

The Economic Consequences and Generational Impact of the Digital Divide

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About the Technology and Public Purpose Project (TAPP)

The arc of innovative progress has reached an inflection point. It is our responsibility to ensure it bends towards public good.

Technological change has brought immeasurable benefits to billions through improved health, productivity, and convenience. Yet as recent events have shown, unless we actively manage their risks to society, new technologies may also bring unforeseen destructive consequences.

Making technological change positive for all is the critical challenge of our time. We ourselves — not only the logic of discovery and market forces - must manage it. To create a future where technology serves humanity as a whole and where public purpose drives innovation, we need a new approach.

Founded by Belfer Center Director, MIT Innovation Fellow, and former U.S. Secretary of Defense Ash Carter, the TAPP Project works to ensure that emerging technologies are developed and managed in ways that serve the overall public good.

TAPP Project Principles:

1. Technology's advance is inevitable, and it often brings with it much progress for some. Yet, progress for all is not guaranteed. We have an obligation to foresee the dilemmas presented by emerging technology and to generate solutions to them.
2. There is no silver bullet; effective solutions to technology-induced public dilemmas require a mix of government regulation and tech-sector self-governance. The right mix can only result from strong and trusted linkages between the tech sector and government.
3. Ensuring a future where public purpose drives innovation requires the next generation of tech leaders to act; we must train and inspire them to implement sustainable solutions and carry the torch.

About the Author

Francella Ochillo Francella Ochillo is an attorney and nonprofit executive whose work underscores how widespread broadband access and adoption can improve economic resilience, educational outcomes, the ability to age in place, and pathways for participating in democracy. She is a long-time public interest advocate and leads a nonprofit organization devoted to helping local officials achieve their community's connectivity goals. Through Federal Communications Commission working groups, Congressional testimony, and local, state, and federal level proceedings, Francella provides expertise on how government policies and industry practices affect societal infrastructure, particularly for underrepresented populations.

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Research Findings

- While universal service principles from the telephone era provided a necessary framework for universal broadband goals, monopolistic practices and lopsided power dynamics that shaped telephone industry regulations also laid the foundation for limited competition and corporate-centered policies in the broadband marketplace.
- An influx of broadband funding will not cure the root causes of widespread digital inequities if many of the regulatory policies and industry practices that gave rise to the digital divide remain unchanged. Additionally, closing deep-rooted digital divides could cost an estimated \$175 billion more than the broadband funding allotted in the historic Infrastructure Investment and Jobs Act and other federal programs, further intensifying the need to invest public funds in strategic and sustainable ways.
- A digitally equitable ecosystem in which all Americans can leverage the benefits of technology requires public and private cooperation buttressed by consumer-focused public policies from federal, state, and local government entities.
- The digital divide is far more expansive than what is depicted in current broadband access data. Using binary measurements for a multi-dimensional problem blurs pictures of digital inequality and reduces the effectiveness of public and private interventions.
- Persistent digital inequities exacerbate other societal inequalities which, combined, cause a ripple effect in local and state economies. They also hobble domestic productivity and competitiveness while increasing the cost of public service delivery nationwide.
- An analysis of broadband access and adoption rates in the richest and poorest states shows a direct correlation between low-income status and the lack of adoption. The race and income levels of disconnected populations were remarkably similar regardless of geography.

- Low- and middle-income Americans have significant limitations on increasing earning power and developing the net assets needed to create intergenerational wealth. Increasing opportunities for digital citizenship improves prospects for higher education, economic mobility, and healthcare while boosting agility in a rapidly changing digital economy.
- The social return on public investments in digital equity is evidenced, for instance, by increases in healthcare options, workforce participation, productivity, and competition. Further, a highly connected populace introduces new communication channels for disenfranchised Americans to access information, financial inclusion, and community-building opportunities to which some have historically been denied.
- The U.S. has a long history of investing in science and technology to boost economic growth and mitigate harm. In addition to developing public policies that center the high-speed connectivity needs of today and tomorrow, investing in digital equity would exponentially boost economic opportunities and create cost savings for generations to come.

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Introduction

History has its eyes on us.¹ Years from now, what was and was not attempted to address the digital divide will not only be remembered but will also be memorialized in code. Americans who perpetually struggle with the ability to get online continually lag behind their connected counterparts in earning power, lifelong learning, healthcare options, and political clout. Meanwhile, those with reliable high-speed internet access, digital dexterity, and ready access to computing devices will continue to produce some of the most influential digital architects of our time as they enjoy unmatched opportunities for well-being, longevity, and wealth.

Digital inequities allow the digital divide to thrive in the most under-resourced communities. Proof of inequity rarely surfaces in isolation and has a compound effect by multiplying the impact of disadvantage. By the time a household is labeled as being on the wrong side of the digital divide, its residents have already missed out on the benefits of a digital economy and experienced socioeconomic consequences that transcend household walls.

In examining the ten highest and lowest median income states, data show that the populations struggling with connectivity are remarkably similar. Poverty tends to be a root problem for households that live in close proximity to digital infrastructure but cannot afford to maintain broadband subscriptions throughout the year. Approximately 50% of Indigenous residents living on tribal lands still do not have baseline broadband access or a computing device at home to get online.² Black and Brown households in high- and low-income states consistently trail behind their White counterparts in broadband adoption rates, a statistic made worse by them being twice as likely to have canceled broadband service at home due to the financial strain of the pandemic.³

This research was designed to explore three primary questions. First, is there a predominant race and socioeconomic class of the populations most frequently impacted by the digital divide? Second, does the digital divide impose a collective cost that is shared with digitally disadvantaged and connected households? Third, should investing in digital equity be a national priority? The analysis documents why the answer to all three of those questions is a resounding yes.

1 "History Has Its Eyes on You," Wikipedia (Wikimedia Foundation, January 30, 2022), https://en.wikipedia.org/wiki/History_Has_Its_Eyes_on_You.

2 Chase DiBenedetto, "Indigenous Communities Built Their Own Internet. Here's How.," Mashable, October 29, 2021, <https://mashable.com/article/how-indigenous-communities-build-their-own-internet>.

3 Emily Vogels et al., "53% Of Americans Say the Internet Has Been Essential during the COVID-19 Outbreak" (Pew Research Center, April 30, 2020), https://www.pewresearch.org/internet/wp-content/uploads/sites/9/2020/04/PI_2020.04.30_COVIDinternet_REPORT.pdf.

Even though the recommendations in this report primarily focus on the effect of public policy decisions or inaction coupled with marketplace dynamics, there is an implicit call for both public and private entities to examine how their roles – including strategic silence – have contributed to digital inequality. Public policy changes are only ceremonial without confronting the underbelly of how technology and telecommunications regulations are made. Moreover, permanently eliminating digital divides necessitates deliberate reflection on whose voices and stories actually inform remedies, which can differ from those that policy proposals are purported to help.

Clearly, the consequences of the digital divide go far beyond the estimated nineteen million households that do not have a single household on their census block that can subscribe to broadband service.⁴ The economic impact of persistent digital inequities, which also exacerbate other societal inequalities, causes a ripple effect in local and state economies in addition to hobbling domestic productivity and competitiveness. Separate but related, when unequal access to financial resources plays such a central role in building assets and transmitting intergenerational wealth, ensuring that all Americans, particularly those trapped in cycles of poverty, have reliable access to a known economic enabler is essential, especially when it improves agility in a rapidly changing digital economy.⁵

There is a direct correlation between the digital divide and income inequality. For digital citizens – those with ready access to broadband connections, computing devices, digital skills, and the ability to contribute to a digital society – technology accelerates earning power and career opportunities. Both are critical for transforming income into wealth. Conversely, those with marginal to no connectivity have significantly different economic outcomes and frequently rely on manual labor or jobs that pay lower wages.

Benchmarks of connectivity will continue to evolve with innovation. Unless public policy strategies recognize the digital divide as a dynamic, multi-dimensional problem that demands sustainable solutions for access and adoption challenges, it will be impossible to contain the economic fallout. The consequences limit education, economic development, wellness outcomes, government service delivery options, access to emergency services, civic engagement, and more for the digitally disadvantaged. These vulnerabilities warrant thoughtful, long-term interventions that meet the enormity of the problem.

4 “FCC Annual Broadband Report Shows Digital Divide Is Rapidly Closing,” Federal Communications Commission, January 19, 2021, <https://www.fcc.gov/document/fcc-annual-broadband-report-shows-digital-divide-rapidly-closing>.

5 John Jerrim and Lindsey Macmillan, “Income Inequality, Intergenerational Mobility, and the Great Gatsby Curve: Is Education the Key?,” *Social Forces* 94, no. 2 (September 2015): pp. 505-533, <https://doi.org/10.1093/sf/sov075>.



Adobe Stock Image

Intricacies Of The Digital Divide

The National Telecommunications and Information Administration (“NTIA”) coined the phrase the “digital divide” in a 1998 report.⁶ It found that while Internet access via computer continued to penetrate households nationwide, trends as to who was and was not able to get online were heavily influenced by race, income, and other demographics.⁷ As the digital divide became an eventual fixture in communities of all sizes and geographies, it transitioned from being a term of art for government agencies to one that has been adopted into dictionaries, research, and encyclopedias in various forms.

Merriam-Webster defines the digital divide as “the economic, educational, and social inequalities between those who have computers and online access and those who do not.”⁸ The Cambridge Dictionary characterizes it as a “problem,” stating that some members of society do not have the opportunity or knowledge to use computers and the internet that others have.⁹ Important context that has yet to be captured in any definition is that the digital divide is a man-made construct that may take as long to dismantle as it did to create.

Definitions for digital equity also vary. In essence, it refers to an approach, informs how digital divides should be addressed, and is based on a foundational belief that every person – regardless of income or geography – should not only have reliable access to highspeed connectivity but also the tools to benefit from advances in technology. Achieving digitally equitable outcomes requires a combination of remedial programs and forward-looking public policies. As long as digital inequities prevent residents from being able to achieve full participation

6 “Falling through the Net II: New Data on the Digital Divide,” National Telecommunications and Information Administration, accessed April 1, 2022, <https://www.ntia.doc.gov/ntiahome/net2>.

7 Ibid.

8 “Digital Divide Definition & Meaning,” Merriam-Webster (Merriam-Webster), accessed April 1, 2022, <https://www.merriam-webster.com/dictionary/digital%20divide>.

9 Ibid.

in a digital society, there is a cost that is discriminately shared by the people and entities that disconnected households touch.

Digital inequities are caused by a confluence of public policy decisions or inaction and marketplace norms which, coupled together, prop up digital divides. Conditions in the broadband landscape that perpetuate digital inequality include but are not limited to: (a) decades of public policy has allowed broadband deployment to be governed by supply and demand principles instead of treating Internet access and adoption as a necessity;¹⁰ (b) markets with limited competition ensure that millions of consumers only have one or two choices in broadband providers;¹¹ (c) federal and state grant programs that myopically focus on incentivizing providers have the dual effect of discouraging innovative service models and ensuring that areas service providers deem unprofitable are repeatedly excluded; and (e) a variety of state prohibitions that prevent overlooked communities from being able to pursue alternative broadband models are inexplicably still in place.¹²

Low broadband adoption and low incomes are tell-tale signs of the digital divide's grip on a community. For instance, when a resident must rely on a computer station at the local library to start a business or perhaps when one lacks the requisite bandwidth or computing device for a mental health evaluation from the privacy of home, too often, those stories are dismissed as anecdotal. Yet, when countless households in the same area face similarly insurmountable obstacles, the aggregate impact of being locked out of a digital society generates direct and indirect consequences for both connected and disconnected populations, regardless of whether their individual harms are ever fully acknowledged.

Estimates related to the cost of closing the digital divide in the US vary. In 2017, the Office of Strategic Planning and Policy Analysis at the Federal Communications Commission ("FCC") published a report that provided

10 Editorial Board, "The FCC Should Do More to Improve Broadband Internet Access and Affordability," The Southerner Online, December 30, 2020, <https://thesoutherneronline.com/79529/front-slideshow/the-fcc-should-do-more-to-improve-broadband-internet-access-and-affordability/>.

11 Jonathan Sallet, "Broadband for America's Future: A Vision for the 2020s," Benton Institute for Broadband and Society, October 2019, https://www.benton.org/sites/default/files/BBA_full_F5_10.30.pdf, 46.

12 Tyler Cooper, "Municipal Broadband Is Restricted in 18 States across the U.S. in 2021," BroadbandNow, December 1, 2021, <https://broadbandnow.com/report/municipal-broadband-roadblocks/>.

a conservative estimate of reducing gaps in broadband access. At the time, setting aside related adoption challenges, the cost of deploying future-proofed, fixed broadband networks across the country was approximately \$80 billion dollars.¹³ Four years later, taking a more holistic view, analysis by researchers at Tufts University indicates that eliminating gaps in access and adoption is an approximately \$240 billion problem.¹⁴

Praiseworthy efforts to address the most unforgiving digital divides are underway at every level of government across the U.S. However, too often, similar efforts have been aimed exclusively at broadband access when adoption challenges are equally problematic. Case in point, while the \$65 billion broadband investments that are included in the Investment and Infrastructure and Jobs Act (“IIJA”) are desperately needed, approximately two-thirds of the funding is earmarked solely for broadband deployment strategies. The leftover is assigned to support adoption and digital equity, but the resources are dwarfed by the scope of the challenge. Thus, IIJA funded programs are more accurately viewed as one tranche in a series of investments that will need to be made in the future.

The Digital Divide Is As Old As The Internet’s Public Debut

The Internet was born of public investments and made its household debut in 1993. The digital divide is as old as the first at-home internet connections to the World Wide Web..

1993 was a completely different time. Back then, students submitted college applications and financial aid forms via mail. Largely limited to academics and researchers who needed to share files and messages from remote terminals,¹⁵ the word “e-mail” had yet to be etched into the public’s lexicon. Rideshares did not exist, banking from a phone was unimaginable, and

13 Paul da Sa, “Improving the Nation’s Digital Infrastructure,” Federal Communications Commission, Office of Strategic Planning and Policy Analysis, January 2017, <https://www.fcc.gov/document/improving-nations-digital-infrastructure>.

14 “Uneven State of the Union.” Digital Planet. The Fletcher School, Tufts University, June 30, 2021, <https://sites.tufts.edu/digitalplanet/uneven-state-of-the-union/>.

15 Samuel Gibbs, “How Did Email Grow from Messages between Academics to a Global Epidemic?,” The Guardian, March 7, 2016, <https://www.theguardian.com/technology/2016/mar/07/email-ray-tomlinson-history>.

working from home was an infrequent comfort reserved for employees who needed special accommodations.

At the public internet's inception, households primarily relied on telephone lines to support dial-up Internet connections, and Internet policy was primarily informed by telephone regulations. When broadband technologies were introduced into the market, consumers could access information, content, and applications at significantly faster speeds, some of which might not be possible with a dial-up connection.¹⁶ Eventually, high-speed Internet would be available via a telephonic digital subscriber line, cable modem, fiber wireline, or satellite with fiber proving itself to be the most durable technology.

Households that could afford a monthly fee (and possibly an additional hourly fee)¹⁷ for an internet subscription at home had immediate access to information as well as the ability to create content for new audiences. Educational and economic opportunities in connected households trounced those in households that could not afford or lacked the tools to get online. At the time, disconnected households would rarely be able to find public reliable access points. It would take another decade for internet access to become ubiquitous in schools, libraries, and community centers.

Although high-speed Internet was originally treated as a luxury, it ushered in a digital revolution that made it a necessity. Recognizing the potential of high-speed connectivity, businesses invested heavily in networks, developing the digital architecture of the Internet that largely remains in place today.¹⁸ As government agencies began to extract themselves from managing the Internet, they also reduced oversight and created once unimaginable opportunities for commercialization. Thus, although using the Internet was free, the price of the high-speed connections needed to get online would remain high or exorbitant in some areas for decades to come.

16 United States Government Accountability Office, "Current Broadband Measures Have Limitations, and New Measures Are Promising but Need Improvement," October 2009, <https://www.gao.gov/assets/gao-10-49.pdf>.

17 Steven Vaughan-Nichols, "Before the Web: Online Services of Yesteryear," ZDNet, December 4, 2015, <https://www.zdnet.com/article/before-the-web-online-services/>.

18 Fact Sheet: A Brief History of NSF and the Internet, National Science Foundation, Aug. 13, 2003, https://www.nsf.gov/news/news_summ.jsp?cntn_id=103050.

As tensions related to whether broadband Internet was a luxury or a utility surfaced in federal, state, and local policymaking proceedings from coast to coast, the FCC repeatedly affirmed its commitment to universal broadband service goals. In 2010, the agency documented the depth of the digital divide, doubling down on its position that widespread broadband connectivity could stimulate economic growth, spur job creation, and boost America's capabilities in education, health care, and homeland security.¹⁹

The digital divide burrowed its way into communities of all geographies and demographics long before the COVID-19 pandemic reached U.S. shores in 2020. However, the pandemic accelerated the march towards digitization that changed almost every aspect of society.

There is no historical event that compares to the speed of the digital revolution. In 2000, only five percent of U.S. households had Internet subscriptions.²⁰ Soon after the Internet's introduction, businesses, governments, health, and educational institutions started to rely heavily on high-speed technologies, fueling a need for broadband that spread like wildfire in households, businesses, and governments. By 2020, upwards of 90 percent of households had some sort of Internet access, whether it be at home, school, or a community gathering place.

The shift in the economy accelerated by a global pandemic unceremoniously revealed why not having a reliable broadband connection was akin to not having reliable electricity at home. While the pandemic made it impossible for connected populations to ignore, residents in unserved and underserved communities have been acutely familiar with this revelation for years.

19 "National Broadband Plan." Federal Communications Commission, June 23, 2014, <https://www.fcc.gov/general/national-broadband-plan>.

20 Greg Stranger and Shane Greenstein, "Pricing at the On-Ramp to the Internet" (National Bureau of Economic Research, October 2007), <https://www.nber.org/system/files/chapters/c0878/c0878.pdf>, 201.

Examining The Roots of Digital Inequities

Understanding why digital inequities became entrenched in the broadband landscape is part and parcel of the history of telecommunications in the U.S. In fact, when it comes to the digital divide, the past is a prologue.

Improving on the capabilities of the telegraph, telephones were the first example of an advanced telecommunication tool for consumers.²¹ Until 1934, when the FCC was created, the American Telephone and Telegraph Company dominated the telephone industry with very few competitors and extremely limited government oversight.

Unlike railway, oil, and tobacco monopolies that were deemed unacceptable, a telephone monopoly that employed a unified, high-quality network was treated as an asset to the nation's infrastructure because it was under the control of a single firm that declared a cardinal duty to serve the public and touted its willingness to put the public's needs above profits.²² Hence, the American Telephone and Telegraph Company's motto, "one policy, one system, universal service,"²³ became the first universal service commitment aimed at providing telecommunications service to every household in every corner of the U.S. The industry promise of universal service would eventually be adopted verbatim into federal law.

The concept of universal service did not only provide the framework for telephone regulation but made an indelible mark on the broadband landscape. Since telephone markets were largely monopolistic, it normalized the idea of only having one or two choices in broadband service providers. Further, even though telephone service was supposed to be deployed to every community, it took over a century to transition from being a comfort

21 "History of the Telephone and Communication with Businesses," Mitel, accessed April 1, 2022, <https://www.mitel.com/articles/history-telephone-and-communication-businesses>.

22 Brian Fung, "This 100-Year-Old Deal Birthed the Modern Phone System. and It's All about to End.," The Washington Post (WP Company, December 6, 2021), <https://www.washingtonpost.com/news/the-switch/wp/2013/12/19/this-100-year-old-deal-birtherd-the-modern-phone-system-and-its-all-about-to-end/>.

23 "AT&T Corporation," Wikipedia (Wikimedia Foundation, March 5, 2022), https://en.wikipedia.org/wiki/AT%26T_Corporation#Origins.

in businesses and affluent households to being a standard in American households.

Notably, the deployment process would have taken longer without legislative intervention since telephone investment strategies – like broadband deployment plans – prioritized densely populated areas. The Rural Electrification Act of 1949 provided federal loans for community-based organizations to help themselves, triggering a wave of electric and telephone cooperatives that connected unserved areas to telephone service in areas that incumbents would not serve.²⁴ That approach could radically change broadband outcomes today.

As telephone services became a vital tool, it was praised in strikingly similar terms to how broadband connectivity is perceived today. Telephones were recognized as a tool for job creation; furthering democracy; enabling grassroots organizing; bringing people closer together; supporting social and economic mobility; improving government functionalities; improving emergency response and healthcare capabilities; helping to improve public information and combat misinformation; and promoting innovation.²⁵ However, unlike broadband, telephone service was treated as a public utility immediately after its introduction.

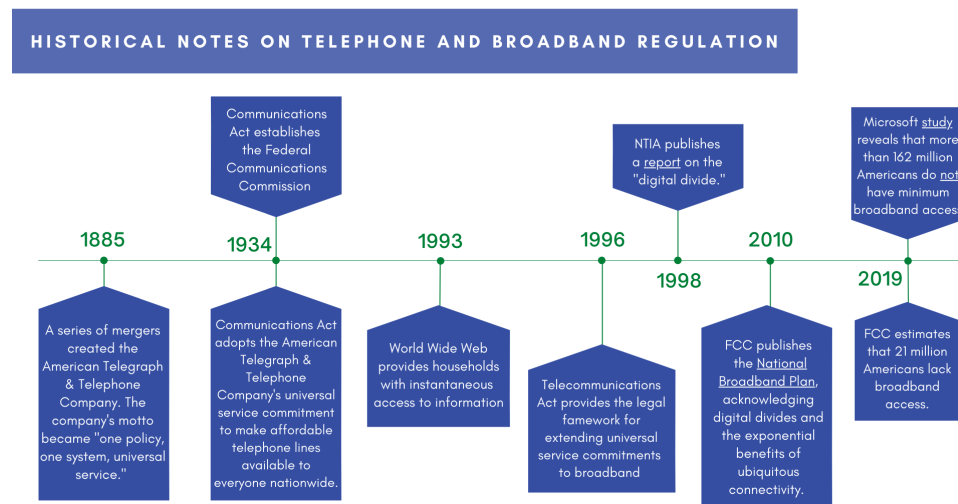


Figure 1.

24 NTCA–The Rural Broadband Association, "History of Rural Telecommunications," accessed April 1, 2022, <https://www.ntca.org/ruralischool/history-rural-telecommunications>.

25 "1870s – 1940s: Telephone," *Imagining the Internet | A History and Forecast* (Elon University), accessed April 1, 2022, <https://www.elon.edu/u/imagining/time-capsule/150-years/back-1870-1940/>.

Figure 1 details milestones in telephone and broadband regulations. The telephone market changed when the Communications Act of 1934 established the FCC to regulate the telephone, telegraph, radio, and television industries.²⁶ Today, the agency continues to regulate telephone service and has primary authority over broadband policymaking, deployment strategies, grant programs, and ensuring that every American has baseline access to technological innovation.²⁷ While there are a variety of government agencies that develop grant programs to help address broadband gaps, the FCC is the only agency with the ability to initiate rulemaking proceedings and enforcement actions to regulate the broadband marketplace.

For example, the Federal Trade Commission's jurisdiction over broadband is limited to competition and consumer protection issues like regulating deceptive marketing and billing practices.²⁸ The National Telecommunications and Information Administration ("NTIA") has an indispensable role in developing broadband grant programs and facilitating outreach between federal and state leaders, however, its actions to expand broadband are aimed at promoting economic growth, job creation, and improved education, health care, and public safety.²⁹ Neither NTIA nor the FTC is responsible for regulating broadband deployment or boosting marketplace competition that ultimately brings broadband services within reach for residents.

The FCC has supreme authority over federal broadband policy and strategies to address persistent access gaps. Historically, its primary focus on broadband access put the onus on state and local governments to fill in adoption gaps. The agency measures broadband gaps by estimating the number of households that do not have close proximity to digital infrastructure. Twice a year, facilities-based broadband providers are required to submit Form 477 data, self-reporting the number of

26 Robert Gobetz, "Communications Act of 1934," Encyclopedia Britannica, accessed April 1, 2022, <https://www.britannica.com/event/Communications-Act-of-1934>.

27 "What We Do," Federal Communications Commission, July 10, 2017, <https://www.fcc.gov/about-fcc/what-we-do>.

28 United States Government Accountability Office, "Current Broadband Measures Have Limitations, and New Measures Are Promising but Need Improvement," October 2009, <https://www.gao.gov/assets/gao-10-49.pdf>.

29 "Broadband," Broadband | National Telecommunications and Information Administration, accessed April 1, 2022, <https://www.ntia.doc.gov/category/broadband>.

households within a census block that subscribe or are able to subscribe to its service.³⁰ A provider counts an entire census block as served even if it is only able to provide service at one location.³¹ Considering that there is no maximum geographic size for census blocks, this calculation particularly disadvantages sparsely populated, hard-to-reach communities.

Households that cannot afford to subscribe or lack the tools to adopt are not captured in current federal data points. Another measurable limitation in determining which households have broadband connections is that the information collected is solely related to advertised speeds, not the actual speeds delivered. In effect, many households that are marked as served do not even have baseline access to the 25/3 Mbps broadband speeds, a federal benchmark that has not been updated since 2015.

Measuring the digital divide has proven to be a relentless challenge. Nevertheless, innovation and learned efficiencies have helped to drive down the costs of providing both wired and wireless broadband services. When the value of being able to get online has increased and the ramifications of being disconnected are more dire, there are fewer excuses for public policy failures for a solvable problem that contributes to inequality and stifles growth.³²

30 "Fixed Broadband Deployment Data from FCC Form 477," Federal Communications Commission, November 10, 2021, <https://www.fcc.gov/general/broadband-deployment-data-fcc-form-477>.

31 Ibid.

32 Ochillo, Francella, Research Interview with Jason Furman, Professor of the Practice of Economic Policy at Harvard Kennedy School and Professor of the Practice in the Department of Economics. Personal, April 6, 2022.

The Economic Impact of The Digital Divide

By conservative estimates, approximately 42 million households do not have internet connections at minimum broadband speeds.³³ When millions of Americans cannot reliably access digital opportunities, it has a far-reaching impact. As a foundational issue, struggles with high-speed connectivity impose barriers to information and curb the ability to communicate in public squares, many of which have exclusively transitioned online. Evidenced throughout the COVID-19 pandemic, disparities in access to information can have a devastating impact on households that struggle with reliable internet access while facing other socioeconomic disadvantages.

Figure 2 details the demographic makeup of the ten richest and poorest states and territories. Figure 3 documents which residents face digital inequities, not having a broadband subscription and/or computing device at home. Data shows that the populations who consistently lack access or the tools required to adopt are concentrated in the American Indian/Alaska Native, Black, and Hispanic/Latino columns.

Percentage of Households by Race/Ethnicity							
State / Territory	American Indian / Alaskan Native	Asian	Black	Hispanic / Latino	Native Hawaiian / Pacific Islander	Other or Two or More Race	White
District of Columbia	0%	4%	45%	4%	0%	9%	37%
Maryland	0%	6%	30%	4%	0%	9%	50%
New Jersey	0%	10%	13%	11%	0%	11%	55%
Massachusetts	0%	7%	7%	6%	0%	9%	71%
Hawaii	0%	38%	2%	3%	10%	26%	22%
Connecticut	0%	5%	11%	8%	0%	10%	66%
California	1%	15%	6%	20%	0%	22%	37%
New Hampshire	0%	3%	2%	2%	0%	4%	90%
Alaska	15%	6%	3%	4%	1%	11%	60%
Washington	1%	9%	4%	6%	1%	12%	67%
Tennessee	0%	2%	17%	3%	0%	4%	73%
Oklahoma	8%	2%	7%	6%	0%	12%	65%
Kentucky	0%	2%	8%	2%	0%	4%	84%
Alabama	1%	1%	27%	2%	0%	4%	65%
New Mexico	9%	2%	2%	33%	0%	17%	37%
Louisiana	1%	2%	32%	3%	0%	4%	58%
Arkansas	1%	2%	15%	4%	0%	7%	72%
West Virginia	0%	1%	4%	1%	0%	3%	92%
Mississippi	0%	1%	38%	2%	0%	3%	56%

Source: 2019 ACS Public Use Microdata Sample (PUMS) (5-year Estimates)
 Note: Household race is determined by the race of the primary householder. White category excludes households that are Hispanic/Latino. The Hispanic/Latino category includes only those that are white. Hispanic/Latino households that are non-white are categorized by their race (e.g., households that are Hispanic/Latino and Black are categorized as Black).

Figure 2.

³³ John Busby, Julia Tanberk, and Tyler Cooper, "BroadbandNow Estimates Availability for All 50 States; Confirms That More than 42 Million Americans Do Not Have Access to Broadband" (BroadbandNow, May 5, 2021), <https://broadbandnow.com/research/fcc-broadband-overreporting-by-state>.

Percentage of Households that Do Not Adopt Broadband at Home (Lack a Broadband Subscription and/or Device)							
State / Territory	American Indian / Alaskan Native	Asian	Black	Hispanic / Latino	Native Hawaiian / Pacific Islander	Other or Two or More Race	White
District of Columbia	59%	8%	39%	15%	71%	27%	5%
Maryland	26%	8%	26%	23%	24%	28%	16%
New Jersey	21%	7%	33%	29%	26%	32%	16%
Massachusetts	32%	12%	30%	35%	25%	36%	17%
Hawaii	24%	24%	11%	20%	40%	22%	13%
Connecticut	27%	9%	33%	35%	56%	37%	17%
California	30%	12%	30%	30%	22%	29%	14%
New Hampshire	10%	8%	27%	28%	10%	21%	17%
Alaska	51%	22%	16%	21%	39%	30%	17%
Washington	36%	12%	26%	29%	33%	28%	15%
Tennessee	40%	13%	45%	39%	28%	37%	27%
Oklahoma	44%	15%	46%	42%	52%	40%	29%
Kentucky	30%	12%	44%	37%	34%	40%	30%
Alabama	35%	15%	47%	40%	47%	42%	29%
New Mexico	60%	17%	31%	40%	19%	45%	20%
Louisiana	42%	19%	51%	39%	36%	37%	28%
Arkansas	47%	16%	52%	43%	63%	42%	32%
West Virginia	53%	14%	44%	30%	5%	36%	34%
Mississippi	54%	21%	53%	41%	82%	41%	32%

Source: 2019 ACS Public Use Microdata Sample (PUMS) (5-year Estimates)
Note: Household race is determined by the race of the primary householder. White category excludes households that are Hispanic/Latino. The Hispanic/Latino category includes only those that are white. Hispanic/Latino households that are non-white are categorized by their race (e.g., households that are Hispanic/Latino and Black are categorized as Black).

Figure 3.

Nationwide, Indigenous populations (including Alaskan Native, Native American, and Pacific Islander), Black/African American, and Hispanic/ Latino American households consistently have the lowest rates of broadband access and adoption. Since limited digital literacy and knowledge about data and technology may prevent some of the most disenfranchised households from being able to advocate for themselves, it is imperative that public policy interventions center on both the impact of disconnectedness and possibilities that could be unlocked with reliable high-speed connectivity.³⁴

Additionally, people living with disabilities cut across race, age, and income classifications, and may need additional devices to be able to use broadband connections.³⁵ Even though reliable, high-speed Internet connectivity could provide necessary accommodations for full participation in the workforce, people living with disabilities are oftentimes an afterthought in broadband program design and are frequently denied equal opportunities to work until the majority of the U.S. workforce was required to move online during the pandemic. Now that

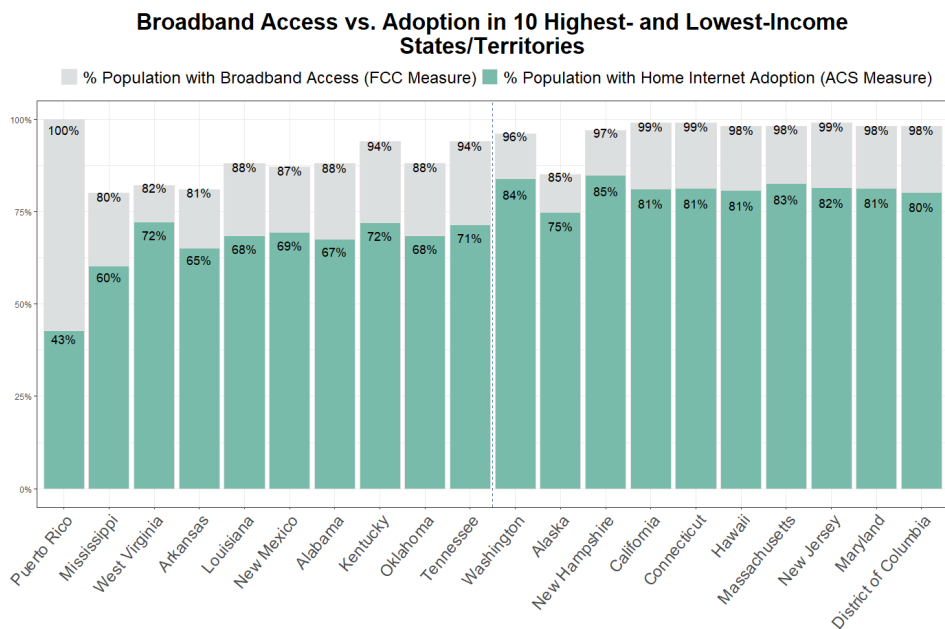
34 John Busby, Julia Tanberk, and Tyler Cooper, “BroadbandNow Estimates Availability for All 50 States; Confirms That More than 42 Million Americans Do Not Have Access to Broadband” (BroadbandNow, May 5, 2021), <https://broadbandnow.com/research/fcc-broadband-overreporting-by-state>.

35 John Busby, Julia Tanberk, and Tyler Cooper, “BroadbandNow Estimates Availability for All 50 States; Confirms That More than 42 Million Americans Do Not Have Access to Broadband” (BroadbandNow, May 5, 2021), <https://broadbandnow.com/research/fcc-broadband-overreporting-by-state>.

organizations are requiring employees to return to the office, the needs of people with disabilities are at risk of being ignored again. Proactive digital and economic inclusion strategies would foster independence, solidarity, and economic equity in previously implausible ways.

Digital Inclusion Is a Prerequisite for Economic Inclusion

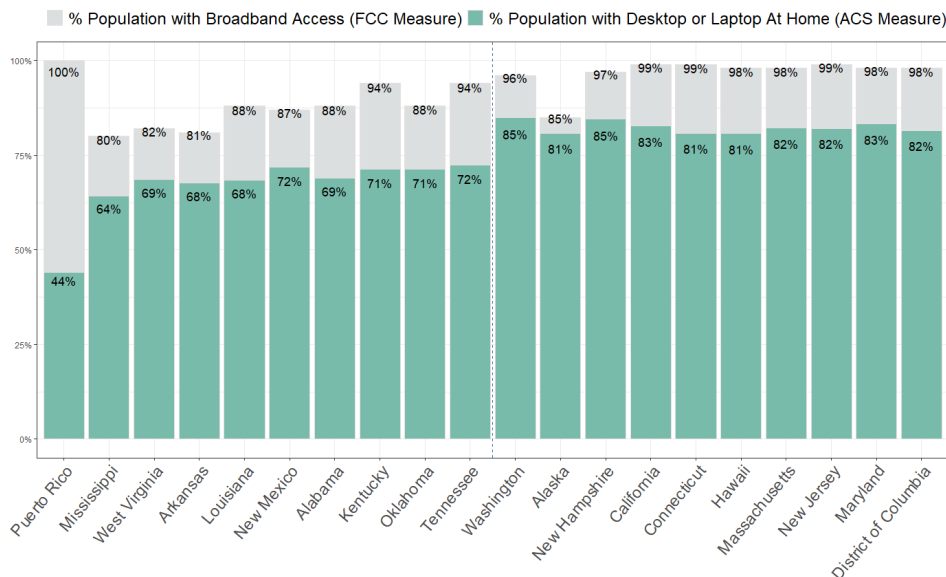
There is a direct correlation between low-income status and being locked out of the benefits of technology. Illustrated in Figures 4 and 5 below, high-income states generally benefit from widespread broadband access, high in-home broadband subscription rates, and ready access to computing devices, more so than low-income states. These residents have more expansive educational, workforce training, work from home and wellness opportunities and benefit from higher productivity statewide. Whereas residents in low-income states have lower median household incomes, lower adoption rates, and fewer remote work opportunities. Low-income states tend to have more digital deserts, areas where there is no internet access of any kind. For residents in these states, employment possibilities are largely restricted by their location. Being able to relocate for the possibility of higher wages may seem more aspirational than realistic.



Sources: FCC's Fourteenth Broadband Deployment Report (2021) & ACS 5-Year Estimates (2020). Notes: [1] FCC measure captures the percent of the population with access to fixed terrestrial 25/3 Mbps broadband. [2] ACS measure captures the percent of households reporting internet access at home (excluding those with cellular only).

Figure 4.

Broadband Access vs. Device Ownership in 10 Highest- and Lowest-Income States/Territories



Sources: FCC Broadband Deployment Report (2021) & ACS 5-Year Estimates (2020). Note: FCC measure captures the percent of the population with access to fixed terrestrial 25/3 Mbps broadband.

Figure 5.

According to Pew Research Center, “the digital lives of Americans with lower and higher incomes remain markedly different.”³⁶ Digital citizens – those with reliable high-speed connectivity, digital dexterity, and ready access to a computing device – are best equipped to contribute to and benefit from the knowledge-based economy with few geographic borders. Conversely, residents with marginal connectivity are more likely to have jobs with hourly wages and rely on manual labor for income.

Over 40% of residents with household incomes of less than \$30,000 per year do not have access to broadband or a computing device at home, a far cry from households that make over \$100,000 per year who have broadband connections, a computing device, and smartphone alternatives at home.³⁷ Reliable broadband connections are widespread in high-income households and drop precipitously in low-income households. In places like San Diego County, California, for instance, almost 97 percent of households earning at least \$75,000 per year had broadband subscriptions

36 Emily A. Vogels, “Digital Divide Persists Even as Americans with Lower Incomes Make Gains in Tech Adoption,” Pew Research Center, June 22, 2021, <https://www.pewresearch.org/fact-tank/2021/06/22/digital-divide-persists-even-as-americans-with-lower-incomes-make-gains-in-tech-adoption/>.

37 Ibid.

at home compared to only 70 percent of households earning less than \$20,000 per year.³⁸

Digital inequality in low- and middle-income households impact job opportunities and the ability to build net assets. In effect, those who start at low- or middle-incomes will rarely be able to catch up to those who start at high-incomes. Also, high-income earners often start at higher income, salaried positions and have more investment opportunities with higher risk tolerance, whereas low-income and middle-income earners have less disposable income and fewer borrowing opportunities, which are critical factors in building assets.

Figure 6 provides an illustration of what low-, middle-, and high-income employees would earn with a three percent annual raise spread over 40 years in the workforce. Imagine that the low-income worker starts at minimum wage, \$15 per hour, equal to around \$31,200 per year. The middle-income worker's \$72,800 per year salary breaks down to roughly \$35 per hour. Finally, the high-income graduate starts with a six-figure salary, at \$104,000 per year, which equals around \$50 per hour.

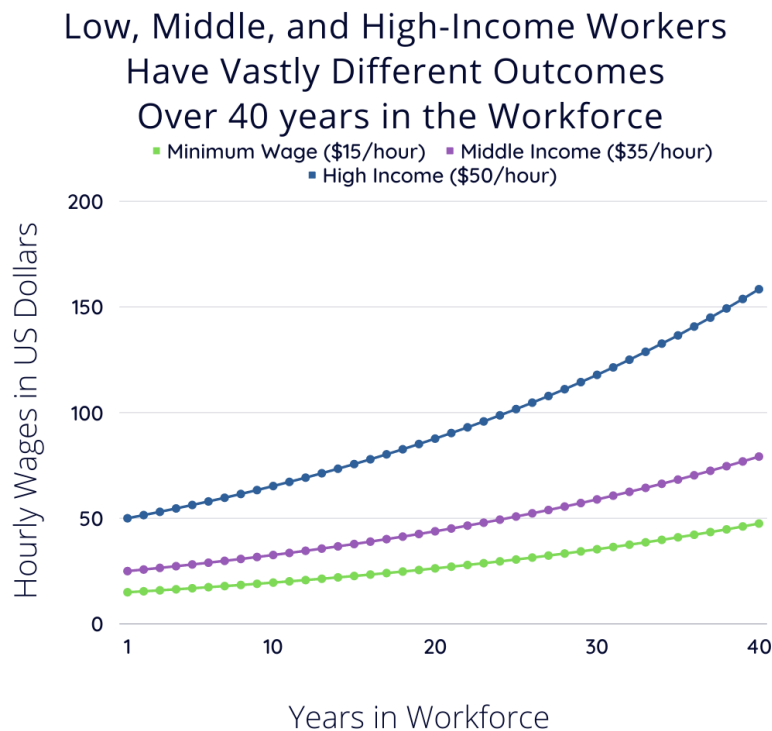


Figure 6.

38 San Diego Association of Governments, "Regional Digital Equity Strategy and Action Plan," December 2021, https://www.sandag.org/uploads/projectid/projectid_614_31195.pdf, 4.

The high-income earner gets farther away from the low and middle-income worker within the first ten years in the workforce and oftentimes enjoys more flexible work schedules and benefits that may not be available to low-income employees. Notably, the low- and middle-income workers will never be able to catch up with low to median wages without a change in skillset or considerable change net earnings, possibly due to multiple jobs. Limited disposable income will also limit investment opportunities for both low- and middle-income households. Another important note, low-income households frequently spend 30 to 40% of household income on rent. Those households are also less likely to have broadband subscriptions and computing devices at home.

Connectivity is an important input into educational and work opportunities, which are both critical for economic mobility.³⁹ As economic mobility has been stagnant or declining,⁴⁰ income inequality has steadily increased in the United States, more so than in peer countries such as Canada, France, Germany, Japan, and the United Kingdom.⁴¹ Upper-income families continue to accumulate wealth as middle and low-income families continue to experience steady decreases in net assets. According to Pew Research Center, between 1983 and 2016, upper-income families amassed “7.4 times as much wealth as middle-income families and 75 times as much wealth as lower-income families.”⁴²

39 Ochillo, Francella, Research Interview with Jason Furman, Professor of the Practice of Economic Policy at Harvard Kennedy School and Professor of the Practice in the Department of Economics. Personal, April 6, 2022.

40 Ibid.

41 Juliana Menasce Horowitz, Ruth Igielnik, and Rakesh Kochhar, “1. Trends in Income and Wealth Inequality,” Pew Research Center’s Social & Demographic Trends Project (Pew Research Center, January 9, 2020), <https://www.pewresearch.org/social-trends/2020/01/09/trends-in-income-and-wealth-inequality/#:~:text=The%20ratio%20increased%20in%20every,%2C%20an%20increase%20of%2039%25.&text=Not%20only%20is%20income%20inequality,than%20in%20other%20advanced%20economies>.

42 Ibid.

Broadband is Critical for Economic Mobility

At the top rungs of the income ladder, it is a powerful enabler. For those on the bottom, it ensures deprivation. The advantages and disadvantages of income have a generational impact on economic opportunities.⁴³ Children born into cycles of poverty will inherit, and likely pass on, reduced socioeconomic mobility.⁴⁴ The low broadband access and adoption rates associated with low-income households increase the probability of that outcome.

Generational wealth in the U.S. is also heavily influenced by race. White households still have approximately eight times the wealth of Blacks and five times that of Hispanics/Latinos.⁴⁵ White households tend to benefit from higher annual salaries and more expansive investment opportunities in contrast to their Black and Brown counterparts who are more likely to work at multiple jobs while facing other economic disadvantages.⁴⁶ More than 70% of White Americans experience homeownership,⁴⁷ one of the most significant wealth-building tools, surpassing the 44% of Black Americans and 48% of Hispanic/Latino Americans who are more likely to be denied home loans with equivalent credentials.⁴⁸

Ubiquitous broadband access and adoption helps to reduce income inequality and, ultimately, the separation of wealth by creating pathways for otherwise disenfranchised populations to find access to capital, workforce development opportunities, and financial inclusion in ways that they have historically been denied. To illustrate, for Americans who cannot work jobs that add to the cost of dependent care or those who

43 David Vandivier, "What Is the Great Gatsby Curve?," The White House of President Barack Obama (National Archives and Records Administration, June 11, 2013), <https://obamawhitehouse.archives.gov/blog/2013/06/11/what-great-gatsby-curve#:~:text=Summary%3A,ladder%20compared%20to%20their%20parents.>

44 Ibid.

45 Neil Bhutta et al., "Disparities in Wealth by Race and Ethnicity in the 2019 Survey of Consumer Finances," The Federal Reserve, September 28, 2020, <https://www.federalreserve.gov/econres/notes/feds-notes/disparities-in-wealth-by-race-and-ethnicity-in-the-2019-survey-of-consumer-finances-20200928.htm>.

46 Lyle Daly, "Study: Race and Personal Finance in America," The Ascent, October 15, 2020, <https://www.fool.com/the-ascent/research/study-race-personal-finance-america/>.

47 "Quarterly Residential Vacancies and Homeownership, Fourth Quarter 2021," February 2, 2022, <https://www.census.gov/housing/hvs/files/currenthvspress.pdf>.

48 Emmanuel Martinez and Lauren Kirchner, "The Secret Bias Hidden in Mortgage-Approval Algorithms," AP News (Associated Press, August 25, 2021), <https://apnews.com/article/lifestyle-technology-business-race-and-ethnicity-racial-injustice-b920d945a6a13db1e1aee44d91475205>.

would be limited by public transportation, reliable connectivity provides opportunities to work from home with unconventional schedules, rarely afforded to low and middle-income workers. Importantly, when over 70 percent of jobs in the U.S. require some sort of digital skills proficiency, digital citizenship provides career opportunities that marginal broadband access simply cannot.⁴⁹

Ripple Effect in Communities

When digital equity strategies are effectively deployed, communities benefit from a boost in economic efficiency, increased productivity and competition, and avoid costs associated with public service delivery.⁵⁰ They also have new opportunities to build on efficiencies and develop a more agile workforce that is prepared for a rapidly changing digital economy.

Municipalities across the country have drawn similar conclusions. For instance, New York City examined the potential economic impact of ubiquitous broadband and found that a strategy aimed at ensuring that all residents could reliably get online could trigger a \$49 billion increase in personal income and up to \$142 billion in incremental Gross City Product by 2045.⁵¹ Projecting the impact of expanding broadband to rural communities in Indiana, researchers concluded that for every dollar invested in broadband, almost four dollars were invested back into the economy.⁵² Similarly, in Hamilton County, Tennessee, analysis confirmed that widespread broadband access generated economic and social benefits that added up to \$1.3 billion to the economy with up to 5,200 new jobs, new investments, and increased tax revenue.⁵³ Universal broadband can lift up digitally disadvantaged households and redistribute the benefits throughout local economies.

49 Stephen Ezell, "Assessing the State of Digital Skills in the U.S. Economy," Information Technology and Innovation Foundation, November 29, 2021, <https://itif.org/publications/2021/11/29/assessing-state-digital-skills-us-economy#:~:text=In%20essence%2C%20over%2070%20percent,to%20high%2Dlevel%20digital%20skills>.

50 The Mayor's Office of the Chief Technology Officer, "The New York City Internet Master Plan," January 2020, https://www1.nyc.gov/assets/cto/downloads/internet-master-plan/NYC_IMP_1.7.20_FINAL-2.pdf, 6.

51 Ibid.

52 Alison Grant, Wallace E. Tyner, and Larry Deboer, "Estimation of the Net Benefits of Indiana Statewide Adoption of Rural Broadband" (Center for Regional Development, August 2018), <https://pcrd.purdue.edu/wp-content/uploads/2018/12/006-RPINSights-Indiana-Broadband-Study.pdf>.

53 Bento J. Lobo, "The Realized Value of Fiber Infrastructure in Hamilton County, Tennessee," June 18, 2015, <http://ftpcontent2.worldnow.com/wrcb/pdf/091515EPBFiberStudy.pdf>.

Likewise, digital inequities can put a drag on local economies. Just as a health insurance network may increase premiums to offset the costs of high-risk participants, some of the costs associated with disconnectedness are also spread among connected populations within the same community.⁵⁴ For instance, there is a household and community impact when some residents lack telehealth capabilities, which also creates a domino effect of unequal access to preventative care, limitations on follow-up treatment, and higher travel costs. In schools, the cost of the digital divide cannot be contained to students who do not have the requisite technology to complete assignments at home. Homework gaps put a toll on well-connected students, teachers, and administrators in the form of reduced academic rigor or low standardized testing scores. Governments cannot be shielded from the impact either. Public service delivery is more expensive per capita in areas with low broadband access and adoption when the expense of public awareness campaigns and low program participation rates increase the administrative costs.

Trends in the Ten Richest and Ten Poorest States

Ubiquitous broadband access and adoption can add resilience to state economies in the same way that it does a household's income. Chiefly, high connectivity rates increase tax revenues and generate cost savings.⁵⁵ Both are critical for improving public services. Widespread broadband also attracts new investments that help ward off population loss.

Looking at the ten highest and ten lowest median-income states, certain trends were impossible to ignore. For example, Figure 7 illustrates that high-income states/territories on average have more residents with connections to home internet. In high-income states like Connecticut, Massachusetts, and New Hampshire, where median household incomes are around \$80,000, more than 80% of residents have access to internet connections at home. By comparison, in low-income states like

54 Seung Min Kim, "Study: Insured Pay 'Hidden Tax' for Uninsured Health Care," ABC News (ABC News Network, May 27, 2009), <https://abcnews.go.com/Business/story?id=7693848&page=1>.

55 Alison Grant, Wallace E. Tyner, and Larry Deboer, "Estimation of the Net Benefits of Indiana Statewide Adoption of Rural Broadband" (Center for Regional Development, August 2018), <https://pcrd.purdue.edu/wp-content/uploads/2018/12/006-RPINsights-Indiana-Broadband-Study.pdf>.

Mississippi, Arkansas, and New Mexico, median household incomes are roughly \$50,000, and only about 60-70% of residents have reliable internet connections at home. In Puerto Rico, where the median household income is roughly \$21,000, just 43% of residents have at-home broadband subscriptions.

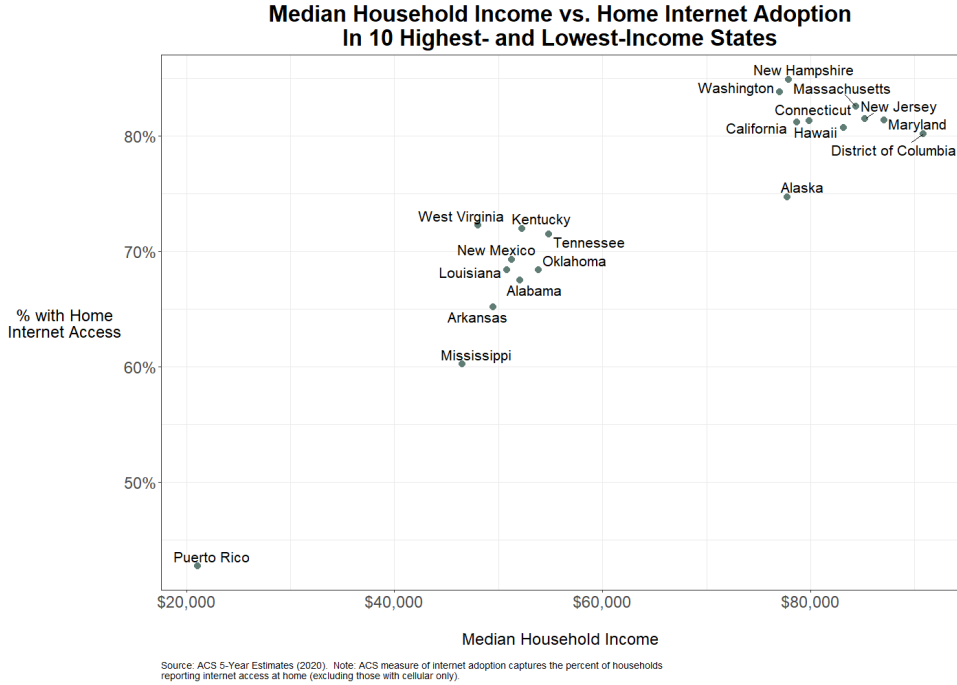


Figure 7.

Although federal and state broadband funding programs invest heavily in rural areas, the digital divide in Washington, D.C. (“D.C.”) is proof that digital inequities are a serious problem in urban areas. D.C. has the highest median income in the country at over \$91,000 per household and extensive broadband infrastructure. According to the FCC, 98% of its residents have broadband access. However, these statistics mask staggering disparities.

In particular, the median annual household income for Black households in D.C. is less than one-third of the median annual household income for white households, \$48,515 versus \$147,488 respectively. American Community Survey (“ACS”) estimates that the median rent is \$1,607 a month. Therefore, the median Black household would have to spend up to 40% of its income on housing costs alone to afford the average apartment

costs. Adding to that, the average Internet plan in D.C. costs about \$70 a month, an amount that is likely out of reach for low-income households that are already cost-burdened by housing.⁵⁶ Unsurprisingly, data shows that 39% of Black households in D.C. lack broadband adoption at home compared to just 5% of white households.

Being on the wrong side of the digital divide restricts economic mobility, a trend that is replicated in other states and territories. In D.C., working-age adults without broadband adoption are 2.3 times more likely to be unemployed and 3.1 times more likely to not be in the labor force compared to working-age adults with broadband adoption. 65% of working-age adults without broadband adoption have obtained only a high school diploma or less, compared to just 14% of adults with broadband adoption. As new jobs increasingly require digital skills, the economic disparities between those with and without broadband adoption are likely to widen over time. The intersection of disconnectedness, poverty, low educational attainment, and joblessness imposes a broader economic cost in Maryland and Virginia, areas that are adjacent to D.C. which share in the benefits and burdens of its economy.

Mississippi, the lowest-median income and least-connected state, provides another illustration of how poverty interferes with connectedness. According to the FCC, 80% of Mississippi residents have minimum access to broadband including 63% of residents in rural areas and 97% of residents in urban areas. ACS data shows that 41% of the population statewide is unable to adopt broadband at home. Broadband access and speeds are particularly low in the Mississippi Delta where the local economy heavily relies on farming.⁵⁷ The majority of residents live below the poverty line and face well-documented struggles with access to healthcare.

56 Will Schick, "DC Faces Challenges in Trying to Overcome Digital Divide, Expand Internet Access," TheDCLine.org, November 4, 2021, <https://thedcline.org/2021/11/04/dc-faces-challenges-in-trying-to-overcome-digital-divide-expand-internet-access/>.

57 "Mississippi Agriculture Lacks Broadband Access," Mississippi State University Extension, accessed April 1, 2022, <http://extension.msstate.edu/publications/mississippi-agriculture-lacks-broadband-access>.

During COVID-19, students who did not have internet access could not go to school at all. A teacher provided a haunting account of the learning loss caused by digital inequities in her hometown:

When it rains in my small Delta town, all of our power, and thus all of our internet, goes out. So when it rained this spring, I could not do my work. Students couldn't ask me for help and I couldn't respond to them. We were only a few miles apart but totally isolated from each other. If we had hot spots or adequate technology, we could've communicated. I could've been teaching.⁵⁸

Mississippi's digital divide did not only wreak havoc on education. Gaps in broadband access put Mississippi farmers at a severe economic disadvantage.⁵⁹ For example, digital inequities limit their ability to use new technologies that improve yield and profitability. Additionally, farming households grapple with disparities related to learning loss, banking, and healthcare much like residents in more densely populated areas.

As one of the poorest and most disconnected states, New Mexico has been confronted with challenges similar to those in Mississippi. Per ACS data, about 53% of households in New Mexico have annual incomes of less than \$35,000 per household. Approximately 35% of New Mexican households lack an internet subscription or device and are unable to adopt broadband at home. The digital divide in this state showcases acute disadvantages that rural, Native American, and Hispanic/Latino households encounter nationwide.

According to the FCC, 58% of New Mexico's rural population lives on a census block where at least one household can subscribe to the internet compared to 97% of the urban population. ACS data reveals that around 60% of American Indian/Alaskan Native households and 40% of Hispanic/Latino households lack broadband adoption, compared to 20% of white households. Low adoption rates cannot be separated from the fact that at least 41% of Native American and 30% of Hispanic/Latino children live in poverty.⁶⁰

58 Alexandra Melnick, "We must close the digital divide for Mississippi's students," August 3, 2020, <https://www.clarionledger.com/story/opinion/2020/08/03/opinion-close-digital-divide-mississippi/5558020002/>.

59 Alexandra Melnick, "We must close the digital divide for Mississippi's students," Clarion Ledger, August 3, 2020, <https://www.clarionledger.com/story/opinion/2020/08/03/opinion-close-digital-divide-mississippi/5558020002/>.

60 Russell Contreras, "New Mexico back to 49th in nation in child poverty," (Indian Country Today, January 16, 2020), <https://indiancountrytoday.com/news/new-mexico-back-to-49th-in-nation-in-child-poverty>.

In all three areas, D.C. Mississippi, and New Mexico, the data reveal a compelling story about the color and condition of the digital divide. In urban and rural areas, minority populations tend to lag behind their white counterparts. One commonality among populations on the wrong side of the digital divide is poverty. Poverty tends to be at the root of the problem for households that live in close proximity to digital infrastructure but cannot afford to maintain a subscription every month of the year. Their subscription status may be intermittent. It is also worth noting that, during the pandemic, financial strain made Black and Brown households more likely to cut their broadband subscriptions than their White counterparts.⁶¹

Lost Productivity and Wealth Nationwide

Embedded in U.S. Census data is a call to action on closing the digital divide. The next decade is expected to be transformative as the U.S. population ages and becomes more racially and ethnically diverse.⁶² In fact, by 2030, one in five residents will be over 65 years old.⁶³ Seniors with incomes below \$25,000 are ten times more likely than the general population to lack a broadband subscription, computing device, or digital skills.⁶⁴ Many live on fixed incomes, having to balance the cost of housing, food, medical expenses, and expensive internet subscriptions needed to connect to family or access online health appointments.⁶⁵ Within the senior population, those who are Black and Hispanic/Latino are more than 2.5 and 3.3 times more likely, respectively, to be locked out of digital opportunities.⁶⁶

61 Emily Vogels et al., “53% Of Americans Say the Internet Has Been Essential during the COVID-19 Outbreak” (Pew Research Center, April 30, 2020), https://www.pewresearch.org/internet/wp-content/uploads/sites/9/2020/04/PI_2020.04.30_COVID-internet_REPORT.pdf.

62 “United States Census Bureau,” United States Census Bureau, March 13, 2018, <https://www.census.gov/newsroom/press-releases/2018/cb18-41-population-projections.html>.

63 Jonathan Vespa, Lauren Medina, and David M. Armstrong, “Demographic Turning Points for the United States: Population Projections for 2020 to 2060” (United States Census Bureau, February 2020), <https://www.census.gov/content/dam/Census/library/publications/2020/demo/p25-1144.pdf>, 4.

64 “AGINGconnected: Exposing the Hidden Connectivity Crisis for Older Adults,” Humana Foundation and Older Adults Technology Services From AARP, December 2020, https://agingconnected.org/wp-content/uploads/2021/05/Aging-Connected_Exposing-the-Hidden-Connectivity-Crisis-for-Older-Adults.pdf.

65 San Diego Association of Governments, “Regional Digital Equity Strategy and Action Plan,” December 2021, https://www.sandag.org/uploads/projectid/projectid_614_31195.pdf, 4.

66 Humana Foundation and Older Adults Technology Services From AARP, “Aging Connected: Exposing the Hidden Connectivity Crisis for Older Adults,” December 2020, https://agingconnected.org/wp-content/uploads/2021/05/Aging-Connected_Exposing-the-Hidden-Connectivity-Crisis-for-Older-Adults.pdf.

The color of the digital divide matters when, by 2045, Census data indicates that White populations will be outnumbered by 24.6 percent of Hispanics/Latinos, 13.1 percent of African Americans, 7.9 percent of Asian Americans, and 3.8 percent multiracial populations who will surpass them in the majority.⁶⁷ Digital inequities that have a stranglehold on households that are predominately Indigenous, Black, and Brown will become even more pronounced when a projected 62 percent of Hispanics/Latinos and 76 percent of African Americans are expected to be shut out of or underprepared for 86 percent of the jobs in the US.⁶⁸ Figure 8 enumerates the aggregate impact.⁶⁹

Deutsche Bank analysis projects that 62% of Hispanic/Latino Americans and 76% of Black/African Americans could be unprepared for 86% of the jobs in the US by 2045.
That could put over 59.4 million Hispanic/Latino Americans and 19.3 million Black/African Americans at a disadvantage.

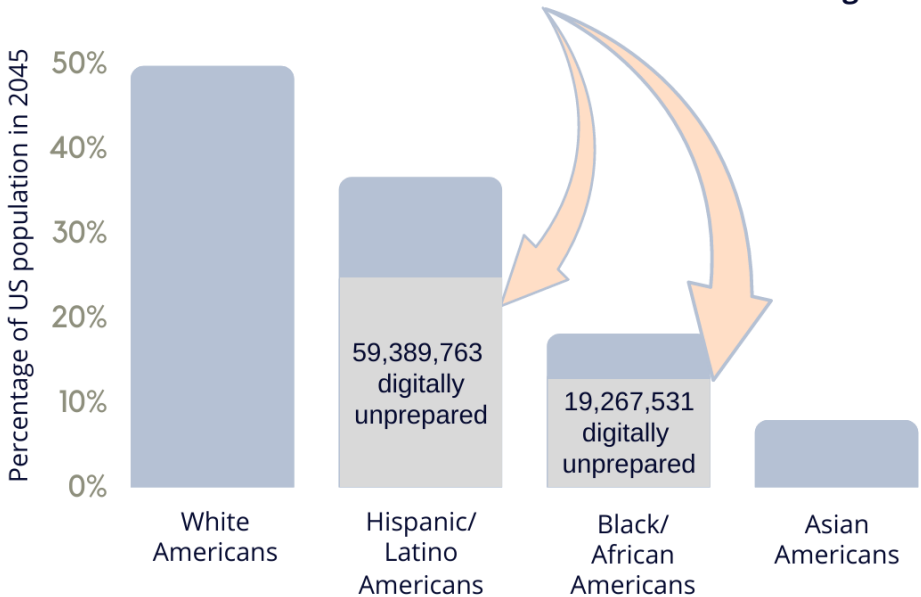


Figure 8.

67 William H. Frey, “The US Will Become ‘Minority White’ in 2045, Census Projects,” Brookings, March 14, 2022, <https://www.brookings.edu/blog/the-avenue/2018/03/14/the-us-will-become-minority-white-in-2045-census-projects/>.

68 Apjit Walia, “America’s Racial Gap & Big Tech’s Closing Window,” Deutsche Bank, September 8, 2020, https://www.db.com/news/detail/20200908-new-report-from-deutsche-bank-technology-strategist-apjit-walia-reveals-americas-racial-gap-in-big-tech?language_id=1.

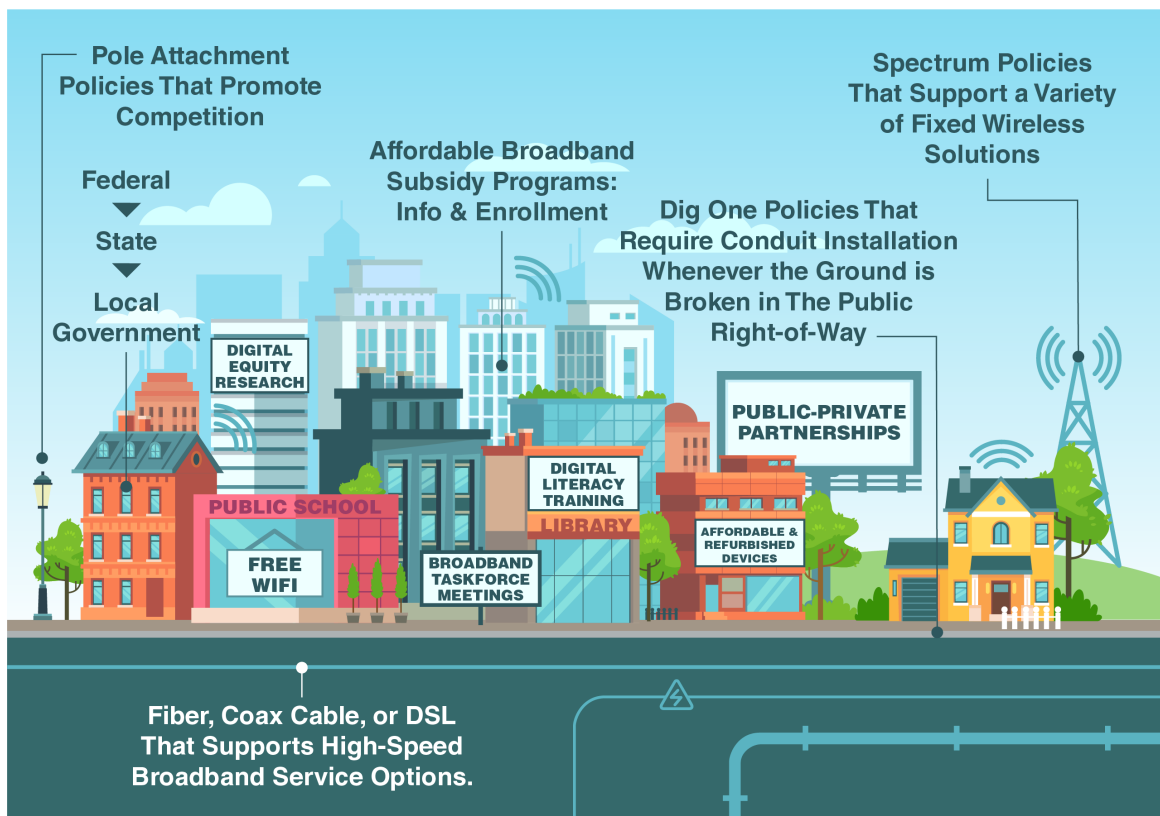
69 Ibid

Recommendations and Potential Solutions

As MIT Professor Daron Acemoglu stated, “Technology is what we create with our collective knowledge, and the technological choices we make can have huge distributional consequences[.]”⁷⁰ Piecemeal public policy responses to known broadband deficiencies have been costly for the most disadvantaged households and overlooked communities. Those who are the last line to have reliable access to technology are the least likely to get into the laboratories where technology is made or the fora where public policies are born.

The digital divide is a manmade construct almost 30 years in the making that is becoming more and more complex. It will take time, varied investments, and unconventional thinking to unseat exclusionary practices that allowed digital inequality to bloom. Regulatory interventions could provide lasting remedies if focused on consumers and aimed squarely at ubiquitous connectivity for every person in the U.S.

70 Hearing on Automation and Economic Disparity, Before the House Select Committee on Economic Disparity and Fairness in Growth, 117 Cong, (2021) (Daron Acemoglu, Institute Professor at the Massachusetts Institute of Technology), <https://fairgrowth.house.gov/sites/democrats.fairgrowth.house.gov/files/documents/Acemoglu%20Testimony.pdf>.



- Federal Government:** Federal entities must develop consumer-focused policies, set competitive speed benchmarks, and improve broadband mapping. Grant programs should include accountability measures that prevent digital discrimination and support a state and municipality’s ability to choose connectivity solutions that fit state and local needs.
- State Governments:** State laws must remove barriers to community-based broadband service models, require transparent deliberation processes to ensure that funding is distributed equitably statewide, and support partnerships that address persistent broadband gaps. State broadband officers should provide planning support, create learning opportunities, and use communications strategies that strengthen state and local broadband programs
- Local Governments:** Local officials must be able to articulate connectivity needs and create dig once, permitting, pole attachment, and right of way policies that promote equitable broadband deployment. Community engagement, public-private partnerships, and interagency government programs are required to support skills training, device distribution, WiFi access points, broadband subsidy program information, etc.

Figure 9. Digitally Equitable Ecosystem.

1. Broadband policies must be laser-focused on enabling all U.S. residents to benefit from high-speed technologies.

There are economic benefits associated with pursuing digitally equitable outcomes that would also improve the effectiveness of federal, state, and local broadband investments. Figure 9 shows how the directives from one level of government underpin outcomes from another.

At the federal level, broadband policies have historically focused on connecting more miles than people.⁷¹ Instead, federal policy should center on consumer needs by promoting a competitive broadband marketplace, booming with high-quality service options. Otherwise, when over one-third of American households are in monopoly markets and another third are in duopoly markets with only two options for a provider, the price of broadband subscriptions will remain artificially high.⁷²

Programs like the FCC's Lifeline⁷³ and the Affordable Connectivity Program⁷⁴ will help offset the cost of broadband subscriptions for low-income households. However, those subsidies will not eliminate the regulatory and marketplace conditions that perpetuate digital inequality. Specifically, federal programs are too often based on the assumption that incentivizing providers is the only way to achieve universal broadband goals. That approach has proven itself to be inadequate due to obvious tensions between how a company versus community assesses its return on investment. A community enjoys economic and social returns with a highly connected population whereas a company primarily justifies its investments by the direct returns that can be recorded on its balance sheet.

71 Ochillo, Francella, Research Interview with Bhaskar Chakravorti, Dean of Global Business at The Fletcher School at Tufts University and Founding Executive Director of Fletcher's Institute for Business in the Global Context. Personal, April 1, 2022.

72 Sallet, Jon. "Too Big to Be Left Unnoticed: America's Uncompetitive Broadband Market." Benton Foundation, December 5, 2019. <https://www.benton.org/blog/too-big-be-left-unnoticed-americas-uncompetitive-broadband-market>.

73 "Lifeline Program for Low-Income Consumers." Federal Communications Commission. Accessed April 5, 2022. <https://www.fcc.gov/general/lifeline-program-low-income-consumers>.

74 "Affordable Connectivity Program." Federal Communications Commission. Accessed April 5, 2022. <https://www.fcc.gov/acp>.

Digitally equitable outcomes also depend on state laws and investment strategies that support connectivity in populations of all sizes. Some states have been tempted to focus on rural areas at the expense of urban and suburban areas, for example, but that method routinely disappoints. In fact, billions of dollars in federal and state dollars have been devoted to connecting the 4.6 million residents in the farthest parts of rural America when there are close to 13.6 million Americans living in urban areas with broadband that they cannot afford.⁷⁵ Favoring rural deployment has yet to eliminate the problem nationwide and could have a similar result in states. Instead, a needs-based approach could improve the value of public investments.

States can also be helpful by investing in middle-mile infrastructure that supports high-speed connectivity, helping communities that are in desperate need of upgrades and basic options. Importantly, in sparsely populated areas, especially those where providers have determined are not profitable to serve, states should not prevent communities from creating broadband solutions for themselves. Unfortunately, 18 states still prohibit or effectively restrict a municipality's ability to provide broadband service through laws that were primarily designed to defend the market share of incumbent broadband providers.⁷⁶ Even if there were a legitimate reason to restrict community-based solutions more than a decade ago when many of the state prohibitions were crafted, leaving those restrictions in place now thwarts many state-level objectives to address deep-rooted digital divides.

At the local level, resources found above and below ground can change connectivity options. At a minimum, communities need robust fiber, coax cable, digital subscriber lines, and fixed wireless options complemented by emerging technologies that support high-speed connectivity. Some areas have infrastructure that is in desperate need of upgrades. When local governments proactively tailor dig once policies that require the installation of fiber or conduit whenever the ground is broken in the public right-of-way, implement rights of way and permitting policies that support efficient deployment, and create pole attachment policies aimed at

75 Eduardo Porter, "A Rural-Urban Broadband Divide, but Not the One You Think Of," *New York Times*, June 2, 2021, <https://www.nytimes.com/2021/06/01/business/rural-urban-broadband-biden.html>.

76 Tyler Cooper, "Municipal Broadband Is Restricted in 18 States Across the U.S. in 2021." *BroadbandNow*, December 1, 2021, <https://broadbandnow.com/report/municipal-broadband-roadblocks/>.

promoting competition, those kinds of actions expedite broadband options for households and businesses.

Within the community, public and private investments paired with community-based partnerships provide critical resources to address affordability, support skills training for increasing benchmarks of digital literacy, and ensure reliable access to computing devices. The human impact of successful partnerships can be profound. For the one in five seniors that are unable to participate in telehealth programs or the 63 million unbanked or underbanked Americans, technology can change economic outcomes and unlock wellness options that do not otherwise exist. It also provides community-building tools and platforms for storytelling, affording disparately impacted populations with pathways for justice and accountability.

2. A binary measurement of who does and does not have broadband access will never be able to capture the contours of the digital divide.

Connectedness should be viewed on a spectrum that accounts for a combination of factors including access to high-speed connectivity, digital dexterity, and ready access to computing devices. Notably, universal broadband access goals may provide a pathway to the bottom rungs of the digital economy. However, Figure 10 illustrates why access alone is woefully inadequate. The social rewards and economic freedom associated with digital citizenship are unlocked when a person is no longer limited to being a consumer but can get online to contribute to a digital economy.

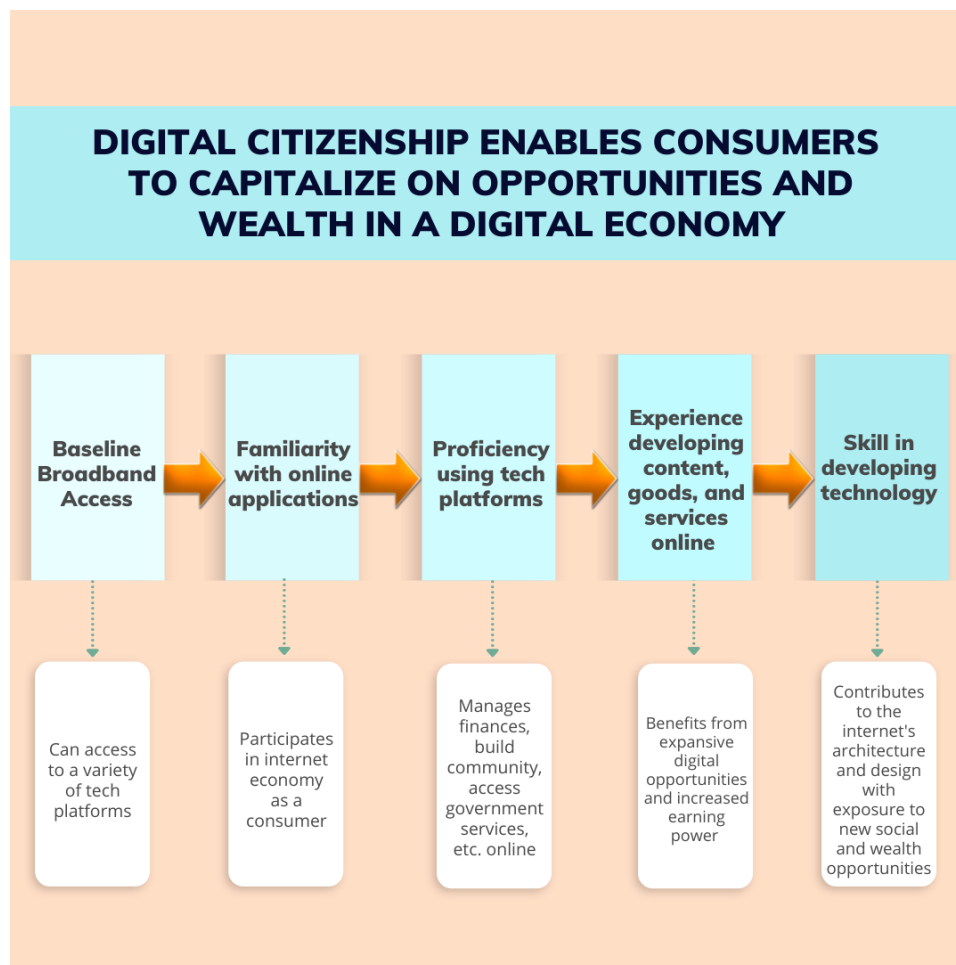


Figure 10.

3. Income inequality is made worse by continual gaps in broadband access and adoption.

For decades, broadband deployment is governed by supply and demand principles. More affluent communities are universally the first to get access and most adept at using technologies. Communities with the least resources are among the last in line to adopt. This dynamic introduces a compound effect that stifles economic growth. In essence, reliable Internet access and high digital proficiency help the rich get richer, whereas digital inequities replicate and exacerbate disadvantages for the poor.⁷⁷

⁷⁷ "Trendline Study on Electronic Access By Households: 1984-1998," Falling through the net: Appendix (National Telecommunications and Information Administration, July 1999), <https://www.ntia.doc.gov/legacy/ntiahome/fttn99/appendix.html>.

Consider the fact that Indigenous, African American, and Hispanic/Latino workers are significantly underrepresented in high-pay, high-tech fields.⁷⁸ They tend to have less flexible work environments when barriers to stable internet connections, digital skills, and computing devices limit opportunities to work from home and are more likely to rely on hourly employment than their White counterparts.⁷⁹ At the same time, automation has accelerated economic disparities over the last 40 years, contributing to task displacement and plateaued wages for those at the bottom of the income distribution ladder.⁸⁰ So while people of color tend to be well-represented in low-wage gig economy jobs, they continue to be excluded from the high-skilled tech jobs with concentrations of wealth. Using a digitally equitable approach to digital access, workforce development, and financial inclusion would increase their earning power and prospects for inter-generational wealth instead of creating unnecessary vulnerabilities.

4. Longitudinal studies on the cost of digital inequities would not only help to improve public policy solutions but would also provide essential documentation of why digital citizenship is a determinant of social and economic wellness.

Internet access is a requirement for securing housing, gaining access to healthcare, obtaining an education, and increasing income – basic necessities. Access to public services or emergency relief almost uniformly requires an email address. In the midst of a global pandemic, millions of people disparately affected by COVID were unable to get online to schedule appointments, obtain vaccination information, or access relief programs.

78 “Digital Injustice: Disparities in Digital Access across the US and How They Disproportionately Hurt the Black and Latinx Communities,” Digital Planet, accessed April 2, 2022, <https://sites.tufts.edu/digitalplanet/digital-injustice-covid19/>.

79 Ibid.

80 Hearing on Automation and Economic Disparity, Before the House Select Committee on Economic Disparity and Fairness in Growth, 117 Cong, (2021) (Daron Acemoglu, Institute Professor at the Massachusetts Institute of Technology), <https://fairgrowth.house.gov/sites/democrats.fairgrowth.house.gov/files/documents/Acemoglu%20Testimony.pdf>.

Undeniably, digital poverty can interfere with rightful access to social and public services, compromising health and wellness outcomes. When everyday tasks that call for reliable internet access can easily be complicated by digital inequities, policymakers need analysis on the shortterm as well as long-term consequences of disconnectedness in order to exact public policy solutions. Knowing that residents with limited to no reliable connectivity options have limited earning power, face heightened obstacles to building assets, and pay higher prices for a range of goods and services are critical insights for regulatory bodies and policymaking proceedings.⁸¹ Additionally, in the age of technology, those who cannot access the public square online have limited political clout and are easily overlooked.⁸² That should be taken into consideration before lawmakers and policymakers assess feedback loops and craft public policy remedies

5. The societal benefits of digital equity investments include those that can be quantified on a balance sheet and many that cannot.

In highly connected communities, the benefits are shared, even if some residents choose not to get online. For instance, when a Trader Joe's or Whole Foods moves into a community, homeowners nearby benefit from an immediate and significant increase in home value even if they never enter the store.⁸³ Similarly, when an Amazon warehouse takes up residence in a community, the announcement alone can bring new jobs, people, and tax revenues that can revitalize a community without a single person in that neighborhood having an Amazon subscription.⁸⁴ Even though many members of those communities may become patrons, the entire

81 Alison Grant, Wallace E. Tyner, and Larry Deboer, "Estimation of the Net Benefits of Indiana Statewide Adoption of Rural Broadband" (Center for Regional Development, August 2018), <https://pcrd.purdue.edu/wp-content/uploads/2018/12/006-RPINsights-Indiana-Broadband-Study.pdf>.

82 Gokhale, Soniya. The Digital Divide, Misinformation & Government: A Conversation with Author, Professor & Dean of Global Business at The Fletcher School at Tufts University & Founding Executive Director of Fletcher's Institute for Business in the Global Context Bhaskar Chakravorti Ph.D. Other. A Desi Woman Podcast, December 8, 2021. <https://adesiwoman.com/podcast/the-digital-divide-misinformation-government-a-conversation-with-author-professor-dean-of-global-business-at-the-fletcher-school-at-tufts-university-founding-executive-director-of-fletchers/>.

83 Natalie Campisi, "If You're Buying a Home, Pay Attention to Which Grocery Stores Are Nearby," The Philadelphia Inquirer, August 31, 2019, <https://www.inquirer.com/real-estate/housing/trader-joes-return-on-investment-real-estate-attom-data-20190831.html&outputType=app-web-view>.

84 Kelly Byer, "What Happens When Amazon Moves into Your Small Town?," GovTech, October 15, 2021, <https://www.govtech.com/news/what-happens-when-amazon-moves-into-your-small-town>.

community benefits from having high employment rates and additional tax revenues that can ultimately be used to enhance public services while reducing social service burdens.⁸⁵

Ubiquitous broadband has a similar impact, even if some households do not adopt. The presence and affordability of high-speed Internet access helps to boost small business development, job opportunities, competitive wages, consumer spending, and wellness care options. Those are critical features of a durable economy and strong workforce.

6. The U.S. has a long history of investing in technology to boost economic growth and mitigate harm.

Investments in pharmaceutical research and development illustrate why long-term investments in digital equity are a good use of public funds. Over the last 90 years, the U.S. has invested over \$900 billion into research and development in what is now known as the pharmaceutical and biotechnology sectors.⁸⁶ Those investments are intended to develop remedies for disadvantaged populations, banking on the fact that when sick people have reliable access to medicine, everyone in society benefits from their wellness and the costs savings associated with care. On average, a new drug costs up to two billion dollars and up to ten years to develop.⁸⁷ During that time, the research company may not recoup a single dollar from its investment, yet receives substantial government support via taxpayer dollars without a guarantee that the proposed drug will be approved for distribution.⁸⁸

85 Laura Arrillaga-Andreessen and David Hoyt, “An Introduction to Social Return on Investment,” Stanford Graduate School of Business, 2003, <https://www.gsb.stanford.edu/faculty-research/case-studies/introduction-social-return-investment>.

86 Mariana Mazzucato, “Op-Ed: How taxpayers prop up Big Pharma, and how to cap that,” Los Angeles Times, October 27, 2015. <https://www.latimes.com/opinion/op-ed/la-oe-1027-mazzucato-big-pharma-prices-20151027-story.html>.

87 “Research and Development in the Pharmaceutical Industry,” Congressional Budget Office, April 2021, <https://www.cbo.gov/publication/57126#:~:text=In%202019%2C%20the%20pharmaceutical%20industry,per%20year%20in%20the%201980s>.

88 Abbey Meller and Hauwa Ahmed. “How Big Pharma Reaps Profits While Hurting Everyday Americans” Center for American Progress, May 30, 2019, <https://www.americanprogress.org/article/big-pharma-reaps-profits-hurting-everyday-americans/>.

Here, there is irrefutable proof that investing in digital equity supports economic resilience, creates wealth opportunities, and boosts competitiveness nationwide for households, businesses, and governments in innumerable ways. Even FCC expert analysis asserts that “the public benefits of broadband could grow exponentially in the coming decades, as the nation is just beginning to realize the potential innovation and productivity gains[.]”⁸⁹ If the U.S. were to invest in addressing the digital divide in amounts that rivaled the billions that it spends on pharmaceutical research and development, it could drastically reduce digital inequality and simultaneously diversify who creates and benefits from technology in inconceivable ways. Naturally, those investments would be even more powerful if coupled with public policies that put consumers’ needs first.

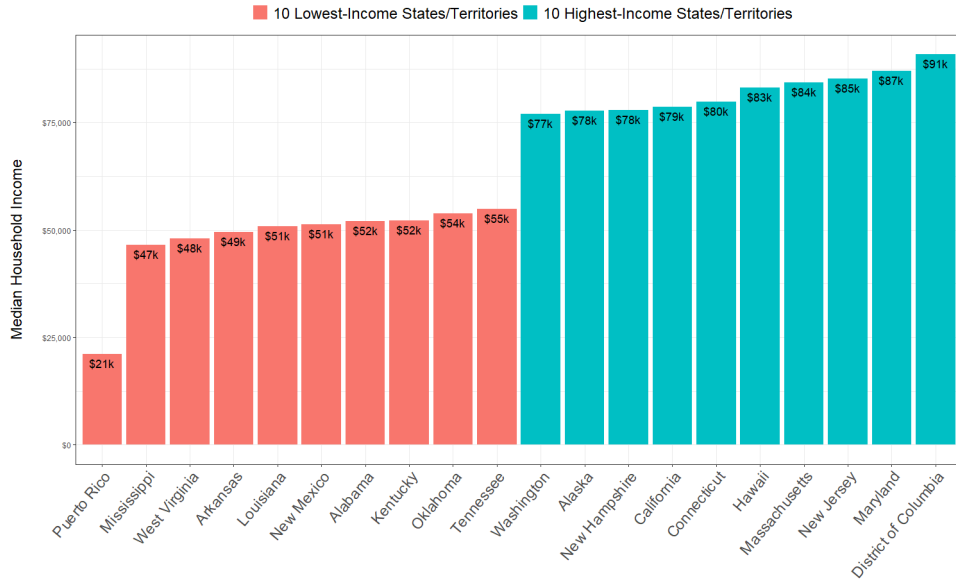
89 “Connecting America: The National Broadband Plan” Federal Communications Commission, March 17, 2010, <https://transition.fcc.gov/national-broadband-plan/national-broadband-plan.pdf>.

Conclusion

The digital divide is a dynamic problem that is increasingly complex as it multiplies disadvantage. Societal goals such as improving diversity in tech, removing the bias out of artificial intelligence, building tech platforms that combat misinformation, and ensuring that every community is prepared for the rapidly changing pace of technology require a highly-connected population and people who are prepared to build digital infrastructure that will benefit generations to come. Poor investments, outdated policies, and political considerations that continue to undermine that promise can be changed. There is no better time than now to create a digitally equitable ecosystem that supports the right of every person to be able to fully participate in a digital society.

Appendix

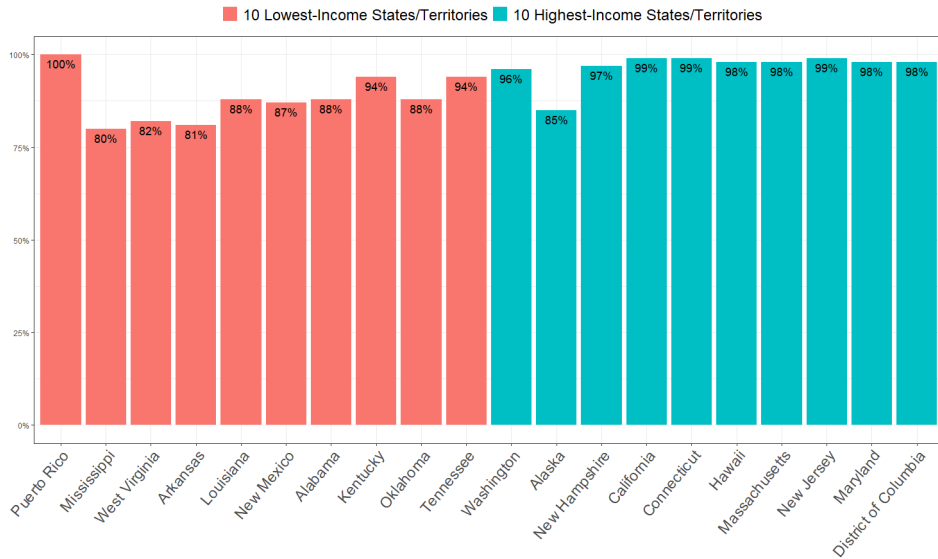
Median Household Income in 10 Lowest- and Highest-Income States/Territories



Source: 2020 ACS 5-year Estimates.

Appendix A.

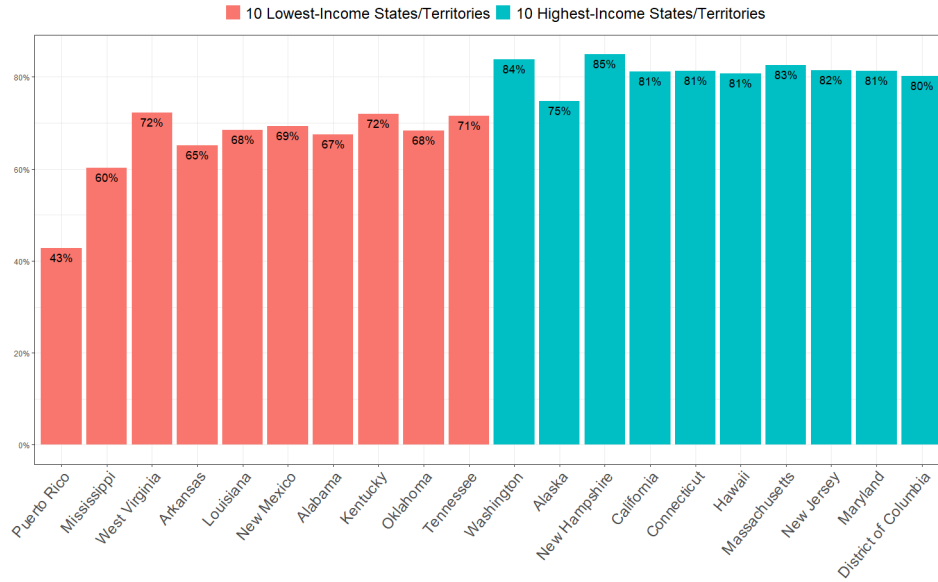
Percent of Population with Access to Fixed Terrestrial 25/3 Mbps Broadband (FCC Benchmark)



Source: FCC's Fourteenth Broadband Deployment Report (2021).

Appendix B.

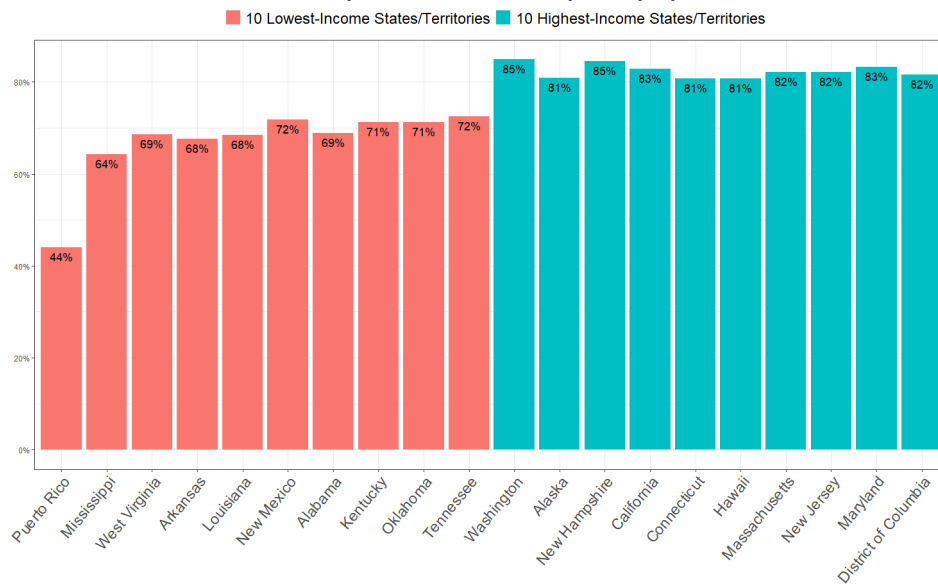
Percent of Population with Internet at Home (Excluding Cellular Data)



Source: ACS 2020 5-Year Estimates

Appendix C.

Percent of Population with a Desktop or Laptop at Home



Source: ACS 2020 5-Year Estimates

Appendix D.



Technology and Public Purpose Project

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