ECONOMIST IMPACT

Advancing the frontier of health and technology integration

The 2023 Digital Health Barometer

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Contents

About this report

Advancing the frontier of health and technology integration: the 2023 Digital Health Barometer is a report by Economist Impact. It describes attitudes and research on digital health across ten countries: Australia, Brazil, France, Germany, Japan, Mexico, South Korea, Spain, the UK (insights from UK consider England, unless stated otherwise) and the US.

A literature search was performed to assess the landscape and to complement a search of grey literature that assesses governance structures and frameworks. In addition, a range of experts were interviewed, including policymakers, clinicians, academics and industry experts, and a field survey was conducted through Computer-Assisted Telephone Interview (CATI) and online among 100 patient consumers in each country. Respondents had all accessed healthcare services outside of primary care within the previous 12 months.

We would particularly like to thank the following experts, listed in alphabetical order by country, who contributed through these interviews:

Australia

- **David Hansen**, CEO at Australian e-Health Research Centre, CSIRO
- **Mark Brommeyer**, senior lecturer in healthcare management at Flinders University and fellow of the Australasian Institute of Digital Health

Brazil

- **Cesar Filho**, co-founder and CEO of WeCancer
- **Thiago Julio**, medical director at Memed and director of technology at the Paulista Society of Radiology

France

- **Alexandre Blanchot**, business development manager at Medexprim EU
- **Aymeric Perchant**, project director of the eHealth delegation, French Ministry of Health and Prevention
- **Louisa Stuwe**, project director of the eHealth delegation, French Ministry of Health and Prevention

Germany

- **Anne Sophie Geier**, managing director at the German Digital Healthcare Association

- **Elgar Fleisch**, professor of information and technology management at ETH Zurich and the University of St Gallen

Japan

- **Charles Sky**, vice president of Medtech & Life Sciences
- **Takashi Okumura**, professor and director of Health Administration Centre at the Kitami Institute of Technology

Mexico

- **Javier Kuri**, president of the Mexican Association of Robotic Surgery
- **Jesús Hernández**, founder CEO at WeeCompany and president of the Asociación HealthTech México (HealthTech Association Mexico)

South Korea

- **Dukyong Yoon**, associate professor at Yonsei University and founder of AI Software Company
- **Ruslan Tursunov**, director and head of digital health & life science at Intralink Korea

Spain

- **Jorge Gonzalez**, director of Ticbiomed
- **Joan Torrent-Sellens**, full professor of economics at the Faculty of Economics & Business Studies, Open University of Catalonia (Universitat Oberta de Catalunya)

UK

- **Andrew Davies**, director of digital health at the Association of British HealthTech Industries
- **Charles Lowe**, chief executive of Digital Health and Care Alliance
- **Julian David**, chief executive officer at techUK
- **Leontina Postelnicu**, head of health and social care at techUK

US

- **Jeff Burnstein**, president at the Association for Advancing Automation
- **Maulik Majmudar** MD, chief medical officer and co-founder of Biofourmis
- **Smit Patel**, innovation lead at Digital Medicine Society (DiME)
- **Luis Fernandez Luque**,* chief scientific officer at Adhera HealthInc – an adaptive self-management platform company in California

The research for this report was led by **Maryanne Sakai**, with research conducted by **Anelia Boshnakova**, **Alcir Santos Neto** and **Ari Smith**, and with contributions by **Michael Guterbock** and **Amanda Stucke**.
This report was written by **Adam Green** and edited by **Maria Carter**.

* Luque was also able to provide insight on Spain due to his previous experience.

Executive summary

Health systems around the world are embracing digital technology at every point in the patient journey, from consultation and diagnosis to treatment and monitoring, thanks to rapid improvements in capabilities such as artificial intelligence, connected devices, data analytics and digital therapeutics.

Such tools are promising given the rising burden of chronic diseases that healthcare systems are struggling to respond to in a cost-effective, equitable and sustainable way. Disease management, continuous monitoring and tracking and behavioural interventions are critical interventions for conditions like heart disease, diabetes and cancer, in contrast to infectious diseases and acute emergencies, but modern health systems have not been built to handle the numbers of patients with these chronic conditions, according to Elgar Fleisch, professor of Information and Technology Management at ETH Zurich and the University of St Gallen.

Digital health technologies demonstrate value, but integrating them into health systems is challenging. Solutions are not always designed with the needs of clinicians and patients in mind, and the data and technology environment can become increasingly complex and fragmented. New approaches to clinical validation and regulatory approval are required, but these take time to develop. Socioeconomic inequalities, such as unequal internet access and varying levels of digital literacy, can mean that such disparities widen in the rush to roll out digital health solutions.

This Economist Impact white paper combined a ten-country barometer covering Australia, Brazil, France, Germany, Japan, Mexico, South Korea, Spain, UK and the US with a wide-ranging expert-interview programme to assess the enabling environment for digital health across economic, demographic and cultural contexts. This barometer assesses national performance in the provision of key regulatory, institutional, policy

and capability enablers for successfully adopting and deploying health technologies at scale.

Key findings from the research include:

- **Interoperability standards are in place across all but one of the ten countries, but only half of the countries have national-level electronic health record (EHR) systems.** There has been strong progress in creating interoperability standards, but only half the countries score in the highest tier for EHRs, meaning that integration at a national level might be missing or fragmented. Fragmented EHRs lead to greater inefficiency, complexity and costs and the increased potential for errors. Further investment in EHRs will improve patient care and the productivity of healthcare providers, whereby medical professionals can access all of a patient's important information to allow them to provide effective treatment in a timely manner.
- **All ten countries have regulatory foundations for enabling digital health, but do not comprehensively have robust assessments of digital health tools in place.** As digital technologies proliferate, it is essential to have regulatory guidance and systems for upholding healthcare safety and quality. On a positive note, the regulatory framework for digital health was the highest scoring indicator overall for the ten countries, showing the existence of comprehensive legislation for allowing electronic access to health data, governing the sharing of data, and protecting privacy. However, four of the countries lack an established technology assessment mechanism for digital tools. Modernised and adapted health technology assessments (HTAs) are essential for equipping consumers, practitioners and patients with the correct information to determine which tools are validated and proven.
- **Digital health solutions are not always user-friendly or accessible for either clinicians or patients.** Digital health tools must be aligned with the skills and training of the healthcare workforce, including cross-generational cohorts, and should be accessible to patients. According to the expert interviewees, this is too often not the case; the onus should be on developers to ensure interfaces and tools can be used by everyone, including people with impairments. Human factors must also be part of product design; rather than relying on technologies and algorithms alone, clinical judgement is required, based on human understanding. Similarly, technologies should be tailored to the ecosystem that patients are familiar with.
- **Digital health initiatives may widen social inequality.** The use of digital technologies may, in the short term, increase inequalities associated with older age and lower educational attainment and socioeconomic levels. Health literacy is critical for tackling this divergence. Only four out of the

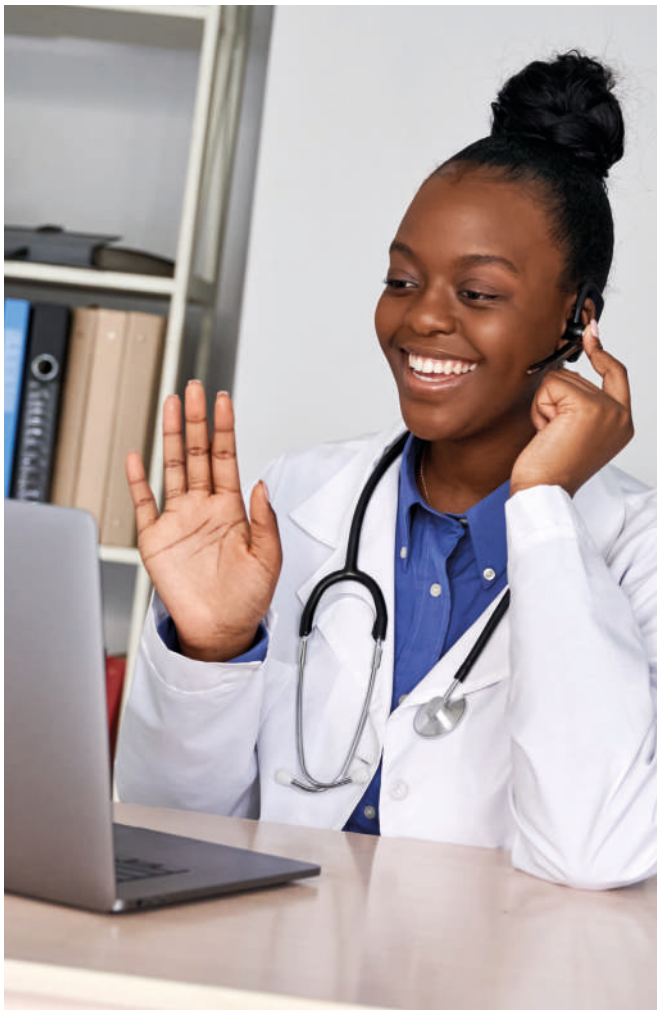
ten countries have digital health literacy programmes for patients and the general population or a national action plan or strategy on health literacy. In Japan, for example, 71% of the surveyed population are not regular digital healthcare users, but about a third of them seem comfortable using technology to interact with health services. The Japanese government delivers several activities for raising the public's awareness and use of digital health; they provide a public relations flyer for patients and the general public describing how to use telemedicine services and explaining their advantages. Japan also developed a specialised website with videos that promote the integration of health services. Internet access is constrained at a national level in Japan, as well as within other specific countries.

- **Widening access to telehealth services, particularly in remote areas, should be a priority**. Since the beginning of the covid-19 pandemic, national telehealth programmes have expanded, allowing patients to control more of their healthcare needs in a more flexible way. Most of the countries have telehealth programmes for remote patient monitoring, but only four (Australia, France, Germany and UK) have implementation monitoring systems. England, for example, has a programme for creating a commissioning environment that supports the use of technology to improve health outcomes and deliver more cost-effective services. In addition to its focus on implementation, the NHS England Technology Enabled Care Services (TECS) measures and evaluates the service. In Australia, priority has been given to widening access to health services in rural and remote areas, and the planning and evaluation of a permanent telehealth system is under development.

Chapter I: Digital health: a systems perspective

Digital technology offers proven benefits for healthcare, improving the efficiency of existing care pathways and offering new approaches to treatment, such as virtual wards and remote management. Automated tools can review scans and x-rays, transcribe notes, and predict patient outcomes. EHRs facilitate the storage, sharing and analysis of health data and enable research into both public health epidemiological trends and service design and performance.

According to Maulik Majmudar MD, Chief Medical Officer and Co-Founder at Biofourmis in the US, telemedicine gives patients convenient access to care and allows resource-constrained countries to 'right-size' their workforce, thus lowering divergences between urban and rural populations. Digital technologies are especially well suited to chronic disease management. Apps and wearable devices enable continuous, accurate monitoring of vital indicators including blood glucose, heart rate and blood pressure. Such innovations will continue to develop as the world continues to experience an "eruption of general-purpose technologies, especially AI and digital platforms," as pointed out by Joan Torrent-Sellens, full professor of economics at the Faculty of Economics & Business Studies, Open University of Catalonia (Universitat Oberta de Catalunya) in Spain.



Although digital health technologies offer a step change in efficiency, accuracy and flexibility, they do not exist in a vacuum; they require regulatory and clinical oversight to uphold standards and guide reimbursement. Patients and medical professionals must have the appropriate skills, and should be involved in design and development processes to encourage their proper use.

Risks also need to be addressed, from data privacy and security to attrition and faulty usage, and a holistic approach and stakeholder collaboration are necessary for successfully embedding digital technology in existing health systems. "The determining factor is not information technology, but the healthcare system itself, that would allow optimisation," says Takashi Okumura, professor and director of Health Administration Centre at Japan's Kitami Institute of Technology.

In its assessment of the digital health environment across ten countries, the *2023 Digital Health Barometer* considers a range of economic, demographic and social contexts, from advanced economies to emerging markets.

The scores shown in Table 1 relate to three core pillars that determine the adoption of digital health, and they outline emerging trends and patterns. Each pillar is divided into specific indicators to enhance understanding of the domain under assessment. Details of the Barometer scores are given in the Appendix.

Table 1: Individual country scores on the 2023 Digital Health Barometer

Core pillar	Score range*	Australia	Brazil	France	Germany	Japan	Mexico	South Korea	Spain	UK†	US
Policy and governance	0–10	10	9	7	10	8	4	8	10	8	7
Adoption and acceptance	0–14	14	7	12	12	12	5	9	10	12	10
Implementation of digital health	0–10	10	8	8	9	7	4	6	7	9	5

3-4/10 or 4-6/14 5-6/10 or 7-9/14 7-8/10 or 10-12/14 9-10/10 or 13-14/14

*Higher scores are better

† As the UK has a devolved health provision for the four constituent countries - England, Scotland, Wales and Northern Ireland - the scores for some indicators are based on information relevant for England, which has the largest number of residents

Source: Economist Impact

I.1 Countries have put in place regulatory frameworks, but more than half lack a fully developed national digital health strategy

Table 2: National digital health strategy and regulatory framework indicators

Policy and governance	Score range*	Australia	Brazil	France	Germany	Japan	Mexico	South Korea	Spain	UK†	US
1.1 National digital health strategy	0–4	4	4	1	4	3	0	3	4	2	2
1.2 Regulatory framework	0–4	4	4	4	4	4	4	3	4	4	4

0 1 2 3 4

*Higher scores are better

† As the UK has a devolved health provision for the four constituent countries - England, Scotland, Wales and Northern Ireland - the scores for some indicators are based on information relevant for England, which has the largest number of residents

Source: Economist Impact

Digital technologies are essential for ensuring that more people benefit from universal health coverage, are better protected from health emergencies, and enjoy better health and wellbeing.[1] But this requires a well-developed policy and regulatory environment.

As mentioned previously, the regulatory framework was the highest-scoring indicator overall, with only one country scoring below the maximum score (Table 2). This shows broad engagement in four digital health actions: allowing people access to their health electronic data in EHRs; providing governance for sharing digital data between health professionals and between health service providers and research entities; protecting the privacy of individual's health data held in EHRs; and protecting the privacy of their identifiable data.

Results from the survey conducted by Economist Impact highlight that approximately two-thirds of healthcare consumers would be "somewhat comfortable" or "very comfortable" about their healthcare providers using their data for preventive treatment in the future. Nonetheless, privacy is their top concern, especially in Australia, France, Mexico and Spain, where 48%, 45%, 45% and 54%, respectively, of the surveyed population considered it to be the most important factor in their decision to use a new health technology. Respondents in South Korea and Japan are the most sceptical about the ability of health technology to safeguard patient data.

Country performance is weaker in terms of the presence of a digital health strategy. Nine of the ten countries have a strategy, but only four achieve the full score of 4/4, with evidence of national digital health strategies that include

an evaluation and monitoring plan, budget or funding details, and an implementation plan.

National digital health strategies coordinate, target and demonstrate political will to improve access to technology. Defining a specific strategy can help ensure such technologies are not just 'layered on' to a system that is not accessible.[2] "If you want to create a digital ecosystem you need one leader," says Alexandre Blanchot, Business Development Manager at Medexprim EU, "you need an entity that will develop and scale and guide everybody in the same direction properly".

A national strategy is especially important during times of rapid technological change. "The healthcare system is in a transformation process," says Anne Sophie Geier, Managing Director of the German Digital Healthcare Association. "Stakeholder groups don't know what the outcome of the transformation will be.

Some healthcare professionals are hesitant and dismissive regarding new technologies. Because of this lack of vision or knowledge, the atmosphere is not as pro-innovation as it could be. The [German] Ministry of Health came up with a digital health strategy in March this year to bring everybody together to try to see the vision."

The consulted experts also consider that national plans should be highly inclusive. "It is important to include the representatives of the different healthcare professionals in the process," says Geier. "If you bring in something new on top of everything healthcare professionals need to do, you need to integrate it in their daily life in an easy and fast way. You need to also give some incentive, otherwise it's really hard to get the time in regarding other priorities; give the opportunity for them to test it, if possible."

I.2 The majority of countries have digital health governance institutions in place, with a recent increase in their formation

Table 3: Digital health governance indicator

Policy and governance	Score range*	Australia	Brazil	France	Germany	Japan	Mexico	South Korea	Spain	UK†	US
1.3 Digital health governance	0–1	1	1	1	1	1	0	1	1	1	1

0 1

*Score of 1 if there is an institutionalised digital health governance structure responsible for coordination with other departments or ministries and for monitoring the implementation of digital health

† As the UK has a devolved health provision for the four constituent countries - England, Scotland, Wales and Northern Ireland - the scores for some indicators are based on information relevant for England, which has the largest number of residents

Source: Economist Impact

Successful implementation of a digital health system depends on a foundation of good digital health governance, which allows the coordination of stakeholders. Countries need an institutionalised structure that is responsible for coordinating with other departments or ministries and for monitoring the implementation of digital health policies. Positively, nine out of ten countries score the maximum for digital health governance, with the exception of Mexico (Table 3), with health institutions that support the health ministry.

Taking France as an example, its digital health agency (Agence du Numérique en Santé; ANS) is an institutional actor within the Ministry of Health that works to create the optimum conditions for developing and regulating digital health and to assist the public authorities in the conduct of digital projects of national interest (Table 4).

A number of similar institutions emerged recently. The government of Japan established the Headquarters for Medical Digital Transformation (DX) Promotion within the Cabinet Office in October 2022, and Spain's Interterritorial Council of the National Health System agreed in 2021 to create a Digital Health Commission to contribute to co-governance with the Autonomous Communities (the self-governing regions of the country) and facilitate the adoption of agreements that ensure the interoperability of projects and initiatives by different public administrations. South Korea is in the early stages of developing an institutionalised digital health governance structure responsible for coordinating with other departments or ministries, and for monitoring the implementation of digital health under the Ministry of Health and Welfare.[3]

While Mexico lacks a specific agency for digital health, its Digital Agency of Public Innovation (Agencia Digital de Innovación Pública) is responsible for the implementation, coordination and monitoring of digital technology in all

sectors. It also has a governing body (the Federal Commission for the Protection against Sanitary Risk; Comisión Federal para la Protección contra Riesgos Sanitarios (COFEPRIS)), which is described as an analogue of the US Food and Drug Administration (FDA), to control the approval of technologies, medicines and any new products. But there are challenges with the approvals process, as outlined by Javier Kuri, President of the Mexican Association of Robotic Surgery, including lengthy waiting times. Jesús Hernández Camacho, Founder CEO at WeeCompany and President of the Asociación HealthTech México (HealthTech Association Mexico), comments, "We are currently having several conversations with the Senate and starting to present initiatives to change the law in order to have a new and improved model".

Table 4: Institutions responsible for digital health governance in each of the ten countries

Country	Digital health governance institutions
Australia	Australian Digital Health Agency
Brazil	Secretaria de Informação e Saúde Digital (SEIDIGI)
France	Agence du Numérique en Santé (ANS), Digital Health Agency (works as an institutional actor of the Ministry of Health)
Germany	Federal Government
Japan	Headquarters for Medical Digital Transformation (DX) Promotion within the Cabinet Office
Mexico	La Agencia Digital de Innovación Pública
South Korea	Currently under development within the Ministry of Health and Welfare
Spain	The Interterritorial Council of the National Health System has agreed to create the Digital Health Commission
UK	NHS England
US	Office of the National Coordinator for Health Information Technology (ONC)

Source: Economist Impact

I.3 Assessment of digital tools, through an HTA mechanism, is not in place across the board

While all but one country has clinical guidelines for digital tools, four out of ten countries do not carry out reviews through specific technology assessment mechanisms, making this one of the lowest scoring indicators overall. Assessments of digital health products require the same level of scrutiny, rigour and pragmatism as pharmaceuticals, relating to scientific evidence, the quality of data, and privacy and regulatory concerns.[4] "Clinical validation of technologies shows what benefits they bring, and this is helpful for policymakers, for healthcare insurance, but also for healthcare professionals because they can compare it also with other opportunities they have and choose the best one. This will bring medical excellence to the market," says Geier.

"Clinical validation is absolutely crucial and to not do so is reckless, because you're endangering patients," says Mark Brommeyer, senior lecturer in Healthcare Management at Flinders University in Australia. Australia scored maximum points for this indicator, and has several advisory and regulatory bodies to provide HTAs and advise on findings. The Therapeutic Goods Administration (TGA) assesses the safety, quality and efficacy of new health technologies and has taken on an expanded role for approving medical software, facilitating a quicker evidence and evaluation process. In keeping with their national eHealth policy, France's Agence du Numérique en Santé is responsible for digital health ecosystem transformation and implementation.

Spain has launched an initiative to speed up the adoption of digital health applications across clinical validation, regulatory process, financing and procurement models. According to the European Institute of Innovation and Technology (EIT) Health in Spain, the project has a core group of fourteen experts and aims to establish a roadmap and recommend feasible solutions to decision-makers for accelerating the delivery of applications to patients and the market, while reducing barriers to innovators. Stakeholders from across the health-innovation value chain will be invited to participate in consultations and workshops, with the goal of reaching a minimum consensus for harmonisation in the processes of evaluation, adoption and financing of digital health applications in the country, as well as facilitate the scalability of solutions.

Key challenges currently facing countries, according to EIT Health, include a lack of methods and data for real-world evidence generation to demonstrate the medical benefits of digital health technology, as well as skills shortages among HTA staff, caregivers and patients.

"Clinical validation is absolutely crucial and to not do so is reckless, because you're endangering patients."

Mark Brommeyer, senior lecturer in Healthcare Management at Flinders University, Australia.

I.4 Only three countries have fully integrated care-delivery models

Integrated care systems are those that effectively coordinate primary, secondary and tertiary care, often via multidisciplinary care teams, to ensure patients receive an appropriate level of care across all levels of the healthcare system and do not 'fall through the cracks'. Incorporating digital tools is essential for driving an integrated model of care that allows effective communication between providers.[5] While nine countries (all but Mexico) have integrated care-delivery models, only three have it as their predominant care-delivery model. Others have integrated care models adopted by some providers or in specific disease areas such as oncology.

Integrated care is the predominant model in Japan for the elderly population (over 75 years) as outlined in their policy, the Community-based Integrated Care System. The 'baby boomer' generation will be in this age bracket by 2025, when the country expects their healthcare, nursing care, prevention, housing and livelihood support to be provided comprehensively in everyday living areas.[6,7] In the UK, the formation of integrated-care partnerships was originally a voluntary process, but this changed following legislative recommendations to the government with the passage of the Health and Care Act 2022.[8,9]

Countries without an integrated model show ambition to achieve one. On 15 October 2022, the Mexican Secretary of Health issued an official notification on the creation of an integrated healthcare model called Modelo de Atención a la Salud para el Bienestar (MAS-Bienestar), which proposes an integrated health service networks model for its health system.[10,11]

I.5 Health systems are embracing person-centred care

There is increasing emphasis on patient-centred care, whereby patients are treated as equal partners in a personalised approach to their own care, and which digital technology can help facilitate.[12] "There is a big trend towards self-service medicine," explains Professor Fleisch. "The consumer wants that."

But it requires a joined-up approach to deliver meaningful outcomes. "For a while, we thought that access to information is the key, but that is not true. If you have information, but the patient doesn't have self-efficacy to know what to do with that, nothing will happen. We need to address patient self-efficacy and autonomy and, for that, meaningful patient involvement is key." This was the opinion of Luis Fernandez Luque, Chief Scientific Officer at Adhera Health – an adaptive self-management platform company in the US. The Economist Impact survey indicates that patients are more likely to use a new technology if it is easy to use and understand, with 37.7% stating ease of use as the most important factor in their decision to use it, and 25.6% prioritising ease of understanding the information provided.

Six of the ten countries show evidence of shared decision-making between healthcare providers and patients. In Germany, for example, the Law on Patients' Rights was standardised in 2013, covering all rights and responsibilities regarding medical care for patients in the country. It includes rights on informed decisions, comprehensive and comprehensible information, and decisions based on the clinician–patient partnership.[13]

South Korea launched a patient-centred clinical research task force in 2018. Their smart hospital projects in 2023 include the development of a patient-centred communication model using digital technology.[14–16]

I.6 Interoperability standards are present in all but one country

Data interoperability requires the adoption and implementation of common and (ideally) open standards. Lack of interoperability limits the re-use of data between healthcare organisations within a country and across borders. The rise of cloud platforms and mobile technology further complicates the data environment. "Data gets captured and it is quite complex and hard to share," says David Hansen, CEO of the Australian e-Health Research Centre, CSIRO. "When shared, it is often not computable. Human intervention is needed to do analytics and this is really expensive."

All countries except Spain achieve the highest score on this indicator, demonstrating that digital health and health information industry-based technical standards for data exchange, transmission, messaging, security, privacy and hardware are in use in the majority of applications and systems to ensure the availability of high-quality data.

In the UK, the non-profit, sector-led organisation Digital Health and Care Alliance focuses on scalability and interoperability, with the aim of creating collaborative business models through the promotion of open standards, collaborative architectures and interoperability.

"Data gets captured and it is quite complex and hard to share, when shared it is often not computable. Human intervention is needed to do analytics and this is really expensive."

David Hansen, CEO of the Australian e-Health Research Centre, CSIRO

In Australia, Hansen explains, the use of a Fast Healthcare Interoperability Resources (FHIR) standard from Health Level Seven International (HL7) is helping to standardise how data is exchanged. HL7 is the authority on standards for health technology interoperability.

Brazil established the National Health Data Network (RNDS) and Germany introduced electronic health cards (Elektronische Gesundheitskarte; eGK), which allow the standardised exchange of information across healthcare sectors. General Data Protection Regulation (GDPR) also provides certain privileges and exemptions from the strict requirements applied on the exchange of health data with other companies. Increasing the use of standards across the ecosystem will greatly help with technology integration.

I.7 Access to internet: Paving the last mile

Digital health literacy and internet connectivity are 'super' social determinants of health, as they have the power to affect the wider social determinants of health.[17] Although the use of digital tools – such as apps, patient portals, and monitoring devices – provides better support beyond clinical settings, greater reliance on them can increase the disparity between people with digital access and skills and those without, and (by extension) health disparities.[18] "One of the major concerns globally in digital health has been tech equity," says Majmudar. "The digital divide could worsen. You need access to the internet, tools and resources. Every country should focus on connectivity, including the US. Can people afford the data plans they need to access telemedicine and remote care? Do we have connectivity in every area, urban or rural?"

According to Charles Sky, Vice President of Medtech & Life Sciences in Japan, "Even in Japan, a developed and technologically advanced market, a significant portion of the population is geriatric and does not use smartphones, limiting the utility and adoption of an app-based digital healthcare solution. There's also the inherent challenge of the language: messages targeted to non-clinicians (e.g. laymen, patients, patients' next of kin) are structured differently from those targeted at clinicians. You need to communicate to your users in the right way."

"One of the major concerns globally in digital health has been tech equity, the digital divide could worsen. You need access to the internet, tools and resources... can people afford the data plans they need to access telemedicine and remote care? Do we have connectivity in every area, urban or rural? "

Maulik Majmudar, chief medical officer and co-founder of Biofourmis.

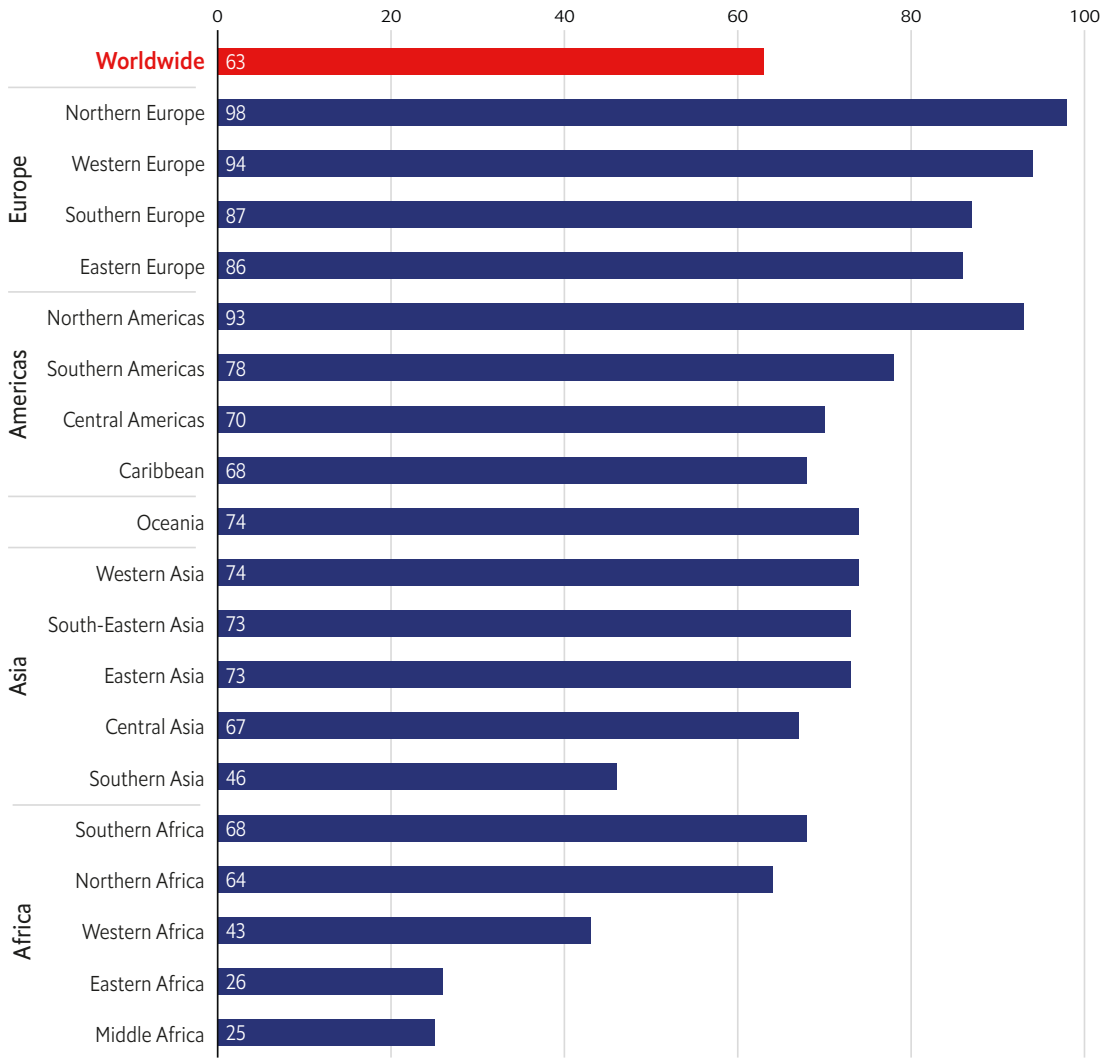
Professor Torrent-Sellens made a similar observation. "Often the problem of the success of digitalisation is the problem of the use of digitalisation. Despite the returns in terms of efficiency or effectiveness of the technical use of digitalisation, there are still a large number of people, organisations and social groups that do not use digital techniques or do not use them well. Therefore, public policies must be very careful with the promotion of the appropriate use of technologies, beyond their investment."

High overall penetration rates should not mask the existence of a minority of people without access, who may also be the most vulnerable.

Mexico faces the biggest challenge with access, scoring only 2/4 on the relevant indicator, whereby 62–77% of its population uses the internet. Its government recently announced that they were considering an investment of USD$1.5bn to boost internet connectivity, particularly in rural areas, based on the recognition of the millions who have no internet access.[19]

Brazil and Japan score 3/4 and the other countries have maximum scores, suggesting that more than 86% of their populations use the internet. The percentage of the total population using the internet in a given country or region (the Worldwide internet penetration rate) was 63% in April 2022, according to Statista (Figure 1).

Figure 1: The percentage of the total population using the internet in a given country or region, 2022



Source: Statista
Graphic insight: Economist Impact

I.8 Half of the countries have a fully developed digital-health competencies training system in place

Five of the countries (Australia, France, Mexico, Spain and UK) scored the maximum of 2/2 for digital health competencies, demonstrating that digital health is included in the training curricula for healthcare professionals and in the education curricula for medical students.

Upskilling and reskilling healthcare professionals is critical to the successful adoption and use of digital technology.[20] Digital competence enables individuals to access, retrieve, produce and present information, along with the ability to communicate as a collaborative network.[21] "Practitioners need to be digitally dextrous. They can use their tools and they understand the processes so they can prescribe or administer medications online or order tests or access electronic medical records, having trust in the data – that it's right, accurate, up to date – is really important [for] integrating those technologies into their work practices," explained Brommeyer.

Using health technology also has an impact on a patient's perception of their healthcare practitioner. Indeed, 34.5% of the surveyed population believe that health technology has a "somewhat positive impact" on the quality of care provided by healthcare professionals; 34.2% thought it has a "very positive impact".

This may be a problem for some of the healthcare workforce, Smit Patel of Digital Medicine Society (DiME) in the US points out. "When it comes to sustainability of tech in healthcare [...] policy measures and harmonized regulatory advancements are obligatory for broad acceptance and utilisation of the technology," he cautioned. A recent review identified the seventeen most commonly studied and published digital health competencies for primary care providers (Figure 2).[22] The authors note that many such resources were out of date considering the evolution of technology and application of digital health in recent years.

Figure 2: Digital health competency domains and the number of 2020 published articles containing them[22]

Source: Jimenez G, Spinazze P, Matchar D, et al. Digital health competencies for primary healthcare professionals: a scoping review. Int J Med Inform 2020;143:104260

Graphic insight: Economist Impact

I.9 Digital health literacy is yet to be integrated into national health literacy plans

Digital health literacy is the ability to seek, find, understand and appraise health information from electronic sources and to apply the knowledge gained to addressing or solving a health problem.[23] "There are three communities that need to improve their digital literacy," says Julian David, Chief Executive Officer at techUK. "The first is those responsible for the health provision in the country, the second community is the practitioners in the various layers of the health provision, and the final one is digital literacy among the public and the patients. Digital health literacy is also important for correctly understanding health studies and avoiding misinformation among the latter community."

Australia, Germany, Japan and the US scored the maximum of 2/2, indicating evidence of the availability of health literacy programmes to patients and the general population that cover digital health literacy. For example, the digital inclusion programme, Health My Way (supported by the Australian Digital Health Agency and piloted initially in seven communities before national rollout) supported people aged over 18 years to gain essential digital skills and confidence for managing their health and wellbeing. One success story relates to people aged over 50, who improved their digital health literacy and felt more empowered to venture on to the internet to take ownership of their health and government services.[24]

I.10 EHR systems are normalised but often fragmented

EHRs are electronic medical charts or notes that centralise health data, allowing it to be gathered, managed and shared digitally. They can be used to support decision-making and patient management, and ideally consist of all patient encounters with healthcare services, including the results of laboratory test or imaging. The information can be shared with healthcare providers and available via a patient portal by anyone with access.

This sharing of information has been shown to prevent medication errors due to available data on any drug doses, interactions and allergies, to improve clinical communication and avoid communication errors by connecting prescribers and pharmacists, and to prevent the duplication of tests due to non-siloed information storage.[25]

The introduction of electronic health-information exchange resulted in a reduction in unnecessary repeated imaging by 8.7% (for CTs), 9.1% (for ultrasound) and 13% (for chest x-rays), because providers can access patient records from other providers.[26]

Half of the countries obtained the maximum score of 2/2, which means they have an EHR integrated at a national level. Australia has reportedly spent over AUS$2bn developing, establishing and implementing a national EHR system. "It is a huge investment that was a policy and investment decision the government made to leverage on some of the infrastructure," explains Brommeyer.

The other five countries scored 1/2, which means there are fragmented EHR systems. In the UK, this fragmentation is known to be problematic, with no real integration between departments. "As a result, in the National Health Service there are different budgets, different organisational points and targets, thereby mitigating the best benefit of technology, which is monitoring those metrics as well as the lifetime management of a patient's health" says David.

One study shows that the introduction of electronic health-information exchange resulted in a reduction in unnecessary repeated imaging by 8.7% (for CTs), 9.1% (for ultrasound) and 13% (for chest x-rays), because providers can access patient records from other providers.[26] However, nearly a third of patients who visited a doctor in the US in 2018 reported a breakdown in information exchange, such as having to repeat a laboratory test or re-provide imaging results. Poor continuity of care, like this, is said to be the reason why patients 'fall through the cracks' and may be a cause for the worsened life expectancy in the US compared to equivalent nations.[27]

The existence of EHRs and other digitised tools and services introduces concerns about data security. According to Patel, "There are substantial privacy and security risks, specifically for the sensitive and personal health information, when external digital tools are integrated into existing platform solutions, leaving vulnerabilities that can be exploited. We need to think about what level of software integration is happening, the level of compliance, who is impacted, and ethical implications. We need harmonised approaches and guidance for ethical, safe and effective integration of novel tech tools in healthcare".

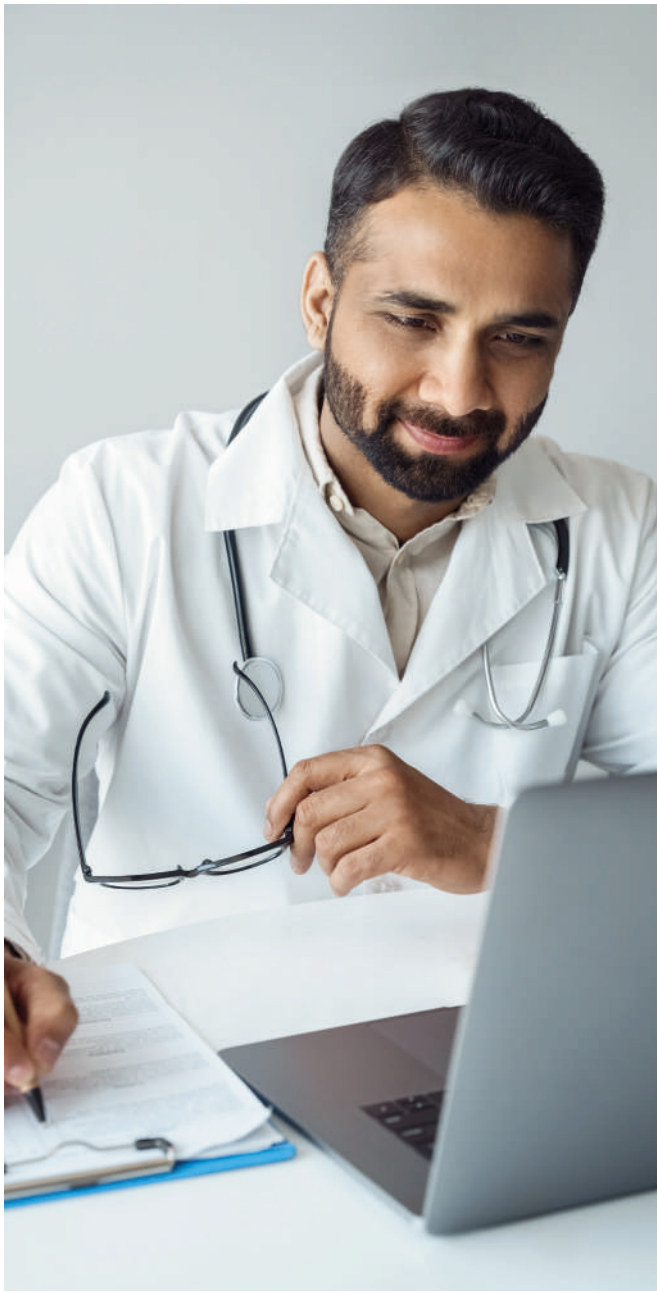
I.11 Telehealth programmes for remote patient monitoring

Telehealth was originally designed to provide health access for remote and underserved patients. Its usage has increased since the start of the covid-19 pandemic, tackling issues of provider shortages and improving the efficiency of delivery. Research shows that it has had a positive effect on the quality of healthcare delivered.[28]

Seven of the ten countries score a maximum of 2/2, showing widespread engagement in telehealth solutions. While Mexico has no national programme, 44% of its surveyed population report using technology to attend virtual healthcare appointments, and 69% say they used technology to share health information with a healthcare professional in the previous year. There are regional and local programmes, and experts hope that telemedicine can help address the country's urban–rural inequality. Camacho says, "Physicians and health providers are moving to the big cities. As a result we do not have much quality services in the small cities. This is a problem. A new operational model needs to be established".

Countries should include patient health literacy in their telemedicine expansion efforts, which is often neglected, say the experts. "Many assume that the patient will understand why they are being monitored, and that's often not the case. Many will stop using the technology," says Luque. "The recommendation is to design technology in a way that patients feel [they] receive value every day".

Telemedicine can also be practised beyond a national border. Professor Torrent-Sellens explains, "In recent research on the uses and results of international telemedicine in Latin America, we have discovered that, in the right



context, the uses of international telemedicine are positive both for the health system where the service is provided (logically) and for the national health system from where the service is provided (no longer so logical). In other words, contact and cooperation between health professionals and agents, even if they are from health systems in different countries, can generate knowledge spillover effects and very positive results. I think we need to start thinking in terms of global health and less in terms of national health".

Data on telehealth incidence (attending virtual healthcare appointments) in 2022, from the sample of 100 people surveyed in each country, are shown in Table 5.

Table 5: Economist Impact survey results on telehealth incidence in 2022

Country	Telehealth incidence* in 2022 (%)
Australia	46
Brazil	58
France	44
Germany	24
Japan	17
Mexico	44
South Korea	27
Spain	42
UK	50
US	59

*Attending virtual healthcare appointments

Source: Economist Impact

Chapter II: Digital health: the road ahead

The trends and expert interviews in the *2023 Digital Health Barometer* highlight critical issues for countries to address in order to maximise the benefits of digital health technologies. Chapter II synthesises both the performance trends and the interviews to identify key areas for improvement.

II.1 Equity and fairness

The digital divide remains large even in developed economies. Nearly half the world's population in 2021, about 3.7 billion people, did not have internet access. More than 80% of populations in the least developed countries were still offline, while 13% and 53% of populations in developed and developing countries, respectively, were unconnected.[29]

More recent data suggests that more than one in six people in the least developed countries still live in areas without mobile broadband coverage, and the high costs of building and deploying infrastructure means that only 28% of the rural population uses the internet.[30]

"Like each new stage of technological change, success is associated with the complementarities that must be developed to guarantee equitable use of the technology and distribution of the benefits."

Joan Torrent-Sellens, Faculty of Economics & Business Studies, Open University of Catalonia (Universitat Oberta de Catalunya)

Connectivity varies widely. In Australia, 91% of the population are active internet users (based on 2021 data), compared to 78.6% in Mexico, thus digital health inequality is evident both within and across nations.[31,32]

Professor Torrent-Sellens gave this word of caution. "Like each new stage of technological change, success is associated with the complementarities that must be developed to guarantee equitable use of the technology and distribution of the benefits."

As governments look to simultaneously maximise their investments in infrastructure and deal with the pressure on health systems, they should look to improved internet access as a critical enabler for digital health innovation.

However, equity means more than digital access. Digital technologies need to be carefully reviewed to ensure they offer fair and unbiased outputs, for example. There have already been instances in which such tools have misfired, such as machine-learning models that are biased against black patients because they assign health risks based on costs – lower health spending on these patients led to an erroneous assumption that the cohort was healthier than its white counterparts.[33]

"AI needs to be trustworthy and the validation of health technology has often been tested in a population that doesn't resemble the real population," says Luque. And Professor Torrent-Sellens states, "We must begin to think about where we want to direct this new digital wave and how we avoid its hidden faces linked to the excessive power of digitised superstars or with the new and emerging problems of addiction, polarisation or exclusion of important groups".

It is thought that digital ecosystems may enable a patient-centred approach owing to the exchange of information among healthcare providers, patients and services.[1] Further, the collected data can lead not only to better outcomes, but also to improvements in health systems.[34]

II.2 Financing and reimbursement

Proving clinical value does not immediately guarantee uptake. Ensuring engagement from payors, whether they are insurers or governments (depending on the context), is critical to success. Uncertainty about reimbursement is one potential barrier to digital health investment.[35] Reimbursement trends are uneven across countries, leading to a fragmented market and, in some countries, like Spain, there are different sub-regional approaches and pathways. Information for some of the ten countries is given in Table 6.[36]

Financing approaches must take account of prevailing norms and expectations. For instance, in the US, early direct-to-consumer efforts in telemedicine visits fall short as consumers are not used to paying for themselves, as compared to Brazil and China. "It depends on the healthcare system and the economic model you are in, and businesses have to adapt to those realities," says Majmudar.

Incentives and accountabilities can also shape financing decisions. In the UK, for instance, the spender and the beneficiary are "rarely in the same organisation as compared to Germany's insurance-based approach," says Charles Lowe, Chief Executive of the UK's Digital Health and Care Alliance. He continues, "Funding and incentives to invest in digital transformation are often not aligned across the NHS and social care. For instance, a local authority might invest in falls-prevention technology, ultimately saving the NHS money by reducing hospital admissions and ambulance call-outs, meaning that local government does not necessarily reap the rewards of their investment. These divisions have meant that although the NHS is fully public, it often provides less coordinated care than public private systems in other countries. The recent move to Integrated Care Systems presents a promising opportunity to address this and deliver a truly integrated health and care system."

Julian David, CEO of techUK, also notes a lack of digital skills in the health system, despite a recent provision of funding for digital transformation.

Financing dynamics are also shaped by regulatory processes, which drive cost. According to Professor Okumura, for instance, "Software is expensive partly because of the regulations required for use in medical care. Research and development costs are therefore more expensive, limiting the use of technology. There has been a call for exemptions to this for software so that they can be deployed in the healthcare system."

Reimbursement is also a challenge in South Korea. The Health Insurance Review and Assessment Service sets reimbursement rates

and covers insurance claims from providers. It has current reimbursement criteria for continuous glucose monitoring, but there is no evidence of reimbursement coverage for insulin pumps, closed-loop insulin delivery systems, smartphone apps, or smart insulin pens. A guideline was released in 2019/2020 about reimbursement for software development, but no health technology has received reimbursement to date, except for a smart watch, according to Ruslan Tursunov, Director and Head of Digital Health & Life Science at Intralink Korea.[38]

Table 6: The reimbursement landscape in selected countries

Country	Public health insurance	Private health insurance	Employer sponsored	Consumer funded
US	Products covered depending on insurance scheme	Most products covered (with some limitations)	Coverage available through direct negotiation	Out-of-pocket payments possible
Germany	Statutory insurance coverage Digital health product directory (DiGA)	Not obliged to cover products but possible through direct negotiation	Not common	Low willingness to pay out-of-pocket
France	Individual funding decisions Some experimental coverage options	Some coverage of specific items	Not common	Low willingness to pay out-of-pocket
UK	No national reimbursement or local organisations for funding and reimbursement	Some products partially covered (but not commonly)	Not common	Low willingness to pay out-of-pocket
Australia	Some schemes available depending on the therapeutic area	Some products covered depending on benefit and efficiency gains	Protection insurance providers may fund digital health	Difficult; co-pays common

Source: Mantovani A et al. Access and reimbursement pathways for digital health solutions and in vitro diagnostic devices: Current scenario and challenges. Front Med Technol 2023;5:1101476.37

II.3 Patient centricity

There is a big move towards self-service medicine, driven by health consumers. "There is vast investment in 'do-it-yourself healthcare', putting the patient or consumer at the centre and putting everything around them," explains Professor Fleisch. Yet there is a need for greater engagement; in some cases, digital technologies are not being fully or appropriately adopted. One study of a cardiovascular health app showed that mean consumer engagement lasts just 4.1 days.[39]

In some cases, digital technologies are not being fully or appropriately adopted. One study of a cardiovascular health app showed that mean consumer engagement lasts just 4.1 days.[39]

There are other studies that demonstrate the unwillingness of patients to engage with available web-based interventions and smartphone apps that may help with lower back pain, despite the high prevalence of the condition. A review of studies showed that attrition rates in both controlled studies and real-world use range from 2.15% for tailored home-exercise programmes, to 82.2% for a study implementing physiotherapy and physical exercise, back pain-specific education and mindfulness and relaxation techniques.[40]

In Spain, several national strategies in specific health areas include the principles of person-centred care and shared decision-making, promoting patients' empowerment and activation. Experts argue that patients need to be supported in the use of digital technologies, rather than have new burdens placed on them. "[Currently], the patient needs to go to the doctor, get a prescription on paper and bring this – in most cases digitally – to their health insurance [provider] to get an activation code. The process is lengthy, and patients can be lost during the process," says Geier.

Doctors often have little time to spend with patients, as little as seven minutes in some cases, which is not enough to explain a solution, obtain consent and interpret data. Further, attitudes to technology differ across demographic groups. "Germans are more sceptical when it comes to new technology, but that scepticism will go away after their first experience. The privacy discussion is driven by the loudest 5% and young healthy individuals, but once they are sick and looking for help they no longer care,'" explains Professor Fleisch.

A study in France, looking at the acceptance of eHealth among people living with HIV, found three distinct groups of users: eHealth believers, technology sceptics, and internet adopters. The technology sceptics were most likely to be women with at least one child, with scepticism evident through behaviours such as an unwillingness to share data, worries about the collection of personal data, having no time to use apps, and finding the use of apps stressful.[41]

GPs in England have expressed concerns about the use of digital virtual care, believing that it can delay diagnosis and treatment due to patients' reluctance to use it, as well as poor access to it and poor digital skills.[42]

II.4 Adoption and acceptance

Adoption of digital health technology by the workforce cannot be assumed. This may be due to apathy or opposition if such tools are not seen as delivering value. EHRs, for example, have been described as being hard to use by clinicians in the US, with some doctors considering them to be time consuming.[43]

An overall lack of awareness and engagement with AI has been noted among doctors in England. Some fear that AI will replace them,[44] while others lack the time or attention required to engage with new tools. "A large number of clinicians consider themselves too busy for digital. We need to educate them that digital technology is their friend," says Lowe. There is great potential to improve patients' opinions of the care they are offered, however, whereby 61% of surveyed respondents agree that healthcare professionals who use the newest technologies offer better treatment; trust in their provider increases by a similar amount if they use the latest technologies.

Others consider that the sudden arrival of so much technology, even though it is intended to help, is overwhelming. "[Health] has long been a [sector] beset by manual processes and has suddenly been hit by a tsunami of new technologies in a very short period of time. AI has been a challenge for physicians to select the right tools and decide what is relevant. For many it has been creating a lot of confusion," states Blanchot.

Patel makes a similar observation. "We have this whole cohort of the excellent healthcare workforce with [a] high-demand technical skills gap in today's digitised world. They understand medicine from the drug side of the world, not the tech side. We need big-tent thinking to embrace digital strategies and programs that integrate new technical skill sets alongside more traditional clinical disciplines." Medical professionals also need to learn a 'Zoom manner' like they did a 'bedside manner', picking up on eye contact and other behaviours online, for instance.

In addition, the Economist Impact survey confirmed that health consumers are looking for an easy-to-use tool that they can trust. They seek information on how to make better health choices and how to live a healthier life. Over 75% of the respondents think that technology has a positive impact on their ability to make better health choices; 77% find technology helpful for understanding information about their health; and 66.5% find the technology to be trustworthy and reliable.

II.5 Digital health companies: best practices

The private sector plays an important role in developing digital health innovations, but experts argue that the sector can improve its approach. One priority is the improvement of focus, and avoiding a tendency to maximise technology usage. "You don't want to give a smartwatch to a patient if it's not mandatory for a specific question," says Blanchot. "It needs to be as non-invasive as possible, something the patient does not think about." He adds that physicians should not be overloaded with data either. Developers need to think about whether to provide raw data or engage teams of physicians to analyse signals and give reports where relevant. "It's very important to understand the day-to-day activity from all the involved parties."

Given the regulatory and market heterogeneity across countries, from legal frameworks and funding to viable price points, companies should consider partnerships to build trust and understand local dynamics. Brommeyer states, "In some countries, it might be a particular software industry association that can recommend or endorse a company. You might need to work with the right clinical associations or professional bodies. When trying to implement something new in healthcare, you want to talk to practitioner groups, medical associations, nursing associations. You need to get experts able to test what you're doing. Getting them involved early in advisory groups is important because they can help you get the right product".

II.6 Digital transformation – with patients at the centre

The speed and potential of digital health technology development cannot be ignored. At a time when health systems are struggling with costs, efficiency, workforce burnout and a rising chronic disease burden, novel approaches must be considered. But too often, technologies do not achieve their intended impact due to factors such as lack of uptake, costs, inadequate review and regulation or complexity.

The *2023 Digital Health Barometer* analysis reveals the need for a strong level of international engagement for building the institutional, regulatory and policy foundations for digital health. Taken together, these pillars will provide any country with the necessary governance, incentives and direction to develop and deploy health technologies safely and efficiently.

Professor Torrent-Sellens comments, "Public health systems are highly stressed by a multitude of demographic, financial, economic and social factors, but it is a mistake to see digital transformation as the solution to all these problems. A new, more personalised medical care model should be possible using the idea of 'complementary intelligences' with the aim of serving an increasingly empowered citizenry in matters of welfare and health."

“Public health systems are highly stressed by a multitude of demographic, financial, economic and social factors, but it is a mistake to see digital transformation as the solution to all these problems. A new, more personalised medical care model should be possible using the idea of ‘complementary intelligences’ with the aim of serving an increasingly empowered citizenry in matters of welfare and health.”

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Appendix

Table 7: Overall scores on the 2023 Digital Health Barometer

Colour key: Score 0 | Score 1/4 | Score 1/2 or 2/4 or 1/3 | Score of 2/3 or 3/ 4 | Maximum score (1, 2, 3 or 4)

The colour of the score varies according to the maximum score that can be obtained for each indicator that is assessed.

Pillar 1: Policy and governance												
Indicator	**Scoring schema**	**Score range**	**Australia**	**Brazil**	**France**	**Germany**	**Japan**	**Mexico**	**South Korea**	**Spain**	**UK***	**US**
1.1 National digital health strategy	1 = The national digital health strategy includes evaluation and monitoring plans 1 = The national digital health strategy includes budget or funding details 1 = The national digital health strategy includes an implementation plan 1 = There is evidence of a national digital health strategy 0 = There is no evidence of a national digital health strategy	0–4	4	4	1	4	3	0	3	4	2	2
1.2 Regulatory framework	1 = Legislation allows patients electronic access to their health data held in EHRs 1 = Legislation governs the sharing of digital data between health professionals, and between health service providers and research entities 1 = Legislation protects the privacy of patients' health data held in EHRs 1 = Legislation protects the privacy of patients' personally identifiable data 0 = There is no evidence of a national legislation for digital health	0–4	4	4	4	4	4	4	3	4	4	4

Indicator	Scoring schema	Score range	Australia	Brazil	France	Germany	Japan	Mexico	South Korea	Spain	UK*	US
1.3 Digital health governance	1 = There is an institutionalised digital health governance structure responsible for coordination with other departments or ministries and for monitoring the implementation of digital health 0 = No institution, department or body exists for the oversight of digital health	0–1	1	1	1	1	1	0	1	1	1	1
1.4 Assessment of digital tools	1 = There is evidence of established technology assessment mechanisms for digital tools (e.g. HTA pathways) 0 = There is no evidence of technology assessment mechanisms for digital tools	0–1	1	0	1	1	0	0	1	1	1	0
Pillar 2: Adoption and acceptance												
Indicator	**Scoring schema**	**Score range**	**Australia**	**Brazil**	**France**	**Germany**	**Japan**	**Mexico**	**South Korea**	**Spain**	**UK***	**US**
2.1 Integrated care-delivery models	2 = Integrated care is the predominant model of care delivery 1 = Integrated care models are adopted by some providers or in some disease areas (e.g. oncology) 0 = Integrated care models are not adopted	0–2	2	1	1	1	2	0	1	1	2	1
2.2 Person-centred care	3 = There is evidence of shared decision-making between healthcare providers and patients 2 = The person-centred care policy includes guidance for healthcare professionals to consider patients' preferences (including cultural preferences) 1 = There is evidence of a national policy or strategy on person-centred care 0 = There is no evidence of a person-centred care approach	0–3	3	1	3	3	3	0	1	3	3	1

Indicator	Scoring schema	Score range	Australia	Brazil	France	Germany	Japan	Mexico	South Korea	Spain	UK	US
2.3 Interoperability standards	1 = Digital health or health information industry-based technical standards for data exchange, transmission, messaging, security, privacy and hardware are in use in the majority of applications and systems to ensure the availability of high-quality data 0 = There is no evidence of digital health or health information standards for data exchange, transmission, messaging, security, privacy and hardware	0–1	1	1	1	1	1	1	1	0	1	1
2.4 Access to internet	4 = More than 86.10% of the population uses the internet 3 = 77.02–86.10% of the population uses the internet 2 = 62.10–77.02% of the population uses the internet 1 = 17.70–62.10% of the population uses the internet 0 = Less than 17.70% of the population uses the internet	0–4	4	3	4	4	3	2	4	4	4	4
2.5 Digital health competencies	1 = Digital health is included in the training curricula for healthcare professionals 1 = Digital health is included in the education curricula for medical students 0 = There is no evidence that digital health is included in the education and training curricula for healthcare professionals	0–2	2	1	2	1	1	2	1	2	2	1
2.6 Digital health literacy	2 = There is evidence of the availability of health literacy programmes for patients and the general population that cover digital health literacy 1 = There is evidence of a national action plan or strategy on health literacy that covers digital health literacy 0 = There is no evidence of the availability of a national plan or strategy or health literacy programmes	0–2	2	0	1	2	2	0	1	0	0	2

Pillar 3: Implementation of digital health														
Indicator	Scoring schema	Score range	Australia	Brazil	France	Germany	Japan	Mexico	South Korea	Spain	UK*	US
3.1 Electronic Health Record system	2 = The EHR system is integrated at national level 1 = A fragmented EHR system exists (only some providers or settings) 0 = There is no evidence of an EHR system	0–2	2	2	2	1	1	1	2	2	1	1
3.2 Telehealth programmes for remote patient monitoring	2 = There is evidence of national telehealth programmes for remote patient monitoring 1 = There is evidence of telehealth programmes for remote patient monitoring at a regional or local level, or of pilot programmes 0 = There is no evidence of telehealth programmes for remote patient monitoring	0–2	2	2	2	2	2	0	1	2	2	1
3.3 Telemedicine implementation monitoring	1 = There is evidence of telemedicine implementation reports 1 = The national telemedicine plan or strategy includes a section on monitoring of implementation 0 = There is no evidence of a telemedicine plan or strategy, or of implementation reports	0–2	2	1	2	2	1	1	1	0	2	0
3.4 Electronic prescription systems	1 = There is evidence of the adoption of electronic prescriptions by community pharmacies 0 = There is no evidence of adoption of electronic prescriptions by community pharmacies	0–1	1	1	1	1	1	1	0	1	1	1
3.5 Clinical guideline recommendations for digital tools	1 = Evidence-based clinical practice guidelines recommend the use of diabetes digital tools 0 = There is no evidence of evidence-based clinical practice guideline recommendations for diabetes digital tools	0–1	1	1	0	1	1	0	1	1	1	1

Indicator	Scoring schema	Score range	Australia	Brazil	France	Germany	Japan	Mexico	South Korea	Spain	UK*	US
3.6 Reimbursement of digital diabetes tools	Relates to measuring reimbursement of key types of digital diabetes tools: continuous glucose monitors, flash glucose monitors, insulin pumps, closed-loop insulin delivery systems, smartphone apps and smart insulin pens. 2 = All of the above are reimbursed in the country 1 = Some tools are reimbursed in the country 0 = None of the tools are reimbursed in the country	0–2	2	1	1	2	1	1	1	1	2	1

*As the UK has a devolved health provision for the four constituent countries - England, Scotland, Wales and Northern Ireland - the scores for some indicators are based on information relevant for England, which has the largest number of residents

Source: Economist Impact

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