

Getting to Personalised Healthcare in APAC

Findings, Insights, and Recommendations



WHITEPAPER

Future
Proofing 
Healthcare

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Introduction

In recent years, a fundamental shift in the way healthcare is practiced, delivered, funded, and experienced has emerged. As the global burden of disease has diversified and technology has become significantly more advanced, both the health needs of individuals and populations are changing, and opportunities for the prevention, treatment, and management of disease are growing. These developments have given rise to **personalised health: a paradigm shift from a one-size-fits-all treatment of disease to maintaining a high and healthy quality of life by applying the right health interventions for the right person and population in the right place at the right time.**

Crucially, the ways in which this shift is manifesting itself as well as how stakeholders are preparing for and adapting to it vary greatly around the world. Collecting, generating, and organising data on regional and interjurisdictional differences in these areas presents an opportunity to:

- 1 Help stakeholders throughout health ecosystems understand local, national, and regional strengths and needs related to the future of healthcare;**
- 2 Contribute to a fact-based discourse about personalised healthcare;**

- 3 Make sought-after data publicly accessible;**
- 4 Better equip decision makers and leaders for emerging changes in healthcare.**

These are the aims of the Personalised Health Index: an open, data-driven, online tool built on publicly available data and insights from 15 healthcare experts from across the Asia-Pacific region.

In this whitepaper, we cover the background, scope, and methodology of the **Asia-Pacific Personalised Health Index** as well as insights drawn from it. In addition, contributing global healthcare experts offer recommendations for how governments, policymakers, and other healthcare stakeholders can support, realise, and innovate in personalised healthcare frameworks and solutions throughout the region – and even lead globally.



Background, Scope, and Methodology

FutureProofing Healthcare's Personalised Health Index, initiated in January 2019, is the fourth in a series of indices that address and highlight the future strengths, opportunities, challenges and needs of national healthcare systems and their beneficiaries in various global regions.

The Personalised Health Index covers the following 11 locations in the Asia-Pacific region:

A panel of 15 health experts¹ from each of these locations supported a core team of FutureProofing Healthcare researchers in the identification and validation of data sources as well as the operationalisation of the measures and variables in the Personalised Health Index. In addition, official representatives from health ministries or related bodies in each location were contacted to provide up-to-date information on the existence and level of implementation of national or regional plans and policies related to personalised healthcare, which contribute data points for several measures in the PHC Index.

The expert panellists participated in a series of three interactive sessions convened and supported by FutureProofing Healthcare and Roche in 2020. **The expert panellists were asked to identify and discuss data sources, variables and concepts to be included in the Personalised Health Index as well as validate interim Index calculations.** In addition, panellists took part in three collaborative online surveys and consensus-building exercises prior to and after the workshops in which they prioritised, validated, and suggested variables. The official health systems representatives provided input via an online questionnaire that was validated by the expert panel.



Australia



China



India



Indonesia



Japan



Malaysia



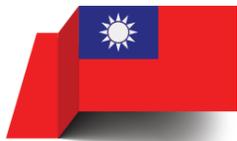
New Zealand



Singapore



South Korea



Taiwan



Thailand

Design of the Index

The measures validated by the expert panel were grouped into four categories termed "Vital Signs" that make up the basis of the Personalised Health Index:



Policy Context

The policies, frameworks, partnerships, people, and drivers that will facilitate personalised healthcare.



Health Information

The data, infrastructures, and technical expertise that will drive personalised healthcare.



Personalised Technologies

The devices, applications, platforms, and reimbursement structures that will drive personalised healthcare based on the needs of stakeholders.



Health Services

The planning, organisation, and delivery of services that will drive personalised healthcare.

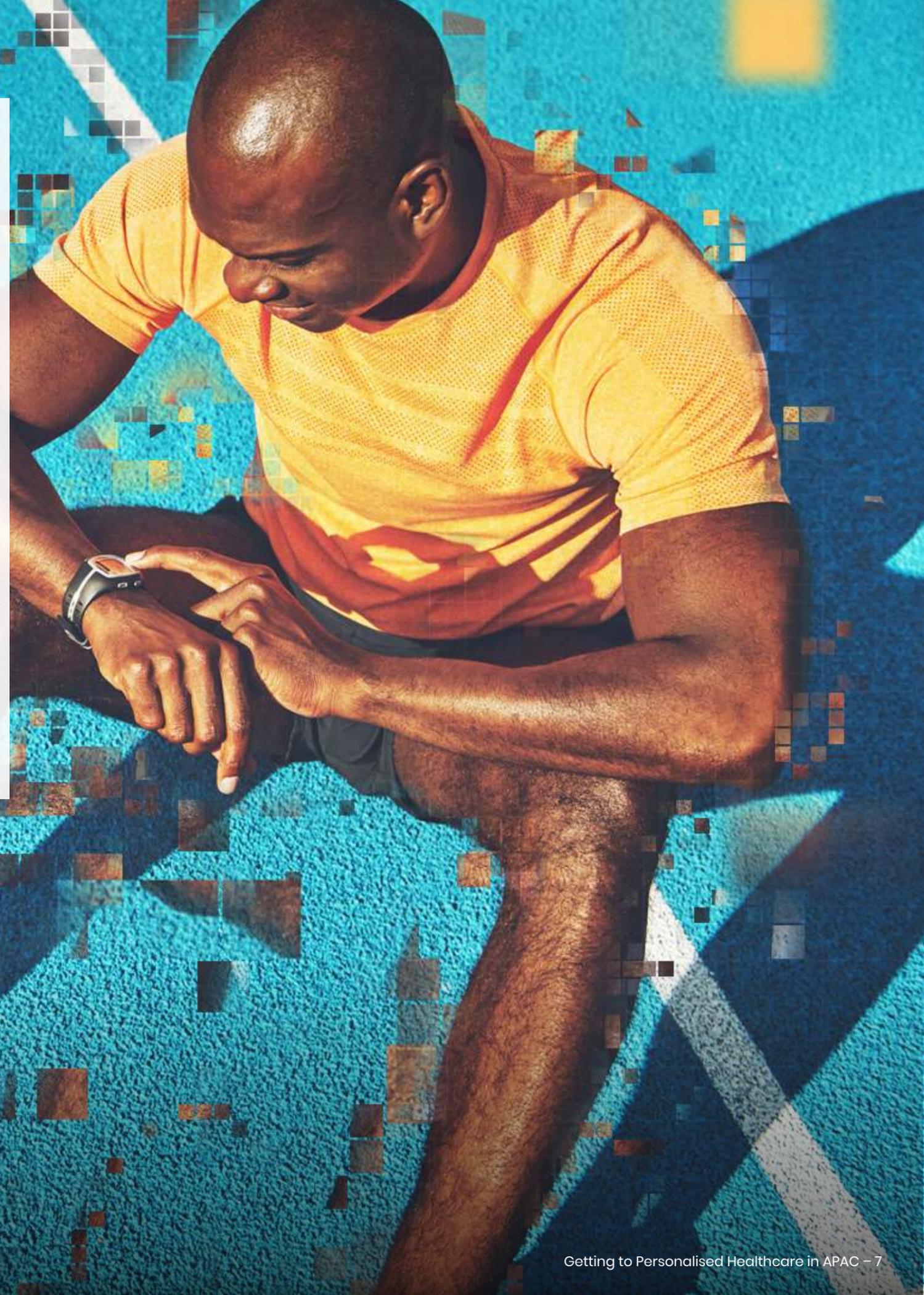
Notably, several measures in the Index are proxy measures, as the concepts covered by the Personalised Health Index are emerging and precise data are therefore too scarce, too old, or non-existent. To account for this, the expert panellists

were tasked with validating measures that the core research team proposed to be adequately representative of a healthcare system's performance or future readiness for a given area of personalised healthcare.



Vital Sign	Definition	Measures
 Policy Context	The policies, frameworks, partnerships, people and drivers that will facilitate personalised healthcare	<ul style="list-style-type: none"> Personalised Health Strategy Scale-up Funding Genetic Counsellors Access to Data for Research Trust in Care Coordination Open Research Data Access to CDx Social Mobility
 Health Information	The data, infrastructures and technical expertise that will drive personalised healthcare.	<ul style="list-style-type: none"> Use of electronic health records (EHRs) EHR Strategy EHR Implementation Digital Infrastructure Patient Data Control Cancer Registries Health System Data
 Personalised Technologies	The devices, applications, platforms and reimbursement structures that will drive personalised healthcare based on the needs of stakeholders.	<ul style="list-style-type: none"> Artificial Intelligence (AI) Strategy AI in Healthcare Wearables Decision Support Systems Reimbursement for CDx
 Health Services	The planning, organisation and delivery of services that will drive personalised healthcare.	<ul style="list-style-type: none"> R&D Expenditure Equity Telehealth Drug Approval and Reimbursement (Lung Cancer) Time to Regulatory Approval Registry Quality and Access Evidence-Based Guidelines

Table 1: The four Vital Signs and the measures they contain.



Scoring

Each location covered in the Index receives a score for its performance in each of the four Vital Signs, which are weighted equally. **The Vital Sign scores together contribute to an overall Index score, which can range from 0 to 100.** The locations are presented in the Index in the following ranked groups in descending order: "Top Tier", "Strong Performers", "Focus Areas", and "Multiple Weaknesses". To be sure, the scores are not intended to be direct country-to-country comparisons, but rather indicators of health systems' strengths, weaknesses, opportunities and challenges in the context of future readiness for Personalised Healthcare that can help guide healthcare planning and decision making.²

While the overall scores reflect that there are significant personalised health-related disparities between the 11 locations, they also indicate that there is ample room for improvement across the entire Asia-Pacific region. In addition, it is important to emphasise that these overall scores provide only a general overview of each location's performance.³ More granular insights offered by each of the locations' four Vital Sign scores are explored below. Finally, it must be made clear that while the **Index is based on the latest available data in each of the locations, the unprecedented and rapidly-changing circumstances due to the COVID-19 pandemic may have significant impacts on certain aspects of the health systems** which are not captured in this edition of the Personalised Health Index.

Results and Analysis

Overall Scores

The assessed countries received the following overall scores in the Personalised Health Index:



Figure 1: Overall location scores in the Personalised Health Index.

The overall scores reflect the average of each location's four Vital Sign scores. **Overall scores range from Singapore with 71 out of 100 to Indonesia with 29. The average overall score in the Personalised Health Index is 51.** Notably, overall scores do not differ greatly between locations in the highest-scoring (Singapore, Taiwan, Japan, and Australia) and lowest-scoring (China, India, and Indonesia) groups – a difference of 9 points between the highest and lowest scoring locations in both groups – while the disparity among the mid-range locations (South Korea, New Zealand, Thailand, and Malaysia) is substantially larger at 16 points.



Overall performance varies with Singapore measuring 71 and Indonesia measuring 29. The average overall score in the Personalised Health Index is 51.

Policy Context



Figure 2: Location scores in the 'Policy Context' Vital Sign.

- > Personalised Health Strategy
- > Scale-up Funding
- > Genetic Counsellors
- > Access to Data for Research
- > Trust in Care Coordination
- > Open Research Data
- > Access to CDx
- > Social Mobility

The Policy Context Vital Sign contains measures that are intended to capture information about policies, plans and determinant factors that have an impact on a location's capacity to realise personalised health. Some measures aim to directly examine the status of personalised health planning, while others address contextual factors that are understood to provide insight into a location's ability to enable personalised healthcare. That is, additional contextual factors are included as proxy measurements for a location's readiness and expected future capacity to enable, deliver and innovate within the area of personalised health services and solutions.

The 'Policy Context' Vital Sign scores are the most disparate in the Personalised Health Index, indicating that performance in this area varies greatly in the Asia-Pacific region. High-income countries perform well above the average score of 48, while middle-income countries tacked closer to the average. Two exceptions in this Vital Sign are South Korea and New Zealand, which despite their classification as high-income countries and which showed above-average overall performance, fall below the average in this Vital Sign with a score of 45. Contributing factors to this result may be their lack of a coherent national strategy or plan for personalised healthcare, limitations on access to data for health research and a lack of capacity to deliver personalised health-related services in their respective workforces.



Policy Context Cases



Singapore

Singapore's Ministry of Health has developed a broad, three-pronged health policy intended to ensure quality, contain costs and make care more personalised known as the "Three Beyonds". With this policy Singapore aims to go beyond health care to health; beyond hospital to community; and beyond quality to value.⁴

Singapore has also harnessed its planning and investment capacity to support advanced applications of personalised healthcare: The country's ongoing Research, Innovation and Enterprise plan has allocated S\$3.2 billion to advanced manufacturing and engineering research throughout 2020.⁵



New Zealand

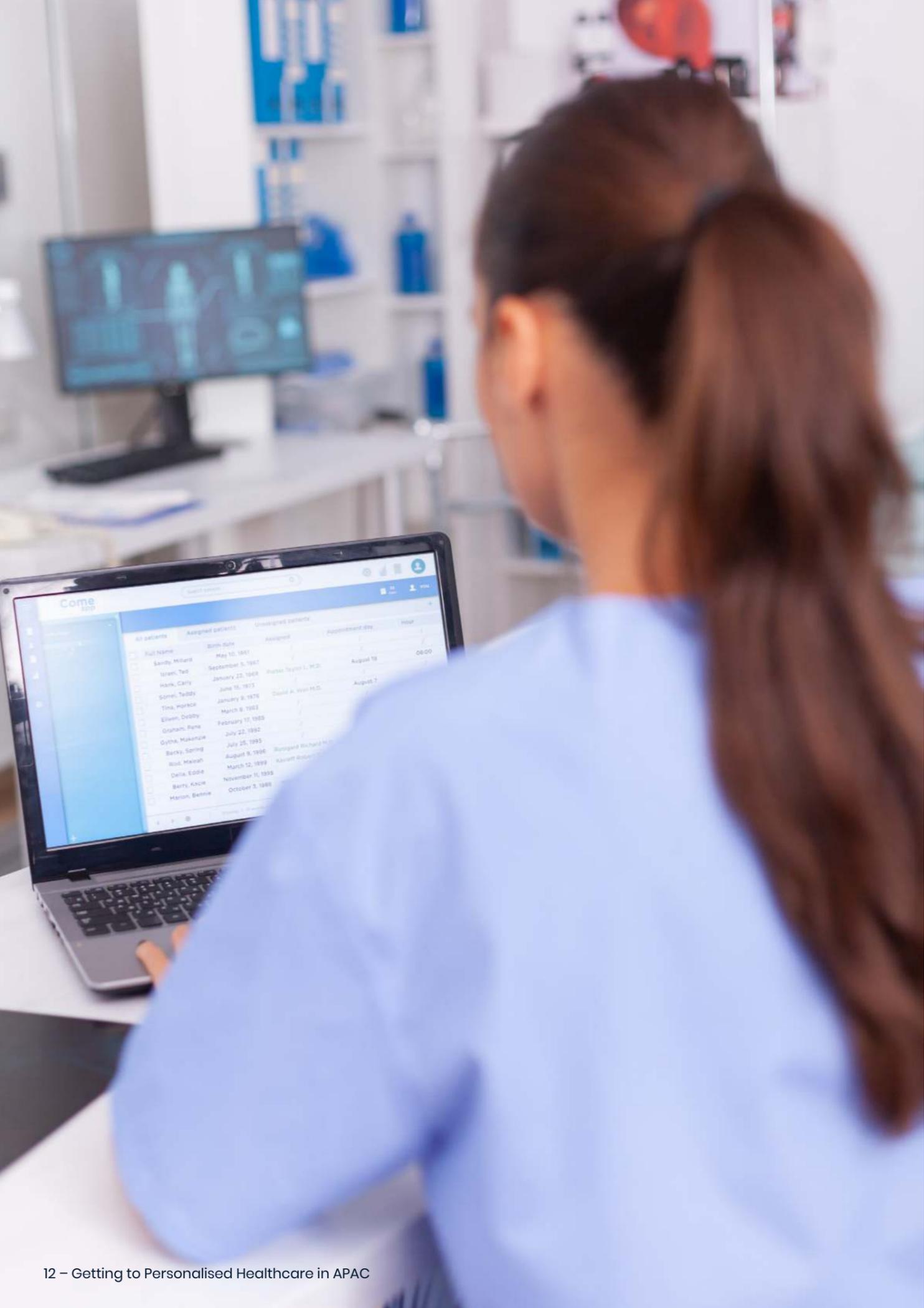
Public and private stakeholders in New Zealand have worked together to establish Genomics Aotearoa, an agile, leading-edge and collaborative platform, established to ensure that New Zealand is internationally participating and leading in the rapidly developing fields of genomics and bioinformatics. Funding for Genomics Aotearoa for 2017-2024 comes from the Strategic Science Investment Fund.⁶



India

Approved by the Indian government in 2020, the Genome India Project is a collaboration between 20 Indian institutions to develop an Indian reference genome based on samples collected from 10,000 Indian citizens. This will help lay the foundation for advanced personalised healthcare solutions in India while also addressing the diversity problem in genomics at large, as most genomes that have been mapped are sourced from urban, middle-class white people and are therefore not representative of the very diverse Indian population.⁷





Health Information

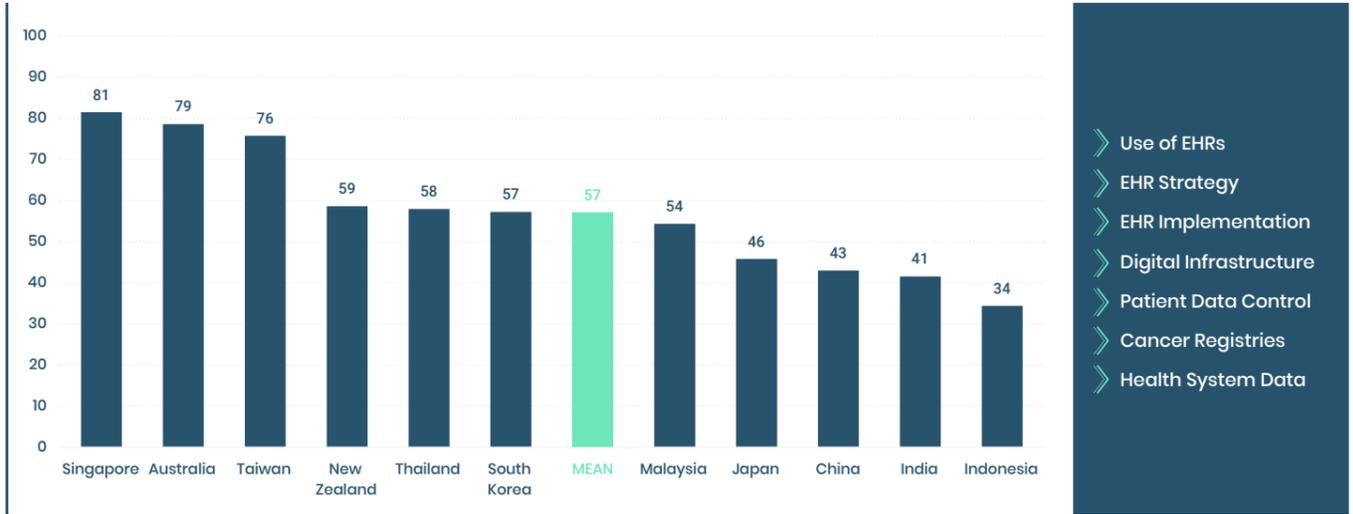


Figure 3: Location scores in the 'Health Information' Vital Sign

The Health Information Vital Sign contains measures that aim to provide an overview of characteristics and capabilities that influence the control, sharing, and interoperability of health-related data. **The measures address both systemic elements such as the strength of a location's digital infrastructure and the robustness of data registries and use of electronic health records (EHRs) in health systems, as well as person-centric elements like the level of control and insight patients are granted over their own health data.** This approach is intended to capture information about factors driving personalised healthcare from multiple angles.

In this Vital Sign, Singapore, Australia and Taiwan lead well above the mean of 57, with strong digital infrastructures and electronic health record uptake and interoperability. Income level cannot be the only determinant of performance here, given the above-average score of Thailand (due to above-average performance in all measures except for Digital Infrastructure and EHR Implementation) and, perhaps most strikingly, the below average score of Japan, which is otherwise a top performer overall. Japan's performance is largely affected by its low scores in the three electronic health record-related measures as well as the Patient Data Control measure.

The results in this Vital Sign serve as an indication that technological and infrastructural robustness may not be enough on their own. Enabling policies and the active use of health information technologies are also fundamental to realising personalised healthcare.



Health Information Cases



Australia

RippleDown, managed by Pacific Knowledge Systems in Australia, is a system integrated with wearable devices such as smartwatches, point-of-care devices and fitness trackers, to encourage and motivate user engagement. According to current research, a third of wearable device users stop using their devices within half a year.

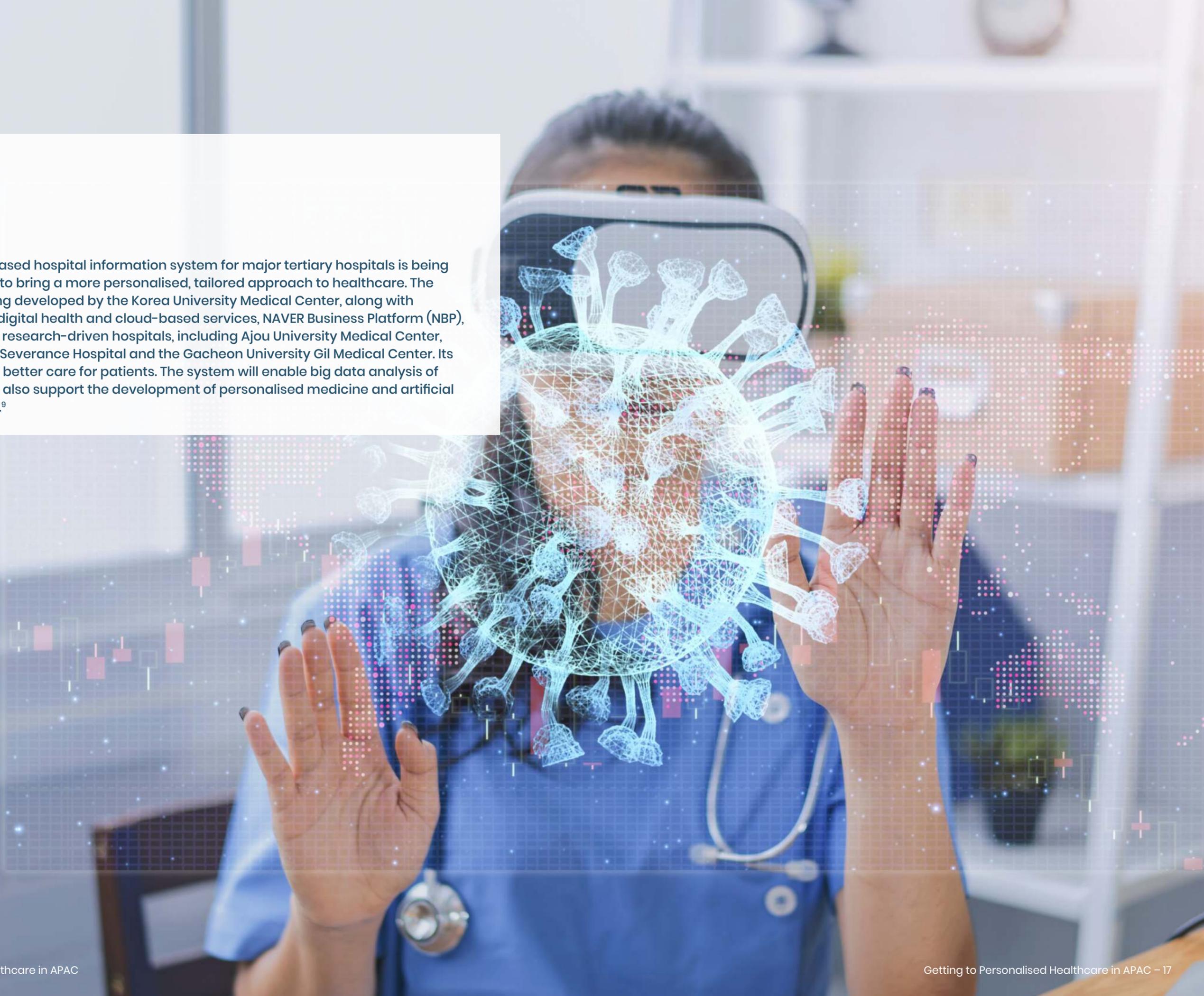
The integration of RippleDown with wearable devices, however, enables the knowledge, expertise, and experience of world-class coaches, trainers, athletes, clinicians, physiotherapists, nutritionists, and other experts to be accumulated and made available to users on a one-stop platform. The information is then applied contextually in real-time in response to the user's health, fitness, and wellness data sources to provide personalised guidance and motivation and support the user in achieving their goals. This in turn, helps to encourage long-term engagement, with positive impacts on the health, fitness, and wellness of the user.⁸





South Korea

A cloud and blockchain-based hospital information system for major tertiary hospitals is being developed in South Korea to bring a more personalised, tailored approach to healthcare. The information system is being developed by the Korea University Medical Center, along with Samsung SDS, a leader in digital health and cloud-based services, NAVER Business Platform (NBP), a national IT provider, and research-driven hospitals, including Ajou University Medical Center, Samsung Medical Center, Severance Hospital and the Gacheon University Gil Medical Center. Its ultimate goal is to provide better care for patients. The system will enable big data analysis of patient outcomes and will also support the development of personalised medicine and artificial intelligence in health care.⁹





Personalised Technologies

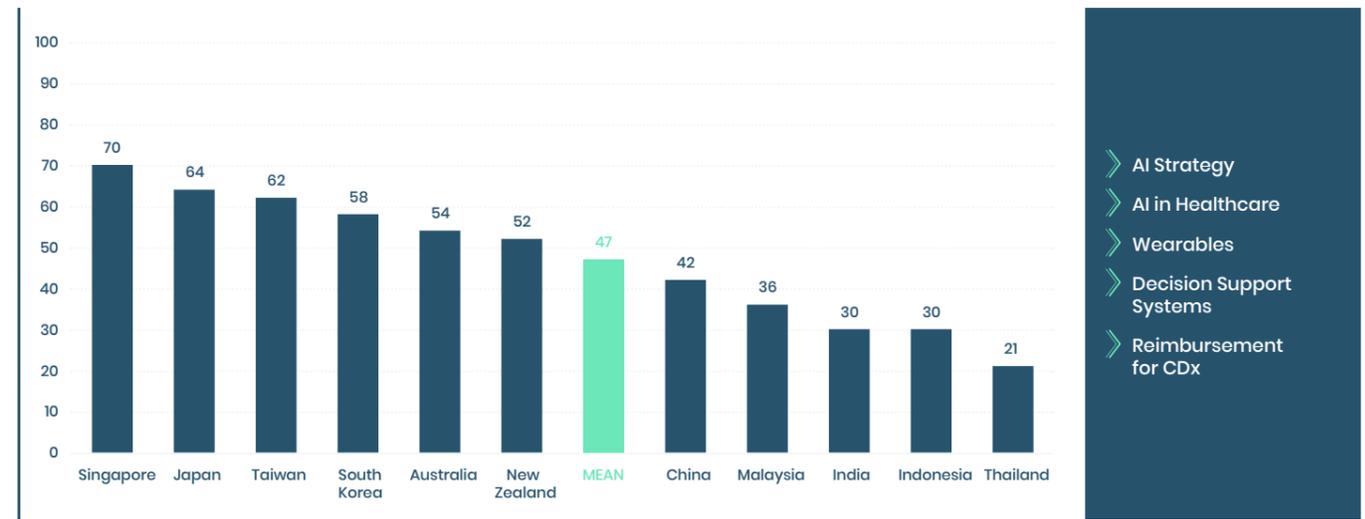
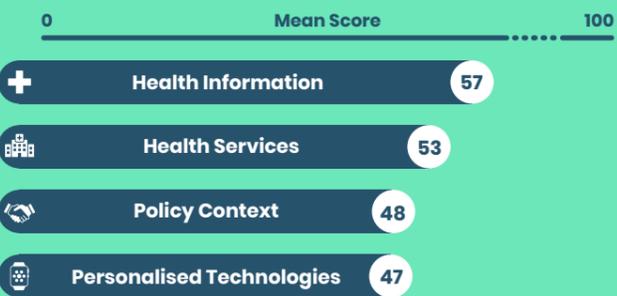


Figure 4: Location scores in the 'Personalised Technologies' Vital Sign

The measures in the Personalised Technologies Vital Sign address plans, policies, platforms, and products that may drive the technological aspects of personalised healthcare. The Vital Sign examines both “top-down” elements such as the potential for reimbursement for the use of personalised health technologies and the use of artificial intelligence-driven clinical decision support systems, as well as “bottom-up” elements such as the uptake of wearable technologies among a location’s population. In this way, the Personalised Technologies Vital Sign aims to assess health systems’ technological capabilities and incentives for personalised healthcare as well as the availability of personalised health technologies to individuals.

The large disparities in the scores and the composition of the above-average and below-average groups also suggest that this is a Vital Sign in which **income levels and health spending may very well have a marked impact on performance, as several measures examine access to and use of platforms, tools, and services, which may require significant up-front investment.** Another major factor could be the prohibitive cost of wearable technologies for many consumers, which may put some locations at an immediate disadvantage.

The 'Personalised Technologies' Vital Sign has the lowest mean score of all the Vital Signs at 47 out of 100, indicating that this is an area where the Asia-Pacific region can improve as a whole.



Personalised Technology Cases



Thailand

Saensuk Municipality in Thailand has partnered with a number of public and private organisations to develop a “smart city for the elderly”. Thailand’s BAESlab assisted in the development of the city’s IoT platform by creating two health monitoring devices, Watchfully and Oura. Watchfully is a wristband or necklace-shaped device that alerts family members and other carers if an emergency occurs. It features built-in location tracking and can contact emergency services in the event of a fall or need for immediate medical assistance. Oura, a ring-shaped device, monitors the wearer’s vital signs and analyses the data to improve sleeping patterns. Both devices aim to improve the elderly wearer’s quality of life as well as increase their independence and that of their carers.¹⁰



Taiwan

Taiwan-based company iXensor has developed a digitally enabled, point-of-care testing solution using smartphone tech. With a smartphone attachment and app, users can get real-time analysis of blood samples that can help manage chronic conditions or prevent the progression or spread of disease. Most recently, iXensor has developed an attachment for analysing COVID-19 antigen tests.¹¹



Malaysia

SMARTPEEP is a Malaysia-based AI technology company that develops and provides automated monitoring systems for health professionals to care for patients and the elderly with higher risk of falls and low mobility. It eases the strain on and complements health professionals in caring for and supporting these populations. The current market and clients are residential aged care facilities, but its smart technology tools and services have broader applications for home care services as well.¹²





Health Services

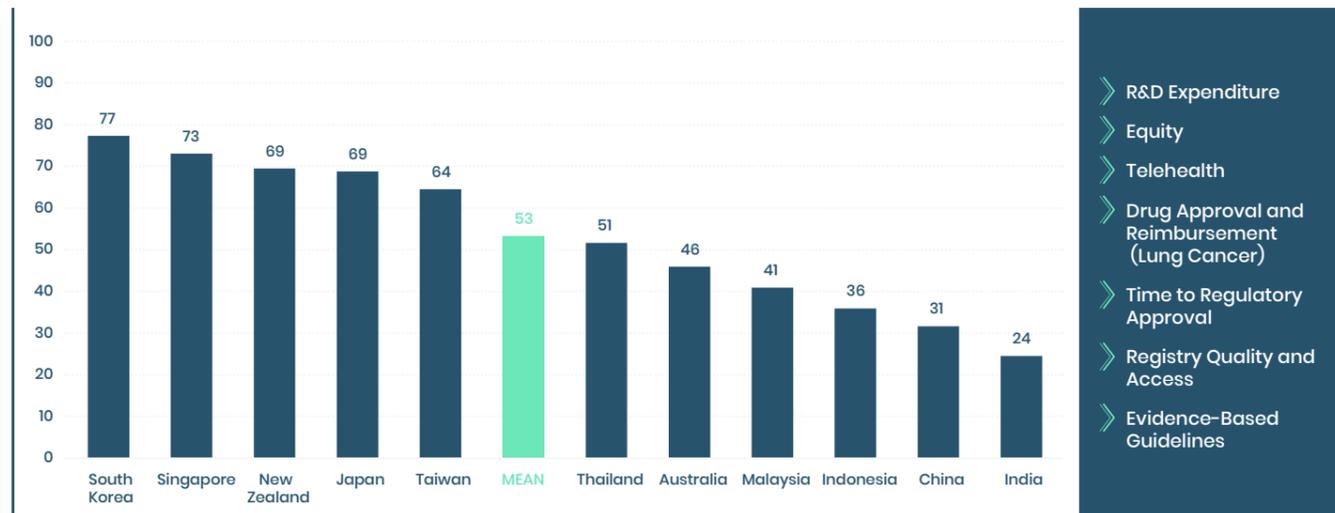


Figure 5: Location scores for the 'Health Services' Vital Sign

The Health Services Vital Sign assesses policies, processes and investments that impact personalised health services and health outcomes. In particular, the measures in this Vital Sign focus on systemic factors that affect a location's ability to innovate in healthcare, provide health services that are tailored to individual needs and achieve more equitable health outcomes.

Performance in the 'Health Services' Vital Sign is largely comparable with locations' overall performance in the Personalised Health Index.

There are significant disparities between the top- and bottom-performing locations, with a difference of 53 points between South Korea (77) and India (24). Among the above-average locations, differences in performance are relatively small (13 points between South Korea and Taiwan), whereas differences between the below-average locations are more

severe (27 points between Thailand and India). Notably, Indonesia has its best performance in this Vital Sign at 36 points due especially to its adequate use of evidence-based guidelines and short regulatory approval timelines, while Japan slightly underperforms despite its very favourable conditions for reimbursement of personalised treatments and use of telehealth. Australia's performance is a clear outlier at 46 points, its lowest score in any Vital Sign by far due in large part to relatively low R&D expenditure and low uptake of telehealth services.

However, it is important to note that any data related to telehealth or digital health included in this Vital Sign may be subject to change substantially given the marked impact of the COVID-19 pandemic on the uptake of such services in the past year.



Health Services Cases



China

Chinese tech giant Tencent has developed an AI Medical Innovation System (AIMIS), an artificial-intelligence driven, cloud-platform used to share patient health imaging data and diagnose a number of diseases by scanning images. The system currently boasts accuracy rates for preliminary diagnoses of oesophageal cancer of over 90%. Accuracy rates for lung sarcoidosis and diabetic retinopathy are even higher, at 95% and 97%, respectively.¹³



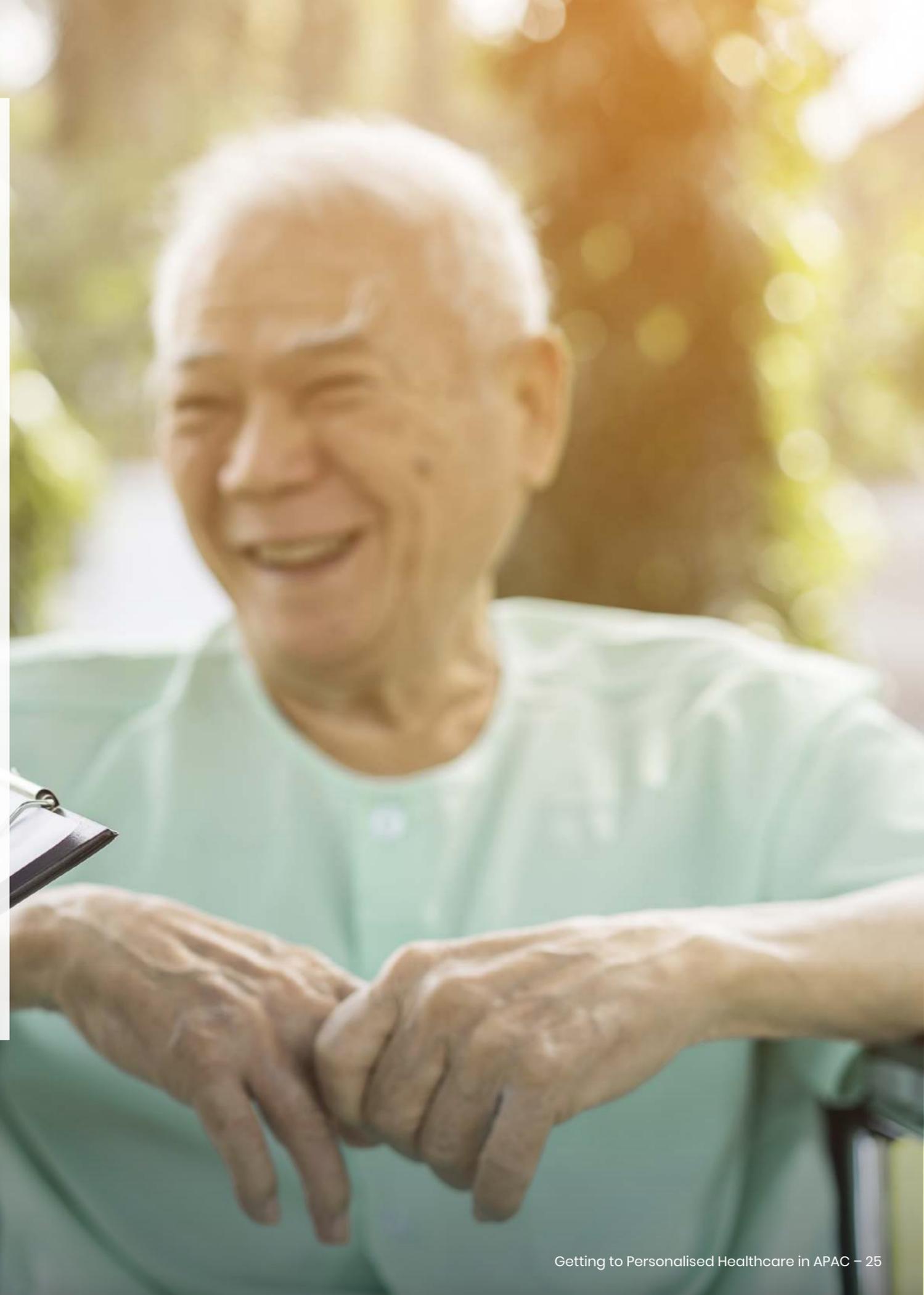
Indonesia

Founded in 2016, Indonesia's digital health consultation service Halodoc now has around 2 million users and 20,000 doctors in its database and supports thousands of consultations every day. Halodoc charges a consultation fee that is lower than what is charged for in-person consultations at traditional clinics. Halodoc allows users to pay with their health insurance and can also facilitate the delivery of medicines through partnerships with pharmacies. Halodoc helps solve two major issues in healthcare in Indonesia: long commute times to doctors and a lack of doctors in many rural areas.¹⁴



Japan

In Japan, the government has established an Integrated Community Care System that combines health care, long-term care, housing, and livelihood support services in a unified manner so that Japan's elderly can receive continuous quality care in their local communities instead of the hospital. This has cut healthcare costs, reduced use of and time spent in hospital settings, while also improving health outcomes for citizens.¹⁵



Conclusion and Recommendations: Getting to Personalised Healthcare in Asia-Pacific

The transition towards personalised healthcare is in very early stages everywhere around the world. However, the findings of the Personalised Health Index show clear signs that this transition is well underway and gaining momentum across most of the Asia-Pacific region. The emergence of strategies, plans and policies that aim to enable more personalised forms of care suggest that key health stakeholders in the Asia-Pacific are thinking about not only how to improve healthcare for citizens, but also how to build future-proofed health systems that are competitive on regional and even global scales. Increased uptake of key enabling technologies such as electronic health records, health data registries, and artificial intelligence throughout the region also illustrate a shift towards personalised healthcare.

Moreover, the **findings of the Personalised Health Index suggest that while economic factors do indeed have an impact on the ability to build and implement personalised healthcare services and solutions, they are not the only factors that matter when it comes to realising personalised healthcare.** Importantly, this gives rise to opportunities for locations in the Asia-Pacific region to “leapfrog”, i.e., utilise unique local characteristics, resources, and strengths to accelerate or even hop over stages of development towards personalised healthcare in spite of economic or material barriers. Crucially, while the Personalised Health Index finds that there are significant disparities between the 11 locations it evaluates, it also highlights that there is a need for continued efforts, innovation and investment in personalised health in all of these locations.

On the basis of the findings of the Personalised Health Index as well as insights offered by the expert panellists during the construction of the Index, FutureProofing Healthcare offers the following recommendations for achieving personalised healthcare in the Asia-Pacific region:

1 Incentivise more comprehensive generation and collection of personalised healthcare-related data

A consistent obstacle in the study of personalised healthcare is the lack of data. In some instances, this takes the form of datasets lacking sufficient coverage of locations in the region, and in others, data that could be operationalised to address a particular aspect of personalised healthcare are non-existent or too old. This is not surprising given the emergent nature of personalised healthcare. However, if the continued development of personalised healthcare is to be supported, more robust and accurate data are needed. **The generation and collection of personalised healthcare-related data should be incentivised on the national and regional levels.** Better data can be used not only to improve decision making in healthcare, improve health outcomes, and achieve more efficiency in health systems, but also to make more comprehensive comparisons between locations and sharing of experience and best practices possible. **To be sure, more intensive collection of data must at the same time firmly ensure that violations of privacy and misuse of individuals’ data does not occur.**



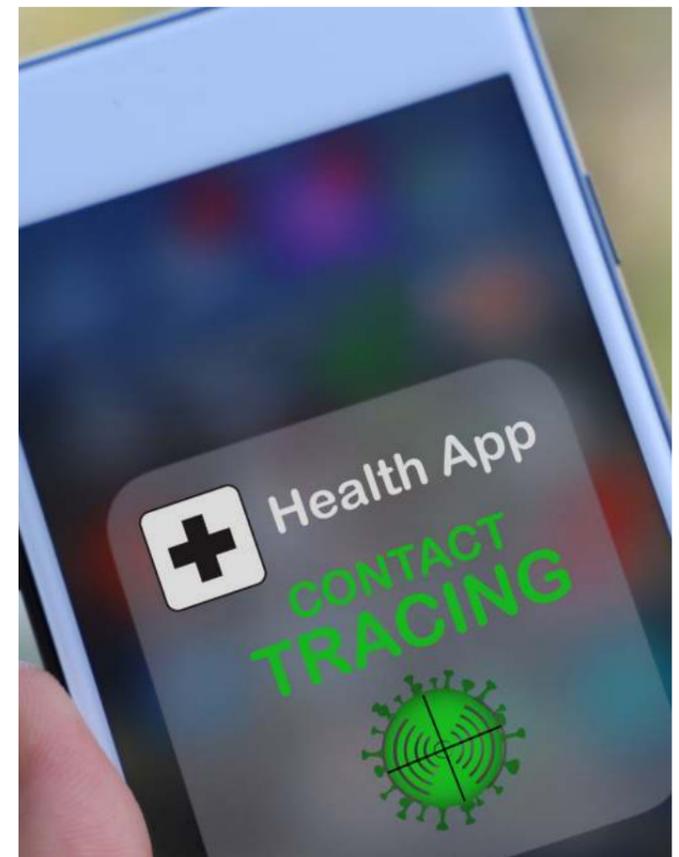
2 Develop personalised healthcare strategies with accompanying implementation plans and establish systems for monitoring developments and evaluating progress in personalised healthcare

To ensure that personalised healthcare steadily develops and adequately addresses the needs of citizens, locations in the Asia-Pacific region should develop fit-for-purpose personalised healthcare strategies and establish monitoring and evaluation systems that regularly take stock of progress and incentivise implementation and accessibility of personalised healthcare.



3 Increase the use of real-world evidence

Policymakers and regulatory authorities should adopt regulations that enable increased use of real-world evidence, which may help accelerate innovation in healthcare, aid in the development of more tailored care guidelines and provide more comprehensive insights into patients’ needs and health outcomes.



4 Improve digital health literacy among citizens

As healthcare becomes more digital, digital literacy is expected to become an increasingly important determinant of access to healthcare and improved health outcomes. Health systems should make it a priority to ensure that all citizens can use basic digital tools and services, and that they can access, understand, and make informed decisions about sharing health data. Improving citizens’ digital health literacy is fundamental to empowering patients in a personalised health system and helping individuals take greater control and responsibility over their own health and healthcare management. **In addition, a fundamental part of achieving greater digital literacy must also be to ensure that citizens are aware of and can accept, navigate, and protect themselves from the risks of increased digitalisation, e.g., data breaches.** A continued focus on improving general health literacy through traditional media is also crucial.

5 Work towards models for interoperability of clinical, -omics, and individually generated data

Access to data is among the most fundamental building blocks of personalised healthcare. Datasets today are largely fragmented and locked into silos and rules governing access for various types of stakeholders vary greatly from location to location. With more open flows of data and fewer barriers to interoperability, the expansive datasets that are needed to support personalised healthcare services and technologies can be built.

While a single set of standards for the region is unrealistic, decision makers and other stakeholders across the Asia-Pacific region should **make a collaborative effort to eliminate barriers to the flow of data between healthcare stakeholders and across borders**. As a part of this, stakeholders should also aim to establish harmonised quality and content standards that are suitable for both clinical and secondary use. At the same time, stakeholders should work to **ensure that increased interoperability does not lead to data getting into the wrong hands – safety and security of data must remain a paramount concern**. A potential space for initiating this work could be APEC's Life Science Innovation Forum, which is already beginning to address important questions around data sharing in the region.

6 Implement a “personalised health in all policies” approach to policymaking

The “Health in All Policies” policymaking framework championed by the World Health Organization, which encourages policymakers to consider the impact of all areas of public policy – e.g., finance, education, and social protection – on health systems, determinants of health, and well-being, should be expanded to assess the impacts on personalised healthcare. As personalised healthcare is in many ways concerned with the impact of social, environmental, and behavioural factors on individual health and wellbeing, encouraging policymakers to consider the impacts of all public policy on personalised healthcare may aid in developing more coherent strategies for personalised healthcare and personalised health-related services.

7 Allocate funding towards innovation in the area of personalised healthcare infrastructure and services

Policymakers should provide targeted funding to projects, activities and initiatives that aim to innovate in all aspects of personalised health, from research and development to the implementation of new services and solutions that stand to benefit both individual and population health.





8 Commit to developing solutions that are made for and available to the vast majority of people

Public and private stakeholders throughout the health ecosystem should make a commitment to developing personalised healthcare solutions that address the needs of and that are affordable for the vast majority of people, in accordance with international efforts to realise universal healthcare and the principles of the United Nations' Sustainable Development Goal 3 on good health and wellbeing. **While personalised healthcare solutions are often conceptualised as high-tech and prohibitively expensive, many aspects of personalised healthcare, like telehealth, can be – and are already being – democratised.** Maximising access to the benefits of personalised healthcare, and thereby opportunities for improved health and wellbeing, should be an imperative for all.

9 Ensure public communications around personalised healthcare clearly state its benefits for citizens

Public trust and confidence in personalised healthcare will be fundamental to ensuring the uptake, proliferation and development of personalised solutions and systems. To gain this trust and confidence, stakeholders must make a clear, compelling and truthful case for why and how personalised healthcare works to benefit citizens.





While these recommendations may appear to be far-reaching and ambitious, they are not unrealistic.

By prioritising health and wellbeing, mobilising resources and talent, and most importantly, building sustainable partnerships between both public and private stakeholders, personalised healthcare can be realised in the Asia-Pacific Region.

Achieving this will require leaders across the entirety of the health ecosystem to step up, shift

organisational thinking from the short-term to the long-term and embrace collaboration rather than competition.

To be sure, personalised healthcare in its most robust form may not arrive tomorrow. **However, with the determination of policymakers, companies, healthcare workers, and citizens, the Asia-Pacific region can set itself on a course to not only succeed in the area of personalised healthcare – but lead – in the years to come.**

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2. For more information on the design and methodology of the Personalised Health Index, please refer to Appendix I (page 5).
3. It should also be noted that the data on which these insights are based primarily concern the performance of the public healthcare systems. Aspects of mixed, public-private healthcare models are not necessarily taken into account here. Moreover, given the lack of quantifiable data for several locations in the Personalised Health Index, scores in some Vital Signs may not necessarily reflect nuances that a single-location, qualitative case study might reveal.
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