Factors Influencing E-health Development in Asian Countries: A Comparative Analysis and Policy Implications

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INTRODUCTION

In recent years, the field of digital health has witnessed significant growth and transformation, revolutionising healthcare delivery systems worldwide (Cummins and Schuller 2020). Among the various aspects of digital health, e-health, which encompasses the use of information and communication technologies (ICTs) in healthcare, has emerged as a vital tool for improving access, quality, and efficiency of healthcare services (Al-Shorbaji 2021). With the potential to overcome geographical barriers, enhance healthcare delivery, and empower patients, e-health has garnered attention as a promising avenue for healthcare advancement.

Understanding the factors that contribute to the development of e-health is crucial for policymakers and healthcare professionals aiming to leverage its benefits effectively. While the adoption and progress of e-health vary across countries, this research paper focuses specifically on Asian nations to investigate the factors influencing e-health development in this region. By utilising the Global Digital Health Monitor as a comprehensive dataset, this study aims to analyse a wide range of variables related to e-health performance, providing insights into the determinants of successful e-health implementation.

The paper's primary objective is to conduct a comparative analysis of e-health development among Asian countries, shedding light on the factors that explain variations in their performance. By examining the diverse approaches and strategies adopted by these nations, valuable insights can be gained to inform policymakers and stakeholders about the key drivers of successful e-health implementation. Such knowledge will enable them to make informed decisions and foster improved e-health outcomes in their respective countries.

The Global Digital Health Monitor dataset serves as a robust foundation for this study, offering a comprehensive view of e-health development across multiple

dimensions. The dataset includes various indicators, such as e-health infrastructure, policy frameworks, health information systems, telemedicine services, and electronic health records, among others. By leveraging this extensive dataset, the research delves into the specific factors that contribute to successful e-health implementation, elucidating the pathways towards improved healthcare delivery in the Asian context.

Asia presents a diverse and dynamic environment for e-health implementation, with significant variations in economic, social, and technological factors across its nations (Lwin et al. 2023; Chongsuvivatwong et al. 2011). In recent years, Asian countries have witnessed significant advancements in e-health implementation (Pengput and Schwartz 2022). The region's unique blend of economic growth, technological innovation, and increasing healthcare demands has created fertile ground for the adoption of digital health solutions. Several Asian nations have made notable strides in implementing e-health strategies, resulting in improved healthcare access, enhanced patient outcomes, and more efficient healthcare systems.

E-health development in Asian countries is influenced by a combination of factors that span economic, social, technological, and policy dimensions. One key driver of e-health adoption in the region is the rapid advancement of ICT infrastructure (Amboala 2021). Countries such as Singapore, South Korea, and Japan have invested heavily in building robust telecommunications networks, broadband connectivity, and mobile penetration rates (Pradhan et al. 2017), creating a solid foundation for e-health initiatives. These countries have capitalised on their technological capabilities to develop and implement comprehensive e-health systems that facilitate telemedicine, health information exchange, electronic health records, and remote patient monitoring.

Furthermore, the rising prevalence of chronic diseases and the growing elderly population in Asia have necessitated the adoption of innovative healthcare solutions (Sukkird and Shirahada 2015). E-health technologies offer opportunities for early detection, remote monitoring, and personalised care, which can significantly improve the management of chronic conditions. In countries like China and India, where the burden of chronic diseases is substantial, e-health solutions have the potential to bridge the gaps in healthcare access, particularly in rural and remote areas (Banbury et al. 2014; Bloom et al. 2014).

Policy and regulatory frameworks play a crucial role in shaping e-health development in Asian countries (Kusumasari et al. 2018). Governments across the region have recognised the importance of e-health and have taken steps to create an enabling environment for its implementation. Policy initiatives that promote interoperability, data privacy and security, and standards harmonisation are critical

for ensuring the seamless exchange of health information and the integration of e-health solutions into existing healthcare systems.

In addition to policy support, successful e-health implementation in Asia relies on strong public-private partnerships (Qureshi et al. 2013). Collaboration between governments, healthcare providers, technology companies, and academic institutions is essential for driving innovation, sharing best practices, and mobilising resources. Public-private partnerships facilitate the development of scalable e-health solutions, encourage knowledge transfer, and help overcome financial and technical barriers.

While several Asian countries have made remarkable progress in e-health implementation, challenges and barriers persist (Dornan et al. 2019). Limited interoperability among different healthcare systems, resistance to change, inadequate healthcare infrastructure in rural areas, and concerns related to data privacy and security are some of the challenges that need to be addressed. Additionally, cultural and social factors may influence the acceptance and adoption of e-health technologies, highlighting the importance of considering local context and tailoring strategies accordingly.

Understanding the variations in e-health development among Asian countries and identifying the factors that contribute to their success or hinder their progress is crucial for policymakers and healthcare professionals aiming to improve healthcare outcomes. Comparative analyses of e-health implementation in different countries provide valuable insights into the strategies, policies, and best practices that can be adopted or adapted to suit specific contexts. By identifying the drivers of successful e-health initiatives and the barriers faced by less developed countries, policymakers can make informed decisions, allocate resources effectively, and design targeted interventions to foster improved e-health outcomes.

DATA AND METHODOLOGY

Data

In the study, the overall indicator of the Global Digital Health Monitor (GDHM)[1] is utilised as the dependent variable. The GDHM serves as an interactive web-based resource designed to track, monitor, and assess the enabling environment for digital health globally. It consists of 23 indicators covering various dimensions of digital

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1. (https://digitalhealthmonitor.org/).

health, such as leadership and governance, strategy and investment, legislation, policy and compliance, workforce, standards and interoperability, infrastructure, services and applications, and cross-cutting issues.

By utilising the overall indicator of the GDHM as the dependent variable, the study aims to evaluate and analyse the progress and quality of digital health interventions and enablers at the country level. The GDHM's comprehensive set of indicators provides a holistic view of the digital health landscape, allowing for the monitoring of advancements in different areas of digital health implementation.

The study utilises the GDHM's overall indicator as a measure to assess the effectiveness and impact of digital health initiatives, track the development of comprehensive digital health systems, identify funding and technical assistance needs, encourage alignment among stakeholders, and highlight potential areas of risk for investment.

The state of digital health in a country can be assessed through various World Bank variables, which serve as proxies for measuring digital health readiness and progress. These variables are crucial for understanding the digital health landscape and its relationship with broader socioeconomic factors. Here are the key variables and their significance:

1. Information and Communication Technology (ICT) Infrastructure: Variables such as broadband and mobile subscriptions per 100 inhabitants, and internet users (percentage of population) reflect the technological infrastructure available in a country. Robust ICT infrastructure is essential for the development, implementation, and accessibility of digital health solutions (Lennon et al. 2017).

2. Health Expenditure and Financing: Health expenditure as a percentage of Gross Domestic Product (GDP), government expenditure on health, and out-of-pocket health expenditure as a percentage of private expenditure on health indicate the financial investment in healthcare. Sufficient health financing is vital for supporting digital health initiatives, including the development of infrastructure, technology adoption, and the sustainability of digital health services (Labrique et al. 2018).

3. Government Policies and Regulations: The regulatory quality index and ease of doing business index reflect the policy environment for digital health. Favourable policies and regulations facilitate innovation, investment, and implementation of digital health solutions, while ensuring privacy, security, and interoperability of health data (Fernandes and Chaltikyan 2020).

Additionally, economic indicators like GDP, GDP per capita, inflation rate, un-employment rate, and foreign direct investment (FDI) inflows provide insights into the socioeconomic context within which digital health operates. They help in the understanding of the economic conditions, resource allocation, and the potential for investment in digital health infrastructure and services.

By considering these variables collectively, policymakers, researchers, and stakeholders can gain a comprehensive understanding of a country's digital health landscape, identify areas for improvement, and make informed decisions to advance digital health for better healthcare delivery, accessibility, and outcomes.

Methodology

Given that the dependent variable in this analysis takes on values from 2 to 5, an ordered logistic regression model (ologit) was employed. The ologit model is suitable for analysing ordinal or ranked dependent variables, where the categories have a meaningful order. The empirical analysis focuses on the whole world.

To improve the distributional properties of certain variables, a logarithmic transformation was applied. Specifically, the variables GDP, GDP per capita, and FDI were logarithmised. This transformation is useful when the variable exhibits a highly skewed distribution or when there is a substantial range of values. By taking the logarithm, we reduce the effect of extreme values and achieve a more symmetrical distribution, which can enhance the validity of statistical analyses. Other variables in the dataset, such as share, per cent, or index variables, were not logarithmised. These variables often represent proportions, percentages, or relative values that do not require logarithmic transformation.

RESULTS

Figure 1 illustrates the global distribution of Global Digital Health Monitor overall indicator. The performance is evaluated on a scale ranging from 2 to 5, with 5 indicating the highest level of achievement, signifying that a particular country has reached an advanced stage in digital health development. On the other hand, a rating of 2 suggests that while the country is making some efforts, they remain limited in their digital health endeavours. We see that the best-performing countries are primarily located in Europe, North America, Australia, and select Asian nations. Meanwhile, Africa and certain Pacific Islands generally exhibit lower levels of performance among countries. Table 1 summarises the results by various indicators for the Asian countries.

Figure 1. Global Digital Health Monitor overall indicator (constructed by the author based on the GDHM data).
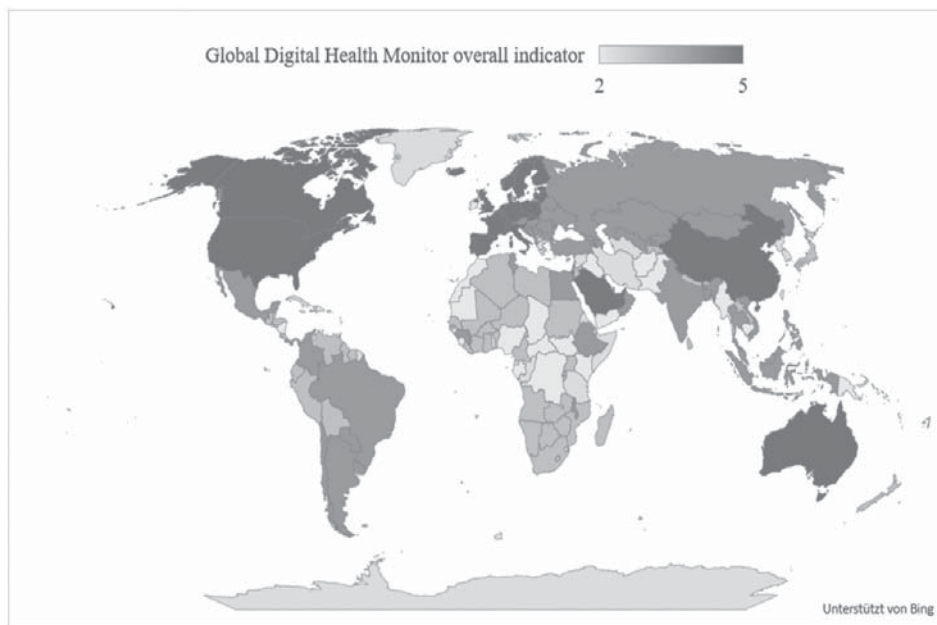
Table 1. Global Digital Health Monitor in Asian countries (GDHM database).[2, 3]

Country Name	Leadership & governance	Strategy & investment	Legislation, policy, & compliance	Workforce	Standards & interoperability	Infrastructure	Services & applications	Overall Phase
China	Phase 5	NA	Phase 4	NA	NA	Phase 4	NA	Phase 5
Israel	Phase 4	NA	Phase 5	NA	NA	Phase 4	NA	Phase 5
Saudi Arabia	Phase 5	Phase 5	Phase 5	Phase 5	Phase 5	Phase 5	Phase 5	Phase 5
Singapore	Phase 5	NA	Phase 5	NA	NA	Phase 5	NA	Phase 5
United Arab Emirates	Phase 5	Phase 5	Phase 5	Phase 4	Phase 5	Phase 5	Phase 4	Phase 5
Armenia	Phase 3	NA	Phase 4	NA	NA	Phase 4	NA	Phase 4
Azerbaijan	Phase 3	NA	Phase 4	NA	NA	Phase 4	NA	Phase 4
Bahrain	Phase 4	NA	Phase 4	NA	NA	Phase 4	NA	Phase 4
Bangladesh	Phase 5	Phase 4	Phase 2	Phase 3	Phase 2	Phase 4	Phase 5	Phase 4
Brunei Darussalam	NA	NA	Phase 3	NA	NA	Phase 4	NA	Phase 4
Cyprus	Phase 4	NA	Phase 4	NA	NA	Phase 4	NA	Phase 4
Egypt	Phase 4	NA	Phase 4	NA	NA	Phase 3	NA	Phase 4
Georgia	Phase 4	NA	Phase 4	NA	NA	Phase 4	NA	Phase 4
India	Phase 3	NA	Phase 4	NA	NA	Phase 3	NA	Phase 4
Indonesia	Phase 4	Phase 3	Phase 4	Phase 3	Phase 3	Phase 4	Phase 4	Phase 4

Country Name	Leadership & governance	Strategy & investment	Legislation, policy, & compliance	Workforce	Standards & interoperability	Infrastructure	Services & applications	Overall Phase
Iran	Phase 4	NA	Phase 3	NA	NA	Phase 4	NA	Phase 4
Kazakhstan	Phase 4	NA	Phase 4	NA	NA	Phase 4	NA	Phase 4
Kuwait	Phase 4	NA	Phase 3	NA	NA	Phase 4	NA	Phase 4
Kyrgyzstan	Phase 4	NA	Phase 3	NA	NA	Phase 3	NA	Phase 4
Malaysia	Phase 5	Phase 4	Phase 5	Phase 4	Phase 3	Phase 4	Phase 4	Phase 4
Mongolia	Phase 4	NA	Phase 3	NA	NA	Phase 3	NA	Phase 4
Oman	Phase 4	NA	Phase 4	NA	NA	Phase 4	NA	Phase 4
Philippines	Phase 2	Phase 4	Phase 4	Phase 2	Phase 4	Phase 4	Phase 4	Phase 4
Qatar	Phase 4	NA	Phase 4	NA	NA	Phase 4	NA	Phase 4
Russian Federation	Phase 4	NA	Phase 4	NA	NA	Phase 4	NA	Phase 4
Thailand	Phase 5	Phase 4	Phase 5	Phase 4	Phase 3	Phase 3	Phase 5	Phase 4
Turkey	Phase 4	NA	Phase 4	NA	NA	Phase 4	NA	Phase 4
Uzbekistan	NA	NA	Phase 4	NA	NA	Phase 3	NA	Phase 4
Viet Nam	Phase 4	Phase 3	Phase 4	Phase 3	Phase 3	Phase 4	Phase 4	Phase 4
Bhutan	NA	NA	Phase 1	NA	NA	Phase 4	NA	Phase 3
Japan	Phase 3	Phase 2	Phase 3	Phase 2	Phase 3	Phase 3	Phase 2	Phase 3
Jordan	Phase 3	Phase 2	Phase 3	Phase 3	Phase 2	Phase 3	Phase 4	Phase 3
Laos	Phase 4	Phase 3	Phase 3	Phase 2	Phase 3	Phase 4	Phase 3	Phase 3
Lebanon	Phase 3	NA	Phase 2	NA	NA	Phase 4	NA	Phase 3
Nepal	Phase 2	Phase 2	Phase 2	Phase 3	Phase 2	Phase 3	Phase 3	Phase 3
Sri Lanka	Phase 3	Phase 2	Phase 3	Phase 3	Phase 3	Phase 3	Phase 3	Phase 3
Tajikistan	Phase 3	NA	Phase 2	NA	NA	Phase 3	NA	Phase 3
Afghanistan	Phase 3	Phase 1	Phase 1	Phase 1	Phase 2	Phase 1	Phase 2	Phase 2
Cambodia	Phase 2	Phase 1	Phase 2	Phase 1	Phase 2	Phase 2	Phase 2	Phase 2

Country Name	Leadership & governance	Strategy & investment	Legislation, policy, & compliance	Workforce	Standards & interoperability	Infrastructure	Services & applications	Overall Phase
Iraq	Phase 2	Phase 1	Phase 2	Phase 1	Phase 1	Phase 1	Phase 2	Phase 2
Maldives	Phase 3	Phase 2	Phase 1	Phase 2	Phase 1	Phase 1	Phase 2	Phase 2
Myanmar	Phase 3	Phase 4	Phase 1	Phase 1	Phase 2	Phase 2	Phase 3	Phase 2
Pakistan	Phase 2	Phase 2	Phase 2	Phase 2	Phase 2	Phase 2	Phase 2	Phase 2
Timor-Leste	NA	NA	Phase 1	NA	NA	Phase 3	NA	Phase 2
Yemen	NA	NA	Phase 1	NA	NA	Phase 2	NA	Phase 2

Table 2 summarises the regression results. The coefficients (without brackets) signify the estimated impact of a predictor, while the standard errors (in brackets) gauge their uncertainty. Stars denote significance – more stars imply greater significance. Pseudo R-squared measures model fit. In ordered logit (ologit) regression, cuts are thresholds separating ordered categories, and coefficients predict cut effects. We find that fixed broadband subscriptions, regulatory quality, and GDP have a positive and significant effect on digital health outcomes (i.e., the higher these variables are, the more advanced is the digital health development), whereas domestic general government health expenditures and GDP per capita show a negative and significant effect. We find that other explanatory variables are not significant. We provide a detailed discussion of the results in the Discussion section below.

Table 2. Regression results.

VARIABLES	Global Digital Health Monitor
Positive and significant relationship	
Fixed broadband subscriptions	0.160***
	(0.0339)
Regulatory quality estimate	1.467**
	(0.576)
Logarithmised GDP	0.533***
	(0.131)
Negative and significant relationship	
Domestic general government health expenditure	-0.115*
	(0.0657)
Logarithmised GDP per capita	-1.204**
	(0.541)
Non-significant relationship	
Current health expenditure	0.0172
	(0.107)
Mobile cellular subscriptions	-0.00152
	(0.00727)

VARIABLES	Global Digital Health Monitor
Individuals using the Internet	0.0307
	(0.0196)
Out of pocket expenditure	-0.0190
	(0.0138)
Ease of doing business score	0.0113
	(0.0322)
Inflation	0.00345
	(0.00336)
Unemployment	-0.0466
	(0.0358)
lnFDI	-0.0358
	(0.0253)
/cut1	1.524
	(4.213)
/cut2	4.298
	(4.227)
/cut3	8.571**
	(4.297)
Pseudo R2	0.4069
Number of countries observed	149

*** $p<0.01$, ** $p<0.05$, * $p<0.1$. Robust standard errors in parentheses.

DISCUSSION

The Asian landscape of digital health development has witnessed remarkable progress, with several countries standing out for their impressive achievements in this field. Among the leading nations driving digital health advancements are China and Singapore. These countries have made substantial investments and implemented innovative strategies, positioning themselves at the forefront of digital health technologies and services. Their commitment to leveraging technology for healthcare has yielded substantial benefits, improving patient care, access to healthcare services, and overall healthcare outcomes.

China has emerged as a pioneer in digital health development, utilising advanced technologies like artificial intelligence, telemedicine, and health information systems (Ye et al. 2020). The country has launched large-scale initiatives to enhance healthcare accessibility and efficiency, with digital platforms facilitating remote consultations, health monitoring, and personalised care (Sun and Martin Buijsen 2022) (e.g., internet hospitals, electronic health records and universal electronic health codes for every resident as well as private platforms like Ping An Good Doctor, AliHealth or WeDoctor).

Singapore has established itself as a global hub for digital health, emphasising the integration of technology into its healthcare system[4]. The country's Smart Nation initiative promotes the use of digital platforms for telehealth, remote patient monitoring, and electronic health records (Laurent et al. 2021). Singapore's robust infrastructure and strong government support have fostered a thriving digital health ecosystem, attracting global collaborations and investments (Liew 2015).

On the other end of the spectrum, several Asian countries face significant challenges in advancing digital health capabilities. Afghanistan, Cambodia, Maldives, Myanmar, Pakistan, and Timor-Leste are among the nations grappling with limited resources, infrastructure, and technological advancements in the healthcare sector. These countries often struggle to implement digital health solutions effectively, which hampers healthcare access, data management, and overall healthcare outcomes.

It is important to note that digital health development is a complex and multifaceted process, influenced by various socio-economic factors. While some countries have made remarkable progress, others face significant barriers that impede their digital health advancements. International collaboration, investment, and knowledge sharing can play a crucial role in supporting nations with limited resources and promoting equitable digital health development worldwide.

As for the factors related to digital health performance, five were identified as being significant.

Fixed Broadband Subscriptions: The effect of fixed broadband subscriptions on digital health is positive. An increase in the number of fixed broadband subscriptions is associated with positive outcomes in digital health. Fixed broadband subscriptions provide a reliable and high-speed internet connection, enabling better access to digital health services, telemedicine, remote patient monitoring, and health information exchange. This increased accessibility and connectivity contribute to improved digital health outcomes.

4 (https://globalventuring.com/university/digital-health-ecosystem-in-singapore/).

Domestic General Government Health Expenditures: The effect of domestic general government health expenditures on digital health is negative. Higher levels of government spending on healthcare may lead to worsened digital health outcomes. This negative effect may be influenced by factors such as inefficient resource allocation, lack of technological infrastructure, or ineffective implementation of digital health initiatives within the healthcare system. Additionally, wealthier countries with higher government health expenditures may rely more on conventional medical services rather than digital health solutions, which can impact digital health outcomes.

Regulatory Quality: The effect of regulatory quality on digital health is positive. Regulatory quality refers to the effectiveness and efficiency of regulations governing the healthcare and digital health sectors. Higher regulatory quality implies well-designed and implemented regulations that promote digital health initiatives, ensure data privacy and security, and facilitate innovation in healthcare technologies. Positive regulatory quality encourages the growth and adoption of digital health solutions, leading to improved digital health outcomes.

GDP: The effect of GDP on digital health is positive. A higher GDP generally indicates a stronger economy with more resources available for investment in digital health infrastructure, research, and development. Increased economic activity and financial resources positively impact the growth and adoption of digital health technologies and services, ultimately improving digital health outcomes.

GDP per capita: The effect of GDP per capita on digital health is negative. Higher GDP per capita may lead to worsened digital health outcomes. Factors such as accessibility to digital health services, health literacy, and equitable distribution of healthcare resources can influence the impact of GDP per capita on digital health. In wealthier countries with higher GDP per capita, there may be a greater reliance on traditional healthcare services, which can contribute to the negative correlation between GDP per capita and digital health outcomes. An example from the GDHM is Japan, which has a high GDP per capita but is only in Phase 3 according to the GDHM.

In summary, while fixed broadband subscriptions, regulatory quality, and GDP have a positive effect on digital health outcomes, domestic general government health expenditures and GDP per capita show a negative effect. The negative effect of higher government health expenditures and GDP per capita could be attributed to wealthier countries relying more on conventional medical services rather than digital health solutions. Other factors such as resource allocation, technological infrastructure, and healthcare practices can also influence these relationships.

CONCLUSION

In conclusion, the development of e-health in Asian countries has gained significant momentum in recent years. The unique combination of economic growth, technological advancements, increasing healthcare demands, and supportive policy environments has created opportunities for leveraging e-health solutions to enhance healthcare delivery. This comparative analysis of e-health development in Asian countries has shed light on the factors that contribute to variations in their performance and provides valuable insights for policymakers and healthcare professionals.

The findings of this research paper have important policy implications for Asian countries. Policymakers can utilise the insights gained from the analysis to craft evidence-based policies that promote the development and implementation of e-health strategies. This includes investing in robust ICT infrastructure such as broadband connectivity to create a solid foundation for e-health initiatives. Governments can also focus on addressing challenges related to interoperability, data privacy, and security to ensure the seamless exchange of health information and the integration of e-health solutions into existing healthcare systems.

Moreover, policymakers should consider the specific healthcare needs of their populations, particularly in addressing the rising burden of chronic diseases and the needs of the elderly population. E-health technologies offer opportunities for early detection, remote monitoring, and personalised care, which can significantly improve the management of chronic conditions. By tailoring e-health strategies to address these specific healthcare challenges, policymakers can bridge the gaps in healthcare access, particularly in rural and remote areas.

Public-private partnerships play a crucial role in successful e-health implementation. Collaboration between governments, healthcare providers, technology companies, and academic institutions can drive innovation, enable the sharing of best practices, and mobilise resources. Policymakers should encourage and facilitate such partnerships to develop scalable e-health solutions, promote knowledge transfer, and overcome financial and technical barriers.

While significant progress has been made, challenges and barriers still exist in e-health implementation in Asian countries. Limited interoperability among different healthcare systems, resistance to change, inadequate healthcare infrastructure in rural areas, and concerns related to data privacy and security need to be addressed. Policymakers should work towards creating an enabling environment that addresses these challenges and fosters the acceptance and adoption of e-health technologies. This includes addressing cultural and social factors that may

influence the acceptance of e-health solutions, ensuring local context considerations are taken into account.

In summary, this research provides valuable insights into the factors influencing e-health development in Asian countries. By understanding these factors and their interplay, policymakers and healthcare professionals can make informed decisions, allocate resources effectively, and design targeted interventions to foster improved e-health outcomes. The successful implementation of e-health strategies has the potential to enhance healthcare access, quality, and efficiency in Asian countries, ultimately leading to improved healthcare delivery and patient outcomes.

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References

Al-Shorbaji, Najeeb. 2021. Improving healthcare access through digital health: The use of information and communication technologies. Healthcare Access 10 (2021).

Amboala, T. 2021. Key factors affecting e-health adoption among young adults in Malaysia.

Banbury, Annie, Alison Roots, and Susan Nancarrow. 2014. Rapid review of applications of e health and remote monitoring for rural residents. Australian Journal of Rural Health 22, no. 5 (2014): 211-222.

Bloom, David E., Elizabeth T. Cafiero-Fonseca, Mark E. McGovern, Klaus Prettner, Anderson Stanciole, Jonathan Weiss, Samuel Bakkila, and Larry Rosenberg. 2014. The macroeconomic impact of non-communicable diseases in China and India: Estimates, projections, and comparisons. The Journal of the Economics of Ageing 4 (2014): 100-111.

Chongsuvivatwong, Virasakdi, Kai Hong Phua, Mui Teng Yap, Nicola S. Pocock, Jamal H. Hashim, Rethy Chhem, Siswanto Agus Wilopo, and Alan D. Lopez. 2011. Health and health-care systems in southeast Asia: Diversity and transitions. The Lancet 377, no. 9763 (2011): 429-437.

Cummins, Nicholas, and Björn W. Schuller. 2020. Five crucial challenges in digital health. Frontiers in Digital Health 2 (2020): 536203.

Dornan, Lesley, Kanokporn Pinyopornpanish, Wichuda Jiraporncharoen, Ahmar Hashmi, Nisachol Dejkriengkraikul, and Chaisiri Angkurawaranon. 2019. Utilisation of electronic health records for public health in Asia: A review of success factors and potential challenges. BioMed Research International 2019 (2019).

Fernandes, Fara Aninha, and Georgi V. Chaltikyan. 2020. Analysis of legal and regulatory frameworks in digital health: A comparison of guidelines and approaches in the European Union and United States. Journal of the International Society for Telemedicine and eHealth 8 (2020): e11-1.

Kusumasari, Bevaola, Widodo Agus Setianto, and Li Li Pang. 2018. A study on digital democracy practice: Opportunities and challenges of e-Health implementation in Indonesia. Jurnal Ilmu Sosial Dan Ilmu Politik 22, no. 1 (2018): 1.

Labrique, Alain B., Christina Wadhwani, Koku Awoonor Williams, Peter Lamptey, Cees Hesp, Rowena Luk, and Ann Aerts. 2018. Best practices in scaling digital health in low and middle income countries. Globalization and Health 14 (2018): 1-8.

Laurent, Brice, Liliana Doganova, Clément Gasull, and Fabian Muniesa. 2021. The test bed island: Tech business experimentalism and exception in Singapore. Science as Culture 30, no. 3 (2021): 367-390.

Lennon, Marilyn R., Matt-Mouley Bouamrane, Alison M. Devlin, Siobhan O'connor, Catherine O'donnell, Ula Chetty, Ruth Agbakoba et al. 2017. Readiness for delivering digital health at scale: Lessons from a longitudinal qualitative evaluation of a national digital health innovation program in the United Kingdom. Journal of Medical Internet Research 19, no. 2 (2017).

Liew, Shirlene Nepacina. 2015. Digital health in Singapore: Building an ecosystem conducive for innovation-driven enterprises. PhD diss., Massachusetts Institute of Technology, 2015.

Lwin, Hnin Nu Nu, Prattana Punnakitikashem, and Trin Thananusak. 2023. E-health research in Southeast Asia: A bibliometric review. Sustainability 15, no. 3 (2023): 2559.

Pengput, Anuwat, and Diane G. Schwartz. 2022. Telemedicine in Southeast Asia: A systematic review. Telemedicine and e-Health 28, no. 12 (2022): 1711-1733.

Pradhan, Rudra P., Mak B. Arvin, Mahendhiran Nair, Jay Mittal, and Neville R. Norman. 2017. Telecommunications infrastructure and usage and the FDI–growth nexus: Evidence from Asian-21 countries. Information Technology for Development 23, no. 2 (2017): 235-260.

Qureshi, Qamar Afaq, Bahadar Shah, Naseem Ullah, Ghulam Muhammad Kundi, Allah Nawaz, Amanullah Khan Miankhel, Kamran Ahmad Chishti, and Najam Afaq Qureshi. 2013. The impact of top management support and e-health policies on the success of e-health practices in developing countries. Scholarly J Med 3, no. 3 (2013): 27-30.

Sukkird, Vatcharapong, and Kunio Shirahada. 2015. Technology challenges to healthcare service innovation in aging Asia: Case of value co-creation in emergency medical support system. Technology in Society 43 (2015): 122-128.

Sun, Lujia, and Martin Buijsen. 2022. Mobile health in China: Does it meet availability, accessibility, acceptability and quality standards? Health Policy and Technology 11, no. 3 (2022): 100660.

Ye, Qing, Jin Zhou, and Hong Wu. 2020. Using information technology to manage the COVID-19 pandemic: Development of a technical framework based on practical experience in China. JMIR Medical Informatics 8, no. 6 (2020): e19515.