HIMSS

MEASURING DIGITAL HEALTH EQUITY FOR IMPACT

A Proposed Framework for Using Digital Determinants of Health (DDOH) To Measure the Impact of Digital Health Services

Measuring Digital Health Equity for Impact

Contents

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Executive Summary

The HIMSS Social Determinants of Health (SDOH) Committee presents a Digital Determinants of Health (DDOH) framework to evaluate the impact of products and services in advancing digital health equity. This DDOH framework responds to the industry's need for an actionable framework to measure a solution's impact on digital health equity. Our SDOH Committee researched existing work by the public sector, industry, and academia to propose an actional framework for designing, implementing, and measuring a solution's impact on digital health equity. The framework covers digital literacy, trust, empowerment, connectivity, and inclusion. Our call to action emphasizes coordinating efforts to gather more DDOH data, implementing existing SDOH and DDOH standards, and modernizing infrastructure to support the digital inclusion of all populations. By incorporating these measures, we aim to ensure that no community is left behind in the digital transformation of the healthcare industry.

HIMSS Social Determinants of Health Committee

HIMSS launched the SDOH Committee, recognizing the growing interest and need for the industry to address SDOH and health inequities. HIMSS member organizations are playing active roles in reducing health disparities through their products, services, and technologies.

SDOH Committee members are elected annually, meet monthly, and form working groups to identify issues, explore topics in-depth, and spearhead initiatives that support the work of HIMSS and industry members. The SDOH Committee aims to learn, synthesize, and share findings that represent industry-wide trends, opportunities, and gaps.

Measuring Digital Health Equity

Over the past few years, there has been a noticeable growth in HIMSS Conference attendees discussing the need to address digital health equity. This has been evident through HIMSS panel discussions, conference presentations, and product trends.

Our SDOH Committee explored the following questions:

- "What does it mean to have a product or service that addresses digital health equity?"
- "What does that look like?"
- "How would you measure that impact?"
- "Who can help advance these efforts and in what ways?"
- "Why is digital health equity important to consider for a product or service?"

These questions led us to evaluate the current state of available data, resources, and frameworks to measure digital health equity. Leveraging the global HIMSS network and partner organizations, we conducted interviews, searched for resources, and explored public datasets to understand what is available and where the gaps exist.

This work conducted in 2023 results in the following key findings and recommendations, which we outline in more detail throughout this paper:

1. **Digital Determinants of Health (DDOH) can serve as a framework for measuring digital health equity.** DDOH offers a more granular, deconstructed set of variables to measure digital health equity in quantitative and qualitative terms.
2. **DDOH can build upon the foundation of SDOH standards.** SDOH data and frameworks offer a blueprint for DDOH data collection and impact measurement.
3. **Industry-wide adoption of emerging standards is critical to advancing the mission of digital health equity.** Organizations like FCC, CDC, ONC, OMB, and HL7 (via the Gravity Project) have developed interoperability frameworks, data standards, and interactive maps that the industry can already use to start measuring the impact of DDOH and SDOH on health disparities and outcomes.[1–5]
4. **Limited data is available to measure DDOH.** We do not have sufficient data to measure the impact of digital health equity on health outcomes today. Increased adoption of existing standards, the development of additional standards, and data exchange are critical to measuring digital health equity at the product, individual, and population levels.
5. **Modernizing infrastructure to support digital inclusion and digital health equity.** Today's infrastructure is insufficient to gather DDOH and SDOH data in an equitable and inclusive manner for the entire population. Ongoing initiatives at ONC, CDC, FCC, and others need widespread support and adoption to advance digital health equity.

We hope this paper offers an overview of the current landscape and stimulates more dialogue and action by our HIMSS community, which includes industry, government, patients, and providers.

Healthcare's Digital Transformation and Digital Divide

As the COVID-19 pandemic closed in on the world, our industry shifted radically towards digital transformation. Telemedicine encounters alone increased 766% in the first three months of the pandemic.[6] Since then, telehealth utilization in the U.S. has stabilized at 38 times higher than before the pandemic, accounting for 13% to 17% of all office and outpatient visits.[7]

Although the adoption of digital tools like telehealth increased access to healthcare for some communities, others were left behind. The speed of digital transformation outpaced our ability to close the digital divide, and historically underserved patient populations were disproportionately left behind.[8,9] The digital divide did not narrow; it widened.[10] More intentional design, implementation, and measurements are needed to ensure that digital technologies are designed and developed to benefit all patients.[11]

Measuring Social Determinants of Health

In the first phase of our work, our SDOH Committee reviewed the history of SDOH standards and conducted a landscape review of the available SDOH data and standards (See Appendix).

Developing SDOH Standards

In November 2017, the Social Interventions Research and Evaluation Network (SIREN) at the University of California, San Francisco, convened a diverse group of stakeholders–including experts in SDOH data from healthcare, community health, and health information technology–to discuss how to develop consensus-based data standards for SDOH related activities (screening, diagnosis, goals, and interventions).[12]

SIREN identified the growing interest from national groups and health systems in addressing individual social risk factors in clinical settings. However, one of the key barriers was the lack of data standards available to represent and exchange this type of data in electronic health records and related systems. Participants recommended convening a multi-stakeholder group, which led to the formation of the Gravity Project in May 2019 and the establishment of an HL7® FHIR® Accelerator in August 2019.[13]

The Gravity Project has developed terminology standards and associated value sets for 20 SDOH domains, including digital access and digital literacy. As an HL7® FHIR® Accelerator, the Gravity Project has also developed and published the HL7 SDOH Clinical Care FHIR Implementation Guide that supports three primary use cases:

1. Document SDOH data in conjunction with the patient encounter to include social risk screening;
2. Document and track SDOH-related interventions (or Health Related Social Needs screening tools) to completion; and
3. Gather and aggregate SDOH data for uses beyond the point of care (e.g., population health management, quality reporting, and risk adjustment).

In 2021, the Gravity Project's terminology standards were included in the U.S. Core for Data Interoperability (USCDI) version 2 as four data classes: SDOH assessments, SDOH problems/health concerns, SDOH goals, and SDOH interventions. The ONC's 2022 Report to Congress highlights that USCDI is the minimum dataset required for health systems. This dataset is available through most hospitals, doctors' offices, and consumer health apps, providing online access to electronic health information (EHI).

Next Frontier: Digital Determinants of Health

The shift toward more digitally-enabled care during the pandemic re-balanced the SDOH scorecard. Digital access, connectivity, and digital literacy became increasingly important factors that impacted health outcomes--these have been referred to as Digital Determinants of Health or Super Determinants of Health.[14–18] In 2023, the Gravity Project released more DDOH-specific variables, including digital access and digital literacy to address this shift in digital transformation.[19]

State of Digital Determinants of Health

Our committee aimed to research and consolidate information on available DDOH resources, including definitions, standards, and publicly available datasets. We met with industry, government, policy, and academia leaders to understand existing frameworks, identify DDOH variables, and deconstruct digital health equity into measurable components. The standards and available datasets (see Appendix) may serve as a helpful resource and the first step in correlating DDOH with health outcomes.

The compilation of datasets addressing DDOH presents a diverse array of resources covering chronic conditions and health disparities across federal, state, and industry collaborations.

However, many still seem to lack specific data on digital and broadband access, digital literacy, and their impact on health outcomes. Healthcare organizations and policymakers can use these data as a baseline to inform policies and service interventions to mitigate the digital divide's impact on health disparities.

Available Public Datasets

Our evaluation of 45 publicly available datasets shows there have been significant efforts in collecting SDOH on a local, regional, and national level. Below is a brief summary of some of the publicly available datasets and standards (see Appendix for complete list).

- **Broadband Data Collection (BDC) System** provides data on broadband availability, subscription, and crowdsourced data for use in the FCC's broadband mapping program.
- **Disability and Health Data Systems (DHDS) and the Interactive Atlas of Heart Disease and Stroke** provide state-level and county-level health data.
- **National Center for HIV, Viral Hepatitis, STD, and Tuberculosis Prevention (NCHHSTP) AtlasPlus** offers comprehensive surveillance of diseases and environmental indicators.
- **Behavioral Risk Factor Surveillance System (BRFSS)** collects information on health-related risk behaviors, chronic health conditions, and the use of preventive services. This telephone-based survey has been continuously conducted since 1984.
- **Childhood Obesity Data Initiative (CODI) and Multi-State EHR Based Networks for Disease Surveillance (MENDS)** use electronic health record data to evaluate short-term outcomes of policies and program interventions focused on specific health concerns.
- **Chronic Disease Indicators** offer critical insights into chronic diseases and associated risk factors at the state and select metropolitan levels.
- **Chronic Kidney Disease (CKD) Surveillance System** comprehensively tracks risk factors at a national level, emphasizing prevention and management efforts.

These datasets aim to address health disparities and serve as a good resource for identifying relationships between SDOH and health outcomes. While these datasets provide essential insights, they might fall short in offering insights into DDOH factors such as broadband connectivity, digital access, and digital literacy and their influence on health outcomes. Many SDOH frameworks (Figure 1) do not address DDOH variables, making it challenging to evaluate the impact of digital technologies on health outcomes.

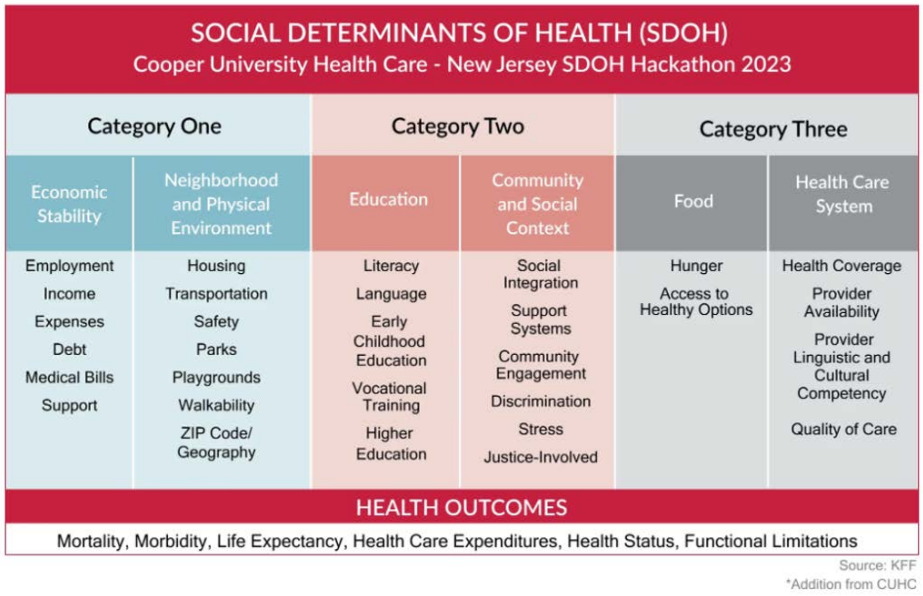

Figure 1. Social Determinants of Health Framework

While we could not find a single source that comprehensively captured DDOH factors, many resources provided valuable frameworks and resources to construct a more complete DDOH framework. Furthermore, organizations like the World Health Organization (WHO) and the National Academies of Sciences, Engineering, and Medicine (NASEM) have provided resources and toolkits to action DDOH insights such as social prescribing of services.[20,21]

Definitions and Components

While there is no set definition for Digital Determinants of Health[16], we centered our work around the following definition: "the circumstances of people, information, services, and systems, which impact accessing health information and services and an individual's health outcomes through the use of digital technologies."

Furthermore, DDOH can be deconstructed into different categories: literacy, access, trust, empowerment, and inclusion. We provide example definitions below (Table 1).

DIGITAL DETERMINANTS OF HEALTH	DEFINITION
LITERACY	
Digital Literacy	The ability to use information and communication technologies to find, evaluate, create, and communicate information, requiring both cognitive and technical skills.
Digital Health Literacy	The ability to seek relevant health information utilizing digital technology to solve health problems and improve quality of life.
ACCESS	
Broadband Connectivity	Adequate internet (reliable and of sufficient speed) to participate in day-to-day and work life and a digital device to access the internet (the device must be appropriate for the user's functional abilities).
Cellular Connectivity	Adequate cellular connectivity (reliable and of sufficient speed) to participate in day-to-day and work life with a digital device to access the cellular connection (the device must be appropriate for the user's functional abilities).
TRUST	
Digital Trust	The confidence, flexibility, and empowerment in the relationships between individuals and organizations when it comes to their data and information.
Digital Empathy	The traditional empathic characteristics such as concern and caring for others expressed through computer-mediated communications.
EMPOWERMENT	
Digital Activation	Patients' ability to play an active role in their own health and healthcare by using digital tools and technologies.
Self-Efficacy	A person's belief in their own ability to succeed at a particular task or goal.
Resourcefulness	One's ability to be resourceful (imaginative, creative, problem solving, etc.).
INCLUSION	
Data Inclusion	The data is representative of the population for which it is meant to be used.
Algorithmic Inclusion (Training, Validation)	The data used to train and validate the algorithm is representative of the population that will use or benefit from the algorithm. This population can change over time, and the data used to train and validate will need to adapt.
Data Justice	A group of frameworks informing the study and use of data in ways that prioritize the needs and experiences of structurally marginalized communities, and contribute to efforts to redress structural, institutional, and political injustices.[22]

Table 1. Digital Determinants of Health - Definitions and Components

Inclusive Data Collection and Policymaking

Digital inclusion is essential to ensure the data represents the entire population. Issues like lack of broadband, digital illiteracy, and mistrust can lead to under-represented and vulnerable populations being excluded from the data, risking policies that overlook their needs and worsening health disparities. Inclusive data is crucial for equitable care, especially in the era of artificial intelligence (AI), where data exclusion could lead to algorithmic bias. Technology- driven solutions need to consider DDOH in their design and implementation to ensure that under-represented patient populations are included in future datasets and policy decisions.

Mapping Health Outcomes to SDOH and DDOH

Visualizing the relationship between SDOH, DDOH, and health outcomes can be a powerful tool to accelerate investments in infrastructure to address DDOH. The Federal Communications Commission (FCC) established the Connect2Health (C2H) Task Force to explore the intersection of broadband, advanced technologies, and health.[18] In 2015, they proposed that broadband be considered a "super" determinant of health that influenced health outcomes and other social determinants such as education and employment.[18] To visualize this relationship, the Task Force developed the Mapping Broadband Health in America platform, which allows users to explore broadband and health data at the national, state, and county levels.

The Mapping Broadband Health in America platform (https://www.fcc.gov/health/maps) allows stakeholders to understand the intersection of broadband and health outcomes. The platform originally included chronic disease data and was subsequently updated to incorporate opioid-related health variables. In 2023, pursuant to a Congressional directive, the Task Force updated the platform to show the relationship between maternal health and broadband. Looking at the maps, users can see hundreds of counties across states that have limited broadband access or adoption.

People who live in these "digital deserts" cannot fully take advantage of digital health tools, services, and digitally-enabled health technologies due to limited internet access and/or insufficient bandwidth. For example, the Connect2Health map (Figure 2) shows the intersection of opioid death rates and internet adoption at the county level. Another map shows regions where broadband and access to maternal health services are both low, highlighting gaps and opportunities for infrastructure investment (Figure 3).

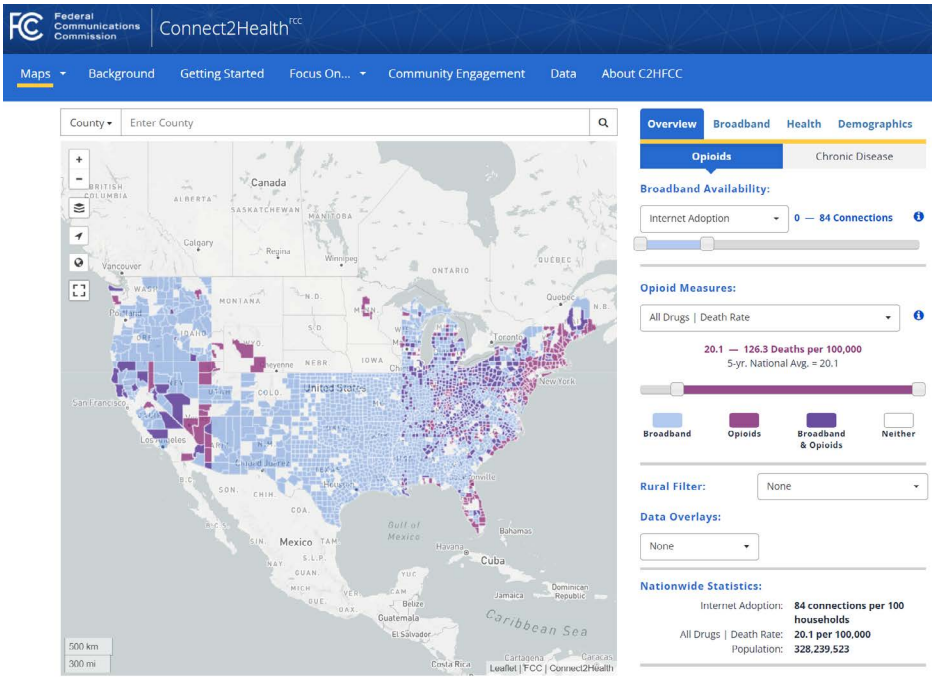

Figure 2. FCC Connect2Health Map for Opioid Death Rates

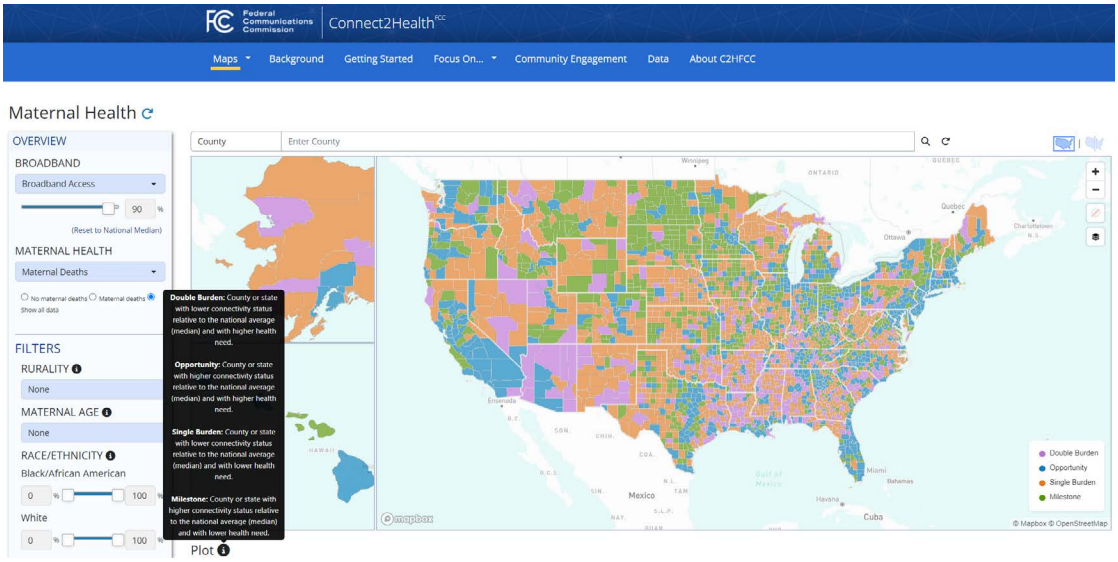

Figure 3. FCC Connect2Health Map for Broadband Access and Maternity Care Deserts

To generate deeper insights and further build on the work of the C2H Task Force's mapping efforts, our committee designed a prototype dashboard that compares digital health equity metrics (DDOH variables) with health outcomes (Figure 4). In this example, households with broadband access and diabetes rates are evaluated at a county level, revealing that many counties in southern states have below-median broadband access and above-median diabetes rates. Investments could be targeted toward counties with high diabetes rates and low broadband access (Figure 5).

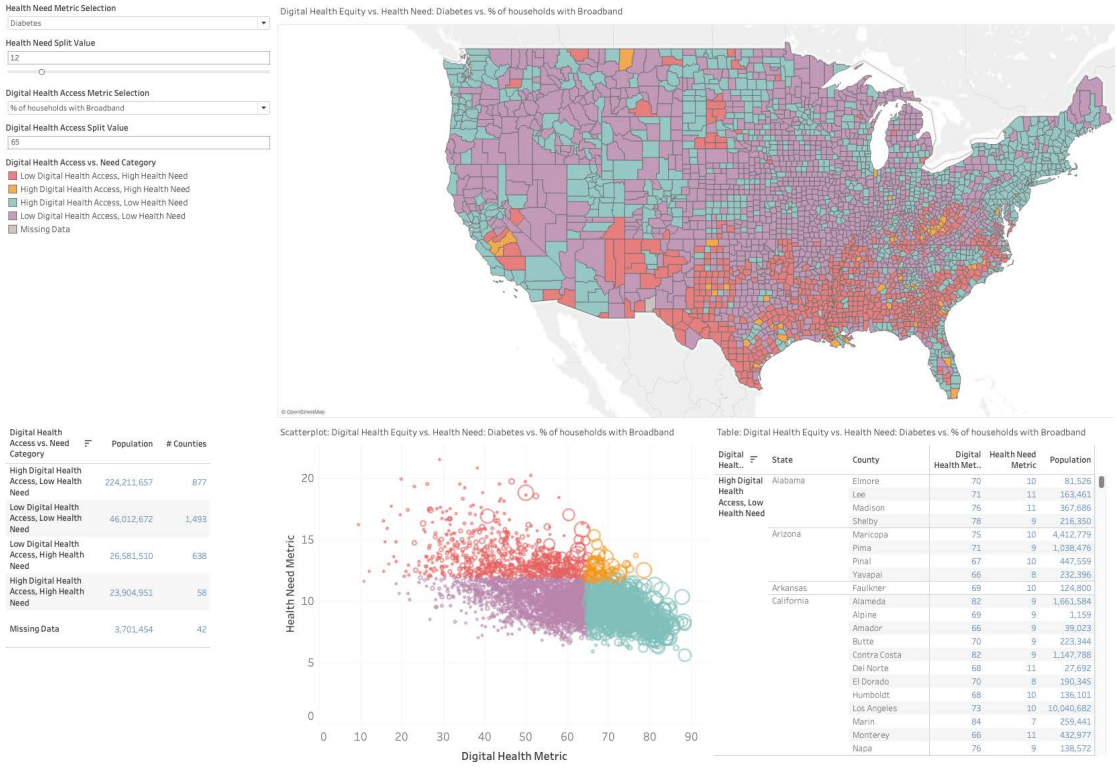

Figure 4. HIMSS SDOH Committee Prototype for Visualizing DDOH Variables

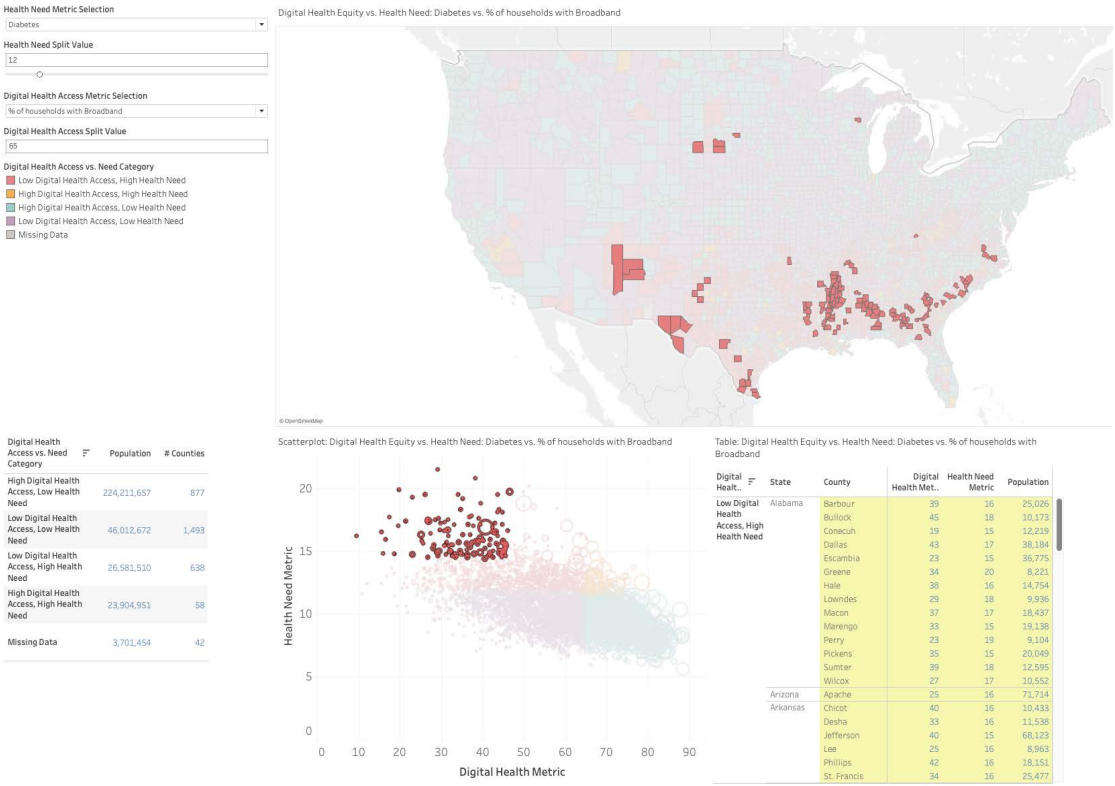

Figure 5. Prototype Interactive Map Focused on High Diabetes Rates and Low Broadband Access

Call To Action: Closing the Gaps

To design effective solutions and policies, more work is needed to understand the relationship between DDOH, SDOH, and health outcomes. This will require a coordinated effort by public and private sector entities to drive more patient-centered innovations, develop standards for impact measurement, and increase investments to modernize infrastructure. To achieve these goals, we propose the following calls to action:

1. Collect more DDOH data.

To effectively measure and address the digital determinants of health, there is a critical need for a more comprehensive DDOH dataset. We outline a framework that defines the key components of DDOH that should be considered for any solution or intervention. This includes data on digital access, literacy, trust, empowerment, and inclusion at the individual and community levels. By systematically gathering such data, healthcare providers, policymakers, and researchers can better understand the digital barriers to accessing healthcare and social services. This requires collaboration among stakeholders in the healthcare ecosystem to develop and use a DDOH data repository, which can be centralized or decentralized. This repository will help to establish a benchmark for the effectiveness of DDOH interventions. We call on academics, health researchers, community-based organizations, and industry to work together to create sustainable models for collecting, storing, and maintaining DDOH datasets.

2. Implement existing standards.

Implementing existing data interoperability standards is essential for a more complete understanding of DDOH and its impact on health outcomes. Widely adopting standards like HL7 FHIR and the Gravity Project's SDOH/DDOH standards ensures seamless data sharing and integration across systems. This commitment enables healthcare organizations and vendors to incorporate SDOH and DDOH insights into their interventions, leading to more equitable healthcare delivery. Financial incentives, such as those from legislation (e.g., HITECH Act), waivers/grants (e.g., CMS), or other funding mechanisms, are crucial to accelerating adoption of existing standards.

3. Expand the use of digital tools that already exist.

A concerted effort should be made to maximize the use of digital health tools already on the market and make them more accessible and inclusive. This approach ensures that existing digital health applications are user-friendly, culturally sensitive, and available in multiple languages to cater to a diverse population. Furthermore, it is vital to provide training and support to healthcare providers and patients to maximize the use of these tools. Expanding the use of existing digital health tools optimizes resources and accelerates the path toward improving digital health equity.

4. Develop an actionable scorecard.

A DDOH scorecard can be useful for measuring a solution's impact on digital health equity. This scorecard would provide a standardized framework for evaluating whether a product/program incorporated DDOH into its design and development. For example, checking for digital literacy onboarding, technical support for patients, and multi-channel accessibility that doesn't require broadband internet. Developing and adopting such a scorecard would provide a measurable framework for enhancing digital health equity, guiding interventions where they are most needed.

A DDOH scorecard can help measure a solution's impact on digital health equity. This scorecard would offer a standardized way to evaluate if a product or program incorporates digital determinants of health (DDOH) in its design. For instance, it would check for digital literacy onboarding, technical support for patients, and multi-channel accessibility that doesn't require broadband. Creating and using such a scorecard would provide a clear framework for improving digital health equity, measuring the impact, and guiding interventions where they are most needed.

5. Invest in modernizing our infrastructure.

Modernizing our infrastructure is crucial for bridging the gap between technological advancements and equitable access. This includes adopting interoperability standards, implementing API-driven systems, and transitioning to cloud-based infrastructure. These upgrades will enable the seamless exchange of vital health data and support timely public health interventions. We encourage startups and industry to align with initiatives like the

CDC's Data Modernization Initiative (DMI) and adopt standards from the Gravity Project to create more equitable and accessible innovations that benefit all patients.

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- The Gravity Project
- MITRE

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Appendix

Please find the complete list of datasets that were researched for this paper:

https://docs.google.com/spreadsheets/d/197wpCYs3qQqryEjB5PXqw8xLXZ3ki8nKj9VSwa5M aIE/edit#gid=1013908629