

# Study on the Use of Telemedicine to Promote Health Equity in APEC Region after COVID-19

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APEC Health Working Group

March 2024



**Asia-Pacific  
Economic Cooperation**





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**APEC Health Working Group**

**March 2024**

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## **Executive Summary**

“Study on the Use of Telemedicine to Promote Health Equity in APEC Region after COVID-19” is the second report of the Digital Health Sub-Working Group (DHSWG). In order to further promote the development of digital health agenda in Asia-Pacific Economic Cooperation (APEC) region and to encourage the development and implementation of digital health related plans in each economy, the APEC Health Working Group (HWG) approved the establishment of the Digital Health Sub-Working Group (DHSWG) in the first HWG meeting in 2020. After two years of efforts, in addition to including personal data protection and private sector participation as the core issues of the DHSWG, the DHSWG compiled the Summary Report of APEC Economies' Digital Policy Measures to Combat COVID-19 in response to the pandemic. The summary report is one of the most important reports for HWG in 2020 and has been adopted by the HWG and published on the APEC website in March 2022.

During the COVID-19, economies have been utilizing digital health technologies to cope with the crisis, and these practices have continued to be integrated into the “New normal”. Economies have also recognized the widespread application of telemedicine, such as using it to provide healthcare services to rural areas or those who cannot access medical treatments, thereby reducing the healthcare disparities and embracing the new way of living.

Therefore, this study aims to collect and analyze practical experiences and policies from international organizations and economies, conduct surveys among economies, and review the result of APEC Digital Health Policy Dialogue. Through these methods, it is expected to introduce and analyze the practical experiences of economies in using telemedicine to address health inequalities.

This study consists of five chapters, which are (1) Foreword; (2) Overview of telemedicine use during the COVID-19 pandemic in the APEC economies; (3) Best practices of using telemedicine to reduce urban-rural disparities; (4) Results of APEC Digital Health Policy Survey among

economies; and (5) Conclusion.

Furthermore, we would like to express our gratitude to all members of the DHSWG (Korea; Peru; the Philippines; Chinese Taipei; Thailand; United States; Viet Nam) and all participating economies who contributed to this report, including the 12 economies (Australia; Canada; Chile; Japan; Malaysia; Korea; the Philippines; Russia; Singapore; Chinese Taipei; Thailand; United States) that responded to the survey questionnaire and the economies (Japan; Malaysia; the Philippines; Singapore; Thailand; United States; Viet Nam) that participated in the APEC Digital Health Policy Dialogue titled "Narrowing Health Inequity Gaps through Telemedicine in Adapting to the New Normal" held on 17-18 November 2022.

This study presents five main findings:

- The acknowledged role of telemedicine during the COVID-19.
- The efforts made by APEC economies in reducing urban-rural health disparities through telemedicine,
- The prioritized digital health *technologies* are **cyber security, electronic medical record exchange, and telemedicine.**
- The prioritized digital health *fields* are **hospital operations management and healthcare data privacy.**
- Almost all surveyed economies have already developed or are in the process of developing guidelines for using digital health data.

Moreover, the study provides three recommendations:

- First, APEC should leverage the momentum of telemedicine and exchange the best practices among economies to advance digital health technologies as a means to promote health equity.
- Second, continuing discussions and exchanges within the APEC Health Working Group (HWG) in the field of digital health.
- Third, fostering more discussions and exchanges regarding APEC regional health data standards and interoperability.

This study demonstrates the strong interest of economies in digital health and highlights concerns regarding **data security and privacy**. The survey results also reveal the concerns of multiple economies regarding **health data exchange and data standards**, while also indicating the diversity of data standards adopted by economies.

Therefore, it is essential to further enhance knowledge and technology related to telemedicine among APEC economies through sharing of best practices, technological cooperation, regulatory harmonization, standard development, policy exchanges, and educational training. This will contribute to making telemedicine a driving force in achieving the APEC Putrajaya Vision 2040, particularly in the two economic drivers of "Innovation and Digitalization" and "Strong, Balanced, Secure, Sustainable, and Inclusive Growth." Through the utilization of innovative and digital tools and systems, economies can establish a robust, balanced, secure, sustainable, and inclusive healthcare service system.



## Chapter I. Foreword

The application of digital technologies in the health and welfare fields has become a popular trend in recent years. The use of digital technologies, such as 5G/IoT, big data analysis, machine learning and AI, wearable devices, and blockchain, have matured the clinical and disease applications of telemedicine, smart medicine, and precision medicine. However, the broad application and commercial use of these digital health technologies still face policy, legal, and social trust challenges, such as information security, personal privacy protection, social and healthcare culture, and public trust.

The COVID-19 pandemic has ravaged the world for more than 3 years, and has caused unprecedented economic, social, and political impacts. During the pandemic, each economy established epidemic prevention measures and tools and developed vaccines and medication at breakneck speeds by utilizing their scientific knowledge and technological innovations. With each economy promoting “Open, Connect, Balance”, the theme of APEC in 2022, together, the economies are heading towards the “New Normal”<sup>1</sup> and restarting economic activities.

In the coming years, the economies will have to consider how to use digital technologies to help the governments rebuild and restart their health and social welfare policies, as well as strengthen the resilience of these health systems and social welfare systems. These focuses are not only in line with the vision of “A 2030 Strategy for Enabling Resilient Health Systems and Promoting the Health of our Populations in the Asia Pacific”, but are also consistent with the goals of APEC Putrajaya Vision 2040 and the three economic drivers of Aotearoa Plan of Action.

The pandemic has brought unprecedented opportunities to innovate, test, accumulate, and create more beneficial digital applications, creating significant impacts on the digital revolutions of public health systems in the various economies. During the pandemic, we saw the opportunities and

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<sup>1</sup> Berwick DM. Choices for the “New Normal”. *JAMA*. 2020;323(21):2125–2126. doi:10.1001/jama.2020.6949

challenges created by the digital technologies:

- Although digital technologies helped deliver correct information, fighting the infodemic is also a must.
- Video technology realized remote working and remote learning. However, inequalities still exist.
- Digital technologies helped monitor the pandemic and track confirmed cases, which also caused conflict between public health policies and personal privacy.
- The pandemic provided development opportunities for telemedicine (video consultations, online visits, and home monitoring), but attention should be paid to the health inequities caused by the digital gap.

In the face of these opportunities and challenges created by digital technologies and applications, this study explore how telemedicine can be used to provide healthcare services to rural areas and those with inconvenient access to healthcare through case and experience sharing, thereby reducing the health gap and improving health equity.

This study is the second study report released by the Digital Health Sub-Working Group (DHSWG) of the HWG. The first report was the “Summary Report of APEC Economies’ Digital Policy Measures to Combat COVID-19”. The report has been adopted by the HWG and published on the APEC website in March 2022. The DHSWG was proposed and established in the first HWG meeting of 2020. Chinese Taipei serves as the leading economy and the members include Korea; Peru; the Philippines; Thailand; United States; Viet Nam. After more than three years of efforts, the DHSWG has organized three policy dialogues and published one report. In addition to including personal data protection and private sector participation issues, the DHSWG has also included telemedicine, digital mental health, vaccination certification, and data governance in the discussions in response to the COVID-19 pandemic. The DHSWG would like to thank all economies for their feedbacks.

This study consists of five parts, which are (1) Foreword; (2) Overview of telemedicine use during the COVID-19 pandemic in the APEC economies; (3) Best practices of using telemedicine to reduce urban-rural disparities; (4) Results of APEC Digital Health Policy Survey among economies; and (5) Conclusion. The study develops an understanding of the policies and cases in economies through the collection of information from international organizations and official websites of economies, the survey questionnaire as well as the APEC digital health policy dialogues held on 17-18 November 2022. By compiling the experience of the economies in improving health equity through telemedicine, the study results will serve as the basis for promoting future related policies in APEC economies.

## Chapter II. Overview of Telemedicine Use During the COVID-19 Pandemic in APEC Economies

### I. Definition of Telemedicine

The definitions of digital health, e-health, and telemedicine in the “Global strategy on digital health 2020-2025”<sup>2</sup> published by the World Health Organization (WHO) in August 2021, are as follows.

- Digital health:

Digital health refers to the development and use of digital technologies to improve the healthcare space. Digital health expands the concept of e-health to incorporate digital consumers and broader smart devices and connecting equipment, as well as the application of various digital technologies in the health field, such as IoT, AI, big data, and robotics.

- eHealth:

eHealth refers to the use of information and communication technologies (ICTs) to support health and health-related fields in a cost-effective and safe way. The fields include healthcare services, health monitoring, health literature, and health education, knowledge, and research.

- Telemedicine:

According to a digital health report<sup>3</sup> published by the WHO in 2010, telemedicine is defined as “when distance is a critical factor in the provision of healthcare services, the healthcare specialist uses ICTs to exchange verified diagnostic information to treat or prevent diseases and injuries, conduct research and evaluations, and provide

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<sup>2</sup> Global strategy on digital health 2020-2025. Geneva: World Health Organization; 2021. License: CC BY-NC-SA 3.0 IGO.

<sup>3</sup> Telemedicine: opportunities and developments in Member States – report on the second global survey on eHealth. Global Observatory for eHealth series – Volume 2. Geneva: World Health Organization; 2010

continuous education to healthcare workers, in order to improve individual and community health.”

In addition, APEC also defined the difference between telehealth and telemedicine in the “Empowering Telehealth Solutions in APEC- Study on the Policy Landscape for Telehealth in the APEC Region” report<sup>4</sup> published in December 2021: Telemedicine refers to “using digital ICTs to provide clinical services when the participants are located in different places. The terms, telemedicine and telehealth, are closely related. However, telehealth encompasses broader technological applications, such as remote education, consumer outreach, and other applications, as well as the use of digital ICTs to support healthcare services”.

Practically, these terms are often used interchangeably. However, based on the aforementioned definitions, various common terms are compiled in Figure 1-1. The figure further explains the relationship between these similar terms in common contexts.

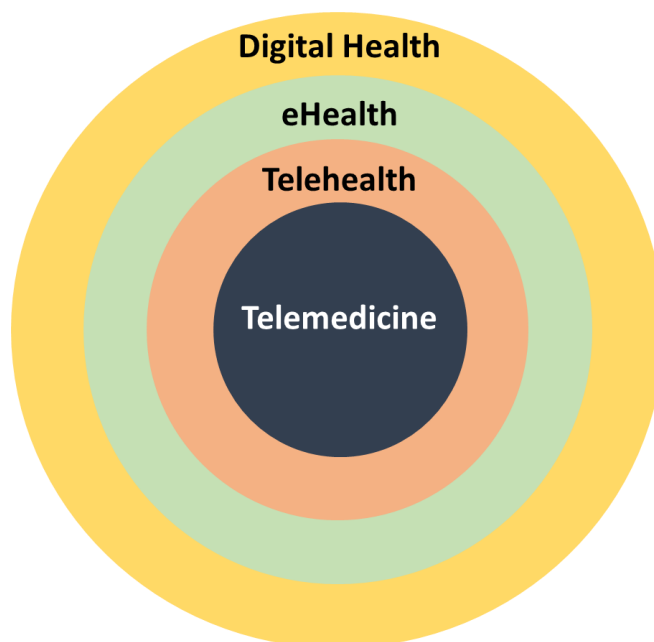


Figure 1-1 Common Terms in the Digital Health Field  
Data source: Compiled by the study team.

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<sup>4</sup><https://www.apec.org/publications/2022/01/empowering-telehealth-solutions-in-apec-study-on-the-policy-landscape-for-telehealth-in-the-apec-region>

In order to define the scope of the study and consistent language, the study will be based on telemedicine in order to explore how participants in different locations are using ICTs to provide healthcare services, including exchanging diagnosis information for treatment or prevention of diseases and injuries, and conducting research and evaluations, thereby improving the knowledge and methods related to individual and public health.

## II. The Role of Telemedicine During the COVID-19 Pandemic

On 30 January 2020, the WHO announced that COVID-19 is a public health emergency of global concern. Since then, the pandemic has entered its fourth year. From the initial strict prevention and control measures (such as lockdowns, travel restrictions, social activity restrictions, and the maintenance of social distancing between people) to the gradual relaxation of restrictions, then to the new normal, the epidemic prevention policies of the economies have changed according to the pandemic, but the main focus is still “minimize exposure to the virus” to combat COVID-19. This is also the main reason why telemedicine can contribute during the COVID-19 pandemic, especially for people who are quarantined. Telemedicine is able to provide real-time health consultation, monitoring, and assistance<sup>5</sup>. Patients will not lose their right to seek medical attention because of the inability to conduct face-to-face consultations. Furthermore, the application of telemedicine during the COVID-19 pandemic is considered to have the potential to strengthen epidemiology, disease control, and case management studies.<sup>6</sup>

The role telemedicine playing during the COVID-19 pandemic allowed patients to receive the services they needed and healthcare workers to provide services in different settings with an emphasis on

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<sup>5</sup> Monaghesh E, Hajizadeh A. The role of telehealth during COVID-19 outbreak: a systematic review based on current evidence. *BMC Public Health*. 2020 Aug 1;20(1):1193. doi: 10.1186/s12889-020-09301-4. PMID: 32738884; PMCID: PMC7395209  
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7395209/>

<sup>6</sup> Smith AC, Thomas E, Snoswell CL, Haydon H, Mehrotra A, Clemensen J, et al. Telehealth for global emergencies: Implications for coronavirus disease 2019 (COVID-19). *J Telemed Telecare*. 2020;1357633X20916567. <https://doi.org/10.1177/1357633X20916567>

“reducing physical contact to prevent infections”. Furthermore, many studies have noticed the benefits of providing mental health services through telemedicine.

(I)It reduces the risk of infection by minimizing contact.

The features of telemedicine allow distance to no longer be a major factor in the provision of medical services through ICTs. Taking COVID-19 patients seeking medical attention as an example, having confirmed patients, suspected patients, and medical staff in the same room or in a crowded waiting area would increase the risk of disease transmission. With real-time video conference, hospitalized patients or quarantined people can receive medical care without any physical contact. Moreover, with large numbers of confirmed cases every day, the video system can help patients receive diagnoses and prescriptions more quickly. Through telemedicine, patients can obtain the treatment drugs they need, and it reduces the risk of exposure for medical personnel. This method can also reduce travel for people with limited mobility or living in remote areas when trying to obtain COVID-19 medication.

(II)Telemedicine provides the services the patients need.

During the COVID-19 pandemic, telemedicine reduced the risk of infection for the general public, patients, and healthcare workers, while improving the accessibility of healthcare services.<sup>7</sup> People not only had to handle medical needs after being infected with COVID-19 during the pandemic, but they also had to face possible medical needs during quarantines (such as the tracking and care for diseases other than COVID-19 or chronic diseases). Furthermore, the public may develop anxiety, depression, and insecurity because of the health, social, and

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<sup>7</sup> Chauhan V, Galwankar S, Arquilla B, Garg M, Somma SD, El-Menyar A, Krishnan V, Gerber J, Holland R, Stawicki SP. Novel Coronavirus (COVID-19): Leveraging Telemedicine to Optimize Care While Minimizing Exposures and Viral Transmission. *J Emerg Trauma Shock*. 2020 Jan-Mar;13(1):20-24. doi: 10.4103/JETS.JETS\_32\_20. Epub 2020 Mar 19. PMID: 32308272; PMCID: PMC7161346.

economic impacts caused by the pandemic.

During the pandemic, people fell into a panic about being infected with COVID-19. The online consultation services provided by some chatbots can provide initial risk assessments and guide them to suitable medical institutions. Moreover, wearable devices that can monitor physiological data also came in handy during the pandemic, such as the wearable devices launched by Apple, Fitbit, and Garmin. They helped medical institutions to understand the physiological status of patients. Other wearable devices that can monitor body temperature were able to monitor the body temperatures of users and issue a fever alert.

During the pandemic, many telemedicine applications were based on communication software and devices that the general public was already accustomed to and are familiar with, such as smartphones and webcams, allowing patients to consult with doctors or receive treatment after diagnosis through video or telephone calls. Chronic disease patients were able to receive the follow up and medication they needed without having to physically return to the hospital.

(III) Telemedicine allows healthcare workers to provide services from different locations.

Telemedicine allows doctors who have contracted COVID-19 and been quarantined to use digital tools to care for their patients<sup>8</sup>. Through video equipment, clinicians in different locations can hold meetings together at the same time, and off-site doctors can provide professional consultation through video conferencing. This will enable fast medical decision-making and assessment, help doctors seek second opinions, or allow for cross-disciplinary and cross-field exchanges. A tool like this can

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<sup>8</sup> Hollander JE, Carr BG. Virtually Perfect? Telemedicine for Covid-19. *N Engl J Med.* 2020 Apr 30;382(18):1679-1681. doi: 10.1056/NEJMp2003539. Epub 2020 Mar 11. PMID: 32160451. <https://pubmed.ncbi.nlm.nih.gov/32160451/>



reduce medical service interruptions during the pandemic.

Furthermore, by taking advantage of the fact that doctors can provide services in multiple locations through remote technologies, help can be provided to the overworked workforce during the pandemic. Telemedicine technologies can help respond to emergencies more quickly, for example, medical teams can be dispatched more quickly and precisely. The capabilities of the medical teams can also be improved through telemedicine.

#### (IV) Provision of mental health services

According to the scientific report published by the World Health Organization in March 2022, during the first year of the COVID-19 pandemic, the global prevalence of anxiety and depression increased by 25%. The impact of the pandemic on mental health has prompted 90% of the economies surveyed by the WHO to include mental health and social psychological support in their COVID-19 response policies. However, the WHO has stated that there are big disparities between the policies and measures provided by each economy.

During the pandemic, many economies have established additional hotlines for mental health services (such as Lifeline and Kids Helpline in Australia, the CARE Hotline in Singapore, and the 1925 hotline in Chinese Taipei). Some economies have also proposed more proactive measures. For example, the Canadian government launched the Wellness Together Canada (WTC) website in April 2020. The Australian government also established a dedicated Coronavirus Mental Wellbeing Support Service. The New Zealand government is also actively working with stakeholders to provide different types of mental and social support services. Many telemedicine companies have offered free COVID-19 consultations. In particular, telemedicine related to mental illnesses received more attention during the

pandemic<sup>9</sup><sup>10</sup>.

### III.Challenges of telemedicine

The application of telemedicine during COVID-19 demonstrated telemedicine's contributions to the healthcare system, but also revealed the potential challenges of expanding telemedicine applications.

In the study by Erito et al., the challenges of using telemedicine have been divided into (1) resistant mindsets; (2) technical limitations of telemedicine; (3) reliability of information security and electronic systems; (4) connectivity of telemedicine technologies with other digital tools; (5) expanding patient accessibility of the aforementioned tools; and (6) continuous evaluation of the benefits of the digital tools.<sup>11</sup> The study by Omboni et al. stated that although some obstacles to digital healthcare have been eliminated during COVID-19, there is still a lack of support for the sustainable development of digital healthcare after COVID-19 in terms of technology, infrastructure, education, economy, and legislation.<sup>12</sup>

In a 2022 study<sup>13</sup>, the author compiled 27 literatures that mentioned the challenges of telemedicine applications during COVID-19 and summarized the seven most discussed challenges: (1) Technological obstacles; (2) Privacy, data confidentiality and fee

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<sup>9</sup> Torous J, Wykes T. Opportunities From the Coronavirus Disease 2019 Pandemic for Transforming Psychiatric Care With Telehealth. *JAMA Psychiatry*. 2020.

<https://doi:10.1001/jamapsychiatry.2020.1640>

<sup>10</sup> Fortney JC, Pyne JM, Edlund MJ, Williams DK, Robinson DE, Mittal D, Henderson KL. A randomized trial of telemedicine-based collaborative care for depression. *J Gen Intern Med*. 2007 Aug;22(8):1086-93. doi: 10.1007/s11606-007-0201-9. Epub 2007 May 10. PMID: 17492326; PMCID: PMC2305730.<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2305730/>

<sup>11</sup> Erito Marques de Souza Filho, Alexandra Monteiro. Challenges in Telemedicine: Even When the Road is Hard, Never Give up. *Int. J. Cardiovasc. Sci*. 35 (2). 2022  
<https://doi.org/10.36660/ijcs.20220014>

<sup>12</sup> Omboni S, Padwal RS, Alessa T, Benczúr B, Green BB, Hubbard I, Kario K, Khan NA, Konradi A, Logan AG, Lu Y, Mars M, McManus RJ, Melville S, Neumann CL, Parati G, Renna NF, Rylvlin P, Saner H, Schutte AE, Wang J. The worldwide impact of telemedicine during COVID-19: current evidence and recommendations for the future. *Connect Health*. 2022 Jan 4;1:7-35. doi: 10.20517/ch.2021.03. PMID: 35233563; PMCID: PMC7612439.

<sup>13</sup> Ftouni, R., AlJardali, B., Hamdanieh, M. et al. Challenges of Telemedicine during the COVID-19 pandemic: a systematic review. *BMC Med Inform Decis Mak* 22, 207 (2022).

<https://doi.org/10.1186/s12911-022-01952-0>

subsidies; (3) Irreplaceable physical examinations and diagnoses; (4) Different obstacles for special groups; (5) Training for healthcare providers and patients; (6) Changes to doctor-patient relationships; (7) Acceptance and satisfaction.

By reviewing the different perspectives related to the challenges of telemedicine, the study has classified the main challenges into four aspects:

- Technical challenges.
- Healthcare provider challenges.
- User and patient challenges.
- Policy and regulation challenges.

#### (I) Technical challenges

Telemedicine is healthcare services built on information and communication technologies and operated on basic infrastructure. Information technology includes the collection, storage, and analysis of data, platforms, and software and hardware facilities. Common communication technologies include messaging/text communication (such as email or chat software), verbal communication (such as landlines, wireless phones, or internet phones), and video communication (communication methods with picture and sound). Remote communications are not only dependent on networks with good signal, but also fast internet connections. In particular, high-quality cameras and connections are crucial for remote services that require video for diagnosis. During verbal or video communications, problems such as lagging, or interruptions will interfere with service quality.

Furthermore, the maintenance of data preservation, data analysis, and information security are areas of concern. There are technological gaps in infrastructure and skill gaps between IT professionals both between and within the economies.

## (II) Healthcare provider challenges

The different studies pointed out the different concerns of healthcare providers. Telemedicine is applicable to different degrees to various departments. For example, some departments require surgeries or special instruments and professionals to perform examinations and diagnosis. In these instances, the benefits of telemedicine are less than physical healthcare, especially when palpation is required. Currently, there are no remote tools that can replace palpations, so telemedicine is not applicable.

Insufficient training related to telemedicine platforms for healthcare providers is also another obstacle to the application of telemedicine. Unfamiliarity with the technology will prevent healthcare providers from using these technologies. In addition, technical and operational problems (such as inability to convene meetings, communication interruptions, etc.) will also interrupt the provision of healthcare and will require more expenses and time to handle technical issues. Therefore, several studies have suggested the increase of digital training for healthcare providers.

## (III) User and patient challenges

Many studies have expressed concern that telemedicine may cause health inequality. Different special groups may face different obstacles. The elderly prefers face-to-face medical relationships because for them, learning and familiarizing themselves with digital tools is too challenging. Some people in rural areas may have restricted access to telemedicine tools due to limited internet and communication infrastructure. Furthermore, groups with lower socioeconomic status may also have difficulty obtaining telemedicine tools, such as devices or network access. Other groups, such as the visually or hearing impaired, may have difficulty receiving healthcare services through video tools that match the same quality as physical services.

Moreover, some studies have stated that face-to-face consultations can deepen doctor-patient relationships more so than telemedicine. Although remote tools can minimize the limitations caused by distance, they cannot replace the trust and peace of mind created by direct contact between people. These factors also impact the acceptance and satisfaction with telemedicine of patients and healthcare providers.

#### (IV) Policy and regulation challenges

Regarding the practices of telemedicine, there is still a lack of consistent global or regional standards.<sup>14</sup> Multilateral platforms, such as the WHO, or regional organizations, such as APEC, should play a bigger role in coordinating the digital healthcare standards. In terms of regulations and policies, the obstacles to telemedicine programs are largely based on certification, payment systems, and insurance policies.<sup>15</sup> Other studies have been focused on the health inequity caused by digital gaps.

As more and more types of digital tools are used during the pandemic, issues such as information security, personal privacy, and accountability continue to be important concerns.<sup>16</sup> The WHA73.1 resolution was passed in the 73rd World Health Assembly (WHA) convened in May 2020. Article 7. (9) of the resolution calls on member states “*to leverage digital technologies for the response to COVID-19, including to deal with its socioeconomic impact, paying particular attention to digital*

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<sup>14</sup> Bhaskar S, Bradley S, Chattu VK, Adishes A, Nurtazina A, Kyrykbayeva S, Sakhamuri S, Yaya S, Sunil T, Thomas P, Mucci V, Moguilner S, Israel-Korn S, Alacapa J, Mishra A, Pandya S, Schroeder S, Atreja A, Banach M, Ray D. Telemedicine Across the Globe-Position Paper From the COVID-19 Pandemic Health System Resilience PROGRAM (REPROGRAM) International Consortium (Part 1). *Front Public Health*. 2020 Oct 16;8:556720. doi: 10.3389/fpubh.2020.556720. PMID: 33178656; PMCID: PMC7596287.

<sup>15</sup> Hollander JE, Carr BG. Virtually Perfect? Telemedicine for Covid-19. *N Engl J Med*. 2020 Apr 30;382(18):1679-1681. doi: 10.1056/NEJMp2003539. Epub 2020 Mar 11. PMID: 32160451.

<sup>16</sup> Shaw SE, Seuren LM, Wherton J, Cameron D, A'Court C, Vijayaraghavan S, Morris J, Bhattacharya S, Greenhalgh T. Video Consultations Between Patients and Clinicians in Diabetes, Cancer, and Heart Failure Services: Linguistic Ethnographic Study of Video-Mediated Interaction. *J Med Internet Res* 2020;22(5):e18378. doi: 10.2196/18378

*inclusion, patient empowerment, data privacy, and security, legal and ethical issues, and the protection of personal data.”<sup>17</sup>*

On 19 November 2020, multiple agencies of the United Nations issued a joint statement<sup>18</sup> to express their position on the continued use of digital technologies and personal data during the pandemic by various economies. The statement supports the use of personal data during the pandemic but also emphasizes the importance of personal rights and privacy while promoting economic and social developments. More and more practices and data have discovered that the collection, use, sharing, and further utilization of personal data can effectively stop the spread of the virus, and accelerate the revitalization of the economy and social life.

Furthermore, the United Nations agencies also expressed their concerns related to the use of personal data for purposes other than epidemic prevention, and even the new normal in the post-pandemic era. They emphasized that the use of personal data should not infringe on privacy and human rights. In summary, the handling and usage principles of personal data in response to the pandemic of various economies should include: (1) Comply with laws and a scope and time limitation should be defined; (2) Ensure the confidentiality and security of the data and destroy the data within the time limit; (3) Ensure all data sharing complies with international laws and privacy principles; (4) Immediately stop all actions after the epidemic prevention needs disappear; (5) Maintain transparency.

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<sup>17</sup> WHA73.1 Resolution COVID-19 response, WHO ( May 19 2020 ) , Retrieved Dec. 2020, from [https://apps.who.int/gb/ebwha/pdf\\_files/WHA73/A73\\_R1-en.pdf](https://apps.who.int/gb/ebwha/pdf_files/WHA73/A73_R1-en.pdf)

<sup>18</sup> Joint Statement on Data Protection and Privacy in the COVID-19, WHO (November 19 2020), Retrieved Dec. 2020, from <https://www.who.int/news/item/19-11-2020-joint-statement-on-data-protection-and-privacy-in-the-covid-19-response>

#### IV. Overview of telemedicine use during the COVID-19 pandemic in the APEC economies

From 2020 to 2022, the APEC economies have recognized that digital healthcare plays an important role in rebuilding and creating a sustainable healthcare system. The 2020 Leaders' Declaration stated that the APEC leaders recognize the importance of the development and contribution of **digital technologies** in safeguarding people's health and protecting the region from health threats, and enhancing resilience, scalability and sustainability of health systems, thereby moving towards universal health coverage. The 2021 Leaders' Declaration again stated that the APEC leaders recognize the importance of maintaining ongoing essential health services, improving **digital solutions**, pursuing increased health equity and our goal to achieve universal health coverage. Moreover, the 2022 Leaders' Declaration reaffirmed: We should continue our efforts to improve **digital solutions** and access to health services and strengthen health systems with a view to achieving universal health coverage.

Telemedicine has been recognized by all sectors as one of the effective solutions to reduce the burdens on medical institutions, reduce public crowds and contact, and resolving issues with healthcare accessibility faced by quarantined people or those in rural areas. In practice, there are differences based on the different telemedicine laws and regulations of each economy and the existing telemedicine infrastructure of each economy.

Some economies that did not have regulations related to telemedicine in the past allowed doctors to provide medical information or treatment through telemedicine using computers and video calls by relaxing medical regulations during the pandemic, such as Republic of Korea relaxing Article 34 of its Medical Act.

Some economies have relaxed the applicable scope of existing digital healthcare/video consultations. For example, the Australian government announced that Australians eligible for Medicare can choose telemedicine (video and telephone) services. They also

temporarily provided 73 specialist telemedicine services before 30 June 2022. From 19 July 2022 to 31 December 2022, the Australian government launched new temporary services, allowing COVID-19 confirmed patients (positive PCR or RAT tests) to receive telemedicine phone appointments. Doctors could ask patients whether the patients received COVID-19 oral medication treatment and perform evaluations through the phone or video calls.

The Chinese Taipei government also gradually relaxed the conditions for telemedicine in 2020 as the pandemic evolved, including services for home quarantine individuals, stable chronic disease patients, etc. When the epidemic level was increased to level three in 2021, a Ministry of Health and Welfare letter stated: After the medical institutions are designated by the health bureaus of counties and cities, they may be exempt from submitting the remote consultation and treatment implementation plan and may consult and treat patients through communication methods. In May 2022, the Omicron epidemic began in Chinese Taipei. People who tested positive with rapid testing kits rushed to the hospital for testing. Therefore, the Central Epidemic Command Center encouraged the public to obtain a diagnosis through remote consultations, that is, during home quarantine, self-health monitoring, or home testing, people who tested positive with home testing kits can use remote consultation to receive medical care. Remote/telemedicine doctors can help confirm the positive test results.

Some economies rolled out programs to provide telemedicine care during the pandemic. For example, the Philippines' Department of Health launched a telemedicine service project in March 2020. As of today, nine third-party telemedicine service providers have been adopted and partnerships with seven local governments have been established. The United States government launched the COVID-19 telemedicine program to provide funds for care providers, helping them offer telemedicine services. Japan's Ministry of Economy, Trade and Industry has also launched a remote health consultation service



project, allowing the public to consult doctors through remote methods for free. On the other hand, Canada invested CAD240.5 million in order to accelerate the use of virtual care and mental health tools to support Canadians access to care during the pandemic. More recently, a Pan-Canadian Interoperability Roadmap was endorsed that outlines the path forward to achieving better data access and exchange in Canada as well as areas to advance interoperability in the health care system.

Some economies allowed doctors to issue digital prescriptions. In March 2020, Australia launched digital prescriptions. Patients only need to register on the My Health Record system to get their prescriptions, and they can fill the prescriptions in different regions and different medical institutions. Within Canada, Canada Health Infoway worked with Health Canada, different provinces and regions, and stakeholders to develop, operate, and maintain the digital prescription service called PrescribeIT®. PrescribeIT® enables prescribers to electronically transmit a prescription directly from an electronic medical record to the pharmacy management system of a patient's pharmacy of choice.

## **Chapter III. Best Cases of Using Telemedicine to Reduce Urban-rural Disparities**

### **I. How Telemedicine Can Reduce Urban-rural Health Disparities**

The World Health Organization (WHO) released the consolidated telemedicine implementation guide<sup>19</sup> in November 2022. It stated that the COVID-19 pandemic accelerated the global use of telemedicine to provide health services. The benefits of telemedicine include reducing unnecessary clinical services, providing more timely care, and increasing medical care accessibility for low-resource communities, as well as helping patients conduct self-care.

However, the WHO also emphasized that telemedicine solutions should not be independently provided health services and must be integrated with the digital health policies of each economy. This includes leadership and governance frameworks, strategies, investments, infrastructure, laws and regulations, human resources, and application platforms. They should strategize with a wider range of health departments and coordinate with universal health coverage strategies, in order to truly reach every citizen.

The Rural Health Information Hub<sup>20</sup>, funded by the U.S. Department of Health and Human Services, organized the assistance telemedicine can provide in remote areas, including helping health system suppliers expand the scope and quality of health services, reducing transportation obstacles for patients to reach specialized health services, and improving the real-time monitoring of health services. During the pandemic, the flexibility of telemedicine was emphasized and applied. With appropriate infrastructure, healthcare personnel training, and legal policy adjustments (such as issuing emergency orders), patients can access remote diagnosis and medical services with reduced face-to-face contact.

Overall, the contributions of telemedicine in reducing urban-rural

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<sup>19</sup> Consolidated telemedicine implementation guide. Geneva: World Health Organization; 2022. Licence: CC BY-NC-SA 3.0 IGO, retrieved at <https://www.who.int/publications/i/item/9789240059184>

<sup>20</sup> Retrieved at <https://www.ruralhealthinfo.org/topics/telehealth>

health disparities can be classified as “reducing transportation obstacles”, “improving the accessibility of specialist services”, and “tracking non-communicable disease patients and providing continuous care”.

(I) Reducing transportation obstacles

Residents of remote areas may find it difficult to access the health services they need due to long transportation times and high transportation costs. Within the telemedicine solutions, people can access diagnosis and treatment services from community medical institutions in their homes. It also allows community medical institutions to continuously accept patients and form sustainable operations. Furthermore, telemedicine can also ensure the stratification and triage of the health system, allowing larger medical institutions to maintain their capacities and reserve bed spaces and resources for intensive care patients.

(II) Improving the accessibility of specialist services

Compared to emergency services or surgery, certain health services are better suited for telemedicine, such as: Mental health, ophthalmology, dermatology, drug addiction treatment, and digital pharmacies. After installing the required hardware facilities, radiology, oncology, and obstetrics and gynecology can also adopt telemedicine, and even intensive care services can be provided.

(III) Tracking non-communicable disease patients and providing continuous care

The decentralized care nature of telemedicine solutions allows it to provide services required by non-communicable disease patients with different needs. Together with appropriate infrastructure and trained healthcare personnel, it can allow patients with chronic diseases, such as diabetes and epilepsy, to receive the necessary testing, diagnosis, and care services at home or in neighboring community telemedicine centers, which will

improve the affordability of health services<sup>21</sup>.

## II. Key Factors of Providing Telemedicine Services in Remote Areas

The key factors of providing telemedicine in remote areas include the establishment and integration of suitable infrastructure, governance structures, healthcare personnel, and funding sources. In the “consolidated telemedicine implementation guide” issued by the WHO, the various aspects to be considered when establishing a telemedicine health system are proposed, including the establishment of cross-department and cross-stakeholder action teams, clear goals for overall health challenges, evaluations of the maturity of infrastructure and digital technologies, funding sources, work methods and standard procedures, and fairness.

The Rural Community Health Toolkit<sup>22</sup> issued by the US Rural Health and Medical Information Center proposed that the key factors for providing telemedicine services in rural areas include (1) planning and implementation of work procedures; (2) identify and prepare necessary resources; (3) licensing and certification of technical tools; (4) network connectivity and security; (5) legal concerns; (6) marketing and expanding the audience; and (7) care for specific groups in rural areas.

Singapore published Guidelines for Telemedicine<sup>23</sup> in 2015. The Guidelines aim to address relevant components for the delivery of telemedicine services by healthcare providers through four key domains: “Clinical Standards and Outcomes”, “Health Resources”, “Organisational”, and “Technology and Equipment”. The principles outlined in the Guidelines serve to ensure patient and provider safety and to provide a holistic approach to execute the delivery of telemedicine service in Singapore.

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<sup>21</sup> Singh, J. The COVID-19 pandemic: an opportunity to strengthen telemedicine in low and middle-income countries. *Pediatr Res* (2022). <https://doi.org/10.1038/s41390-022-02167-9>

<sup>22</sup> Retrieved at <https://www.ruralhealthinfo.org/toolkits/telehealth>

<sup>23</sup> Ministry of Health of Singapore. National Telemedicine Guidelines. Jan 2015. Retrieved at [https://www.moh.gov.sg/docs/librariesprovider5/resources-statistics/guidelines/moh-cir-06\\_2015\\_30jan15\\_telemedicine-guidelines-rev.pdf](https://www.moh.gov.sg/docs/librariesprovider5/resources-statistics/guidelines/moh-cir-06_2015_30jan15_telemedicine-guidelines-rev.pdf)

### III. Case Analysis: Rural Telemedicine Policies and Practical Experiences of APEC Economies

There have been several economies in APEC that have announced policies and guidelines related to the application of telemedicine. This study compiles the valuable feedback from the survey of APEC economies' digital health policy landscape and the discussions in the APEC Digital Health Policy Dialogue: Narrowing Health Inequity Gaps through Telemedicine in Adapting to the New Normal on 17-18 November 2022. The following will present practical case examples from 11 economies, including Australia; Canada; Chile; Korea; Malaysia; New Zealand; the Philippines; Chinese Taipei; Thailand; United States; Viet Nam. It will focus on the telemedicine policies and practices adopted by each economy in addressing the healthcare needs of rural areas and vulnerable populations.

#### (I) Case 1: Australia

During the pandemic, telemedicine services helped hundreds of thousands of Australian patients receive continuous care, providing greater flexibility to the health system and implementing universal health coverage. In March 2020, the Australian government expanded the coverage of telemedicine services through the temporary adjustments of the Medicare Benefits Schedule (MBS), thereby covering more members of the public. Moreover, since January 2022, MBS is now permanently providing telephone and video consultation services with general practitioners, a digital prescription system<sup>24</sup>, and several approved specialist remote services<sup>25</sup>.

To assist Indigenous populations in Australia with timely detection and proactive management of chronic kidney disease (CKD), the Australian Department of Health and Aged care, in collaboration with partners, has introduced an integrated and

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<sup>24</sup> Retrieved at <https://www.health.gov.au/health-alerts/covid-19/coronavirus-covid-19-advice-for-the-health-and-disability-sector/providing-health-care-remotely-during-the-covid-19-pandemic>

<sup>25</sup> Retrieved at <http://www.mbsonline.gov.au/internet/mbsonline/publishing.nsf/Content/Factsheet-Telehealth-Arrangements-Jan22>

information- based kidney disease management system "Territory Kidney Care<sup>26</sup>" (TKC).

TKC is an innovative clinical information system that utilizes powerful analytics and best practices to aid in the early identification and management of kidney disease. It can integrate with existing health record systems to securely transmit clinical information about patients and utilize algorithms to prioritize patients based on risk and disease stage, identifying those in need of follow-up care and notifying the higher-level clinical support team of the required actions.

Partners involved in the development of TKC include the Menzies School of Health Research, the Northern Territory Department of Health, the peak Aboriginal health representative body (AMSANT), and Aboriginal community-controlled health services. Research findings on the implementation of TKC emphasize the importance of integrated care systems that focus on prevention and coordination, as they can slow the progression of kidney disease and reduce complications associated with diabetes and cardiovascular disease. The significant achievement of TKC lies in the involvement of community health services and general practitioners who possess a deep understanding of patients and their families, addressing the complex care and treatment needs associated with kidney disease.

## (II)Case 2: Canada

The "First Nations Virtual Doctor of the Day program" in British Columbia, Canada, is dedicated to addressing the inequalities and systemic factors faced by Indigenous populations in accessing healthcare services, such as institutionalized racism within digital and healthcare systems, which create barriers to care for Indigenous individuals.

This program utilizes a digital health solution by providing

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<sup>26</sup> TKC [https://www.menzies.edu.au/page/Research/Projects/Kidney/territory\\_kidney\\_care/](https://www.menzies.edu.au/page/Research/Projects/Kidney/territory_kidney_care/)

Indigenous individuals with access to "virtual daily doctors." Through the use of platforms such as Zoom or phone consultations, Indigenous individuals and their family members can receive primary healthcare services in close proximity to their place of residence, especially when faced with limited access to physical services.

The program serves Indigenous populations and their family members in British Columbia, including non-Indigenous family members, with a priority given to doctors with Indigenous heritage or backgrounds. All participating doctors undergo cultural training specific to Indigenous communities.

Under this program, the Canadian government provides financial resources for provincial and regional health services, while the management of healthcare personnel, including this program, is overseen and operated by local governments.

### (III) Case 3: Chile

Since March 2019, Chile has been implementing the "Digital Rural Hospital (RDH)" program, with a pilot location in the Aisén region.

Historically, healthcare services in rural areas of Chile have been provided by rural health posts, where basic healthcare needs are attended to by primary care nurses. More complex health issues require treatment and services at family health centers. However, visiting a family health center can often take several hours to 2 days.

Given the limited healthcare institutions and physician resources in rural areas, the Digital Rural Hospital program utilizes telemedicine platforms to establish connections between rural areas and hospitals. Primary care nurses at rural health posts can reach out to physicians at the Digital Rural Hospital for assistance in resolving patient issues.



This program has improved accessibility and opportunities for rural patients to receive medical assistance. As of March 2019, the Digital Rural Hospital in the Aisén region has provided services to 2,744 individuals, with only 19% of patients needing to visit more complex healthcare centers for treatment.



Figure3-1 Digital Rural Hospital in Chile  
Source: APEC HWG Chile Team



(IV)Case 4: Republic of Korea

Republic of Korea has been implementing the "Pilot for Medical Support in Vulnerable Areas" since 2017. The aim of this program is to provide non-face-to-face healthcare services to residents living in vulnerable areas such as islands and rural regions, in order to ensure equitable access to healthcare services and resources from urban areas.

The program targets patients with non-communicable diseases, such as dementia and diabetes, who require daily care. It offers four types of non-face-to-face medical services, allowing patients residing in islands and rural areas to connect with physicians and nurses from urban areas and receive consultations.

Through this program, Republic of Korea aims to narrow the gap in healthcare resources between urban and rural areas and provide higher-quality medical services to residents in vulnerable regions.



Figure 3-3 Pilot for Medical Support in Vulnerable Areas in Korea

Source : APEC HWG Republic of Korea Team

In addition, since October 2020, Republic of Korea has been conducting the "Pilot Program for Healthcare Services of the Elderly using AI, IoT." This program aims to provide sustainable healthcare services to the elderly population who have difficulty

accessing healthcare services by utilizing the practices of visiting services provided by community public health centers and leveraging artificial intelligence (AI) and Internet of Things (IoT) technologies.

As of now, the digital health solutions and achievements of this program include:

- The number of individuals who completed the post-evaluation of physical activity is 25,966, with 16,136 individuals showing improvement, resulting in an improvement rate of 62.1%.
- The number of individuals who completed the post-evaluation of diet is 25,966, with 13,655 individuals showing improvement, resulting in an improvement rate of 52.6%.
- The number of individuals who completed the post-evaluation of the weakness score is 25,966, with 21,792 individuals maintaining their score (first half of the year), resulting in a maintenance rate of 83.9%.
- The number of individuals who completed the post-evaluation of grip strength is 25,966, with 15,026 individuals maintaining their strength, resulting in a maintenance rate of 57.8%.

Through this program, Korea aims to utilize advanced AI and IoT technologies to provide higher-quality healthcare services to the elderly population and improve their quality of life.

#### (V)Case 5: Malaysia

Malaysia is piloting the "EMR Project: Digitalization of Health Facilities in Negeri Sembilan" in the state of Negeri Sembilan. The project, which started in 2021, is expected to run until 2024.

To address health inequity issues in Negeri Sembilan, the pilot project aims to integrate various digital health solutions, improve data interoperability, and enhance the coordination and integration of healthcare systems and resource management to provide continuous and coordinated care services.

The digital health solutions used in this project include a health information exchange platform, virtual clinics, facility-based patient management systems, and clinical support systems. These solutions will contribute to better management and operational efficiency of healthcare resources, improve the quality of patient care, and foster collaboration among different healthcare facilities.

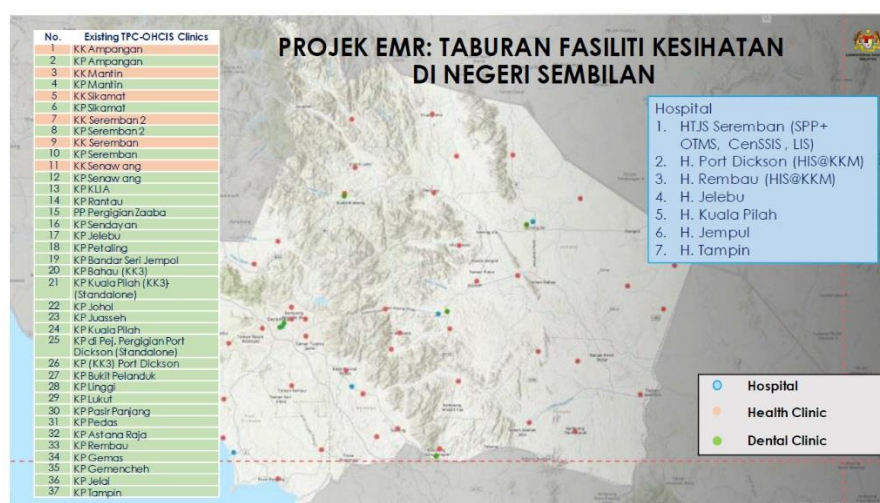


Figure 3-2 EMR Project in Malaysia  
Source : APEC HWG Malaysia Team

The Ministry of Health Malaysia introduced the virtual consultation initiative as a proof of concept in five health centres in 2019. It serves as a complement to existing health services, providing follow-up care for chronic disease/respiratory issues, physiotherapy (PT), occupational therapy (OT), dietetics, and pharmacy services. It was expanded during the COVID-19 pandemic to improve access to primary healthcare services while addressing physical distancing mandates.

As of December 2023, the initiative has expanded to 376 health centres across Malaysia. During this period, 141,089 clients have benefited from these services, with the age group between 25 to 59 years (65%) being the most frequent users. Notably, females (61%) have utilised these services more than males. Digital health has become an integral part of delivering health services in primary healthcare in Malaysia.

#### (VI)Case 6: New Zealand

The New Zealand Ministry of Health established the telemedicine service platform<sup>27</sup> in 2015. It regularly proposes plans, expected targets, and outputs of telemedicine services. In the latest 2021-2022 annual plan, it emphasizes the challenges to telemedicine services caused by the pandemic and the functions the platform can provide during the pandemic and in the new normal, including physical and mental health care, COVID-19 care, and vaccination.

Furthermore, the biennial plan also emphasizes the necessity of focusing on fringe and disadvantaged groups. The four key areas proposed in the biennial plan are “equitable health outcomes”, “family-centered services”, “integrated innovative systems”, and “sustainable and safe services”. Specific action goals have also been proposed, including ensuring the equity and inclusivity of the health system, establishing partnerships with Maori tribes and non-government organizations, encouraging Maori local health workers, and expanding the number of Maori and Pacific Islander workers in all telemedicine services.

#### (VII)Case 7: the Philippines

##### 1.Universal Health Care Act of the Philippines

The Philippines is a multi-island economy. The cost of seeking medical attention includes high transportation costs

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<sup>27</sup> Retrieved at <https://www.health.govt.nz/our-work/national-telehealth-service>

and transportation times, which affect the affordability of health services. The Universal Health Care Act of the Philippines ensures that all citizens can enjoy high quality and affordable health services without falling into financial hardship. Therefore, telemedicine became a viable solution.

In March 2020, the Philippines' Ministry of Health launched the telemedicine service plan, allowing third-party telemedicine service providers to partner with local governments and provide telemedicine services. Meanwhile, the Ministry of Health is responsible for reviews and certification. Under this framework, there are four types of telemedicine service structures, including: (1) Linking primary care institutions in rural areas with primary care institutions in cities. (2) Linking primary care institutions in rural areas with third-party primary care institutions. (3) Linking primary care institutions in rural areas with telemedicine service providers in cities. (4) Linking primary care institutions or clinics with telemedicine service providers in high-level, specialized hospitals.

So far, the Philippines' Ministry of Health and Welfare has approved nine third-party telemedicine service providers providing telemedicine services in seven regions. Furthermore, in order to implement universal health coverage, the Philippines' Ministry of Health and Welfare is expanding the scale and coverage of telemedicine services.

## 2. Establishment of Model Barangay Health Care Centers through promoting the use of Telemedicine and Digital Health in the Urban Health Project Site in Parañaque

The program took place from 12 August to 12 December 2022, in the Moonwalk, Sto. Niño, and Vitalez communities in Parañaque City.

The target community health centers identified

challenges in utilizing digital health technologies, including:

- Community members' fear or unfamiliarity with technology or emerging technologies, which affects their willingness to use telemedicine services.
- Inadequate manpower at community health centers, making it difficult to balance telemedicine services with other essential healthcare services.

To address these challenges, the pilot program focused on allocating resources to provide telemedicine services. The specific achievements obtained include:

- Health consumers can access safer and higher-quality healthcare services. For example, they can more easily access health information and personal health records, use this information and knowledge to manage their health, and obtain primary healthcare services through telemedicine.
- Healthcare service providers can enhance the quality of treatment and care decisions. By using tools and platforms integrated into telemedicine services, they can obtain more comprehensive patient information, improve cooperation and coordination with other healthcare providers, and enhance patient monitoring and tracking.
- Decision-makers and researchers in the health field can obtain more reliable health data and statistical results through appropriate program implementation, improving prevention, treatment, clinical care, and decision-making tools.

In the future, the Philippines will further promote the establishment of exemplary community telemedicine health

centers to improve and enhance healthcare outcomes in low-resource communities within metropolitan areas.

(VIII)Case 8: Chinese Taipei

In order to use technology to improve the efficiency and accessibility of medical care, the Ministry of Health and Welfare announced the Rules of Medical Diagnosis and Treatment by Telecommunications on 11 May 2018, which clearly stipulates patients in five special situations can undergo remote consultations. They are not limited to people from mountainous areas, outlying islands, and rural areas. The Rules act as a legal basis for telemedicine. The “Approved Reference Principles for Psychologists to Perform Remote Psychological Counseling Services” were announced on 29 November 2019. The Principles allow psychologists working in institutions that have applied for remote psychological counseling to remotely conduct counseling with patients.

In 2020, due to the impact of the COVID-19 pandemic, Chinese Taipei began gradually loosening the conditions for remote counseling in the Rules of Medical Diagnosis and Treatment by Telecommunications, to ensure the public’s right to medical care during the pandemic. If quarantined people need immediate medical care, they can consult with a doctor and receive a diagnosis through different communication methods to obtain a prescription. For stable chronic disease patients, they can ask others to describe their condition to the doctor and obtain a prescription or talk to the doctor through telemedicine methods.

In May 2022, due to the severe Omicron-virus outbreak, people who tested positive with rapid testing kits rushed to the hospital for further diagnosis. Therefore, the government encouraged the public to obtain a diagnosis through remote consultations. People who tested positive with home testing kits can use remote consultation to receive medical care. Remote/telemedicine doctors can help confirm the positive test

results.

In the process of expanding telemedicine treatment, the key support is the measures related to NHI health insurance reimbursement. If the public uses video consultation services due to the aforementioned factors, the video consultation fees shall be paid by the NHI health insurance.

Telemedicine has not only helped relieve the pressure on medical institutions and reduce the foot traffic in the institutions, but also allows the public to quickly obtain the medication and consultation they require. Furthermore, long before the COVID-19 pandemic, the government had already listed the application of telemedicine as an important policy to actively reduce the health inequity between urban and rural areas through telemedicine. The NTUH Yunlin Branch and Kaohsiung Chang Gung Memorial Hospital have been listed below as examples of how Chinese Taipei is using digital tools to improve healthcare accessibility and service quality in resource-scarce and remote areas.

#### 1. NTU Hospital Yunlin Branch

The NTU Hospital Yunlin Branch is located in Yunlin County in the south of Chinese Taipei. Yunlin County mainly consists of plains and mountainous areas. Therefore, the medical needs of those living in hard-to-reach rural areas have become one of the healthcare service challenges of Yunlin County. The NTU Hospital Yunlin Branch established the Telemedicine Center in April 2017, and formulated the “Safe Yunlin e-Hospital Defense” framework in 2018. It piloted telemedicine for emergency care integration and innovative services in rural areas in Yunlin County, and successfully demonstrated four solutions, including: “Douliu Inter-disciplinary Regional Defense”, “Smart and Remote Wound Care”, “Real-time Monitoring of High-risk Newborns”, and “Remote Crowd Sourcing for Children's Heart Screening”.



(1) “Douliu Inter-disciplinary Regional Defense”

The program connects two hospitals in the Douliu area, allowing doctors from both hospitals to establish a VPN for remote and secure access based on Security Socket Layer (SSL). Aside from sharing information to work together, it can prevent overcrowding in one hospital while there are empty beds in the other.

(2) “Smart and Remote Wound Care”

In response to the problem of serious wound deformation among long-term care institution patients in rural areas due to transportation difficulties and low treatment frequency, wound care specialists visit the patients and track wound healing through an AI wound analysis system, allowing patients who find it hard to seek medical attention to heal completely.

(3) “Real-time Remote Monitoring of High-risk Newborns”:

Telemedicine equipment is installed in obstetrics and gynecology clinics to provide real-time physiological information monitoring and transmission, and remote online guidance, in order to solve the problem of insufficient basic healthcare in Yunlin.

(4) “Rural Area Remote Crowd Sourcing for Children's Heart Screening”

The ECGs of school children in rural areas are transmitted using ICT, Bluetooth, and internet-connected tablet devices. The doctor then uses the cloud to identify the school children with

abnormalities in their hearts and helps them in receiving treatment. The program uses a crowd sourcing model. The ECGs and heart sounds of the school children are uploaded to the cloud and distributed to pediatric cardiology teams in different hospitals for remote diagnosis. The children are transferred for re-examination in a timely manner, thereby solving the problem of insufficient examination capacity for pediatric cardiology in Yunlin.

Table 3-1 contains the NTUH Yunlin Branch telemedicine solution. The partnership of policy, healthcare, and industry combines ICT and services to innovate new solutions for insufficient resources and medical difficulties in rural areas. It can help ensure that people in different areas have access to high quality and affordable health services.

**Table 3-1 NTUH Yunlin Branch Telemedicine Solution**

Telemedicine solution	Rural challenges	Solutions	
		IT solutions	Service process innovations
Douliu Inter-disciplinary Regional Defense	<ul style="list-style-type: none"> <li>● Insufficient and uneven resources</li> <li>● Lack of ER doctors causing scheduling difficulties</li> <li>● ER patients need to be transferred</li> </ul>	<ul style="list-style-type: none"> <li>● Set up a cross-hospital medical records system</li> <li>● Telemedicine communication devices and platform</li> <li>● Diverse integration and AIoT connection of examination instruments</li> </ul>	<ul style="list-style-type: none"> <li>● Specialist regional defense</li> <li>● Establish a cross-hospital human resources database for joint scheduling</li> <li>● Patient-centered approach where the doctor goes to the patient</li> </ul>
Smart and	● Difficulty in	● Smart wound	● Nurse

Telemedicine solution	Rural challenges	Solutions	
		IT solutions	Service process innovations
remote wound care	<p>seeking medical attention for the public</p> <ul style="list-style-type: none"> <li>● Bedridden residents in institutions have difficult to heal wounds due to the pressure</li> </ul>	<p>assessment device and application</p> <ul style="list-style-type: none"> <li>● AI assessment of wound analysis</li> <li>● Remote wound care platform</li> </ul>	<p>practitioners' institution visits.</p> <ul style="list-style-type: none"> <li>● Remote B2B specialist guidance</li> </ul>
Real-time remote monitoring of high-risk newborns	<ul style="list-style-type: none"> <li>● Lack of support at the basic level</li> <li>● Long waiting times for high-risk newborns in obstetrics and gynecology clinics</li> <li>● Time-consuming plug-ins with anxiety-filled processes</li> </ul>	<ul style="list-style-type: none"> <li>● Continuous remote vital sign monitoring and transmission</li> </ul>	<ul style="list-style-type: none"> <li>● Improve first aid capabilities for newborns at the base level</li> <li>● Remote B2B medical guidance for newborn first aid</li> </ul>
Remote crowd sourcing for children's heart screening	<ul style="list-style-type: none"> <li>● Lack of specialists</li> <li>● The low number of pediatric cardiologists means that pediatric heart disease screenings cannot be</li> </ul>	<ul style="list-style-type: none"> <li>● Digital capture of heart sounds and ECG</li> <li>● Remote transmission</li> <li>● Cloud assessment</li> <li>● AI assessment of heart sounds</li> </ul>	<ul style="list-style-type: none"> <li>● Crowd sourcing by pediatric cardiologists in different areas.</li> </ul>

Telemedicine solution	Rural challenges	Solutions	
		IT solutions	Service process innovations
	conducted at the level of urban areas		

## 2. Kaohsiung Chang Gung Memorial Hospital

Kaohsiung Chang Gung Memorial Hospital is located in the south of Chinese Taipei. It has worked with several hospitals in different townships in recent years to conduct telemedicine programs for dermatology, ENT, ophthalmology, gastroenterology and emergency care. Overall, Kaohsiung Chang Gung Memorial Hospital has used the following methods to establish and promote the sustainable telemedicine programs:

### (1) Fast and safe digital transmission and storage systems

Ensuring that data transmission complies with the Health Insurance Portability and Accountability Act (HIPAA), and using RSA public key/private key encryption, AES-256 encryption, and active protection systems to provide data transmission security.

### (2) Human resource training

Provide training courses and organize seminars for social healthcare practitioners and other interested health workers. Furthermore, the hospital helped train doctors in Feng Bin Aboriginal Branch Hospital and Hengchun Tourism Hospital.

### (3) Community promotion

Promote telemedicine to the public and post information on bulletin boards in social healthcare

institutions, and partner with the “Wen 8 Health” website to improve the understanding of telemedicine services among the public. Furthermore, the hospital worked with television stations to promote 5G telemedicine, greatly improving healthcare accessibility among people in mountainous areas, outlying islands, and rural areas, as well as patients in long-term care institutions.

#### (4) Drug management

Establish a continuous prescription procedure for chronic diseases in video consultations.

In terms of practical applications, starting in 2018, Kaohsiung Chang Gung Memorial Hospital has partnered with hospitals in Hualien, Taitung, Hengchun, and Penghu to provide telemedicine services. People can make appointments on the Kaohsiung Chang Gung Memorial Hospital website or app and attend the remote consultation at the scheduled time through their phone or webex application on their computer.

Through the “U-Dr. Telemedicine System” and mobile medical kit, the hospital provides full-time, multi-specialty remote consultation services. Among which, the “combined diagnostic” remote assessment device can upload medical images in real time to Kaohsiung Chang Gung Memorial Hospital for diagnosis, increasing the timeliness of treatment for people in mountainous areas, outlying islands, and rural areas. Kaohsiung Chang Gung Memorial Hospital has applied telemedicine technologies in skin cancer screening, treatment and referrals, and introduced a lightweight deep learning model for skin cancers to help diagnosis and decision-making. The “digital combined diagnostic” tool and other telemedicine devices,

together with specialists in medical centers, can provide people in rural areas with fast and correct diagnoses and treatments. It can also help discover serious diseases early and patients can be referred in time, greatly improving healthcare quality in remote regions.

With the outbreak of the COVID-19 pandemic, the daily number of patients visiting Kaohsiung Chang Gung Memorial Hospital decreased, while the number of patients using video consultations increased. The virtual platform of Kaohsiung Chang Gung Memorial Hospital is equipped with a cloud Health Information System(HIS) to ensure personal data security, and minimizes the needs of medical personnel, in order to satisfy the video consultation needs of patients.

#### (IX)Case 9: Thailand

Since 28 February 2021, Thailand has implemented the "Moh Prompt Platform" covering the entire territory of Thailand. After the outbreak of the COVID-19, Thailand actively promoted vaccination to control the pandemic. This platform aims to establish a data system that integrates the healthcare information systems (HIS) of different healthcare institutions, tracks and monitors the safety and effectiveness of vaccines, and transparently manages the distribution of vaccines throughout Thailand.

The platform offers several specific functionalities, including:

- Establishing APIs to connect and integrate vaccine data from all HIS and healthcare departments.
- Establishing a central data hub (MOPH Data Hub) to collect data.
- Providing a mobile application for the public to engage

in health education and communication, access vaccine services, and receive digital vaccine certificates.

- Conducting data analysis and presenting information through dashboards to provide vaccine administration information to authorities, healthcare units, healthcare workers, and the public.

The Moh Prompt Platform is Thailand's first healthcare data integration system that connects all departments, serving 32.9 million people and 7,888 healthcare institutions. It has had a significant impact on the functioning of Thailand's digital health system.

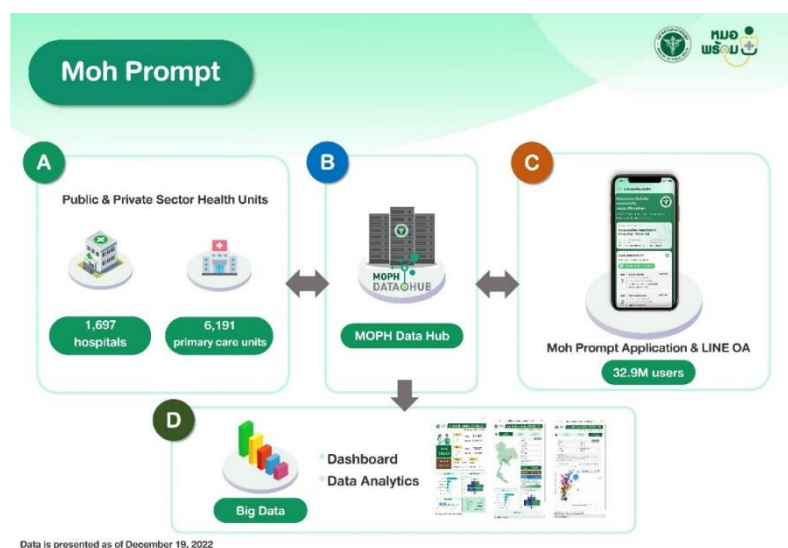


Figure 3-4 Moh Prompt Platform of Thailand

Source : APEC HWG Thailand Team

#### (X)Case 10: United States

##### 1. Telehealth in Low Resource Settings guidelines<sup>28</sup>

The US Centers for Disease Control and Prevention published guidelines to introduces the experiences and results of telemedicine in rural and low-resource areas.

<sup>28</sup>CDC. Telehealth and Telemedicine during COVID-19 in Low Resource Non-U.S. Settings. May 2022. Retrieved at <https://www.cdc.gov/coronavirus/2019-ncov/global-covid-19/telehealth-covid19-nonUS.html>

During the most severe period of the pandemic, around half of basic health services were disrupted around the world<sup>29</sup>. This impact also created opportunities for telemedicine, such as COVID-19 health education and consultation, daily health consultation, prescriptions, and mental health services.

With the development of digital technologies, electronic devices have become more practical in remote diagnosis and evaluations. In developing economies, such as the African region, patients in rural areas are able to access health services through remote tools due to increasingly extensive internet infrastructure<sup>30</sup>.

However, in some middle- and low-income economies, the social and economic disparities will affect the accessibility of medical services. Those with more resources can access telemedicine services more easily. Furthermore, when health workers are more invested in telemedicine startups, this would cause a shortage of human power in medical institutions.

When promoting and implementing telemedicine services, aside from improving the public's understanding of telemedicine benefits, a balance should also be reached between telemedicine services and physical medical services. Therefore, local needs should be considered, and stakeholders should be involved in the establishment of telemedicine services. At the same time, attention should be paid to the digital literacy in low-resource area, and services in the local language should also be provided.

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<sup>29</sup>WHO. Second round of the national pulse survey on continuity of essential health services during the COVID-19 pandemic. March 2021. Retrieved at <https://www.who.int/publications/i/item/WHO-2019-nCoV-EHS-continuity-survey-2021.1>

<sup>30</sup>Babatunde AO, Abdulazeez AO, Adeyemo EA, Uche-Orji CI, Saliyu AA. Telemedicine in Low and Middle Income Countries: Closing or Widening the Health Inequalities Gap?. EUR J ENV PUBLIC HLT. 2021;5(2):em0075. <https://doi.org/10.21601/ejeph/10777>



## 2. Pilot Program for Improving Health Information Exchange in COVID-19 Disparity-Affected Communities

In this two-year pilot program, the goal is to increase health information exchange among communities disproportionately impacted by the COVID-19 pandemic. These communities include those related to the stratifying factors of age, race, ethnicity, disability, and sex. The program is increasing understanding of how COVID-19 has disproportionately impacted various communities and increasing the capability of public health agencies and the health care system to respond to health inequities. There was also initial focus on Social Determinants of Health and how HIEs support COVID-19 response and address health inequities.

Additionally, the pilot program aims to understand and address social determinants of health and how health information exchange systems can respond to health inequality issues. Here are the pilot program outcomes from three states: Nebraska, Pennsylvania, and Kansas:

- Nebraska (CyncHealth): implemented a regional Social Determinants of Health network and implemented analytics services and visualizations that incorporate race, ethnicity, and geographical location to aid in identification of areas and populations disproportionately impacted by COVID-19.
- Pennsylvania (HSX): has indexed their Master Patient Index (MPI) extract with a COVID risk index for chronic conditions that increase someone's risk of a poor outcome should they become infected. The Public Health Agencies and HSX payer members use this to target their outreach for vaccine distribution towards patients

most at risk. HSX risk index includes codes such as diabetes and cardiovascular diseases (CVD) disproportionately affecting racial minorities.

- Kansas (KONZA): is helping rural practices report their COVID lab results and COVID vaccines electronically to the Kansas Department of Health and Environment (KDHE). KONZA focuses on health equity through their HQInsight dashboards that provides data to providers, hospitals, and health plans regarding key quality measures.

#### (XI)Case 11: Viet Nam

The current health challenges in Viet Nam include: (1) Most of the healthcare capacity is used for treating noncommunicable diseases. (2) Lower ratio of hospital beds (30.5 beds per 10,000 residents). (3) Lower density of healthcare personnel (1 physician and 1.4 nurses per thousand residents), and the distribution in different areas is uneven. (4) Poor patient experience due to the low healthcare capacity and healthcare personnel density. Telemedicine can help with meeting these challenges.

1. Viet Nam currently has established policies related to telemedicine, which include:

- (1) Decision No. 2628/QD-BYT dated 22 June 2020, approving the remote medical examination and treatment plan for 2020 - 2025.
- (2) Implementation Decision No. 411/QD-TTg dated 31 March 2022, by the Prime Minister, which approves the government's strategy for digital economic and social development until 2025, with a vision extending to 2030. In line with this strategy, the Ministry of Health has issued the following documents:

- Decision No. 2955/QD-BYT dated 28 October 2022, approving the plan for promoting the development and utilization of digital healthcare platforms to facilitate the implementation of the digital transformation program by 2025, with a vision for 2030.
- Decision No. 823/QD-BYT dated 15 February 2023, endorsing the plan for the implementation of the Remote Consultation Support Platform in 2023.
- Decision No. 1923/QD-BYT dated 20 April 2023, approving the plan for the implementation of the Electronic Health Record Platform in 2023
- Notably, Resolution No. 157-NQ/BCSD, dated 3 February 2023, emphasizes the key task of "Promoting the deployment of medical digital platforms," with a particular focus on ensuring the successful implementation of four digital platforms. One of these platforms is the Vtelehealth platform, as outlined in Decision No. 823/QD-BYT, dated 15 February 2023.

The Ministry of Health is currently in the process of drafting a Decree regarding remote medical examination and treatment; and a Circular concerning the provision of basic healthcare services at commune health stations.

## 2. Application Development and Real-world Implementation

The Ministry of Health has successfully developed the fundamental features of the Remote Consultation Support Platform (Vtelehealth platform) under Decision No. 823/QD-BYT. This platform encompasses an information management system for remote medical consultations at

healthcare facilities and mobile applications designed for healthcare professionals and citizens.

As of September 2023, the Vtelehealth platform has been implemented in the provinces of Tra Vinh, Khanh Hoa, Vinh Phuc, and the Thai Binh Pediatric Hospital. Some specific results are as follows:

- Number of participating doctors: Over 846 doctors
- Number of citizens with profiles in the system: 86,742 people
- Number of consultation sessions conducted: 880 consultation sessions.

In 2023, training and TOT (Training of Trainers) will be conducted for 63 provinces and cities, with local implementations taking place in 19 provinces and cities. Training and TOT for the remaining provinces and cities will occur in 2024.

In collaboration with the Ministry of Health's efforts in telehealth development, the United Nations Development Programme (UNDP) has been working closely with the Electronic Health Administration (EHA, now the National Health Information Center) of the Ministry of Health and the Departments of Health (DOH) in Ha Giang, Bac Kan, and Lang Son provinces since December 2020 to implement the Telemedicine Consultation Project at the Grassroots Level using the 'Doctor for Everyone' software.

The 'Doctor for Everyone' software has been developed for web and smartphone platforms, offering features such as booking appointments at commune health stations (CHS), conducting consultations or online

meetings with video, and enabling multi-point calls. Through the 'Doctor for Everyone' software, the Project has facilitated communication between health workers at Commune Health Stations (CHS) and higher-level medical units for regular briefings, professional activities, and remote consultations. Simultaneously, with the goal of 'leaving no one behind,' the Project has also connected people, especially those in remote and mountainous areas, ethnic minorities, and individuals with disabilities, with health workers at the CHS for health advice, appointment scheduling, and remote medical examination and treatment.

The previous assessment report for the period 2020-2022 indicates that the implementation process in the three provinces yielded positive results. Furthermore, as the project expands, provinces may meet the criteria for achieving advanced new rural communes, with nearly 26,000 appointments and support for remote medical examinations and treatments.

Starting in June 2023, the Ministry of Health in Viet Nam plans to integrate 'Doctor for Everyone' with the Vtelehealth platform. The next step will involve further upgrades and deep integration, making the 'Doctor for Everyone' software a module within the Vtelehealth platform.

In the future, Viet Nam will continue to develop IT infrastructure, strengthen the digital capabilities of healthcare workers, improve information accessibility among the elderly and people in remote areas, and change the behaviors of the public and healthcare workers. In response to these challenges, Viet Nam's primary solution is to establish a telemedicine platform to provide consultations and prescriptions for patients online. It also aims to integrate the resources of hospitals and doctors to provide more services to every family.

Furthermore, in terms of policy, technology, and partnerships, the Ministry of Health of Vietnam has proposed related solutions, as shown in Table 3-2 below.

**Table 3-2 Telemedicine Solutions in Viet Nam**

<b>Solutions</b>	<b>Primary actions</b>	<b>Description</b>
Improve policy directions	Promote decisions No. 2628 and No. 749	Establish and maintain telemedicine departments in hospitals and medical centers
	Incentive program	The community sponsors telemedicine programs for disadvantaged people and rural areas
	Clear regulatory framework	Coordinate with Viet Nam’s social safety net to implement telemedicine
Strengthen online platform functions and scope	24-hour online consultation	Allows patients to contact online doctors for consultation at any time without an appointment for a physical visit
	Home health assistant	Connects each platform user to a health assistant for initial assistance
	Accelerate integration with other digital platforms	Including digital prescriptions, digital medical records, and online payments
Include partners	Promote subscription models	Encourage service providers to pay USD1 per month to use the platform
	Work with private insurance companies	Work with private insurance companies that have accepted the platform services
	Corporate sponsorships	Encourage medical companies to provide sponsorship

## **Chapter IV. Survey of APEC Economies' Digital Health Policy Landscape**

In this study, the research team issued a questionnaire to the 21 economies in the APEC region in order to understand the governance and policy landscape of digital health in these economies. The questionnaire included topics such as the digital health technologies of interest, the application fields of interest, governance frameworks, and the issues covered in key or high-level digital health policies. The aim was to gain insights into the digital health policy trends in APEC economies.

After receiving responses from 12 economies (Australia; Canada; Chile; Japan; Malaysia; Korea; the Philippines; Russia; Singapore; Chinese Taipei; Thailand; United States), the analysis yielded the following results.

### **I. Digital health *TECHNOLOGIES* prioritized by APEC member economies**

According to the questionnaire, the responses from 12 economies regarding the development of various types of digital health technologies (including Algorithms/Artificial Intelligence, Augmented Reality/Virtual Reality Devices, Big Data, Blockchain, Cloud Computing, Cybersecurity, Edge Computing, Electronic Medical Record Exchange, Health Information System (HIS) on Cloud, Internet of Things, Information and Communication, Importing Health Information Systems, Robotics, Telemedicine/Virtual Healthcare, Wearables, and Other technologies) have been summarized in Table 4-1 and Figure 4-1.

Based on the responses, the digital health technologies that received the highest priority among the economies were Cybersecurity (11), Electronic Medical Record Exchange (11), and Telemedicine/Virtual Healthcare (11). The next priorities were Health Information System (HIS) on Cloud (10), Big Data (9), and Artificial Intelligence (8). This trend demonstrates the economies' emphasis on digital transformation in healthcare systems, particularly in electronic medical record exchange, and highlights their concern for

cybersecurity. Additionally, the application of digital technologies during the COVID-19 pandemic may have increased the willingness of economies to consider incorporating telemedicine/virtual healthcare into their healthcare systems, as evidenced by the policy cases presented earlier in this study.

There were several technology areas that the economies considered not to be their current priority, including Augmented Reality/Virtual Reality Devices (0), Blockchain (1), and Edge Computing (1). This reflects that the economies' digital health policies prioritize technologies that have matured and have successful experiences in the healthcare field.

In addition, under the "Other" category, Malaysia mentioned enterprise architecture, Singapore mentioned diagnostics & privacy-enhancing technologies, and the United States mentioned application programming interface (API) enabled technologies and health data standards. This reflects the specific needs of different healthcare systems when it comes to digital technologies. It is crucial to have more exchanges and discussions in the future to further understand the varying considerations of different healthcare systems in adopting digital health technologies. By learning from case studies and sharing policy experiences, it can assist APEC economies in adopting solutions that are better suited to their own healthcare system situations.



Table 4-1 Digital health *TECHNOLOGIES* Prioritized by the Member Economies

	AUS	CDA	CHL	JPN	ROK	MAS	PH	RUS	SGP	CT	TH	US	Total
Algorithms/Artificial Intelligence		0	0		0	0		0	0	0	0		8
Augmented Reality /Virtual Reality Devices													0
Big Data		0	0		0	0	0	0	0	0	0		9
Blockchain										0			1
Cloud Computing	0		0			0	0	0	0		0		7
Cybersecurity	0	0	0		0	0	0	0	0	0	0	0	11
Edge Computing					0								1
Electronic Medical Record Exchange	0	0	0		0	0	0	0	0	0	0	0	11
Health Information System (HIS) on Cloud	0	0	0		0		0	0	0	0	0	0	10
Internet of Things							0	0			0		3
Information and Communication	0	0	0			0	0				0		6
Importing Health Information Systems	0		0				0			0	0		5
Robotics									0		0		2
Telemedicine/Virtual Healthcare	0	0	0		0	0	0	0	0	0	0	0	11
Wearables					0			0	0				3

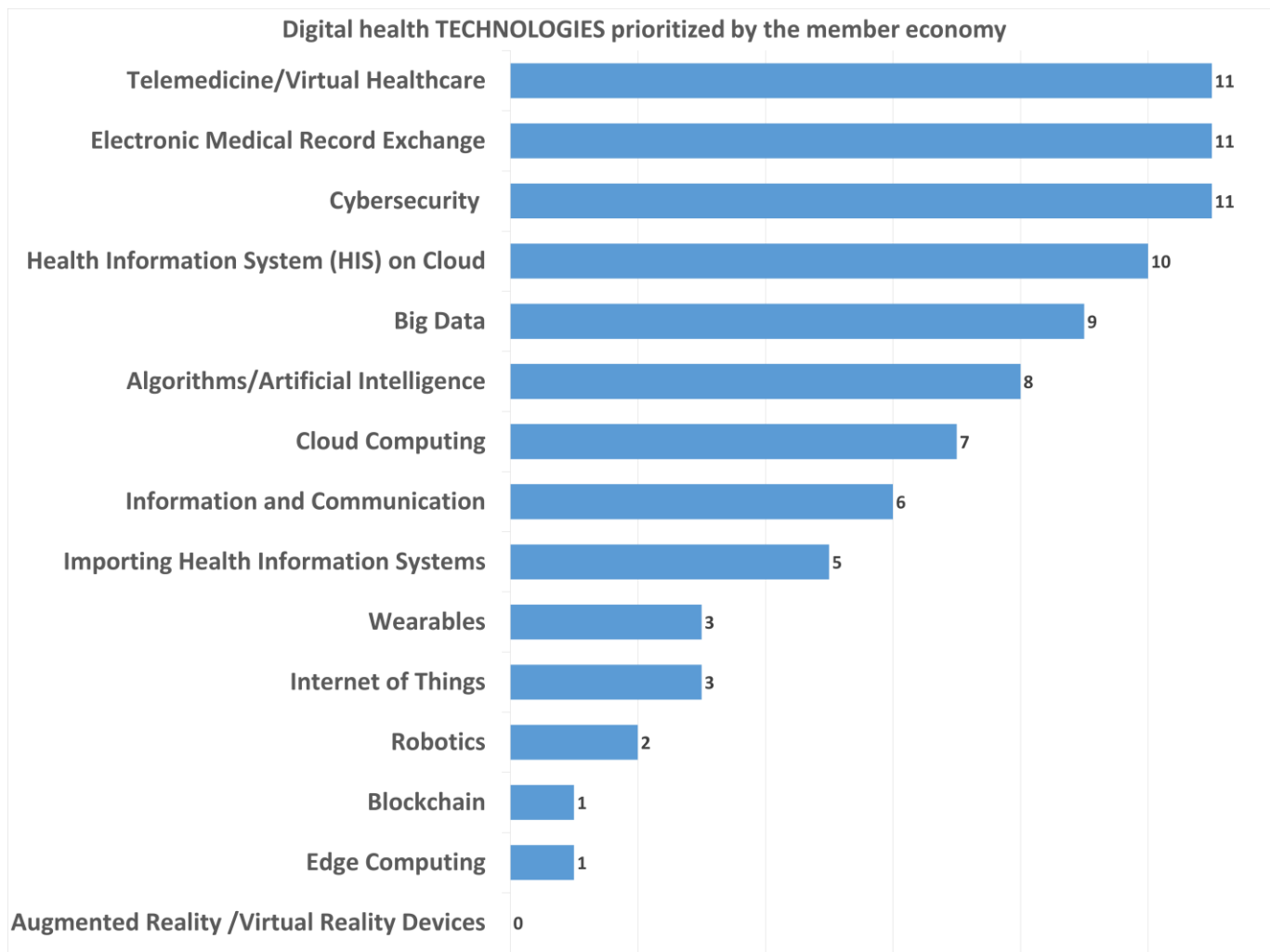


Figure 4-1 Digital *technologies* prioritized by APEC member economies

## II. Digital health *FIELDS* prioritized by APEC member economies

Regarding the prioritized digital health application fields among the economies, including Health Education and Consultation, Health Promotion, Precision Medicine/Personalized Medicine Using Genomic/Clinical Data, Emergency and Critical Medical Services, Noncommunicable Diseases and Mental Health Care, Infectious Disease Surveillance and Prevention, Digitalized applications of hospital operation systems, Medical personnel training, Cybersecurity, Clinical Data Repository (such as Biobank for Medical Study and Research), Clinical Decision Supporting System, Health Information System for Continuous Health Care, Health Data Developed Using

International Standards (such as HL7 FHIR), Medical Reimbursement System, and Medical Data Privacy, the responses from the 12 economies are summarized in Table 4-2, and the frequency distribution is presented in Figure 4-2.

In the responses, the most concerned fields for digital health applications among economies are Digitalized Applications of Hospital Operation Systems (10), Medical Data Privacy (10), followed by Infectious Disease Surveillance and Prevention (9), Cybersecurity (9), Health Data Developed Using International Standards (9). Health Promotion (8) and Noncommunicable Diseases and Mental Health Care (8) are also highly valued.

It is evident that economies hold significant and broad interest in the potential application of digital technologies in healthcare services. Whether it is enhancing hospital management or monitoring and managing infectious and non-communicable diseases, strong interest is expressed by all economies. Notably, data privacy and cybersecurity are major concerns for most economies, and this trend should be reflected in their digital health policies. Furthermore, multiple economies express their focus on standardized health data, indicating their interest in driving discussions on health data standards within the APEC region.

In the "Other" category, the United States mentions the Public Health Informatics & Technology (PHIT) Workforce Development Program, which provides a positive guidance for future research.

Table 4-2 Digital health *FIELDS* Prioritized by the Member Economies

	AUS	CDA	CHL	JPN	ROK	MAS	PH	RUS	SGP	CT	TH	US	Total
Health Education and Consultation		O	O				O		O	O	O		6
Health Promotion		O	O		O		O	O	O	O	O		8
Precision Medicine/Personalized Medicine Using Genomic/ Clinical					O			O	O	O	O		5

	AUS	CDA	CHL	JPN	ROK	MAS	PH	RUS	SGP	CT	TH	US	Total
Data													
Emergency and Critical Medical Services	0				0		0	0		0	0		6
Noncommunicable Diseases and Mental Health Care	0	0	0				0	0	0	0	0		8
Infectious Disease Surveillance and Prevention	0	0	0		0		0	0	0	0	0		9
Digitalized applications of hospital operation systems	0	0	0		0		0	0	0	0	0	0	10
Medical personnel training	0	0	0					0			0		5
Cybersecurity	0	0	0				0	0	0	0	0	0	9
Clinical Data Repository such as Biobank for Medical Study and Research		0					0	0		0	0		5
Clinical Decision Supporting System	0	0			0			0			0	0	6
Health Information System for Continuous Health Care	0	0			0	0		0		0	0		7
Health Data Developed Using International Standards such as HL7 FHIR	0	0	0		0	0		0		0	0	0	9
Medical Reimbursement System							0		0		0		3
Medical Data Privacy	0	0	0		0		0	0	0	0	0	0	10

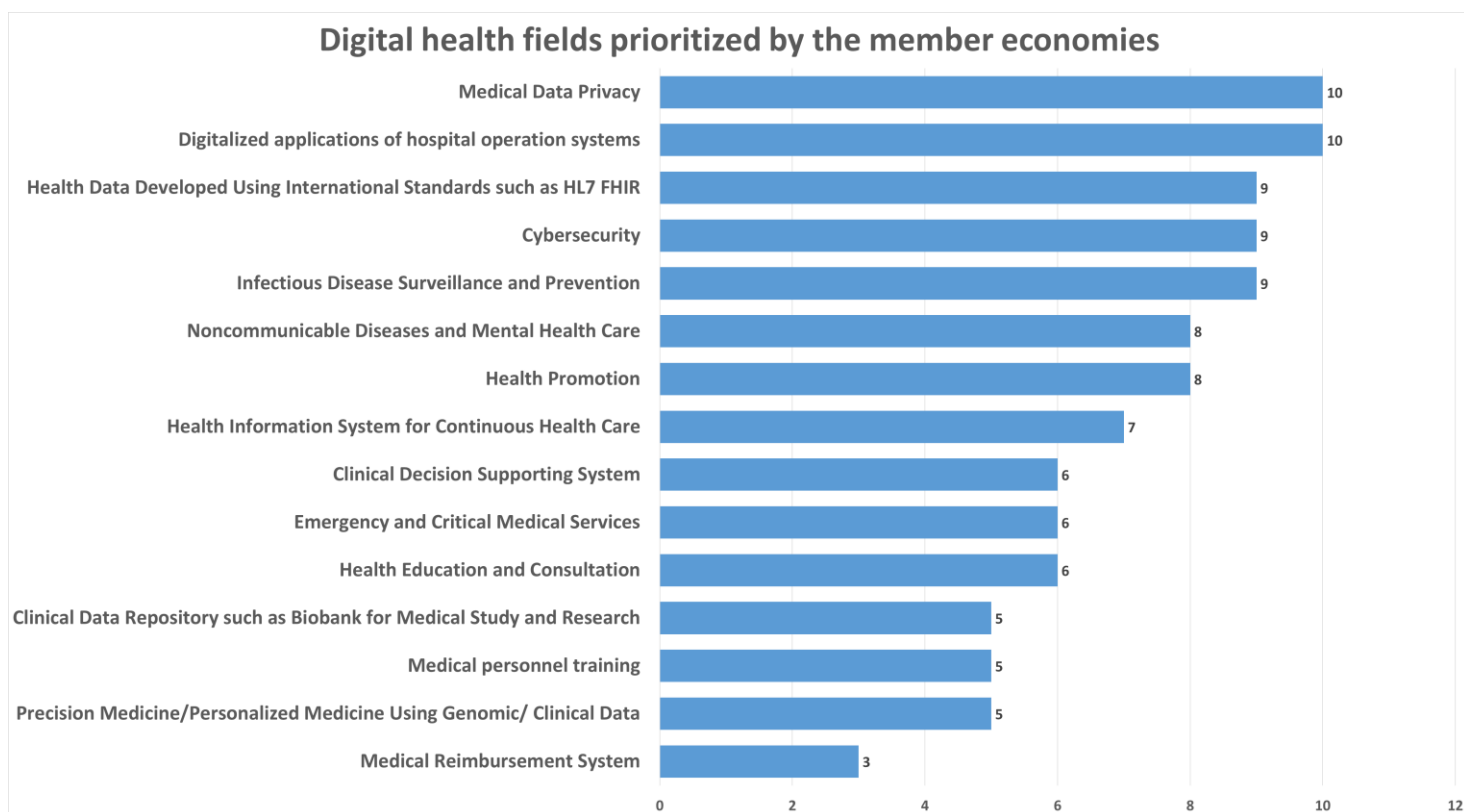


Figure 4-2 Digital health *fields* prioritized by the member economies

### III. Overview of Digital Health Policies and Systems in APEC Member Economies

The survey results on the implementation status of digital health policies in the 12 economies are presented in Table 4-3, and the frequency distribution is illustrated in Figure 4-3.

Nearly all surveyed economies have regulations/guidelines/strategies for using digital health data (11) and increase the capacity, understanding, and level of acceptance of digital health technologies among the people and health workers (11). many economies have also established digital-based disease surveillance information center (7), developed digital health maturity assessment model/tool (7), and formulated accelerated marketing policies for digital health innovation (7).

Furthermore, some economies have R&D incentive policies for digital health innovation (6) or have formulated guidelines for digital health R&D and applications (5).

Table 4-3 Overview of Digital Health Policies and Systems ("O" represents "Implemented" and "※" represents "In Planning. In the survey, the two items are combined for calculation.)

	AUS	CDA	CHL	JPN	ROK	MAS	PH	RUS	SGP	CT	TH	US	Total
Digital-Based Disease Surveillance Information Center		O				※	※	※	O	O	O		7
Regulations/Guidelines/Strategies for Using Digital Health Data	O	※	O	O	O		O	O	O	O	O	O	11
Digital Health Maturity Assessment Model/Tool		※	※			O	O	O	O		O		7
Guidelines for Digital Health R&D and Applications		※				※		O	O		※		5
R&D Incentive Policies for Digital Health Innovation		※				※		※	O		※	O	6
Accelerated Marketing Policies for Digital Health Innovation		※				※		※	O	O	※	O	7
Increase the Capacity, Understanding, And Level of Acceptance of Digital Health Technologies Among the People And Health Workers	O	※	※	O	※	O		O	O	O	O	O	11

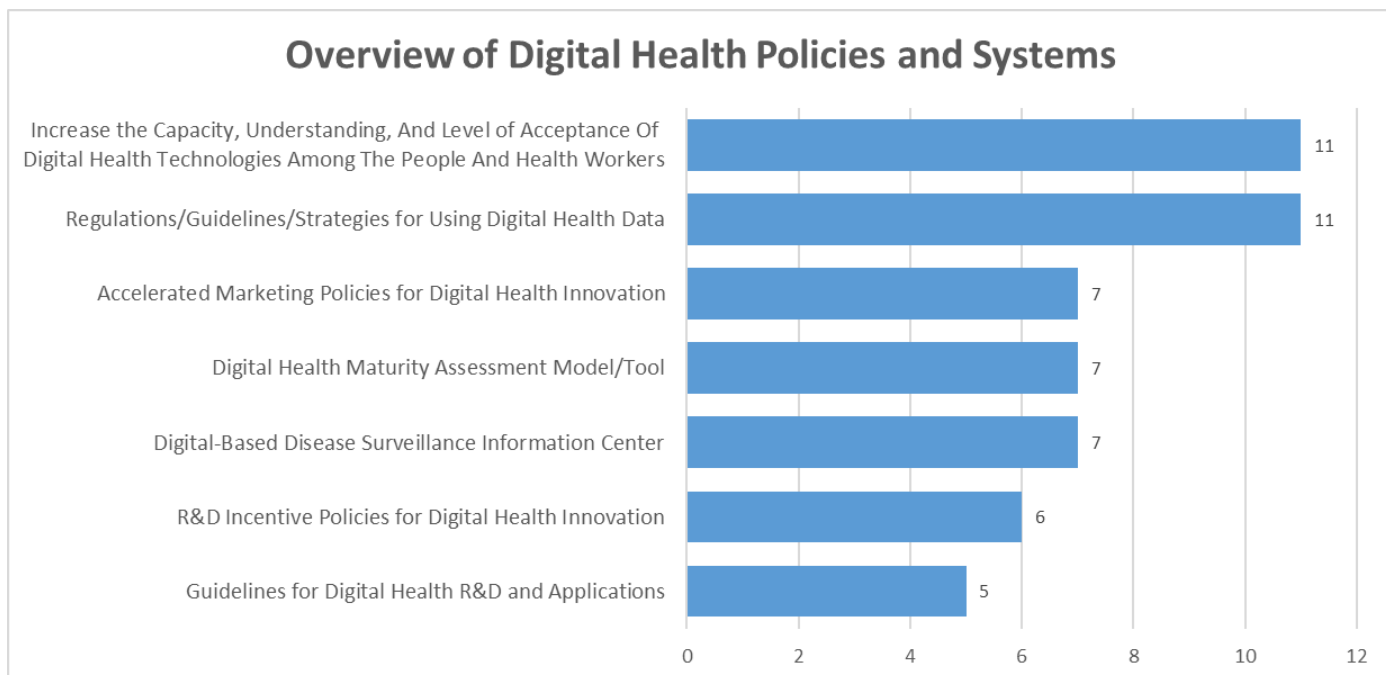


Figure 4-3 Overview of Digital Health Policies and Systems in APEC Member Economies

#### **IV. Comparison of APEC member economies' health data guidelines/policies**

Through the previous survey question, we found that most economies have developed guidelines/policies for health data. Furthermore, we investigated the specific areas of application, types of data, and data standards covered by these guidelines. Additionally, we explored whether economies have established advanced coordination mechanisms to facilitate the utilization of digital health data.

1. Topics are covered/expected to be covered by the guidelines for using digital health data

The topics covered by the health data guidelines/policies issued by each economy are summarized in Table 4-4, and the frequency distribution is presented in Figure 4-4.

According to the survey results, most economies' health data guidelines/policies focus on interoperability (10 economies) and data format standards (9 economies).

Personal data privacy protection (9 economies) is also a significant area of emphasis.

Table 4-4 Topics Are Covered/Expected to Be Covered by The Guidelines for Using Digital Health Data

	AUS	CDA	CHL	JPN	ROK	MAS	PH	RUS	SGP	CT	TH	US	Total
Personal Data Privacy Protection	O		O		O		O	O	O	O	O	O	9
Interoperability	O	O	O	O			O	O	O	O	O	O	10
Anonymization					O		O	O	O	O	O		6
Data Format Standards		O	O	O			O	O	O	O	O	O	9
Health Data Applications	O			O			O	O	O	O	O		7
Terms of Reference, and Assessment Mechanisms of Supervisory Units									O	O			2
Assess Policy Direction and Advancement	O	O		O					O	O		O	6
Health Data Use and Sharing with Industry, Academia, and Research Institutions	O	O		O			O		O	O	O		7



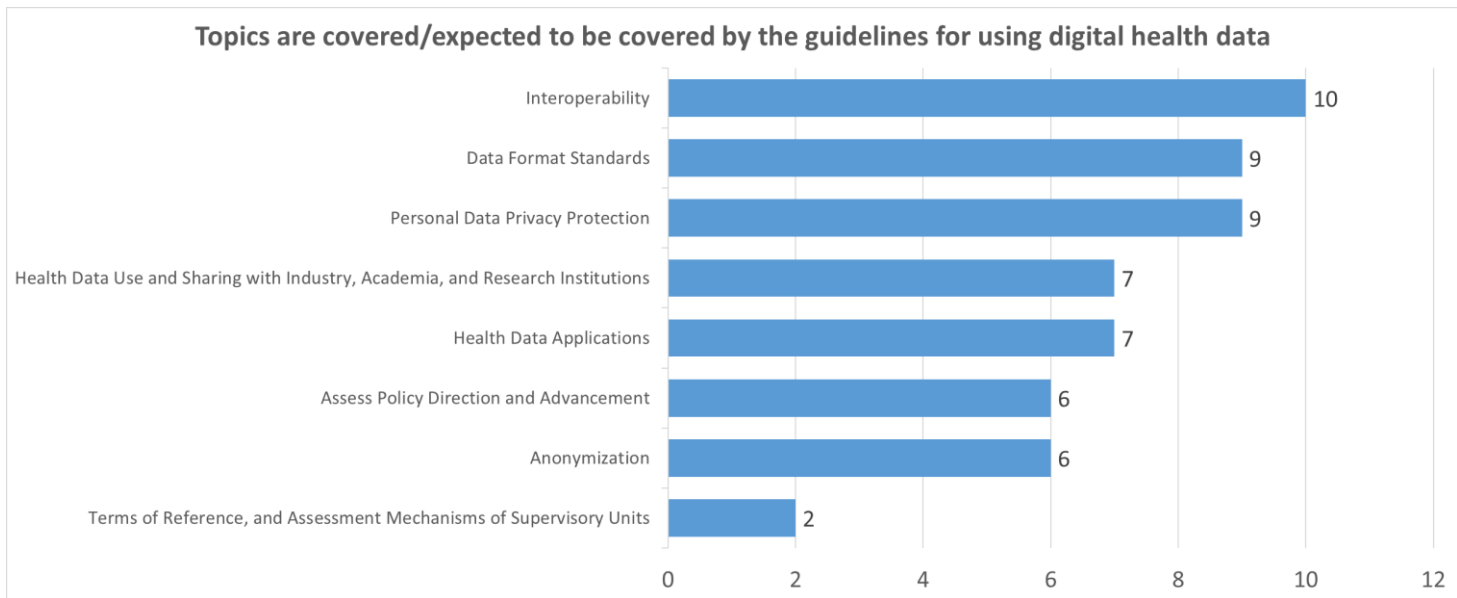


Table 4-4 Topics are covered/expected to be covered by the guidelines for using digital health data

2. The data categories covered by the health data guidelines/policies

The data categories covered by the health data guidelines/policies of each economy are summarized in Table 4-5, and the frequency distribution is presented in Figure 4-5.

These guidelines/policies often address the use or regulation of medication records (11 economies), medical records (9 economies), physical examination records (8 economies), and medical imaging data (8 economies). Some economies also include rare disease data (6 economies) and birth records (6 economies) in their guidelines/policies.

In the "Other" category, Thailand's guidelines/policies also incorporate health insurance and social welfare data, while the United States includes data related to surgeries, health service quality assessment, and public health.

Table 4-5 The categories of health data that are contained and managed by the guidelines for using digital health data

	AUS	CDA	CHL	JPN	ROK	MAS	PH	RUS	SGP	CT	TH	US	Total
Medical Records		○	○	○			○	○	○	○	○	○	9
Medication Records	○	○	○	○	○		○	○	○	○	○	○	11
Physical Examination Records		○		○			○	○	○	○	○	○	8
Genetic Data/ Genomic data				○	○		○		○				4
Medical Imaging data		○	○	○	○		○		○	○		○	8
Clinical Trial Data				○	○		○			○			4
Information Collected by Wearable Devices							○	○					2
Rare Disease and Cancer Registry			○				○	○			○	○	5
Birth and Death Records			○				○	○		○	○		5
Other Social Welfare, Police Records, Information from Domestic Investigations	○						○			○			3

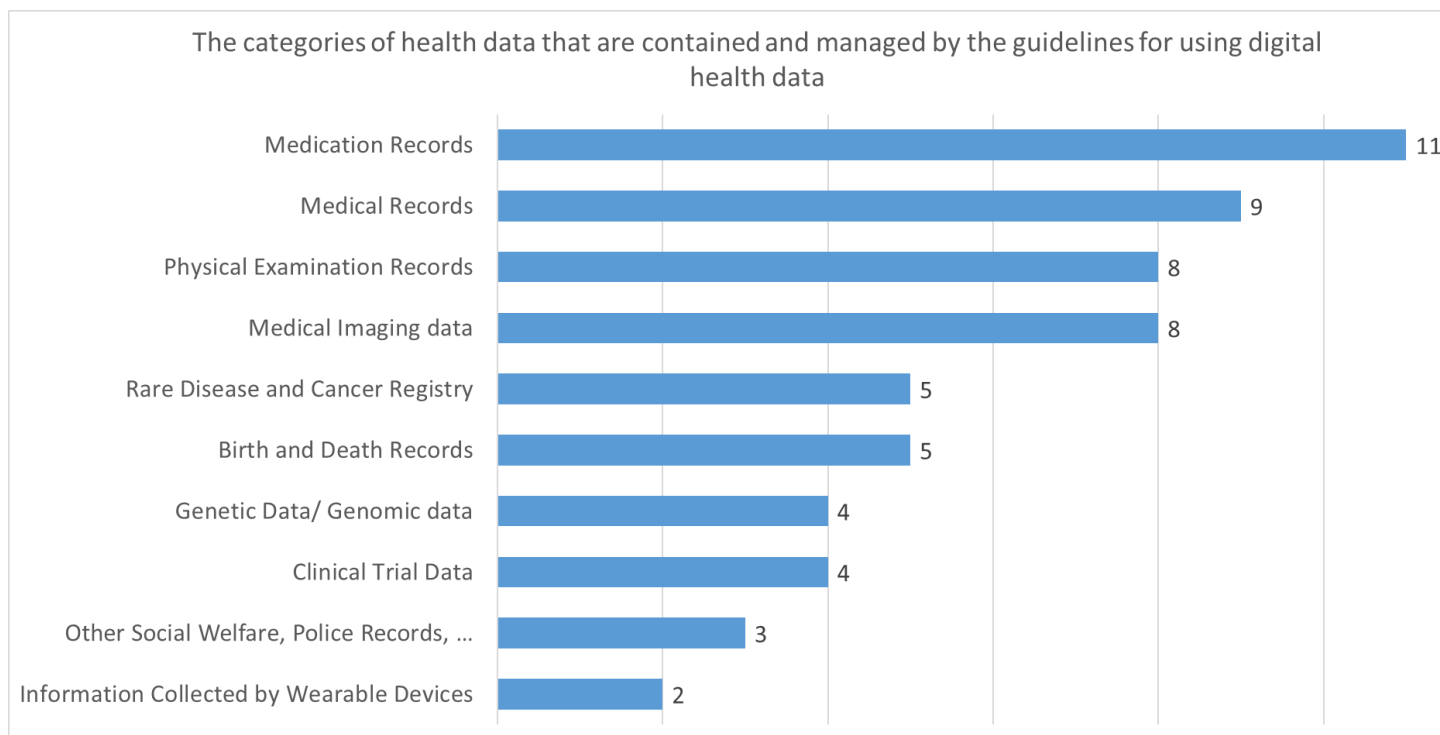


Figure 4-5 The categories of health data that are contained and managed by the guidelines for using digital health data

### 3. Health data standards referenced in the guidelines/policies

Health data standards referenced in the guidelines/policies is presented in Table 4-6, with frequency distribution shown in Figure 4-6. Among the economies that responded, 9 indicated the use of the Fast Healthcare Interoperability Resources (FHIR) standard, while 5 mentioned the adoption of SNOMED CT (Systematized Nomenclature of Medicine-Clinical Terms).

Several economies supplemented their health data guidelines/policies with other types of data standards, including ISO, World Health Organization's ICD, or standards specified by the respective economies themselves. The Philippines mentioned Logical Observation Identifiers and Codes (LOINC) and the Philippine National Drug Formulary. Russia mentioned ICD-11. Singapore mentioned ISO 27001 for information

security management systems and ISO 27002 information security management code of practice. Thailand mentioned ICD-10, local data standards (including TMT, TMLT, 43 tables), and Dataset Structure of Personal Health Records (PHRs). The United States mentioned ONC (Office of the National Coordinator for Health Information Technology) XDR and XDM for Direct Messaging Specification, National Council for Prescription Drug Programs (NCPDP), SCRIPT Standard Implementation Guide; Version 2017071, and NCPDP SCRIPT Standard, Implementation Guide, Version 10.6.

This survey reveals that the FHIR standard may be a potential direction for health data standards, but different economies may adopt different standards in various healthcare domains. Therefore, it is necessary to further investigate the health data standards adopted by each economy and explore which categories of health data require international harmonization. This will help drive the standardization of health data in the APEC region, promoting data interoperability and usability.

Table 4-6 Data standards referenced by digital health data

	AUS	CDA	CHL	JPN	ROK	MAS	PH	RUS	SGP	CT	TH	US	Total
HL7 standards, such as Fast Healthcare Interoperability Resources (FHIR)	O	O	O	O			O	O	O	O		O	9
Various standards of CEN/TC 251 proposed by the EU										O			1
SNOMED CT (Systematized Nomenclature of Medicine-Clinical Terms)	O	O	O						O			O	5

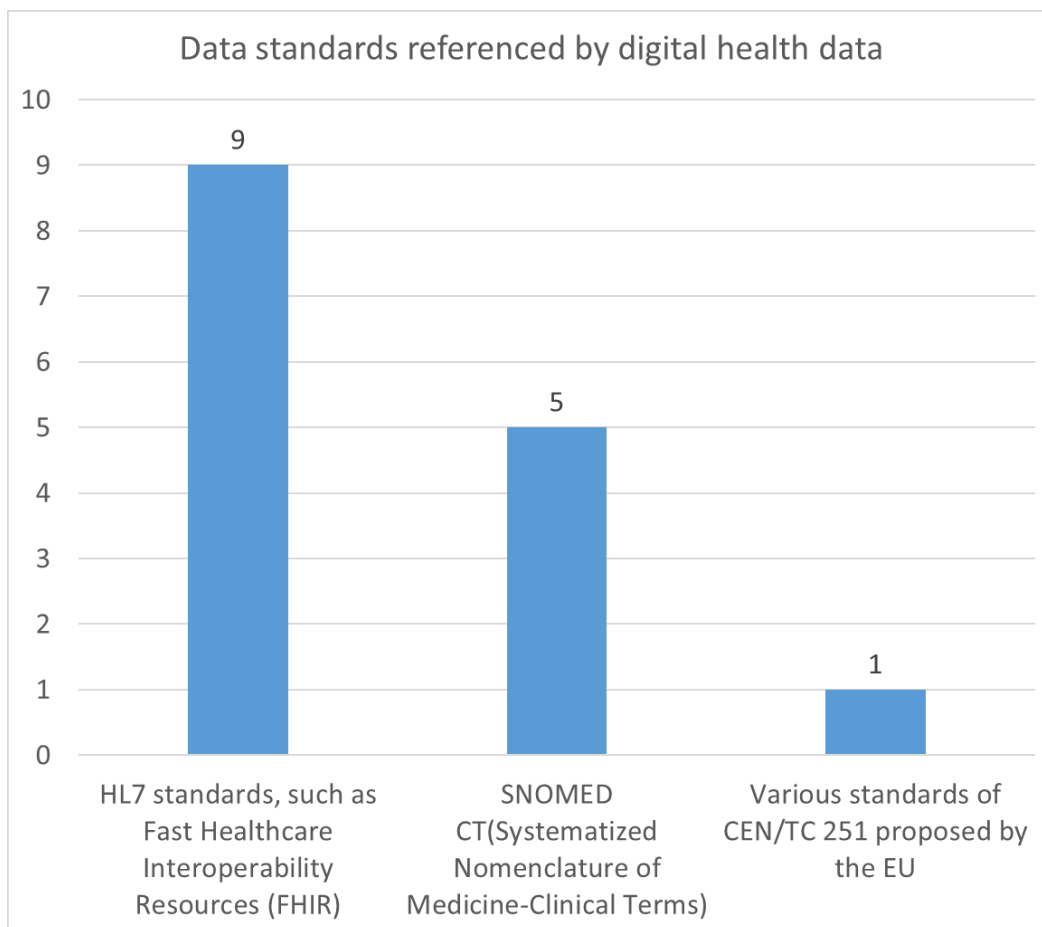


Figure 4-6 Data standards referenced by digital health data

## V. Governance mechanisms for digital health among APEC member economies

Digital health governance mechanisms include intergovernmental decision-making and policy support departments, as well as other collaborative coordination mechanisms such as high-level meetings involving stakeholders and experts.

The responsible units for digital health policy in the 12 economies are summarized in Table 4-7. Several economies have shared their experiences in establishing collaborative coordination mechanisms involving stakeholders and experts:

- Australia: Leading the Global Digital Health Partnership (GDHP) as the inaugural Chair and host of the summit,

Australia plays a leadership role on the global platform, sharing insights, service delivery experiences, and frontline work information on digital health with the global community.

- Canada: Given digital health and health data is shared responsibility in Canada, Canada's Federal, Provincial and Territorial governments work together to advance priorities, including related to health systems data and public health data, with work driven by a joint action plan and a pan-Canadian Health Data Charter to guide collective action towards a shared vision for health data in Canada. Canada also relies on Pan-Canadian Health Organizations to play collaborative leadership roles, with Canada Health Infoway leading the implementation of the Pan-Canadian Interoperability Roadmap and the Canadian Institute on Health Information leading the collecting and reporting of data against common health indicators. Canada has also leveraged expert advice to guide its strategies, such as the Expert Advisory Committee on health data, whose advice was used to develop key elements of a Pan-Canadian Health Data Strategy that informed recent commitments made by all FPT governments (except Quebec) in the Working Together to Improve Health Care for Canadians<sup>31</sup> plan and recently endorsed action plan to make progress against those commitments.
- Japan: Established the Data-based Health Management Initiatives Headquarters under the Ministry of Health, Labour and Welfare, and the Health, Medical, and Nursing Care Data Utilization Study Group, a collaborative effort involving the Ministry of Internal Affairs and Communications, the Ministry of Health, Labour and Welfare, and the Ministry of Economy, Trade and Industry.
- The Philippines: Currently a member of the ASEAN eHealth

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<sup>31</sup><https://www.canada.ca/en/health-canada/corporate/transparency/health-agreements/shared-health-priorities.html>

Technical Working Group and the Asian eHealth Information Network, the Philippines actively participates in discussions and the formulation of regional-level policies and best practices.

- United States: Established the Health IT Advisory Committee (HITAC) and the National Committee on Vital Health Statistics (NCVHS).

Table 4-7 The responsible units for digital health policy in economies

<b>Economies</b>	<b>Responsible unit</b>	<b>Website</b>
AUS	Medicare Benefits & Digital Health Division, Department of Health and Aged Care	<a href="http://www.health.gov.au/">www.health.gov.au/</a>
CDA	Health Canada	<a href="https://www.canada.ca/en/health-canada.html">https://www.canada.ca/en/health-canada.html</a>
CHL	Digital Health	
ROK	Ministry of Health and Welfare	<a href="https://www.mohw.go.kr">https://www.mohw.go.kr</a>
MAS	Information Management Division	<a href="https://www.moh.gov.my/">https://www.moh.gov.my/</a>
PH	Philippine Department of Health	<a href="http://www.doh.gov.ph">www.doh.gov.ph</a>
RUS	Ministry of Health of the Russian Federation	<a href="https://minzdrav.gov.ru/">https://minzdrav.gov.ru/</a>
SGP	Ministry of Health	<a href="http://www.moh.gov.sg">www.moh.gov.sg</a>
CT	Ministry of Health and Welfare	<a href="https://www.mohw.gov.tw/">https://www.mohw.gov.tw/</a>
TH	Ministry of Public Health	<a href="https://www.moph.go.th/">https://www.moph.go.th/</a> <a href="https://ops.moph.go.th/public/">https://ops.moph.go.th/public/</a> <a href="https://spd.moph.go.th/">https://spd.moph.go.th/</a>
US	Office of the National Coordinator for Health IT	<a href="http://www.healthit.gov">www.healthit.gov</a>

## **Chapter V. Conclusions**

Based on the compilation of case studies and questionnaire responses from the economies, this study presents 5 key findings and 3 future action recommendations for the APEC region.

### **Key Finding I: The Role of Telemedicine During COVID-19 Is Well Recognized**

During the COVID-19 pandemic, many economies have implemented temporary policy relaxations, introduced new initiatives or programs, and increased government support to reduce barriers to the use of telemedicine. Overall, the role of telemedicine during COVID-19 has been acknowledged, enabling patients to access necessary services (including chronic disease management and mental health care) and allowing healthcare providers to deliver services from different locations. Particularly, telemedicine has been effective in reducing direct contact, saving travel and waiting time, thus not only reducing the transmission of diseases but also improving the efficiency of healthcare systems.

### **Key Finding II: APEC Economies Are Using Telemedicine to Reduce Urban-Rural Health Disparities**

The contributions of telemedicine in reducing health inequalities can be summarized as "reducing transportation barriers," "improving accessibility to specialized services," and "tracking and providing continuous care for non-communicable disease patients." The policies and implementation cases from the 11 economies included in this study demonstrate the potential of digital technologies in reducing health inequities.

### **Key Finding III: APEC Economies Prioritize Cybersecurity, Electronic Health Record Exchange, And Telemedicine in Digital Health Technologies**

According to the survey results, cybersecurity, electronic health record exchange, and telemedicine received the highest attention from



APEC economies. This is followed by big data, cloud-based health information systems, and artificial intelligence. Additionally, Malaysia mentioned Enterprise architecture, while the United States highlighted Application Programming Interface (API) enabled technologies and health data standards. This indicates the unique needs of different economies' healthcare systems regarding digital technologies.

#### **Key Finding IV: APEC Economies Prioritize Digital Health Applications in Hospital Operations Management And Healthcare Data Privacy**

According to the survey results, APEC economies are most concerned about the application of digital technologies in hospital operations management and medical data privacy. The next priorities include health promotion, infectious disease surveillance and prevention, cybersecurity, establishment of internationally standardized health data, and non-communicable disease management.

#### **Key Finding V: Almost All Surveyed Economies Have Established Guidelines/Policies for The Use of Health Data**

The health data guidelines/policies published by the economies mainly focus on the interoperability of data and standardization of data formats. Personal data privacy protection is also a significant aspect covered in these guidelines/policies. In terms of data categories, the guidelines/policies predominantly involve the use or regulation of medication records, medical records, physical examination data, and medical imaging data.

#### **Recommendation A: Harness the Momentum of Telehealth Applications Sparked by COVID-19 and Promote Digital Health Technologies to Advance Health Equity**

Currently, there is a lack of global or regional consensus on standards and regulations for telehealth practices. Additionally, as we expand the sustainable use of telehealth, there are governance challenges related to technology, infrastructure, education and training,

personal privacy and security, healthcare insurance, and accountability. The application of telehealth should aim to improve healthcare accessibility while avoiding digital divides that may contribute to health inequities.

### **Recommendation B: Continue to Promote Discussions and Exchanges Within the APEC HWG on Digital Health**

This study demonstrates the strong interest among economies in the field of digital health, as well as concerns regarding data security and privacy. It is crucial to foster more communication and discussion to further understand the diverse considerations of different healthcare systems in the application of digital health technologies. Through sharing of case studies and policy experiences, these exchanges can help APEC economies adopt solutions that are better suited to their own healthcare systems.

### **Recommendation C: More Discussions and Exchanges Are Needed on APEC Regional Health Data Standards and Interoperability**

The survey results also revealed the concerns of multiple economies regarding health data exchange and data standards. While most economies reported adopting the Fast Healthcare Interoperability Resources (FHIR) standard, the survey also showed that economies have adopted diverse data standards, including ISO, the World Health Organization's International Classification of Diseases (ICD), or standards determined by individual economies. Therefore, further research is necessary to examine the health data standards adopted by each economy and discuss which categories of health data require international consensus. Additionally, discussions should focus on how to promote the standardization of health data in the APEC region to enhance data interoperability and availability.

This study serves as foundational research on the trends of digital health development in APEC economies and reveals the ongoing positive benefits brought by digital technologies. Issues such as data standards and data governance, which are associated with the increasing applications of digital technologies, are areas where multilateral organizations like APEC can play a crucial role. Through case sharing, technology collaboration, regulatory harmonization, standard development, policy exchange, and education and training, APEC economies can enhance their knowledge and technical capabilities in telemedicine. Moreover, integrating and harmonizing telemedicine regulations or standards among APEC economies can contribute to making telemedicine a driving force in achieving the APEC Putrajaya Vision 2040, particularly in the two economic drivers of "Innovation and Digitalization" and "Strong, Balanced, Secure, Sustainable, and Inclusive Growth." This means that through innovative and digital tools and systems, economies can establish robust, balanced, secure, sustainable, and inclusive healthcare service systems.

We expect that the findings of this research can serve as recommendations for the future work directions of the APEC Health Working Group and the Digital Health Sub Working Group. These recommendations can further facilitate the development of consensus and guidelines for APEC regional digital health technologies that are suitable for APEC economies.

# **Annex A: Survey on the Use of Digital Health to Narrow Health Inequity Gaps in APEC Region**

## **I. Overview of Digital Health Governance in Member Economies**

1. Information on the responsible units/related departments for digital health of the member economy
  - Department name:
  - Department website:
  - Responsible for digital health field:
  - Contact information (email and telephone) for international cooperation:
  
2. Digital health technologies prioritized by the member economy (check all that apply)
  - Algorithms/Artificial Intelligence
  - Augmented Reality (AR)/Virtual Reality (VR) Devices
  - Big Data
  - Blockchain
  - Cloud Computing
  - Cybersecurity
  - Edge Computing
  - Electronic Medical Record Exchange
  - Health Information System (HIS) on Cloud
  - Internet of Things
  - Information and Communication

- Importing Health Information Systems
- Robotics
- Telemedicine/Virtual Healthcare
- Wearables
- Other (describe):

3. Digital health fields prioritized by the member economy (check all that apply)
- Health Education and Consultation
  - Health Promotion
  - Precision Medicine/Personalized Medicine Using Genomic/  
Clinical Data
  - Emergency and Critical Medical Services
  - Noncommunicable Diseases and Mental Health Care
  - Infectious Disease Surveillance and Prevention
  - Digitalized applications of hospital operation systems (for  
example: improving quality of diagnosis, improving quality of  
clinical trials, optimizing medical management systems,  
promoting data interoperability, digitizing medical records,  
electronic prescriptions, etc.)
  - Medical personnel training
  - Cybersecurity
  - Clinical Data Repository such as Biobank for Medical Study and  
Research
  - Clinical Decision Supporting System
  - Health Information System for Continuous Health Care
  - Health Data Developed Using International Standards such as HL7  
FHIR
  - Medical Reimbursement System
  - Medical Data Privacy

Other (describe):

## II. Overview of Digital Health Policies and Systems in Member Economies

1. Has the member economy established an economy-wide level, digital-based disease surveillance information center/unit?
  - Yes (provide the name and website link of center/unit:)
  - No
  - No, but one is planned for the future
  
2. Does the member economy have economy-wide level regulations/guidelines/strategies for using digital health data?
  - Yes (continue to questions 2-1 through 2-5):
  - No
  - No, but one is planned for the future (continue to questions 2-1 through 2-5)

**※ If answer for 2. is "Yes" or "No, but one is planned for the future", continue to answer.**

**If the answer is "No", continue from question 3.**

2-1. Digital health policies (legislation, guidance documents, strategic plans, action plans, etc.) of the member economy

- Digital health policy name:
- Links to the abovementioned documents (if any):

2-2. Which of the following topics are covered/expected to be covered by the abovementioned documents? (check all that apply)

- Personal Data Privacy Protection
- Interoperability



- Anonymization
- Data Format Standards
- Health Data Applications
- Terms of Reference, and Assessment Mechanisms of Supervisory Units
- Assess Policy Direction and Advancement
- Health Data Use and Sharing with Industry, Academia, and Research Institutions
- Other (describe):

2-3. What categories of health data do/will the abovementioned documents contain and manage? (check all that apply)?

- Medical Records
- Medication Records
- Physical Examination Records
- Genetic Data/ Genomic data
- Medical Imaging data
- Clinical Trial Data
- Information Collected by Wearable Devices
- Rare Disease and Cancer Registry
- Birth and Death Records

Other Social Welfare, Police Records, Information from Domestic Investigations

Other (describe):

2-4. What existing standards or policies have been/are expected to be referenced in the abovementioned documents? (check all that apply)

HL7 standards, such as Fast Healthcare Interoperability Resources (FHIR)

Various standards of CEN/TC 251 proposed by the EU

SNOMED CT(Systematized Nomenclature of Medicine-Clinical Terms)

Other standards or policies proposed by other economies; describe:

2-5. Cooperation and coordination mechanisms established by the economy (if any) (such as digital health conferences that invite stakeholders, digital health committees composed of experts, etc.):

3. Does the economy have a digital health maturity assessment model/tool for understanding the future direction of action in digital health space?

Yes (provide a link to the document(s))

- No
  - No, but one will be planned/implemented
4. Does the economy have guidelines (or similar mechanisms) for digital health R&D and applications?
- Yes (provide a link to the document(s))
  - No
  - No, but one will be planned/implemented
5. Does the economy have R&D incentive policies (or similar mechanisms) for digital health innovation?
- Yes (provide a link to the document(s))
  - No
  - No, but one will be planned/implemented
6. Does the economy have accelerated marketing policies (or similar mechanisms) for digital health innovation?
- Yes (provide a link to the document(s))
  - No
  - No, but one will be planned/implemented
7. Is the economy taking actions to increase the capacity, understanding, and level of acceptance of digital health technologies among the people and health workers?
- Yes (if possible, provide an example)
  - No

- No, but one will be planned/implemented

### **III. Case study: The Practical Experience of Economies Using Digital Technologies to Reduce Domestic Health Inequity**

1. Location(city/community/hospital) of the Project
2. Duration: day/month/year-day/month/year
3. Overview and Challenges of Health Inequalities in the project location
4. Digital Health Solutions Used by the Project and its Outcomes
5. Any other details the economy wishes to add for clarification
6. One photo with description