

Digitising Indonesia's Health Care Sector

July 2022

Abbreviation list

AI	Artificial Intelligence
AIIMS	All India Institutes of Medical Sciences
AR	Augmented Reality
BPPT	<i>Badan Pengkajian dan Penerapan Teknologi</i> (Agency for the Assessment and Application of Technology)
BSSN	<i>Badan Siber dan Sandi Negara</i> (National Cyber and Crypto Agency)
CAGR	Compound Annual Growth Rate
DTO	Digital Transformation Office
eHAC	Electronic Health Alert Card
HER	Electronic Health Record
ECG	Electrocardiogram
EMR	Electronic Medical Record
ESP	Electronic System Provider
HIMMS	Healthcare Information and Management Systems Society
ICU	Intensive Care Unit
IDR	Indonesian Rupiah
HIS	Indonesia Health Services
IOT	Internet Of Things
NAR	New All Record
PCR	Polymerase Chain Reaction
PaaS	Platform as a Service
USD	United States dollar
VR	Virtual Reality

Foreword

Indonesia's digital health care industry has risen since the COVID-19 pandemic started. The pandemic has pushed people to use telemedicine instead of coming to the hospital for an in-person physical consultation as they are used to. This behavioral change in health care was captured in a survey conducted by Inventure and Alvara showing that there was a sevenfold increase in telemedicine users from 11% in 2019, or before the pandemic, to 76% in 2021. Despite the fact that we could not predict the pandemic that began in 2020, the rise of health technology was also predicted in our previous report on digital health care issues: 21st century Health Care Challenges: A Connected Health Approach, Megatrends in Health care. Following up on this emerging issue, we would like to present our latest report on the development of digital health care in Indonesia, with a focus on telemedicine. However, we will also cover the various elements of digital health care and digital infrastructure.

The pandemic has prompted the Indonesian government to take the first step in collaborating with private digital health care businesses to provide telehealth services for COVID-19 patients. There are significant drivers for the industry to grow, especially with regulatory support in digital health care in Minister of Health Regulation Number 20 of 2019 and Minister of Health Decree Number HK.01.07/Menkes/4829/2021. The increase in the digital health care business is not only experienced by private telemedicine service providers but also hospitals that provide digital services. Both private and state-owned hospitals are preparing to provide high-quality digital services to meet customer needs in terms of medical practitioners, digital talent, user experience, as well as digital infrastructure. In addition to telemedicine services, there has been significant advances in the digital health care industry, one of which is the use of robotic surgery in several hospitals. This development has shown a bright spot in the evolution of digital health care industry which requires more elaboration on the business side. On the other hand, there are challenges that lie ahead, such as the issue of electronic medical record that includes the process, ownership, and regulation. You may read more about these engaging discussions in the report.

With a better understanding of the promising future in the digital health business, the Indonesian government realized its responsibility, which motivated them to establish a digital transformation office (DTO) under the Ministry of Health. In this report, we interviewed Bapak Setiadji, MSc, director of DTO as a resource person. In addition to creating and maintaining a healthy environment for Indonesia's digital health care industry, DTO is also working to develop a national strategy blueprint for the sector. This work is highly regarded because it puts DTO ahead of the government in terms of its ability to respond to recent developments.

We would like to express our high appreciation to Bapak Setiadji, M.Si, Head of DTO, the Ministry of Health, Ibu Dr. dr. Fathemah Djan Rahmat, Sp.B, Sp.BTKV (K), MPH, ex General Director of a state-owned hospital holding company and expert on digital hospital management, Bapak Prof. dr. Purnawan Junadi, MPH, Ph.D, Head of ATENSI, Bapak Joddy Hernady, Senior Vice President for Media & Digital Business PT. Telkom (Persero) Tbk, Bapak Nurhadi Yudiyanto, Managing Director BMHS (Bunda Medik Healthcare System), and Bapak Aditya Wijaya, Head of Investor Relations Mitra Keluarga Hospital and their teams for the time and effort in sharing their insights, knowledge and experiences during our interviews with each of them.

We hope that the report on the latest development of Digital Health Care in Indonesia will be beneficial to the audience to understand the issues and bright spots that exist in this industry.

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Introduction

Suffice to say, COVID-19 has accelerated and catalysed several aspects of digital health care across Indonesia – particularly telemedicine, which might otherwise have taken years to reach the level of adoption that took place during the pandemic. But will the trajectory of digital health continue to accelerate once the threat of COVID-19 subsides?

During the early response phase of the COVID-19 crisis, Indonesia's government had been quick to recognise the potential of digital technology. As one of its first moves, it launched the Pedulilindungi mobile application for contact tracing purposes. By relying on community participation, Pedulilindungi enables people to share their location data, and thereby track their contact history with infected persons. Since then, the application has been expanded to include vaccination-related uses – such as the inclusion of a chatbot to answer frequently asked questions on COVID-19 vaccinations, as well as integration with the WhatsApp messaging platform to enable people to register for their vaccination appointments.

At the same time, telemedicine services also experienced an unprecedented boom. In collaboration with 11 digital health start-ups, the government launched the national COVID-19 telemedicine service to alleviate strain on the health care system during the crisis, and provide much needed health care to patients undergoing isolation. While Indonesia is not alone in experiencing such an acceleration in uptake of digital health technologies – the global digital health market is expected to grow at a compound annual growth rate (CAGR) of 17% from 2021 to 2026 to reach USD 385 billion¹ – it nevertheless faces its own set of unique nuances and challenges.

In this report, we will explore some recent developments in Indonesia's digital health care sector, and take a closer look at the dynamics of the fast-growing sub-sector of telemedicine. Later, we will also highlight some of the results from the Indonesia Digital Health Survey conducted by Deloitte Indonesia in the first half of 2022. This research – which comprised a health care consumer survey, and a medical practitioner survey – reveals some of the stakeholder perceptions of Indonesia's telemedicine sub-sector, and the challenges that both health care consumers and medical practitioners are facing in their experience with telemedicine.

As Indonesia looks ahead to a post-pandemic world, we will also examine several roadblocks that it will need to overcome in order to capitalise on the momentum generated by COVID-19 and thereby realise the full potential of digital health services, as well as further developments in the health care sector that could propel Indonesia's telemedicine trajectory into the future and beyond.

We hope that you will find this report insightful and look forward to more conversations with you on the future of Indonesia's digital health care sector.



¹ "Global Digital Health Technologies Market 2021 to 2026 Featuring Allscripts Healthcare Cerner and Epic Systems Among Others", www.globenewswire.com, 4 January 2022

The rise of telemedicine

Buoyed by the widespread use of digital technology and a digitally-savvy population – Indonesia's Internet penetration rate was 74% as of January 2022, with some 205 million Internet users² – the recent decades have seen an increasing but gradual uptake of telemedicine services.

The advent of the COVID-19 pandemic, however, changed the game: nearly overnight, it has accelerated the uptake of telemedicine services to the point where such services have since become mainstream. In this section, we will explore some of the recent dynamics catalysed by COVID-19, and the ways in which they are collectively reshaping Indonesia's health care landscape.

A boom for digital start-ups

To alleviate strain on the health care system, the government moved swiftly to launch a national COVID-19 telemedicine service in collaboration with 11 digital health start-ups during the pandemic. Briefly, this service not only enables COVID-19 patients to receive remote consultation, but also obtain their medicines through delivery³ (see "Indonesia's COVID-19 telemedicine service coverage and service flow").

The result has been an unprecedented surge in demand for telemedicine: the digital start-up Good Doctor, for example, reported a sixfold increase in telemedicine usage from the previous month in July 2021; similarly, Alodokter has also seen the number of its subscribers double to reach 30 million since the onset of the pandemic⁴. Indeed, these exponential rates of growth have not escaped the attention of foreign and domestic investors, many of whom have made recent investments in Indonesia's telemedicine start-up scene (see Figure 1).



Indonesia's COVID-19 telemedicine service coverage and service flow^{5,6}

Background

- Launched on 5 July 2021
- Delivered in collaboration with 11 participating digital health platforms: Alodokter, Getwell, Good Doctor, Halodoc, KlikDokter, Klinikgo, Link Sehat, Milvic, Prosehat, SehatQ, and YesDok

Service coverage

- Existing coverage: Jakarta, Bogor, Depok, Tangerang, and Bekasi (Jabodetabek)
- Planned expansion: Karawang, Bandung City, Semarang City, Surakarta City, Yogyakarta City, Malang City, and Denpasar

Service flow

1. Patient undergoes a COVID-19 polymerase chain reaction (PCR) or antigen test at a laboratory affiliated with the Ministry of Health.
2. If the test result is positive, the information will be entered into the national New All Record (NAR) system, and the patient will receive a WhatsApp message. Patients may also check the status of their test results on the Ministry of Health's telemedicine portal.
3. Upon receiving the WhatsApp message, the patient will be able to receive teleconsultations from any of the 11 participating digital health platforms, and obtain their prescribed medicines through delivery.

²"Internet use in Indonesia in 2022", datareportal.com, February 2022

³"Potensi Pasar Kesehatan Digital Asia Diramal Rp1.434 Triliun", www.katadata.co.id, 17 February 2022

⁴"Pandemi COVID-19 Memicu Lonjakan Pengguna Platform Kesehatan Digital", Katadata.co.id, Safrezi Fitra, 26 August 2021; "Punya 20 juta pengguna aktif bulanan begini fokus Halodoc selama masa pandemic", Industri.kontan.co.id, 7 Juli 2021

⁵"Penggunaan Telemedicine Diperluas ke Jabar, Jateng, Jatim & Bali", Sehat Negeriku-Kemenkes.go.id;

⁶"Cerita Pasien Isoman COVID-19 Gunakan Telemedicine Kemenkes: Gratis Sih tapi Lama!", www.liputan6.com, 8 February 2022

Figure 1: Non-exhaustive list of digital health start-ups in Indonesia

	Brief background	Key investors	Recent funding
Alodokter ⁷	<ul style="list-style-type: none"> • Health care superapp providing end-to-end digital solutions to patients, from telemedicine and doctor booking to medical content and health insurance services • Currently, the platform connects more than 30,000 doctors and 1,500 hospitals and clinics with millions of Indonesian patients • Latest additions to service offerings also include a new e-pharmacy service known as AloShop 	MDI ventures, and Samsung Ventures Investment Corporation	Series C Extension funding of undisclosed amount in November 2020
Halodoc ⁸	<ul style="list-style-type: none"> • Digital platform offering live teleconsultations with more than 20,000 licenced doctors • Customers can also order lab tests, as well as medication from over 4,000 participating pharmacies, which can deliver within an hour • Recent additions to service offerings include an appointment service connecting over 2,000 health care providers to patients in over 180 cities across Indonesia 	Temasek, Astra International, PT. Telkomsel, Bangkok Bank, Novo Holdings, and Acrew Capital	Series C funding of USD 80 million in April 2021
KlinikGo ⁹	<ul style="list-style-type: none"> • Digital platform offering clinic-booking, telemedicine, and homecare services 	Risjadson Holding & Investment, Gaido Group, and 5Digital Ventures	Seed funding of undisclosed amount in October 2021
Klinik Pintar ¹⁰	<ul style="list-style-type: none"> • Digital platform offering teleconsultations, virtual health services, and appointment services for in-clinic sessions with over 120 participating clinics across 60 Indonesian cities • Upcoming plans include the continued development of its clinic management tool known as Klinik OS, and expansion in number of participating clinics to 400 over the next two years 	Golden Gate Venture, PT. Bundamedik Tbk, Skystar Capital, and Sequis Life	Series A funding of more than USD 4.1 million in November 2021

⁷ "Alodokter raises Series-C Extension funding from MDI Ventures", www.cision.com, 12 November 2020.

⁸ "Healthtech startup Halodoc raises US\$80m in funding led by Astra unit", www.businesstimes.com.sg, 22 April 2021.

⁹ "Indonesian conglomerate's investment arm joins healthtech startup's seed round", www.techinasia.com, 11 October 2021.

¹⁰ "Golden Gate Ventures co-leads \$4m round of Indonesian healthtech firm", www.techinasia.com, 17 November 2021.

	Brief background	Key investors	Recent funding
Nusantics ¹¹	<ul style="list-style-type: none"> • Genomics technology company that successfully repurposed its microbiome research capability to develop two generations of COVID-19 polymerase chain reaction (PCR) test kits • Its first generation of COVID-19 PCR test kits were distributed to 19 provinces across Indonesia under the PASTI BISA program, in collaboration with the Agency for the Assessment and Application of Technology (BPPT) 	East Ventures	Series A funding of undisclosed amount in January 2021
Zi.Care ^{12,13}	<ul style="list-style-type: none"> • Digital health information system platform offering cloud computing-based electronic medical record or electronic health record (EMR/EHR) applications for hospital administration, clinical support, and claims management • Other applications under development also include health passports and a patient personal health record 	Iterative VC, Choco-Up, and Telkomsel Innovation Centre	Seed funding of USD 500,000 in August 2021

Hospitals enter the fray

On the back of the rapid uptake of telemedicine services and patients' reluctance to visit hospitals amidst the pandemic – one recent survey revealed that 80% of respondents were afraid to visit a hospital¹⁴ – many traditional hospital providers have also begun to enter the fray. According to the Ministry of Health's website in April 2022, more than 60 hospitals across Indonesia currently provide teleconsultation and telepharmacy services¹⁵ (see Figure 2).

As compared to non-hospital providers, hospital providers benefit from higher levels of trust: about 71% of respondents in another survey indicated that they have more trust in telemedicine services that are delivered by hospitals¹⁶. It is worth noting, however, that there are several important differences between telemedicine services provided by non-hospital providers and those provided by hospital providers (see Figure 3).

Key hospital players in the telemedicine space include, for example, BMHS (Bundamedik Healthcare System), which introduced its "digital touchpoint" feature to enable patients to obtain remote access to medical information and health care services during the

"Over the next few years, the hospital network intends to collaborate with digital health care companies to extend its telemedicine services to new market, including Indonesian cities where it does not yet have a presence."

Nurhadi Yudiyanto, Managing Director of BMHS (Bundamedik Healthcare System)

pandemic. According to Nurhadi Yudiyanto, Managing Director of BMHS (Bundamedik Healthcare System), over the next few years, the hospital network intends to collaborate with digital health care companies to extend its telemedicine services to new markets, including Indonesian cities where it does not yet have a presence. Other digital initiatives that it has implemented also include a new digital platform to facilitate integration with the national EHR, as well as integration with Internet of Things (IoT) technologies to enable patients' vital signs to be incorporated into their patient records¹⁷.

¹¹ "East Ventures doubles down on Nusantics", East Ventures. 7 January 2021.

¹² "Indonesian healthtech startup wins Telkomsel backing in \$500k seed round", www.techinasia.com, 26 August 2021.

¹³ "Healthtech startup Zi.Care announces early stage funding". www.mime.asia, August 2021.

¹⁴ "Pasien Lebih Pilih Layanan Telemedicine Rumah Sakit ketimbang Startup", katadata.co.id, Ekarina, 5 November 2020

¹⁵ "List Rumah Sakit yang telah bekerjasama", temenin.kemkes.go.id, April 2022

¹⁶ "Pasien Lebih Pilih Layanan Telemedicine Rumah Sakit ketimbang Startup", katadata.co.id, Ekarina, 5 November 2020

¹⁷ Interview with Nurhadi Yudiyanto, Managing Director BMHS (Bundamedik Healthcare System), 27 January 2022

Over at Hermina Hospital, work is also underway to develop a smart hospital system to deliver hybrid, physical-digital services to patients. It is envisioned that this will be achieved through two phases: first, it will launch teleconsultation and drug delivery services that are integrated with the hospital's electronic medical records; then, it will leverage partnerships to develop a complete digital health care ecosystem¹⁸. Other examples of its smart hospital features include smart ward connectivity, as well as intelligent medical support dashboards for intensive care units (ICU), surgery, and dialysis.

Similarly, Mitra Keluarga hospital is another large hospital group offering telemedicine and hospital e-registration services. The latter, in particular, has not only resulted in shortened patient waiting times, but also increased the efficiency of appointment scheduling for doctors. Aditya Wijaya, Head of Investor Relations, Mitra Keluarga Hospital, the digital system enhances patient safety and lowers the chance of human error by connecting the data from the various departments of the hospital.

"The digital system enhances patient safety and lowers the chance of human error by connecting the data from the various departments of the hospital."

**Aditya Wijaya, Head of Investor Relations,
Mitra Keluarga Hospital**

Figure 2: Non-exhaustive list of hospital networks providing telemedicine services in Indonesia

	Geographical coverage	Telemedicine services provided
Pondok Indah Hospital Group	South Jakarta (Pondok Indah and Bintaro), and West Jakarta (Puri Indah)	Hospital e-registration; teleconsultation with medical specialists and sub-specialists; teleconsultation with dentists and specialist dentists; and telepharmacy
Mitra Keluarga Hospital	North Jakarta (Kelapa Gading and Kemayoran), Bekasi, Tangerang, and Cikarang	Hospital e-registration; and teleconsultation conducted via the WhatsApp messaging platform, AlteaCare insurance application, or Garda Mobile Medicare application
Siloam Hospital	Jabodetabek, Jawa, Bali & Nusa Tenggara, Sumatra, Kalimantan, and Sulawesi	Teleconsultation conducted via MySiloam application or Aido Health application
BMHS (Bundamedik Healthcare System)	Jakarta, Depok, South Tangerang, Riau Island, Bekasi, West Java, West Sumatra, and Banten	Teleconsultation, virtual scheduling, and drug delivery
Hermina Hospital	Java, Sumatra, Kalimantan, and Sulawesi	Teleconsultation conducted via Halo Hermina hotline phone number and Hermina mobile application
Pertamedika IHC	Various locations across Indonesia, including Jakarta and East Kalimantan	Teleconsultation conducted via IHC Telemed application

¹⁸"RS Hermina Malang Kembangkan Layanan Kesehatan Digital, Tingkatkan Pelayanan untuk Peserta JKN-KIS", Tribunjatim.com, 19 November 2020

Figure 3: Differences between telemedicine services provided by non-hospital providers and telemedicine services provided by hospital providers

	Telemedicine service provided by non-hospital providers	Telemedicine service provided by hospital providers
Fees	Relatively more affordable than telemedicine services provided by hospital providers	Similar to fees charged for physical consultations at hospitals
Data storage	Electronic medical record data hosted on the cloud	Electronic medical record data hosted in data centres
Service coverage	Access to general practitioners, medical specialists, laboratory tests, and e-prescriptions	Access to general practitioners, medical specialists (including physical examination at the hospital), laboratory tests, and e-prescriptions
Applicable laws and regulations	<ul style="list-style-type: none"> • Law Number 36 of 2009 concerning Health (as amended by Law Number 11 of 2020 concerning Job Creation) • Minister of Health Regulation Number 90 of 2015 concerning Healthcare Services in Remote and Very Remote Areas • Minister of Health Regulation Number 20 of 2019 concerning Telemedicine Services Implementation between Health Services Facilities • Minister of Health Decree Number HK.01.07/Menkes/4829/2021 concerning Guidelines for Health Services through Telemedicine during the Corona Virus Disease 2019 (COVID-19) Pandemic (as amended by Minister of Health Decree Number HK.01.07/Menkes/243/2022) 	<ul style="list-style-type: none"> • Law Number 36 of 2009 concerning Health (as amended by Law Number 11 of 2020 concerning Job Creation) • Minister of Health Regulation Number 90 of 2015 concerning Healthcare Services in Remote and Very Remote Areas • Minister of Health Regulation Number 20 of 2019 concerning Telemedicine Services Implementation between Health Services Facilities • Minister of Health Decree Number HK.01.07/Menkes/4829/2021 concerning Guidelines for Health Services through Telemedicine during the Corona Virus Disease 2019 (COVID-19) Pandemic (as amended by Minister of Health Decree Number HK.01.07/Menkes/243/2022)



Understanding stakeholder perceptions in the telemedicine sector

To obtain a more in-depth understanding of stakeholder perceptions in Indonesia's telemedicine sector – defined as the sector involved in the use of technology, including telephone, video, mobile applications, text-based messaging, and other communication platforms, in the delivery of remote health care services – Deloitte Indonesia conducted the Indonesia Digital Health Survey in the first half of 2022. Briefly, this research comprised a series of two surveys:

1. Health care consumer survey

To find out more about the health care consumer's experience with telemedicine services and identify areas of improvement, a health care consumer survey was conducted with 224 members of the public. The majority of survey respondents were between 26 and 41 years old, and located in provinces in Java, such as DKI Jakarta, West Java, East Java, and Banten. Around half of total survey respondents also reported monthly expenditures of more than IDR 5 million.

2. Medical practitioner survey

To gain an understanding of telemedicine services from the point of view of medical practitioners, the medical practitioner survey was conducted with 30 survey respondents involved in the provision of services at hospitals, clinics, and other health care facilities.

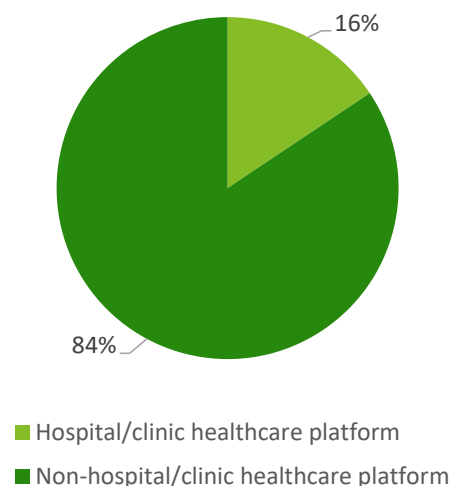
In this section, we will examine the key findings from each of the two surveys, as well as their potential implications for the telemedicine sector in Indonesia.

Health care consumers

Our health care consumer survey revealed significant uptake of telemedicine services, with more than half (57%) of total survey respondents reporting some experience in utilising telemedicine services. In terms of frequency, an overwhelming majority (77%) of them utilised telemedicine services between 1 and 5 times a year.

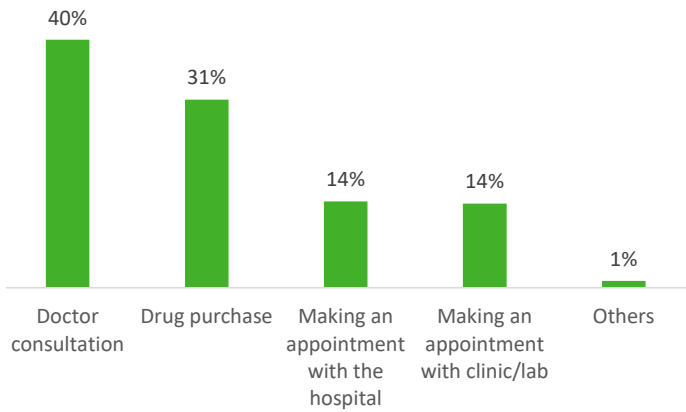
Of this group of users, the majority (84%) had utilised services delivered by non-hospital/clinic platforms, with only a minority (16%) utilising those provided by hospital/clinic platforms (see Figure 4). Most frequently utilised services also include doctor consultations (40%) and drug purchases (31%), followed by appointment services for hospitals (14%) and clinics/labs (14%) (see Figure 5).

Figure 4: Usage of different types of telemedicine platforms amongst survey respondents utilising digital health services between 1 and 5 times a year



Source: Deloitte's Indonesia Digital Health Survey 2022

Figure 5: Usage of different types of telemedicine services amongst survey respondents utilising digital health services between 1 and 5 times a year

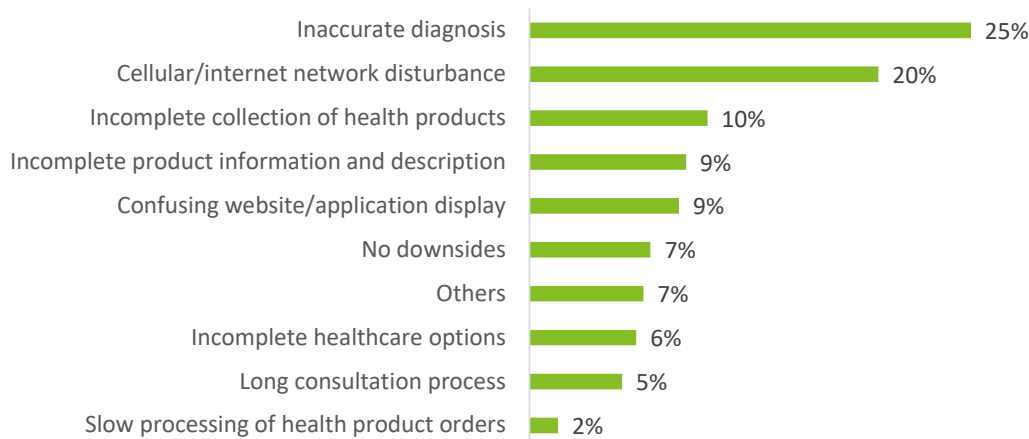


Source: Deloitte's Indonesia Digital Health Survey 2022

Satisfaction with telemedicine services was also fairly high: only a small fraction of survey respondents (5%) expressed dissatisfaction with their experience, with the majority expressing satisfaction (57%), high satisfaction (3%) or neutrality (35%). Nearly all survey respondents (95%) also indicated that they would be willing to continue utilising telemedicine services in the future, with about 38% of them believing that telemedicine services could replace at least a quarter of their total hospital visits.

Perhaps more notably, however, even amongst health care consumers with no prior experience interest in telemedicine services, interest was high: about three quarters (75%) of this group of survey respondents indicated that they were interested in trying out telemedicine services, with convenience and safety cited as top reasons.

Figure 6: Perceived downsides and challenges of digital health services



Source: Deloitte's Indonesia Digital Health Survey 2022



Overall, ease of access was rated by survey respondents across the board as the top perceived benefit of telemedicine services, followed by fast processing times for doctor consultations and product orders. Other perceived benefits also include a wide variety of health service options, user-friendly application and website interfaces, as well as comprehensive product information and description.

On the other hand, perceived downsides and challenges include concerns regarding the accuracy of diagnoses made from virtual consultations, as well as the lack of a reliable cellular or Internet network that could hinder the user experience (see Figure 6).

Medical practitioners

More than half (60%) of medical practitioners in our survey reported some experience in providing telemedicine services. Of this group, the majority (78%) of them did so between 1 and 10 times per month.

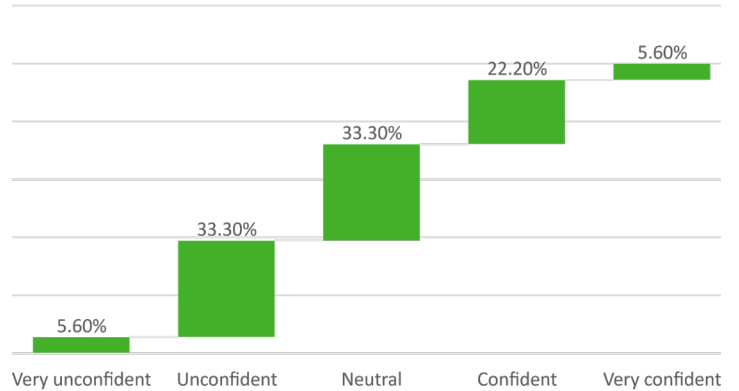
Their responses also shed light on the issues confronting medical practitioners in their delivery of telemedicine services. Obstacles cited include, for example, the inadequate or non-optimal physical examination process which made it difficult to make an accurate diagnosis, lack of a reliable cellular or Internet network, as well as lack of integration with electronic health systems.

In terms of their confidence in the accuracy of a diagnosis made from a teleconsultation process, only a minority of survey respondents indicated that they were very confident (6%) or confident (22%) (see Figure 7). Indeed, most survey respondents (83%) still prefer to conduct physical examinations of their patients, with 72% of them also stating that they feel the need to receive additional training in order to more effectively deliver telemedicine services (see Figure 8).

To improve the delivery of telemedicine services, survey respondents recommend enhancements to the technology infrastructure – including software capable of facilitating a more complete examination of the patient, and more stable Internet connections – as well as a more comprehensive regulatory framework for telemedicine, and better integration with hospital health systems to enable patients' follow-up examinations to be conducted in a hospital setting.

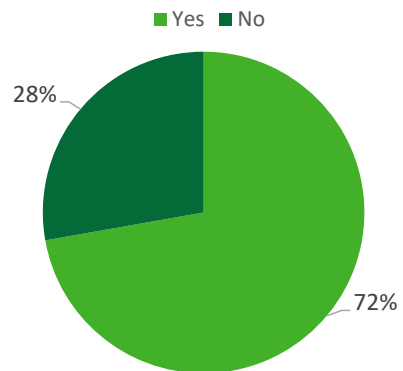
In addition, medical practitioners also suggested investing more efforts in patient education. Specifically, they felt that patients need to understand that the telemedicine process entails much more than a mere remote consultation – for example, patients may be required to undergo certain lab tests or other home diagnostic tests before they can obtain a medical diagnosis.

Figure 7: Confidence level in the accuracy of a diagnosis made from a teleconsultation process



Source: Deloitte's Indonesia Digital Health Survey 2022

Figure 8: Desire for additional training to more effectively deliver telemedicine services



Source: Deloitte's Indonesia Digital Health Survey 2022



The role of pharmaceutical companies in the telemedicine sector

Given that telemedicine is a remote service, there remain some limitations in terms of the services that it can provide. According to the existing law, a medical practitioner can only provide a diagnosis after a process of anamnesis – which includes a dialogue between the medical practitioner and patient on the symptoms, health complaints, treatments that have been done, and drugs that have been consumed – as well as a physical or other supporting examination process, such as a laboratory test.

As the physical examination process does not exist in telemedicine, many telemedicine providers in Indonesia have tried to bridge some of these gaps by forming collaborations with laboratories and/or pharmacies¹⁹, as stated by Prof. dr. Purnawan Junadi, MPH, Ph.D, Head of ATENSI¹⁹. This underscores the importance of pharmaceutical companies in the telemedicine sector: from e-prescription services to the conducting of lab tests, pharmaceutical companies have a critical role in building the necessary infrastructure required to serve patients digitally.

Prodia Clinical Laboratory, for example, is one player that has launched a mobile application to enable patients to book their lab test schedules, consult doctors, and view their test results – anytime and anywhere. During the COVID-19 pandemic, Prodia was also one of the appointed diagnostic laboratories supporting Indonesia's Travel Corridor Arrangement. As part of this program, travellers' COVID-19 tests were conducted in Prodia's laboratories, the results of which were then subsequently integrated into their electronic Health Alert Cards (eHACs)²⁰.

As health consumers and providers become more comfortable with remote health care delivery, we can reasonably expect pharmaceutical companies to take on more important roles in the telemedicine sector. To envision what this future could entail, the experiences of more developed telemedicine markets could be instructive: in the US, for example, patients are able to conduct their own electrocardiograms (ECGs), before sending the results to a medical practitioner, who in turn be able to assist patients in recognising if they are at risk of an imminent heart attack – all without any physical interaction²¹.

"As the physical examination process does not exist in telemedicine, many telemedicine providers in Indonesia have tried to bridge some of these gaps by forming collaborations with laboratories and/or pharmacies."

Prof. dr. Purnawan Junadi, MPH, Ph.D, Head of ATENSI



¹⁹ Interview with Prof. dr. Purnawan Junadi, MPH, Ph.D, the Head of ATENSI, 11 April 2022

²⁰ www.prodia.co.id

²¹ Interview with Prof. dr. Purnawan Junadi, MPH, Ph.D, the Head of ATENSI, 11 April 2022

Potential challenges and roadblocks

While the COVID-19 pandemic has unveiled the immense potential of digital health services for Indonesia, capitalising on these opportunities in the long haul will first require overcoming several potential challenges. In this section, we will explore three major roadblocks that we have identified, and some of the ongoing efforts that are being made to address them.

Nascent regulatory landscape

Despite the recognition of the importance of telemedicine technology – and its role in enhancing health care access for the large rural populations living in Indonesia's remote areas – the regulatory landscape remains a fairly nascent one at this point in time, with few telemedicine-specific laws (see Figure 9).

Specifically, while the Minister of Health Regulation Number 90 of 2015 concerning Healthcare Services in Remote and Very Remote Areas had acknowledged telemedicine for its timeliness and accuracy in delivering health services to remote areas, it was only four years later that the telemedicine-specific regulation – the Minister of Health Regulation Number 20 of 2019 concerning the Provision of Telemedicine Services Between Health Services Facilities – was introduced.

Thereafter, amidst the pandemic, the Minister of Health Decree Number HK.01.07/Menkes/4829/2021 on Guidelines for Health Services through Telemedicine during the Corona Virus Disease 2019 (COVID-19) Pandemic – as amended by Minister of Health Decree Number HK.01.07/Menkes/243/2022 (MoHD 243/2022) – was launched to enable telemedicine to exist as a health facility during the COVID-19 pandemic. Other key regulations also include the Regulation of the Chairperson of the Indonesian Medical Council Number 74 of 2020 (IMCR 74/2020), which oversees doctors' professional practice of telemedicine during the pandemic²².

Any potential sanctions related to incompliance to these laws will be meted out according to the hierarchy of regulations and cross-sectoral regulations – such as the Law Number 36 of 2009 concerning Health (as amended by Law Number 11 of

2020 concerning Job Creation), and Law Number 11 of 2008 concerning Electronic Information and Transaction (as amended by Law Number 19 of 2016) – and could include penalties, fines, revocations of business licences, and/or revocations of business entity status.

There remain, however, several limitations. Specifically, as the abovementioned regulations cover only the use of telemedicine during the COVID-19 pandemic, they do not apply to the use of telemedicine in a post-pandemic world. There is therefore a need for these regulations to be adjusted not only to provide greater legal certainty, but also protect the interests of patients and medical practitioners in the longer term.

Furthermore, under prevailing regulations, digital health (also referred to as e-Kesehatan or e-Health) is also defined as the utilisation of info-communications technology to improve the quality of health services and its work processes. By laws, e-Health relates to the use of health management information systems, such as EMR/HER systems, health knowledge management systems, health surveillance systems, telemedicine, mobile health (m-health), consumer health informatics, and digital learning for health sciences and medical research. Briefly afterwards, it is classified into two categories – health informatics and remote health services (telemedicine)²³ – under the supervision of the Ministry of Health.²⁴

Current digital health regulations, however, only cover the use of telemedicine in health care facilities (that is, hospitals and clinics), and online drug distribution – which are both regulated under the Minister of Health Regulation of the Republic of Indonesia Number 20 of 2019 concerning Telemedicine Services Implementation between Health Services Facilities (MoHR 20/2019), and National Agency of Drug and Food Control Regulation Number 8 of 2020 on the Supervision of Online Distribution of Medicine and Food as amended by the National Agency of Drug and Food Control Regulation Number 32 of 2020 (BPOMR 8/2020). This implies that there remain regulatory gaps pertaining to the other abovementioned aspects of digital health.

²²“Urgensi Menyusun Regulasi Komprehensif Telemedicine”, Pusat Studi Hukum & Kebijakan Indonesia, M. Nur Sholikin, 22 January 2022

²³The terminology of “telemedicine” is defined by Minister of Health Regulation Number 20 of 2019 as providing remote health services by health professionals using information and communication technology, including the exchange of information on diagnosis, treatment, prevention of disease and injury, research and evaluation, and continuing education of health service providers for the benefit of improving individual and community health, consisting of (i) tele-radiology, (ii) tele-electrocardiography, (iii) tele-ultrasonography, (iv) teleconsultation clinic service; and (v) other telemedicine consultation services in accordance with the development of science and technology

²⁴ Exhibit of Minister of Health Reg Number 46 of 2017

In addition, we believe that several aspects relating to the practice of telemedicine may also warrant more consideration. These include, for example, the rights and obligations of telemedicine providers, scope of services, quality control, service responsibilities, service governance, protection and training for medical practitioners, management of electronic medical records, and wider public education on the uses of telemedicine. Furthermore, as telemedicine practices increasingly leverage the use of emerging technologies, such as IoT devices, there also needs to be regulation covering the interoperability aspects of these technologies, as well as their accompanying implications for patient-doctor interactions.



Figure 9: Regulations relating to telemedicine in Indonesia

Regulation	Theme	Link to more information
1. Law Number 29 of 2004 (Law 29/2004)	Medical Practice	UU No. 29 Tahun 2004 tentang Praktik Kedokteran
2. Law Number 11 of 2008 as amended by Law Number 19 of 2016 (Law 11/2008)	Electronic Information and Transaction	UU No. 11 Tahun 2008 tentang Informasi dan Transaksi Elektronik
3. Law Number 14 of 2008 (Law 14/2008)	Public Information Disclosure	UU No. 14 Tahun 2008 tentang Keterbukaan Informasi Publik
4. Law Number 36 of 2009 as amended by Law Number 11 of 2020 (Law 36/2009)	Health	UU No. 36 Tahun 2009 tentang Kesehatan
5. Law Number 36 of 2014 (Law 36/2014)	Medical Practitioner	UU No. 36 Tahun 2014 tentang Tenaga Kesehatan
6. Law Number 38 of 2014 (Law 38/2014)	Nursing	UU No. 38 Tahun 2014 tentang Keperawatan
7. Government Regulation Number 46 of 2014 (Law 46/2014)	Healthcare Information	Peraturan Pemerintah No. 46 Tahun 2014 tentang Informasi Kesehatan
8. Government Regulation Number 47 of 2016 (GR 47/2016)	Healthcare Facilities	Peraturan Pemerintah No. 47 Tahun 2016 tentang Layanan Fasilitas Kesehatan
9. Government Regulation Number 71 of 2019 (GR 71/2019)	System Operation and Electronic Transaction	Peraturan Pemerintah No. 71 Tahun 2019 tentang Penyelenggaraan Sistem dan Transaksi Elektronik
10. Government Regulation Number 21 of 2020 (GR 21/2020)	Large-Scale Social Distancing in the Context of Acceleration of Handling of Corona Virus Disease 2019	Peraturan Pemerintah No. 21 Tahun 2020 tentang Pembatasan Sosial Berskala Besar dalam Rangka Percepatan Penanganan Corona Virus Disease 2019 (COVID-19)
11. Presidential Regulation Number 82 of 2018 as amended latest by Presidential Regulation Number 64 of 2020 (PR 82/2018)	Healthcare Securities	Peraturan Presiden No. 82 Tahun 2018 tentang Jaminan Kesehatan

Regulation	Theme	Link to more information
12. Regulation: Regulation of Minister of Health Number 269/Menkes/PER/III/2008 (MoHR 269/2008)	Medical Record	Peraturan Menteri Kesehatan No. 269/Menkes/PER/III/2008 tentang Rekam Medis
13. Regulation of Minister of Health Number 36 of 2012 (MoHR 36/2012)	Medical Confidentiality	Peraturan Menteri Kesehatan No. 36 Tahun 2012 tentang Rahasia Kedokteran
14. Regulation of Minister of Health Number 90 of 2015 (MoHR 90/2015)	Healthcare Services in Remote Areas	Peraturan Menteri Kesehatan No. 90 Tahun 2015 tentang Pelayanan Kesehatan di Daerah Terpencil
15. Regulation of Minister of Communication and Information Number 20 of 2016 (MoCIR 20/2016)	Personal Data Protection Electronic System	Peraturan Menteri Komunikasi dan Informatika No. 20 Tahun 2016 tentang Perlindungan Data Pribadi dalam Sistem Elektronik
16. Regulation of Minister of Communication and Information Number 5 of 2020 as amended by Regulation of Minister of Communication and Information Number 10 of 2021 (MoCIR 5/2020)	Private Electronic System Providers (ESPs)	Peraturan Menteri Komunikasi dan Informatika No. 5 Tahun 2020 tentang Penyelenggara Sistem Elektronik Lingkup Privat
17. Regulation of Minister of Health Number 21 of 2020 as amended by Regulation of the Minister of Health Number 13 of 2022 (MoHR 21/2020)	2020-2024 the Ministry of Health's strategic plan	Peraturan Menteri Kesehatan No. 21 Tahun 2020 tentang Rencana Strategis Kementerian Kesehatan Tahun 2020-2024
18. Regulation of Minister of Health Number 85 of 2020 (MoHR 85/2020)	Transfer and Use of Materials, Information Content and Data	Peraturan Menteri Kesehatan No. 85 Tahun 2020 tentang Pengalihan dan Penggunaan Material, Muatan Informasi, dan Data
19. Minister of Health Decree Number HK.01.07/Menkes/4829/2021 (MoHD 4829/2021)	Guidelines for Health Services through Telemedicine during the Corona Virus Disease 2019 (COVID-19) Pandemic	Surat Keputusan Menteri Kesehatan Nomor HK.01.07/Menkes/4829/2021 tentang Pedoman Pelayanan Kesehatan melalui Telemedicine pada Masa Pandemi Covid-19
20. Minister of Health Decree Number HK.01.07/Menkes/243/2022 (MoHD 243/2022)	Clinical Management of Corona Virus Disease 2019 (COVID-19) Protection in Health Services Facilities	Surat Keputusan Menteri Kesehatan Nomor HK.01.07/Menkes/243/2022 tentang Manajemen Klinis Tata Laksana Covid-19 di Fasilitas Pelayanan Kesehatan
21. Regulation of Food and Drug Supervisory Agency Number 8 of 2020 as amended by Regulation of Food and Drug Supervisory Agency Number 32 of 2020 (BPOMR 8/2020)	The control of drugs and foods online distribution	Peraturan Badan Pengawas Obat dan Makanan No. 8 Tahun 2020 tentang Pengawasan Obat dan Makanan yang Diedarkan Secara Daring Peraturan Badan Pengawas Obat dan Makanan No. 32 Tahun 2020 (perubahan BPOMR 8/2020)
22. Regulation of the Chairperson of the Indonesian Medical Council Number 74 of 2020 (IMCR 74/2020)	Clinical Authority and Medical Practice through Telemedicine During Corona Virus Disease 2019 (COVID-19) Pandemic Period in Indonesia	Peraturan Konsil Kedokteran Indonesia No. 74 Tahun 2020 Kewenangan Klinis dan Praktik Kedokteran melalui Telemedicine

Infrastructure considerations

One of the most important advantages of telemedicine and other digital health solutions is their ability to extend health care access to patients living in remote areas with inadequate health facilities. The challenge, however, is that over 12,000 of the approximately 83,000 villages across Indonesia do not yet have access to 4G services²⁵, and therefore lack access to a stable Internet connection.

To tackle this issue, the Ministry of Information and Communications is currently working with various telecommunications providers to expand network coverage to remote areas. Ongoing efforts include, for example, the Palapa Ring project, which entails the construction of a 36,000 km-long fibre optic network to bring 4G Internet connectivity to 440 cities and districts. However, Indonesia's vast geographical area and uneven population distribution – coupled with its volcanically-active geographical location directly above the Pacific Ring of Fire – continues to make such efforts challenging.

In tandem, the Ministry of Communications and Information is also aiming to roll out 5G connectivity across Indonesia by 2025. This means that, at least in the key urban cities, we are likely to witness the imminent emergence of new digital health applications – in particular, those based on cloud computing and artificial intelligence (AI) technologies. Indeed, several high-profile developments can already be observed to be gaining traction, such as the partnership between the Ministry of Health and Google to develop digital health talent and digital health technology, including the integration of artificial intelligence (AI) technology into the national health service infrastructure²⁶.

Apart from the telecommunications infrastructure, there is also the need to invest in improvements to the distribution and logistics network in Indonesia to support the delivery of prescription drugs and diagnostic tests: while the existing distribution and logistics infrastructure remains functional, speed is of the essence when it comes to the shelf life of samples that are collected for laboratory-based tests.

"With the introduction of the Indonesia Health Services different health care providers will be able to access and exchange data within a health information exchange system integrated with the various data management systems owned by different health care providers."

Joddy Hernady, Head of Digital Vertical Ecosystem Health and Head of One Data for Vaccination COVID-19 and PeduliLindungi, PT Telkom Indonesia (Persero) Tbk

Data management and protection

Based on information provided by the Ministry of Health, central and local governments currently operate 400 different digital health applications with varying health data requirements²⁷. This vast amount of unstandardised data means that data interoperability – or the ease of transfer of medical records and other health information between health care providers and system – is a key challenge that Indonesia will need to overcome in the digitisation of its health services.

This is especially critical with the introduction of the Indonesia Health Services (IHS) (see "Towards a single, integrated health services platform"), where different health care providers will be able to access and exchange data within a health information exchange system integrated with the various data management systems owned by different health care providers, as stated by Joddy Hernady, Head of Digital Vertical Ecosystem Health and Head of One Data for Vaccination COVID-19 and PeduliLindungi, PT Telkom Indonesia (Persero) Tbk. Furthermore, by creating a "single source of truth", the standardisation of data could also facilitate greater collaboration amongst health care providers, health practitioners, researchers, and pharmaceutical companies to improve diagnoses, increase medical device or drug effectiveness, and encourage desirable patient behaviours.

To this end, some signs of progress can already be observed. For example, the Regulation of the Minister of Health of the Republic of Indonesia Number 21 of 2020, as amended by Regulation of the Minister of Health of the Republic of Indonesia Number 13 of 2022 (MoHR 21/2020), has called for the better integration of information systems for health research and health development²⁸. In addition, the Ministry of Health's Digital Transformation Office (DTO) has also introduced its Blueprint for the 2024 Digital Health Transformation Strategy setting out its strategy for the integration of the entire health ecosystem on the Indonesia Health Services (IHS) platform²⁹.

²⁵ "12.000-an Desa di Indonesia Belum Terkoneksi Jaringan 4G", cyberthreat.id, Tenri Gobel, 10 Juni 2020

²⁶ "Kemenkes-Google Cloud Platform Indonesia Kerja Sama Kembangkan Layanan Kesehatan Berbasis Teknologi", Sehatnegeriku.kemkes.go.id, 19 April 2022

²⁷ Cetak Biru Strategi Transformasi Digital Kesehatan 2024, Kementerian Kesehatan Republik Indonesia

²⁸ <https://dto.kemkes.go.id/Digital-Transformation-Strategy-2024.pdf>

²⁹ Idem.

"The office has set a target of 8,000 facilities - ranging from labs to pharmacies - into the platform by the end of 2022. This initiative is supported by industry players, including private health care organisations, Healthcare Information and Management Systems Society (HIMMS) and other funding institutions"

Setiaji, M.Si, Head of DTO

Given the occurrence of several high-profile data breaches – including recent case involving the eHAC system, where travellers' personal and health data were compromised³⁰ – data protection is also another aspect that must be considered. Currently, however, the regulatory framework relating to data protection remains lacking in several ways.

Specifically, although provisions relating to personal data protection have been stipulated in several different regulations – including Law Number 11 of 2008 on Electronic Information and Transaction as amended by Law Number 19 of 2016; Government Regulation Number 71 of 2019 on Administration of Electronic Transaction and System; Minister of Communication and Information Regulation Number 5 of 2020 on Private Electronic System Providers as amended by Minister of Communication and Information Regulation Number 10 of 2021; and Minister of Communication and Information Regulation Number 20 of 2016 on Personal Data Protection in Electronic System – there remains a lack of data privacy-specific regulation.

Furthermore, there is a lack of regulation pertaining to confidentiality in health services. With Indonesia's growing focus on EMR systems, this is a gap that needs to be quickly closed. In general, confidentiality in health care services has been regulated under Ministry of Health Regulation Number 36 of 2012 on Medical Confidentiality. It is also noteworthy that the only regulation covering the use of medical records is the Ministry of Health Regulation Number 269/Menkes/PER/III/2008 which regulates the management of e-medical data; however, this does not cover aspects relating to data safeguards in the transfer or exchange of data.

Nevertheless, it must be noted that the government is already making progress on data protection: currently, it is preparing a draft of the Personal Data Protection Law – which will be broadly based on the European Union's General Data Protection Regulation – to put in place the necessary protection mechanisms for personal data protection, while also promoting the growth of Indonesia's digital economy.

Towards a single, integrated health services platform

With the objective of digitising Indonesia's health services, the Ministry of Health had earlier in March 2021 established its Digital Transformation Office (DTO). Briefly, the DTO will oversee initiatives to reduce the administrative burden in the health care system, increase EMR uptake, and support innovation across the health care ecosystem.

According to the Ministry of Health's Blueprint for Digital Health Transformation Strategy 2024, the government intends to adopt a platform-as-a-service (PaaS)-based approach towards the integration of its national health data system, health application systems, and health technology ecosystem. Essentially functioning as an integrated health service system, this platform – referred to as Indonesia Health Services (IHS) – is intended to neither replace nor merge existing applications; instead, it will simply act as a link between them.

Specifically, although applications linked to the integrated health service system will be required to comply with standardised specifications and other mechanisms relating to business process, data, technical aspects, and security, they will not be required to leverage any specific programming platforms. This integration would enable, for example, a doctor to access a patient's previous medical records, including prior diagnosis and lab test results, upon receiving the patient's consent – without the patient needing to furnish prior information about their allergies or other health history, or physical copies of past medical records.

According to Setiaji, M.Si, Head of DTO, the office has set a target of 8,000 facilities - ranging from labs to pharmacies - into the platform by the end of 2022. This initiative is supported by industry players, including private health care organisations, Healthcare Information and Management Systems Society (HIMMS) and other funding institutions.

At the same time, the Ministry of Health's DTO team is also collaborating with the National Cyber and Crypto Agency (BSSN) to secure the data centres that are used to store health information. Briefly, BSSN will be responsible for reviewing the technology infrastructure to ensure compliance with the relevant security standards, and working with telecommunication providers to ensure the ongoing security of these premises.

³⁰ www.prodia.co.id

Digital health care talent

When it comes to health care talent, the crunch is real: Indonesia has only about 0.4 medical practitioners per 1,000 population, far behind many other neighbouring economies, such as Malaysia (1.9 medical practitioners per 1,000 population) and Singapore (2.3 medical practitioners per 1,000 population). Add to that the need for specialised skills required to participate in the digital health sector, and the talent shortage becomes clear.

Indeed, in order for medical practitioners to leverage technology to deliver health promotion and curative services to people living in the most remote parts of Indonesia, they will require not only digital literacy skills, but also data literacy and human literacy skills³¹. Furthermore, as shared by the ex General Director of a state-owned hospital holding company and expert on digital hospital management, Dr. dr. Fathemah Djan Rahmat, Sp.B, Sp.BTKV (K), MPH, the rise of digital health services will also³², while not compromising on patient outcomes and satisfaction.

This is a challenging endeavour, and one that medical practitioners appear to have recognised: in one of the findings from Deloitte Indonesia's medical practitioner survey covered in the earlier part of this report, 72% of medical practitioners had reported needing additional training in order to more effectively deliver telemedicine services.

Looking ahead, the competition for talent in the digital health sector is likely to continue to heat up, as the sector will need to compete with many other industries seeking talent with the same digital skillsets, while talent supply remains tight: according to estimates by the World Bank, Indonesia will require the addition of some 9 million digital talents by 2030 to support its technological development³³.

Recognising this issue, the Ministry of Information and Communication, in collaboration with the Coordinating Ministry of Human Resources and Culture, is investing in efforts to advance the development of Indonesia's digital talent pipeline. Some of its initiatives include, but are not limited to, a digital talent scholarship program, a digital leadership academy, as well as efforts to facilitate increase digital literacy across the board through national digital literacy movements.

"Medical practitioners will require not only digital literacy skills, but also data literacy and human literacy skills, while not compromising on patient outcomes and satisfaction."

Dr. dr. Fathema Djan Rachmat, Sp.B, Sp.BTKV (K), MPH



³¹ "Perkuat Kapasitas Tenaga Kesehatan dalam Digitalisasi Layanan", Kompas.id, 2 December 2021

³² Interview with Dr. dr. Fathemah Djan Rahmat, Sp.B, Sp.BTKV (K), MPH, ex General Director of a state-owned hospital holding company and expert on digital hospital management, 5 April 2022

³³ "Kominfo Luncurkan SIMONAS, Platform Rekrutment Talenta Digital," Siaran Pers No. 172/HM/KOMINFO/09/2019, 5 September 2019

Further developments in the digital health sector

Given Indonesia's large, fragmented population and shortage of qualified medical practitioners, telemedicine solutions present a natural fit for some of the inherent challenges that it faces in terms of increasing health care access. But that is only the tip of the iceberg: several other ongoing digitisation developments in Indonesia's health care sector are also well underway, with important implications for all stakeholders in the ecosystem – including but not limited to health care consumers, health care providers, and the government.

In this section, we will take a closer look at some of these trends, and the opportunities that they present for future convergence with the telemedicine sub-sector. Indeed, the market size of these opportunities is not to be underestimated: Indonesia's digital health sector is expected to be worth an approximately USD 973 million in 2023, which represents a CAGR of more than 60 percent from 2017 when it was worth only about USD 85 million³⁴.

Growing consumer acceptance of wearables

Across the globe, there has been a growing consumer acceptance of the use of wearables for health monitoring, and consumer willingness to share data³⁵. From 2022 to 2030, the global medical device wearables market is expected to expand at a CAGR of 28%, on the back of the growth of the home health care sector, remote patient monitoring devices sector, and increasing consumer focus on fitness and healthy lifestyles³⁶.

Closer to home, we are also witnessing an increasing acceptance of such wearables with the Indonesian consumer's growing uptake of digital health care solutions. The digital fitness and well-being devices market in Indonesia, for example, is expected to expand at a CAGR of about 7% between 2022 and 2026 to reach a projected market volume of about USD 638 million³⁷. This is a promising development, as wearables are highly complementary to the telemedicine process. Specifically, these devices can not only provide medical practitioners with more accurate patient data, but also enable medical practitioners to conduct remote monitoring of a patient's health condition, and intervene where necessary.

Shift in preferences towards home-based care

Another related trend is also the broad-based, global shift in preferences towards home-based care: on the back of ageing populations and increasing incidences of chronic diseases, the global home-based health care market is expected to grow at a CAGR of 8% between 2022 and 2030³⁸.

Much of this shift is driven by technological advancements in remote monitoring devices and self-diagnostics – including but not limited to high-accuracy blood glucose self-diagnostic tests, and wearables capable of continuously transmitting data on heart rates, physical activity, or sleeping patterns to medical practitioners – as well as the benefits that home-based health care offers in terms of cost, and reduction in physical hospital visits.

By replacing costly hospital visits with either teleconsultations or regular delivery of prescription medications, home-based health care is one area with immense potential for the greater delivery of telemedicine services, and more hybrid physical/digital patient experiences.

Evolution of bio-genomics

One other development warranting consideration is the evolution of bio-genomics, where personalised therapy is developed for an individual patient based on their own genetic or bio-genomic data. Two subsets of bio-genomics are toxicogenomics and nutrigenomics: in the former, the focus is on the health impact of a person's genetic response to toxins; in the latter, the focus is on the health impact of a person's genetic response to their diet.

Several notable bio-genomics projects currently underway in Indonesia include, for example, the research collaboration between the Eijkman Institute, microbiome start-up Nusantics, and the bio-informatics company PT. Biogenomik Artifisial Inteligen to advance precision medicine.

Quite conceivably, bio-genomics can be integrated into telemedicine services to deliver personalised treatments to patients. This, however, would require the support of an integrated EMR/EHR system to facilitate the exchange of data between different health care systems and the patient.

³⁴ "Layanan Kesehatan Berbasis Digital Diuji Lewat Regulatory Sandbox", Fintechasia.com, 18 October 2021

³⁵ "Are consumers already living the future of health?", www.deloitte.com, 13 August 2020.

³⁶ "Home Healthcare Market Size, Share & Share Report 2022 – 2030, www.grandviewresearch.com, 2022

³⁷ "Digital Fitness & Well-Being Devices", www.statista.com, accessed in July 2022.

³⁸ "Home Healthcare Markt Size, Share & Trends Analysis Report By Equipment (Therapeutic, Diagnostic), By Services (Skilled Home Healthcare Services, Unskilled Home Healthcare Services), By Region, And Segment Forecast, 2020 - 2030



Advent of the metaverse

Looking ahead, the advent of the metaverse – a term used to describe what many expect to be the next significant paradigm for how we have virtual, immersive, and interactive experiences of all kinds – could also be expected to spur further digitisation of the health care sector. Coupled with tools such as augmented reality (AR) or virtual reality (VR), the metaverse could also potentially enable medical practitioners to deliver more effective and accurate outcomes through telemedicine.

In the area of surgery, for example, we can already witness the game-changing potential of the metaverse: earlier in 2022, the All India Institutes of Medical Sciences (AIIMS) implemented a digital surgery metaverse to support surgeons in virtually planning and simulating each patient's unique anatomy in 3D prior to entering the operating room³⁹.

Similar applications in Indonesia, albeit at a smaller scale, also include the collaboration between the University of Gadjah Mada and the digital start-up, Arutala, to leverage VR technology as instructional media for medical students during the pandemic, when there were restrictions limiting their access to hospitals⁴⁰.

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³⁹ "ImmersiveTouch metaverse now available for surgeons in India", Cision. 13 January 2022.

⁴⁰ "Adopsi Metaverse Diperkirakan Marak di Sektor Healthtech", Bisnis Indonesia, 27 May 2022.

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