Medical Research Archives

European Society of Medicine

OPEN ACCESS

Published: June 30, 2024

Citation: Nyutu P, Wall W, et al., 2024. Provider-Perceived Impacts of Social Vulnerability on Patients' Access to Care During the COVID-19 Pandemic, Medical Research Archives, [online] 12(6). https://doi.org/10.18103/mra.v12i6.5474

DOI
https://doi.org/10.18103/mra.v12i6.5474

ISSN: 2375-1924

RESEARCH ARTICLE

Provider-Perceived Impacts of Social Vulnerability on Patients' Access to Care During the COVID-19 Pandemic

Pius Nyutu, PhD[1], **Whitney Wall, PhD**[1], **Valeria A. Russ, PhD**[1]

[1] Fayetteville State University

***Corresponding author:** wwall1@uncfsu.edu

ABSTRACT:

Objective: To study the provider-perceived impacts of social vulnerability on patients' access to care during the COVID-19 Pandemic.

Data Sources and Study Settings: Survey data was collected from healthcare providers in a medium-sized county within a south-eastern state in the U.S. during the COVID-19 pandemic.

Study Design: A cross-sectional mixed-method survey design was utilized to collect qualitative and quantitative data from study participants.

Data Collection: Healthcare providers were recruited from all major healthcare-related state licensure boards, including nurses, physicians, psychologists, social workers, and mental health counselors. The final study sample consisted of 141 licensed healthcare providers.

Principal Findings: Healthcare providers in our study indicated that the social vulnerability factors impacted patients' access to care. This study provides recommendations for improving access to care among socially vulnerable populations during pandemics as a means to reduce health disparities. The study also identifies areas for future research.

Keywords: Health Care Disparities; Health Equity; Nursing; Qualitative Research; Determinants of Health/Population Health/Socioeconomic Causes of Health

Introduction

The impact of the COVID-19 pandemic was widespread, but there were notable health disparities in COVID-19 diagnosis and treatment outcomes, with socially vulnerable populations being disproportionately affected. Racial minorities, particularly those who identify as Black, were at an increased risk of contracting COVID-19 and had an increased risk of death. Poor, immigrant, disabled, and racial minority groups were more likely to be living in conditions where COVID-19 could easily spread, and have comorbid health conditions that were a major risk factor for COVID-19 related complications[1,2]. Language and education inequalities may also have contributed to a lack of knowledge pertaining to the spread of the virus. Additionally, migrant status, low SES, unemployment, and disability have all been associated with having limited or no health insurance coverage [3], thus hindering the ability to access quality health care. Migrant status, low household income, and identifying as a racial/ethnic minority were factors associated with reduced rates of vaccination during the pandemic[4,5]. Older age (i.e., individuals over 65) and living in an elder-care facility were also identified as risk-factors for COVID-19 severity, with individuals aged 85 and over having the highest risk of death[6].

Disparities in COVID-19 outcomes among racial and ethnic minorities were noted globally since the start of the pandemic, particularly among minorities in densely populated urban areas with high transmission rates and with a high number of essential workers [7]. African Americans were more likely to be hospitalized due to complications related to COVID-19 when compared to Whites [8] and medical billing data indicated that Black Americans with COVID-19 symptoms were less likely to be given a COVID test than Whites[9]. Overall, racial minorities were reported to contract COVID-19 at higher rates than non-Hispanic Whites and were more likely to die as a result[10,11]. Further compounding these effects, people living in southern states within the U.S., particularly minority populations, are disproportionately uninsured as compared to those living in Northern and Western regions[12].

Shelter in place mandates were widely implemented with the intent to stop the spread of COVID-19 by limiting travel and person-to-person contact, but compliance with these mandates was associated with socioeconomic status. Families from impoverished communities were the least likely to adhere to physical distancing mandates and the most likely to experience significant financial and health-related hardships due to COVID-19[13]. Minorities represent a high percent of laborers in essential industries and may not be able to avoid being in high-risk contact situations such as riding on public transportation to work. In contrast, individuals and families from higher privileged socioeconomic backgrounds have better access to opportunities and technology that enable working from home and acquiring everyday supplies while adhering to social distancing guidelines[8].

A common aspect of these groups that were more likely to be affected severely by COVID-19, is that they are mostly marginalized and socially vulnerable. To identify socially vulnerable communities, the Agency for Toxic Substances and Disease Registry[14] recommends the use of the Center for Disease Control and Prevention (CDC) Social Vulnerability Index (SVI). The CDC identifies four SVI themes, which are then further divided into 15 categories and social factors[15]: 1. socioeconomic status (below poverty, unemployed, income, and no high school diploma); 2. household composition and disability (aged 65 or older, aged 17 or younger, civilian with a disability, and single-parent households); 3. minority status and language (minority, and aged 5 or older and speaks English "less than well."); 4. housing and transportation (multi-unit structures, mobile homes, crowding, no vehicle, and group quarters). This study therefore utilizes the SVI as a theoretical framework for identifying people who were socially vulnerable during the COVID-19 pandemic.

As the COVID-19 pandemic progressed, there were efforts made to improve healthcare access and safety. The Centers for Medicare and Medicaid Services (CMS) provided waivers and flexibilities that were updated regularly to enable providers to respond to those impacted by COVID-19[16]. SAMHSA recommended the use of telemedicine to expand the reach of substance use mental health services, particularly evaluation and treatment services, to reduce the spread of COVID-19[10]. Some of the initiatives taken were relevant to socially vulnerable populations such as increased access to testing among marginalized groups[17]. However, at the start of the COVID-19 pandemic, the focus on healthcare providers was mostly on their safety, and guidelines provided were mainly related to reducing their risk of exposure. For instance, the U.S. Department of Labor's Occupational Safety and Health Administration (OSHA)[18] regularly provided updated guidance on protecting healthcare workers and employers. In a systematic review of literature on changes related to access to healthcare services made globally during the COVID-19 pandemic, Pujolar and

colleagues[19] found that there was less use of healthcare services in the early stages of the pandemic and new barriers to access/worsening of barriers already present as a result of the pandemic. It is evident that throughout the COVID-19 pandemic, healthcare providers were tasked with serving populations of varying needs and following initiatives and policies designed to improve care and increase access to healthcare services. As a result, healthcare providers adjusted their practices to adhere to social distancing guidelines and to address increasing patient demands, including the use of virtual appointments[20]. Yet, research on the ability of socially vulnerable populations to access care as a result of these efforts, and specific plans made by healthcare providers to continue with quality care for this population during the pandemic, is minimal.

The current study utilized findings from survey-based research targeting healthcare providers during the height of the COVID-19 pandemic to identify the perceived barriers to provision and access of care for socially vulnerable populations. While most recent studies have focused on the general population, this study provides a unique perspective by assessing healthcare providers' perceived impacts of the COVID-19 pandemic on socially vulnerable populations thus contributing to greater understanding of the impact of pandemics on this population. The following exploratory research questions were investigated among a sample of healthcare providers in a medium-sized county in North Carolina:

1. What is the provider-perceived impact of social vulnerability on patients' access to care during the COVID-19 pandemic?
2. How does the provider-perceived impact of social vulnerability on patients' access to care during the COVID-19 pandemic vary by providers' demographic characteristics (i.e., provider race/ethnicity)?
3. What adjustments did providers in the county make to care for socially vulnerable populations as a result of the COVID-19 pandemic?
4. What did providers in the county report as needed to provide better care to socially vulnerable populations?

Method

Procedure. After approval to conduct the study was acquired from the Institutional Review Board, an invitation to complete the study survey was distributed through email to providers residing in the target county. The e-mail lists were acquired from the North Carolina Board of Nursing (n=5192), the North Carolina Medical Board (n=498), the North Carolina Psychology Board (n=74), the North Carolina Social Work Certification and Licensure Board (n=251), and the North Carolina Board of Licensed Mental Health Counselors (n=279). Volunteers who agreed to participate were directed to an online survey platform where they read the purpose of the study and asked to indicate consent by clicking agree. Those who consented were then directed to the survey instrument. The study utilized a mixed methods survey research design to collect both qualitative and quantitative data from participants to answer exploratory research questions. Qualitative data was collected using open-ended survey questions.

Participants. The study sample consisted of 141 medical and mental health providers, of whom 87 percent were female. The racial/ethnic background included Asian/Asian American (3%), Black (35%), Hispanic Latino (4%), Non-Hispanic White/Caucasian (53%), and Other (5%). More than half of the sample identified as nurses (63%). Complete demographic data for the study sample is provided in Table 1.

Table 1. Demographic data

Provider Type	Frequency
Medical Doctor	6 (4%)
Physician Assistant	2 (1%)
Nurse Practitioner	9 (7%)
Nurse	85 (63%)
Psychologist	5 (4%)
Mental Health Counselor	26 (19%)
Other	8 (6%)

Provider Type	Frequency
Medical Practice	
Urgent Care	8 (6%)
Clinic	21 (15%)
Private Practice	31 (23%)
Agency	8 (6%)
Community Center	6 (4%)
Nursing Home	10 (7%)
Hospital	39 (29%)
Other	22 (16%)
Gender	
Male	17 (13%)
Female	118 (87%)
Other	1 (.7%)
Race/Ethnicity	
White/Caucasian	72 (53%)
Black/African American	47 (35%)
Hispanic/Latinx	6 (4%)
Asian/Asian American	4 (3%)
Biracial/Multiracial/Other	7 (5%)
Education	
Doctorate	13 (10%)
Ph.D.	5 (4%)
Masters	38 (28%)
Bachelors	47 (35%)
Associates	27 (20%)
Other	6 (4%)

Note: N=141; Multiple responses accepted.

Measures. Data was collected using a 49-item researcher constructed instrument, The Provider Survey of COVID-19 Impact on Care to Socially Vulnerable Populations. This instrument collected information pertaining to provider participants' (1) demographic data (e.g., race, ethnicity, provider type, years of experience), (2) frequency of treating socially vulnerable populations during the COVID-19 pandemic, (3) perceived impact of social vulnerability on access to care during the COVID-19 pandemic, (4) adjustments made to enable care to socially vulnerable populations during the COVID-19 pandemic, (5) needs in order to provide better care to socially vulnerable populations during COVID-19 pandemic, and (6) use of SAMHSA's Recommendations for First Responders. Data analyzed for this study did not include the items on the use of SAMHSA's recommendations for first responders. A 6-item scale was used to assess the frequency of treating socially vulnerable populations and an 8 item scale was used to assess provider perceived impact of social vulnerability on access to care. Both measures used a 5-point Likert scale in which 1 = "Never" and 5 = "Always." Sample questions were, "Since the COVID-19 pandemic started, how often have you treated people from the following groups…?" and "In your experience, how much have these factors affected the ability of patients to access care during the COVID-19 pandemic?" The inventories were found to be reliable among the study sample with Cronbach alphas of .90 and .94, respectively. Open-ended qualitative survey questions included, "what adjustments were made to enable care to socially vulnerable populations during the COVID-19 pandemic?" and "what do you need in order to provide better care to socially vulnerable populations during COVID-19 pandemic?"

Data Analysis

Quantitative data was analyzed using descriptive statistics and regression analysis using SPSS software to answer exploratory research questions (1) and (2). Qualitative data was used to answer exploratory research questions (3) and (4). Content analysis was used to analyze qualitative data by a trained member of the research team using processes housed in the grounded theory approach, which allows for major themes to emerge from the data. Specifically, data was independently organized with regard to similar themes using an open coding process and then "tag lines" were established to summarize the major themes that emerged. The PI then reviewed the raw data and

the identified major themes/ "tag lines" to ensure consistency and accuracy.

Results

To answer the first research question, providers were asked to rate the frequency at which the following factors normally used to indicate social vulnerability affect the ability of patients to access care during the COVID-19 pandemic: being in a racial minority group, elderly age (65+), living with a disability, unemployment, no high school diploma/GED, housing instability/homelessness, without reliable transportation, and living in a rural area. Among our study sample, the most commonly reported factors identified as frequently/always affecting the ability of patients to access care during the COVID-19 pandemic were: (1) being without reliable transportation (n=41; 46%), (2) elderly age (n=39; 44%), and (3) homelessness (n=37; 42%). In contrast, the most commonly reported factors identified as never/rarely affecting the ability of patients to access care during the COVID-19 pandemic were (1) having no high school diploma/GED (n=39; 44%), (2) being a racial minority (n=37; 41%), and (3) being unemployed (n=33; 37%). See figure 1 for detailed results.

When looking at data trends, as outlined in our second research question, the frequency at which social vulnerability affected the ability of patients to access care during the COVID-19 pandemic tended to vary by provider's race. Most notably, Non-Hispanic White/Caucasian providers were more likely to report that being a racial minority rarely/never impacts access to care (n=26; 53%) when compared to Black providers (n=5; 17%). Furthermore, only 47% of non-Hispanic White/Caucasian respondents reported that being a racial minority sometimes, frequently, or always impacted access to care as compared to 83% of Black providers. Linear regression was used to further investigate this trend. There was a significant relationship between provider race and provider's report that being a racial minority impacts access to care ($t = 2.616$, $p = .01$); provider race explained 12% of the variance in providers' report that being a racial minority impacts access to care.

Qualitative data was collected to answer research questions (3) & (4). Our study sample reported that adjustments made to enable care of socially vulnerable populations during COVID-19 pandemic included the implementation of virtual appointments (e.g., telehealth, videoconferencing, and phone calls), increased use of PPE, decreased cost of services, increased testing, increased patient education, increased referrals to community resources, and increased overall flexibility. See table 2 for full responses. Additionally, providers reported that they needed the following to provide better care for socially vulnerable populations: more staff/space, more/better PPE for providers and patients, community resources, patient-education resources, improved technology/technical capabilities for patients to enable telehealth, transportation for patients, and improved patient insurance. See table 3 for full responses.

Figure 1: Factors affecting access to care during COVID-19, reported by providers

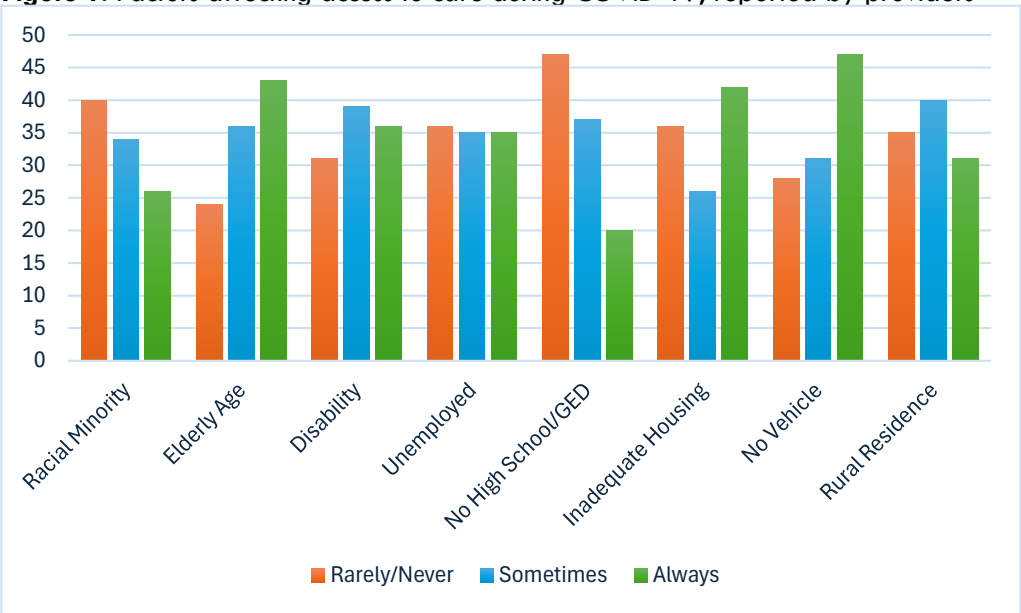

Table 2. Provider reported adjustments made due to COVID-19 to enable care to socially vulnerable populations.

Category	Sample of Comments
Technology/Telehealth	"I have some people who live in rural populations and I have been accommodating them by using zoom telehealth." "Maximize virtual encounters."
Testing	"Access to adequate testing sites with reasonable result times became a factor. We contracted with major university to mitigate this factor for our federal site." "Weekly screenings. Active surveillance of patients with symptoms to quarantine and monitor for further symptoms."
Cost	"Meeting the population where they needs are, providing care on the basis they can afford." "We have waived copays and made sliding scales for those struggling to pay for services."
Flexibility	"Greater flexibility in scheduling and cancellation policy." "follow always changing hospital policies." "Work more hours." "Increased flexibility in scheduling and attendance policies." "We have mailed out enrollment documents to clients who do not have internet access due to rural communities or age."
Knowledge/Education	"Be more knowledgeable about local resources for SVI populations." "Since patients have not been able to have their preventive care appointments, I have had to adjust to make sure I provide more education than ever regarding preventive care and/or maintenance of their disease."
PPE and Prevention	"Implementing CDC and state guidelines for social distancing limits the contact with these individuals because of the limited PPE." "The general precaution such as mask cleaning, more diligent cleaning of rooms between patients, and social distancing in waiting rooms."
Community Referrals/Care Coordination	"Reach out to community resources to coordinate transportation, shelter, and medical attention." "More targeted work on managing socioeconomic stressors."
Visitors	"Limiting and restricting visitors in the clinic treatment areas to reduce exposure risk to patients and staff."
Other	"Everything is by appointment, so we miss a lot of our patients being seen or being able to get ahold of them. A lot of our patients have no phone, no car, and appointments don't work for them." "Taking more time to assess the family's mental health needs."

Table 3. Provider-reported needs to improve care to socially vulnerable populations.

Category	Sample of Comments
Staffing/Space	"More real estate and staff to accommodate larger volumes." "more ICU beds." "lower patient to nurse ratio." "More medical staff. Such as nurses and CNAs."
Community Resources/Referrals	"More readily available community resources, particularly to aid them in financial stress, managing unemployment, and obtaining and utilizing appropriate personal protective equipment." "Better access to primary care providers."
Telehealth/technology	"Free smart phones or iPad for vulnerable populations and free internet service." "Ability to get to those populations that cannot get to me-that is more telemedicine, more getting out into the community and to rural areas to reach them."
Transportation	"Availability of mobile units that can go out to SVI where they live." "volunteers to overcome transportation issues and enroll eligible in Medicaid."
Insurance	"Permanent TeleMental Health benefits from ALL insurance companies." "Increased support provided by government agencies (i.e. insurance)"
PPE/Supplies	"Accessible PPE to protect SVI and healthcare workers. Increase funding to provide PPE to SVI as well as other resources." "Proper equipment [would] be very nice masks gloves pay us mileage and back pay for front lines."
Knowledge/Information	"awareness of their needs, before visit." "More ways to provide patient education especially to the elderly because some don't have email and etc." "Improved education on telehealth services/benefits."
Testing	"More testing sites in rural areas."
Other	"Grant funding for medical supplies after care visits/ surgical cases and travel vouchers." "Translators." "Better communication from leadership to those providing care." "More case managers to help put patients in touch with community resources after hospitalization."

Discussion

There were notable health disparities in COVID-19 diagnosis and treatment outcomes, with socially vulnerable populations being disproportionately negatively affected by the pandemic[1,2]. Healthcare providers were frontline responders during the COVID-19 pandemic and have valuable knowledge related to the provision of healthcare to socially vulnerable populations during the COVID-19 pandemic.

This study was aimed at providing a broad view of healthcare providers' perceived patient factors limiting access to care among socially vulnerable populations in a range of healthcare settings in a moderately highly populated county in North Carolina during the COVID-19 pandemic. Notably,

despite extensive literature highlighting the barriers to care experienced by racial/ethnic minorities during the COVID-19 pandemic across the nation[21,22] and particularly in the south[12], almost 40% of the providers that participated in our study reported that race/ethnicity was never or was rarely a factor that impacted care during the COVID-19 pandemic. More research is needed to better understand these findings. Use of a multi-method approach, to include qualitative techniques, is recommended to add context to these findings and to better interpret providers' perceptions regarding the barriers experienced by socially vulnerable populations.

Qualitative data collected from our sample of providers pertaining to the adjustments that they made as a result of the COVID-19 pandemic to improve care for socially vulnerable populations are consistent with national reports regarding the adjustments that were made by healthcare providers in response to COVID-19. These adjustments included the utilization of PPE and preventative practices, use of technology and telehealth to facilitate virtual appointments, reducing the cost of services, increasing attention to community referrals and care coordination, and limiting visitors. A unique theme that emerged among our study sample was the use of increased flexibility (e.g., working longer hours when needed, working while short staffed, following quickly changing policies, providing patients with more leniency pertaining to healthcare site policies, and accommodating patients' unique needs in-the-moment). Flexibility may be an integral tool used by providers to care for socially vulnerable populations during the COVID-19 pandemic within the medium-sized county in North Carolina where our study was conducted. Future research should further explore the role of flexibility in pandemic response efforts, the impact of provider flexibility on patient health outcomes, and the factors that may facilitate and/or impede flexibility among healthcare providers during pandemics.

Additionally, qualitative findings pertaining to what our sample of healthcare providers reported that they needed to provide better care to socially vulnerable patients during the COVID-19 pandemic included more staff, more space, more funding support, and fast and reliable internet. Interestingly, providers also noted their need for patients to be better supported in order to receive the care they provide. Specifically, our sample of providers noted the need for patients to be insured, to have transportation, to have the technology needed to engage in virtual appointments, and to be educated about COVID-19.

There are noteworthy study limitations that should be considered when interpreting the findings from this study. First, the survey response rate was low (2%) and there were substantially more female respondents than male respondents. However, this is not atypical of survey research among healthcare providers[23,24]. Also, given the novelty of COVID-19 at the time of study implementation, existing measures related to COVID-19 care did not exist and a researcher-constructed questionnaire was utilized. Given this, our research, like most research conducted during the COVID-19 pandemic, is exploratory in nature. Also, the data collected for this study was entirely based on provider self-report which may encourage socially desirable responding. Despite this, self-report survey measures are commonly used in social science and healthcare research[25]. Another limitation is that the cross-sectional study design did not provide information on provider self-report across time or during the second half of the pandemic. The impact and duration of the COVID-19 pandemic was more extensive than was originally anticipated. Therefore, this study may not have captured providers' experiences and perceptions during the height of the pandemic in the county. Future studies, during times of pandemics, should consider using a longitudinal design to explore providers' perceived barriers to the provision and access of care to socially vulnerable populations due to pandemics, as this may capture progression over time. Despite these limitations, this research is novel in that it is one of the only known studies to directly access provider perspectives regarding the factors that impacted access to healthcare among socially vulnerable populations during the COVID-19 pandemic and includes providers' perspectives on ways to improve care to socially vulnerable individuals/populations during pandemics.

Conclusion

Healthcare providers observed an impact on access to care by socially vulnerable populations right from the beginning of COVID-19 pandemic. The highest negative impact on access to care was among patients who lack reliable transport, those who are elderly, and those with inadequate housing. Providers tried to adjust by increasing use of strategies that may be relevant for the socially vulnerable people such as telehealth, patient education, and referral to community services. We therefore recommend that County and State governments explore increasing support for healthcare providers at times of pandemics so that they can continue to maintain standards of care and meet the needs of those who are most vulnerable. Evidence from the COVID-19 pandemic indicates that the highest need during

times of pandemics may be for more staff and space, more/better PPE for providers and patients, availability of community resources, patient-education resources, improved technology/ technical capabilities for patients to enable telehealth, transportation for patients, improved patient insurance, interns, training, and financial support. Flexibility may also be an integral tool when providing care to socially vulnerable populations during pandemics.

Acknowledgements: Funding for this study was provided by NC Collaboratory as part of a grant for a larger study "COVID-19 Assessment, Research, and Emerging Science". The contributions of Dr. Laura Coyle, Dr. Kimberly Tran, and Dr. Chu-Chun Fu in the larger study are appreciated. The authors would also like to acknowledge the contribution of Zenia Washington, MA, who served as a research assistant for this study.

References

1. Holmes L, Deepika K, Williams J, et al. *Medical Research Archives* 2022. 10(6) Black/African Americans (AA) and Disproportionate Burden of SARS-COV-2 (COVID-19) Mortality in the United States. Doi:10.18103/mra.v10i6.2786
2. Lima NNR, de Souza RI, Feitosa PWG, et al. People experiencing homelessness: their potential exposure to COVID-19. *Psychiatry Res*. 2020;288:112945. Doi: 10.1016/j.psychres.2020.112945.
3. Shadmi E, Chen Y, Dourado I, et al. Health equity and COVID-19: global perspectives. *Int J Equity Health*. 2020;19(1):1-16. https://doi.org/10.1186/s12939-020-01218-z.
4. Crawshaw AF, Deal A, Rustage K, et al. What must be done to tackle vaccine hesitancy and barriers to COVID-19 vaccination in migrants? *Journal of Travel Medicine*, 2021; 28(4). https://doi.org/10.1093/jtm/taab048.
5. Willis, DE, Andersen JA, Bryant-Moore K, et al., COVID-19 vaccine hesitancy: Race/ethnicity, trust, and fear. *Clinical and translational science*. 2021;14(6): 2200-2207. https://doi.org/10.1111/cts.13077.
6. Peters DJ. Community susceptibility and resiliency to COVID-19 across the rural-urban continuum in the United States. *J Rural Health*. 2020;36(3):446-456. Doi: 10.1111/jrh.12477.
7. Dorn AV, Cooney RE, Sabin ML. COVID-19 exacerbating inequalities in the US. *Lancet*. 2020;395(10232):1243–1244. https://doi.org/10.1016/S0140-6736(20)30893-X.
8. Tai DBG, Shah A, Doubeni CA, et al. The disproportionate impact of COVID-19 on racial and ethnic minorities in the United States. *Clin Infect Dis*. 2021;72(4):703-706. Doi: 10.1093/cid/ciaa815.
9. Wilder JM. The disproportionate impact of COVID-19 on racial and ethnic minorities in the United States. *Clin Infect Dis*. 2021;72(4):707-709. Doi: 10.1093/cid/ciaa959.
10. Substance Abuse and Mental Health Services Administration (SAMHSA). Considerations for the care and treatment of mental and substance use disorders in the COVID-19 epidemic. Published May 7, 2020. Accessed October 18, 2023. https://www.samhsa.gov/sites/default/files/considerations-care-treatment-mental-substance-use-disorders-covid19.pdf
11. Yancy CW. COVID-19 and African Americans. *JAMA*. 2020;323(19):1891–1892. Doi:10.1001/jama.2020.6548
12. Johnston CD, Ruoxi C. The COVID-19 pandemic and its impact on the southern United States. *Journal of Comparative Family Studies*. 2020;51(3/4):314–323. https://doi.org/10.3138/jcfs.51.3-4.007
13. Wright AL, Sonin K, Driscoll J, et al. Poverty and economic dislocation reduce compliance with covid-19 shelter-in-place protocols. University of Chicago, Becker Friedman Institute for Economics Working Paper #40. Published April 15, 2020. Accessed on September 4, 2020. https://dx.doi.org/10.2139/ssrn.3573637
14. Agency for Toxic Substances and Disease Registry. CDC/ATSDR social vulnerability index. ATSDR Place and Health. U.S. Department of Health and Human Services, Last revised on October 26, 2022. Accessed on July 12, 2023. https://www.atsdr.cdc.gov/placeandhealth/svi/index.html
15. Flanagan BE, Hallisey EJ, Adams E, Lavery A. Measuring community vulnerability to natural and anthropogenic hazards: the Centers for Disease Control and Prevention's Social Vulnerability Index. *J Environ Health*. 2018;80(10):34-36.
16. Centers for Medicare and Medicaid Services. Physicians and other clinicians: CMS flexibilities to fight COVID-19. Fact sheet published on July 20, 2023. Accessed on October 4, 2023. https://www.cms.gov/files/document/physicians-and-other-clinicians-cms-flexibilities-fight-covid-19.pdf
17. Cancino RS, Su Z, Mesa R, Tomlinson GE, Wang J. The impact of COVID-19 on cancer screening: challenges and opportunities. *JMIR Cancer*. 2020;6(2):e21697. Doi: 10.2196/21697.
18. Occupational Safety and Health Administration. Protecting workers: guidance on mitigating and preventing the spread of COVID-19 in the workplace. Published June 10, 2021. Accessed on October 4, 2023. https://www.osha.gov/coronavirus/safework
19. Pujolar G, Oliver-Anglès A, Vargas I, Vázquez ML. Changes in access to health services during the COVID-19 pandemic: a scoping review. *Int J Environ Res Public Health*. 2022;19(3):1749. Doi: 10.3390/ijerph19031749.
20. Smith AC, Thomas E, Snoswell CL, et al. Telehealth for global emergencies: implications for coronavirus disease 2019 (COVID-19). *J Telemed Telecare*. 2020;26(5):309-313. Doi: 10.1177/1357633X20916567.
21. Azar KMJ, Shen Z, Romanelli RJ, et al. Disparities in outcomes among COVID-19 patients in a large health care system in California. *Health Aff (Millwood)*. 2020;39(7):1253-1262. Doi: 10.1377/hlthaff.2020.00598.

22. Young CL. There are clear, race-based inequalities in health insurance and health outcomes (Commentary). USC-Brookings Schaeffer Center for Health Policy and Economics, Published on February 19, 2020. Accessed on October 4, 2023. https://www.brookings.edu/articles/there-are-clear-race-based-inequalities-in-health-insurance-and-health-outcomes/#:~:text=In%20the%20United%20States%2C%20there,states'%20refusal%20to%20expand%20Medicaid.
23. Cull WL, O'Connor KG, Sharp S, Tang SF. Response rates and response bias for 50 surveys of pediatricians. *Health Serv Res*. 2005;40(1):213-26. Doi: 10.1111/j.1475-6773.2005.00350.x.
24. Silverman TB, Schrimshaw EW, Franks J, et al. Response rates of medical providers to internet surveys regarding their adoption of preexposure prophylaxis for HIV: methodological implications. *J Int Assoc Provid AIDS Care*. 2018;17:2325958218798373. Doi: 10.1177/2325958218798373.
25. Cantuaria ML, Blanes-Vidal V. Self-reported data in environmental health studies: mail vs. web-based surveys. *BMC Med Res Methodol*. 2019;19(1):238. Doi: 10.1186/s12874-019-0882-x.