Digital Equity and High-Speed Health Born From the COVID-19 Crisis

Tracy Doaks

The COVID-19 pandemic has triggered massive technology shifts, shining a bright light on the digital divide in North Carolina. Technology nonprofit MCNC continues to emphasize the importance of high-speed internet for all and how the right investments in broadband can drive economic and social growth as well as positive health care outcomes.

Telemedicine Mitigates Medical Workforce Shortage

Access to health care in America is challenging and inconsistent. The Centers for Disease Control and Prevention (CDC) estimates about 1.25 billion ambulatory care visits per year in the United States, with approximately one-third of those involving issues that could be addressed via telemedicine [1]. The Association of American Medical Colleges (AAMC) believes that by 2030, the United States will lack between 42,600 and 121,300 physicians needed to meet patient demand [2].

From remote patient monitoring to mobile health applications, advances in telemedicine and telehealth technologies have impacted patient care and health outcomes outside of hospitals and doctors' offices in North Carolina. Today's health care environment increasingly depends on digital connections that assure high-quality care is provided efficiently, effectively, and at an acceptable cost. Reliable and fast broadband technologies are necessary for accessing remote experts at a moment's notice, sharing information among a patient's physicians quickly and easily, keeping parents informed and up to date on the details of their child's doctor visits, and providing continuing education to health care practitioners and clinicians.

As health care evolves and becomes increasingly reliant on health information exchanges, electronic medical records, and internet-enabled research for the next great cures, high-speed and secure broadband connectivity becomes critically essential.

MCNC's Role

MCNC is a nonprofit, client-focused technology organization based in Research Triangle Park [3]. Founded in 1980, MCNC owns and operates the North Carolina Research and Education Network (NCREN), one of America's longest-running regional research and education networks. For 40 years MCNC has connected and protected communities with high-speed internet and networking technologies throughout North Carolina. During those four decades, MCNC has built out its world-class fiber-optic network to many unserved and underserved areas of the state (now covering more than 4000 miles), while stressing that the growth of the "digital divide," or, in education, "homework gap," would pose significant social and economic challenges. Today, North Carolinians' home internet must be able to support remote work, health care, virtual school, and day-to-day living, and the COVID-19 pandemic has shown that digital equity and inclusion really are all-encompassing; citizens not only need access to reliable broadband, but also secure access to services and the support and skills to use them.

The North Carolina Telehealth Network Association (NCTNA) operates a dedicated network for a consortium of public and nonprofit health care sites in the state (Figure 1). In 2010, MCNC became the broadband service provider for the NCTNA, which operates about 300 sites throughout North Carolina and is the fourth-largest Healthcare Connect Fund consortium in the country [4]. To date, the NCTNA has secured subscription discounts of more than $30 million for North Carolina health care institutions [5]. The NCTNA also provides connectivity for many of North Carolina's largest health care systems; many of these connections are mission-critical links between hospitals and data centers. The vision of the NCTNA is for North Carolina to be a leader in the adoption of sharing electronic medical records, telemedicine-enabled health services, and seamless health information exchanges.

COVID-19 Exposes Inequities and Connectivity Gaps

The pandemic has shown that high-speed internet is no longer a luxury, it is an indispensable utility required for functioning as a citizen of the 21st century. Health care changed during the pandemic, raising concerns about digi-

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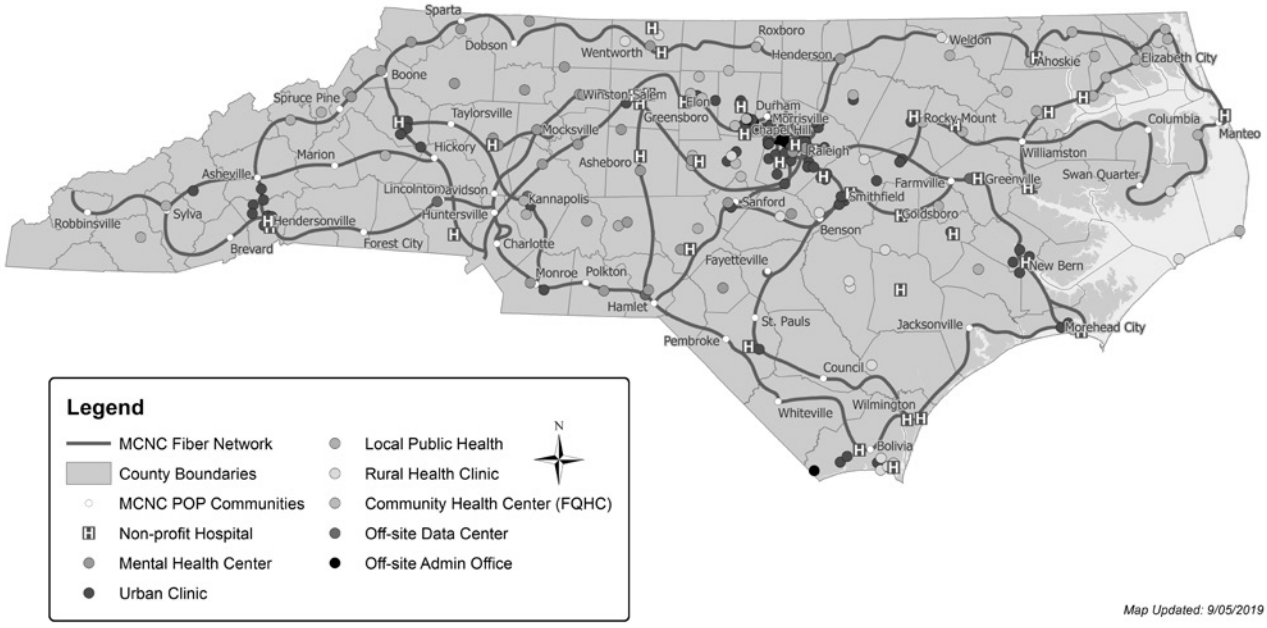
FIGURE 1.
MCNC Fiber Network and Health Care Institutions Served as Part of NCTNA



Note. MCNC serves health care institutions that are part of the NCTNA. Health care sites that are eligible for the FCC's program discounts range from small community health clinics to large hospitals. Additionally, administrative and data center locations that support these sites are eligible. A consortium such as NCTNA must have at least 50% rural sites among all eligible sites in order to obtain discounts through the program (there are also options for savings for ineligible sites).
Source. MCNC

tal equity and inclusion and access to care, as well as social determinants of health like education and participation in the economy. In the context of life-or-death situations in medicine, lack of access to broadband should be viewed as life-threatening.

Telehealth services in particular have faced many challenges in recent years, including effectiveness, privacy and security, government regulations, and more. Recently, telehealth has been seen as a double-edged sword in that it can enable patient access but also deepen the digital divide [6]. In 2018, 1 in 4 Medicare beneficiaries had no digital access at home [7]. Those without digital access were more likely to be aged 85 years or older, members of racial or ethnic minority communities, and/or from low-income households [7]. Drilling down even further, according to Pew Research Center, 25% of adults aged 65 or older do not have internet [8], complicating their ability to register for vaccine appointments and/or get information about the pandemic. This isn't just a problem facing elderly Americans; Pew also finds that more than 40% of Americans don't have broadband at home [9].

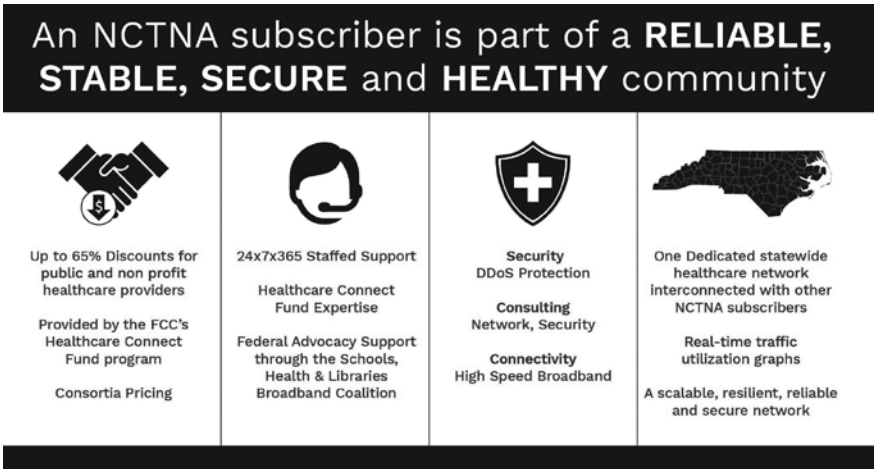
Prior to COVID-19, telehealth was familiar but not commonplace. Telehealth now has a critical role in the mitigation of COVID-19, providing a safe way for patients to receive medical care. According to the CDC, there was a 154% increase in telehealth visits in the United States during the last week of March 2020 compared to the same period the year prior [10], likely due to public health recommendations that led many people to shift away from in-person care. Increasingly, patients need to access electronic communications from their providers through email or medical applications [11]. Public health departments and the CDC have relied on their websites, online events, and social media to educate the population about COVID-19.

This has been particularly true as the vaccine has been rolled out. While it was possible in some places to secure an appointment by phone, signing up for the vaccine has occurred predominantly online. This means that far fewer older adults from underresourced racial and ethnic minority communities have been able to schedule appointments. Vaccine distribution is "yet another casualty of the digital divide," Gigi Sohn, a counselor to the former chairman of the Federal Communications Commission under the Obama Administration, stated in February [12]. She added, "It has never been more clear than now how important it is for every American household to have broadband internet access."

No Patient Left Offline

The impact of COVID-19 has forever changed broadband usage patterns. For example, the pandemic forced a nationwide shift to distance learning that made internet access a precondition to student participation. It is no different for health care outcomes; offering universal and ubiquitous internet access is an equity issue. Now, it appears that internet access is emerging as a determinant of health [13, 14]. This appears to be particularly true for underre-

FIGURE 2.
How The MCNC-NCTNA Fiber-Optic Network Improves Health Care Access



Note. This figure illustrates how the collaboration between NCTNA and MCNC allows for a successful fiber-optic network to run at high capacity all across North Carolina assuring that public and nonprofit health care providers have access to reliable and affordable broadband services.
Source. MCNC

sourced racial and ethnic minority communities and aging populations. Over the past year, lawmakers nationwide have introduced about 300 bills aimed at expanding access to telemedicine [15].

The Schools, Health & Libraries Broadband Coalition (SHLB) 2021 Policy Roadmap, which makes recommendations to Congress, advocates for increased funding and improved administration of the FCC's Rural Health Care (RHC) program. The COVID-19 pandemic highlights the urgent need to strengthen this underfunded program. The spike in telemedicine demands more bandwidth for health care providers, and the RHC program's $605 million cap is not sufficient. SHLB analysis suggests that the RHC program needs $2 billion in additional funding each year to ensure that all health care providers have the connectivity they need [16].

Digital Equity, Inclusion, and the CARES Act

MCNC is well positioned to leverage broadband in support of digital equity and inclusion in North Carolina, forming actionable strategies and identifying sustainable approaches to digital equity; participating in active conversations at the state and national level; collaborating with groups such as the National Digital Inclusion Alliance and the North Carolina Digital Equity and Inclusion Collaborative, hosted by the North Carolina Broadband Infrastructure Office; and gathering input from community anchor institutions (CAIs)—including local governments and internet service providers (ISPs)—to help identify key challenges to reaching their digital inclusion goals.

As a member of the SHLB Coalition, MCNC supports efforts to improve broadband access and digital inclusion efforts "to and through" the CAIs of unserved and underserved areas (Figure 3). This mirrors MCNC's mission, as CAIs are on the front lines of meeting the needs and goals of their surrounding communities and are critical in creating ripple effects in other communities.

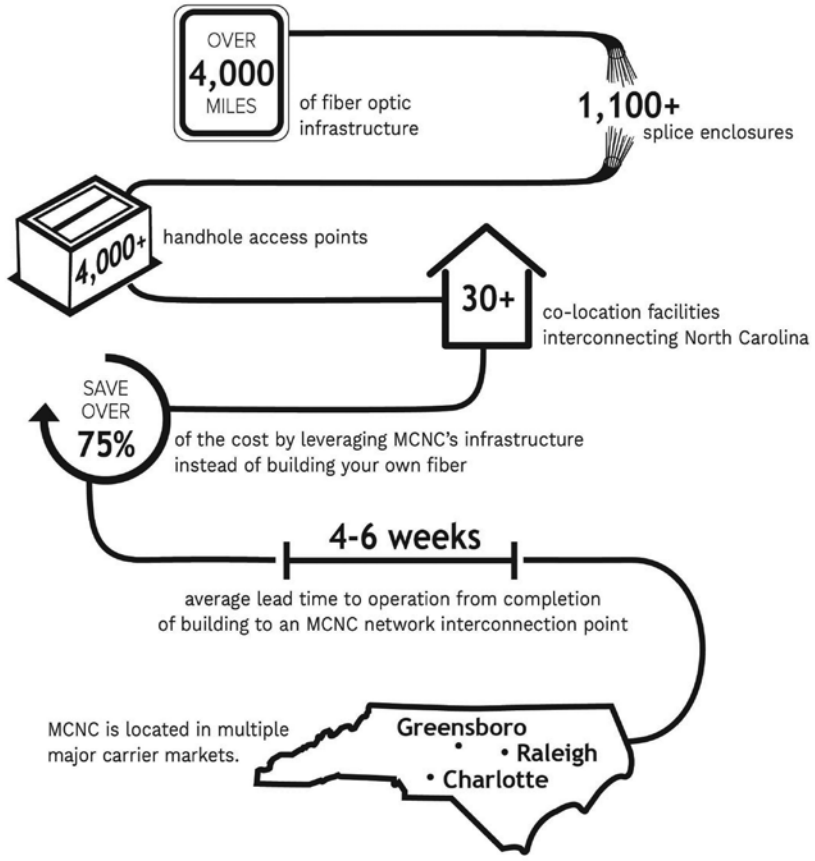
The Coronavirus Preparedness and Response Supplemental Appropriations Act of 2020 (CARES Act) is a $2.2 trillion economic stimulus in response to the economic fallout from the pandemic [17]. MCNC completed important projects associated with funding from the CARES Act, including the Rural College Broadband Access Project, a major step in extending high-speed connections for the North Carolina Community College System. This $12 million endeavor improved the technology infrastructure at 20 of the state's most rural campuses. Additionally, MCNC completed cyber hygiene assessments, evaluating how security controls measure up against known vulnerabilities for 50 local education agencies (LEAs) in just 14 weeks. This work addressed cybersecurity from both a technology and behavior level, provided vital and timely information to those LEAs, and allowed for MCNC's Secure Application Access service to be available at no added cost.

MCNC will continue to explore innovations in unserved and underserved communities by collaborating with anchor institutions and last-mile ISPs to determine if digital equity and inclusion efforts in North Carolina could be replicated in other communities across the state and nation.

Protecting Patients with Proactive Cybersecurity

Medical devices connected to the internet are an important source of accurate information that can be the difference between life and death for patients who rely on them. While this improves medical professionals' ability to treat patients, it also heightens the risk of cybersecurity threats. Phishing and ransomware attacks have increased around

FIGURE 3.
MCNC Infrastructure By The Numbers



Note. This figure illustrates how MCNC operates and manages a statewide backbone that serves Community Anchor Institutions in North Carolina in an open, non-discriminatory manner. In some areas, MCNC provides lit service and other middle-mile services to private-sector middle or last-mile providers or wholesalers within the MCNC service area at reasonable rates and terms.
Source. MCNC

the world during the COVID-19 pandemic; cyber criminals tend to embrace the cynical opportunities provided during a crisis. Health care organizations remain at high risk of a breach, which can have a devastating impact on operations and delivering care. Organizations will need to rethink their risk management measures and how best to remediate threats. MCNC remains focused on ensuring the highest levels of security and confidentiality for health care. The MCNC security portfolio has grown and evolved to solve tough security challenges for CAIs and health care institutions; since 2018, MCNC has held the industry-leading SOC Type II certification [18].

The Health Insurance Portability and Accountability Act of 1996 (HIPAA) comes with regulations protecting the privacy and security of certain health information [19]. To fulfill this requirement, the US Department of Health and Human Services (HHS) published the HIPAA Privacy Rule and the HIPAA Security Rule. The Privacy Rule, or Standards for Privacy of Individually Identifiable Health Information, established national standards for the protection of certain health information. The Security Standards for the Protection of Electronic Protected Health Information (the Security Rule) established a national set of standards for protecting certain health information held or transferred electronically. The Security Rule operationalizes the protections contained in the Privacy Rule by addressing the technical and nontechnical safeguards that organizations called covered entities must put in place to secure individuals' "electronic protected health information" (e-PHI). Within HHS, the Office for Civil Rights (OCR) has responsibility for enforcing the Privacy and Security Rules.

MCNC's cybersecurity professionals assist in all areas of information security and risk management, and maintain HIPAA compliance and security in health care IT through the NCTNA (Figure 2). As cyber threats continue to evolve, it will be the organizations that address cybersecurity from both a technology and behavior level that will be the strongest and most successful.

Conclusion

The catastrophic impacts of COVID-19 serve as an important opportunity for ISPs and lawmakers to make long-over-

due changes. With the nation stopped in its tracks and its people especially attuned to inequities, it would be remiss to let this moment pass without advocating for change and providing solutions for achieving it.

Broadband internet is necessary for Americans to do their jobs, get equal education, provide and receive proper health care, and to stay connected. Strategic investments and upgrades in digital infrastructure, as well as research in wireless technologies and accurate mapping to understand where connectivity gaps exist, are needed now—especially in rural areas. Innovation, creativity, and human energy can reduce the cost of broadband internet, promote more widespread adoption, and produce meaningful outcomes. NCMJ

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References

1. National Center for Health Statistics. Summary Health Statistics: National Ambulatory Interview Survey, 2018. Hyattsville, MD: NCHS; 2018. https://ftp.cdc.gov/pub/Health_Statistics/NCHS/NHIS/SHS/2018_SHS_Table_A-18.pdf. Published 2018. Accessed March 7, 2021.
2. Association of American Medical Colleges (AAMC). New AAMC Report Confirms Growing Physician Shortage. AAMC website. https://www.aamc.org/news-insights/press-releases/new-aamc-report-confirms-growing-physician-shortage. Published June 26, 2020. Accessed March 5, 2021.
3. MCNC. MCNC website. https://www.mcnc.org. Accessed April 15, 2021.
4. MCNC. Case Study: NCTN. Broadband brings life to North Carolina TeleHealth Network. MCNC website. https://www.mcnc.org/knowledge-center/case-studies/case-study-nctn. Published Dec. 6, 2013. Updated June 2020. Accessed March 5, 2021.
5. North Carolina Telehealth Network Association. What We Do. NCTNA website. https://nctna.org/what-we-do. Accessed May 17, 2021.
6. Healthcare IT News. Telehealth may worsen digital divide for people with disabilities. HealthcareITNews.com. https://www.healthcareitnews.com/news/telehealth-may-worsen-digital-divide-people-disabilities Published November 23, 2020. Accessed March 3, 2021.
7. Roberts ET, Mehrotra A. Assessment of disparities in digital access among Medicare beneficiaries and implications for telemedicine. JAMA Intern Med. 2020;180(10):1386-1389. doi: 10.1001/jamainternmed.2020.2666
8. Perrin A, Atske S. 7% of Americans don't use the internet. Who are they? Pew Research Center website. https://www.pewresearch.org/fact-tank/2019/04/22/some-americans-dont-use-the-internet-who-are-they/. Published April 2, 2021.
9. Anderson M, Kumar M. Digital divide persists even as lower-income Americans make gains in tech adoption. Pew Research Center website. https://www.pewresearch.org/fact-tank/2019/05/07/digital-divide-persists-even-as-lower-income-americans-make-gains-in-tech-adoption/. Published May 7, 2019. Accessed March 6, 2021.
10. Koonin LM, Hoots B, Tsang CA. Trends in the use of telehealth during the emergence of the COVID-19 pandemic—United States, January–March 2020. MMWR Morb Mortal Wkly Rep. 2020;69(43)1595-1599. doi: 10.15585/mmwr.mm6943a3
11. Merschel M. High-speed internet offers key connection to health, but millions lack it. Heart.org. https://www.heart.org/en/news/2020/08/05/high-speed-internet-offers-key-connection-to-health-but-millions-lack-it. Published August 5, 2020. Accessed March 6, 2021.
12. O'Brien SA. Covid-19 vaccine rollout puts a spotlight on unequal internet access. CNN.com. https://www.cnn.com/2021/02/04/tech/vaccine-internet-digital-divide/index.html. Published Nov. 23, 2020. Updated Feb. 4, 2021. Accessed March 3, 2021.
13. Loeb TB, Ebor MT, Smith AM, et al. How mental health professionals can address disparities in the context of the COVID-19 pandemic. Traumatology. 2021;27(1):60-69. doi: 10.1037/trm0000292
14. American Medical Informatics Association. Re: Request for Comment: Actions to Accelerate Adoption and Accessibility of Broadband-Enabled Health Care Solutions and Advanced Technologies. Rockville, MD: AMIA; 2017. https://www.amia.org/sites/default/files/AMIA-Response-to-FCC-Notice-on-Accelerating-Broadband-Health-Tech-Availability.pdf. Published May 24, 2017. Accessed March 6, 2021.
15. Jercich K. For next steps on telehealth, look to the states. HealthcareITNews.com. https://www.healthcareitnews.com/news/next-steps-telehealth-look-states. Published January 26, 2021. Accessed March 3, 2021.
16. Schools, Health & Libraries Broadband (SHLB) Coalition. Letter of support: H.R. 6474, the Healthcare Broadband Expansion During COVID-19 Act. Washington, DC: SHLB Coalition; 2020. https://www.shlb.org/uploads/Policy/Healthcare%20BB/SHLB%20Ltr%20to%20Congress%20on%20RHC%20funding%20-%20FINAL%20-%2010%20April%202020.pdf. Published April 10, 2021. Accessed March 5, 2021.
17. 116th Congress of the United States of America - Second Session (January 2020). H.R. 6074 - Coronavirus Preparedness and Response Supplemental Appropriations Act, 2020. Washington, DC: 116th Congress; 2020. https://www.congress.gov/116/bills/hr6074/BILLS-116hr6074enr.pdf.
18. MCNC. Security. MCNC website. https://www.mcnc.org/our-solutions/security. Published June 2020. Accessed March 6, 2021.
19. Centers for Disease Control and Prevention. Health Insurance Portability and Accountability Act of 1996 (HIPAA). CDC website. https://www.cdc.gov/phlp/publications/topic/hipaa.html. Last reviewed September 14, 2018. Accessed March 7, 2021.