes.[5] These disparities in testing rates are concerning because delays in testing increase the chance of a surge in silent spread and severe COVID-19 cases in states among rural and lower-income populations. In this viewpoint, we will discuss the geographic disparities that exist during this pandemic and provide our recommendations on what can be done to change the current paradigm.

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**Access to testing**

There is a wide disparity in COVID-19 testing by geographic area. Such disparities may stem from a lack of: hospitals and health care facilities, walk-in testing sites, access to transportation to drive-up testing sites, and lack of information regarding availability of testing. Although urban sites may have public transportation and walk-in testing facilities, communities in rural areas or low income settings are challenged by limited access to individual/private transportation or walk-in testing locations.[6] A recent analysis highlighted that geographic access to COVID-19 testing sites is as uneven as access to overall health care, with higher travel times to COVID-19 test sites in rural counties and in counties with a larger non-white or uninsured population, suggesting that COVID-19 cases are potentially under-counted and under-reported in these areas.[7]

Some of these limitations may be unique to communities in specific geographic areas, including areas with a large Amish or Mennonite population (where access to healthcare facilities is limited), Native American communities, and other socially isolated communities. Testing for novel diseases and information regarding how to access testing needs to be made widely available with resources tailored to the needs of the persons residing in the community, to avoid stigma associated with a new disease. It is critical that jurisdictions expand public health and commercial laboratory testing in all communities regardless of geography. Innovative methods of testing, such as mobile testing units or home testing kits, should also be considered.

**Messaging regarding pandemic and tests**

While transportation may pose unique challenges to accessing testing, accurate information about the pandemic may not be disseminated to communities further away from urban settings and in isolated communities. These populations may consider pandemics more of an "urban disease" and less relevant for rural settings with lower population density and

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exposure to impacted individuals may be limited. However, societal norms in rural settings and in various communities may lend themselves to transmission of diseases if there are large communal gatherings in which frequent close contact activities are the norm. Thus, the messages regarding disease transmission need to be tailored to communities to emphasize the importance of using face masks/coverings, hand hygiene, preventative measures, social distancing, and acquisition of COVID-19 from asymptomatic "silent" spreaders. Engaging thought leaders and key stakeholders in the community will be essential to provide information regarding disease transmission, signs and symptoms, as well as prevention measures. Methods of communication may include broadcast media, print materials, digital technology, as well as, information exchange through common local neighborhood gatherings including places of worship. For the younger generation, utilizing social media platforms (e.g. Twitter, Instagram) would be an effective means of communicating and disseminating information.

**Children, adolescent, and young adult populations**

Access to COVID-19 testing has been limited across the United States with testing practices varying across different local and regional areas and across age groups. In many areas of the country, prioritization for testing has been limited to persons who are symptomatic. In general, many studies report that persons ≤ 18 years of age are more likely to be asymptomatic or have milder symptoms. Therefore, they may not meet the testing criteria even if there has been significant exposure, leading to limited number of tests provided to children relative to the 22% of the population that they comprise. Although the risk of severe illness from COVID-19 is lower in the pediatric population, severe disease such as multisystem inflammatory syndrome in children (MIS-C) is occurring in an increasing number of children and studies have shown an increased burden of MIS-C among children of color.[8-12] Based on data from Virtual Pediatric Systems (a national registry), at least 201

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infected children < 18 years of age have been admitted to pediatric intensive care units in the U.S. and at least 20 under the age of 20 years have died from COVID-19.[8,13-16] Across the U.S., over 476,000 children under 20 years of age have tested positive for COVID-19 according to state health department data compiled by the American Academy of Pediatrics[17]. Based on antibody seroprevalence studies, it is estimated that the total number of persons in the U.S. infected with COVID-19 is at least 10 times higher than the current number of confirmed cases, indicative of significant undertesting in pediatric and adult populations alike.[18-20] Because of the lack of testing, the proportion of infants, children, adolescent and young adults infected with COVID-19 who are potentially at risk for developing serious or life-threatening illness remains unclear. The limited access to testing is significantly worse for those who live in rural areas and low income settings, inhabited by a disproportionate number of socio-economically disadvantaged Whites, African Americans, and Latinx populations. Programs focused on increased testing of children, utilizing community centers, places of worship, and schools, are needed, especially with schools reopening.

**Urban and rural differences**

The COVID-19 pandemic initially impacted the most densely populated areas in the United States particularly large urban areas in which health systems endured waves of cases that overwhelmed resources including hospital beds, personal protective equipment, intensive care capacity, ventilators, and personnel. It appeared that more rural communities had initially been less directly impacted. However, as social distancing recommendations around the country have relaxed and as access to testing has started to increase, rural populations have become more vulnerable to new surges of infection. Those living in rural communities may not have experienced the first hand perception of threat and may be less likely to maintain strict adherence to precautions such as social distancing and wearing of masks.[21] The major concern for COVID-19 infections in rural populations, in which 14% of the U.S.

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population reside, is that healthcare systems are less equipped for high capacity and high acuity care. Non-metropolitan hospitals have fewer intensive care unit beds (1.7 versus 2.8 beds per 10,000 population), fewer intensive care resources, and less access to ID subspecialists.[22] A study looking at the distribution of U.S. ID specialists found that of the 3,142 U.S. counties, 2,499 counties (79.5%) do not have a single ID physician.[23] Furthermore, individuals living in rural areas are more likely to be older and have underlying conditions that place them at an increased risk for severe infection.[24] Therefore, outbreaks in rural areas have the potential to overwhelm the limited healthcare resources available. Potential action items to ease the burden include: equipping previously non-ICU areas to function as ICUs, expansion of in-hospital tele-health capabilities for subspecialty consults, and having state licensing boards allow qualified physicians and nurses to temporarily staff rural hospitals in an outbreak.

**Conclusion**

The COVID-19 pandemic has accentuated longstanding racial/ethnic disparities in healthcare access and outcomes in the United States particularly in regard to geographic locations in rural and remote areas and low income settings. As rural and urban geographic areas remain interconnected, health policymakers and government authorities need to develop emergency and preparedness plans that address the limited access to COVID-19 testing, effective means of communication, provider shortage, and lack of healthcare facilities and intensive care units in rural areas. These geographically distant and isolated spots of COVID-19 transmission can become fertile grounds for resurgence of the pandemic.

**Potential conflicts of interest:** The authors have no conflicts of interest to disclose.

**Financial Support:** No funding was received.

**Acknowledgements:** The authors would like to thank the staff of the Infectious Diseases Society of America (IDSA) for their assistance with preparing this manuscript.

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