LITERATURE REVIEW SARS-CoV 2 Epidemiology

By: Dr. Rose Ann Huynh, Laureen Gbordzoe, Swetha Maddipudi, Chloe Jensen, Olivia Chen, Phillip Acosta, Jane Anderson, Chase Ballard, Cameron Holguin, Julian De La Chapa
Peer reviewed by: Dr. Jason Rosenfeld and Dr. Kelly Echevarria. Updated on 2/1/2021

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GENERAL POPULATION

GLOBALLY

- As of 2/1/2021, there have been a total of 103,111,445 cases reported (**Cases/1,000~13.2** based on a population of 7.8 billion; ↑ from **10.9** on 1/3), 57,180,176 patients recovered, and 2,231,324 fatalities (**2.16% fatality rate;** ↓ from **2.17%** on 1/3) from COVID-19.

UNITED STATES

- As of 2/1/2021, there have been a total of 26,201,301 cases reported (**Cases/1,000~79.8** based on a population of 328.2 million, ↑ from **62.9** on 1/3), 16,453,846 patients recovered, and 441,454 fatalities (**1.68% fatality rate,** ↓ from **1.70%** on 1/3) from COVID-19. A total of 304,415,413 tests have been performed.

TEXAS

- As of 2/1/2021, there have been a total of 2,376,889 cases reported (**Cases/1,000~82.0** based on a population of 29 million, ↑ from **62.4** on 1/3), 1,947,493 patients recovered and 37,074 fatalities (**1.56% fatality rate,** ↓ from **1.57%** on 1/3) from COVID-19. There is an estimate of 392,322 active cases with a total of 17,399,120 tests performed.

SAN ANTONIO

- Bexar County: As of 2/1/2021, there have been a total of 173,154 cases reported (**Cases/1,000~86.6** based on a population of 2 million, ↑ from **60.8** on 12/1), 142,214 patients recovered and 2,143 fatalities (**1.24% fatality rate,** ↓ from **1.43%** on 1/3) from COVID-19. There is an estimate of 28,797 active cases with a total of 1,467,370 tests performed.
- **Metropolitan Health Department Monthly Epidemiological Report (December 2020)**
  - November had an increase in COVID-19 cases across the county compared to October.
  - There have been ~4,600 hospitalizations due to COVID-19 since March 2020.
  - The pediatric Hispanic/Latino population has been disproportionately hospitalized compared to their proportion in the population.
  - Cases aged 41-65+ have the highest average number of days spent in the hospital.
  - More males than females have died due to COVID-19 in Bexar County.
  - Approximately 91% of cases are recovered and 10% of cases are indicated to have been asymptomatic when were presented.
  - People in their 20's account for 20% of total cases and 20% of cases reported in November. People <18 accounted for 18.8% of cases in November.
  - ~480 school-related cases were reported in November, which is an increase from previous months.

MEDICALLY AT-RISK POPULATIONS

MALE POPULATION

- Males face a greater incidence, longer clinical course, and mortality than women.
- Disparities might be due to prevalence of co-morbidities and higher presence of angiotensin-converting enzyme 2 (ACE-2) in males.
- *Recommendation*: The sex and gender disparities observed in COVID-19 vulnerability emphasize the need to better understand the impact of sex and gender on incidence and case fatality of the disease and to tailor treatment according to sex and gender. Clinical suspicion, accompanied by a relevant epidemiological history, should be followed by early imaging and a virological assay.

PREGNANT POPULATION

- There is minimal evidence of vertical transmission and no evidence of transmission through breastfeeding.
- Risk for pregnancy related complications is inconclusive, but there is evidence of of increased risk of preeclampsia, caesarian delivery, and pre-term birth.
- *Recommendation*: Systematic screening of any suspected 2019-nCoV infection during pregnancy and extensive intensive follow-up for confirmed mothers and their fetuses is recommended. Breastfeeding can be continued if the parent is COVID-19 positive but precautions (hand washing before touching the infant and mask wearing) should be taken. There is still uncertainty if COVID-19 can cross the placenta in-utero but study suggest low rates of vertical transmission of COVID-19 during the third trimester. Ensuring proper social distancing, hand-washing, and mask-wearing might decrease COVID transmission to pregnant women, which could lower hospitalized and COVID-related illness.

LGBTQ+ POPULATION

- Specific data is not collected on COVID-19 incidence, hospitalizations, or mortality in the LGBTQ+ population.
- The pandemic has exacerbated social and economic stressors on this population, increasing unemployment and poor mental health status, while decreasing access to routine care, medications and mental health services.
- *Recommendation*: Telehealth and a mailed specimen self-collection services should be developed to ensure continued access to mental health care (including to address the mental health impacts of social distancing) and HIV/STI prevention and treatment. To avoid exacerbating health disparities, large-scale seroprevalence studies must be deployed to better understand the potential co-morbidity of HIV and SARS-CoV-2 among MSM. LGBTQ individuals may also benefit from periodic home-calls from healthcare providers. This is to ensure that these individuals are not in any dangerous/unfavorable situations at home while under stay-at-home orders. These home-calls should include a multidisciplinary team of providers who can provide care in different aspects of the individual's life. While home-calls can be beneficence, those who are living in homes where their LGBTQ status is unknown or not supported at home, a secure text-based support may provide a better way to ensure the individuals privacy and safety.

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MEDICALLY AT-RISK POPULATIONS CONTINUED

PEDIATRIC POPULATION

- Children (primarily ages 0-20) make up only about 10% of confirmed cases so far, though this may be due to under-testing of asymptomatic or mild cases; cases in children continue to rise.
  - From March to September in the US, COVID-19 incidence among children aged 12-17 was about twice that of children aged 5-11.
- Children who live in low income households, as well as Black and Hispanic children, have disproportionately high rates of infection, hospitalizations, and MIS-C compared to white children and those from high income households. The high rates persisted even when each was adjusted for comorbidities and socioeconomics individually.
  - While most cases in children are mild, severe illness requiring hospitalization and mortality do occur. One in three children who are hospitalized are admitted to the ICU.
    - Children with preexisting comorbidities and infants may be at higher risk for severe illness..
  - Multisystem Inflammatory Syndrome (MIS-C) is rare but serious syndrome affecting mostly children who were previously healthy. A relatively high proportion of Black and Hispanic children develop MIS-C, though it seems to be similar to the percent of Black and Hispanic children infected with COVID-19.
- There is conflicting evidence on whether children transmit COVID-19 less readily than adults. More recent evidence indicates children may have similar transmission rates as adults.
  - A large population-based cohort study in England found that working age adults living with children ages 0-18 were not at increased risk of serious COVID outcomes.
  - There is some evidence that older children (10-18) have a higher secondary attack rate compared to younger children (under 10).
  - As schools reopen globally, some have shown outbreaks soon after reopening, while schools in areas with well-controlled COVID seem to have opened safely. Schools that employ strict distancing, masking, sanitization, and symptoms screening had few cases.
  - A large contact tracing study in India found no difference in infection risk between contacts of adults and contacts of children infected with COVID-19.
- *Recommendation*: Clinicians should monitor for progression of illness in children, especially in infants, and children with pre-existing conditions, as well as for MIS-C. Public health efforts should ensure equitable allocation of testing and culturally appropriate prevention education. More research is needed to determine the modifiable reasons for disparities in COVID infection rates and hospitalizations in order to find effective preventative measures. Preventive measures (e.g., social distancing, respiratory hygiene, and wearing face coverings in public settings where social distancing measures are difficult to maintain) should be continued to prevent transmission by children and adults with asymptomatic or mild disease. Schools will need to have adequate preventive measures (distancing, sanitization, and air ventilation and filtration) to reopen safely.

LatinX POPULATION

- Infection rates
  - In Texas, Hispanics account for 40% of COVID-19 cases and 56% of deaths.
  - Of the 45% of cases where demographic data were available, 33% occurred in Hispanic or LatinX patients.
- Mortality rates
  - Hispanics are dying at a rate 2.6 times higher than non-Hispanic whites; they comprise 18% of the total U.S population, but 26% of COVID-19 deaths.
  - Nationally, the mortality rate of Hispanic individuals is 52/100,000 compared to 35/100,000 in Whites.
- Reasons for disparities
  - Disparities are due to co-morbidities, smaller living spaces, working frontline jobs, language barrier, loss of health insurance, and fear of loosing immigration status.
    - Diabetes, heart disease, and cirrhosis are co-morbidities and have an increased prevalence in Hispanic populations compared to other racial and ethnic groups.
- *Recommendation*: Though the amount of racial and ethnic data on the epidemiology of COVID-19 has increased, more data is needed to fully characterize how COVID-19 affects LatinX populations and to understand the impact of both sex and race on hospitalization rates in this population. Evidence suggests that disparity may be worsening due to lack of education and health awareness among LatinX people. National programs (such as CDC's REACH program) and local programs (such as Penn State Project ECHO) are being implemented to increase education and resources dedicated to the LatinX community. These community programs and partnerships are particularly effective at connecting Latinx communities with testing services and increasing the trust that Latinx communities have with said services. More programs at local, state, and national levels should be implemented to educate Latinos by translating information into Spanish and increasing outreach.

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MEDICALLY AT-RISK POPULATIONS CONTINUED

BLACK POPULATION

- Infection rates
  - There is increasing concern that infection rates in African American communities are underreported.
  - In the United States, the infection rate is more than 3-fold higher in predominantly Black counties than in predominantly white counties.
- Hospitalization rates
  - Hospitalizations rates for black Americans are 4.6 times higher than those of non-Hispanic whites.
- Mortality rates
  - In Texas, counties with a greater proportion of African American residents reported significantly higher mortality rates than counties with lower proportions of African American residents.
  - The mortality rate in African Americans is 85/100,000 comparted to 35/100,000 in non-Hispanic white, and 6-fold higher in predominantly Black counties than in predominantly white counties.
  - Nationally, African Americans account for 24% of all COVID-19 deaths despite making up only 14% of the population.
- Reasons for disparities
  - African American women are at particular risk of contracting and developing complications from SARS-CoV-2 infection due to overrepresentation in essential fields, higher levels of co-morbidities, and lack of access to testing and care.
  - There is no evidence to suggest that the use of ACE inhibitors/ARBs increases an individual's risk of contracting or developing complications from COVID-19.
  - There is no evidence to suggest that genetic or immunologic predispositions are responsible for COVID-19 disparities in the African American population.
  - Misinformation and historical abuse of the African American community by authority figures has contributed to confusion regarding the risks, severity, and effective precautionary measures for COVID-19 in the African American community.
  - Disparities are due to comorbidities, racial discrimination, spatial exclusion, housing, environmental pollution, lack of insurance, employment types/opportunities, and implicit bias from providers.
    - Comorbidities more likely in black populations include obesity, cardiovascular disease, end-stage renal disease*, chronic respiratory disease* (all linked to increased risk of contracting sever COVID-19 infection), hyperglycemia (higher mortality rate and longer ICU stay), and vitamin D deficiency (linked to increased hospitalization time and complications).
  - *Recommendation*: Documenting racial/ethnic variations in testing and treatment is essential. Public health officials must prioritize prevention activities in communities and racial/ethnic groups most affected by COVID-19, including Black populations. Prioritizing access to early testing and equitably applied interventions may prevent the risk of COVID-19 transmission in marginalized populations. Special consideration should also be given to marginalized communities when determining priority for vaccination and novel treatments*. Investigation should occur to discern whether disparities are due to comorbidities, job exposure, or systemic racism in healthcare/society at large. Additionally, community organizations should be mobilized to provide factual information, guidelines on COVID-19, and equipment to prevent infection* to African American communities.