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Digital health: An opportunity to advance health equity

Digital health solutions have the potential to make healthcare more equitable. Here's how innovators can deliver on that promise.

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The COVID-19 pandemic, which ushered in widespread acceptance of telehealth and other digital innovations in medicine, has changed the game for the healthcare sector. Yet the pandemic has also laid bare the issue of healthcare inequity and its well-documented impact on ethnic and racial minorities, rural communities, the underprivileged, and the elderly.

Equal access to affordable and competent healthcare has the potential to improve patient outcomes by providing better quality of life, easing reliance on emergency and late-stage interventions, and reducing early deaths.[1] Digital technologies have the potential to play a critical role in efforts to improve health equity. However, rapidly advancing technology may also exacerbate exclusion, introduce unexpected biases, widen the digital divide, and continue to leave some populations behind.[2]

The opportunity for technology and life sciences companies that address health equity challenges with digital innovation is immense, and the downstream economic, financial, and health benefits for society are significant.[3] Leading digital health innovators and investors explored these topics at the 2021 McKinsey Digital Health Conference on Accelerating Diversity, Equity, and Inclusion in Digital Health and offered some early case studies. By building on those topics and case studies, we propose a framework for developing and implementing digital solutions that narrow health equity gaps.

Why health equity is good for patients and business

Inadequate access to healthcare has serious consequences for patients. Despite recent efforts to expand healthcare access (such as the 2010 Patient Protection and Affordable Care Act in the United States), some long-standing disparities remain. For example, Hispanic Americans under age 64 are more than twice as likely to be uninsured as their White counterparts, according to a 2021 Kaiser Family Foundation (KFF) study. KFF also reported that Black Americans fared significantly worse than their White counterparts across 19 of 27 health measures, including infant mortality, pregnancy-related deaths, the prevalence of chronic conditions, and overall physical and mental health.[4]

Equalizing healthcare access and quality not only improves individual and population-level outcomes but also has salutary effects on the larger economy: good health and prompt, effective treatment allow patients to live active and productive lives. Indeed, improvements in global health have contributed to about a third of all economic growth in advanced economies over the past century.[5] In order to sustain this growth rate, digital health solutions must be designed to reach previously excluded or underrepresented groups.

Investors in digital health solutions are beginning to take note. Venture funding for digital health companies reached a record $29.1 billion in 2021, with more than $0.5 billion in funding for digital health companies targeting social determinants of health and underserved populations (Exhibit 1).[6] What's more, as investors integrate environmental, social, and governance criteria into their decision making, health equity can become a core principle in planning for maximum social impact.[7]

[1] Samantha Artiga and Nambi Ndugga, "Disparities in health and health care: 5 key questions and answers," Kaiser Family Foundation, May 11, 2021.

[2] For more on how technology can perpetuate biases, see Mehdi Bilgrami, Sara Cinnamon, Shenglan Qiao, and Joe Zachariah, "Inclusive tech? It starts with design," McKinsey, May 14, 2021.

[3] Anas El Turabi, Anjali Menon, Lucy Pérez, and Gila Tolub, "Health equity: A framework for the epidemiology of care," McKinsey, March 21, 2022.

[4] "Disparities in health and health care," May 11, 2021.

[5] "Prioritizing health: A prescription for prosperity," McKinsey Global Institute, July 8, 2020.

[6] Rock Health Venture Funding Database, 2021; McKinsey analysis.

[7] Alyssa Stankiewicz, "The number of new sustainable funds hits an all-time record," Morningstar, October 28, 2021.

Exhibit 1

Innovators can accelerate equity in digital health by aligning goals and actions to levers that prioritize diversity, equity, and inclusion.
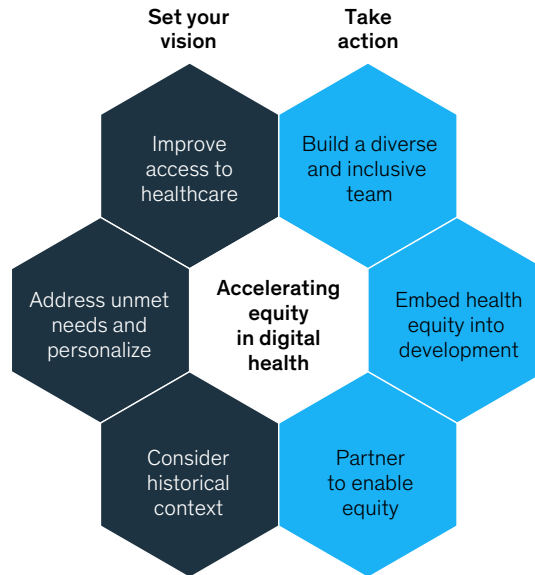
The opportunity: Addressing health equity with digital solutions

Bridging equity gaps requires significant work, and digital tools can be critical in that effort. By taking inspiration from start-ups and established leaders in the field, digital health innovators can begin to envision how their product will address health equity.

Digital tools can improve equity by increasing healthcare access, addressing unmet needs and personalizing care for patients, and considering the historical context within the communities they serve (Exhibit 2). Understanding these three areas of opportunity can help digital health innovators develop and scale their products to make a meaningful difference.

1. Improve access to healthcare
Digital technology can narrow the equity gap in several ways, from streamlining difficult-to-navigate

medical bureaucracy processes to eliminating travel and transportation factors from healthcare access. Access is limited by two chief constraints: affordability and availability.

High treatment costs and limited insurance coverage are well-known barriers to care. For example, health plans often have poor coverage for fertility treatments, making in vitro fertilization (IVF) prohibitively expensive for many patients. The digital health start-up Univfy is working to lower those costs in two ways: by developing an AI-based platform that predicts a patient's probability of success and by partnering with clinics to offer refunds if IVF efforts fail.

For many patients, such as those in rural areas, the limited availability of providers and the costs associated with travel and time away from work are barriers to care. The COVID-19 pandemic spurred a rapid and significant increase in telemedicine

Exhibit 2

Venture funding for digital health companies targeting social determinants of health and underserved populations reached new highs in 2021.

Funding for firms focused on social determinants of health[1] and underserved populations,[2] $ million
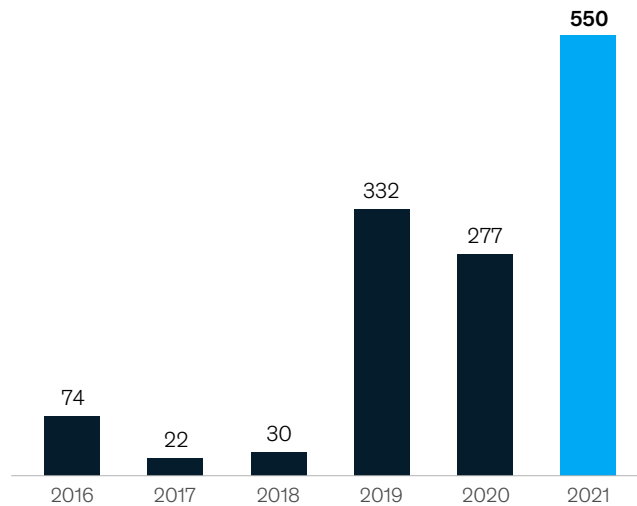
[1]Rock Health defines social determinants of health as the complex, interrelated social structures and economic systems that shape the conditions in which people are born, grow, live, work—ultimately affecting their overall health. Examples of social determinants of health that might be addressed by digital health companies include: education, economic stability, and job opportunities; safe, accessible housing, transportation, and neighborhoods; violence, racism, and discrimination; food security, air and water quality; and education and literacy skills.
[2]Rock Health classifies digital health companies as those addressing medically underserved populations if they explicitly develop products and services for communities that experience health disparities or systemic barriers to care in the US, not otherwise named in Rock Health's databases (eg, elderly, LGBTQ+, women+). Following guidance from the US Department of Health and Human Services and the US Health Resources and Services Administration, Rock Health defines medically underserved communities as including: African Americans, Latinos, Native Americans, people experiencing homelessness, people who are low income, people who are eligible for Medicaid, people with disabilities, refugees, undocumented immigrants, non-English speakers, and others.
Source: Rock Health data through Dec 31, 2021 (includes deals >$2 million for US digital health companies); McKinsey analysis

and improved access for those who were not reliably able to attend in-person consultations.[8] The London-based digital health service provider Babylon offers a transformative example of the power of telemedicine. Developed in collaboration with the Rwandan government in 2016, the company's Babyl platform is designed to work with the basic phone features available to most Rwandans and, as of December 2021, has more than 2.6 million registered patients.[9]

Access to medical equipment can also be a challenge in many parts of the world. To improve diagnostic imaging access, Butterfly Network has

developed a $2,000 hand-held ultrasound device that offers an imaging solution for developing areas where more expensive machines like CT or MRI scanners, or even X-ray machines, are cost prohibitive.[10] Such portable diagnostics and medical devices can transform care by reducing costs and expanding the availability of diagnostic services beyond traditional healthcare settings.

2. Address unmet needs

Even when patients overcome geographic and financial barriers to care, treatment options can be limited due to variation in physician knowledge and varying responses to treatments. For example,

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[8] Oleg Bestsennyy, Greg Gilbert, Alex Harris, and Jennifer Rost, "Telehealth: A quarter-trillion-dollar post-COVID-19 reality?" McKinsey, July 9, 2021.
[9] "Babylon launches AI in Rwanda in next step towards digitising healthcare in Rwanda," Babylon, December 3, 2021.
[10] Donald G. McNeil Jr., "In African villages, these phones become ultrasound scanners," *New York Times*, April 15, 2019.

incomplete information and a mismatch between provider knowledge and the clinical presentation of disease can complicate rare disease diagnosis and treatment. This can lead to "diagnostic odysseys" that last, on average, more than five years. Through algorithmic population screening of electronic health records, London-based Mendelian aims to decrease the time it takes to diagnose more than 100 rare diseases and connect patients with the appropriate providers.

Furthermore, once patients are prescribed a therapy, their response to the drug may differ depending on their genetic profile (see sidebar "Prioritizing diversity and inclusion in clinical trials"). Biologic drugs used to treat autoimmune disorders can have paradoxical effects in certain patients, which could be due to genetic differences.[11] Digital health companies have an opportunity to address the factors contributing to these limited effective treatment options across large populations.

Social determinants of health, such as access to clean water, nutritious food, safe housing, and transportation, affect patients' ability to maintain good health and seek care when they need it.[12] This combination of unmet social needs and lack of access to quality care can create a feedback loop in which each erodes the other. Considering patients' social determinants of health and specific medical needs in product development can help break this cycle.

It is also important to take into account that different populations have different needs.[13] Maven, a New York–based virtual clinic for women's and family health, serves populations with low technological and health literacy and partners with payers and employers to reduce or eliminate patients' costs.[14] The company's on-demand virtual care

Prioritizing diversity and inclusion in clinical trials

Companies should test their digital health solutions with people who have diverse needs, backgrounds, and social determinants of health. This is especially important when conducting clinical trials for medical devices or therapeutics. Boston's Multi-Regional Clinical Trials Center of Brigham and Women's Hospital and Harvard University has developed innovative and practical

measures to increase diverse and inclusive representation in clinical research.[1]

Furthermore, regulators are now recognizing the importance of diversity in clinical-trial patient populations. For example, drug and treatment efficacy can vary by gender. In early 2022, the Center for Devices and Radiological Health released the "Health of Women

Program Strategic Plan," which outlined initiatives to ameliorate those variations, and the FDA issued draft guidance on increasing diversity in clinical trials through enrollment efforts.[2] In addition to applying these frameworks, digital health innovators can analyze prior studies to shed light on previously overlooked inequities and bias.

[1] "Diversity, inclusion, and equity in clinical research," Multi-Regional Clinical Trials Center of Brigham and Women's Hospital and Harvard, accessed July 15, 2022.
[2] "The MRCT Center equity by design metrics framework launched," Multi-Regional Clinical Trials Center of Brigham and Women's Hospital and Harvard, accessed July 15, 2022; "FDA takes important steps to increase racial and ethnic diversity in clinical trials," US Food and Drug Administration, April 13, 2022.

[11] Mohammad Darvishi, Mojtaba Ghasemiadl, and Soheil Tavakolpour, "Pharmacogenetics: A strategy for personalized medicine for autoimmune diseases," *Clinical Genetics*, 2018, Volume 93, Number 3.
[12] "Social determinants of health," US Department of Health and Human Services, accessed July 15, 2022.
[13] Erica Hutchins Coe, Jenny Cordina, Danielle Feffer, and Seema Parmar, "Understanding the impact of unmet social needs on consumer health and healthcare," McKinsey, February 20, 2020.
[14] "The next generation of care for women and families," Maven Clinic, accessed July 15, 2022.

Providing a variety of avenues for patients to receive education and care is one way to reach a broader population and "meet patients where they're at."

allows patients to connect with a greater range of providers, increasing the possibility of pairing a patient with a provider that understands their medical and sociocultural needs.

3. Consider the historical context
A community's historical experiences with the medical establishment influences individuals' comfort with seeking care and engaging with novel services. Past atrocities such as forced sterilizations and the Tuskegee syphilis study continue to contribute to Black Americans' mistrust of the medical community, according to a report from the Commonwealth Fund. This mistrust, when combined with other structural factors, is associated with fewer preventive health interventions, longer time to diagnosis, and worse patient outcomes.[15]

Digital health companies can build trust by engaging patients via new channels. For example, the Stone Ridge, Virginia, Tigerlily Foundation provides support and education to patients, including young women and women of color, who are typically overlooked in breast cancer prevention programs. The foundation makes outreach efforts ranging from preventive care alerts to Zumba and yoga classes to better engage hard-to-reach cohorts. Providing a variety of avenues for patients to receive education

and care is one way to reach a broader population and "meet patients where they're at." Companies must consider how past experiences shape the patient perception of a product or service and find creative ways to establish trust and understanding.

Taking action: Where to begin
Setting the stage for improving health equity with digital solutions is a critical first step. Digital innovators can increase their likelihood of success by incorporating emerging best practices:

— *Build a diverse and inclusive team.* This may involve making changes to recruitment, hiring processes, and company culture.[16] Diverse teams are likely to bring the range of perspectives that lead to innovative and more broadly accessible products.[17] For example, Unite Us, a technology company that builds coordinated-care networks of health- and social-service providers, hires individuals from each community it enters to ensure solutions that consider the local culture.[18]

— *Embed equity in product development.* Digital innovators can prioritize diversity and inclusion at every step, from initial research and concept

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[15] Martha Hostetter and Sarah Klein, "Transforming care: Understanding and ameliorating medical mistrust among Black Americans," Commonwealth Fund, January 14, 2021.

[16] Sundiatu Dixon-Fyle, Kevin Dolan, Vivian Hunt, and Sara Prince, "Diversity wins: How inclusion matters," McKinsey, May 19, 2020.

[17] Katharine Nester, "Diversity, innovation and opportunity: Why you need a diverse product engineering team," *Forbes*, July 31, 2018.

[18] Gracyn Shah, "Why hiring locally matters," Unite Us, July 28, 2020.

design to testing and implementation. When conducting research or developing algorithms, for example, it's important to identify and account for bias in the data used to inform product design. The risk of bias is especially profound in disease areas and populations where data acquisition is challenging or flawed. To capture the multisystemic patterns and symptoms that characterize rare diseases or complex conditions, such as cancer and autoimmune disease, researchers must consider diverse data that represent all patients seeking diagnoses. Verifying data quality and comparing samples to population-level statistics can also reduce the likelihood of bias skewing results (see sidebar "Creative digital solutions to improve diversity, equity, and inclusion in clinical trials").

— *Collaborate with patients.* Codeveloping products with patients ensures that the digital tool will meet their needs. Savvy Cooperative is a patient-owned cooperative that lets patients share their health experiences with companies and researchers. By listening to and working with patients, businesses and innovators can better understand the intricacies of the patient journey, which allows them to develop their products with greater sensitivity.

— *Integrate equity in commercialization.* Keeping patients' different preferences for media consumption in mind throughout marketing development and deployment will help digital innovators reach a diverse patient population. It is important to have a deep understanding of the targeted groups to avoid stereotypes and create authentic content that resonates with their experience.[19] Additionally, content creators must ensure that educational materials and instructions are inclusive of the entire patient population by considering and addressing factors such as health literacy and language barriers.

— *Consider cultural context.* Considering patients' backgrounds can improve their experience

Creative digital solutions to improve diversity, equity, and inclusion in clinical trials

Clinical trials historically have failed to consistently report participant demographics, let alone consider participants' social determinants of health. Digital innovators are now increasing diversity, equity, and inclusion in this crucial step.

Jerusalem-based YonaLink is streamlining the flow of clinical data from medical labs and centers to clinical trial databases. Automatically converting and analyzing data from electronic health records can decrease both processing time and errors while increasing the number of centers and labs—and therefore patients—that can participate in trials.

Virtonomy, a medical equipment manufacturer in Munich, is developing a database of virtual human anatomy to allow for rapid testing and simulation of medical devices. The virtual patients are based on CT scans from living patients with diverse ethnicity, age, height, weight, gender, pathological background, and geographic origin.

Adopting an approach specific to disease areas, TrialJectory, an AI-powered decision support platform based in New York, is connecting cancer patients with clinical trials by allowing patients to view treatment plans and options tailored to their specific diagnoses.

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[19] Sonia Thompson, "Data shows consumers want diversity in marketing—why many brands struggle to get it right and how to fix," *Forbes*, February 5, 2020.

with and the efficacy of a digital product, whether it's a medical device or an interactive platform. While many digital tools integrate various language options, failing to address cultural context remains a barrier to adoption. SameSky Health of North Hollywood, California, partners with health plans to create messages customized for each patient based on their cultural background, language, and preferred mode of communication. Patients receive culturally aligned responses from a real human in one of 30 supported languages via their preferred channel. Lowering linguistic, cultural, and educational barriers helps ensure patients can complete annual wellness checks, satisfy urgent care needs, fulfill their social needs by connecting patients to one another, and manage chronic conditions.

— *Partner with communities.* Patients do not necessarily trust services offered by organizations outside of their community. Tools such as big data and social media can improve efficiency and efficacy, but community outreach still depends on local relationships and human connections. Community partnerships can help introduce a product or service to a population, provide community-

level data that can be used to identify and track gaps in care, and support the users of new digital solutions. To do this, it is important to connect with trusted local leaders outside of the healthcare realm. For instance, researchers cite local churches and clergy as trusted conduits of healthcare information within Black communities.[20] Digital innovators can collaborate and engage with communities via social media, neighborhood centers, schools, nurse navigators, and local congregations.

The returns on health equity

Digital innovators have an unprecedented opportunity to think more carefully about health equity and develop new solutions to entrenched healthcare problems. They must begin by considering how inequities in access limit the number of "reachable" patients and by determining which dimension of health inequity their solution could address. Then they must do the hard work of developing and implementing digital solutions that align with that health equity goal. Digital innovators who can move the needle on health equity will improve the lives of patients, increase the efficacy of healthcare systems, and have a positive impact on the greater economy.

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[20] Lisa M. Brown et al., "African American faith communities and public health: working at the Intersections of COVID-19," *Human Arenas*, March 6, 2021.