

Health and healthcare disparities associated with the digital divide

Esli Osmanliu, MD^{1,2}

Ramesh Johari, PhD¹

David Scheinker, PhD^{1,3}

¹Stanford University, Management Science and Engineering, Stanford, CA, United States of America,

²McGill University Health Centre, Department of Pediatrics, Montreal, Canada

³Stanford University, Clinical Excellence Research Center, Stanford, CA, United States of America

Corresponding author:

David Scheinker

Jen-Hsun Huang Engineering Center

475 Via Ortega

Stanford, CA 94305-4121

dscheink@stanford.edu

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The prioritization of telehealth in response to the COVID-19 pandemic may accelerate progress to virtual integrated care at scale. However, disparities in healthcare and health outcomes may widen if telehealth is not accessible to the underserved communities that are most in need (1). Providers faced with practical constraints have already defaulted into a two-tiered system of telehealth: technology-driven, integrated care for those with the requisite resources and phone-based, ad-hoc care, possibly less effective (2), for those without. Insights based on data from federal organizations offer a starting point for primary care providers to understand common structural barriers to telehealth access, identify interventions they can implement to increase equity in their virtual care practice, and advocate for their patients.

Broadband access has an undesirable gatekeeping role on the reach of telehealth. Efforts to alleviate other barriers -- such as lack of access to technology, inadequate physical space, provider bias, and maladapted clinic workflows -- may ultimately be for naught without sufficient connectivity. While some communities with insufficient infrastructure remain far from adequate connectivity, many face a challenging “last mile” problem. Most cellular and landline broadband plans allow users to conduct occasional, short teleconferences with a healthcare provider. Typical voice, video, and high-definition video calls require respectively 6, 540, and 1620 megabytes per hour. However, patients with complex medical and social needs may require frequent encounters, multiple participants, and the exchange of voluminous clinical information (images, videos, remotely monitored data). The bandwidth required for healthcare, remote learning and other activities of daily life may exceed the speed and data limits available through the most affordable plans. As long as high-quality broadband is necessary for access to fully integrated virtual health care, those who need it most may not be able to access it.

In its 2010 National Broadband Plan, the Federal Communications Commission (FCC) prioritized affordable access to robust internet for every American. Using broadband and population health data that are openly available on the FCC Connect2Health platform, we calculated that 31.9 million Americans lacked fixed (non-cellphone) broadband access as of December 2015. Two years later, the size of the unconnected population decreased to 21.3 million, as per the 2019 FCC Broadband Deployment Report. However, these numbers likely underestimate the digital divide: first, the FCC defines broadband as minimum upload and download speeds of 3 and 25 megabytes per second respectively, which may no longer reflect the ubiquitous role of network connectivity for daily activities; second, “access” does not imply actual adoption in all or even most households; and third, the FCC definition makes the dubious assumption that service in a single location of a census block -- as reported by internet-service providers -- is sufficient to consider the whole area as having broadband.

Despite their limitations, the available data demonstrate that deficient connectivity co-exists with long-standing structural vulnerabilities that contribute to health disparities (3). In the counties with the largest burden of disease, 14.9% of the population had the worst level of broadband access, as compared to 2.4% in counties with the best health. This accounts for a 630% higher proportion of Americans without broadband access in counties with the worst levels of diabetes and/or heart disease mortality. Nationally, 11.4 million people lived in these “double-burdened” counties. Southern counties, which have the highest proportion of Black or African Americans, were particularly affected (Figure 1). Diabetes and heart disease are highly prevalent and correlated with other chronic conditions; negatively impact the lives of millions of Americans;

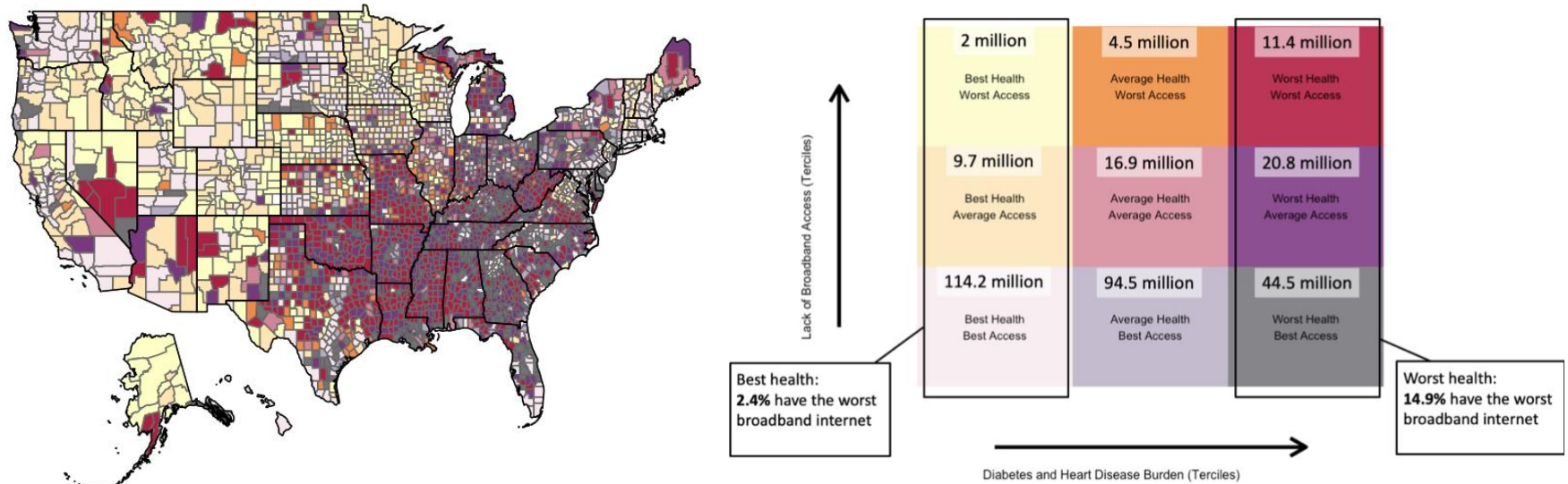
account for over 13% of total US healthcare spending; and have the strongest established evidence that the use of telehealth conveys benefit (4). Other acute and chronic conditions, including those related to mental health, present an opportunity for improved outcomes through telehealth-enabled care. Broadband may thus be viewed as a “super-determinant” of health, not only gatekeeping access to care, but also to other social determinants of health such as employment, education and food.

The transition to value-based care would be well served by better connectivity for the millions of Americans most affected by disparities in health and access to care. Many of them live in rural or low-income communities and face the deleterious consequences of structural racism (5). Thus, if deployed in a way that reduces rather than enhances existing disparities in access to care, telehealth programs have the potential to improve patient outcomes and satisfaction; enable provider gains in efficiency; reduce the massive brick and mortar costs of in-person health care delivery; expand the reach of specialized care; and ultimately contribute to improvements in population health, particularly among communities most affected by chronic disease (4, 6).

Physicians need not wait for massive broadband infrastructure projects to move the US off the path to wider disparities in access to care and health outcomes. In parallel, some providers and clinics are adapting their service delivery in order to equitably serve communities impacted by insufficient broadband. Simple interventions allow physicians to meet underserved patients where they are and avoid systematically limiting their care to phone-based telehealth (5). Lower bandwidth alternatives are available for visits that require video, high-quality images, and medical device data. Support teams dedicated to patient on-boarding can alleviate the burden of limited digital literacy skills and facilitate practical options for occasional data-intensive tasks such as accessing public institutions that offer secure, high-speed internet. The integration of interpretation and social work services into telehealth workflows can increase access among under-represented groups. Patient-centered outcomes research will help identify encounters where "broadband-efficient" phone-based telehealth is as effective as more demanding options. Larger-scale technological solutions may also be needed, such as the aim of *SpaceX* to deliver high-speed internet across the US through fleets of low-orbit satellites.

Technology alone cannot solve the problem of the digital divide. Work on structural competency reveals myriad social, economic and political forces influencing health outcomes (7). Providers have an essential role to play in advocating for the elimination of disparities in access to care and health outcomes. Equitable and inclusive expansion of virtual healthcare is a step in the right direction.

Figure 1: Bivariate choropleth map of broadband access and disease burden in American counties ^a



The fuchsia coloration (top-right corner of the 3x3 legend) represents "double-burdened" counties, in the lowest tercile of broadband access ("Worst Access") and highest tercile of diabetes prevalence and/or adult heart disease mortality ("Worst Health"). The left and right-hand columns capture counties in the lowest and highest terciles of disease burden, respectively. The legend also presents the population size in each tercile of disease burden and broadband access.

^a Data sources:

Adult heart disease mortality (2014): Centers for Disease Control and Prevention (CDC), <https://catalog.data.gov/dataset/heart-disease-mortality-data-among-us-adults-35-by-state-territory-and-county>

Broadband access and diabetes prevalence: from Federal Communication Commission (FCC) Connect2Health portal, including annual fixed broadband data as of December 2015 from Form 477 submission; diabetes prevalence data from the 2017 Robert Wood Johnson Foundation (RWJF) report <https://www.fcc.gov/reports-research/maps/connect2health/background.html>

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