

A QUICK LOOK AT DIGITAL HEALTH

WHAT'S NEW AND WHAT'S NEXT

The landscape of digital health is evolving so rapidly there is no fixed, standard definition of "digital health." Although the definitions are fuzzy and the borders are ever-changing, the impact of digital health is revolutionary and accelerating.

Digital health is a broad term for the use of digital technologies – including telehealth, sensors, electronic databases, artificial intelligence, and the list goes on – for collecting, sharing, and integrating data to improve individual and population health.

One area of promise for digital health is to accurately predict the future, so our default approach to personal and public health can be proactive vs. reactive. Yet – as with any powerful set of tools – there are risks and challenges along with opportunities.

Opportunities

1. Enable broad-scale access to care and information

One of the starting points for digital health was instant access by individuals to a literal Web of health knowledge. And not just the ability to look up static information about conditions or care, but to access communities in real time. Ad hoc interest groups – particularly around rare diseases or conditions – are among the greatest success stories in how a global Internet has transformed access to knowledge, accelerated connection, and improved access to diagnosis, treatment, and care. And the connections continue to grow.

2. Expand data collection

Cellphones, smart watches, specialized health trackers (like continuous glucose monitors), and even fabrics can collect individuals' real-time health data, supplemented by data from in-home, "Internet of Things" devices like smart scales and toothbrushes. At the same time, sensors can monitor toxins, pollution, noise levels, and other environmental conditions in an area that affect residents' health -- this can range in scale from monitoring a single person or home up to tracking regional or even global trends.

Data context

21 gigabytes

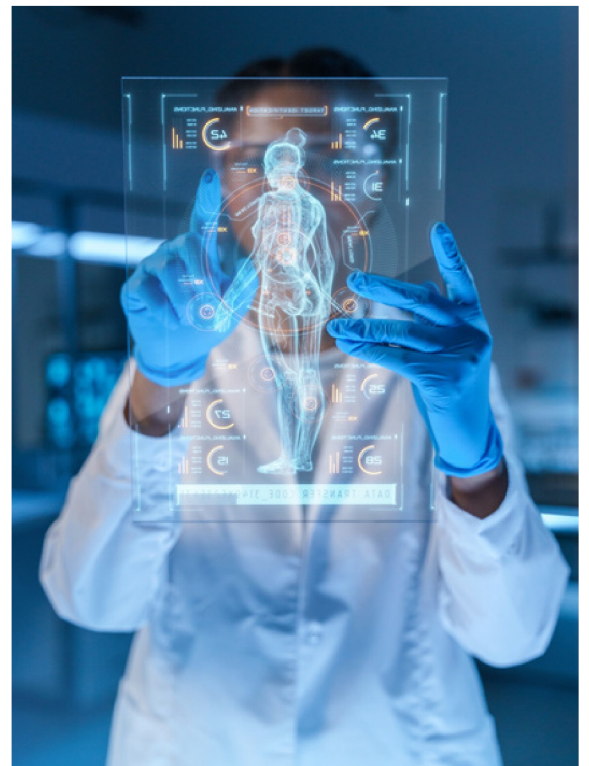
The total storage required for the text of the [English-language Wikipedia](#) (6.6 million articles).

2,000,000+ gigabytes

The personal health data of just one individual: [Michael Snyder, PhD](#), Director of the Stanford Center for Genomics and Personalized Medicine; this is an outlier today, but speaks to the future of individuals' health data.

30%

The volume of the world's [data generated by the health care industry](#) – data in health is growing faster than in any other industry.



3. Revolutionize data analysis

The unprecedented scale of data collection and integration (e.g. Apple Health can store and track 150+ types of personal health data) analyzed by increasingly sophisticated algorithms can discern patterns and forecast future health outcomes and risks for an individual, a population, or a region.

4. Improve health related decision-making

A key promise of digital health is to gather enough context to improve decision making – both immediate and long-term, small-scale and global. Having access to enough data impacts real-time decision making. E.g.:

- Continuous glucose monitors provide individuals (including those without diabetes) a real-time picture of how metabolism reacts to dietary choices.
- Whole genome (DNA) sequencing is increasingly being used to assess individuals' future health risks.
- Wastewater monitoring is tracking the regional spread of COVID-19, polio, and other diseases.

Challenges

1. Data security and privacy

Personal health information is protected by HIPAA within health care systems (which are still vulnerable to cyberattack), but an increasing amount of personally-generated digital health data has few (if any) protective measures in place. Increasingly, it's possible for outside entities to take advantage of individuals' health data.

2. Data integration

It can be challenging (or impossible) to access your own digital health data and/or to integrate it with your traditional health records. E.g.: it's hard to share data from your smart devices with your doctor.

3. Governance and regulation

Some digital health tools fall under the jurisdiction of the Food and Drug Administration, including specific tools designated “software as a medical device” (SaMD). Still, many areas of digital health have limited oversight, and the rate of change and complexity of the field makes it almost impossible for regulators to address issues in a timely way.

Words to know

The landscape of digital health is ever-expanding. This is by no means a comprehensive list, but these are some key terms worth learning more about. Links are to .gov sites providing definitions and context:

- [Telehealth](#)
- [Wearables](#)
- [Patient-generated data](#)
- [Digital divide](#)
- [Interoperability](#)
- [Health Information Technology](#)
- [Precision medicine](#)
- [Health care analytics](#)
- [Digital health literacy](#)
- [Human-centered design](#)
- [Extended reality, AR/VR](#)
- [Mobile health/mHealth](#)

Further reading

In addition to the "words to know," we recommend a few broader resources to help understand the digital health arena:

- [The Promise of Digital Health: Then, Now, and the Future](#), June 27, 2022; National Academy of Medicine
- [Global Strategy on Digital Health](#), 2021; World Health Organization

A note about AI

"What's the impact of artificial intelligence?" is the trillion dollar question driving virtually every aspect of digital health. AI is exponentially evolving and being applied broadly to every area of the digital landscape – including health and research. For more, visit the [NIST AI page](#) and the [NIH AI page](#), both of which capture current approaches to integrating AI into in S&T and into health and medicine.

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