



future
health
index
2018

Building systems for **better outcomes**

Using digital solutions to move us
towards **value-based healthcare**



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*“We need to bring value to the patient and provide **timely, efficient and cost-effective care**”*

Nancy Brown
CEO, American Heart Association

The journey so far

From the beginning, the Future Health Index (FHI) was designed to become a driver of systemic change and go beyond providing insight on how health systems globally fare and function. This is because change is so clearly needed. Aging populations, longer lifespans and the rise of chronic disease mean that most countries will face an unsustainable rise in the cost of healthcare if it continues to be delivered in the traditional way. Systems will therefore have to deliver more for the money spent.

Various approaches currently plan for this with some success at the local or institutional level, but have proven difficult to implement at speed or at scale. Part of this is because each country's journey towards value-based healthcare will follow a different route and involve overcoming different challenges.

This year's FHI will be published in three chapters. By helping gauge the value created by healthcare in each country to address health challenges, the aim is that the FHI will encourage countries to question existing practices and take the steps needed to shape health systems that are efficient, effective and fit for purpose for years to come.

This first of three chapters of this year's FHI will therefore:

- articulate an indicator of the value delivered by healthcare systems in 16 countries, including both developed and developing markets. This metric, which we have called the Value Measure, combines criteria associated with value-based healthcare and access to care, arguably the ultimate goals of modern healthcare
- provide actionable insights from global healthcare leaders on how countries can improve the value their health systems deliver
- set out the landscape of connected care technology adoption and look ahead to what is coming next.

Connected care technology provides a foundation to enhance access and integration, and represents a vital link in the value-based healthcare chain. Connected care comes in many forms, but the 2018 FHI zeroes in on two major solutions around data collection and analytics, and care delivery. These will be explored in depth in subsequent chapters of the 2018 FHI, which will be published later this year and look at how these can both accelerate the journey towards value-based healthcare.

Overview of key findings

Integrating connected care technology into health systems can accelerate countries along the path to value-based healthcare

Health systems that provide universal access to care, deliver effective outcomes and high levels of healthcare professional and general population satisfaction – such as those in Singapore, Sweden and the Netherlands – tend to be those with comparatively high levels of support from **advanced data collection and analytics**, and that have **integrated connected care technology** into care delivery models.



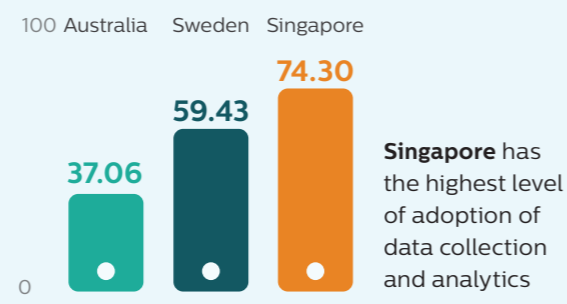
The ability to deliver value is connected to trust among healthcare professionals and the general population

Countries with high Value Measures tend to contain healthcare professionals and general populations who express **high degrees of trust in the healthcare system**.



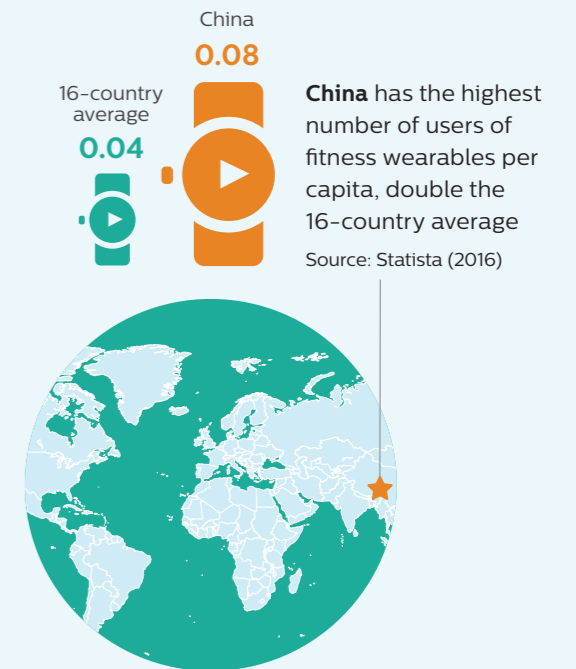
Healthcare professionals believe connected care helps their patients

In markets with comparatively high Value Measures, such as **Singapore, Sweden** and **Australia**, there is a clear relationship between **high rates of adoption of data collection and analytics**, and healthcare professionals' **confidence** in the healthcare system's ability to serve the needs of patients.



'Pockets of excellence' could provide countries and healthcare professionals with a way forward

While no one country performs consistently well across all metrics, the data points to certain areas of excellence – such as **China in consumer wearables** – that could act as examples for the adoption of technology, drive better value and blaze a trail for others to follow.

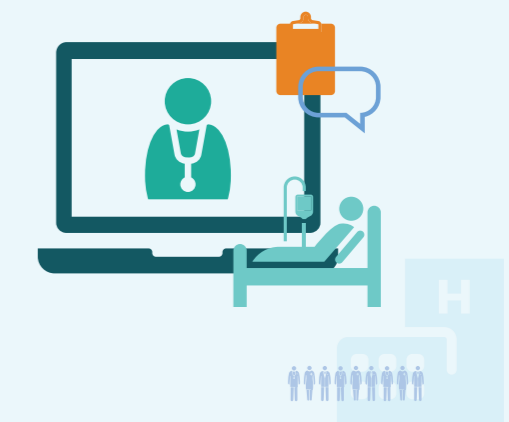


Policy plays a major role in driving adoption

Many countries with high connected care technology adoption rates, such as Singapore, Sweden and the Netherlands, have set clear national goals for the digital and/or remote delivery of healthcare services. Developing markets like **India** are starting to mandate the use of **electronic health records (EHRs) at hospitals and clinics to improve outcomes**.

Measurement and perceptions of value must evolve

As connected care technology adoption grows, the traditional indicators of a healthcare system's ability to deliver value – and the focus of countries, healthcare professionals and patients on those indicators – will need to shift. **Telehealth** may reduce the need for people to physically visit doctors and **allow more care to be delivered outside hospitals**, making healthcare professional density and hospital bed numbers less relevant as indicators of healthcare access.



Why value-based healthcare and why now?

Value-based healthcare was introduced as a concept by academics Elizabeth Teisberg and Michael E. Porter in the seminal 2006 book *Redefining Health Care*¹. There are already two schools of thought around value-based healthcare emerging, according to Rafael Bengoa, Co-Director, The Institute for Health & Strategy, Vice Chairman of Advisory Group Horizon 20/20 and a senior leadership fellow at Harvard University.

The first, which is advanced by Michael Porter and tends to predominate in the US, focuses on patient outcomes for the money spent², while the second, as outlined by academics in the Nuffield Department of Primary Care Health Sciences, University of Oxford, is more prevalent in Europe and looks at results in the context of entire populations³.

For the purposes of this report, value-based healthcare describes a system with the goal of increasing access to care, improving patient outcomes and delivering satisfaction to both patients and practitioners at optimum cost.

“There are lots of challenges in global healthcare – many people have limited access to healthcare and of course there are those that can’t afford it,” says Cecilia Anim, President of the UK’s Royal College of Nursing. “That’s why I believe in value-based healthcare. It has the potential to maximize what we can offer populations around the world with existing resources and make healthcare more affordable and accessible for all.”

Providers are experimenting with value-based healthcare at the national and sub-national levels, like the UK’s National Health Service (NHS) with its RightCare initiative⁴, or the more than 40 US states that now pursue value-based payment programs⁵.

As the World Economic Forum (WEF) points out, the outcomes tracked and measured will vary depending on the demographic or disease profile of the patients in question⁶. Value-based healthcare is contextual, geared towards providing the right care in the right place, at the right time and at the right level of cost.

This is a significant change from the volume-based approach to healthcare that has dominated in the past and still persists today. Measuring results in terms of the number of patients treated or services tends to encourage use itself, rather than effective use; studies have estimated that about 20% of mainstream clinical procedures bring no benefit to the patient due to “widespread overuse of tests and interventions.”⁷ Healthcare professional groups such as the US-based Council of Accountable Physician Practices (CAPP) and the European Federation of Nurses Associations (EFN) have emerged as strong advocates of a value-based healthcare approach.⁸

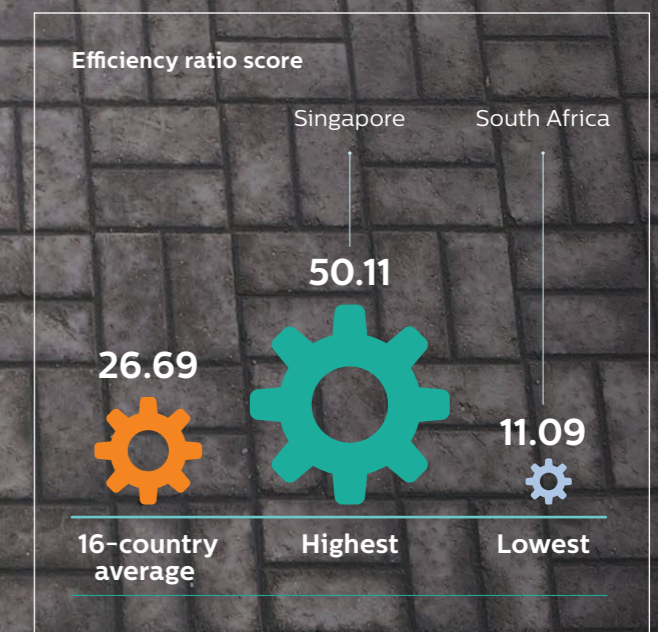
Tracking and analyzing outcomes is integral to value-based healthcare. The WEF has identified data informatics and new analytical tools for benchmarking and research as two of the key pillars of a value-based healthcare approach, along with value-based payments and new organizational models – a connection this paper will explore in further detail.

Even before technology can be effectively applied, or data collected and analyzed, important questions need to be answered. What results should be measured, and what constitutes a desirable result? As noted, this will necessarily differ for sub-groups of patients, but building a functional, integrated system requires some kind of consensus on overarching goals – and a clear definition of what value is.

“The population agenda is very interesting in the sense that it brings forward the need to have a delivery system which is much more integrated”

Rafael Bengoa
Co-Director, The Institute for Health & Strategy,
Vice Chairman of Advisory Group Horizon 20/20

Value-based healthcare describes a system with the ultimate goal of **increasing access to care and improving patient outcomes at optimum cost**



A new value indicator

As part of the research for the 2018 FHI we have developed a broadly applicable indicator of the value being delivered by healthcare systems – the Value Measure. The intent is not to provide a black and white assessment of a health system’s quality, but to create a new indicator of the value delivered by health systems of developed and developing markets. It combines criteria associated with value-based healthcare and access to care.

As Rafael Bengoa notes, value-based healthcare is frequently viewed exclusively in intellectual terms. “When we talk about value, everybody seems to be very interested and engaged, but they see it as too far away from the reality they’re in. We need to better identify how countries are getting from A to B and not just why, which is too intellectual.”

In line with the FHI’s historical focus and findings, the Value Measure is based on **three key factors**, all of which speak to a system’s ability to effectively deliver value:

Access: how universal and affordable is access to healthcare in the designated market?

Satisfaction: to what extent do the general population and healthcare professionals in the designated market see the healthcare system as trustworthy and effective?

Efficiency: does the system in the given market produce outcomes at an optimum cost? The FHI’s efficiency ratio divides healthcare outcomes by % GDP spend on healthcare.

Measures were created for each of these factors based on a set of metrics drawn from previous FHI research and reputable third-party data (summary only; for details please see appendix).

“We need to better identify how countries are getting from A to B and not just why, which is too intellectual”

Rafael Bengoa
Co-Director, The Institute for Health & Strategy,
Vice Chairman of Advisory Group Horizon 20/20



How much do you **trust the healthcare system** in your country?
(healthcare professionals and general population)



How much do you agree the healthcare **available to you** via the healthcare system in your country meets your needs?
(general population)



How much do you agree the healthcare **available to patients** via the healthcare system in your country meets their needs?
(healthcare professionals)



How would you **rate healthcare overall** in your country?
(healthcare professionals)



Healthcare spend as a percentage of a country’s GDP



Tuberculosis incidence and treatment success rates



Healthy life expectancy at birth
Life expectancy at birth



Neonatal and maternal mortality rates

Probability of dying from key chronic diseases between ages **30 and 70**



Satisfaction

Efficiency

Value

Access

Skilled healthcare professional density (per 10,000 people)



Risk of **impoverishment** due to surgical care



Hospital beds (per 10,000 people)

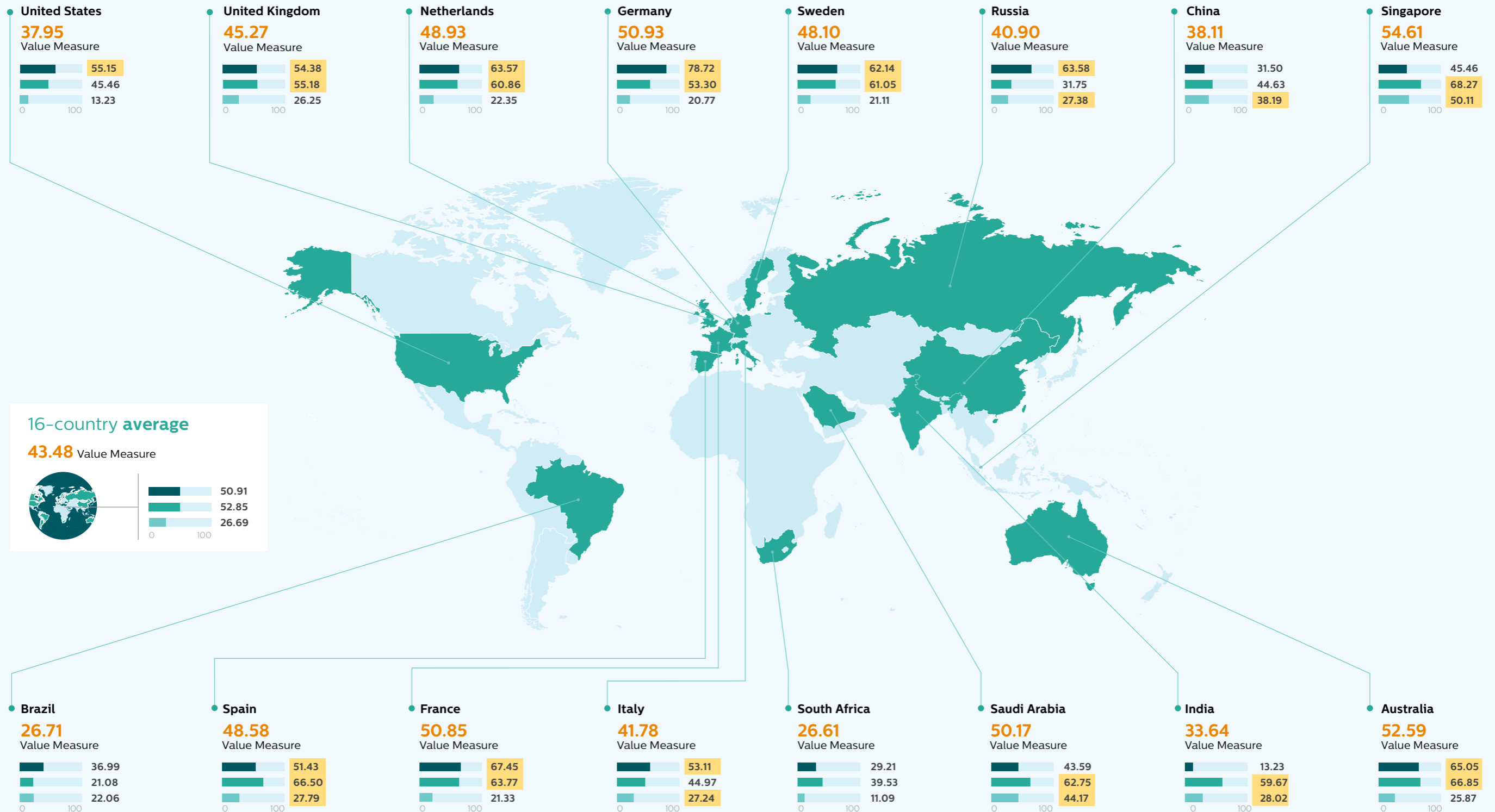


Value Measure by country

Examining the overall Value Measure results as well as individual metrics highlights areas where national health systems are already providing value, and where value may need to be better defined and delivered. It also makes it clear that no one market is a consistent performer across all factors.

Measurement

- Access score
- Satisfaction score
- Efficiency ratio score
- Above 16-country average



What the Value Measure means

The importance of experience

Among developed markets, the US is a clear outlier, with a low Value Measure (37.95). The main factors behind this are low levels of satisfaction – just 40% of the general population polled expressed trust in the healthcare system – and efficiency, with the equivalent of 17.1% of the country’s GDP spent on healthcare to achieve outcomes that fall short of those in Australia, Singapore and most countries in Europe.

As Nancy Brown, CEO of the American Heart Association notes, in the US “everyone knows the current system isn’t working. If you look at the places where the system is working, they’ve got it figured out, but that’s not the world the rest of healthcare and patients live in.” And, she says, because of the health access gap between urban and rural communities in the US, there is a need to “show how a platform that connects everything together can truly work. Show it will make lives better and create better outcomes.”

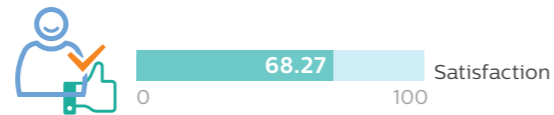
Getting healthcare professionals inside

The research shows trust and value are intimately connected. Countries with high Value Measures also tend to contain healthcare professionals and general populations with significant trust in the healthcare system, contributing to solid satisfaction levels.

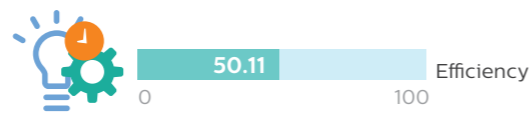
Singapore, for example, has a standout Value Measure of 54.61, based on very high levels of satisfaction (68.27), with 88% of healthcare professionals and 66% of the general population expressing trust in the country’s healthcare system. Singapore also has a higher than average efficiency ratio score (50.11) that seems to be borne out by other data; the country’s ‘hybrid’ public-private model regularly tops commissioned studies in terms of costs versus results.⁹ It does less well in terms of access, with a relatively low density of healthcare professionals and hospital beds. Studies have indicated Singapore’s public healthcare sector could face a major shortage of healthcare manpower and facilities by 2030.¹⁰

Singapore has the highest Value Measure across the 16 countries surveyed. This is in part due to:

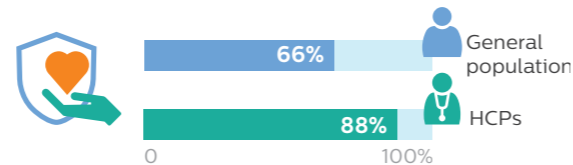
Very high levels of **satisfaction**



Higher than average **efficiency**



Trust in the local healthcare system



Resulting in the **highest Value Measure**

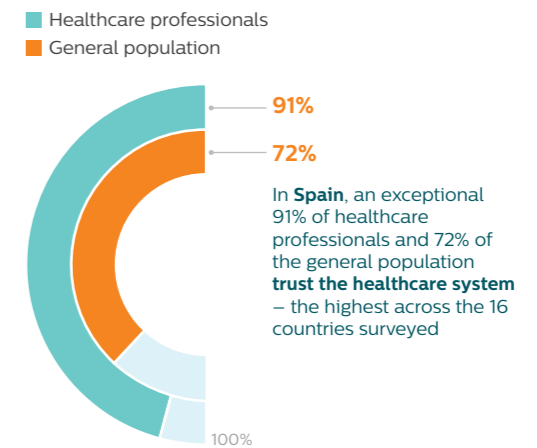


Yet a low access score may also be a signal of a country’s willingness to move beyond traditional thinking around care delivery and embrace new means of access such as telehealth, as evident in Singapore’s FHI results and the government’s focus on updating healthcare regulation in order to concentrate on the licensing of services delivered, rather than physical locations.

Developed and emerging economies

European markets measure highly in terms of access and satisfaction, with high levels of healthcare professional and general population trust, but all at a proportionally high cost. In France, for example, 85% of healthcare professionals and 67% of the general population trust the healthcare system, but the country has an efficiency ratio score of 21.33, with 11.5% of its GDP spent on healthcare (the third-highest of the 16 countries surveyed). The Netherlands’ exceptional access score of 63.57 contributes to a Value Measure of 48.93 – but its efficiency ratio score is just 22.35, thanks partly to the country spending 10.9% of its GDP on healthcare.

Faced with more limited resources, developing countries tend to exhibit low scores across all criteria, but there are exceptions. China’s efficiency ratio score (38.19) is very high due to its proportionally low healthcare spending (albeit with below-average outcomes) and it also performed relatively well in satisfaction, with the majority of both healthcare professionals and the general population expressing trust in the healthcare system. Both groups were also relatively satisfied in India, where 65% of the general population surveyed agreed that the healthcare available meets their needs – despite the country’s low access score of 13.23.



Connected care technology: fundamental to value-based healthcare

The Value Measure shows that all markets have some way to go in delivering value. Varying pockets of excellence and system shortfalls mean they may approach this journey in any number of ways. Indian policymakers, for example, have already identified access as a major issue, with the finance minister recently unveiling a national health protection scheme designed to fund care for nearly 40% of the population.¹¹ Rafael Bengoa notes Sweden has seen some recent success from implementing the PDSA (Plan-Do-Study-Act) model of quality improvement, particularly in internal medicine and gynecology. Studies have underlined the role of PDSA in improving the care delivered by national pediatric diabetes centers.¹²

When implementing new approaches to care, Rafael Bengoa is clear on the importance of measuring, reviewing and following what the metrics tell us. As healthcare professionals become more accustomed to this discipline and measuring performance, the method moves beyond theory to become embedded in the way they practice. There is a need, he says, “to link the word ‘value’ to quality and patient safety” – things healthcare professionals understand and support.

An evidence-based approach

While methods are important, connected care technology is foundational to value-based healthcare. The WEF¹³ notes that since value-based healthcare is an evidence-based approach to improvement, it requires an informatics infrastructure capable of systematically tracking costs and outcomes. This in turn needs to be based on a common architecture that integrates hardware (databases, devices), software (analytics tools), services and standards around things like data access and formats to ensure the various parts of a health system are connected and seamlessly sharing information. The WEF notes the goal of a truly integrated informatics infrastructure is “still relatively far off,” and that the barriers are manifold, from a lack of interoperability among devices, to infrastructure limitations and shortages of data-proficient talent.

“The biggest hurdle is convincing healthcare professionals to change the way they practice,” says Toby Cosgrove, Executive Advisor and former CEO and President of Cleveland Clinic. *“At the same time, it’s a challenge to shift patient expectations. We see great resistance to small things, even simply downloading an app, but when patients do engage with new processes around technology we have really positive results and great feedback.”*

Adoption of technology

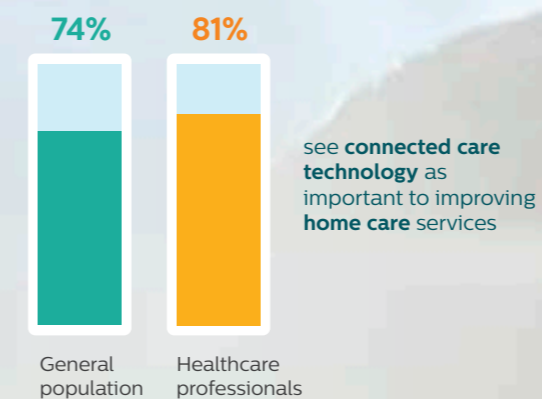
As technology has advanced and its adoption in healthcare has increased, so has awareness, and the institutions and markets that have pursued a more unified architecture have made more impact. A recent study in the US, for example, showed that the adoption of health information exchanges by health systems enhances the quality of services delivered while lowering costs.¹⁴ However, these outcomes depend to a large extent on the free flow of information, which is far from a given in many countries considering concerns around data privacy, inconsistent standards and varying levels of access. Strict or ambiguous legal frameworks on data protection, for example, have been identified as a major barrier to the exchange of health data.¹⁵

“With the intersection of science and technology, the opportunity to break down data barriers and generate new insights and discoveries has never been more promising,” says Nancy Brown. *“The power of technology and connectivity can help bring the most value and best outcomes for patients.”*

Developing more supportive regulation, Brown continues, will rely on addressing concerns about data breaches while clearly articulating the value proposition of information sharing for patients: “more seamless, customized and current care based on their data for less cost to them and the system.”

Our research, though, demonstrates a clear link between this kind of data use in connected care and positive outcomes in the eyes of healthcare professionals and the general population. Among the general population surveyed for the 2017 FHI, 79% that see their health system as very or completely integrated trust that system, versus about half (47%) of those who see integration as limited or non-existent.

Significant majorities of healthcare professionals and the general population (81% and 74%, respectively) see connected care technology as important to improving home care services – a major route to access in markets where centralized facilities may be distant or limited. Healthcare professionals and the general population also believe connected care technology plays a key role in enhancing prevention, treatment and diagnosis of medical conditions.



“The biggest hurdles are convincing healthcare professionals to change the way they practice and shifting patient expectations”

Toby Cosgrove
Executive Advisor and former CEO and President of Cleveland Clinic

Blueprints for change: Putting the Value Measure into action

If the connections between technology and value-based healthcare are clear, the next step is deciding where to start.

To facilitate this process, the 2018 FHI has identified the digital solutions that are among the best placed to help healthcare professionals, institutions and entire systems accelerate their journey towards value-based healthcare and boost factors that indicate value (access, general population and healthcare professional satisfaction, and efficiency). These can be divided into two overarching categories:

Data collection and analytics (including electronic health records (EHRs), wearables and analytic tools such as AI)

Care delivery (including telehealth, diagnosis and treatment solutions).

Clear lines between these digital solutions and the value-based healthcare goals can be drawn. Telehealth, for example, is being deployed to broaden access to remote areas in countries as diverse as India¹⁶, where it is enabling technicians to act as a proxy for doctors in rural villages by conducting basic diagnostic tests, and the US.¹⁷ The rapid proliferation of health apps and wearable devices in the US has already resulted in reductions in acute care use for chronic conditions like diabetes and asthma, and could save the healthcare system an estimated US\$7 billion annually.¹⁸

However, transforming entrenched processes can be difficult and expensive, and often encounters resistance from vested interests.

This means demonstrating progress early in the journey towards value-based healthcare should be a priority, to build momentum for transformation. As Rafael Bengoa puts it, “you need to be able to continuously demonstrate that you can do things differently and achieve different results. That’s the best educational approach.”

Determining where countries stand with regards to the adoption of health data and technology-enabled care delivery models will help identify strengths and ‘weak spots’ where change should be prioritized or has the most potential to produce gains. This will help highlight a more targeted path towards value-based healthcare.

“The sunk costs and the switching costs are so enormous it would be quite challenging to switch up one or several of these systems for systems that are better designed to work together. In addition, people, as part of the human condition, do not like change”

Christoph Wald

Chairman of the Department of Radiology at Lahey Hospital & Medical Center and professor of radiology at Tufts University Medical School.



Demonstrating progress early in the journey towards value-based healthcare should be a priority, to **build momentum for transformation**

Striving for true adoption

Countries with high Value Measures tend to exhibit comparatively high levels of connected care technology adoption, indicating that markets with a high prevalence of digital solutions are indeed potentially further along the path to value-based healthcare.

Patient data has to be put to use in order to boost a country's Value Measure. Jaap Goudsmit of the Harvard T.H. Chan School of Public Health wants to see more done to raise the general population's understanding of their data and the importance of its accuracy.

“Harnessing the trust between healthcare professionals and patients is vital in changing this. Patients trust healthcare professionals, which makes doctors and their colleagues pivotal in educating the population on the importance of accurate health data”

Jaap Goudsmit
Harvard T.H. Chan School of Public Health

When looking at data collection and analytics, for example, Sweden and Singapore are among the high achievers with scores of 59.43 and 74.30 respectively, boosted in Sweden's case by the high penetration of artificial intelligence (AI), and in Singapore by widespread adoption of EHRs and wearables. These markets also tend to have healthcare professionals that are confident in the effectiveness of the health system; in Singapore, for example, 82% of healthcare professionals agree the system meets patient needs, and in Sweden 61% do.

Singapore: a pocket of excellence

Data collection and analytics

Comparatively high scores in data collection and analytics



16-country average
41.91



Adoption of new care delivery models

Widespread adoption of new care delivery models



16-country average
22.41

Saudi Arabia, South Africa, Brazil and India, by contrast, are hampered by low adoption of EHRs and wearables, as well as analytics software. For example, Brazil's (8.34) and India's (2.52) data collection and analytics scores are well under the 16-country average of 31.03. While the UK and the Netherlands scored above average overall for data collection and analytics adoption, their scores were curbed due to their lack of a universal EHR system.

The foundations for change: where are our 16 health systems starting from with digital solutions as they look to deliver more value?

Country	Data collection and analytics Solutions which allow for the collection and intelligent use of patient-centric data	Care delivery Technology developments that are enabling innovative approaches to delivering care
Total	31.03	22.41
Australia	37.06	29.78
Brazil	8.34	4.48
China	25.01	3.17
France	33.53	17.43
Germany	32.75	24.67
India	2.52	0.89
Italy	25.73	14.69
Netherlands	37.78	30.09
Russia	14.53	6.68
Saudi Arabia	13.61	10.00
Singapore	74.30	79.16
South Africa	10.35	5.07
Spain	25.95	19.17
Sweden	59.43	49.98
UK	41.01	21.36
US	54.55	42.03

Average



































Average



Singapore was also the standout performer in care delivery, due primarily to its exceptional telehealth adoption score of 94.56, compared to the 16-country average of 25.52. This may reflect the country's recent successes in piloting and extending remote solutions in areas like elderly care and rehabilitation.¹⁹ The FHI highlights the fact that such initiatives are by no means a given in relatively wealthy countries with solid technological infrastructure, including high internet and mobile penetration rates and fast networks. For example, the UK, Italy, France and Spain all have low telehealth scores.

China, by contrast, may struggle with 'basic' healthcare infrastructure (i.e. below-average healthcare professional density per 10,000 people and above-average risk of impoverishment due to surgical care) but is an outperformer versus most developing and many developed markets in fitness wearables adoption, as there are 0.08 users per capita in China versus the average of 0.04. Despite this, China achieved a relatively low data collection and analytics score of 25.01 due to limited adoption of EHRs and intelligent care relative to the size of the population. Other countries with low data readings included Russia, Saudi Arabia, South Africa, Brazil and India, due primarily to limited intelligent care and EHR penetration.

As noted by experts like Nancy Brown, policy also has an impact, both positive and negative, on connected care adoption. Countries with high data collection and analytics scores – such as Singapore, Sweden, the US and the Netherlands – all have policies or regulations in place governing data protection and sharing. The mainly developing countries that lack this legal foundation – Brazil, China and South Africa – exhibited lower Value Measures. However, as shown by the cases of Russia and Saudi Arabia, which have relevant legislation in place but limited infrastructure and adoption rates, adoption cannot be driven by policy alone.

Data protection and sharing: policies or regulations

	 Policy on data protection	 Regulation/legislation around data sharing
Australia		
Brazil		
China		
France		
Germany		
India		
Italy		
Netherlands		
Russia		
Saudi Arabia		
Singapore		
South Africa		
Spain		
Sweden		
UK		
US		

 Yes  No

Many countries with high data collection and analytics scores have set clear national goals for the digital and/or remote delivery of healthcare services

Countries with **high data and care delivery** scores all have **policies or regulations in place** governing data protection and sharing



What comes next?

The road to the adoption of new connected care technologies and value-based healthcare will not be a straight one. But some of the challenges that governments and healthcare professionals can expect to face may be relatively easy to address with the right investments. Health infrastructure gaps, for example, could be tackled by improving connectivity, while data collection and analytics could be improved by encouraging the adoption and effective use of remote monitoring or wearable devices, as has been done to some success in China. Other necessary steps are likely to prove more difficult, and will show that while technology is an important facilitator of value-based healthcare, it needs to be accompanied by changes in policy, financial models, regulation and performance measurement. These include:

Developing more unified standards and formats around data. Given the proliferation of information and devices, data is being produced in multiple ways and often outside the confines of the healthcare system, hampering collection, analysis and the use of data as a tool for change.

Creating clear and consistent policies around data security, privacy and ownership, and securing institutional, healthcare professional and patient buy-in for the same. This can only be achieved by balancing the need to protect sensitive patient information with the ability for institutions and healthcare professionals to share and use data effectively. Lack of knowledge and trust when it comes to how data is shared, stored and deployed hampers the adoption of connected care technology among both patients and healthcare professionals.

Fostering more receptive attitudes to the adoption of connected technologies in healthcare among healthcare professionals and patients. This is likely to involve new funding and reimbursement models that address healthcare professional and institutional concerns about technology threatening revenue, and a mindset shift among patients worried that technology will 'depersonalize' care.

However, many countries are already moving to address the gaps highlighted in the FHI. India is making progress towards the adoption of a national EHR system after a high-level expert group flagged this in 2011 as a prerequisite for the delivery of universal, equitable health services. The government has followed up with laws mandating the use of EHRs at hospitals and clinics, and the establishment in 2013 of national EHR standards. While adoption has been inconsistent, EHRs are seen as an essential building block in the development of a more integrated health system.²⁰

In Saudi Arabia, the government is targeting a full-scale health system overhaul as part of its Vision 2030 strategy, including technology-driven elements such as the establishment of a more accurate national health database.²¹ This should help the country realize near-term progress towards value-based care. Work is going on across the world and the three points set out above will help accelerate these transformations.

Data collection and analytics

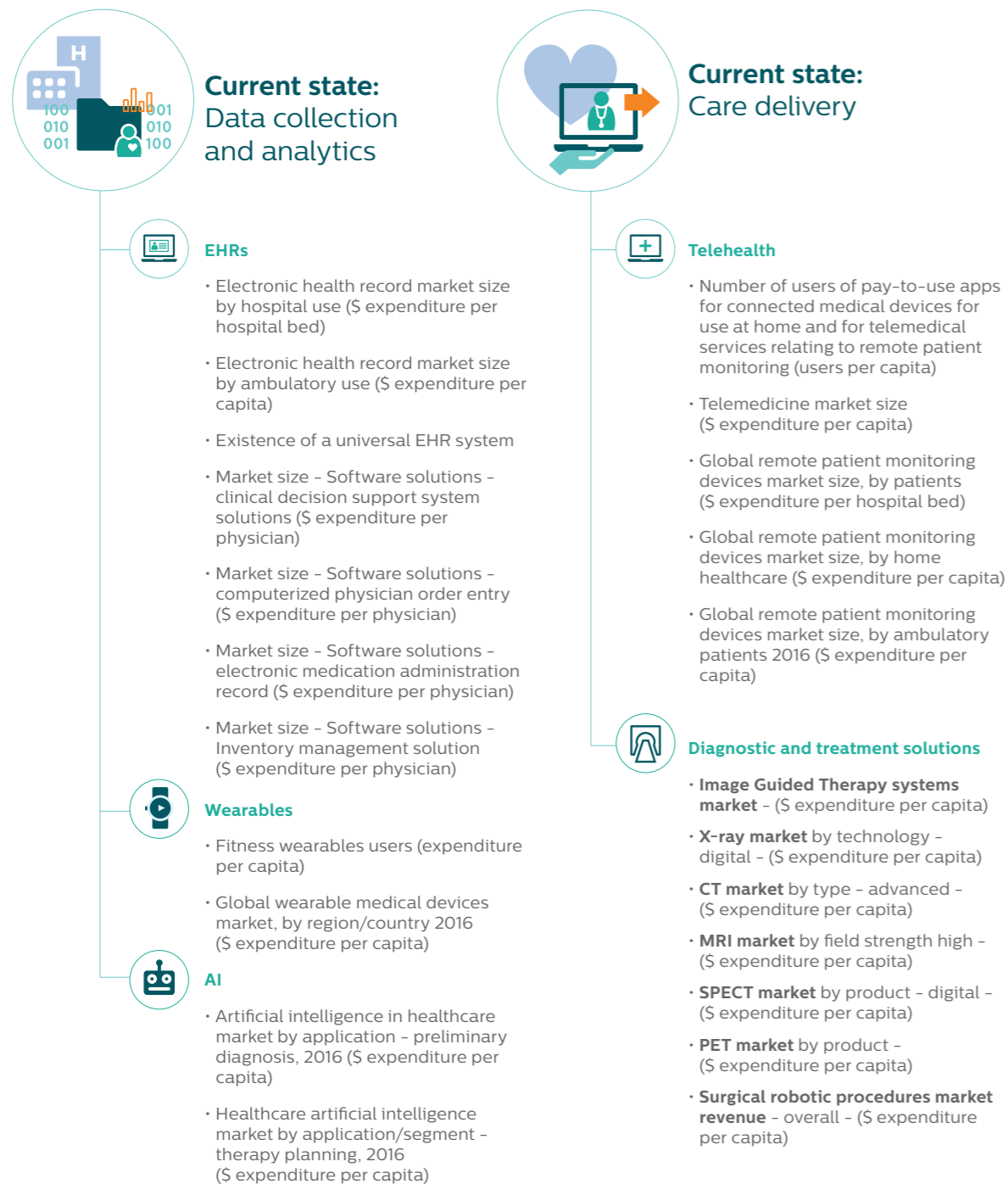
Having identified a way to measure value as it relates to value-based healthcare, future chapters of the 2018 FHI will explore in detail how the issues around data collection and analytics, and care delivery can be addressed, paving the way for the adoption, integration and effective use of the technological enablers that will help countries achieve value-based healthcare. Chapter two will focus on how to overcome barriers to the effective collection and use of data, while chapter three will examine more technology-driven care delivery models, as well as the barriers that stand in the way of this change.

These chapters will show that, along with the better outcomes and optimum costs that define value-based healthcare, the transparency, insight and integration that connected technologies bring can serve as a basis for what Nancy Brown of the American Heart Association calls a "new public trust" encompassing patients, healthcare professionals and healthcare delivery systems.



Appendix

These measures are based on **sets of indicators** that measure the rate of adoption of, or resources applied towards, key digital solutions:



Research overview and objectives

The Future Health Index (FHI) is a research-based platform designed to help determine the readiness of countries to address global health challenges and build sustainable, fit-for-purpose national health systems. In the context of ever-growing pressure on resources and costs, the FHI focuses on the crucial role digital tools and connected care technology can play in delivering more affordable, integrated and sustainable healthcare.

16 countries (Australia, Brazil, China, France, Germany, India, Italy, Netherlands, Russia, Saudi Arabia, Singapore, South Africa, Spain, Sweden, the UK and the US) are analyzed based on several factors to provide actionable insights into the journey to value-based healthcare. For this purpose and based on our prior research, we believe the focus should be on the following digital enablers which have the potential to accelerate change:

In 2016 the FHI measured perceptions to produce a snapshot of how healthcare is experienced on both sides of the patient-professional divide. In 2017 it compared these perceptions to the reality of health systems in each country researched.

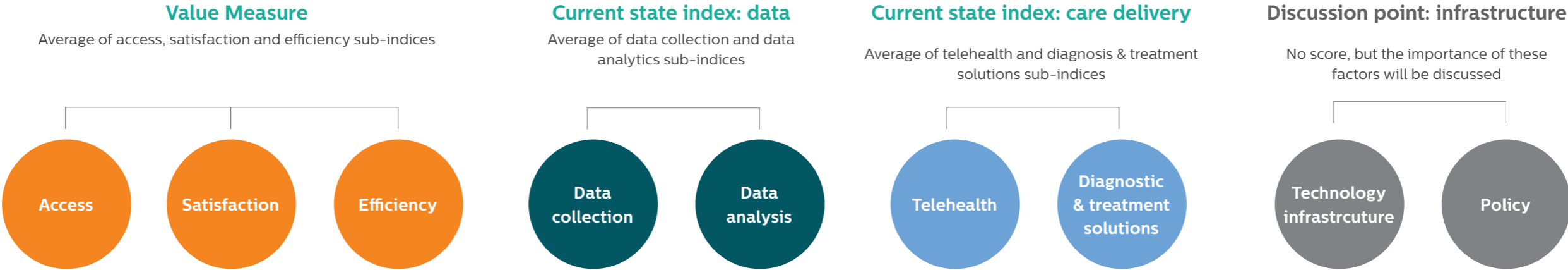
- **Data collection and analytics:** the ability to share and collect patient-centric data and analyze it on a large scale
- **Care delivery:** technology developments which are bringing innovative ways to deliver better care

In 2018, the FHI builds on the fast-growing consensus that the value-based healthcare model is the best approach to address the challenges posed by a combination of growing and aging populations with the rise of chronic diseases and healthcare costs. The 2018 edition of the FHI identifies key challenges that form a barrier to the large-scale adoption of value-based healthcare and improved population access; and assesses where connected care technology – data collection and analytics, and new care delivery models – can help speed up the healthcare transformation process.

Research framework: summary of metrics

Report one - exploring the relationship between value and connected care technology adoption

Sub-indices



Summary of sub-index

- Skilled health professional density (per 10,000 population)
- Risk of impoverishment due to surgical care (% of people at risk)
- Hospital beds (per 10,000 population)
- Trust in healthcare system (HCPs and general population)
- Healthcare system meets needs (HCPs and general population)
- Rating of healthcare system overall (HCPs)
- Healthcare spend as a percentage of GDP
- Tuberculosis: incidence and treatment success rates
- Life and health life expectancy at birth
- Probablility of dying from key chronic diseases between 30-70
- Neonatal mortality rate
- Maternal mortality rate
- **EHRs:** Market size by hospital and ambulatory use, existence of a universal EHR, market size for health-related software solutions
- **Wearables:** User numbers consumer werables, market size of wearable medical device market
- **AI:** Market size by use in AI diagnosis, therapy planning
- **Telehealth:** Number of users of pay-to-use apps for connected medical devices market size telemedicine, market size remote monitoring devices market by home use and ambulatory use
- **Imaging:** Digital x-ray technology market, advanced CT market, MRI high field strength market, SPECT digital market (nuclear), PET digital market (nuclear)
- **IGT:** Image guided therapy systems market
- **Assisted surgery:** Global surgical robotics procedures market
- Internet penetration rates and speeds
- Secure servers per capita
- Mobile penetration and 3G+ connectivity
- Existence of regulation / legislation or policy for: data protection, quality standards, data sharing

Research methodology and sources

In the first chapter of the 2018 FHI, 45 different metrics are analyzed and grouped together in key pillars:

1. Value Measure
2. Current State (of Data and Care Delivery)

The **Value Measure** is the first pillar. The Value Measure is a new indicator of the value delivered by healthcare systems of developed and developing markets. It combines factors associated with value-based healthcare and access to care, arguably the ultimate goals of modern healthcare. It consists of three parts:

1. **Access** (i.e. how universal, and affordable, is access to healthcare in the designated market?)
2. **Satisfaction** (i.e. to what extent do the general population and practitioners in the designated market see the healthcare system as trustworthy, and effective?)
3. **Efficiency** (i.e. does the system in the given market produce outcomes at an optimum cost?)

The second pillar, **Current State** measures current levels of adoption of key digital enablers:

1. **Data (collection and analytics)** (including wearables, Electronic Health Records (EHRs), Intelligent Care)
2. **Care Delivery** (Telehealth and Diagnostic & Treatment Solutions)

Each pillar consists of several sub-metrics (see metrics graphic on pg.26). Within each pillar, the metrics are normalized to ensure comparability across countries and are scored to fit onto a 0 to 100 scale. Specifically, metrics related to market size are normalized per capita, per hospital bed or per physician in each country. The market size metrics were scored relative to the highest scoring country (with a population over 1,000,000) among the available dataset. For other metrics, including those for the Value Measure and technology infrastructure metrics, scoring is either relative to the highest scoring country (with a population over 1,000,000) among the available dataset, or based on any optimal baseline number set by global authorities e.g. standards/goals set by the United Nations

Sustainable Development Goals (SDGs). By excluding countries with populations of less than 1,000,000, we exclude outliers that may create unrealistic potential to reach 100.

A metric which does not follow this pattern of normalization is:

- The risk of impoverishment due to surgical care – this metric is reported as a percentage, so it is simply inversed and no further normalization is needed

In a next step, the scores for each metric are then averaged to calculate each sub-index score and those sub-indices averaged to create each pillar.

The 45 different metrics analyzed use a combination of third-party data and original research collected via a survey in partnership with a global market research firm.

The survey data was collected January 18, 2017 to March 3, 2017 for 15 of the 16 countries analyzed in 2018 (Australia, Brazil, China, France, Germany, Italy, The Netherlands, Russia, Saudi Arabia, Singapore, South Africa, Spain, Sweden, the UK and the US) in their native language. The survey had an average length of 25-30 minutes. A combination of online, face-to-face (computer-assisted) and phone (computer-assisted) interviewing was used. Survey data for India was collected during February 16, 2018 to March 26, 2018 in a manner consistent with the other countries in 2017.

The total sample from the survey includes:

- 3,244 healthcare professionals (defined as those who work in healthcare as a doctor, surgeon, nurse practitioner, registered nurse, licensed practical nurse or nurse across a variety of specializations)

24,654 adults (representative of each country's respective adult population). Third-party data was sourced from a number of organizations including the World Health Organization, The Commonwealth Fund, and the World Bank. A full list of sources is available [here](#).

Glossary

Value-based healthcare

Value-based healthcare describes a system that aims to increase access to care and improve patient outcomes at optimum cost. It is a people-centric approach that spans the entire health continuum. In short, it is about providing the right care in the right place, at the right time and at the right level of cost. At Philips, we also focus on improving the patient experience and the work life of care providers as we look to:

- enhance the patient experience
- improve health outcomes
- lower the cost of care
- improve the work life of care providers.

Factors

The five elements which indicate the success of a value-based healthcare system are:

1. **Access:** Securing universal access and affordability to healthcare
2. **Outcomes:** Driving better healthcare outcomes
3. **Costs:** Optimizing costs and reducing waste
4. **Satisfaction:** Ensuring healthcare professional satisfaction
5. **Experience:** Improving patient experience.

Enablers

Categories of integrated solutions which help accelerate achievement of key factors:

Data collection and analytics

- **Electronic health records (EHRs)** – includes electronic version of a patient's health or medical history; generated by one or more encounters in any care delivery setting
- **Wearables** – includes electronics that can be worn on the body as accessories or clothing such as activity trackers and smartwatches
- **Artificial intelligence (AI)** – includes algorithms and software to approximate human cognition in the analysis of complex medical data; aims to analyze relationships between healthy living, prevention, diagnosis, treatment and home care techniques and patient outcomes.

Care delivery

- **Telehealth** – includes provision of healthcare remotely by means of telecommunications technology, such as remote patient monitoring and virtual consultations
- **Diagnosis and treatment solutions** – includes imaging, image-guided therapy and assisted surgery technologies.

The Future Health Index

The Future Health Index (FHI) is a research-based platform designed to help determine the readiness of countries to address global health challenges and build sustainable, fit-for-purpose national health systems. Using a scale of 0 to 100, the FHI assesses where a market currently is in terms of its ability to realize the benefits of the identified enablers.

The following considerations are taken into account:

- **Process** – the ways in which a country has addressed the need for initial investment in enablers and necessary training
- **Attitudes** – the knowledge and perceptions among healthcare professionals and the general population towards the enablers.

Value Measure

A new indicator of the value delivered by healthcare systems of developed and developing markets. It combines criteria associated with value-based healthcare and access to care, arguably the ultimate goals of modern healthcare.

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