WIP: Telehealth, Law, and Inequality: How Policy Shapes Digital Health Access in Underserved Communities

Toluwani Comfort Oyedepo, Morgan State University

Toluwani Oyedepo is a graduate scholar currently pursuing a Master's degree in Sociology at Morgan State University, with an interdisciplinary background spanning law, community empowerment, and sustainable development. Her work focuses on research and evaluation and policy analysis, with particular attention to examining structural inequalities and advancing evidence-based solutions that promote social inclusion and equitable development. Toluwani holds a Bachelor's degree from Adeleke University, Nigeria, as well as a Bachelor of Laws (B.L.) qualification from the Nigerian Law School. Her academic training bridges legal frameworks with sociological inquiry and community-centered research. Through this combined expertise, she brings a critical, policy-oriented perspective to initiatives aimed at addressing social disparities through research-driven and sustainable interventions.

Julius Ogaga Etuke, Morgan State University

Julius Ogaga Etuke is a seasoned civil engineer and Ph.D. Candidate in Civil Engineering at Morgan State University, where his research focuses on sustainable and resilient infrastructure engineering. With over 15 years of consulting and project leadership experience, primarily in Nigeria's infrastructure landscape, he brings a robust, practical perspective to academic inquiry. His doctoral research is at the cutting edge of transportation resilience, integrating virtual and augmented reality (VR/AR), climate adaptation modeling, and data-driven solutions to improve disaster preparedness and risk mitigation in complex transportation systems. As a COREN-registered engineer and member of the Nigerian Society of Engineers, his work emphasizes impactful research and consultancy that bridges structural design principles with urgent sustainability and resilience challenges.

Dr. Oludare Adegbola Owolabi P.E., Morgan State University

Dr. Oludare Owolabi, a professional engineer in Maryland, joined the Morgan State University faculty in 2010. He is the director of the Sustainable Infrastructure Development, Smart Innovation and Resilient Engineering Research Lab, Department of Civil Engineering at Morgan State University

Israel Oluwaseun Jimson, Morgan State University
Dr. Uttam Gaulee

TELEHEALTH, LAW AND INEQUALITY: HOW POLICY SHAPES DIGITAL HEALTH ACCESS IN UNDERSERVED COMMUNITIES

ABSTRACT

Telehealth has become an essential component of modern healthcare delivery and a critical application domain for digital infrastructure and socio-technical systems. However, residents in underserved communities continue to face significant barriers to access and use. Gaps in broadband connectivity, limited funding, and narrowly framed policies contribute to widening inequities in digital access, with implications not only for healthcare delivery but also for participation in digital learning environments and workforce preparation in technology-enabled sectors. These structural barriers constrain equitable care delivery, limit exposure to digital skills development, and weaken community resilience within an increasingly digital society.

This work-in-progress study examines how laws and policies shape access to telehealth by focusing on the intersection of technology, regulation, and inequality within a historically marginalized urban community. Guided by the Social Determinants of Health (SDOH) and the Digital Healthcare Equity Framework (DHEF), the study applies a mixed-methods (QUAN–QUAL) design. The quantitative phase analyzes policy impact and broadband access data, while the qualitative phase explores lived experiences, legal barriers, and ethical challenges through interviews and document analysis.

Together, these methods provide a comprehensive understanding of how funding mechanisms, legal rules, policies, and governance frameworks influence access to digital health technologies as socio-technical systems. This study is designed to examine whether and how certain laws and funding models may unintentionally reinforce the digital divide, with downstream effects on digital literacy, educational access, and workforce readiness. The study aims to produce evidence-based policy recommendations that inform engineers, educators, policymakers, and healthcare leaders seeking to design, evaluate, and govern inclusive digital health and broadband systems that support equitable access, learning opportunities, and community resilience.

Keywords: Telehealth Policy, Digital Inequality, Broadband Access, Health Equity, Law and Regulation, Social Determinants of Health, Socio-Technical Systems.

INTRODUCTION

Background

Telehealth has become a central feature of contemporary healthcare delivery, particularly following its rapid expansion during the COVID-19 pandemic. Temporary regulatory waivers related to reimbursement, licensing, and service delivery enabled healthcare systems to rapidly scale virtual care in response to disruptions in in-person services [1]. These policy interventions functioned as enabling design conditions that shaped how digital health systems were configured, deployed, and governed. Consequently, telehealth has increasingly been positioned as a long-term policy strategy for improving healthcare access, system efficiency, and digital service integration beyond the public health emergency [2].

Despite this expansion, access to telehealth remains uneven. Underserved communities continue to face persistent barriers related to broadband availability, affordability, digital literacy, and institutional trust. Empirical studies show that low-income households, racial and ethnic minorities, and older adults are significantly less likely to use telehealth services, even when such services are theoretically available [3]. These disparities reflect broader social determinants of health and parallel unequal access to digital learning environments and workforce preparation opportunities, as broadband connectivity and digital skills increasingly shape participation in education, employment, and technology-mediated services.

Rather than focusing exclusively on clinical outcomes, this study centers law and policy as structural design constraints that shape telehealth systems and user access. Laws governing broadband funding, reimbursement eligibility, data privacy, and institutional compliance establish system requirements that influence infrastructure design, platform usability, and institutional implementation. Policies framed as neutral may unintentionally reinforce inequities when they fail to account for community-level constraints and historical disinvestment [4]. This work-in-progress paper examines these dynamics through a case analysis of underserved communities, documenting the conceptual framing, policy context, and mixed-methods research design of an ongoing study to inform engineering practice, engineering education, and future empirical evaluation.

Guided by the Social Determinants of Health framework and the Digital Health Equity Framework, the study analyzes how telehealth policies and broadband regulations influence access to digital health services at the community level, with the aim of informing more equitable and resilient telehealth policy design.

Research Aim and Objectives

This study examines how policy, law, and inequality shape access to telehealth, with attention to implications for digital literacy, educational access, and workforce learning systems. The specific objectives are to:

1. Analyze federal and local policies that structure telehealth access and related digital learning infrastructure.
2. Examine legal and ethical challenges affecting the implementation of community-based telehealth and their influence on digital literacy and institutional trust.
3. Develop policy and legal recommendations that reduce inequality and support resilient, inclusive telehealth systems linked to equitable education and workforce participation.

Research Questions

To examine how governance structures influence equitable access to digital healthcare, this study is guided by the following research questions:

1. How do federal funding policies and broadband regulations shape access to telehealth in underserved communities?
2. What legal and ethical challenges arise in community-based telehealth programs?
3. How can sociological perspectives on inequality inform legal frameworks to reduce the digital divide in healthcare delivery?

THEORETICAL AND CONCEPTUAL FRAMEWORK

Social Determinants of Health (SDOH)

This study is grounded in the Social Determinants of Health (SDOH) framework, which emphasizes that health outcomes and access to healthcare are shaped by the social, economic, and environmental conditions in which individuals live, rather than by medical care alone. The World Health Organization (WHO) defines social determinants of health as the conditions in which people are born, grow, live, work, and age, underscoring the role of policy, governance, and resource distribution in shaping health equity. Foundational work by the WHO Commission on Social Determinants of Health further argues that health inequities arise from "the causes of the causes," namely structural and political decisions that systematically advantage some populations while disadvantaging other. [5]

Applied to telehealth, the SDOH framework highlights how digital infrastructure, particularly broadband availability and affordability, functions as a structural determinant of healthcare access. U.S. policy initiatives such as Healthy People 2030 explicitly recognize neighborhood infrastructure, economic stability, and access to healthcare as key determinants of health Without addressing these upstream conditions, digital health interventions risk reinforcing existing disparities rather than reducing them. By situating telehealth access within the SDOH framework, this study conceptualizes digital health inequities as policy-driven outcomes embedded within broader systems of social and economic inequality [6]

Digital Health Equity Framework (DHEF)

		Levels of Influence*			
		Individual	**Interpersonal**	**Community**	**Societal**
Domains of Influence (Over the Lifecourse)	**Biological**	Biological Vulnerability and Mechanisms	Caregiver–Child Interaction Family Microbiome	Community Illness Exposure Herd Immunity	Sanitation Immunization Pathogen Exposure
	Behavioral	Health Behaviors Coping Strategies	Family Functioning School/Work Functioning	Community Functioning	Policies and Laws
	Physical/Built Environment	Personal Environment	Household Environment School/Work Environment	Community Environment Community Resources	Societal Structure
	Digital Environment	Digital Literacy, Digital Self-Efficacy, Technology Access, Attitudes Towards Use	Implicit Tech Bias, Interdependence (e.g. shared devices), Patient-Tech-Clinician Relationship	Community Infrastructure, Healthcare Infrastructure, Community Tech Norms, Community Partners	Tech Policy, Data Standards, Design Standards, Social Norms & Ideologies, Algorithmic Bias
	Sociocultural Environment	Sociodemographics Limited English Cultural Identity Response to Discrimination	Social Networks Family/Peer Norms Interpersonal Discrimination	Community Norms Local Structural Discrimination	Social Norms Societal Structural Discrimination
	Health Care System	Insurance Coverage Health Literacy Treatment Preferences	Patient–Clinician Relationship Medical Decision-Making	Availability of Services Safety Net Services	Quality of Care Health Care Policies
Health Outcomes		**Individual Health**	**Family/ Organizational Health**	**Community Health**	**Population Health**

Figure 1: DHEF Domains of Influence adapted from Richardson,et al. *A framework for digital health equity*. The Lancet Digital Health, *4*(2), e159–e165

This study also draws on the Digital Health Equity Framework (DHEF) to conceptualize how legal and policy structures shape access to telehealth. The DHEF, emphasizes that equitable digital healthcare depends not only on technological availability, but also on governance, institutional practices, and community context [7]. Rather than treating digital health as a neutral innovation, the framework highlights how laws, funding mechanisms, and regulatory decisions structure who can meaningfully access and benefit from telehealth services.

Within the DHEF, federal funding policies, broadband regulations, reimbursement rules, and data governance frameworks function as upstream determinants of digital health equity. Research applying digital health equity perspectives demonstrates that policies emphasizing efficiency or rapid innovation without explicit equity considerations may unintentionally exclude underserved communities and deepen existing disparities [8]. By applying the DHEF to a community-based case analysis, this study examines telehealth as a policy-mediated system shaped by legal rules, ethical considerations, and institutional decision-making, highlighting pathways through which governance frameworks can either mitigate or reinforce the digital divide [9]

Together, the Social Determinants of Health (SDOH) and Digital Health Equity Framework (DHEF) provide a comprehensive lens for examining telehealth access in underserved communities. The SDOH framework situates digital health disparities within broader patterns of social inequality that also shape access to education, digital learning environments, and skill development, while the DHEF clarifies the role of policy, law, and governance in shaping digital healthcare systems and related technological infrastructures. Integrated, these frameworks enable analysis of how federal funding policies, broadband regulations, and legal structures interact with community-level conditions to influence telehealth access, digital literacy, and equitable participation in technology-enabled health and learning systems.

POLICY AND REGULATION LANDSCAPE OF TELEHEALTH IN THE US

Federal-Level Telehealth Laws and Waivers

The policy and regulatory landscape governing telehealth in the United States is shaped by a fragmented intersection of federal healthcare regulations, broadband infrastructure policies, and emergency public health authorities. Rather than operating within a unified legal framework, telehealth governance is distributed across multiple federal agencies, including the Centers for Medicare & Medicaid Services (CMS), the Federal Communications Commission (FCC), and the National Telecommunications and Information Administration (NTIA), each responsible for distinct dimensions of reimbursement, connectivity, and digital infrastructure. Collectively, these regulatory domains shape not only healthcare delivery but also access to digital tools, learning environments, and skill development opportunities required to navigate telehealth systems. While these policies are intended to expand access through digital modalities, existing scholarship demonstrates that regulatory design and funding mechanisms often fail to account for structural inequalities related to income, geography, and digital access. Moreover, temporary telehealth expansions enacted during the COVID-19 public health emergency revealed both the transformative potential of telehealth and the instability of access when equity-focused reforms are not permanently embedded in law. Understanding how these federal policies are structured and implemented is therefore essential for assessing how law and regulation shape equitable telehealth access, digital literacy development, and participation in technology-enabled health and learning systems for underserved communities.

1. **Centers for Medicare & Medicaid Services (CMS) Telehealth Policies**

   At the federal level, telehealth policy in the United States is most directly shaped through regulations and reimbursement rules administered by CMS. As the primary administrator of Medicare and overseer of Medicaid, CMS exercises substantial authority in determining when, how, and for whom telehealth services are accessible. Beyond healthcare delivery, CMS telehealth policies influence patients' and providers' exposure to digital platforms, affecting digital literacy, informal learning, and workforce readiness in technology-mediated care environments. Through statutory interpretation, emergency waivers, and annual rulemaking, CMS policies function as binding federal instruments that shape provider participation, patient access, and the equity of digital health system engagement nationwide. The following subsections outline major federal telehealth policies administered by CMS and their implications for access, inequality, and participation in digital service ecosystems:

   a. **Medicare Telehealth Services Policy (Social Security Act S. 1834 (m).**
      This policy establishes federal rules for Medicare telehealth reimbursement, including eligible services, provider types, and conditions for payment, and historically imposed geographic and originating-site restrictions.
   b. **Medicare Telehealth Public Health Emergency (PHE) Waivers.**
      CMS implemented temporary federal waivers during the COVID-19 PHE that removed geographic and originating-site restrictions, expanded covered services and providers, and allowed home-based telehealth, significantly broadening access nationwide[10].
   c. **Medicare Audio-Only Telehealth Coverage.**
      CMS authorized reimbursement for certain audio-only (telephone) telehealth services, particularly during the PHE, to accommodate beneficiaries without broadband access or video-enabled devices [11].
   d. **Medicare Physician Fee Schedule (PFS) Telehealth Provisions.**
      Through annual PFS rulemaking, CMS determines which services are included on the Medicare Telehealth Services List, sets reimbursement rates, and designates services as permanent or temporary [12].

2. **Federal Communications Commission (FCC) Telehealth and Broadband Programs**

The Federal Communications Commission administers telecommunications and broadband programs that function as enabling infrastructure for telehealth delivery. While the FCC does not regulate healthcare services directly, its broadband and connectivity policies play a critical role in determining whether telehealth services authorized by CMS can be practically accessed by providers and patients. These policies also shape access to digital learning environments, influence digital literacy development, and condition workforce participation in technology-enabled healthcare settings. The major FCC programs with implications for telehealth access and broader digital inclusion are outlined below. [13].

   a. **Rural Health Care (RHC) Program.**
      The FCC's Rural Health Care Program subsidizes broadband and telecommunications services for eligible rural healthcare providers, aiming to improve connectivity for telehealth and remote care delivery by reducing the cost of high-speed internet access.
   b. **Connected Care Pilot Program.**

The Connected Care Pilot Program supports broadband connectivity for healthcare providers delivering telehealth services to low-income and veteran populations, with a focus on remote patient monitoring and chronic disease management outside traditional clinical settings.

c. **Universal Service Fund (USF) Healthcare Support.**
Through the Universal Service Fund, the FCC provides financial support to healthcare institutions for telecommunications and broadband services, including programs that reduce connectivity costs for eligible providers serving underserved communities.

3. Telecommunications and Information Administration (NTIA) Broadband Equity Programs

The National Telecommunications and Information Administration, housed within the U.S. Department of Commerce [14], administers federal broadband equity programs that directly influence the feasibility of telehealth access by addressing infrastructure gaps, affordability, and digital inclusion. Beyond healthcare delivery, NTIA programs shape access to digital learning environments, support digital literacy development, and influence workforce preparation by determining who can reliably participate in technology-mediated services. Unlike CMS and the FCC, NTIA's role is primarily focused on large-scale broadband deployment and equity planning, making its programs central to the long-term sustainability of telehealth, educational access, and workforce learning systems in underserved communities.

a. **Broadband Equity, Access, and Deployment (BEAD) Program.**
The BEAD Program provides federal funding to states to expand high-speed broadband infrastructure in unserved and underserved areas, forming the backbone for telehealth connectivity in communities lacking reliable internet access.

b. **Digital Equity Act Programs.**
Administered by NTIA, the Digital Equity Act programs support state and local initiatives aimed at improving digital literacy, device access, and broadband affordability, addressing non-infrastructure barriers that limit telehealth use among low-income and marginalized populations.

c. **Broadband Infrastructure Program.**
The Broadband Infrastructure Program supports partnerships between state, local, and private-sector entities to deploy broadband infrastructure in unserved areas, complementing other federal efforts to expand internet access necessary for telehealth delivery.

Broadband Regulation and Infrastructure Laws

Broadband regulation and infrastructure laws in the United States establish the statutory authority, funding mechanisms, and implementation frameworks for expanding internet access and ensuring equitable connectivity. These laws are critical for shaping how broadband infrastructure is deployed, how underserved communities are prioritized, and how broadband access intersects with broader social systems—including healthcare delivery and telehealth. Although broadband policy historically centered on market competition and telecommunications deregulation, recent legislation increasingly treats broadband as essential infrastructure necessary for economic participation, education, and access to critical services.

1. Telecommunications Act of 1996

The Telecommunications Act of 1996 modernized U.S. communications law by promoting competition across telecommunications markets and expanding access to advanced telecommunications services, including broadband. Administered primarily by the Federal Communications Commission, the Act also restructured the Universal Service Fund to support access in rural and high-cost areas. However, its reliance on market-based deployment without enforceable equity requirements contributed to uneven broadband infrastructure development, leaving persistent disparities across geographic, racial, and socioeconomic groups [15].

2. Infrastructure Investment and Jobs Act (IIJA)

The Infrastructure Investment and Jobs Act of 2021 represents the most significant federal investment in broadband infrastructure in U.S. history, allocating over $65 billion toward broadband deployment, affordability, and digital equity initiatives. The law explicitly recognizes broadband as critical infrastructure necessary for economic recovery, education, and healthcare access. By prioritizing unserved and underserved communities, the IIJA reframes broadband as a foundational determinant of equitable access to telehealth and other essential services [16].

Research Design and Study Status

This study adopts an explanatory sequential mixed-methods design (QUAN-QUAL), in which quantitative analysis of broadband access and policy impact provides structural context for subsequent qualitative inquiry into lived experiences and legal barriers. This design allows statistical patterns in access disparities to inform deeper exploration of how policy frameworks are experienced and interpreted at the community level. The research is structured around three interrelated components:

1. Policy and legal analysis of federal telehealth and broadband regulations;
2. Quantitative analysis of broadband access and infrastructure data relevant to community-level telehealth feasibility; and
3. Qualitative inquiry into lived experiences, legal barriers, and ethical considerations associated with community-based telehealth implementation.

The research questions are addressed through complementary methodological strands. The First research question, which examines how funding policies and broadband regulations shape access, is addressed through quantitative analysis of infrastructure data and policy impact indicators. The Second Research Question, focusing on legal and ethical challenges, is examined through qualitative interviews and policy document analysis. The Third Research Question integrates findings from both strands, using sociological frameworks to interpret how structural policy conditions influence digital inequality and inform legal reform.

At the time of submission, this work is in progress. The conceptual framework, policy landscape analysis, and research design have been fully developed, while empirical data collection and analysis are ongoing. Federal and local policy documents governing telehealth reimbursement, broadband funding, and digital equity initiatives have been identified and organized for systematic analysis. Quantitative datasets related to broadband availability and access are being prepared for evaluation, and qualitative data collection through interviews and document analysis is currently in the planning and early implementation phase. Together, these data sources are expected to inform how policy design shapes access to technology-enabled learning environments and workforce preparation pathways linked to telehealth systems.

Accordingly, this paper focuses on articulating the theoretical grounding, policy context, and methodological approach guiding the study rather than presenting finalized empirical findings. By presenting the study as a work-in-progress, the authors aim to document the analytical framework and research design underpinning the ongoing investigation, invite scholarly feedback, and establish a foundation for subsequent publications reporting full empirical results and policy recommendations. This approach reflects the iterative nature of community-based and policy-oriented research, where careful design and contextual analysis are essential precursors to meaningful evaluation of both healthcare and educational system impacts.

CONCLUSION

This work-in-progress study examines how law, policy, and broadband infrastructure shape equitable access to telehealth in underserved communities, emphasizing governance as a central determinant of digital inclusion. Grounded in the Social Determinants of Health and Digital Health Equity Frameworks, the study conceptualizes telehealth access not as a purely technological issue, but as a policy-mediated outcome influenced by legal rules, funding mechanisms, and institutional decision-making. These same policy and infrastructure conditions also shape access to education, digital learning environments, and opportunities for developing the digital literacy required to engage with technology-enabled systems.

Rather than presenting finalized empirical findings, the paper contributes a structured analytical framework and policy-oriented research design for examining telehealth access at the community level. The analysis highlights how regulatory fragmentation across healthcare and telecommunications systems can produce uneven access to virtual care, digital literacy development, and institutional learning opportunities, particularly in historically marginalized contexts. As the study progresses, mixed-methods findings are expected to inform policy discussions aimed at strengthening telehealth resilience while supporting inclusive approaches to education, workforce training, and institutional learning in digitally mediated environments, reinforcing the relevance of telehealth policy to ASEE's mission of advancing equitable engineering education and socio-technical system design.

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