

Trends in Telehealth and Its Implications for Health Disparities*

Kelly D. Edmiston, Ph.D.[†]

and

Jordan AlZuBi, Ph.D.[‡]



March 2022

*This article is subject to revision. Any opinions expressed are those of the authors and not necessarily those of the Center for Insurance Policy & Research (CIPR), the National Association of Insurance Commissioners (NAIC) or its staff. The authors acknowledge useful feedback and suggestions from Jeffrey Czajkowski, Commissioner Andrew Stolfi (Oregon), and members of the NAIC's Health Innovations Working Group.

[†]Policy Research Manager. Corresponding author. Center for Insurance Policy & Research, National Association of Insurance Commissioners, 1100 Walnut Street, Suite 1500, Kansas City, MO 64106. Email: kedmiston@naic.org. Telephone: (816) 783-8067.

[‡]Assistant Professor of Finance and Insurance, National Taiwan Normal University. This article was written while AlZuBi was as a post-doctoral associate at the CIPR/NAIC. Email: aalzub45@gmail.com.

Trends in Telehealth and Its Implications for Health Disparities

ABSTRACT

The intersection of race and insurance is one of the four regulatory priorities of the National Association of Insurance Commissioners (NAIC) for 2022 and has been a key initiative of the NAIC since 2020. One workstream of the initiative is devoted to measures to advance health equity through lowering the cost of healthcare and promoting access to care and insurance coverage for historically disadvantaged and marginalized groups. A charge from the workstream to the NAIC's Health Innovations Working Group (HIWG) is to examine the potential for telehealth to ameliorate (or exacerbate) health disparities, particularly for racial and ethnic minorities, but also the LGBT+ community and across the urban-rural continuum. This review engages with the HIWG on that directive by documenting recent developments and trends in telehealth and implications for regulators and addressing implications for disparities in health and healthcare.

Disparities in health outcomes and healthcare across disadvantaged and marginalized groups are well-documented. The substantial increase in the utilization of telehealth during the COVID-19 pandemic has sparked considerable interest in telehealth, and along with that interest, questions about the implications for existing socioeconomic and demographic health disparities.

We find the greatest potential for telehealth to reduce health disparities is by surmounting barriers in access to care. Unfortunately, the potential for telehealth technologies to increase parity in access to care and health outcomes is limited by access to broadband internet and digital literacy. We show marked disparities in broadband internet access across population groups, particularly in rural areas and among racial and ethnic minorities, especially Native Americans. Even with access to broadband, many in these same groups lack sufficient digital literacy to leverage digital technology to improve health. Older adults also are limited by digital literacy.

Our overall assessment is that limitations in broadband access and digital literacy likely will constrain efforts to increase access to care for disadvantaged and underserved Americans through telehealth. While digital inequities may not exacerbate *existing* socioeconomic and demographic health disparities, they may create a new one. Still, reducing disparities is a bottom-up effort to alleviate the burden of disease in disadvantaged populations. Disparities could widen, but telehealth will improve access to care, and ostensibly, health outcomes, for some of the disadvantaged.

We suggest that for telehealth to effectively bridge gaps in access to care, healthcare professionals and patients must have a reliable guarantee of coverage and parity. Further, to reach the critical mass of telehealth utilization to make it cost-effective, sufficient infrastructure must be put in place and both providers and patients adequately trained. Finally, to be equitable, and indeed, to make significant progress in reducing gaps in access to care, technology and digital literacy must be better diffused across socioeconomic and demographic groups.

Trends in Telehealth and Its Implications for Health Disparities

EXECUTIVE SUMMARY

The intersection of race and insurance is one of the four regulatory priorities of the National Association of Insurance Commissioners (NAIC) for 2022 and has been a key initiative of the NAIC since 2020. The effort is led by a Special (Executive) Committee on Race and Insurance. The Health Innovations Working Group (HIWG) was charged by the special committee to “evaluate mechanisms to resolve disparities through improving access to care, including the *efficacy of telehealth as a mechanism for addressing access issues*” in “historically underserved communities” (emphasis added). This report was prepared to assist (HIWG) in their fulfillment of this directive. The purpose of the report is to document recent developments and trends in telehealth, to highlight implications for regulators, and to address potential implications for disparities in health and healthcare.

Socioeconomic and Demographic Disparities in Health and Healthcare

Health disparities across socioeconomic strata, race, ethnicity, and geography in the United States are well-documented in health statistics and the research literature. Life expectancy at birth is 3.5 years shorter for Blacks than for Whites, and, per 100,000 population (adjusted for age distribution), there are 127.5 more Black deaths annually than non-Hispanic White deaths. Native Americans have a lower life expectancy than Black individuals. Across 27 specific health measures, Black health outcomes are worse than those for Whites for 19, or roughly 70 percent. Health outcomes also are worse for Hispanics and Native Americans across most measures. In addition, those with low incomes or, more generally, low socioeconomic status (SES), have worse outcomes than those with higher SES, and the rural population is less healthy than the urban and suburban populations.

While disparities in *healthcare* have declined over time, they persist across numerous domains within the healthcare system. For about 40 percent of 250 healthcare quality measures tracked by the U.S. Agency for Healthcare Research and Quality (AHRQ), Black patients received “worse care” than White patients. Hispanics received worse care than Whites for more than one-third of quality measures and Asians for nearly 30 percent.

Trends and Developments in Telehealth

In general terms, “telehealth” refers to “the use of medical information exchanged via electronic communications to support and provide health care.” Broadly defined, examples include direct provider-to-patient interactions via videoconferencing (virtual visits), chat-based interactions, remote patient monitoring, physician-to-physician consultations, patient education, data transmission and interpretation, and digital diagnostics alone or in combination with conventional modalities. The key characteristics of telehealth are that it involves the use of information and

communications technologies (ICTs) and is delivered outside of traditional facilities. In this report, the alternative term, “telemedicine” means specifically direct provider-to-patient interaction using ICT.

Technology has always played a critical role in medicine and healthcare, and technological change is pervasive in healthcare. But the challenges of integrating telehealth technology are significant, and telehealth has not seen the rapid take-up characteristic of most medical innovations. The pace of expansion in telehealth accelerated rapidly with the onset of the COVID-19 pandemic. There was a spike in telehealth utilization across all specialties from a negligible amount in January and February 2020 to over 32 percent of outpatient visits in April 2020. While utilization of telehealth has since moderated, it remains exceptionally high compared with pre-pandemic levels, approaching 17 percent of all outpatient evaluation and management visits. It remains to be seen if these trends in expanded utilization of telehealth continue. The latest data at writing show telehealth accounted for 4.4 percent of total insurance claims in September 2021, up 0.2 percentage point from July 2021’s post-pandemic low. However *total claims* are much higher than in spring 2020 because of a “return to normal” in healthcare and recoument of deferred care. The decline in share of claims thus overstates the decrease in telehealth utilization.

Before the onset of the COVID-19 pandemic, limits on reimbursement constrained the widespread use of telehealth. Given the importance of and increased demand for telehealth services during the pandemic, state insurance regulators were obliged to address policies on the insurability of telehealth services. The scope of these actions varied by state. Before the pandemic, 35 states required state-regulated individual and group health insurers to cover telehealth visits. Five additional states added the requirement after the pandemic’s onset (maps in the main document show policy actions by specific states). Half of the states required parity in policyholder cost-sharing before the pandemic, but since, 3 additional states added parity requirements, and 4 prohibited cost-sharing altogether. Only 3 states required insurers to cover audio-only telemedicine visits at the pandemic’s onset, but 18 states have added the requirement. Half of the states require parity in reimbursement of providers: 15 before the pandemic and 10 additional since. We document recent developments (16) as well. In most cases, new orders extended states of emergency and related telehealth regulations, but there have also been rescindments, and there are several near-term sunsets.

Issues around licensure, insurance, privacy, and legal liability are challenging and have limited growth in the utilization of telehealth, particularly in direct provider-to-patient interactions. Much progress has been made, but these issues must be settled if telehealth is to remain a viable alternative (or complement) to traditional modes of medical practice.

How Could Telehealth Reduce Health Disparities?

While there are many barriers to health equity, we find physical access to care to be the most substantial and pervasive obstacle that could be alleviated with the

increased use of telehealth. Additionally, telehealth could provide access to culturally competent care that may not otherwise be accessible.

A critical problem facing rural areas is an insufficient supply of physicians and other healthcare professionals. Large areas with sparse populations lack the capacity to support many healthcare services. In particular, the overall distribution of physicians in the United States is exceedingly uneven. Physicians are highly concentrated in urban areas, and some rural places have proportionately very few—and in some cases, none. The problem of low physician supply in rural areas is compounded by physician mobility because physicians located in areas with a low supply of physicians are more likely to move. Further, physicians often are located close to hospitals where they have privileges, and much of the population of a large county could be many miles away from a physician, even if the physician density in the county is acceptably high. We also find substantially lower concentrations of physicians in areas with high Black and Hispanic populations.

The problem of a dearth of physicians and other healthcare professionals in rural and high-minority-concentrated areas is significantly exacerbated by transportation deficits in these same areas, particularly access to private vehicles. Most research that associates inadequate transportation with lack of access to healthcare defines transportation as access to a private vehicle. Lack of vehicle access corresponds closely with race and ethnicity. Our analysis of Census microdata (individuals) reveals that over 18 percent of Black households do not have access to any vehicle. In addition, 11 percent of Hispanics, 13 percent of Native Americans, and 11 percent of Asians lack access to any vehicle. By comparison, just over 6 percent of White non-Hispanic households lack access to a vehicle. Less than 5 percent of households in urban areas lack access to a vehicle, compared with 14 percent of households in rural areas. Lack of vehicle access is especially problematic in rural areas because of a lack of alternative transit options.

Arguably, telehealth has great potential to bridge the gap in access to care by connecting isolated people with health practitioners and reducing the need for transportation to receive care. Unfortunately, those who would likely benefit the most from telehealth are also the ones with the greatest obstacles in using it.

Limitations of Telehealth to Alleviate Health Disparities

One of the most pressing concerns in the evolution of the digital economy, which has persisted throughout the internet's history, is that of a digital divide, or a gap in computer and Internet access across economic, demographic, or social lines. The term encompasses multiple disparities, including the lack of access to technology and low levels of digital literacy; that is, the ability to navigate, evaluate, and communicate information online or in a digital format. More advantaged individuals historically have been the first to adopt and benefit the most from the introduction of new technologies in health, including telehealth.

Access to *the internet* (at all) has diffused almost fully across racial and ethnic groups without substantial disparities, although it has not diffused as completely by age, income, and spatial population density. But access to the internet is not sufficient for telehealth. Users must have broad bandwidth for videoconferencing and also privacy—ideally broadband access at home.

Over 21 million American adults have limited or no access to broadband. Lack of broadband access is considerably more pronounced among vulnerable populations, including racial and ethnic minorities, lower-income individuals, and seniors. The communities likely to benefit the most from telehealth—these groups as well as those in rural areas—also are the least likely to have access to broadband internet.

About 80 percent of Whites have broadband access at home, which itself meaningfully limits access to telehealth services. But around one-third of Blacks (29 percent) and Hispanics (35 percent) lack broadband at home. The gap for seniors is especially pronounced. In 2021, more than 36 percent of seniors had no broadband at home. The gap in rural areas is 28 percent, which is especially substantial when considering that those in rural areas are perhaps the most in need of telehealth to improve access to care.

While the penetration of broadband at home is inadequate for a widespread, equitable transition to telehealth, considerable progress has been made in the last five years. Still, even as the number of new broadband subscribers continues to grow, rural areas have lagged urban and suburban areas in broadband deployment and the speed of service offered, especially in tribal areas. In 2019, the latest date at which data are available, fixed terrestrial broadband was available to 99 percent of urban residents, compared with less than 83 percent in rural areas and 79 percent in tribal areas.

A lack of digital literacy for vulnerable populations also stands in the way of more universal access to care through telehealth. To have successful telehealth appointments, patients need to understand how telehealth platforms work, which is likely to pose difficulty for some patients, especially older adults. In addition to older adults, research finds disproportionately low digital literacy in the health context among the less educated and those who are members of racial or ethnic minority groups. Research also suggests that those with lower levels of digital literacy are less engaged and receive fewer psychological benefits from telehealth interactions even when they participate.

Inadequate digital literacy is not only a barrier for patients, but also for some health professionals. Some medical facilities are not prepared for a rapid transition to telehealth, and inadequate digital literacy is common among healthcare workers.

Assessment

In investigating the potential for telehealth to reduce health disparities, we find the most significant obstacle to health parity that could be bettered by increased development and utilization of telehealth resources is access to care, including culturally competent care. Disparities in access to care are associated with disparities in health outcomes.

Our overall assessment is that telehealth has great potential to reduce the problem of access to care for disadvantaged and underserved groups. However, limitations in broadband access and digital literacy will meaningfully limit efforts to increase access to care through telehealth. While digital inequities may not exacerbate existing socioeconomic and demographic health disparities, increased telehealth utilization may well create a new one. Nevertheless, most members of disadvantaged groups do have access to broadband internet at home and sufficient literacy to navigate the digital landscape. Reducing disparities is a bottom-up process with the goal of alleviating the burden of disease in disadvantaged populations. While disparities could widen in some sense, telehealth is likely to improve access to care, and ostensibly, health outcomes, for some in disadvantaged populations. Moreover, telehealth technology and knowledge developed since the pandemic have brought us to a place where telehealth has the potential to mitigate disparities in a meaningful way. We believe this reality is imminently doable.

An Overview of Telehealth and Its Implications for Health Disparities

Disparities in health outcomes and healthcare provision across racial and ethnic minorities, those with lower incomes and socioeconomic status, older adults, and those who live in rural areas are well-documented. The accelerated development and substantial increase in the utilization of telehealth during the COVID-19 pandemic; that is, the use of information and communications technologies (ICTs) in the delivery of healthcare, have sparked considerable interest in telehealth, and along with that interest, questions about the implications of increased telehealth utilization for socioeconomic and demographic health disparities (see, e.g., Timmermans and Kaufman, 2020).

The World Health Organization (WHO) describes health technologies generally as the “application of organized knowledge and skills in the form of devices, medicines, vaccines, procedures, and systems developed to *solve a health problem and improve quality of lives*” (2007, p. 106, emphasis added). The most salient development in the use of technology in the COVID-19 era is the rapidly increased utilization of telehealth. Telehealth has doubtlessly contributed to solving a health problem—provision of care at a distance during a pandemic—but has it improved quality of life for vulnerable populations? We suggest that it has for some, but many of the most vulnerable Americans are unable to take advantage of these gains.

We begin with a review of disparities in health outcomes across traditionally disadvantaged and underserved populations and an examination of disparities in the provision and quality of healthcare. We focus largely on race and ethnicity, but we also consider disparities by socioeconomic status (SES), LGBT+ status, and urban-rural continuum. In the next section, we discuss the concept of telehealth in general and telemedicine (direct provider-to-patient interactions) in particular. Specifically, we provide a detailed overview of trends in telehealth utilization, telehealth perceptions of patients and healthcare providers, and issues around insurance coverage and licensure. In the following two sections we evaluate opportunities for telehealth to reduce health disparities and its limits in doing so. Finally, we give an overall assessment of the intersection between telehealth and health disparities. We conclude that telehealth has great potential to increase access to care for disadvantaged populations but is unlikely to reach its full potential in the near term due to structural barriers. Indeed, the potential exists for telehealth to add another layer of socioeconomic and demographic disparity.

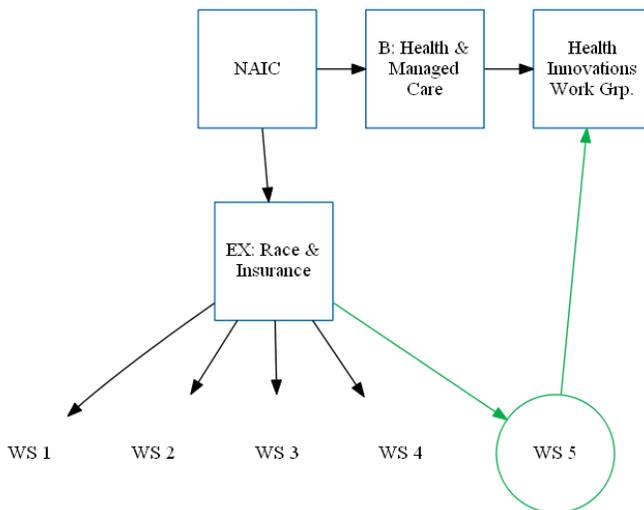
I. IMPETUS AND SCOPE

Impetus for the Study

The intersection of race and insurance is one of the four regulatory priorities of the [National Association of Insurance Commissioners](#) (NAIC) for 2022 and has been a key initiative of the NAIC since 2020. The effort is led by a [Special \(Executive\) Committee](#)

on [Race and Insurance](#). The initiative is coordinated through five workstreams (Figure 1). Workstream 5 within this initiative is devoted to advance health equity through lowering the cost of healthcare and promoting access to care and insurance coverage for historically disadvantaged and marginalized groups. A charge from Workstream 5 came to the [Health Innovations Working Group](#) (HIWG) to “[evaluate] mechanisms to resolve disparities through improving access to care, *including the efficacy of telehealth* as a mechanism for addressing access issues . . . in historically underserved communities” (emphasis added).⁴ This paper is an effort to assist the HIWG in fulfilling this directive.

Figure 1: Structure of Relevant NAIC Committees and Working Groups



Source: CIPR (Center for Insurance Policy and Research). Rendered with GraphViz 2.38.

Scope of the Study

There is a voluminous literature on disparities in health and healthcare across socioeconomic and demographic groups in the United States and mounds of data to support it. A search of “health AND disparities” on the research database PubMed (National Library of Medicine) yields over 86,000 results when limited to the last 20 years. There is also a sizeable literature on the use of information and communications technologies (ICTs) in health (telehealth) that has exploded in the last few years, particularly since the onset of the COVID-19 pandemic. A PubMed search yields almost 30,000 results when limited to the last 5 years. Moreover, there is a growing literature at the intersection of telehealth and health and healthcare disparities. Most of this literature, however, addresses disparities in access to or utilization of telehealth itself (see, e.g., Julien et al., 2020; Darrat et al., 2021; Jaffe et al., 2020; Rodriguez et al., 2021), and much of it is centered on specific implementations (see, e.g., Tong et al., 2020; Lattimore et al., 2021).

⁴See “2021/2022 Adopted Charges from the Special (EX) Committee on Race and Insurance,” which is on the [HIWG website](#). The Health Innovations Working Group operates under the umbrella of the NAIC’s [Health Insurance and Managed Care \(B\) Committee](#).

While we address disparities in access to and utilization of telehealth as an important and relevant concern, the overall objective of our study is to explore *disparities in health and healthcare* and the potential of expanded telehealth utilization to reduce them. There is little literature to date and no consensus on this question. The lack of a definitive conclusion on telehealth and health and healthcare disparities owes largely to the complexity of technology and the complexity of measuring disparities.

Weiss et al. (2018) review 33 papers addressing the intersection of health technologies (generally) and health disparities. They conclude: “Although the studies included in our results generally suggest that the implementation and adoption of new technologies (re)produce [socioeconomic] and class-based social inequalities in health, some results indicate that these technologies can, in fact, reduce inequalities over time” (p. 16). They propose that additional research is needed to “reliably establish these conclusions.” Our goal is to pursue this line of research further, looking specifically at telehealth. We review and analyze a large quantity of research literature and analyze relevant data on health disparities, the development of telehealth, and the nexus between them.

II. HEALTH AND HEALTHCARE DISPARITIES

Health disparities across socioeconomic strata, race, ethnicity, and geography in the United States are well-documented (Barr, 2019). Few other areas of health research have received more attention in recent years (Williams and Cooper, 2019), and disparities evident during the COVID-19 pandemic have served to magnify the issue in the last two years (Webb et al., 2020; Laurencin and McClinton, 2020). We first analyze data and review the research literature on health disparities to provide a foundation for engaging the issue in the context of telehealth.

Definitions

By health disparities, we mean “differences in the incidence, prevalence, mortality, and burden of diseases and other adverse health conditions that exist among specific population groups in the United States” (National Institutes of Health, 2002). By *healthcare* disparities, we mean inequities in access to healthcare or the delivery of healthcare across specific population groups.

“Race” and “ethnicity” have multiple meanings, and sometimes ethnicity is embodied in the definition of race, particularly if that definition is based on common ancestry. In the Census, race and ethnicity are separate questions with categories based on guidelines of the U.S. Office of Management and Budget (OMB) [[62 Fed. Reg. 58782](#) (October 30, 1997)]. However, the “Some Other Race” category, intended to be a small residual category, is the third-largest race group, overwhelmingly due to reporting by Hispanics who do not identify with the more specific OMB race categories (U.S. Census Bureau). In the data we provide and in our review of the research literature, we use the definition of race and ethnicity used by the source and do not usually specify what that definition is. To be inclusive, we generally use the

term “Black” rather than “African-American.” We refer to the Indigenous people of the continental United States as “American Indians” but use the term “Native Americans” when the context includes native Hawaiians and Alaskan natives. We generally employ the more commonly used and gender-neutral term “Hispanic” rather than Latino and Latina.

Socioeconomic status (SES) refers broadly to “an individual’s rank or status in a social hierarchy” (Krieger et al., 1997), but has traditionally been defined as a combination of income, education, and occupational prestige (Glymour et al. 2014). Numerous studies have examined the pathways by which SES can influence health (see, e.g., Adler and Newman, 2002; Braveman et al., 2011).⁵

Racial and Ethnic Disparities in Health Outcomes

Data and research are consistent and clear: all else equal, the White population is healthier than the Black population (see, e.g., Williams and Rucker, 2000). Hispanics and American Indians also have poorer health outcomes than non-Hispanic Whites.

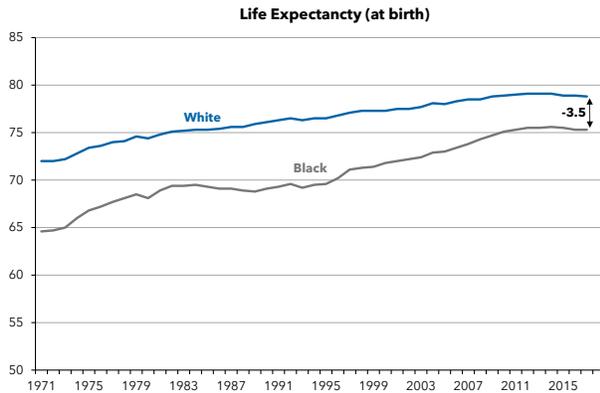
The broadest evidence of these health disparities is found in life expectancy and age-adjusted mortality rates.⁶ Life expectancy (at birth) and age-adjusted mortality rates vary significantly between the Black and White populations (Figure 2). There has been significant progress in reducing racial disparities as measured by these data, but convergence has slowed. In the last five decades, the Black-White differential in life expectancy at birth has declined (in magnitude) from -7.4 years to -3.5 years (Panel A). The Black-White differential in age-adjusted mortality rate had declined from 297.5 deaths per 100,000 to 127.5 deaths per 100,000 (Panel B). Although these data are available for the White and Black populations only, other data show that Native Americans have a lower life expectancy than Black individuals (Arias et al., 2014).

⁵Link and Phelan (1995) go further to assert that SES is also a “fundamental cause” of health status; that is, it has a causal relation to health outside of its influence on proximate risk factors.

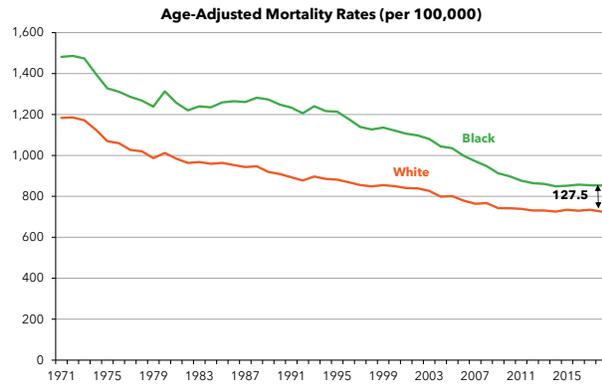
⁶Data are aggregated by the source only for Black and White and by gender. The data here are for both genders identified in the data (that is, male and female). An age-adjusted mortality rate is a weighted average of age-specific crude death rates, where the weights are the proportions of persons in the corresponding age groups of a standard population. This adjustment makes death rates more comparable across population groups. Life expectancy is at birth. Data are from the National Center for Health Statistics (NCHS), Centers for Disease Control and Prevention (CDC), National Vital Statistics System, [historical data](#), 1900-1998; NCHS, National Vital Statistics System, [mortality data](#); and the [CDC WONDER](#) database. Data are shown through the latest available compiled data at the time of writing.

Figure 2: Differences in Key Health Statistics Between Black and White Individuals

Panel A



Panel B



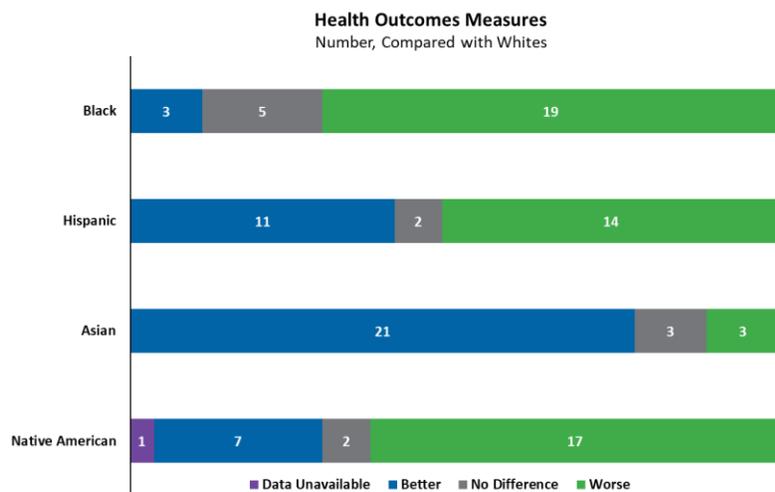
Data Sources: NCHS (National Center for Health Statistics), [National Vital Statistics System](#), historical data, 1900-1998; NCHS, National Vital Statistics System, mortality data; and the [CDC WONDER](#) database. [datafiles]

Differentials in mortality rates between races are especially pronounced for young people. Data from the CDC's Multiple Causes of Death Files show that death rates for non-Hispanic Black youth are twice that of young, non-Hispanic Whites (Harper et al., 2021). The most striking statistic is the difference in rates of death by homicide, which is 5.7 times higher for Black youth than for White youth. Indeed, the dramatic decline in homicide rates since the 1990s (although they are now ticking up) is a significant factor in the reduced Black-White differential in life expectancy (Harper et al. 2007).

The incidence of specific diseases also varies significantly across races. Black individuals have higher mortality rates than Whites for 10 of the 15 leading causes of death, while mortality rates are not consistently higher than Whites for other racial minorities and, in many cases, are lower (Williams, 2012). Disparities in the severity and progression of illness are significant even for outcomes that are less prevalent in the Black population, such as breast cancer.

Across 27 specific health measures, Black health outcomes are worse than those for Whites for 19, or roughly 70 percent (Figure 3) (KFF, 2019). For Hispanics and Native Americans, outcomes are worse than those of Whites across 14 and 17 measures, respectively.

Figure 3: Health Outcomes by Race and Ethnicity



Data Source: KFF, [Key Facts on Health and Health Care by Race and Ethnicity](#)

Increasingly, racism itself is considered among the social determinants of health (American Public Health Association). Bailey et al. (2021) argue that racism is the “root cause” of many racial inequities in health. The research literature suggests that structural racism is an important if underappreciated, factor in explaining health disparities. The key distinction of “structural racism” is that it has a cumulative impact. Bailey et al. (2017) define structural racism as “the totality of ways in which societies foster racial discrimination” (p. 1453). They cite several research articles that have “established multiple pathways by which racism harms health” (p. 1456). Among these are economic injustices; environmental and occupational health inequities; psychosocial trauma; inadequate access to care, including health insurance and health facilities; maladaptive coping behaviors; and stereotype threats (such as a stigma of inferiority and impaired patient-provider relationships). Lukachko et al. (2014) find that Blacks living in states with higher levels of structural racism were more likely to report past-year myocardial infarction (heart attack) than Blacks living in low-structural racism states, while there was no corresponding result for Whites.

We also recognize that physiological differences across race could contribute to health disparities. For example, physiological differences have been identified as factors in cardiovascular and cerebrovascular diseases (Wolf et al., 2020; LaBounty et al., 2019), renal function (Powe, 2020), perinatal outcomes (Snowden et al., 2016), and skin hydration (Mayrovitz et al., 2017) (see also Kaplan and Bennet, 2003).⁷

⁷We neither assert nor suggest that physiological differences between races are a primary or substantial cause of racial health disparities. Moreover, we recognize that physiological differences are not necessarily genetic. For example, environmental factors and stress responses can account for physiological differences across race (Thomas et al., 2019; Kim, 2014; Lepore et al., 2006, Williams, 1999). In general, we concur that “[u]nderstanding the purpose of race in medicine should be guided by appropriate evidence and agreement on how it is to be used and not used,” as “race may inform practice of better medical care and lead to improved health” (Powe, 2020).

Racial and Ethnic Disparities in Healthcare

While disparities in *healthcare* have declined over time, they persist across numerous domains within the healthcare system. For about 40 percent of 250 healthcare quality measures tracked by the U.S. Agency for Healthcare Research and Quality (AHRQ), Black patients received “worse care” than White patients (U.S. Agency for Healthcare Research and Quality, 2020). Hispanics received worse care than Whites for more than one-third of quality measures and Asians for nearly 30 percent.

The quality differential in healthcare among races is pervasive [Fiscella et al. (2000) and references therein]. Elderly Black individuals, compared with Whites, are seen less often by specialists, receive less appropriate preventive care, experience lower-quality hospital care, and receive fewer expensive technological procedures. A voluminous research literature shows that hospitalized Black patients receive less intensive care across numerous procedures and have been reported to receive less aggressive treatment, for example, of cancer and HIV. Healthcare disparities in other racial and ethnic minorities are significant as well. There are also marked disparities in healthcare *utilization* by racial and ethnic minorities, which invariably leads to worse health outcomes.⁸

Using fictitious patient histories (including patient pictures), Shulman et al. (1999) provide evidence that physicians were significantly more likely to recommend cardiac catheterization for White patients with angina (clinically diagnosed chest pain) (and men) than Black patients (and women). Shulman et al. do not differentiate their results by race and gender of the physician but note they were “overwhelmingly” White.

Socioeconomic Disparities

The research is clear and consistent that, all else equal, those with low incomes or, more generally, low socioeconomic status (SES), have worse outcomes than those with higher SES (Barr, 2019). SES and race and ethnicity are closely intertwined in a complex relationship (Barr; Navarro, 1990). The link between race and SES, and the complexity of it, is evident in Phelan and Link (2015), who find that “racial inequalities in health endure primarily because racism is a fundamental cause of racial differences in SES and because SES is a fundamental cause of health inequalities” (p. 311).

Most social epidemiologists and other authorities on the social determinants of health distinguish disparities across socioeconomic strata from those along racial and ethnic lines (Williams et al., 2010). An important reason for this dichotomy is that racial and ethnic disparities in health status and outcomes appear even after controlling for SES. For example, except for men who did not complete high school, statistically significant differences in all-cause mortality are present between non-Hispanic Black and non-Hispanic White men with the same level of education (Gilmore et al., 2019). Similarly, socioeconomic variance in health status and outcomes exists within racial and ethnic groups.

⁸Fiscella et al. assert that SES often is a more powerful determinant of healthcare use than race and ethnicity.

Disparities During the COVID-19 Pandemic

Racial, ethnic, and socioeconomic health disparities have increased in prominence during the COVID-19 pandemic. Disparities in infection rates, hospitalization rates, and mortality have been well-documented (Price-Haywood, 2020; Shiels, 2021; Yang et al., 2021). Previous work at the NAIC demonstrates significant disparities in vaccination rates across races and ethnicity (Edmiston et al., 2021). Much of the research suggests inequities in morbidity and mortality associated with COVID-19 was due to an exacerbation of existing socioeconomic and demographic disparities (see, e.g., Bamba et al., 2020). Kirksey et al. (2021) argue that COVID-19 is a “pandemic superimposed on an epidemic of racial health inequities and healthcare disparities” (p.39). Among other factors, they attribute COVID-19 disparities to existing chronic disease and structural racism.

Urban-Rural Disparities

All else equal, people in urban areas are healthier than those in rural areas, and the urban-rural disparity is widening over time (Millar and Vasan, 2021; Singh and Siahpush, 2014). Disparate rates of educational attainment, increased poverty and unemployment, and fewer economic opportunities generally all contribute to the divide. Gomez-Vidal and Gomez (2021) find that the lack of municipal status is a significant determinant of health due to social conditions that generate cumulative health risks for residents. Lack of access to care is a mammoth concern. As we document below, many rural areas suffer from a paucity of medical professionals in the region. The problem is compounded by the dire financial straits of rural hospitals, which have been closing at alarming rates (Kauffman et al., 2016; McCarthy et al., 2021).

The COVID-19 pandemic underscores these disparities. Although Abedi et al. (2021) find lower rates of SARS-CoV-2 infection in less populated counties, death rates from COVID-19 are higher. Also evident is synchronicity in urban-rural and socioeconomic and demographic disparities. Dixon et al. (2021) note that “Black and Brown populations” and rural populations experienced “unequal burden and hospitalization due to COVID-19 at the same time” (p. 8) [see also, Abedi et al. (2021)].

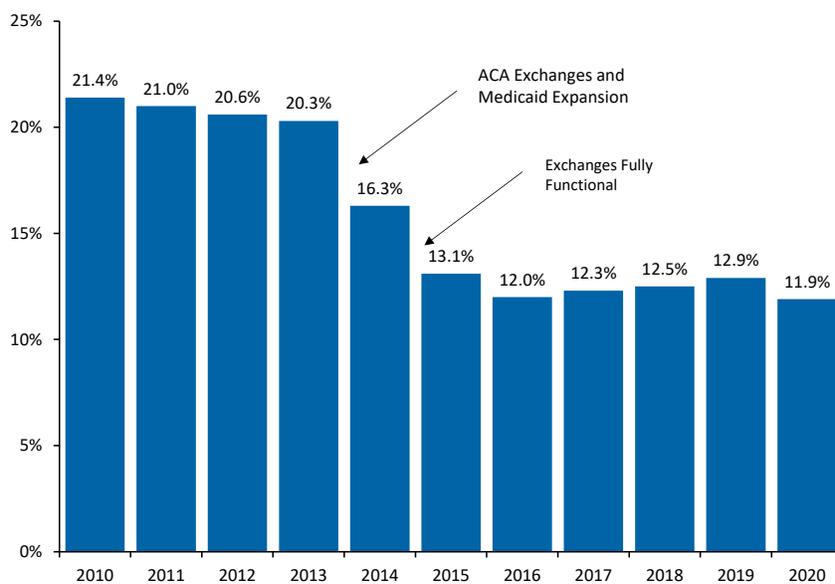
The Role of Insurance in Health and Healthcare Disparities

The compendium of health services research makes a convincing case that health outcomes are strongly associated with health insurance coverage. A landmark 2002 Institute of Medicine (IOM) report on the effects of health insurance coverage on health outcomes of working-age (18-64) adults provides volumes of compelling evidence that the uninsured are more likely to suffer from adverse health outcomes or die prematurely than their insured counterparts (IOM, 2002). The report argues that “the *ultimate result* [of health insurance coverage] is improved health outcomes” (p. 6, emphasis added). The study further suggests that “increased health insurance coverage would likely reduce racial and ethnic disparities in the use of appropriate health care services and may also reduce disparities in morbidity and mortality among ethnic groups” (p. 7). In a review of the research literature, Woolhandler and

Himmelstein (2017) find that the accumulated evidence since “supports and strengthens” the conclusions of the original IOM report (p. 429).

The Patient Protection and Affordable Care Act of 2010 (ACA) made significant progress in increasing insurance rates, particularly once the individual exchanges were implemented in 2014 and increasing numbers of states expanded their Medicaid programs.⁹ Between 2013, the year before implementation (of most components), and 2016 the uninsurance rate for working-age adults fell from 20.3 percent to 12 percent (Figure 4). Nevertheless, millions of Americans remain without health insurance, and stark disparities in health insurance coverage persist across socioeconomic and demographic groups.

Figure 4: Uninsurance Rate for Working-Age Adults (18-64)



Data Sources: U.S. Census Bureau, American Community Survey, 1-Yr Estimates; Keisler-Starkey and Burch (2021)

Notes: Percent of adults 18-64 without health insurance coverage (19-64 after 2016). The 2020 estimate is from Keisler-Starkey and Burch (2021).

The ACA has reduced racial and ethnic disparities in health insurance coverage, but not markedly (Buchmueller et al., 2016). In 2020, 14.3 percent of Black working-age adults were uninsured, up significantly from 13.5 percent in 2018 (Keisler-Starkey and Burch, 2021). The uninsurance rate for Hispanic working-age adults in 2020 was 24.9 percent (24.6 percent in 2018). By comparison, the uninsurance rate for working-age adults who are White, non-Hispanic was 7.7 percent (7.6 percent in 2018). On the downside, the 12 states that have not expanded eligibility for Medicaid to low-income adults collectively have higher populations of people of color, and undocumented people are generally not eligible for public coverage programs (Allsbrook and Keith, 2021).

⁹To further reduce the number of uninsured, ACA was revised in 2014 to facilitate insurance coverage of individuals after losing employment (Mojtabai, 2019).

Despite the availability of Medicaid, for which coverage has been significantly expanded under the ACA in most states, 17.2 percent of the population in poverty (including children) were uninsured in 2020, compared to 3.4 percent of the population with incomes greater than 400 percent of the federal poverty line (FPL).¹⁰ A significant problem in non-expansion states is a coverage gap for those who do not qualify for Medicaid; that is, they exceed the income eligibility threshold for Medicaid in their states but have incomes less than 100 percent of the FPL, which makes them ineligible for subsidies on the individual health insurance exchanges.¹¹ Roughly 2.2 million Americans, of whom a disproportionate number are Black, fell in this coverage gap in 2021 (Garfield et al., 2021). An analysis of the ACA's impact on minority uninsurance rates by Lines et al. (2021) reveals that in some states, "more than one-quarter of Black, one half of Hispanic, and approaching one-half of low-income adults remained uninsured after full implementation of the ACA" (p. 493).

III. TELEHEALTH AND TELEMEDICINE

Before turning to the intersection of telehealth and health disparities, we define and describe telehealth and review trends in its use. In addition, we briefly explore some issues critical to the viability and longevity of telehealth. Based on our assessment of trends, quality of care and cost, licensure, and insurability, we expect telehealth to remain a viable alternative and complement traditional modes of care. While the use of telehealth has diminished in recent months as the intensity of the pandemic has waned, we anticipate expanded use of these technologies to remain over the longer term, including direct provider-to-patient interactions. There is a marked disparity in access to and utilization of telehealth across race and geography. This issue will need to be addressed before telehealth is successfully mainstreamed as a mode of healthcare delivery.

What Is Telehealth?

In general terms, "telehealth" refers to "the use of medical information exchanged via electronic communications to support and provide health care" (Rosenthal, 2021). Broadly defined, examples include direct provider-to-patient interactions via videoconferencing (virtual visits), chat-based interactions, remote patient monitoring, physician-to-physician consultations, patient education, data transmission and interpretation, and digital diagnostics (algorithm-based support), whether alone or in combination with conventional modalities ([American Telemedicine Association \[ATA\]](#)). The key characteristics of telehealth are that it involves the use of information and communications technologies (ICTs) and is delivered outside of traditional

¹⁰As of November 2021, 12 states has not expanded Medicaid under the ACA, mostly in the southeast (KFF, [Status of State Action on the Medicaid Expansion Decision](#)).

¹¹Because the ACA, as originally passed, provided low-income people with coverage through Medicaid, it does not provide financial assistance to people below poverty for other coverage. The median income eligibility threshold for Medicaid in nonexpansion states is 41 percent of the FPL.

facilities. Distance is often a factor that promotes the use of telehealth (World Health Organization, 2010; Hyder and Razzak, 2020) but is not a necessary factor in the decision to exploit telehealth resources.

In this overview, we focus chiefly on “telemedicine,” or live encounters that involve real-time, synchronous, bi-directional audio and videoconferencing between patients and their healthcare providers, which is often distinguished from other forms of telehealth (Doraiswamy et al., 2020).

Trends in the Utilization of Telehealth

Technology has always played a critical role in medicine and healthcare, and technological change is pervasive in healthcare. Indeed, physicians were among the first to adopt the telephone as a “tool of the trade” (Baumann and Scales, 2016). But the challenges of integrating telehealth technology are significant, and telehealth has not seen the rapid take-up characteristic of most medical innovations.

One problem is simply technological know-how. Although much of the output of the healthcare sector is processed information, relatively few healthcare workers are highly skilled in the associated technologies (Lee, 2019). A recent review of telehealth training in allied health, for example, argues that education programs have “been slow to catch up and adapt the curriculum to ensure graduates are equipped with the knowledge and skills to implement telehealth in the workplace” (Hui et al., 2021). Further, communication competency requirements are unique in the telehealth sphere, but most telehealth training does not develop these competencies (van Galen et al., 2019). Nevertheless, experience with the transition to electronic health records (EHR) suggests the problem is undoubtedly tractable. In 2004 the take-up rate for EHR was 18 percent, but by 2013 almost 80 percent of office-based physicians were using some type of EHR system (DeSalvo, 2014). By 2018 EHR penetration was 92 percent (CDC, [National Electronic Health Records Survey](#)).

Historically, outside of mental health (see Brenes et al., 2015), the application of telehealth to chronic conditions has been largely limited to asynchronous monitoring or telephone support (Dorsey and Topol, 2016). As recently as 2012, a review of 141 randomized controlled trials of 148 telehealth interventions for chronic conditions included only 10 that incorporated videoconferencing with a clinician (Wootton).¹² Only 0.24 percent of January 2020 medical claims were for provider-to-patient telehealth services, the bulk of which were for psychiatry or colds and flu (FAIRHealth, 2020). Still, the use of telehealth, particularly video visits, has expanded significantly in the last few years. Even before the COVID-19 pandemic ensued, the National Health Service in the United Kingdom had committed to providing every constituent

¹²The overall assessment was that the telemedicine interventions were equally effective, although the median duration for the studies was six months, and the authors note an intervention for a chronic condition likely could not have much effect unless applied for “a long period.” The authors also highlight the well-known bias against publication of null findings (no effect of the intervention) in the literature.

the right to be offered digital primary care by 2023-24, and that all patients would have the right to video consultations by April 2021 (Macwilliam, 2021).

The pace of expansion in telehealth accelerated rapidly with the onset of the COVID-19 pandemic as healthcare providers made efforts to ensure safety for medical staff and patients. In February 2020, the Centers for Disease Control and Prevention (CDC) issued guidelines suggesting that healthcare facilities and providers offer services through virtual means (Koonin et al., 2020). Using data from health data purveyor [Compile](#), McKinsey & Company reported a subsequent spike in telemedicine utilization across all specialties from a negligible amount in January and February 2020 to over 32 percent of outpatient visits in April 2020 (Bestsenny et al., 2020 [May]). While utilization of telemedicine has since moderated, a July 2021 update to the McKinsey & Company report shows that utilization of telemedical visits remains exceptionally high when compared with pre-pandemic levels, approaching 17 percent of all outpatient evaluation and management visits. This number of outpatient visits amounts to about two-thirds of the number of *potential* visits McKinsey & Company projected *could be* virtualized in their May 2020 report.

Some suppliers of telehealth services saw dramatic increases in the use of their products, suggesting there was significant development of telehealth infrastructure concurrently. The enhancement of telehealth infrastructure has significant implications for future use by increasing the capacity of healthcare systems to provide it. Amwell, a major telehealth company headquartered in Boston, saw its provider usage jump from 5,000 to 72,000 in less than a year and is now launching an open architecture platform that can enable further connectivity between healthcare stakeholders and potentially foster additional innovation and integration (Schoenberg and Deetjen, 2021).

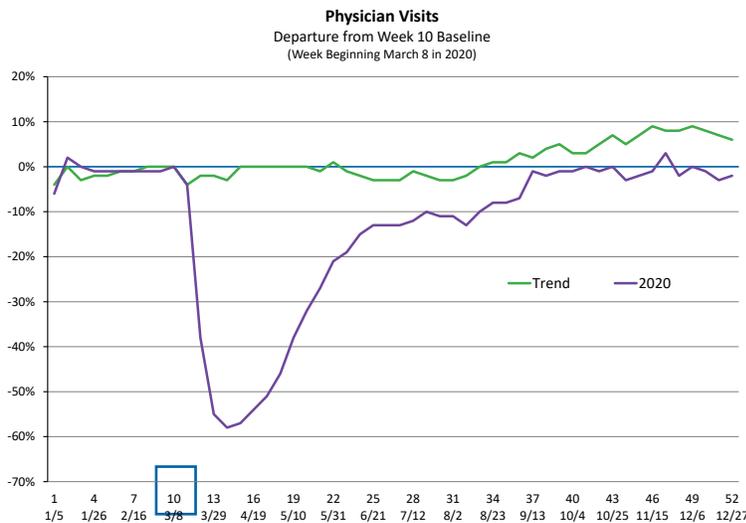
The updated McKinsey & Company report (July 2021) shows that in February 2021, at which time many social distancing orders and recommendations had been relaxed, uptake in virtual visits remained as high as 50 percent of all visits for psychiatry, 30 percent of all visits for substance use disorder treatment, and 17 percent for endocrinology and rheumatology. This finding is unsurprising given that these practice areas often do not require a physical exam of the patient. Northern California physician Leah Rothman, DO stated in a recent interview, "It's about having a dialogue and the clinician asking probing questions around it and then coming up with what the plan is. In many instances, the exam is not the highest-value item for that discussion" (McCray-Ruiz-Esparza, 2021).

In 2018, the most common users of telehealth for physician-to-patient interactions were radiologists (39.5%) and psychiatrists (27.8%) (Kane and Gillis, 2018) (radiology is not included among the specialties analyzed in the McKinsey & Company report). As late as June 2021, according to a separate McKinsey & Company survey, only 37 percent of respondents reported their last visit with a psychologist or psychiatrist was in person, the remainder occasioned virtually by video conference (40 percent) or by

telephone (23 percent) (Bestsenny et al., 2021 [July update]). Latest pediatric visits were 70 percent in person, and last urgent care visits were 79 percent in person.

Data from Phreesia, a health technology company, show a precipitous decline of in-person physician visits concurrent with the sharp rise in telemedicine visits (Mehrotra et al., 2021).¹³ The data were collected from 50,000 provider-clients. As the number of telemedicine visits surged during the early-pandemic period, the Phreesia data show the number of in-person visits declining precipitously, down 58 percent by April 2020 from the early-March 2020 baseline (Figure 5). The decline of in-person visits was likely due in large part to deferments of care, but telemedicine accounts for a significant portion of the decline of in-person visits.¹⁴ By early May 2020, telemedicine accounted for 12.5 percent of all outpatient visits according to the Phreesia data (Figure 6).

Figure 5: In-Person Physician Visits in 2020 Compared with Trend Visits (week of year)



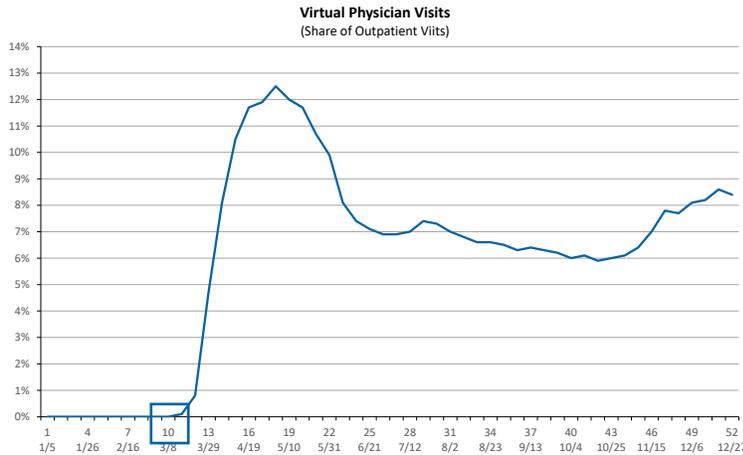
Data Source: The Commonwealth Fund (February 22, 2021) [datafile]

Note: All figures represent percentage departures from the baseline, which is week 10 of the year, or for 2020, the week beginning March 8. In week 52, the *trend* (green line) is for in-person visits to be 6 percent higher than the week 10 baseline (highlighted with a blue box); that is, *in a typical year*, visits in late December are about 6 percent higher than in early March. In *2020* (purple line), however, week 52 visits were 2 percentage points below the week 10 baseline. Therefore, the net difference in 2020 in-person visits in the last week of the year was $6\% - (-2\%) = 8\%$ percentage points. The 2020 census of physicians from the Federation of State Medical Boards was 1,018,776 in the United States and District of Columbia (Young et al., 2021).

¹³The data were collected from Phreesia’s 50,000 provider-clients and analyzed by researchers from Harvard University. There were just over 1 million licensed physicians in the United States in 2020 (Young et al., 2021).

¹⁴Deferments represent medical care that was delayed, but some care was eliminated. Examples of delayed care would include elective surgeries or well-patient visits. Examples of eliminated care would be emergency department visits and hospice care.

Figure 6: Virtual Physician Visits in 2020 (by week of year)



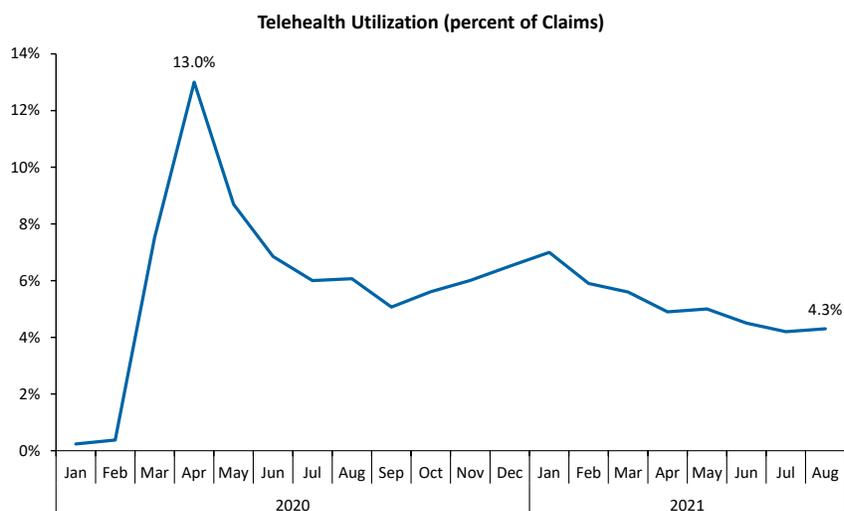
Data Source: The Commonwealth Fund (February 22, 2021) [datafile]

Note: These data are differently sourced than the McKinsey & Company data, and therefore results are not directly comparable. Data were collected from 50,000 provider-clients of Phreesia, a health technology company and analyzed by researchers at Harvard University. The 2020 census of physicians from the Federation of State Medical Boards was 1,018,776 in the United States and District of Columbia (Young et al., 2021).

In-person visits rebounded shortly after the spring 2020 entrenchment, but by the end of 2020 remained about 8 percentage points below their typical level for that time of the year (see chart notes, Figure 5). Some Americans continue to defer care, but much of the decline is likely due to telehealth alternatives. Regarding the former, continued deferment is most pronounced in pediatrics. For example, by the last week of 2020, for children ages 3-5, in-person physician visits were 48 percentage points below where they would be for that week prior to the COVID-19 pandemic (Mehrotra et al., 2021).

It remains to be seen if these trends in expanded utilization of telehealth continue. For example, despite significant customer adoption of online tools for filing claims in the pandemic era, consumers began to “revert to in-person ways to file insurance claims” as the pandemic was waning in late 2021 (French, 2021). The latest data at writing from FAIRHealth show telehealth to have accounted for 4.3 percent of claims in August 2021, a tick up from the previous month’s post-pandemic low (Figure 7).

Figure 7: Telehealth Claims as a Percent of Total Medical Claims



Data Source: FAIRHealth, [Monthly Telehealth Regional Tracker](#)

Issues around licensure, insurance, privacy, and legal liability are challenging and often have stymied growth in the utilization of telehealth technologies, particularly in provider-patient interactions (Breen and Matusitz, 2010; Baumann and Scales, 2016). The COVID-19 pandemic forced healthcare professionals, consumers, industry, and policymakers to address these issues, and much progress has been made. But these issues must be settled, and quality and cost-effectiveness ensured, if telehealth is to remain a viable alternative to or complement to traditional modes of medical practice.

Quality of Care and Cost-Effectiveness

Our discussion of the implications of telehealth for health and healthcare disparities presumes a future for telehealth. That future will depend on the quality of care telehealth can provide and its comparative cost. Because telehealth encompasses numerous modalities that can be used for diverse conditions and patient populations and it can either substitute for or supplement in-person visits, a blanket assessment of telehealth's efficacy is untenable, as the efficacy varies by application and modality (Shigekawa et al., 2018). However, to provide some perspective, we highlight a sample of reviews of studies that address issues of quality and cost of care, recognizing that telehealth technology is continuously evolving, and with that evolution is an evolution in telehealth's cost-effectiveness.

Quality of Care

Evaluations of quality of care in telehealth generally compare telehealth modalities with "usual care," which most typically is traditional in-person care, rather than to absolute standards. Most studies we reviewed find that, in the majority of use cases, telehealth modalities are as effective or more effective than usual care, although there is variance across use cases and the specific modalities implemented.

In a systematic review of meta-analyses on the clinical effectiveness of telehealth modalities, Snoswell et al. (2021) conclude that telehealth can be as clinically effective or more clinically effective than usual care.¹⁵ They are careful to note that the studies they examined are discipline-specific, which again underscores the likely variance in the efficacy of telehealth applications across uses. In another review of reviews, Eze et al. (2020) find that in 83 percent of the studies they evaluated, “telemedicine was found to be at least as effective as face-to-face care” (p. 1).

Flodgren et al. (2016) reviewed 93 clinical trials evaluating the effectiveness of telehealth interventions delivered in addition to (32 percent of included studies), as an alternative to (57 percent), or partly substituted for (11 percent) usual care, as compared to usual care alone. Interventions provided remote monitoring (55 studies), or real-time videoconferencing (38 studies), which was used either alone or in combination with remote monitoring. They find no difference in all-cause mortality. Results for specific use cases, however, show promise for telehealth gains in some diagnostic areas and reinforce the view that efficacy is likely to vary by modality and application.

For studies recruiting participants with diabetes, Flodgren et al. find lower A1c (a persistent measure of glucose concentration in the blood; lower is better) levels for those allocated to telehealth. They also find “some evidence” for a decrease in LDL (“bad cholesterol”; lower is better) and blood pressure for those allocated to telehealth to address those maladies. The findings of lower blood pressure in the telehealth group by Flodgren et al. are consistent with a volume of evidence that suggests home blood pressure monitoring provides greater accuracy and prognostic value than in-clinic readings (George and MacDonald, 2015). George and MacDonald find home blood pressure monitoring to be especially efficacious when a healthcare professional observes and provides feedback on the patients’ routine over videoconferencing.

Cost-Effectiveness

Although a 1997 article declared that house calls were a “vanishing practice” (Meyer and Gibbons), Landers et al. (2005) document a reversal, at least for the Medicare beneficiaries they studied. Home visits for outpatient evaluation and management increased 118 percent between 1998 and 2004 (although remaining below 1 percent of all visits). They attribute this reversal to several factors, among them information technology. But cost seems to have played a significant role. In particular, they attribute increased house calls partly in response to Medicare’s early hospital discharge program, which (ostensibly) was for cost-saving, and significant increases in house call volume came from (ostensibly) cost-saving use of nurse practitioners.

¹⁵A meta-analysis is a systematic, quantitative assessment of a body of literature intended to draw conclusions about that body of literature. It is the quantitative cousin to the (systematic) literature review. See Haidich (2010).

These results suggest that “house calls” in the form of remote monitoring or videoconferencing have significant potential for cost savings.

As an example, Grustam et al. (2017) assessed the cost-effectiveness of home telemonitoring in the management of patients with chronic heart failure from a third-party payer perspective. They compared this modality with nurse telephone support and “usual care.” They find both home telemonitoring and nurse telephone support to be cost-effective alternatives to usual care, with incremental costs (the measure of cost-effectiveness) being lower for home telemonitoring than for nurse telephone support.

Research suggests that telehealth can be less costly in a variety of applications, but the evidence is mixed. Critical to cost-effectiveness are the cost of implementing telehealth and the degree to which that cost can be spread. Unsurprisingly, some threshold level of use must be met for the technology to be cost-effective. For example, Buvik et al. (2019) showed that the use of videoconferencing for orthopedic consultations in a remote clinic cost less than standard outpatient consultations at the specialist hospital as long as the total number of patient consultations exceeded 151 per year (183 visits from a “health sector perspective”). Echoing the importance of the costs of implementing telehealth, Snoswell et al. (2021) argue that telehealth “does not routinely reduce costs for the health system and can actually increase costs at both implementation *and* ongoing service delivery stages” (p. 763, emphasis added). In their relatively large review of published telehealth effectiveness studies, which crosses several disciplinary boundaries, Eze et al. (2020) report that 39 percent of studies that measured cost-effectiveness found “telemedicine” to be cost-saving or cost-effective.

Rather than focus on cost, Snoswell et al. argue that health services considering the implementation of telehealth “should be motivated by benefits other than cost reduction such as improved accessibility, greater patient-centricity, and societal cost-benefit” (p. 763).

Perceptions of Telehealth

McKinsey & Company’s August 2021 [Consumer Health Insights](#) poll finds that consumers have become increasingly focused on their health and wellness during the pandemic period, labeling those categories with increased importance compared to before the pandemic (Cordina et al, 2021). Among consumers who were surveyed, between 40 and 60 percent “expressed interest” in a set of “broader virtual health solutions,” such as digital check-ins and a lower-cost virtual health plan. Important, however, is that there has been a historic gap in interest in telehealth solutions and actual usage.

In pre-pandemic research by Powell et al. (2017), most of the patients interviewed expressed overall satisfaction with (primary care) video visits and were interested in continuing to use the telemedicine alternatives to in-person visits. The primary

benefits cited were convenience and decreased costs.¹⁶ Important domains for the consideration of primary care video visits were convenience, efficiency, communication, privacy, and comfort.

Many physicians who had been reluctant to use new health technologies embraced telemedicine as a way to limit patient exposure during the COVID-19 pandemic. Shiferaw et al. (2021) consider numerous factors that could potentially affect physicians' acceptance of telehealth technologies, broadly defined. Among them, the expectancy of the effort required on the part of the physicians, ease of use, and expectations of performance were significant. The authors note that during the time of their survey, amidst the COVID-19 pandemic, intentions toward telehealth were "amplified" (p. 11). Physicians also have expressed financial concerns (Heyer et al., 2021). Still 57 percent of physicians view telehealth more favorably than they did before the COVID-19 pandemic, and 64 percent are more comfortable using it (Bestsenny et al., 2001 [July update]). During the early months of the COVID-19 pandemic, an important determinant of telehealth utilization by physicians was pre-pandemic telehealth utilization (Patel et al., 2021b).

Research suggests privacy is a pervasive concern, which could limit the acceptance of telemedicine alternatives to in-person care, especially in sensitive interactions like psychiatry and in the wearing of digital devices that store large amounts of information accessible to third parties "without user consent" (Cowan et al., 2019; Anaya et al., 2018). Informed consent may alleviate some concerns regarding the latter. Physicians and medical students also report privacy concerns, particularly data security (Wernhart et al., 2019). In particular, physicians have pointed to the Health Insurance Portability and Accountability Act's (HIPAA) privacy regulations as an impediment to their use of telemedicine (Keesara et al., 2020) [the U.S. Department of Health and Human Services Office for Civil Rights issued a [Notification of Enforcement Discretion](#) to empower healthcare providers to use telehealth applications without the risk of penalties for violations of HIPAA rules for the good faith provision of telehealth services]. An additional concern, both from the perspective of patients and physicians, is physician-patient relationships (Heyer et al., 2021; Wernhart et al.), including the limited ability of physicians to comfort patients in a virtual setting (Heyer et al.).

A sheer volume of research papers on telehealth perceptions in health literature databases such as PubMed and MEDLINE provide mixed results on acceptance of telehealth by patients and providers, depending in large part on the specific specialty, but the consensus seems to be that most patients and healthcare providers are interested in and welcoming of telehealth. This sentiment is echoed particularly in recent work by Connolly et al. (2020), who find that, at least in psychiatry, which is the dominant specialty in telemedicine, "the relative advantages of [telemental health

¹⁶Decreased costs for patients are far from universal, as currently, most physicians are compensated commensurate with an in-person visit.

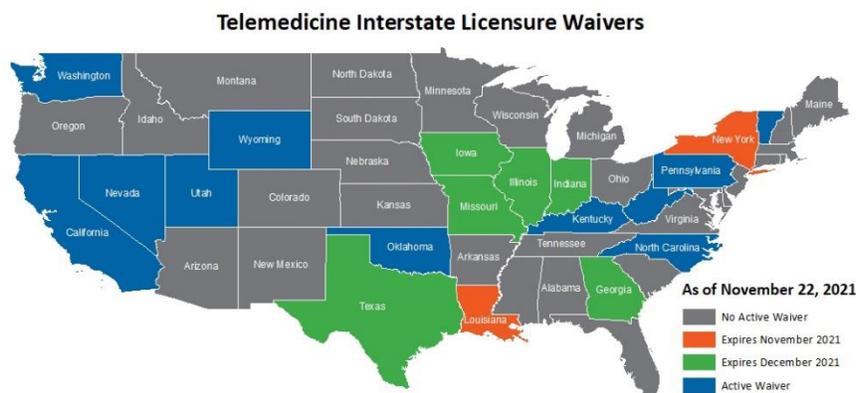
conducted via videoconferencing], such as its ability to increase access to care, may outweigh its disadvantages” (p. 2510).

Licensure

Early in the COVID-19 pandemic, all 50 states and the District of Columbia used emergency authority to waive some licensure requirements to facilitate patient access to care and continuity of care via telehealth (Alliance for Connected Care). States differ widely in how they define and regulate telehealth. While there are similarities in language, noticeable differences also can exist. These differences can create a confusing environment to navigate when a health system or practitioner provides services in multiple states.

Some states have since lifted emergency waivers or let them expire. As of November 22, 2021, 18 states had waivers in force (Federation of State Medical Boards) (Figure 8).¹⁷ The remaining 32 states and the District of Columbia do not have waivers (or closed waivers). Finally, many states have been granted the flexibility to use telehealth for Medicaid services (Medicaid Section 1135 Waiver). The blanket waivers allow healthcare providers to use telehealth platforms that are not HIPAA-compliant (e.g., Skype, FaceTime, WhatsApp). According to The Alliance for Connected Care (2021), CMS has approved 53 state waivers under Section 1135.

Figure 8: Waivers for Interstate Delivery of Telemedicine



Data Source: Federation of State Medical Boards

Notes: Alaska has no waiver in place. A waiver in Hawaii is due to expire November 30, 2021.

Insurance and Reimbursement Policies and Regulation

Before the onset of the COVID-19 pandemic, limited reimbursement constrained the widespread use of telehealth, although reimbursement regimes were changing (Dorsey and Topol, 2016). In 2016, 29 states had regulations requiring private insurers to provide coverage for telehealth services, which was about twice the number of states with coverage requirements three years before. Medicaid covered

¹⁷The Federation of State Medical Boards maintains an [up-to-date list](#) of waivers and requirements that includes legislative citations. The Alliance for Connected Care has a similar [dashboard](#). See also U.S. Department of Health and Human Services, [Telehealth Licensing Requirements and Interstate Compacts](#).

telehealth in 48 states. Medicare coverage of telehealth was highly restrictive, however. Medicare reimbursed for telehealth services only in clinical facilities in areas with a shortage of health professionals.

Given the importance of and increased demand for telehealth services during the pandemic, state insurance regulators were obliged to address policies on the insurability of telehealth services. As the COVID-19 pandemic began to unfold, the NAIC urgently took up potentially problematic issues around health insurance coverage and access to care. On March 20, 2020, the NAIC held a special session of its Spring National Meeting to address prospects for the pandemic itself, but more specifically, the likely impact of the pandemic on health insurance markets.¹⁸ One outcome was the NAIC's [Coronavirus Resource Center](#), which provides a detailed summary of the actions taken by states in response to the COVID-19 pandemic (through December 2020). These actions include requirements, regulations, and advisories on telehealth coverage, including reimbursement parity and consumer cost-sharing (deductibles, copayments, and coinsurance).

The scope of these actions varied by state and were in the form of orders, requests, and notices. Orders *require* or *direct* insurers to take an action, requests *encourage* insurers to take an action, and notices advise insurers. Aggregating data from the NAIC Coronavirus Resource Center, Frederick and Karl (2021) write that, through the end-of-year 2020, 45 states had taken regulatory action on telehealth and health insurance. In the aggregate, 46 orders had been issued, 21 requests had been made, and 14 notices had been given related to telehealth. Many of these actions directed carriers to cover telemedicine visits.

Most state actions covering telehealth have been orders requiring coverage of services provided through telemedicine. For example, the [Arizona Telehealth Order \(Executive Order 2020-07\)](#) requires that insurance plans provide coverage for telemedicine services, including short-term limited duration plans and limited-benefit plans, and that coverage must be provided for all health care services. Further, insurers can not place additional requirements on telehealth providers that are more restrictive or less consumer-friendly than in-person requirements, and insurers are required to reimburse telehealth services at the same level as in-person services (parity).

As an additional example, Colorado's [Emergency Regulation 20-E-05](#) orders individual, small group, large group, and student health plans to cover (appropriate) telehealth services, even if technologies are not HIPAA-compliant (many HIPAA requirements were relaxed during the pandemic). Insurers also must pay no less than the typical payment for in-person care and are prohibited from mandating an existing patient-provider relationship. Further, the order requires coverage of in-network telehealth services that are pandemic-related without cost-sharing.

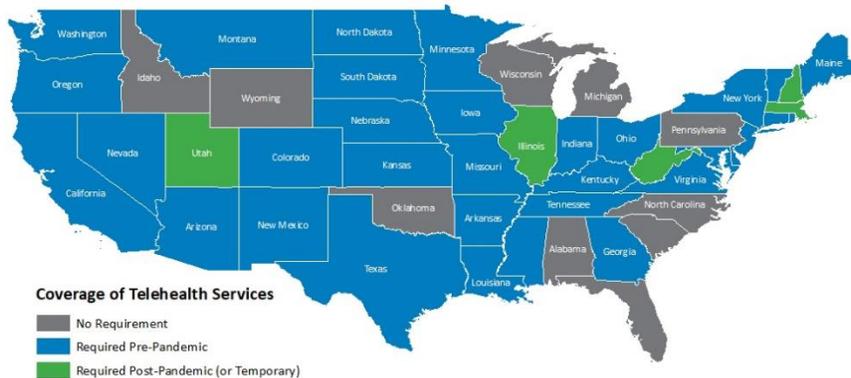
¹⁸Videos of the session are available on the [NAIC's YouTube channel](#).

In Figure 9, we update a broad set of telehealth regulations through March 15, 2021, as enumerated by Volk et al. (2021). There are numerous components of telehealth regulation, and there are many nuances in state policies. As a result, there are some inconsistencies in reports of rules and regulations by states across information sources. Moreover, many of the requirements are subject to interpretation. The reader is encouraged to contact the relevant department of insurance for specific, up-to-date regulations and requirements in any specific state. Finally, many states changed telehealth-related rules and regulations regarding aspects unrelated to insurance, such as licensure requirements or authority to prescribe controlled substances *via* telehealth.

Per Volk et al., 35 states required state-regulated individual and group health insurers to cover telemedicine visits before the pandemic (Panel A). Five additional states added the requirement after the pandemic commenced, either permanently or temporarily. Half of the states (25) required parity in policyholder cost-sharing (Panel B). Since the pandemic began, 3 additional states added parity requirements, and 4 prohibited cost-sharing altogether (2 of which required parity before the pandemic). Only 3 states required insurers to cover audio-only telemedicine visits at the pandemic’s onset, but 18 states have added the requirement since, either permanently or temporarily (Panel C). Half of the states require parity in reimbursement of providers: 15 before the pandemic and 10 additional since (Panel D).

Figure 9: State Telemedicine Coverage Requirements (as of March 15, 2021)

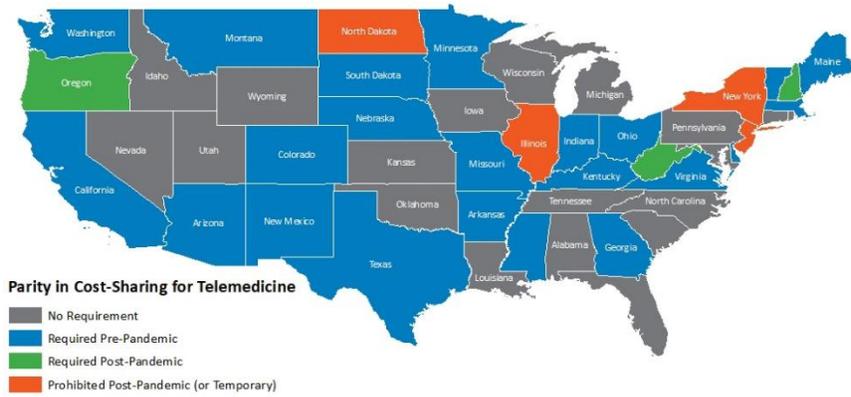
Panel A: Coverage of Telemedicine Video Visits



Note: Some requirements have since expired or been rescinded. Alaska required coverage of telemedicine visits before the pandemic. Hawaii has no requirements.

Data Source (all panels): Center on Health Insurance Reforms, Georgetown University Health Policy Institute. Volk et al. (2021) [The Commonwealth Fund] [Data as of March 15, 2021]

Panel B: Cost-Sharing Parity for Telemedicine Video Visits (Consumers)



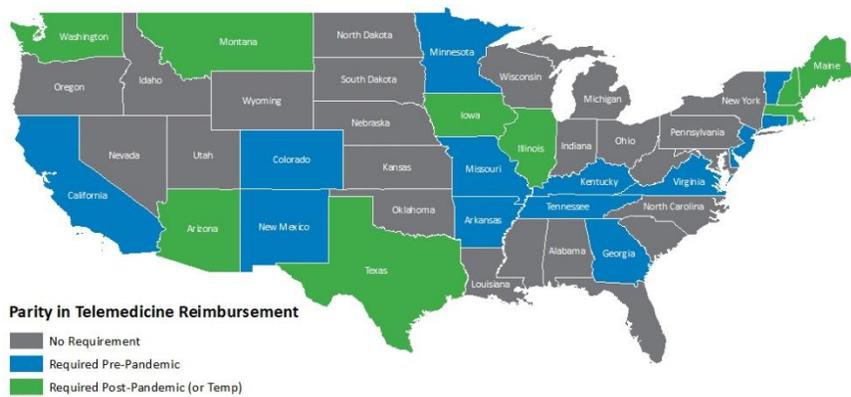
Note: Neither Alaska nor Hawaii has cost-sharing parity requirements for telemedicine visits. Some requirements have since expired or been rescinded.

Panel C: Coverage of Telemedicine Audio-Only Visits



Note: Neither Alaska nor Hawaii has requirements in place for audio-only telemedicine visits. Some requirements have since expired or been rescinded.

Panel D: Reimbursement Parity for Telemedicine Visits (Providers)



Note: Alaska does not require parity in reimbursement. Hawaii required parity before the pandemic. Note: Some requirements have since expired or been rescinded.

Dress and Mitchell (2021, October 8) provide additional updates for 16 states. In most cases, the orders extended states of emergency and related telehealth regulations, although there are exceptions. Governor DeSantis of Florida issued an executive order to end the public health emergency on June 26. Audio-only was no longer considered an “acceptable platform to deliver telehealth services to non-Medicare patients,” and physicians can no longer prescribe controlled substances *via* telehealth. Virginia’s order was reported to have ended June 30. Governor Cuomo of New York rescinded that state’s emergency order but noted that consumers could receive coverage for telehealth services while the federal public health emergency order is still in place. Both Iowa and Wisconsin made telehealth flexibilities permanent, while Illinois extended flexibilities to 2027.

The status of telehealth rules and regulations across states is likely to remain fluid for some time, even after the COVID-19 pandemic wanes. For example, the Mississippi legislature is set to “revisit” telehealth regulations in its next legislative session (Sullivan, 2021). Variation across states likely will remain for an extended time.

IV. CAN INCREASED TELEHEALTH UTILIZATION AMELIORATE HEALTH AND HEALTHCARE DISPARITIES?

To examine how increased availability and use of telehealth service services could reduce socioeconomic and demographic health disparities, we review the literature on barriers to healthcare for these populations generally and then associated them, as relevant, with telehealth. That is, for any known barriers to equitable care, which could potentially be reduced or eliminated with further developments and increased use of ICT-enabled healthcare?

The sheer number of obstacles that stand in the way of equitable healthcare make enumerating all of them quite impossible. However, we note that some of the more prominent among them are financial barriers; inadequate outreach; a lack of health literacy and opportunities for health education; language; lack of cultural competencies; systemic and structural racism; behavioral factors; and lack of physical access to care (see, e.g., Lion et al., 2020; Terui, 2017; White and Itzkowitz, 2020; Rask et al., 1994). While there are many barriers to health equity, we find physical access to care to be the most substantial and pervasive obstacle that could be alleviated with the increased utilization of telehealth.

Inadequate Supply of Healthcare Professionals and Institutions

A significant impediment to healthcare access is physical distance. There is a dearth of physicians and other healthcare practitioners in many areas of the United States. The paucity of healthcare professionals in some rural areas is not surprising, but the

extent to which many rural areas lack reasonable physical access to care is astounding in some cases.

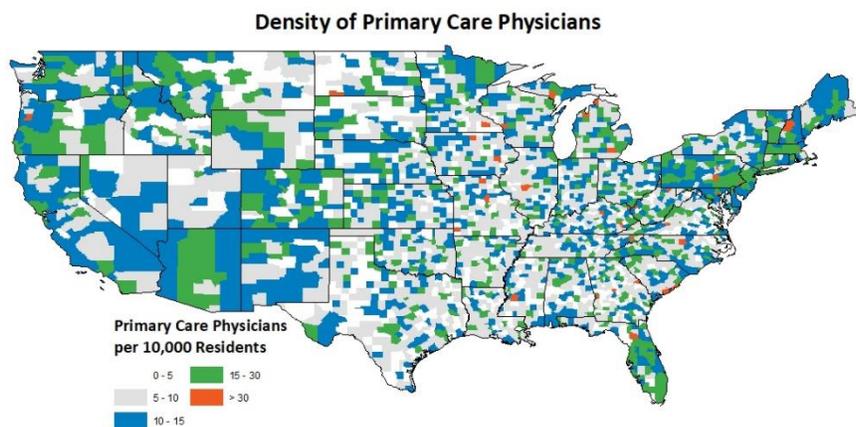
Rural Areas

A critical problem facing rural areas is an insufficient supply of physicians and other healthcare professionals and staff. Large areas with sparse populations lack the capacity to support many healthcare services.

The overall distribution of physicians in the United States is exceedingly uneven. Physicians are highly concentrated in urban areas, and some rural places have proportionately very few (Ricketts, 2013). Moreover, physicians are also highly mobile compared with the general population, and they more often move from rural areas to metropolitan areas than the reverse. Rural populations consistently suffer from a (relative) shortage of physicians. The problem of low physician supply in rural areas is compounded by the mobility of physicians because physicians located in areas with a low supply of physicians are more likely to move (Ricketts).

Using data from Vericred, a large purveyor of data on health insurance and provider networks, we compute the number of primary care physicians (PCPs) per 10,000 residents by county (Figure 10).¹⁹ We note that specialists are more concentrated than PCPs, and thus accessing specialty care can be considerably more arduous.

Figure 10: Density of Primary Care Physicians by County



Data Source: Vericred

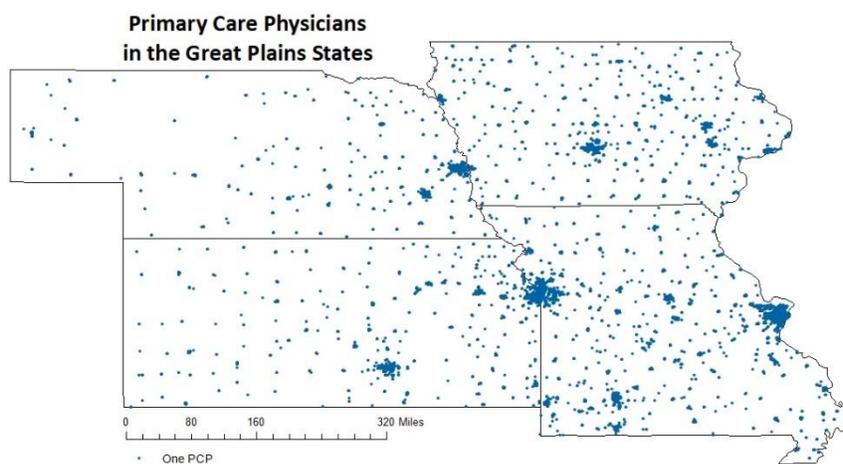
The median county has about 9.1 PCPs per 10,000 residents. Of all 3,142 counties, 121, or just under 4 percent, have no PCPs in the county, another 97 counties have only 1 PCP, and 102 counties have only 2 PCPs. Thus, more than 10 percent of counties have 2 or fewer PCPs located in the county. About 19 percent of counties

¹⁹We classified physicians as PCPs if their stated specialty is family medicine, general practice, or internal medicine. The Vericred data may *overestimate* the number of physicians because we could not verify, they were still in practice. In total, we count roughly 534,000 PCPs in the United States.

have 5 or fewer PCPs in practice there. Over one-quarter of counties have less than 6 PCPs per 10,000 residents.

More telling of the paucity of PCPs in some areas is a visualization of the physical locations of the physicians. Often physicians are located close to hospitals where they have privileges, and thus much of the population of a large county could be many miles away from a PCP, even if the PCP density in the county is acceptably high. To make the visualization clearer, we map PCPs in a subset of states (Figure 11). Specifically, we map PCPs in the Great Plains states (Iowa, Missouri, Nebraska, and Kansas) to highlight the large swaths of areas without physicians one commonly finds in rural areas.

Figure 11: Density of Primary Care Physicians in the Great Plains States



Data Source: Vericred

Note: One dot = one primary care physician

Areas with High Minority Concentrations

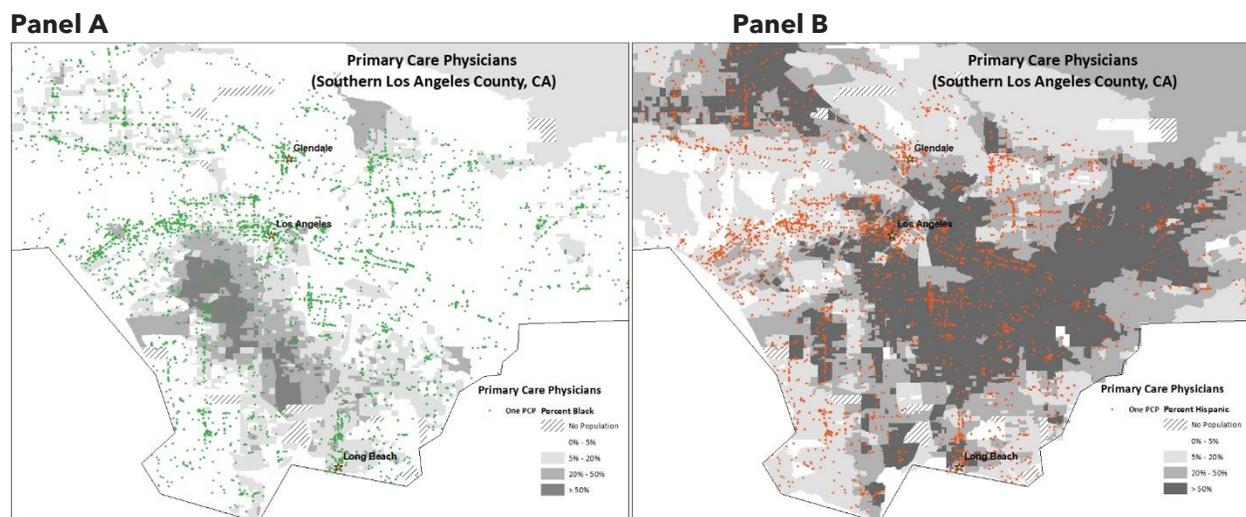
To examine the density of PCPs by racial and ethnic density, a national map is uninformative because the volume of information is too overwhelming to clearly visualize patterns. We, therefore, look specifically at southern Los Angeles County, CA. Los Angeles is the largest county in the United States by population, with more than 10.1 million residents (2020 Census).²⁰ It is also racially and ethnically diverse. About 26 percent of the population is White and non-Hispanic. Moreover, Los Angeles does not have a well-developed rail system and does not have the ease of transport that one might find in, say, New York City or Chicago, and therefore the location of physicians may have more bearing on access to care. The northern part of the county is relatively unpopulated (largely White, non-Hispanic), and the paucity of

²⁰The distribution of the PCP population differs from city-to-city. We looked at PCP concentration in several other cities, and the distribution is qualitatively the same as in southern Los Angeles County. That is, PCPs tend to be concentrated in non-minority areas. Southern Los Angeles County should be viewed as an example of what we see.

physicians there obscures the meaningful spatial relationship between PCP location and racial and ethnic density.

While there are PCPs located throughout southern Los Angeles County, they are substantially more concentrated in non-Black, non-Hispanic areas (Los Angeles County is 15.4 percent Asian) (Figure 12). Panel A shows a marked dearth of PCPs in areas with high concentrations of Black residents. Comparatively more PCPs are located in areas with high Hispanic population concentrations, however, almost 50 percent of the Los Angeles County population is ethnically Hispanic (2020 Census), and the density of physicians is still comparatively sparse.

Figure 12
Primary Care Physicians in Southern Los Angeles County (by race and ethnic density)



Data Source: Vericred

Note: Densities are calculated at the census block group level.

Inadequate Access to Transportation

Access to healthcare depends critically on transportation, and telehealth holds great promise as a means of alleviating the burden of disease by increasing access to care when physical presence is not feasible. Syed et al (2013) cite 31 research studies that associate inadequate transportation with reduced access to care. Access to regular health services is especially critical for chronically ill patients, who require not only regular visits with clinicians, which can involve changes in treatment plans but also access to acquire medications.

Minority and Low-Income Populations

Lack of adequate transportation is a significant impediment to acquiring healthcare services for many disadvantaged Americans, whether historically underserved racial and ethnic minorities, low-income individuals and families, or those living in rural areas. Rask et al. (1994) study obstacles to gaining access to care for several thousand low-SES Atlantans. They find that walking or using public transportation to receive

healthcare is a significant, independent predictor of not having a regular source of care and that patients who do not use private transportation are significantly more likely to delay receiving healthcare, which is a recurring theme in the literature. Nine of the studies cited in Syed et al. (2013) that associate inadequate transportation with lack of access to healthcare define transportation as access to a private vehicle, whether through ownership or the assistance of family and friends. Particularly troubling from a social perspective is a finding by Hensley et al. (2018) that those without private vehicle access are more likely to leave prescriptions for their children unfilled.

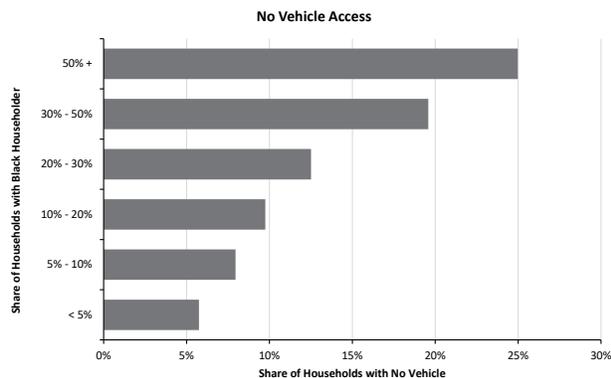
Especially pertinent in the last year has been access to COVID-19 vaccinations. Kim (2021) finds differential access to have been a significant contributing factor to vaccination rate differentials at the time of his study (March 2021) (see also Edmiston et al., 2021). Dr. Alister Martin of Massachusetts General Hospital suggests that the “number one barrier [to vaccination] is still access” (Garcia, 2021). Higher vaccination rates among Native Americans than non-Hispanic Whites are thought to be due in part to efforts by the Indian Health Service (IHS), an infrastructure that is lacking for other minority groups (Recht et al., 2021). According to survey evidence, Latinx individuals are the most eager of any group to get vaccinated, but numerous obstacles have kept vaccination rates low compared with non-Hispanic Whites, which includes transportation barriers (Almendra, 2021; see also Reyes-Velarde, 2021). In states where access to IHS facilities is lacking, vaccination rates for Native Americans are lower than for non-Hispanic Whites. Black unvaccinated participants interviewed by Okoro et al. (2021) asserted that transportation is a major barrier preventing them from getting vaccinated.

Lack of vehicle access corresponds closely with race and ethnicity. We analyze data from the Census Bureau’s 2019 [Public Use Microdata Sample](#) (PUMS) and find that 18.3 percent of Black households do not have access to any vehicle. In addition, 10.7 percent of Hispanics, 13.1 percent of Native Americans, and 11 percent of Asians lack access to any vehicle. By comparison, 6.2 percent of White non-Hispanic households lack access to a vehicle.

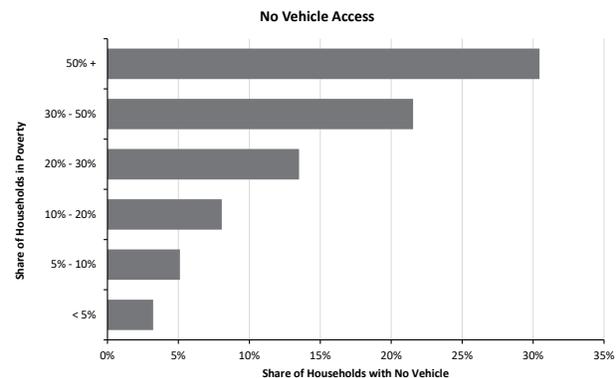
Figure 13 breaks down the relationship between race (Black) and vehicle access and also shows vehicle access by share of households living in poverty. In census tracts where the population is 50 percent or more Black, one-quarter of households lack access to a vehicle (Panel A). Comparatively, in areas where 5 percent or less of households is Black, just over 5 percent of households lack access to a vehicle. Given the overall rate of vehicle access for Black households (18.3 percent), these data make clear that most Black households without access to a vehicle live in areas where black households are most concentrated. Thus, many Black households suffer the dual problem of few healthcare professionals close-by *and* lack of access to a vehicle with which to travel to them.

Figure 13: Household Vehicle Access (Black Households and Low-Income Households)

Panel A



Panel B



Data Source: [Spatial Risk Systems](#)

Note: Data are for census tracts.

Unsurprising is that households located in areas with concentrated poverty are more likely to have no access to a vehicle (Panel B). Specifically, in areas where the majority of households live in poverty, almost one-third of households lack access to a vehicle. In very low-poverty areas, few households lack a vehicle. Poverty is generally concentrated spatially, and most poor households live in dominantly poor neighborhoods (Shapiro et al., 2015). Moreover, poor Black or Hispanic families are more likely to live in concentrated poverty neighborhoods, 25.2 percent and 17.4 percent, respectively, than are poor white families (7.5 percent).²¹

Rural Populations

Transportation issues are not limited to urban areas. Indeed, our analysis of data from the Bureau of Transportation Statistics’ Local Area Transportation Characteristics for Households ([LATCH Survey](#)) shows rural households to be much more likely to have no vehicle access (Table 1). Less than 5 percent of households in urban areas lack access to any vehicle, compared with 14 percent of households in rural areas.

Table 1: Household Vehicle Access in Urban, Suburban, and Rural Areas

Urbanicity	No Vehicles	1 Vehicle	< 2 Vehicles	2+ Vehicles
Urban	4.9%	28.1%	33.0%	67.0%
Suburban	5.9%	33.0%	38.9%	61.1%
Rural	14.0%	38.0%	52.0%	48.0%

Source: CIPR calculations.

Data Source: Bureau of Transportation Statistics, [LATCH Survey](#)

The implications for health of lacking personal vehicle travel are evident when looking at healthcare utilization among those who are unable to drive. In a study of rural residents in Appalachia, Arcury et al. (2005) estimated that rural residents who had a driver’s license had 2.29 times more health visits for chronic care and 1.92

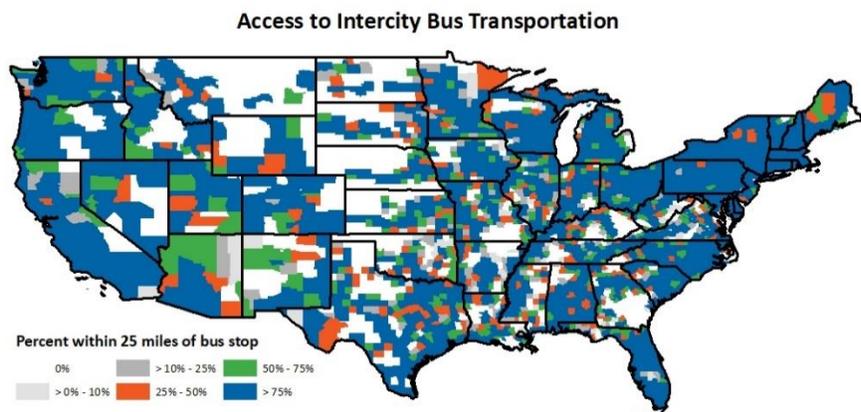
²¹A neighborhood is considered to have concentrated poverty if 40 percent or more of households are in poverty.

times more visits for regular checkup visits than those who did not. Of those without a driver's license, access to family or friends who could provide transportation led to 1.58 times more visits for chronic care than those who did not.

While access to public transportation can significantly increase visits for those without access to private transportation, public transportation networks are very thin in rural areas when compared to urban areas. Large swaths of the rural population, particularly in the country's mid-section, have no access to intercity bus transit at all, as measured by living within 25 miles of an intercity transit bus stop (Figure 14). In many other rural areas, sizeable portions of the population do not live within 25 miles of an intercity transit bus stop. As with areas with high concentrations of minorities, millions of rural Americans suffer a dual problem of having few if any physicians and no vehicle with which to travel where they are located. The situation is made worse in rural areas due to the absence of alternative transportation modes.

In a study of veteran health in rural areas, Buzza et al. (2011) distance was identified by patients and healthcare providers as the *most important barrier* to access to healthcare.

Figure 14: Access to Intercity Bus Transportation, by County



Data Source: Bureau of Transportation Statistics, Access to Intercity Transportation in Rural Areas [shapefile]

Transportation research is clear and consistent in finding that quality transportation infrastructure produces multiplicative benefits, including increased economic output, productivity, income, employment; and most germane to this article, improved access to healthcare (Ingram et al. 2020; Bhatta, and Drennan 2003). Woolf and Braveman (2011) report that allocating less resources to transportation would increase medical costs and health disparities. If poor public transportation infrastructure would negatively influence individuals' access to healthcare, and evidence suggests that U.S. infrastructure is in dire need of repair and enhancement (Czajkowski et al. 2021), then relying on telehealth could potentially reduce health disparities; that is, by reducing the burden of poor public transportation in underserved areas.

Access to Culturally Competent Care

While access to any kind of care often is problematic for vulnerable populations, for some, what is lacking is not access to healthcare *per se*, but rather, access to *culturally competent* healthcare.

Hofstede et al. (1991) define culture as “the collective programming of the human mind that distinguishes members of one human group from another.” Culture is multidimensional and includes, among other factors, race and ethnicity, religion and spirituality, sexual orientation and gender identity, geography, age, socioeconomic status, educational attainment, and language (see, e.g., Castaneda-Guarderas et al, 2016).

Cross et al. (1989), in perhaps the seminal paper on cultural competency in healthcare, describe cultural competency as “acceptance and respect for difference, continuing self-assessment regarding culture, careful attention to the dynamics of difference, continuous expansion of cultural knowledge and resources, and a variety of adaptations to service models in order to better meet the needs of minority populations” (p. 17). The American Hospital Association (2013) characterizes culturally competent healthcare as “the ability of systems to provide care to patients with diverse values, beliefs and behaviors, including the tailoring of health care delivery to meet patients' social, cultural and linguistic needs” (p. 3). Further, a culturally competent health care system “is one that acknowledges the importance of culture, incorporates the assessment of cross-cultural relations, recognizes the potential impact of cultural differences, expands cultural knowledge, and adapts services to meet culturally unique needs.”

The significant surge in population diversity in the United States has led to a greater recognition of the importance of providing culturally competent and linguistically appropriate healthcare, and a growing literature documents the manifold impact of culture and language on clinical care (Brotanek et al., 2008). The need for culturally competent care is well-recognized and has led to myriad training programs across health professions, ranging from single-day seminars to 10-year programs (Brottman et al., 2020).

Arguably, telehealth has great potential to bridge the gap in access to care by connecting isolated people with culturally competent health practitioners and reducing the need for transportation to receive such care. Existing research asserts that lessening the necessity of physical transportation to access medical care improves access and mitigates disparate health outcomes (see, e.g., Blumenshine et al., 2008; Almagro and Orane-Hutchinson, 2020).

Language Barriers

Perhaps the most salient issue around cultural competency is language. According to the 2019 American Community Survey 1-yr estimates, 25.5 million Americans, or 8.3

percent of the total U.S. population 5 and older speak English “less than very well.”²² Moreover, many individuals with limited English proficiency cannot rely on members of their household to help them navigate language barriers. Roughly 5.3 million U.S. households, or 4.3 percent of all U.S. households, are classified by the Census Bureau as “limited English-speaking status,” meaning no member of the household 14 or older speaks English “very well.” Ideally, for those who are unable to effectively communicate with healthcare practitioners due to language barriers, telehealth would offer an opportunity to mitigate this concern by providing access to a broader array of practitioners, some of whom would be able to communicate in other languages than English. Unfortunately, despite the potential for telehealth to mitigate language barriers, Rodriguez et al. (2021) find that those with limited English proficiency are much less likely to take advantage of telehealth. Studying patients in California, they find the rate of telehealth use to be 4.8 percent for non-English-proficient patients, compared with 12.3 percent for English-proficient patients. Hence, increasing awareness of telehealth resources and requisite literacy will be important to better leverage telehealth to bridge language barriers.

Immigrant Communities

There exists a well-documented “healthy immigrant effect” (HIE), which is the observation that recent immigrants are in general healthier than locally born residents, on average. This effect could explain lower healthcare utilization among immigrants. However, in a cross-country study, Constant et al. (2018) argue that the HIE is due largely to selection. They show that the HIE is evident in most European countries, which often have selective immigration policies with regard to health, among other factors. But in Israel, which is largely open for migration for any Jewish people, immigrants largely are in poorer health than natives, and this divide generally persists for 20 years. Moreover, research has documented a decline in the HIE with continued residency in a foreign environment (see Antecol and Bedard, 2006), which suggests that immigrants may not adequately utilize the healthcare system after migration.

Immigrant communities may have cultural barriers to effective healthcare beyond language barriers, although they often include language barriers. Deri (2005) argues that immigrants may have difficulty understanding treatment directives even in the absence of (or in addition to) language barriers. Many immigrants face lack country-specific capital about the American healthcare system. Country-specific capital refers to institutional knowledge about the operation of the healthcare system that is not transferable between countries. This institutional knowledge includes information like protocols and procedures, the location of healthcare providers (see Asanin and Wilson, 2008), and general navigation of the healthcare system.

²²Authors’ calculations from detailed Census Bureau tables. About 67.8 million Americans aged 5 years and older, or 22 percent of the population, speak a language other than English at home. The 2020 1-yr estimates have some potential flaws, and the Census Bureau had released only “experimental” estimates as of writing.

Evidence from both Canada (Deri, 2005) and the United States (Leclere et al., 1994) suggests that recent immigrants are less likely to utilize physician services than either locally born or long-term immigrants. Deri finds that this difference in utilization between recent immigrants and non-immigrants/long-term immigrants is largest for preventative services. Understanding the determinants of immigrant groups' healthcare utilization decisions may be essential to reducing healthcare costs or improving the value immigrants receive from the healthcare system.

The evidence is mixed on the effects of increased preventative care on national healthcare spending, and numerous studies argue that increased utilization of preventative care would increase healthcare spending (see, e.g., Cohen et al., 2008). Maciosek et al. (2010) suggest this result arises because current use of preventative care is relatively low for services that can produce high-cost savings. Some types of preventative care are cost-effective, and some are not.

As an alternative approach to viewing the cost effectiveness of preventative care, it could lead to a considerable *value* in the form of increased life years at negligible cost. Maciosek et al. estimate that tobacco cessation programs, discussion of daily aspirin use, alcohol screening with brief counseling, and colorectal cancer screening each would have contributed more 100,000 years of life in 2006 had utilization been increased to 90 percent at an increased cost in total healthcare spending of 0.25 percent. To the extent that enhanced cultural competency through telehealth would increase use of physicians' services generally and for preventative care specifically therefore could significantly improve immigrant health status.

Race and Ethnicity

Empirical evidence suggests that many people feel more comfortable with healthcare practitioners of their own race and/or ethnicity, ostensibly due to cultural competency issues. Presumably, the access to a more diverse pool of practitioners that telehealth could offer would enhance utilization of healthcare services, which should improve health.

In a study of over one hundred clients who had received outpatient mental health services, Meyer and Zane (2013) find that ethnic minority clients generally felt race and ethnicity were more important than did White clients. When these elements were considered important by clients but not considered in their care, clients were less satisfied with treatment. Based on these findings, Meyer and Zane suggest that culturally relevant aspects of the mental health service experience are salient to ethnic minority clients and can affect how they respond to services. Gamst et al. (2003) demonstrate that Asian-American youth have higher health services satisfaction when they are racially matched with their provider. Even before the COVID-19 pandemic, several Black entrepreneurs had developed telehealth sites that connect African American patients with African American physicians with whom the patients felt more comfortable (Anthony, 2021).

As is the case with recent immigrants, racial and ethnic minorities are less likely to take advantage of telehealth opportunities (Albon et al., 2021), although they could

be among the groups most likely to see gains with telehealth utilization. Comparatively low telehealth utilization is especially pronounced for Hispanics/Latinos. However, in a study of American Indians, Shore et al. (2008) find that telepsychiatry was well received and comparable in level of patient comfort, satisfaction, and cultural acceptance to in-person interviews. They also emphasize that telehealth evaluation presents an opportunity to “provide mental health services to a population that might otherwise not have access” to care (p. 461).

Sexuality and Gender Identity

Another arena for which telehealth has potential to increase access to culturally competent care is for LGBTQ+ patients, particularly for those who identify as transgender or gender diverse.²³ Societal challenges to LGBTQ+ individuals are often more intense for youth who do not conform to social expectations and norms regarding gender, including access to quality healthcare and particularly mental health care (Rafferty, 2018). Twenty-three percent of LGBTQ+ youth reported not receiving mental health care because of a lack of LGBTQ+ competent providers, and this number increases to nearly 50 percent for transgender, nonbinary, or gender diverse youth (Klein et al., 2021). LGBTQ+ youth may be at greater risk for mental health problems as they must contend not only with pandemic-related stressors, but also familial and societal pressures related to their identity and gender development. Survey evidence suggests 63 percent of transgender youth surveyed reporting unmet needs for mental health and substance use during the early COVID-19 crisis (Hawke et al. 2021).

V. LIMITATIONS OF TELEHEALTH TO AMELIORATE HEALTH AND HEALTHCARE DISPARITIES

One of the most pressing concerns in the evolution of the digital economy, which has persisted throughout the internet’s history, is that of a digital divide, or a gap in computer and Internet access across economic, demographic, or social lines (Edmiston, 2003). The term encompasses multiple disparities, including the lack of access to Information and Communications Technology (ICT) infrastructure, such as high-speed internet (i.e., broadband) and low levels of digital literacy. [Adobe Systems](#) defines digital literacy as “the ability to navigate, evaluate, and communicate information online or in a digital format.”

The digital divide has been a consistent and pervasive roadblock in the diffusion of ICT-enabled services as they have evolved. For example, Edmiston (2003) elucidates serious consequences of a digital divide for the provision of ICT-enabled government services, both along access and literacy domains. “Innovations Theory” shows that new technologies consistently diffuse through socioeconomic strata from high SES to low SES populations [Rodgers (1995); see Robinson (2009) for a summary of Rogers]. Consistent with this well-established theory, individuals of higher SES historically have

²³We use LGBTQ+ inclusively to include those who do not identify or express a gender that is consistent with the culturally defined norms of the sex that was assigned at birth.

been the first to adopt and benefit the most from the introduction of new technologies in health (Weiss et al., 2018 and references therein).

The diffusion of telehealth has followed a similar pattern both across and within countries. In the years before the onset of the COVID-19 pandemic, telemedicine, which was limited overall, was largely restricted to developed countries, and within those countries, to high-income individuals (Scott and Mars, 2015). This experience suggests the rapid transition to telehealth commensurate with the pandemic could exacerbate health disparities by limiting opportunities for vulnerable populations to take advantage of innovations. Indeed, in an early pandemic study of telemedicine utilization in New York City, Weber et al. (2020) estimated that, of any age group, patients 65 and older had the lowest odds of using telehealth versus other modalities. Black and Hispanic patients had higher (adjusted) odds of using either emergency department or clinical office visits versus telehealth than either Whites or Asians.

Evidence that minorities, low-income people, the less educated, and rural dwellers have less access to the Internet, and hence telemedicine, and are less technologically literate (on the whole) is a significant policy problem. The federal and state governments, by their nature (and in many places, constitutionally), must consider equity concerns in their policy decisions (Edmiston, 2003).

Access to Technology Infrastructure

Eruchalu et al. (2021) report that over 21 million Americans have limited or no access to broadband. Lack of broadband access is more pronounced among the historically disadvantaged and underserved, including racial and ethnic minorities, lower-income people, and older adults. The communities likely to benefit the most from telemedicine and other forms of telehealth—these groups as well as those in rural areas—also are the least likely to have access to broadband internet, which is a necessity for telemedicine.

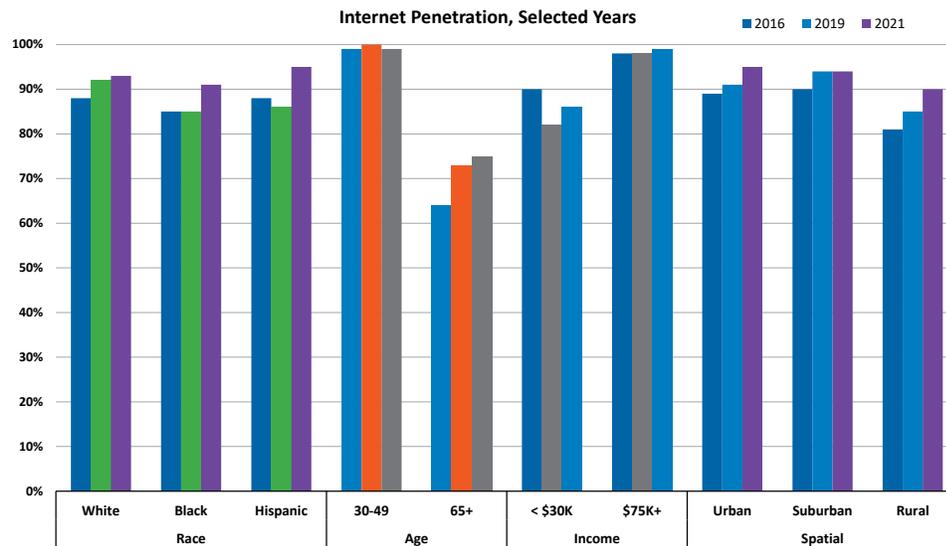
Lai and Widmar (2021) assert the digital divide has been “painful” during the COVID-19 pandemic because the availability of high-speed internet has been a necessity for most people to work effectively, and more germane, to have access to healthcare *via* ICT (p. 459). Indeed, in the very early stages of the COVID-19 pandemic, before healthcare providers and facilities were able to adapt to new norms, telehealth was the only way to receive certain types of care. Lai and Widmar argue that heavy reliance on digital technologies early in the pandemic exacerbated health disparities among older patients (over 65 years), Hispanics, Blacks, and other traditionally disadvantaged and underserved populations, such as those who reside in rural areas.

Pew Research Center, through their extensive survey operations, have been collecting data on broadband internet penetration and use since 2000. Data for 2021 show that the share of the population with any access to the internet has now diffused almost fully across racial groups without substantial disparities: 93 percent for Whites,

91 percent for Blacks, and 95 percent for Hispanics (Figure 15). Nevertheless, gaps clearly persist, and roughly 7 percent of Americans (of all races) do not have any internet access. While clearly the large majority of Americans have internet access, the internet has become so fundamental to everyday life that even a small gap is troubling.

Internet access has not diffused as completely by age, income, and spatial population density. Nevertheless, there have been significant gains. With respect to age, the share of seniors with internet access increased from 64 percent to 75 percent from 2016 to 2021 (penetration has been about 100 percent for younger Americans since 2016). For those with low incomes, internet penetration increased from 79 percent in 2016 to 86 percent in 2021. Rural areas have struggled to gain internet access compared with their urban and suburban counterparts, but as of 2021, 90 percent of rural Americans had internet access.

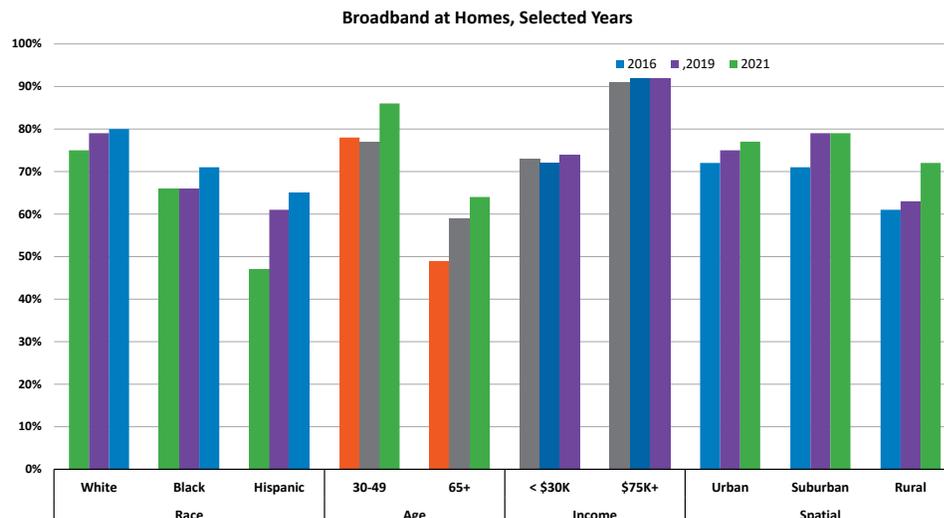
Figure 15: Internet Penetration by Selected Socioeconomic and Demographic Groups



Source: Pew Research Center, Internet/Broadband Fact Sheet

The Pew survey question asks about any access to the internet, which presumably may not be at home for some. Adequate technology for telehealth purposes requires access at home (for privacy, or at least some access to the internet with sufficient privacy) and also broadband. Substantial gaps remain in broadband internet access at home, and disparities are clearly evident (Figure 16).

Figure 16: Broadband at Home for Selected Socioeconomic and Demographic Groups

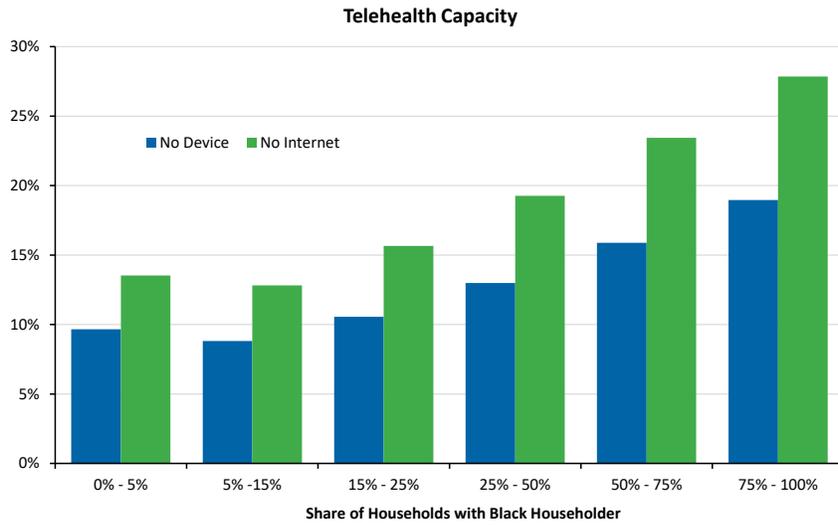


Source: Pew Research Center, Internet/Broadband Fact Sheet

About 80 percent of Whites have broadband access at home, which itself meaningfully limits access to telehealth services. But around one-third of Blacks (29 percent) and Hispanics (35 percent) lack broadband at home. The gap for seniors is especially pronounced, but access to broadband at home has increased significantly for seniors over the last five years. By 2021, almost two-thirds of seniors had broadband at home (64 percent), compared with less than half in 2016 (49 percent). There has also been rather dramatic penetration of broadband at home in rural areas, increasing from 61 percent in 2016 to 72 percent in 2021. But a 28 percent gap is substantial when considering that those in rural areas are perhaps the most in need of telehealth to improve access to care.

Disparities in access to technology necessary for telehealth services are also evident spatially. Using data from Spatial Risk Systems, we show the proportion of households without access to a device (computer, tablet, or smartphone) and without access to the internet by race (percent Black) (Figure 17). In areas with a majority Black population, substantial shares of households have no access to a device and sizably more have no internet access. For census tracts that have 50-75 percent Black householders, almost 16 percent of households do not have access to any kind of device, and over 23 percent do not have any kind of internet access. For those with more than 75 percent Black householders, the rates are roughly 19 percent and 28 percent, respectively. By comparison, in census tracts with few Black householders, only a small fraction of households lacks a device and/or internet access.

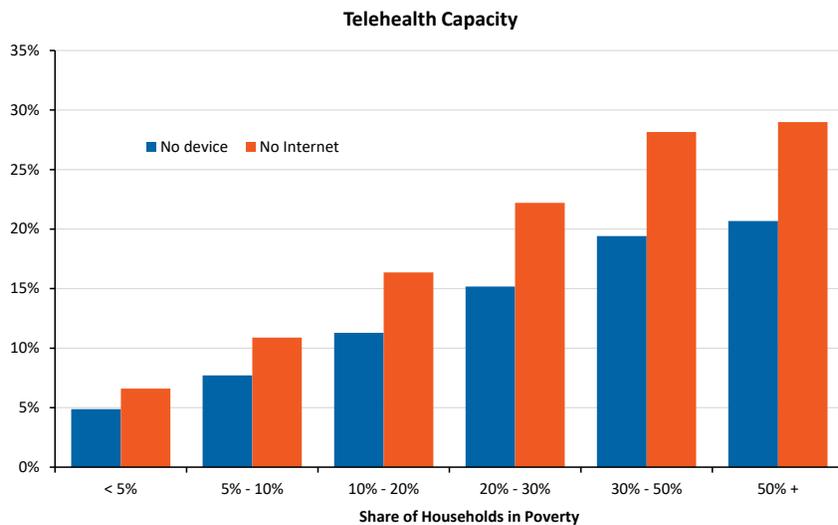
Figure 17: Physical Access to Internet Devices and Service (Black Households)



Source: CIPR calculations.
Data Source: Spatial Risk Systems.

We explore telehealth technology capacity by poverty status as well. In areas with 30 percent or more households in poverty, roughly 20 percent lack an internet-capable device and nearly 30 percent lack access to the internet.

Figure 18: Physical Access to Internet Devices and Service (Poverty Households)



Source: CIPR calculations.
Data Source: Spatial Risk Systems.

Telehealth disparities due to the digital divide also are pervasive among individuals who have limited English proficiency. English is the native language of 25.9 percent of internet users, compared with 19.6 percent of the entire population ([Internet World Stats](#)). More importantly, however, is that 60.4 percent of internet content is in

English, compared with 4.0 percent for Spanish, the second most common native language in the United States ([Visual Capitalist DataStream](#)).²⁴ Internet penetration among primary English speakers is 77.5 percent, compared with 58.8 percent for the world at large ([Internet World Stats](#)).

Rodriguez et al. (2021) examine the effect of English proficiency on telehealth use, and then the effect of telehealth on access to healthcare and utilization. They find substantially lower rates of telemedicine use among people with a language barrier compared with proficient speakers of English (4.8 percent and 12.3 percent, respectively). Rodriguez et al. conclude that telehealth has the potential to mitigate health disparities if and only if it meets patients' needs, such as accessible language and better, more diffused ICT infrastructure. They call on policymakers and providers "to pursue linguistically equitable care in emerging technologies" (p. 949).

Older Americans are a constituency where a digital divide could weigh heavily on telemedicine adoption as well. Contrary to conventional wisdom, Wu et al. (2015) found in a series of focus groups that older adults (mean age 77.1 years) generally are "fascinated by the potential of technologies," and indeed, those who "master technologies were considered empowered." Still, older adults are comparatively slower to adopt new technologies and tend to be more selective when doing so (Olson et al., 2011). Interestingly, an exception noted by Olson et al. was alternative modes of healthcare delivery, which older adults used more often than younger adults (largely telephony at the time).

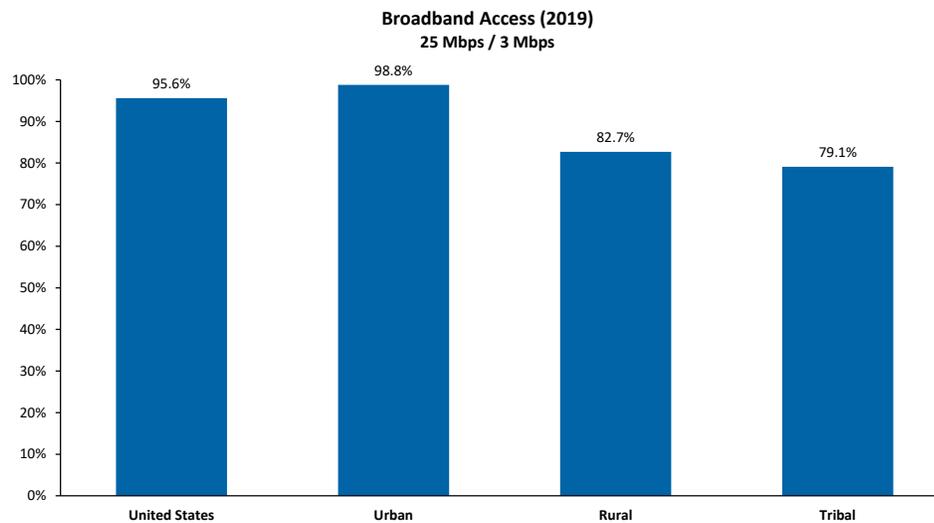
Post-pandemic research estimates that telemedicine use is 25-30 percent lower in rural areas than in urban areas (Patel et al. 2021a; Patel et al., 2021b). Consider mental health. As noted in the text, psychiatry is the medical specialty with the greatest penetration of telemedicine, currently at 50 percent of all outpatient visits. Historically, rural residents have been deprived of mental healthcare due to a lack of psychiatrists and other mental health professionals in rural areas. Telemedicine is seemingly the ideal solution to this problem. However, rural residents often lack the necessary internet bandwidth, or even the access to technology, to make this solution a reality (Patel and Mehrotra, 2021, October 7). Moreover, even after controlling for local health care resources, COVID-19 burden, broadband infrastructure, and indicators of socioeconomic status, rural residents still are less likely to use telehealth resources than their more urban counterparts (Patel and Mehrotra). Although why is unclear, we conjecture that visibility and digital literacy (see below) could be parts of the problem.

While the number of new broadband subscribers continues to grow, in general, rural areas, have lagged urban and suburban areas in broadband deployment and the speed of service offered, especially in tribal areas (Congressional Research Service). In 2019, the latest date at which data are available, 98.8 percent of urban residents

²⁴[DailyWireless](#) reports a significantly lower number, but what they mean by English spoken on the internet is not clear on the website and may reflect primary language of users, which would be largely consistent with the data we report in the text.

had access to fixed terrestrial broadband (download speed of 25 Mbps or greater and upload speeds of 3 Mbps or greater) (not necessarily at home), compared with only 82.7 percent in rural areas and 79.1 percent in tribal areas (Figure 19).

Figure 19: Fixed Terrestrial Broadband Access



Source: Congressional Research Service, 2021.

Heavy reliance on telehealth requires pervasive ICT infrastructure and access to related technology. However, this requirement is not met rural areas. According to the Federal Communications Commission (2020), 34 percent of Americans who live in rural areas do not have access to internet or lack access to the *high-speed* infrastructure that is needed for a successful telemedicine visit (see also Eberly et al., 2020). Hirko et al. (2020) report that that 40 percent of Michigan residents who live in rural areas do not have access to high-speed internet compared with Michigan residents who live in urban areas. Such digitally isolated people in rural areas—those with limited access to internet and related technology—tend to be financially burdened, less educated, and to suffer from serious diseases. According to Hirko et al., chronic diseases, diabetes, and obesity are more prevalent among digitally isolated people in the rural areas. The individuals who may have the highest need and with conditions that are amenable to telemedicine, appear to have the least access.

Digital Literacy

Insufficient digital literacy for vulnerable populations also stands in the way of more universal ICT-enabled gains in access to care. In June 2021, American Medical Association (AMA) delegates added digital literacy to connected health programs and the AMA’s strategic plan for advancing health equity (Wicklund, 2021). Digital literacy also is a central objective of the [Healthy People 2030](#) program of the Office of Disease Prevention and Health Promotion at the U.S. Department of Health and Human Services.

To have successful telemedicine appointments, patients need to understand how telemedicine platforms work, which is likely to pose difficulty for some patients, especially older adults (Lam et al., 2020). Lai and Widmar (2021) also cite digital literacy as an especially significant concern about the elderly. In addition to older adults, Chesser et al. (2016) find disproportionately low digital literacy in the health context among the less educated and those who are members of racial or ethnic minority groups.

Research also suggests that those with lower levels of digital literacy are less engaged and receive fewer psychological benefits from telehealth interactions even when they participate. Lepore et al. (2019) find that population variance in digital literacy affects the value cancer patients receive from internet support groups.

Inadequate digital literacy is not only a barrier for patients, but also for many health professionals. Seifert and Smith (2020) examine the role of digital literacy on telehealth use by medical staff and residents in Long-Term Care Facilities (LTCFs). They argue that successful use of telehealth resources is not only dependent on the availability of telemedicine infrastructure but also the proficiency of using health technology by medical staff (as well as patients).

Some medical facilities are not prepared for a rapid transition to telehealth, and inadequate digital literacy is common among healthcare workers. Seifert and Smith assert that “innovative models of care that include telemedicine can be helpful, but organizational readiness to adopt telemedicine needs urgent attention” (p. 3). To ensure organizational readiness, they call for allocating more resources to educate medical staff using health technology platforms, and for the provision of better telemedicine infrastructure (telemedicine tools, and access to internet) in underserved areas.

Kemp et al (2021) argue that limited digital literacy among patients and some health professionals are major drivers of health disparities in Australia, which is similar to the United States in many important ways. About 87 percent of Australians use the internet, compared with 89 percent of the United States, and Australia has a significant disadvantaged and underserved indigenous population. Much like the United States, digital technology engagement is less common among older individuals and disadvantaged populations in underserved areas.

VI. SUMMARY, ASSESSMENT, AND CONCLUSIONS

Voluminous research has documented disparities in health outcomes and healthcare provision across minority racial and ethnic groups, those with lower incomes and socioeconomic status, older adults, and those who live in rural areas. The accelerated development and substantial increase in utilization of telehealth resources during the

COVID-19 pandemic has sparked considerable interest in telehealth, including at the NAIC, where the Health Innovations Working Group has been charged with investigating implications of increased telehealth availability for socioeconomic and demographic health disparities.

In investigating the potential for telehealth to reduce health disparities, we find the most significant obstacle to health parity that could be affected by increased development and utilization of telehealth resources is likely access to care. We document research that shows wide differences in densities of medical professionals across geographies and accessibility to transportation, particularly private transportation. Moreover, those most limited in these regards are historically disadvantaged and marginalized Americans. These disparities in access to care are associated with disparities health outcomes.

Unfortunately, the potential for telehealth technologies to increase parity in access to care and health outcomes is limited by access to broadband internet and digital literacy. We show marked disparities in broadband internet access across population groups. In particular, millions of households in rural areas lack access. Racial and ethnic minorities also disproportionately lack access to broadband infrastructure, particularly Native Americans. Even with access to broadband, many in these same groups lack sufficient digital literacy to leverage digital technology to improve health. Older adults also will be limited by insufficient digital literacy.

Our overall assessment is that telehealth, and telemedicine in particular, have great potential to reduce problems of access to care for disadvantaged and underserved groups. However, limitations in broadband access and digital literacy will meaningfully limit efforts to increase access to care through telehealth. While digital inequities may not exacerbate existing socioeconomic and demographic health disparities, they may well have created a new one.

To effectively address access to care through telehealth, we suggest that

- Rules and regulations that add flexibility for telehealth, including those around licensure and insurance parity, must be addressed in a way that makes them reliable. One way to ensure faith in this flexibility would be to codify pandemic era rules and regulations.
- Sufficient infrastructure must be in place, and healthcare professionals and patients sufficiently educated, to reach a critical mass of telehealth utilization to ensure cost-effectiveness.
- A concerted effort will be required to ensure that disadvantaged and marginalized groups have the necessary technology and digital literacy to take advantage of telehealth.

Research must also continue, as the need is great. Good policy is well-informed policy. In particular, there is a dire need for additional tracking of telehealth's utilization by socioeconomic and demographic stratum. The existing literature is

exceedingly thin. Moreover, research on the effect of telehealth utilization on disparate health outcomes is nonexistent. Because telehealth came into “wide” use only since the onset of the COVID-19 pandemic, it will take time to generate this research, and doing so will be far from easy due to a tangled web of complexities. As Timmermans and Kaufman (2020) rightly note, “health technologies are not immutable black boxes having uniform effects on all users but that the kind of health technology, its origins, its adoption, and the *actual use of the technology* will produce a variety of intended and unintended effects on different kinds of users” (p. 588, emphasis added). Further, “[w]hile there is little doubt that digital health technologies are widely used, it is difficult to disentangle digital technologies’ independent effects on social inequities, because these technologies are so intertwined with every aspect of wellness and health care, many of them take off quickly and widely, and they may have few observables, direct health effects” (p. 596).

References

- Abedi, V., Olulana, O., Avula, V., Chaudhary, D., Khan, A., Shahjouei, S., . . . Z and, R. (2021). Racial, Economic, and Health Inequality and COVID-19 Infection in the United States. *Journal of Racial and Ethnic Health Disparities*, 8(3), 732-742. doi:10.1007/s40615-020-00833-4.
- Adler, N. E., & Newman, K. (2002). Socioeconomic Disparities in Health: Pathways and Policies. *Health Affairs*, 21(2), 60-76. doi:10.1377/hlthaff.21.2.60.
- Agency for Healthcare Research and Quality [AHRQ] (2020). [2019 National Healthcare Quality and Disparities Report](#). Rockville, MD: AHRQ. Pub. No. 20(21)-0045-EF. December.
- Albon, D., Van Citters, A. D., Ong, T., Dieni, O., Dowd, C., Willis, A., . . . Schechter, M. S. (2021). Telehealth Use in Cystic Fibrosis during COVID-19: Association with Race, Ethnicity, and Socioeconomic Factors. *Journal of Cystic Fibrosis*, 20, 49-54. doi:10.1016/j.jcf.2021.09.006
- Alliance for Connected Care. [State Telehealth and Licensure Expansion COVID-19 Dashboard](#). Last accessed October 22, 2021.
- Almendrala, A. (2021, May 13). [Latinos Are the Most Eager to Get Vaccinated, Survey Shows – But Face Obstacles](#). KHN.
- Anthony, C. (2021). [Black Tech Founders Want to Change the Culture of Health Care, One Click at a Time](#). *Kaiser Health News* [KHN].
- Alcalá, H. E., Roby, D. H., Grande, D. T., McKenna, R. M., & Ortega, A. N. (2018). Insurance Type and Access to Health Care Providers and Appointments Under the Affordable Care Act. *Medical Care*, 56(2), 186-192. doi:10.1097/MLR.0000000000000855.
- Almagro, M., & Orane-Hutchinson, A. (2020). JUE Insight: The Determinants of the Differential Exposure to COVID-19 in New York City and Their Evolution Over Time. *Journal of Urban Economics*, 103293. doi:10.1016/j.jue.2020.103293.
- Allsbrook, J. F., & Keith, K. (2021, December 8). [ACA Section 1557 As A Tool For Anti-Racist Health Care](#). Health Affairs Blog.
- American Hospital Association. (2013). [Becoming a Culturally Competent Health Care Organization](#). June.
- American Public Health Association. [Racism and Health](#).
- American Telemedicine Association (ATA). [Telehealth: Defining 21st Century Care](#).
- Antecol, H., & Bedard, K. (2006). Unhealthy Assimilation: Why Do Immigrants Converge to American Health Status Levels? *Demography*, 43(2), 337-360. doi:10.1353/dem.2006.0011.
- Anthony, D. L., Campos-Castillo, C., & Lim, P. S. (2018). Who Isn't Using Patient Portals and Why? Evidence And Implications from A National Sample of US Adults. *Health Affairs*, 37(12), 1948-1954. doi:10.1377/hlthaff.2018.05117.

- Anthony, D. L., & Campos-Castillo, C. (2015). A Looming Digital Divide? Group Differences in the Perceived Importance of Electronic Health Records. *Information, Communication & Society*, 18(7), 832-846. doi:10.1080/1369118X.2015.1006657.
- Arcaya, M. C., Arcaya, A. L., & Subramanian, S. V. (2015). Inequalities in health: definitions, concepts, and theories. *Global Health Action*, 8(1), 27106. doi:10.3402/gha.v8.27106.
- Arcury, T. A., Preisser, J. S., Gesler, W. M., & Powers, J. M. (2005). Access to Transportation and Health Care Utilization in a Rural Region. *The Journal of Rural Health*, 21(1), 31-38. doi:10.1111/j.1748-0361.2005.tb00059.x.
- Arias, E., Xu, J., & Jim, M. A. (2014). Period Life Tables for the Non-Hispanic American Indian and Alaska Native Population, 2007–2009. *American Journal of Public Health*, 104(S3), S312-S319. doi:10.2105/ajph.2013.301635.
- Asanin, J., & Wilson, K. (2008). "I Spent Nine Years Looking for a Doctor": Exploring Access to Health Care among Immigrants in Mississauga, Ontario, Canada. *Social Science & Medicine*, 66(6), 1271-1283. doi:10.1016/j.socscimed.2007.11.043.
- Bailey, Z. D., Krieger, N., Agénor, M., Graves, J., Linos, N., & Bassett, M. T. (2017). Structural racism and health inequities in the USA: evidence and interventions. *The Lancet*, 389(10077), 1453-1463. doi:10.1016/S0140-6736(17)30569-X.
- Bailey, Z. D., Feldman, J. M., & Bassett, M. T. (2021). How Structural Racism Works – Racist Policies as a Root Cause of U.S. Racial Health Inequities. *New England Journal of Medicine*, 384(8), 768-773. doi:10.1056/nejmms2025396.
- Barr, D. A. (2019). *Health Disparities in the United States: Social Class, Race, Ethnicity, and the Social Determinants of Health* (Third ed.). Baltimore: Johns Hopkins University Press.
- Baumann, P. K., & Scales, T. (2016). History of Information Communication Technology and Telehealth. *Academy of Business Research Journal*, 3, 48-52.
- Bestsenyy, O., Gilbert, G., Harris, A., & Rost, J. (2020, May 29; updated 2021, July 9). [Telehealth: A Quarter-Trillion-Dollar Post-COVID-19 Reality?](#) McKinsey & Company.
- Béland, D., Rocco, P., & Waddan, A. (2016). Obamacare and the Politics of Universal Health Insurance Coverage in the United States. *Social Policy & Administration*, 50(4), 428-451. doi:10.1111/spol.12237.
- Blumenshine, P., Reingold, A., Egerter, S., Mockenhaupt, R., Braveman, P., & Marks, J. (2008). Pandemic Influenza Planning in the United States from a Health Disparities Perspective. *Emerging Infectious Diseases*, 14(5), 709-715. doi:10.3201/eid1405.071301.
- Braveman, P., Egerter, S., & Williams, D. R. (2011). The Social Determinants of Health: Coming of Age. *Annual Review of Public Health*, 32, 381-398. doi:10.1146/annurev-publhealth-031210-101218.
- Breen, G.-M. & Matusitz, J. (2010). An Evolutionary Examination of Telemedicine: A Health and Computer-Mediated Communication Perspective. *Social Work in Public Health*, 25(1), 59-71. doi:10.1080/19371910902911206.
- Brenes, G. A., Danhauer, S. C., Lyles, M. F., Hogan, P. E., & Miller, M. E. (2015). Telephone-Delivered Cognitive Behavioral Therapy and Telephone-Delivered Nondirective

- Supportive Therapy for Rural Older Adults with Generalized Anxiety Disorder. *JAMA Psychiatry*, 72(10), 1012. doi:10.1001/jamapsychiatry.2015.1154.
- Brotanek, J. M., Seeley, C. E., & Flores, G. (2008). The Importance of Cultural Competency in General Pediatrics. *Current Opinion in Pediatrics*, 20(6), 711-718. doi:10.1097/MOP.0b013e328317efff.
- Brottman, M. R., Char, D. M., Hattori, R. A., Heeb, R., & Taff, S. D. (2020). Toward Cultural Competency in Health Care: A Scoping Review of the Diversity and Inclusion Education Literature. *Academic Medicine*, 95(5), 803-813. doi:10.1097/ACM.0000000000002995
- Buchmueller, T. C., Levinson, Z. M., Levy, H. G., & Wolfe, B. L. (2016). Effect of the Affordable Care Act on Racial and Ethnic Disparities in Health Insurance Coverage. *American Journal of Public Health*, 106(8), 1416-1421. doi:10.2105/AJPH.2016.303155.
- Buvik, A., Bergmo, T. S., Bugge, E., Smaabrekke, A., Wilsgaard, T., & Olsen, J. A. (2019). Cost-Effectiveness of Telemedicine in Remote Orthopedic Consultations: Randomized Controlled Trial. *Journal of Medical Internet Research*, 21(2), e11330. doi:10.2196/11330.
- Buzza, C., Ono, S. S., Turvey, C., Wittrock, S., Noble, M., Reddy, G., . . . Reisinger, H. S. (2011). Distance is Relative: Unpacking a Principal Barrier in Rural Healthcare. *Journal of General Internal Medicine*, 26(S2), 648-654. doi:10.1007/s11606-011-1762-1.
- Campos-Castillo, C., & Anthony, D. (2021). Racial and Ethnic Differences in Self-Reported Telehealth Use During the COVID-19 Pandemic: A Secondary Analysis of a US Survey of Internet Users from Late March. *Journal of the American Medical Informatics Association*, 28(1), 119-125. doi:10.1093/jamia/ocaa221.
- Castaneda-Guarderas, A., Glassberg, J., Grudzen, C. R., Ngai, K. M., Samuels-Kalow, M. E., Shelton, E., Wall, S. P., & Richardson, L. D. (2016). Shared Decision Making With Vulnerable Populations in the Emergency Department. *Academic Emergency Medicine*, 23(12), 1410-1416. doi:10.1111/acem.13134.
- Center for Connected Health Policy (2021). ["State Telehealth Laws and Reimbursement Policies Report, Spring 2021."](#)
- Chesser, A., Burke, A., Reyes, J., & Rohrberg, T. (2016). Navigating the Digital Divide: A Systematic Review of eHealth Literacy in Underserved Populations in the United States. *Informatics for Health and Social Care*, 41(1), 1-19. doi:10.3109/17538157.2014.948171.
- Cohen, J. T., Neumann, P. J., & Weinstein, M. C. (2008). Does Preventive Care Save Money? Health Economics and the Presidential Candidates. *New England Journal of Medicine*, 358(7), 661-663. doi:10.1056/nejmp0708558.
- Congressional Research Service (2021). [The Digital Divide: What Is It, Where Is It, and Federal Assistance Programs](#). Washington, DC, March 9.
- Connolly, S. L., Miller, C. J., Lindsay, J. A., & Bauer, M. S. (2020). A Systematic Review of Providers' Attitudes toward Telemental Health via Videoconferencing. *Clinical Psychology: Science and Practice*, 27(2). doi:10.1111/cpsp.12311.

- Constant, A. F., García-Muñoz, T., Neuman, S., & Neuman, T. (2018). A "Healthy Immigrant Effect" or a "Sick Immigrant Effect"? Selection and Policies Matter. *The European Journal of Health Economics*, 19(1), 103-121. doi:10.1007/s10198-017-0870-1.
- Cowan, K. E., McKean, A. J., Gentry, M. T., & Hilty, D. M. (2019). Barriers to Use of Telepsychiatry: Clinicians as Gatekeepers. *Mayo Clinic Proceedings*, 94(12), 2510-2523. doi: 10.1016/j.mayocp.2019.04.018.
- Cordina J., Leven, E. and Stein, G. (2021, September 2). [COVID-19 Consumer Healthcare Insights: What 2021 May Hold](#). McKinsey & Company.
- Cross, T. L., Bazron, B. J., Dennis, K. W., & Isaacs, M. R. (1989). Towards a Culturally Competent System of Care. In G. U. C. D. Center (Ed.). Washington, DC: ERIC.
- Czajkowski, J, Edmiston, K. D., Kolchinsky E., Nauheimer, T., Wong, M., Zhang, H., Cornish, R., Nikas, D. (2021). [Can Insurance Company Investments Help Fill the Infrastructure Gap?](#) National Association of Insurance Commissioners.
- Darrat, I., Tam, S., Boulis, M., & Williams, A. M. (2021). Socioeconomic Disparities in Patient Use of Telehealth During the Coronavirus Disease 2019 Surge. *JAMA Otolaryngology-Head & Neck Surgery*, 147(3), 287. doi:10.1001/jamaoto.2020.5161.
- Deri, C. (2005). Social networks and health service utilization. *Journal of Health Economics*, 24(6), 1076-1107. doi:10.1016/j.jhealeco.2005.03.008.
- DeSalvo, K. (2014, January 17). [Survey: Electronic Health Records Incentive Program Is on Track](#). The Health Care Blog.
- Dixon, B. E., Grannis, S. J., Lembcke, L. R., Valvi, N., Roberts, A. R., & Embi, P. J. (2021). The Synchronicity of COVID-19 Disparities: Statewide Epidemiologic Trends in SARS-CoV-2 Morbidity, Hospitalization, and Mortality Among Racial Minorities and in Rural America. *PLoS One*, 16(7), e0255063. doi:10.1371/journal.pone.0255063.
- Dorsey, E. R. & Topol, E. J. (2016). State of Telehealth. *New England Journal of Medicine*, 375(2), 154-161. doi:10.1056/nejmra1601705.
- Doraiswamy, S., Abraham, A., Mamtani, R., & Cheema, S. (2020). Use of Telehealth During the COVID-19 Pandemic: Scoping Review. *Journal of Medical Internet Research*, 22(12), e24087. doi:10.2196/24087.
- Douglas, M. D., Xu, J., Heggs, A., Wrenn, G., Mack, D. H., & Rust, G. (2017). Assessing telemedicine utilization by using Medicaid claims data. *Psychiatric Services*, 68(2), 173-178.
- Dress, J. & Mitchell, H. (2021, October 8). [Where the US Stands on Telehealth Coverage: 16 States that Let Orders Expire or Kept Expansions](#). *Becker's Hospital Review*.
- Eberly, L. A., Kallan, M. J., Julien, H. M., Haynes, N., Khatana, S. A. M., Nathan, A. S., & Adusumalli, S. (2020). Patient characteristics associated with telemedicine access for primary and specialty ambulatory care during the COVID-19 pandemic. *JAMA network open*, 3(12), e2031640-e2031640.
- Edmiston, K. D. (2003). State And Local E-Government: Prospects and Challenges. *The American Review of Public Administration*, 33(1), 20-45. doi:10.1177/0275074002250255.

- Edmiston, K.D., Campbell, E. E., & Czajkowski, J. R. (2021). [Racial Vaccine Equity: A Brief Review of the Evidence and Literature](#). Center for Insurance Policy & Research, National Association of Insurance Commissioners. Unpublished manuscript.
- Eruchalu, C. N., Pichardo, M. S., Bharadwaj, M., Rodriguez, C. B., Rodriguez, J. A., Bergmark, R. W., . . . Ortega, G. (2021). The Expanding Digital Divide: Digital Health Access Inequities during the COVID-19 Pandemic in New York City. *Journal of Urban Health*, 98(2), 183-186. doi:10.1007/s11524-020-00508-9.
- Eze, N. D., Mateus, C., & Cravo Oliveira Hashiguchi, T. (2020). Telemedicine in the OECD: An Umbrella Review of Clinical and Cost-Effectiveness, Patient Experience and Implementation. *PLoS One*, 15(8), e0237585. doi:10.1371/journal.pone.0237585.
- FAIRHealth. [Monthly Telehealth Regional Tracker, Jan. 2020](#). Accessed November 22, 2021.
- Federation of State Medical Boards. (2021). [U.S. States and Territories Modifying Requirements for Telehealth in Response to COVID-19](#). November 22. Last accessed November 28, 2021.
- Fiscella, K., Franks, P., Gold, M. R., & Clancy, C. M. (2000). Inequality in Quality. *JAMA*, 283(19), 2579. doi:10.1001/jama.283.19.2579.
- Frederick, J. D. & Karl, J. B. (2021). The COVID-19 Pandemic and Health Insurance Regulation. *Journal of Insurance Regulation*, 40(2), 1-14.
- French, David (2021, November 19). [Policyholders Pull Back from Digital Claims in Post-Pandemic Insurance World](#). Reuters. Accessed November 22, 2021.
- Flodgren, G., Rachas, A., Farmer, A. J., Inzitari, M., & Shepperd, S. (2015). Interactive Telemedicine: Effects on Professional Practice and Health Care Outcomes. *Cochrane Database of Systematic Reviews*, 2016(12). doi:10.1002/14651858.cd002098.pub2.
- Garfield, R., Orgera, K., & Damico, A. (2021). [The Coverage Gap: Uninsured Poor Adults in States that Do Not Expand Medicaid](#), January 21. KFF.
- George, J. & Macdonald, T. (2015). Home Blood Pressure Monitoring. *European Cardiology Review*, 10(2), 95. doi:10.15420/ecr.2015.10.2.95.
- Gilmore, D. R., Whitfield, K. E., & Thorpe, R. J. (2019). Is There a Difference in All-Cause Mortality Between Non-Hispanic Black and Non-Hispanic White Men with the Same Level of Education? Analyses Using the 2000-2011 National Health Interview Surveys. *American Journal of Men's Health*, 13(1), 155798831982779. doi:10.1177/1557988319827793.
- Glymour, M. M., Avendano, M., & Kawachi, I. (2014). Socioeconomic Status and Health. In L. Berkman, I. Kawachi, & M. M. Glymour (Eds.), *Social Epidemiology* (Second ed., pp. 17-62). New York NY: Oxford University Press.
- Goel, M. S., Brown, T. L., Williams, A., Hasnain-wynia, R., Thompson, J. A., & Baker, D. W. (2011). Disparities in Enrollment and Use of an Electronic Patient Portal. *Journal of General Internal Medicine*, 26(10), 1112-1116. doi:10.1007/s11606-011-1728-3.
- Graetz, I., Gordon, N., Fung, V., Hamity, C., & Reed, M. E. (2016). The Digital Divide and Patient Portals: Internet Access Explained Differences in Patient Portal Use for Secure

- Messaging by Age, Race, and Income. *Medical Care*, 54(8). doi: 10.1097/MLR.0000000000000560.
- Grustam, A. S., Severens, J. L., De Massari, D., Buyukkaramikli, N., Koymans, R., & Vrijhoef, H. J. M. (2018). Cost-Effectiveness Analysis in Telehealth: A Comparison between Home Telemonitoring, Nurse Telephone Support, and Usual Care in Chronic Heart Failure Management. *Value in Health*, 21(7), 772-782. doi:10.1016/j.jval.2017.11.011.
- Haidich, A. B. (2010). Meta-Analysis in Medical Research. *Hippokratia*, 14(Suppl 1), 29-37. PMID: 21487488; PMCID: PMC3049418.
- Harper, S., Lynch, J., Burris, S., & Davey Smith, G. (2007). Trends in the Black-White Life Expectancy Gap in the United States, 1983-2003. *JAMA*, 297(11), 1224. doi:10.1001/jama.297.11.1224.
- Harper, S., Riddell, C. A., & King, N. B. (2021). Declining Life Expectancy in the United States: Missing the Trees for the Forest. *Annual Review of Public Health*, 42(1), 381-403. doi:10.1146/annurev-publhealth-082619-104231.
- Hawke, L. D., Hayes, E., Darnay, K., & Henderson, J. (2021). Mental Health among Transgender and Gender Diverse Youth: An Exploration of Effects during the COVID-19 Pandemic. *Psychology of Sexual Orientation and Gender Diversity*, 8(2), 180-187. doi:10.1037/sgd0000467.
- Hensley, C., Heaton, P. C., Kahn, R. S., Luder, H. R., Frede, S. M., & Beck, A. F. (2018). Poverty, Transportation Access, and Medication Nonadherence. *Pediatrics*, 141(4), e20173402. doi:10.1542/peds.2017-3402.
- Heyer, A., Granberg, R. E., Rising, K. L., Binder, A. F., Gentsch, A. T., & Handley, N. R. (2021). Medical Oncology Professionals' Perceptions of Telehealth Video Visits. *JAMA Network Open*, 4(1), e2033967. doi:10.1001/jamanetworkopen.2020.33967.
- Hirko, K. A., Kerver, J. M., Ford, S., Szafranski, C., Beckett, J., Kitchen, C., & Wendling, A. L. (2020). Telehealth In Response to the COVID-19 Pandemic: Implications for Rural Health Disparities. *Journal of the American Medical Informatics Association*, 27(11), 1816-1818. doi:10.1093/jamia/ocaa156.
- Hofstede, G., Hofstede, G. J., & Minkov, M. (1991). "Cultures and Organizations: Intercultural Cooperation and its Importance for Survival." *Software of the Mind*. London, UK: McGraw-Hill.
- Hui, K. Y., Haines, C., Bammann, S., Hallandal, M., Langone, N., Williams, C., & McEvoy, M. (2021). To What Extent is Telehealth Reported to be Incorporated into Undergraduate and Postgraduate Allied Health Curricula: A Scoping Review. *PLOS One*, 16(8), e0256425. doi:10.1371/journal.pone.0256425.
- Ingram, M., Leih, R., Adkins, A., Sonmez, E., & Yetman, E. (2020). Health Disparities, Transportation Equity and Complete Streets: A Case Study of a Policy Development Process through the Lens of Critical Race Theory. *Journal of Urban Health*, 97(6), 876-886. doi:10.1007/s11524-020-00460-8.
- Institute of Medicine (2002). *Care Without Coverage: Too Little, Too Late*. Washington, DC: The National Academies Press.

- Jaffe, D. H., Lee, L., Huynh, S., & Haskell, T. P. (2020). Health Inequalities in the Use of Telehealth in the United States in the Lens of COVID-19. *Population Health Management, 23*(5), 368-377. doi:10.1089/pop.2020.0186.
- Julien, H. M., Eberly, L. A., & Adusumalli, S. (2020). Telemedicine and the Forgotten America. *Circulation, 142*(4), 312-314. doi:10.1161/circulationaha.120.048535.
- Kaiser Family Foundation [KFF] (2019). [Key Facts on Health and Health Care by Race and Ethnicity](#).
- Kakolyris, A., Delacruz, J. J., & Giannikos, C. I. (2021). COVID-19, Race/Ethnicity, and Age: The Role of Telemedicine to Close the Gaps on Health Disparities. *Journal of Economics, Race, and Policy*. doi:10.1007/s41996-021-00089-y.
- Kane, C. K. & Gillis, K. (2018). The Use of Telemedicine by Physicians: Still the Exception Rather than the Rule. *Health Affairs, 37*(12), 1923-1930. doi:10.1377/hlthaff.2018.05077.
- Kaplan, B. (2021). Access, Equity, and Neutral Space: Telehealth Beyond the Pandemic. *The Annals of Family Medicine, 19*(1), 75-78. doi:10.1370/afm.2633.
- Kaplan, J. B., & Bennett, T. (2003). Use of Race and Ethnicity in Biomedical Publication. *JAMA, 289*(20), 2709-2716. doi:10.1001/jama.289.20.2709.
- Kaufman, B. G., Thomas, S. R., Randolph, R. K., Perry, J. R., Thompson, K. W., Holmes, G. M., & Pink, G. H. (2016). The Rising Rate of Rural Hospital Closures. *The Journal of Rural Health, 32*(1), 35-43. doi:10.1111/jrh.12128.
- Keesara, S., Jonas, A., & Schulman, K. (2020). COVID-19 and Health Care's Digital Revolution. *New England Journal of Medicine, 382*(23), e82. doi:10.1056/nejmp2005835.
- Keisler-Starkey, K., & Bunch, L. N. (2021). [Health Insurance Coverage in the United States: 2020](#). Current Population Reports P60-274, U.S. Census Bureau, Washington, D.C.
- Kemp, E., Trigg, J., Beatty, L., Christensen, C., Dhillon, H. M., Maeder, A., . . . Koczwara, B. (2021). Health Literacy, Digital Health Literacy and the Implementation of Digital Health Technologies in Cancer Care: The Need for a Strategic Approach. *Health Promotion Journal of Australia, 32*(S1), 104-114. doi:10.1002/hpja.387.
- KFF (See Kaiser Family Foundation)
- Kim, M. (2014). Racial/Ethnic Disparities in Depression and Its Theoretical Perspectives. *Psychiatric Quarterly, 85*(1), 1-8. doi:10.1007/s1126-013-9265-3.
- Kirksey, L., Tucker, D. L., Taylor, E., Jr., White Solaru, K. T., & Modlin, C. S., Jr. (2021). Pandemic Superimposed on Epidemic: Covid-19 Disparities in Black Americans. *Journal of the National Medical Association, 113*(1), 39-42. doi:10.1016/j.jnma.2020.07.003.
- Klein, K., Woo, P., & Schneider, R. (2021, December 9). [Ensuring Access to Affirming Mental Health Care For LGBTQ+ Children And Teens](#). Health Affairs Blog.
- Koonin, L. M., Hoots, B., Tsang, C. A., Leroy, Z., Farris, K., Jolly, B., . . . Harris, A. M. (2020). Trends in the Use of Telehealth During the Emergence of the COVID-19 Pandemic – United States, January–March 2020. *MMWR. Morbidity and Mortality Weekly Report, 69*(43), 1595-1599. doi:10.15585/mmwr.mm6943a3.

- Krieger, N., Williams, D. R., & Moss, N. E. (1997). Measuring Social Class in U.S. Public Health Research: Concepts, Methodologies, and Guidelines. *Annual Review of Public Health, 18*(1), 341-378. doi:10.1146/annurev.publhealth.18.1.341.
- LaBounty, T. M., Bach, D. S., Bossone, E., & Koliass, T. J. (2019). Effect of Race on Echocardiographic Measures of Cardiac Structure and Function. *The American Journal of Cardiology, 124*(5), 812-818. doi:10.1016/j.amjcard.2019.05.049.
- Lai, J., & Widmar, N. O. (2021). Revisiting the Digital Divide in the COVID -19 Era. *Applied Economic Perspectives and Policy, 43*(1), 458-464. doi:10.1002/aep.13104.
- Lam, K., Lu, A. D., Shi, Y., & Covinsky, K. E. (2020). Assessing Telemedicine Unreadiness Among Older Adults in the United States During the COVID-19 Pandemic. *JAMA Internal Medicine, 180*(10), 1389. doi:10.1001/jamainternmed.2020.2671.
- Landers, S. H., Gunn, P. W., Flocke, S. A., Graham, A. V., & Kikano, G. E. (2005). Trends in House Calls to Medicare Beneficiaries. *JAMA, 294*(19), 2431. doi:10.1001/jama.294.19.2435-b.
- Lattimore, C. M., Kane, W. J., Fleming, M. A., Martin, A. N., Mehaffey, J. H., Smolkin, M. E., . . . Hedrick, T. L. (2021). Disparities in telemedicine utilization among surgical patients during COVID-19. *PloS one, 16*(10), e0258452. doi:10.1371/journal.pone.0258452.
- Laurencin, C. T. & McClinton, A. (2020). The COVID-19 Pandemic: A Call to Action to Identify and Address Racial and Ethnic Disparities. *Journal of Racial and Ethnic Health Disparities, 7*(3), 398-402. doi:10.1007/s40615-020-00756-0.
- LeClere, F. B., Jensen, L., & Biddlecom, A. E. (1994). Health Care Utilization, Family Context, and Adaptation among Immigrants to the United States. *Journal of Health and Social Behavior, 35*(4), 370-384.
- Lee, R. H. (2019). *Economics for Healthcare Managers* (Fourth ed.). Chicago: Association of University Programs in Health Administration.
- Lepore, S. J., Revenson, T. A., Weinberger, S. L., Weston, P., Frisina, P. G., Robertson, R., . . . Cross, W. (2006). Effects of Social Stressors on Cardiovascular Reactivity in Black and White Women. *Annals of Behavioral Medicine, 31*(2), 120-127. doi:10.1207/s15324796abm3102_3.
- Lepore, S. J., Rincon, M. A., Buzaglo, J. S., Golant, M., Lieberman, M. A., Bauerle Bass, S., & Chambers, S. (2019). Digital Literacy Linked to Engagement and Psychological Benefits among Breast Cancer Survivors in Internet-Based Peer Support Groups. *European Journal of Cancer Care, 28*(4), e13134. doi:10.1111/ecc.13134.
- Levy, H. G., & Meltzer, D. (2001). *What Do We Really Know About Whether Health Insurance Affects Health?* Economic Research Initiative on the Uninsured Working Paper Series (ERIU Working Paper 6), University of Michigan.
- Lines, G., Mengistu, K., LaPorte, M. R. C., Lee, D., Anderson, L., Novinson, D., . . . McCormick, D. (2021). States' Performance in Reducing Uninsurance Among Black, Hispanic, and Low-Income Americans Following Implementation of the Affordable Care Act. *Health Equity, 5*(1), 493-502. doi:10.1089/heq.2020.0102.
- Link, B. G., & Phelan, J. C. (1995). Social Conditions as Fundamental Causes of Disease. *Journal of Health and Social Behavior, Spec No*, 80-94. PMID: 7560851.

- Lukachko, A., Hatzenbuehler, M. L., & Keyes, K. M. (2014). Structural Racism and Myocardial Infarction in the United States. *Social Science & Medicine*, 103, 42-50. doi:10.1016/j.socscimed.2013.07.021.
- Lyles, C., Schillinger, D., & Sarkar, U. (2015). Connecting the dots: health information technology expansion and health disparities. *PLOS Medicine*, 12(7), e1001852.
- Lyerly, M. J., Wu, T.-C., Mullen, M. T., Albright, K. C., Wolff, C., Boehme, A. K., . . . Carr, B. G. (2016). The Effects of Telemedicine on Racial and Ethnic Disparities in Access to Acute Stroke Care. *Journal of Telemedicine and Telecare*, 22(2), 114-120. doi:10.1177/1357633x15589534.
- Machi, L. A., & McEvoy, B. T. (2016). *The Literature Review: Six Steps to Success* (Third ed.). Thousand Oaks, CA: Corwin/Sage.
- Maciosek, M. V., Coffield, A. B., Flottemesch, T. J., Edwards, N. M., & Solberg, L. I. (2010). Greater Use of Preventive Services in U.S. Health Care Could Save Lives at Little or No Cost. *Health Affairs*, 29(9), 1656-1660. doi:10.1377/hlthaff.2008.0701.
- MacWilliam, J., Hennessey, I., & Cleary, G. (2021). Telemedicine: Improving Clinical Care and Medical Education in Paediatrics. *Paediatrics and Child Health*, 31(10), 388-396. doi:10.1016/j.paed.2021.07.004.
- Mayrovitz, H. N., Mahtani, S. A., Pitts, E., & Michaelos, L. (2017). Race-Related Differences in Tissue Dielectric Constant Measured Noninvasively at 300 MHz in Male and Female Skin at Multiple Sites and Depths. *Skin Research and Technology*, 23(4), 471-478. doi:10.1111/srt.12358
- Mazurenko, O., Balio, C. P., Agarwal, R., Carroll, A. E., & Menachemi, N. (2018). The Effects of Medicaid Expansion Under The ACA: A Systematic Review. *Health Affairs*, 37(6), 944-950. doi:10.1377/hlthaff.2017.1491.
- McCarthy, S., Moore, D., Smedley, W. A., Crowley, B. M., Stephens, S. W., Griffin, R. L., . . . Jansen, J. O. (2021). Impact of Rural Hospital Closures on Health-Care Access. *Journal of Surgical Research*, 258, 170-178. doi:10.1016/j.jss.2020.08.055.
- McCray-Ruiz-Esparza (2021). [Deferred Health Care: Why Americans Are Due for a Checkup. From Day One](#), July 12.
- McKinsey & Company (2020, May 29; updated 2021, July 9). [Telehealth: A Quarter-Trillion-Dollar Post-COVID-19 Reality?](#)
- Mehrotra, A., Chernew, M. E., Linetsky, D., Hatch, H., Cutler, D. A., & Schneider, E. C. (2021). [The Impact of COVID-19 on Outpatient Visits in 2020: Visits Remained Stable, Despite a Late Surge in Cases](#). The Commonwealth fund, 2020.
- Meyer, G. S. & Gibbons, R. V. (1997). House Calls to the Elderly – A Vanishing Practice among Physicians. *New England Journal of Medicine*, 337(25), 1815-1820. doi:10.1056/nejm199712183372507.
- Miller, C. E., & Vasan, R. S. (2021). The Southern Rural Health and Mortality Penalty: A Review of Regional Health Inequities in the United States. *Social Science & Medicine*, 268, 113443. doi:10.1016/j.socscimed.2020.113443.
- Mojtabai, R. (2019). Insurance Loss in the Era of the Affordable Care Act: Association with Access to Health Services. *Medical Care*, 57(8). doi:10.1097/MLR.0000000000001150.

- National Institutes of Health (2002). [Strategic Research Plan and Budget to Reduce and Ultimately Eliminate Health Disparities, Volume I, Fiscal Years 2002-2006](#).
- Navarro, V. (1990). Race or class versus race and class: mortality differentials in the United States. *The Lancet*, 336(8725), 1238-1240. doi:10.1016/0140-6736(90)92846-A.
- Okoro, O., Kennedy, J., Simmons, G., Vosen, E. C., Allen, K., Singer, D., . . . Roberts, R. (2021). Exploring the Scope and Dimensions of Vaccine Hesitancy and Resistance to Enhance COVID-19 Vaccination in Black Communities. *Journal of Racial and Ethnic Health Disparities*. doi:10.1007/s40615-021-01150-0.
- Olson, K. E., O'Brien, M. A., Rogers, W. A., & Charness, N. (2011). Diffusion of Technology: Frequency of use for Younger and Older Adults. *Ageing International*, 36(1), 123-145. doi:10.1007/s12126-010-9077-9.
- Park, J., Erikson, C., Han, X., & Iyer, P. (2018). Are State Telehealth Policies Associated with the Use of Telehealth Services among Underserved Populations? *Health Affairs*, 37(12), 2060-2068.
- Patel, S. Y., Mehrotra, A., Huskamp, H. A., Uscher-Pines, L., Ganguli, I., & Barnett, M. L. (2021a). Variation In Telemedicine Use and Outpatient Care During The COVID-19 Pandemic in The United States. *Health Affairs*, 40(2), 349-358. doi:10.1377/hlthaff.2020.01786.
- Patel, S. Y., Rose, S., Barnett, M. L., Huskamp, H. A., Uscher-Pines, L., & Mehrotra, A. (2021b). Community Factors Associated with Telemedicine Use During the COVID-19 Pandemic. *JAMA network open*, 4(5), e2110330. doi:10.1001/jamanetworkopen.2021.10330.
- Patel, S. Y., Mehrotra, A. (2021c, October 7). [The Surge of Telehealth During the Pandemic Is Exacerbating Urban-Rural Disparities in Access to Mental Health Care](#). Health Affairs blog.
- Pearl, R. (2014). Kaiser Permanente Northern California: Current Experiences with Internet, Mobile, And Video Technologies. *Health Affairs*, 33(2), 251-257. doi:10.1377/hlthaff.2013.1005.
- Phelan, J. C. & Link, B. G. (2015). Is Racism a Fundamental Cause of Inequalities in Health? *Annual Review of Sociology*, 41(1), 311-330. doi:10.1146/annurev-soc-073014-112305.
- Powe, N. R. (2020). Black Kidney Function Matters. *JAMA*, 324(8), 737. doi:10.1001/jama.2020.13378.
- Powell, R. E., Henstenburg, J. M., Cooper, G., Hollander, J. E., & Rising, K. L. (2017). Patient Perceptions of Telehealth Primary Care Video Visits. *The Annals of Family Medicine*, 15(3), 225-229. doi:10.1370/afm.2095.
- Price-Haywood, E. G., Burton, J., Fort, D., & Seoane, L. (2020). Hospitalization and Mortality among Black Patients and White Patients with Covid-19. *New England Journal of Medicine*, 382(26), 2534-2543. doi:10.1056/nejmsa2011686.
- Rafferty, J. (2018). Ensuring Comprehensive Care and Support for Transgender and Gender-Diverse Children and Adolescents. *Pediatrics*, 142(4), e20182162. doi:10.1542/peds.2018-2162.

- Rask, K. J., Williams, M. V., Parker, R. M., and McNagny, S. E. (1994). Obstacles Predicting Lack of a Regular Provider and Delays in Seeking Care for Patients at an Urban Public Hospital. *JAMA: The Journal of the American Medical Association*, 271(24), 1931. doi:10.1001/jama.1994.03510480055034.
- Reyes-Velarde, A. (2021, May 19). [Many Latino Men Haven't Gotten Vaccinated. Misinformation, Fear and Busy Lives are Factors.](#) *Los Angeles Times*.
- Robinson, L. (2009). [A Summary of Diffusion of Innovations.](#) ChangeoLogy, the Book.
- Rodriguez, J. A., Betancourt, J. R., Sequist, T. D., & Ganguli, I. (2021). Differences in the Use of Telephone and Video Telemedicine Visits During the COVID-19 Pandemic. *The American Journal of Managed Care*, 27(1). doi:10.37765/ajmc.2021.88573.
- Rodriguez, J. A., Saadi, A., Schwamm, L. H., Bates, D. W., & Samal, L. (2021). Disparities In Telehealth Use Among California Patients with Limited English Proficiency. *Health Affairs*, 40(3), 487-495. doi:10.1377/hlthaff.2020.00823.
- Rogers, E. M. (1995). *Diffusion of Innovations* (Fourth Ed.). New York: Simon and Schuster.
- Schoenberg, I. and Deetjen, U. (2021). [How Health Tech Can Democratize Healthcare: An Interview with Ido Schoenberg.](#) McKinsey & Company.
- Schulman, K. A., Berlin, J. A., Harless, W., Kerner, J. F., Sistrunk, S., Gersh, B. J., . . . Escarce, J. J. (1999). The Effect of Race and Sex on Physicians' Recommendations for Cardiac Catheterization. *New England Journal of Medicine*, 340(8), 618-626. doi:10.1056/nejm199902253400806.
- Scott, R. & Mars, M. (2015). Telehealth in the Developing World: Current Status and Future Prospects. *Smart Homecare Technology and Telehealth*, 25. doi:10.2147/shht.s75184.
- Seifert, A., Batsis, J. A., & Smith, A. C. (2020). Telemedicine in Long-Term Care Facilities During and Beyond COVID-19: Challenges Caused by the Digital Divide. *Frontiers in Public Health*, 8(690). doi:10.3389/fpubh.2020.601595.
- Segura Anaya, L. H., Alsadoon, A., Costadopoulos, N., & Prasad, P. W. C. (2018). Ethical Implications of User Perceptions of Wearable Devices. *Science and Engineering Ethics*, 24(1), 1-28. doi:10.1007/s11948-017-9872-8.
- Senft, N., Butler, E., & Everson, J. (2019). Growing Disparities in Patient-Provider Messaging: Trend Analysis Before and After Supportive Policy. *Journal of Medical Internet Research*, 21(10), e14976.
- Shiels, M. S., Haque, A. T., Haozous, E. A., Albert, P. S., Almeida, J. S., García-Closas, M., . . . de González, A. B. (2021). Racial and Ethnic Disparities in Excess Deaths During the COVID-19 Pandemic, March to December 2020. *Annals of Internal Medicine*. doi:10.7326/M21-2134.
- Shiferaw, K. B., Mengiste, S. A., Gullslett, M. K., Zeleke, A. A., Tilahun, B., Tebeje, T., . . . Mehari, E. A. (2021). Healthcare Providers' Acceptance of Telemedicine and Preference of Modalities During COVID-19 Pandemics in a Low-Resource Setting: An Extended UTAUT Model. *PloS One*, 16(4), e0250220. doi:10.1371/journal.pone.0250220.

- Shigekawa, E., Fix, M., Corbett, G., Roby, D. H., & Coffman, J. (2018). The Current State of Telehealth Evidence: A Rapid Review. *Health Affairs*, 37(12), 1975-1982. doi:10.1377/hlthaff.2018.05132.
- Shore, J. H., Brooks, E., Savin, D., Orton, H., Grigsby, J., & Manson, S. M. (2008). Acceptability of Telepsychiatry in American Indians. *Telemedicine and e-Health*, 14(5), 461-466. doi:10.1089/tmj.2007.0077.
- Singh, G. K., & Siahpush, M. (2014). Widening Rural-Urban Disparities in Life Expectancy, U.S., 1969-2009. *American Journal of Preventive Medicine*, 46(2), e19-e29. doi:10.1016/j.amepre.2013.10.017.
- Snoswell, C. L., Taylor, M. L., & Caffery, L. J. (2021). Why Telehealth Does Not Always Save Money for the Health System. *Journal of Health Organization and Management*, 35(6), 763-775. doi:10.1108/jhom-04-2020-0159.
- Snowden, J. M., Mission, J. F., Marshall, N. E., Quigley, B., Main, E., Gilbert, W. M., . . . Caughey, A. B. (2016). The Impact of Maternal Obesity and Race/Ethnicity on Perinatal Outcomes: Independent and Joint Effects. *Obesity*, 24(7), 1590-1598. doi:10.1002/oby.21532.
- Snyder, H. (2019). Literature Review as a Research Methodology: An Overview and Guidelines. *Journal of Business Research*, 104, 333-339. doi:10.1016/j.jbusres.2019.07.039.
- Sullivan, M. C. (2021, November 16). [Telemedicine May Be Revisited at the Next Legislative Session](#). WCBI, Columbus, Mississippi.
- Syed, S. T., Gerber, B. S., & Sharp, L. K. (2013). Traveling Towards Disease: Transportation Barriers to Health Care Access. *Journal of Community Health*, 38(5), 976-993. doi:10.1007/s10900-013-9681-1.
- Thomas, M. D., Michaels, E. K., Reeves, A. N., Okoye, U., Price, M. M., Hasson, R. E., . . . Allen, A. M. (2019). Differential Associations Between Everyday versus Institution-Specific Racial Discrimination, Self-Reported Health, and Allostatic Load Among Black Women: Implications for Clinical Assessment and Epidemiologic Studies. *Annals of Epidemiology*, 35, 20-28.e23. doi:10.1016/j.annepidem.2019.05.002.
- Tong, T., Myers, A. K., Bissoonauth, A. A., Pekmezaris, R., & Kozikowski, A. (2020). Identifying the Barriers and Perceptions of Non-Hispanic Black and Hispanic/Latino Persons with Uncontrolled Type 2 Diabetes for Participation in a Home Telemonitoring Feasibility Study: A Quantitative Analysis of Those Who Declined Participation, Withdrew or Were Nonadherent. *Ethnicity & Health*, 25(4), 485-494. doi:10.1080/13557858.2019.1566520.
- de la Torre-Díez, I., López-Coronado, M., Vaca, C., Aguado, J. S., & de Castro, C. (2014). Cost-Utility and Cost-Effectiveness Studies of Telemedicine, Electronic, and Mobile Health Systems in the Literature: A Systematic Review. *Telemedicine and e-Health*, 21(2), 81-85. doi:10.1089/tmj.2014.0053.
- Tyler, J. M. B., Pratt, A. C., Wooster, J., Vasilakis, C., & Wood, R. M. (2021). The Impact of Increased Outpatient Telehealth During COVID-19: Retrospective Analysis of Patient Survey and Routine Activity Data from a Major Healthcare System in England. *The*

- International Journal of Health Planning and Management*, 36(4), 1338-1345.
doi:10.1002/hpm.3185.
- U.S. Agency for Healthcare Research and Quality (AHRQ) (2021). "2019 National Healthcare Quality and Disparities Report."
- U.S. Census Bureau. [Research to Improve Data on Race and Ethnicity](#).
- van Galen, L. S., Wang, C. J., Nanayakkara, P. W. B., Paranjape, K., Kramer, M. H. H., & Car, J. (2019). Telehealth requires expansion of physicians' communication competencies training. *Medical Teacher*, 41(6), 714-715. doi:10.1080/0142159X.2018.1481284.
- Vardell, E. (2019). Health Insurance Literacy and Health Disparities in the United States: A Literature Review. *The International Journal of Information, Diversity, & Inclusion (IJIDI)*, 3(4). doi:10.33137/ijidi.v3i4.33012.
- Veinot, T. C., Mitchell, H., & Ancker, J. S. (2018). Good intentions are not enough: how informatics interventions can worsen inequality. *Journal of the American Medical Informatics Association*, 25(8), 1080-1088. doi:10.1093/jamia/ocy052.
- Veinot, T. C., Ancker, J. S., Cole-Lewis, H., Mynatt, E. D., Parker, A. G., Siek, K. A., & Mamykina, L. (2019). Leveling Up: On the Potential of Upstream Health Informatics Interventions to Enhance Health Equity. *Medical Care*, 57, S108-S114. doi:10.1097/MLR.000000000000103.
- Volk, J., Palanker, D., O'Brien, M., & Goe, C. L. (2021). [States' Actions to Expand Telemedicine Access During COVID-19 and Future Policy Considerations](#). The Commonwealth Fund. doi: 10.26099/r95z-bs17.
- Weber, E., Miller, S. J., Astha, V., Janevic, T., & Benn, E. (2020). Characteristics of Telehealth Users in NYC for COVID-Related Care During the Coronavirus Pandemic. *Journal of the American Medical Informatics Association*, 27(12), 1949-1954. doi:10.1093/jamia/ocaa216.
- Webb Hooper, M., Nápoles, A. M., & Pérez-Stable, E. J. (2020). COVID-19 and Racial/Ethnic Disparities. *JAMA*, 323(24), 2466. doi:10.1001/jama.2020.8598.
- Weiss, D., Rydland, H. T., Øversveen, E., Jensen, M. R., Solhaug, S., & Krokstad, S. (2018). Innovative Technologies and Social Inequalities in Health: A Scoping Review of the Literature. *PloS One*, 13(4), e0195447. doi:10.1371/journal.pone.0195447.
- Wernhart, A., Gahbauer, S., & Haluza, D. (2019). eHealth and Telemedicine: Practices and Beliefs Among Healthcare Professionals and Medical Students at a Medical University. *PloS One*, 14(2), e0213067. doi:10.1371/journal.pone.0213067.
- White, P. M., & Itzkowitz, S. H. (2020). Barriers Driving Racial Disparities in Colorectal Cancer Screening in African Americans. *Current Gastroenterology Reports*, 22(8). doi:10.1007/s11894-020-00776-0.
- Wicklund, Eric (2021, June 15). [AMA Adds Digital Literacy to its Telehealth Adoption Gameplan](#). mHealth Intelligence.
- Williams, D. R. (2012). Miles to Go Before We Sleep. *Journal of Health and Social Behavior*, 53(3), 279-295. doi:10.1177/0022146512455804.

- Williams, D. R. & Rucker, T. D. (2000). Understanding and Addressing Racial Disparities in Health Care. *Health Care Financing Review*, 21(4), 75-90.
- Williams, D. R. & Cooper, L. (2019). Reducing Racial Inequities in Health: Using What We Already Know to Take Action. *International Journal of Environmental Research and Public Health*, 16(4), 606. doi:10.3390/ijerph16040606.
- Williams, D. R., Mohammed, S. A., Leavell, J., & Collins, C. (2010). Race, Socioeconomic Status, and Health: Complexities, Ongoing Challenges, and Research Opportunities. *Annals of the New York Academy of Sciences*, 1186(1), 69-101. doi:10.1111/j.1749-6632.2009.05339.x.
- Wolf, S. T., Jablonski, N. G., & Kenney, W. L. (2020). Examining "Race" in Physiology. *American Journal of Physiology-Heart and Circulatory Physiology*, 319(6), H1409-H1413. doi:10.1152/ajpheart.00698.2020.
- Woolf, S. H. & Braveman, P. (2011). Where Health Disparities Begin: The Role of Social and Economic Determinants—And Why Current Policies May Make Matters Worse. *Health Affairs*, 30(10), 1852-1859. doi:10.1377/hlthaff.2011.0685.
- Woolhandler, S. & Himmelstein, D. U. (2017). The Relationship of Health Insurance and Mortality: Is Lack of Insurance Deadly? *Annals of Internal Medicine*, 167(6), 424-431. doi:10.7326/M17-1403.
- Wootton, R. (2012). Twenty Years of Telemedicine in Chronic Disease Management - An Evidence Synthesis. *Journal of Telemedicine and Telecare*, 18(4), 211-220. doi:10.1258/jtt.2012.120219.
- World Health Organization [WHO] (2007). Health Technologies. Sixtieth World Health Assembly (Geneva). [Resolutions and Decisions Annexes](#). Resolution 60.29.
- World Health Organization [WHO] (2010). [Telemedicine: Opportunities and Developments in Member States](#).
- Wosik, J., Fudim, M., Cameron, B., Gellad, Z. F., Cho, A., Phinney, D., . . . Tcheng, J. (2020). Telehealth transformation: COVID-19 and the rise of virtual care. *Journal of the American Medical Informatics Association*, 27(6), 957-962. doi:10.1093/jamia/ocaa067.
- Wu, Y.-H., Ware, C., Damnée, S., Kerhervé, H., & Rigaud, A.-S. (2015). Bridging the Digital Divide in Older Adults: A Study from an Initiative to Inform Older Adults about New Technologies. *Clinical Interventions in Aging*, 193. doi:10.2147/cia.s72399.
- Yang, X., Zhang, J., Chen, S., Olatosi, B., Bruner, L., Diedhiou, A., . . . Li, X. (2021). Demographic Disparities in Clinical Outcomes of COVID-19: Data from a Statewide Cohort in South Carolina. *Open Forum Infectious Diseases*, 8(9). doi:10.1093/ofid/ofab428.
- Young, A., Chaudhry, H. J., Pei, X., Arnhart, K., Dugan, M., & Simons, K. B. (2021). FSMB Census of Licensed Physicians in the United States, 2020. *Journal of Medical Regulation*, 107(2), 57-64. doi:10.30770/2572-1852-107.2.57.