Building Inclusive and Collaborative Digital Health Development in Southeast Asia: A Comparative Analysis of Vietnam and Indonesia

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INTRODUCTION

The rising demand for high-quality healthcare services and rising healthcare expenses in the Association of Southeast Asian Nations (ASEAN) may be addressed via e-health development. The ASEAN Member States (AMS) have progressed in their transition to digital health. Although there are numerous legal products, requirements for online products, infrastructure readiness, and digital literacy, there is still no uniformity in today's e-health readiness in the region.[1]

The study and practice of using digital technology to advance health are defined as "digital health" or "e-health" by the World Health Organisation (WHO). A greater variety of smart devices and linked equipment are being used in digital health, broadening e-health's definition to include digital consumers. Artificial intelligence, big data, blockchains, health data, health information systems, the infodemic, the Internet of Things, interoperability, and telemedicine are typically recognised as components of digital health.

E-health programmes in Southeast Asia are more frequently private sector-driven; therefore, to comprehensively evaluate the landscape of digital health in the region, this paper uses the WHO e-health Components framework, which is summarised in the table below:

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1. The Resilience Development Initiative. 2023. Transforming the digital health landscape in ASEAN. ASEAN Socio-Cultural Community Policy Brief. Accessed 10 August 2023. (https://asean.org/wp-content/uploads/2023/02/ASCC_Policy-Brief_Issue_6_Jan2023.pdf).

Table 1. WHO Digital Health Components.

Component	Content
Leadership, Governance and Multi-sector engagement	• Oversee and manage e-health; guarantee congruence with health goals and national interest; build awareness; and integrate stakeholders. • Utilise tools, knowledge, collaboration, and partnerships to create or implement other digital health components.
Strategy and Investment	• Ensure that the strategy and plan are suitable for the e-health environment. • Manage and allocate financial resources aligned with national goals and interests.
Legislation, Policy and Compliance	• Establish regulations and laws in key sectors; evaluate sectoral policies for coherence and accuracy; and institute regular policy assessments.
Infrastructure	• Develop the physical infrastructure, including networks, core services, and applications for digital health.
Standard and Interoperability	• Develop guidelines that allow health information to be collected and exchanged across systems and services with accuracy and consistency.
Services and Applications	• Access, sharing, and control of information and content should be made possible via concrete mechanisms.
Workforce	• Digital health knowledge and abilities should be made accessible through knowledge, technological collaboration, or the commercial sector; create digital health education and training programmes to improve the capability of the healthcare staff.

Source: World Health Organisation. 2012. National e-health Strategy Toolkit. Accessed 10 August 2023. (https://www.itu.int/dms_pub/itu-d/opb/str/D-STR-E_HEALTH.05-2012-PDF-E.pdf).

Within ASEAN, Singapore has the overall highest scores, with exceptional scores on strategy and investment, infrastructure, and workforce, all standing at around 90 per cent. Malaysia and Brunei Darussalam also had high scores among AMS, followed by Vietnam and Indonesia. In general, both countries have comprehensive strategies and investments when it comes to national digital health development and sufficient infrastructure to further develop digitalisation in this sector.[2] Given the similarities in their scores as well as their important role in developing regional digital health, this article will first examine the national landscapes of Indonesia and Vietnam through a comparative lens. Following that, the paper explores possible ways to improve the inclusive and sustainable development of e-health

2. The Resilience Development Initiative. 2023. Transforming the digital health landscape in ASEAN. ASEAN Socio-Cultural Community Policy Brief. Accessed 10 August 2023. (https://asean.org/wp-content/uploads/2023/02/ASCC_Policy-Brief_Issue_6_Jan2023.pdf).

collaboration in pan-Southeast Asia by strengthening multi-sectoral partnerships, public-private partnerships, and partnerships with the European Union (EU) and European countries.

1. VIETNAM'S NATIONAL DIGITAL HEALTH LANDSCAPE

Vietnam has made commendable progress over the course of the last two decades on important measures of quality of life, including life expectancy, infant mortality, and access to inexpensive medicines. The government's concerted efforts to update the healthcare system and provide access to affordable care have been successful.

In general, among all WHO e-health Components, Vietnam has been doing relatively well, except for the *Workforce* component. Regarding the *Leadership and Governance* and *Legislation, and Policy and Compliance* components, the Vietnamese Ministry of Health (VMoH) has announced a variety of rules to create a legal foundation for the growth of digital health. Until now, the most overarching document issued by the VMoH has been the document issued in 2020 – Health Digital Transformation Program (NDTP) by 2025 with an orientation to 2030 (Decision No. 5316/QD - BYT/2020), which aims to promote the application of science and digital technology in health activities. The table below summaries the targets of the VMoH in digital health transformation:[3]

Table 2. Targets of the Decision of the approval of the healthcare digital conversion programme until 2025, with the orientation towards 2030.

Focus	2020-2025	2025-2030
Develop digital governance in the health sector	• Maintain 100 per cent of online public services, of which 80 per cent of online public services are provided on many different access means, including mobile devices; • 80 per cent of medical information systems that require sharing and connecting information are connected and interconnected through an integrated platform to share medical data; information of people and businesses is digitised and stored in the national health database,	• 100 per cent of online public services are provided on many different access means, including mobile devices; • 100 per cent of work records at the Ministry of Health, Department of Health; 90 per cent of work records of the district health department are processed online (except for work records that are national secrets); • 100 per cent of medical information systems that require sharing and connecting information are connected and interconnected through an integrated platform to share medical data; information of people and businesses that has been digitised and stored in the national health database does not have to be provided again.
Develop a digital society in the health sector	• 100 per cent of medical facilities deploy non-cash electronic payments; • 100 per cent of medical examination and treatment facilities deploy remote medical examination and treatment consultation; • 100 per cent of medical examination and treatment facilities deploy online medical examination and treatment registration; • 100 per cent of health sector officials and employees participate in the Vietnam medical connection network.	Maintain the development of digital society in healthcare according to the targets achieved in the period 2021-2025.
Digital transformation in disease prevention and people's health care	• 100 per cent of people are medically identified; • 100 per cent of medical staff, including doctors, pharmacists, officials, civil servants, and health sector employees, are identified; • 90 per cent of people have electronic health records; • 100 per cent of communes deploy commune health station management software with full functions according to regulations of the Ministry of Health.	• Maintaining targets in disease prevention and people's healthcare achieved in the 2021-2025 period; • 95 per cent of people have electronic health records.

Focus	2020-2025	2025-2030
Digital transformation in medical examination and treatment	15 per cent (about 210) of hospitals nationwide have successfully converted digitally, deployed electronic medical records without using paper medical records, and accepted electronic payment of hospital fees.	50 per cent (about 700) of hospitals nationwide have successfully converted digitally, deployed electronic medical records without using paper medical records, and accepted non-cash electronic payment of hospital fees.

Source: Law Library. 2020. Decision of the approval of the healthcare digital conversion program until 2025, with the orientation towards 2030 [Quyết định phê duyệt chương trình chuyển đổ số y tế đến năm 2015, định hướng đến năm 2030]. Accessed 10 November 2023. (https://thuvienphapluat.vn/van-ban/The-thao-Y-te/Quyet-dinh-5316-QD-BYT-2020-phe-duyet-chuong-trinh-chuyen-doi-so-y-te-den-2025-460152.aspx).

Furthermore, the Decision to Approve the Project on Information Technology Application at Communal Health Care Facilities in the Period of 2018–2020 (Decision No. 6111/QD-BYT) is an example of such a policy. In order to manage professional activities, finances, human resources, and other issues for healthcare institutions in communes, wards, and townships more efficiently and effectively, this project supports the use of information technology. The strategy also ensures data correctness and the ability to connect commune health stations with the higher levels of health stations, including the city level, regional level, and national level, and social insurance, all of which enhance management work generally.[4] Most recently, on 20 April 2023, Decision 1923/Q-BYT approved the Vietnam 2023 Electronic Health Record Platform Implementation Plan[5]. According to this strategy, the infrastructure must be in place by 1 June 2023. It is also necessary to set up an information system that will link and identify digital Fast Healthcare Interoperability Resources (FHIR) on core medical information, build an e-health record database for the VMoH that includes a selection of fundamental medical data, and provide a software module with features to help create and update personal health record information

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4. Nguyen, Ba Dat. 2021. Digital Health in Vietnam – Opportunities and Challenges. In Country Report - Vietnam, No 3, 2021: Vietnam as a Digital Society. Vietnam: Thanh Nien Publishing House.

5. Vietnam Ministry of Health. 2023. Approving the plan to deploy the electronic health record platform in 2023 [Phê duyệt kế hoạch triển khai nền tảng hồ sơ sức khoẻ điện tử năm 2023]. Accessed 10 August 2023. (https://thuvienphapluat.vn/van-ban/Cong-nghe-thong-tin/Quyet-dinh-1923-QD-BYT-2023-Ke-hoach-trien-khai-Nen-tang-Ho-so-suc-khoe-dien-tu-564088.aspx).

and reporting data for use by the Ministry of Health, district health centres, and commune health centres.

Regarding the *Strategy and Investment Strategy* component of the Vietnamese government in terms of identifying and diversifying financial resources for national digital health development, former Minister of Health Nguyen Thi Kim Tien in 2019 shared: "Together with the achievements made over recent years, Vietnam continues the reform of the healthcare system. And we want to learn from countries in the development of the healthcare sector and encourage private investment in this path."[6] Although digital health is still in its infancy in Vietnam, start-ups and multinational corporations, including notable telecommunications firms such as FPT, VNPT, and Viettel, have shown interest in participating. Through real-time data, digital signature integration, and solutions for digital medical records, these businesses in Vietnam offer end-to-end solutions with the aim of helping hospitals manage daily operations. Furthermore, there are market participants from other countries. Examples include the use of Microsoft and its cloud services by hospitals and modern drugstore chains, as well as the use of IBM's Watson for oncology by local businesses.[7]

Thirdly, Vietnamese digital health *Infrastructure* has a strong advantage as internet coverage and the percentage of smartphone users in the country are both high. Vietnam is one of the nations with the highest percentage of internet users in the Asia-Pacific region. As of 2021, there were around 69 million internet users out of a total population of over 96 million.[8] Internet consumption in Vietnam is mostly mobile-based due to the high smartphone penetration rate. Therefore, Vietnam's continued investment in its telecommunications infrastructure puts the country in a better position to embrace digital health solutions. A solid foundation will serve as the first step to improve the national information, communications and technology (ICT) infrastructure to facilitate future expansion in telemedicine, consumer health electronics, and electronic health records.[9]

6. Bich, Thuy. 2019. Hospitals leap on the digital bandwagon. Vietnam Investment Review, August 19. Accessed 10 August 2023. (https://vir.com.vn/hospitals-leap-on-the-digital-bandwagon-70630.html).

7. PMG. 2020. Digital Health in Vietnam: Market Intelligence Report. Accessed 10 August 2023. (https://kpmg.com/vn/en/home/insights/2021/01/future-of-digital-health-in-vietnam.html).

8. Nguyen, Minh-Ngoc. 2022. Internet usage in Vietnam - statistics & facts. Statista. Accessed 10 August 2023. (https://www.statista.com/topics/6231/internet-usage-in-vietnam/).

9. KPMG. 2020. Digital Health in Vietnam: Market Intelligence Report. Accessed 10 August 2023. (https://kpmg.com/vn/en/home/insights/2021/01/future-of-digital-health-in-vietnam.html).

As a result, *Services and Applications* are increasingly being developed and applied at both local and national levels. Healthcare big data and products and services based on Artificial Intelligence (AI), telemedicine, consumer health electronics, and health information technology are the four main categories of the Vietnamese digital health market; however, they still remain underdeveloped or are at the beginning stage due to the lack of the necessary software, facilities, support applications and technical know-how related to big data and AI. For example, the majority of Vietnam's healthcare facilities continuing to utilise paper-based medical records for patients tracking and illnesses tracking are two major factors influencing the Vietnamese market for digital health.

In particular, telemedicine emerged as one of the examples of the use of cutting-edge technology for healthcare services in Vietnam during the COVID-19 outbreak. By implementing a national digital transformation programme, the Vietnamese MoH established Project 2628/Quyet dinh-Bo y te, which authorised a plan for remote medical inspections and treatments throughout the period of 2020-2025. The goal was to promptly stop the spread of the COVID-19 pandemic. The initiative aims to connect 1,000 hospitals and enhance the calibre of medical care by using the expertise of central hospitals to serve rural areas through provincial hospitals.[10]

Even though Vietnam has not made significant progress in AI applications in healthcare yet, the NDTP aims to make Vietnam one of the top 50 ICT nations, and AI is an important pillar to achieve this goal.[11] In 2023, Microsoft signed its first contract for AI healthcare in Vietnam, covering three areas: data exchange, cross-product validation, and research and development. The cooperation states that DrAid, a group of AI-powered pathology tools that can recognise 21 illness indicators in the bone, heart, and lungs, will be used by VinBrain. The US FDA-licensed platform is used by more than 100 institutions and 2,000 professionals in Vietnam[12].

10. Nguyen, Ngoc Huy, An Quang Nguyen, Van Thi Bich Ha, Phuong Xuan Duong, and Thong Van Nguyen. 2021. Using emerging telehealth technology as a future model in Vietnam during the COVID-19 pandemic: practical experience from Phutho General Hospital. JMIR Formative Research 5, no. 6 (2021): e27968.

11. Tran, Mai Chi. 2023. AI in Vietnam: Opportunities and Challenges for Foreign Investors. Vietnam Briefing, August 2. Accessed 10 August 2023. (https://www.vietnam-briefing.com/news/ai-in-vietnam-opportunities-and-challenges.html/).

12. Ang, Adam. 2023. Microsoft signs first AI healthcare partnership in Vietnam. Healthcare IT News, January 31. Accessed 10 August 2023. (https://www.healthcareitnews.com/news/asia/microsoft-signs-first-ai-healthcare-partnership-vietnam).

Last but not least, the Vietnamese *workforce* has received the government's attention. The NDTP aims to increase awareness among state agencies, organisations, and business leaders about the necessity of accelerating digital transformation, guaranteeing that all stakeholders have access to digital skills, and enhancing the effectiveness of workforce development programmes for digital transformation in each industry, region, and community. The government additionally intends to create incentive programmes for information technology (IT) officials and initiatives to draw skilled IT personnel to the healthcare industry. However, there have been no specific and comprehensive statistics or data on the number of ICT experts or the digital readiness of the workforce in the healthcare industry until now. The research conducted by Swiss Business Hub ASEAN (2021) is among a few research studies pointing out that the existing number of Vietnamese healthcare staff is insufficient to meet the demands of the population. For instance, since the majority of highly qualified doctors and nurses work at provincial and central-level institutions, there are less qualified staff in the rural areas.[13]

2. INDONESIA'S NATIONAL DIGITAL HEALTH LANDSCAPE

In general, the use of digital technology for public health is strongly supported and encouraged by the Indonesian government. According to the Indonesian Minister of Health, Budi G. Sadikin, the transformation of the health system is built on six pillars: primary care, secondary care, system resilience, financing, talent and culture in the field of health, and digital and technological advancements[14].

Regarding *Leadership and Governance*, together with all health industry stakeholders, the Indonesian Ministry of Health (IMoH) created the Blueprint for Digital Health Transformation Strategy 2024 under the Indonesia Health Services (IHS) Platform, which supports and integrates many health applications in Indonesia and provides data connection, analysis, and services. The goal of the digital health blueprint is to lay the foundation for developing Indonesia's business architecture for health technology. It is supported by important pillars, including the digital integration of patient and healthcare provider health information and

13. Swiss Business Hub ASEAN. Opportunities in the Digital Health Industry in Vietnam. Accessed 5 September 2023. (https://www.s-ge.com/en/publication/industry-report/20213-c3-vietnam-digital-health-medt2?ct).

14. East Ventures. 2022. Indonesian Health System Transformation. Accessed 10 August 2023. (https://east.vc/insights/indonesian-health-system-transformation/).

the integrated development of digital health infrastructure. The blueprint will also help the Indonesian government utilise digital technologies to advance its national objective of offering universal, cheap, egalitarian, and high-quality healthcare to all Indonesians[15].

Prior to that, the IMoH's DTO (Digital Transformation Office) was founded in March 2021 with a focus on three key areas: digital medical records, streamlining health service applications, and regulatory guidance for the ecosystem of e-health innovation. Six months later, in December 2021, Indonesia presented its first digital health strategy, laying the groundwork to digitise its healthcare systems in order to provide its 270 million residents with more comprehensive healthcare coverage.[16]

In terms of *Legislation, Policy and Compliance*, similar to Vietnam, patient privacy, data standardisation, and data protection are not adequately regulated in the healthcare industry; thus, health policies are not supported effectively by data.[17]

Regarding *Strategy and Investment*, based on Article 170 in Law No. 36 of 2009 concerning health, health financing in Indonesia "aims to provide health financing continuously with the sufficient amount, fair allocation, and efficient and effective utilisation to ensure the realisation of high-quality public health development."[18] Activating funding sources, allocating the national health budget, and using the funds are three main responsibilities of the government to realise the aims for healthcare financing.[19] In the 2010s, investment in health innovation expanded quickly in Indonesia, from $1.6 billion in 2010 to $19.6 billion in 2018.[20] Furthermore, increasing private sector participation in e-health investment has been fostered since the Blueprint on Digital Health was established with the United Nations

15. UNDP. 2021. Indonesia launches a blueprint on digital health to expand inclusive health care coverage. Accessed 10 August 2023. (https://www.undp.org/indonesia/press-releases/indonesia-launches-blueprint-digital-health-expand-inclusive-health-care-coverage).

16. Accessed 10 August 2023. (https://transformhealthcoalition.org/indonesia/).

17. Ministry of Health of the Republic of Indonesia. 2021. Blueprint of Digital Health Transformation Strategy 2023. Accessed 10 August 2023. (https://dto.kemkes.go.id/ENG-Blueprint-for-Digital-Health-Transformation-Strategy-Indonesia%202024.pdf).

18. The President Republic of Indonesia. 2009. Law of Republic of Indonesia, Number 36, year 2009, p. 75.

19. International Labour Organisation. 2009. Indonesia Law on Health (Law No. 36/2009). Accessed 10 August 2023. (http://www.ilo.org/dyn/natlex/natlex4.detail?p_lang=en&p_isn=91185&p_country=IDN&p_count=611).

20. Cheung, Ruby and Elvina Tio. 2021. Indonesia's digital health boom and the opportunities for Australian healthcare providers. WilliamBuck. Accessed 10 August 2023. (https://williambuck.com/nz/news/gr/health/indonesias-digital-health-boom-and-the-opportunities-for-australian-healthcare-providers/).

Development Programme (UNDP) in 2021.[21] Nevertheless, only 2 per cent of healthcare spending at the time was made by the private sector, indicating a great possibility for public-private partnerships. After the COVID-19 pandemic, acknowledging the importance of ICT in the health sector, the Indonesian Chief Operating Officer of the Digital Transformation Office, Ministry of Health, Daniel Oscar Baskoro, reported in 2023 that the nation was successful in boosting health investment. While government health spending increased by 124.5 per cent between 2013 and 2021, expanding at a compound annual rate of 10.4 per cent, health spending per person increased by 23 per cent between 2015 and 2019, from $97 to $120.[22]

Regarding *Infrastructure*, 77 per cent of the country's population had access to mobile phones, yet only 53 per cent had access to the internet.[23] Furthermore, the construction of upstream infrastructure, a national data centre (PDN), and the Telecommunications Equipment Testing Centre (BBPPT) are intended to be finished by 2023 by the Ministry of Communication and Informatics to enhance digital infrastructure and technology. Among all government agencies, the IMoH utilises cloud technology the most, accounting for 24.1 per cent.[24] Furthermore, the digital gap in Indonesia will also be addressed through the development of the digital infrastructure and support for the 47 per cent of the population without internet access. They are marginalised populations in rural regions, especially children and women in undeveloped areas who need healthcare the most. Therefore providing patients living in locations without appropriate medical facilities with access to healthcare is a key task for Indonesia's digital infrastructure. To extend network access to outlying locations, the Ministry of Information and Communications has been collaborating with numerous telecommunications companies. For instance, the Palapa Ring project involves building a 36,000 km-long fibre optic network to connect 440

21. UNDP. 2021. Digitalizing Indonesia's health sector, a critical step towards SDGs achievement. Accessed 10 August 2023. (https://www.undp.org/indonesia/news/digitalizing-indonesia%E2%80%99s-health-sector-critical-step-towards-sdgs-achievement).

22. PwC. 2023. How can technology accelerate the digitisation of the Indonesian healthcare sector? Accessed 10 August 2023. (https://www.pwc.com/id/en/media-centre/press-release/2023/english/how-can-technology-accelerate-the-digitisation-of-the-indonesian-healthcare-sector.html).

23. Antara News. 25 February 2023. Indonesia progressed in digital infrastructure development: Minister. Accessed 10 August 2023. (https://en.antaranews.com/news/273876/indonesia-progressed-in-digital-infrastructure-development-minister).

24. Santhika, Eka. 2023. Indonesia's Three Digital Development Focus Areas in 2023. Open Gov. Accessed 10 August 2023. (https://opengovasia.com/indonesias-three-digital-development-focus-areas-in-2023/).

cities and districts to the 4G network.[25] The major obstacle to Indonesia's national e-health growth, however, remains inclusive digital infrastructure given the country's wide geography and unequal population distribution.

Regarding *Services and Applications*, digital health data in Indonesia is dispersed because of the many apps and low restrictions on standardisation and data exchange. The national and municipal governments have produced 400 health applications, according to the IMoH's most recent mapping data. This situation shows that there is still room for progress in the health policy based on completely comprehensive data and raises questions about the efficacy of health services. The IMoH created the 2024 Digital Health Transformation Strategy, a roadmap built on the concept of creating an "Indonesia Sehat" in conjunction with the whole ecosystem of players in the health sector on the *SATUSEHAT* platform (Indonesia Health Services). *SATUSEHAT* is a platform that supports and integrates various health resources and applications through data communication, analysis, and services[26]. Moreover, there are now more than 60,000 healthcare institutions. The integration of all of these capabilities with *SATUSEHAT* is required by Regulation No. 24 on Electronic Medical Records, which was published in 2022. It provided Indonesia with a fantastic opportunity to standardise, incorporate, and digitalise its health applications.[27]

Indonesia has been moving slightly faster than Vietnam regarding telemedicine and AI applications in e-health. In particular, for example, an AI system has been installed at the Mayapada Hospital in Jakarta to analyse medical pictures and aid in the diagnosis of illnesses. A different Surabaya hospital has used an AI system to forecast patient health outcomes and help doctors create personalised treatment regimens. Despite the country still being in the early stages of accepting and implementing AI in healthcare, the usage of AI in healthcare in Indonesia is anticipated to increase over the next few years as more healthcare professionals invest in the

25. Deloitte. 2022. Digitising Indonesia's Health Care Sector. Accessed 10 August 2023. (https://www2.deloitte.com/id/en/pages/life-sciences-and-healthcare/articles/id-tmt-lshc-digitalhealth-2022.html).

26. PwC. 2023. How can technology accelerate the digitisation of the Indonesian healthcare sector? Accessed 10 August 2023. (https://www.pwc.com/id/en/media-centre/press-release/2023/english/how-can-technology-accelerate-the-digitisation-of-the-indonesian-healthcare-sector.html).

27. Azhar, Mochamad. 2023. Indonesia makes health data available at one's fingertips. Gov Insider. Accessed 10 August 2023. (https://govinsider.asia/intl-en/article/Indonesia-makes-health-data-available-at-ones-fingertips).

technology and become knowledgeable about it.[28] Moreover, in the Blueprint for Digital Health document, Telemedicine Technology Expansion is one of the core components. The use of telemedicine has considerably expanded as a result of the COVID-19 pandemic. The government's goal of achieving Universal Health Coverage (UHC) for at least 95 per cent of the population, or as many as 257.5 million people, by 2020 is linked to the use of telemedicine. The lack of human resources and inadequate healthcare facilities that restrict the general public's access to healthcare services may also be resolved with the use of this telemedicine technology.[29]

Lastly, speaking of the workforce in the digital health sector, the healthcare sector is struggling to find qualified employees. In contrast to other surrounding economies like Singapore (2.3 medical professionals per 1,000 people) and Malaysia (1.9 medical professionals per 1,000 people), Indonesia only has roughly 0.4 medical professionals per 1,000 people. The demand for specific skills to operate in the field of digital health draws attention to the talent deficit.[30] The World Bank also predicts that Indonesia will need to add 9 million digital talents by 2030 to support its technological development because the competition for talent in the field of e-health is expected to intensify and the industry will need to compete with several other sectors searching for individuals with a similar technological skill set.[31]

Indeed, Indonesia needs more than 160,000 physicians, according to the IMoH. The 2020-2024 Digital Transformation Strategy prioritises healthcare and seeks to change the healthcare system into one that is more effective, efficient, and patient-centred, as stated by Minister of Health Budi Gunadi Sadikin. To support and enhance healthcare talents, the IMoH has financed health education through a number of scholarship programmes. These initiatives encourage an equitable distribution of healthcare professionals. The government projects that basic

28. Upadhyay, Vidhi. 2022. Market Research Report: Digital Health. Accessed 10 August 2023. (https://www.insights10.com/report/indonesia-artificial-intelligence-ai-in-healthcare-market-analysis/).

29. Ministry of Health of the Republic of Indonesia. 2021. Blueprint of Digital Health Transformation Strategy 2023. Accessed 10 August 2023. (https://dto.kemkes.go.id/ENG-Blueprint-for-Digital-Health-Transformation-Strategy-Indonesia%202024.pdf).

30. Deloitte. 2022. Digitising Indonesia's Health Care Sector. Accessed 10 August 2023. (https://www2.deloitte.com/id/en/pages/life-sciences-and-healthcare/articles/id-tmt-lshc-digitalhealth-2022.html).

31. Deloitte. 2022. Digitising Indonesia's Health Care Sector. Accessed 10 August 2023. (https://www2.deloitte.com/id/en/pages/life-sciences-and-healthcare/articles/id-tmt-lshc-digitalhealth-2022.html).

healthcare services, like heart disease treatments, will be available nationwide in Indonesia by 2024.[32]

3. POLICY RECOMMENDATIONS

3.1. Collaboration between ASEAN Member States

Leadership and regional governance are the breakthrough points for more integrated and sustainable digital health development. AMS should develop a unified digital health growth roadmap along with a coordination framework that is understood by every stakeholder. Even though Singapore has developed into a centre for medical services and technological innovation in the region, there are still significant health disparities in many other ASEAN nations. In fact, hospital bed density in ASEAN is lower than the global average, except for the more industrialised nations such as Brunei, Singapore, and Malaysia. ASEAN countries also lag behind the global average in terms of physicians per population. As de facto leaders of ASEAN with their development stages positioned in the middle among AMS, both Indonesia and Vietnam should take the lead to enhance regional collaboration in e-health. While having the means and opportunity to significantly enhance their digital health capabilities and catch up with the most advanced AMS, Indonesia and Vietnam are aware of the challenges faced by the least developed nations, such as Laos, Cambodia, and Myanmar. Currently, ASEAN does not have an official and comprehensive strategy for digital health that can serve as the prerequisite for a more coordinated and coherent partnership scheme. Nevertheless, in the ASEAN Digital Masterplan, health is identified as one of the four essential industry sectors along with finance, education, and government: "ASEAN should build trust by developing trust and security frameworks for these industries. With the cooperation of industry stakeholders in the region, ASEAN could support the development of best practises and aim for a unified certification approach to trust and security in these industries."[33] It particularly mentioned "cross-border e-health services as the key to improving cohesive e-services across Southeast Asia".[34]

32. Cuaca, Willson. 2023. How Digital Transformation Strategy could transform Indonesia's healthcare system for the better? BioSpectrum Asia Edition. Accessed 10 August 2023. (https://www.biospectrumasia.com/opinion/46/22517/how-digital-transformation-strategy-could-transform-indonesias-healthcare-system-for-the-better.html).

33. ASEAN. 2021. ASEAN Digital Master Plan, p. 72.

34. ASEAN. 2021. ASEAN Digital Master Plan.

When it comes to *Strategy and Investment*, multi-sectoral coordination and public-private partnerships also play a crucial role since several areas in e-health are driven by the private sector. This is particularly true amid the global pandemic. For instance, the Indonesian Ministry of Health collaborated with the telemedicine company Halodoc and the ride-hailing company Gojek to offer rapid COVID-19 diagnoses in remote locations. Additionally, by collaborating with the digital health platforms Alodokter and Halodoc, the IMoH can provide COVID-19 patients across the nation with moderate symptoms free access to teleconsultation and medicine delivery services. In Vietnam, the government worked together with Viettel Group, the country's major telecommunication service provider, to create the Viettel Telehealth platform. The platform facilitates technology transfer, training, and remote medical and surgical consultations. Therefore, to foster multi-stakeholder partnerships at the regional level, in 2022, the ASEAN Secretariat organised for the first time a webinar on "Transforming ASEAN's Digital Health Landscape to Improve Regional Health". Dr. Alvin B. Marcelo from the Asia eHealth Information Network (AeHIN) pointed out during the webinar that the success of the adoption of digital healthcare depends on coordinated and collaborative efforts, efficient information technology use, and general good governance. In the post-COVID-19 world, the private sector accounted for 53 per cent of Southeast Asia's healthcare market, valued at US$420 billion. Due to the economic recession and the resulting reduction in tax revenues, governments do not have sufficient budgets to maintain the effective provision of healthcare services to the population. Therefore, the private sector plays an important role in complementing the efforts of the government in providing healthcare to its citizens.[35]

Legislation, Policy, and Compliance might be the hardest components to harmonise given the variety in national legislations, health policies, and development stages of the ten ASEAN member states. According to the Global Digital Health Index, numerous AMS have lax privacy and telemedicine legislations, especially when it comes to consistent legal enforcement.[36]

Southeast Asia's digital health infrastructure has been developing, with Vietnam and Singapore taking the initiative. The ministries of health of AMS are

35. ASEAN BAC Malaysia. 2022. Public-Private Partnerships (PPP) in healthcare is critical for the post-pandemic recovery. Accessed 10 August 2023. (http://aseanbac.com.my/public-private-partnerships-ppp-in-healthcare-is-critical-for-the-post-pandemic-recovery/).

36. The Resilience Development Initiative. 2023. Transforming the digital health landscape in ASEAN. ASEAN Socio-Cultural Community Policy Brief. Accessed 10 August 2023. (https://asean.org/wp-content/uploads/2023/02/ASCC_Policy-Brief_Issue_6_Jan2023.pdf).

encouraged to manage infrastructure initiatives, such as free Wi-Fi and internet access, under the Mind the GAPS[37], Fill the GAPS framework.[38] While Fill the GAPS suggests potential solutions based on the assessment's results, Mind the GAPS evaluates the present capabilities of the respective ministries of health. The critical task is to prioritise equal access to affordable, high-quality internet services by encouraging investment from the private sector and using government resources to fill the network gaps via targeted wireless services. "All AMS, except Singapore, often face challenges with internet and mobile phone access, similar to what Indonesia encounters."

Next, *Services and Applications*: AI applications can serve as the driving force for digital health development. However, Nguyen et al. (2023) pointed out that ASEAN is still unable to fully use AI technologies to accomplish sustainable development, including e-health, due to its inadequate levels of AI resilience and preparation, notably in the business and technology sectors. The government sector's impaired vision, insufficient digital capacity, and the inability of both the business and government sectors to adapt and develop AI technologies are some of the challenges faced by the AMS. Therefore, collaborating with countries and partners that are more advanced might serve as a solution.[39]

Last but not least, the need to equip the workforce in the health sector with the necessary digital skills is placed highly on ASEAN's digital agenda. In cooperation with the ministries of education, the private sector, and other pertinent players, the respective ministries of health should deliver appropriate digital health literacy training and education. To create cutting-edge models of digital education, training, and skills development, ASEAN policymakers must work with experts from academia, civil society, and the private sector. They must first reform curricula to consider the evolving needs of the e-health workforce and then form partnerships with the private sector to create fresh approaches to digital upskilling that can be used throughout the region.[40]

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37. GAPS refers to Governance, Architecture, People and Program Management, and Standards and Interoperability.

38. Marcelo, Alvin. 2022. Digital Infrastructure for Universal Health Care in ASEAN. The ASEAN Magazine, 7 December. Accessed 10 August 2023. (https://theaseanmagazine.asean.org/article/digital-infrastructure-for-universal-health-care-in-asean/).

39. Dao, Nguyen Dang, Upalat Korwatanasakul, and Suonvisal Seth. Artificial Intelligence and the Sustainable Development Goals in ASEAN. Dialogues on Connectivity between Europe and Asia: 169.

40. Karr, John, Benjamin Lokshin, and Katherine Loh. 2020. The Future of Work Across ASEAN Policy Prerequisites for the Fourth Industrial Revolution Recommendations and Country Studies. The ASEAN Foundation.

3.2. Collaboration between ASEAN and the EU on digital health development

Until 2022, the third-largest commercial partner of ASEAN, the EU, accounted for around 10.6 per cent of ASEAN trade. The EU's third-largest economic partner outside of Europe is ASEAN, with bilateral commerce in goods and services bilateral commerce in goods and services reaching around €189 billion in 2020. Furthermore, the EU is one of the main investors in AMS, as its stocks of foreign direct investment (FDI) into ASEAN were €313.6 billion in 2019.[41] Therefore, the EU has been one of the main investors and partners in terms of regional digitalisation and digital health development in Southeast Asia. However, when it comes to e-health, the partnership between the two sides remains limited compared to other digital fields, leaving ample room for growth.

The Directorate-General for Communication Networks, Content, and Technology of the European Commission met with top ASEAN representatives in October 2019 in Laos to examine ways to improve connectivity and collaboration in the digital economy between the two areas. Best practices from the EU's Digital Single Market policy, which also includes topics of shared interest to ASEAN, were shared during the event.[42] Furthermore, since 2022, the EU and ASEAN have been researching digitalising health insurance across Southeast Asia. In particular, the EU-ASEAN Business Council Insurance Group examines how a regulatory framework may assist with long-term insurance fund investments and how European insurers can commit to implementing digital solutions to improve Southeast Asian consumers' access to insurance while addressing data privacy and governance issues and harmonising regional laws to maximise the free flow of data securely across borders.[43] This project can serve as a good practice for ASEAN, the EU, and their businesses to foster further collaboration on improving different WHO e-health components.

41. Delegation of the European Union to ASEAN. 2022. The European Union and ASEAN: A Strategic Partnership. Accessed 10 August 2023. (https://www.eeas.europa.eu/asean/european-union-and-asean_en?s=47).

42. Delegation of the European Union to ASEAN. N.d. Working Towards a Sustainable and Secure Digital Economy. Accessed 10 August 2023. (https://euinasean.eu/working-towards-a-sustainable-and-secure-digital-economy/).

43. EU-ASEAN Business Council. 2020. Inclusive Insurance Ecosystem: Long-term Investment, Digital Innovation and Sustainable Healthcare. Accessed 10 August 2023. (https://www.eu-asean.eu/wp-content/uploads/2022/02/Inclusive-Insurance-Ecosystem-Long-term-Investment-Digital-Innovation-and-Sustainable-Healthcare-2020.pdf).

Most recently, in 2023, through the Enhanced Regional EU-ASEAN Dialogue Instrument (E-READI), the EU supported the ASEAN Employment Outlook by analysing digital labour platforms and platform workers and proposing practical solutions to ensure that platform workers receive sufficient protection and assistance in line with labour regulations and requirements for decent work.[44] Based on E-READI and the EU Global Health Strategy, ASEAN and the EU can collaborate in various fields, particularly in terms of equipping the necessary skills for the workforce, more cohesively linking and coordinating policies and measures among AMS, and joint research to develop information and communications technology applications on health.[45]

44. ASEAN. 2023. ASEAN and EU support well-being of online platform workers in growing digital economy. Accessed 10 August 2023. (https://asean.org/asean-and-eu-support-well-being-of-online-platform-workers-in-growing-digital-economy/).

45. European Union. 2022. EU Global Health Strategy.

CONCLUSION

In general, the developments of digital health in Vietnam and Indonesia share several difficulties and opportunities that are summarised in the table below:

Table 3. National Digital Health Landscape in Vietnam and Indonesia.

E-health component	Vietnam	Indonesia
Key Policies and Initiatives	• - Circular No. 53, 2014: Indicate the provision of digital health services • - Directive No.16, 2017: Establish the fundamental guidelines for regulating digital health • - Circular No. 54, 2017: Regulate the use of technology in medical facilities • - Circular No. 49, 2017: Outline services that are permitted in telemedicine • - Decision No. 4888, 2019: Adopt the smart health information technology and industry 4.0 growth goals • - Decision No. 5316/QD - BYT/2020: Approve the health digital transformation programme to 2025, with a vision to 2030 • - Decision 1923/Q-BYT/2023: Approve the plan to deploy the electronic health record platform in 2023	• - Blueprint of Digital Health Transformation 2024 • - MOH Regulation No. 21 of 2020 on the MOH Strategic Plan for 2020-2024 about the use of technology through telemedicine for direct medical care between patients and doctors • - MOH Regulation No. 90 of 2015 on the Implementation of Health Services in Health Services Facilities in Remote Areas and Very Remote Areas
Leadership, Governance and Multi-sector engagement	Constantly improve the capacity in management, develop digital health capacity and engage stakeholders	Same with Vietnam
Investment Strategy	Diversify various financial resources; collaborate with private sectors	Develop a national investment strategy and collaborate with various stakeholders; increase health expenditures yearly
Legislation, Policy and Compliance	Adopt updated legislation and national strategy to develop e-health	Develop a national blueprint for e-health development
Infrastructure	Wide internet coverage across the country and 69 million smartphone users (out of 96 million people) in 2021	77 per cent of the population has access to mobile phones but unequal internet access remains a challenge due to geographical factors
Standard and Interoperability	Lack of clear guidelines with accurate data management system	Same as Vietnam

E-health component	Vietnam	Indonesia
Services and Applications	Focus on healthcare big data and AI-based goods and services, telemedicine, consumer health electronics, and health information technology; slow progress on AI health applications	Have several applications but not well-managed, yet more advanced in AI and telemedicine
Workforce	Pay more attention to upskilling the health workers but still far from addressing the actual needs of the society	Possess a strong demand for more highly qualified health workers and finance more scholarships and training

Source: Author, 2022.

The noticeable worldwide need for digital health goods and services will drive future growth in the ASEAN digital health industry. Each AMS is working to develop the healthcare sector, making healthcare services more affordable and accessible, especially for the people on the margins. This is in response to growing public demand and understanding of the significance of digitisation in the healthcare system. All member states are on the same road to improving health by making use of new technologies despite differences in pace. Countries in the region can learn and benefit greatly from one another. At each level of the medical system, every stakeholder involved, from healthcare providers to policymakers, can improve the digitalisation of the industry by fostering know-how transfer and sharing good practices to sustain, accelerate, and innovate the respective national and regional health systems, thus paving the way to developing a more inclusive and collaborative digital health ecosystem in ASEAN.

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