Digital Health Transformation in Asian Healthcare Systems

Zheng Jianming[1]   **Mahrukh Maqbool[2]**

[1]School of Information Management, Nanjing University, Nanjing, China. E-Mail: jianmingz@nju.edu.cn
[2]Department of Food and Nutrition, Muhammad Nawaz Sharif Agricultural University, Pakistan. E-Mail: maqboolmahrukh4@gmail.com

ABSTRACT

The digital transformation of healthcare systems in Asia presents unique challenges and opportunities, requiring tailored approaches for effective implementation. This research article delves into the landscape of digital health transformation within Asian healthcare systems, aiming to dissect the challenges, opportunities, and best practices in navigating this transformative journey. By analyzing regional dynamics and drawing lessons from global experiences, this study provides valuable insights for policymakers, healthcare practitioners, and stakeholders invested in driving digital health innovation across Asia. Emphasizing the significance of systematic methods in managing risks and achieving successful digital health governance, the article advocates for flexible governance structures adaptable to diverse contexts. Leadership identification, national steering committees, and customized frameworks are crucial for effective governance, performance measures, and monitoring mechanisms to ensure accountability and progress toward patient-centered care. Despite challenges, the focus remains on equitable access to quality healthcare and improved population health outcomes. By prioritizing good governance and overarching goals, Asian countries can leverage the digital health revolution to build healthier and more resilient societies.

Corresponding Author's E-Mail: maqboolmahrukh4@gmail.com

1. <u>Introduction</u>

In recent decades, globalization has spurred unprecedented changes in the business landscape, compelling organizations to adapt swiftly to remain competitive. Central to this adaptation is integrating digital processes and collaborative tools—a phenomenon commonly called digital transformation (DT). Scholars have increasingly emphasized the importance of DT, recognizing its significance beyond mere technological shifts (Allioui & Mourdi, 2023).

Successful DT entails exploiting and exploring digital opportunities to enhance organizational agility, especially in the face of disruptive changes catalyzed by digitalization (Cosa, 2023). Industries, including banking, have swiftly embraced e-banking to gain a competitive edge, showcasing the necessity for rapid adaptation in dynamic market environments (TOHANEAN & SANGEORZAN, 2023). The imperative for DT extends beyond enhancing productivity and reducing costs; it also fosters innovation, sustaining competitiveness within the digital economy.

Health Information Technology's (HIT) transformative potential in healthcare has reshaped service delivery and patient care modalities (Walsh et al., 2023). The emergence of digital health leverages information technology and electronic communication tools to revolutionize healthcare delivery. Despite global aspirations for digital health advancement, adoption rates vary across countries, with regions like Catalonia in Spain leading in eHealth adoption (Kautsch et al., 2018). This infrastructure proved crucial in maintaining healthcare delivery during crises such as the COVID-19 pandemic, highlighting the pivotal role of digital transformation in bolstering healthcare systems.

As we delve into Asian healthcare systems, examining the nuances of digital health transformation in this diverse and dynamic region becomes imperative. This research article explores the current state of digital health transformation in Asian healthcare systems and its recent trends, challenges, and opportunities. By shedding light on these aspects, we can identify strategies to harness the full potential of digital technologies in improving healthcare delivery and patient outcomes across Asia.

2. <u>Asian Healthcare Systems</u>

Over the past half-century, the Asia Pacific region has experienced a transformative journey marked by significant strides in poverty alleviation, robust economic growth, and notable advancements in healthcare infrastructure and services (Legido-Quigley et al., 2018). This period has witnessed a remarkable shift in health outcomes, characterized by escalating life expectancy rates and noteworthy declines in infant and maternal mortality across numerous regional countries.

However, amidst these commendable achievements, substantial challenges persist, posing formidable obstacles to realising comprehensive and equitable healthcare access for all region residents (Jiang & Kumah, 2023). The escalating prevalence of non-communicable diseases (NCDs), including but not limited to diabetes, hypertension, cancer, and mental health disorders, presents a complex and multifaceted health crisis. Coupled with the forces of globalization, rapid urbanization, income disparities, and the

spectre of climate change, these emerging health challenges demand urgent attention and concerted action from policymakers, healthcare practitioners, and stakeholders across the board (Davies et al., 2015). Moreover, the looming threat of antimicrobial resistance (AMR) casts a shadow over public health efforts, jeopardizing the efficacy of essential antibiotic and antiviral treatments and posing a significant risk of resurgence in infectious diseases. Concurrently, the region grapples with the looming specter of health security threats, underscored by the specter of past outbreaks such as severe acute respiratory syndrome (SARS) and avian influenza, which continue to loom large in the collective consciousness of healthcare systems and policymakers (Ahmed et al ., 2019). Despite notable progress, access to affordable and high-quality healthcare services remains elusive for a significant population segment, particularly in the region's low- and middle-income countries. Out-of-pocket expenditures continue to represent a substantial financial burden for individuals and families, limiting their access to essential healthcare services and pushing many into the vicious cycle of poverty and ill health (Yingchoncharoen et al., 2021).

The onset of the COVID-19 pandemic further exacerbated existing health disparities and exposed the vulnerabilities inherent within the region's healthcare systems. While the Asia-Pacific region accounts for a significant proportion of the global population, the reported incidence and mortality rates of COVID-19 vary widely across countries, reflecting disparities in healthcare infrastructure, testing capabilities, and surveillance mechanisms(El Guerche-Seblain et al., 2021). However, the true extent of the pandemic's impact remains obscured by under-reporting and the prevalence of asymptomatic cases, underscoring the need for improved data collection and reporting mechanisms to accurately assess and address the evolving public health landscape.

While gains in life expectancy and reductions in mortality rates indicate progress, significant disparities persist within and across countries, underscoring the urgent need for targeted interventions to address the root causes of health inequities (Wirayuda & Chan, 2021). Gender disparities further exacerbate these inequities, with women generally experiencing longer healthy life expectancies compared to men. Significant variances exist among countries due to various socio-economic, cultural, and healthcare situations. The Asia-Pacific area has made notable progress in enhancing healthcare and health results, but considerable obstacles remain. To overcome these problems, all stakeholders must work together in a coordinated and cooperative manner, driven by a mutual dedication to achieving universal health care and guaranteeing the right to health for all persons in the area.

3. <u>Existing Challenges in Healthcare Delivery in Asia</u>

Throughout the diverse landscape of the Asian region, access to fundamental services remains a persistent issue, spanning health, education, water, and sanitation. However, various barriers hinder this access, primarily around three key challenges.

Firstly, the availability of physical infrastructure poses a significant hurdle, particularly in remote rural regions. Historically, Asian health systems grappled with shortages in facilities, personnel, drugs, and resources. While strides have been made to address these deficiencies, certain pockets, especially in remote rural areas, still face a scarcity of state facilities and educational resources (Yip, 2019). Secondly, affordability remains a critical barrier, particularly for disadvantaged populations. Even when services are ostensibly free, associated costs such as transportation and opportunity costs of labour may render them financially burdensome (Kwon, 2011). This economic constraint disproportionately affects marginalized

groups, exacerbating health and educational inequities. Thirdly, social exclusion presents a pervasive challenge across many Asian countries, manifesting in various forms, such as caste-based discrimination in India or spatial and social inequalities in Nepal. Women, in particular, face unique barriers due to cultural norms and gender roles, impacting their access to essential services like water, healthcare, and education (Yip, 2019).

Moreover, the quality of publicly provided basic services in many Asian countries often falls short of desired standards. Infrastructure deficiencies, inadequate maintenance, and unmotivated personnel plague healthcare and education systems (Vandan et al., 2020). Additionally, users grapple with challenges in assessing service quality, leading to distorted incentives for providers and undermining trust in the healthcare system. Affordability and sustainability further compound these challenges, necessitating a robust financing system for health and education services. Inadequate public spending, coupled with biases in resource allocation favoring the affluent, undermines efforts to reach the most vulnerable segments of society (Legido-Quigley et al., 2018). Furthermore, corruption and mismanagement divert crucial funds from essential services, perpetuating systemic inequalities.

4. <u>Role of Technology in Addressing Healthcare Challenges in Asia</u>

In healthcare, technological advancements offer promising solutions to address pressing challenges across Asia. While the concept of a technological singularity, characterized by the convergence of genetics, nanotechnology, and robotics, remains aspirational, tangible progress has been made in leveraging technology to enhance healthcare delivery (Bhatia, 2021).

Wearable technologies, such as smartwatches and wristbands, have gained popularity, enabling individuals to monitor physical activity, vital signs, and nutritional habits. These gadgets offer real-time feedback to promote good behavioural changes and proactive health management and make managing long-term diseases easier (Hoe, 2022). By allowing for fall detection and position monitoring in case of crises, wearable sensors have also played a crucial role in improving the safety of the senior population. Advancements in robotics show great potential to revolutionize healthcare delivery in Asia. As a result of the accuracy and efficiency it brings to a variety of medical operations, robotic-assisted surgery has become increasingly popular. Furthermore, robots are increasingly deployed for remote clinical consultations, autonomous care tasks, and the delivery of medical supplies to remote regions. As ageing populations strain healthcare resources, robots offer a viable solution to alleviate the burden on healthcare systems and improve accessibility for older patients (Bhatia, 2021).

Beyond clinical applications, robots offer invaluable support to elderly and disabled populations at home and in residential care facilities. Companion robots provide companionship and assistance with health management tasks, such as medication adherence, while fulfilling various social functions (Hoe, 2022). Robotic assistive devices improve mobility, aid in daily tasks, and support independent living for older persons and individuals with impairments. Moreover, technology such as 3-D printing has significant potential to transform healthcare services in Asia. 3-D printing provides creative answers for current healthcare difficulties by creating anatomical models for surgery planning, tailored prosthetics, and personalized medications (Penno & Gauld, 2017). While initial costs remain a barrier to widespread adoption, ongoing advancements are expected to drive down expenses, making these technologies increasingly accessible across the region.

Thus, technology is a potent instrument for tackling healthcare obstacles in Asia. Innovative solutions such as wearables, robots, and 3-D printing provide an opportunity to increase healthcare access, better patient outcomes, and address resource limitations. By adopting and utilising these innovations, Asia can lead to a healthier and more resilient future for its diverse populace.

5. <u>Key Components of Digital Health Transformation</u>

Digital healthcare innovations are revolutionizing the delivery of healthcare services, offering efficient and patient-centered solutions across various medical domains. These advancements encompass a diverse range of technologies and strategies, each contributing to improved patient outcomes and streamlined healthcare delivery:

5.1 Remote Monitoring and Telemedicine

With the help of telemedicine, patients in rural or underserved locations can have remote consultations and diagnoses. Wearables and other remote monitoring devices also give doctors access to vital sign data in real time, allowing them to keep tabs on their patient's health and act quickly if needed. Access to healthcare services is improved, patient outcomes are improved, and healthcare expenditures are reduced through these technologies (Ahmadi, 2024).

5.2 Health Management Systems and Electronic Health Records

To help healthcare providers make educated decisions, EHRs consolidate patient data and make it freely accessible. Health management systems enhance healthcare delivery by improving the efficiency of administrative processes, appointment scheduling, and patient data management. Electronic health records (EHRs) and health management systems improve precision, efficacy, and care coordination through digitalizing administrative procedures and medical records (Mbunge, Muchemwa & Batani, 2021).

5.3 Wearable Health Devices

Wearable devices, such as smartwatches and fitness trackers, empower individuals to monitor their health metrics, including heart rate, activity levels, and sleep patterns. These devices provide valuable data to patients and healthcare providers, facilitating early detection of health issues, promoting preventive care, and encouraging self-management engagement.

5.4 Data Analytics and Artificial Intelligence (AI)

Data analytics techniques are utilised to enhance clinical decision-making, streamline healthcare operations, and draw useful conclusions from massive amounts of healthcare data. Based on clinical data and patient characteristics, AI algorithms improve diagnosis accuracy, tailor treatment strategies, and forecast patient outcomes (Akinola & Telukdarie, 2023). Healthcare practitioners can improve the accuracy and personalization of patient treatment by utilizing data and AI.

5.5 Patient-Centered Care and Collaboration

By involving patients in their healthcare, giving them individualized support, and encouraging them to participate in decision-making, digital health innovations are emphasizing patient-centred care. Using

collaboration tools, healthcare professionals can communicate and share information more easily. This allows interdisciplinary care teams to work together more efficiently and coordinate patient care more smoothly (Bhatia, 2021).

Despite the transformative potential of digital healthcare, challenges such as data security, limited analytics capabilities, and the need for stakeholder engagement must be addressed to ensure successful implementation (Bhatia, 2021). By leveraging key innovations in digital healthcare, healthcare systems can enhance efficiency, accessibility, and quality of care, ultimately improving patient outcomes and advancing healthcare delivery in the modern era.

6. <u>Implementation Strategies and Case Studies in Asia</u>

Implementing electronic health records (EHR) in medical practice has witnessed a significant surge in recent years, offering valuable opportunities to enhance health surveillance and improve service provision, thereby promoting public health. Studies suggest clinicians extensively utilize EHR information to assess patient conditions, inform clinical decisions, and facilitate communication within patient care teams. By June 2013, most office-based physicians in the United States had integrated EHR into their practices. However, the effectiveness of EHR adoption depends on physicians' willingness to embrace the technology, as it represents a substantial investment of resources (El-Yafouri & Klieb, 2014). In public health, the convergence of primary clinical care and population health goals underscores the importance of flexible systems. Amidst evolving healthcare objectives, particularly in the context of the Patient Protection and Affordable Care Act (ACA) in the United States, there is a growing need for proactive strategies to improve health outcomes for defined populations at minimal cost (El-Yafouri & Klieb, 2014).

Researchers have leveraged EHR systems to gather rich data on various health indicators, including heart disease, smoking, and preventive services delivery. Moreover, as asserted by Hoe (2022), EHRs have facilitated the tracking and optimization of vaccination programs, thereby enhancing immunization strategies. Despite the undeniable value of EHRs in clinical settings, the dynamic nature of health information technology presents ongoing challenges, particularly regarding data sharing and governance. In the Asian context, the adoption and effectiveness of EHR systems remain understudied compared to developed countries like the United States and the United Kingdom. Understanding the progress and adaptation processes of EHR systems in Asia is essential for effectively promoting individual and community health. Studies in Asia have highlighted numerous external and internal contextual factors influencing EHR implementation. External challenges often stem from infrastructure variability, such as centralized information systems and ICT constraints. Moreover, limited funds for healthcare technology and fragmented healthcare systems pose additional hurdles. In low- and middle-income countries (LMICs), inconsistent power supplies and intermittent internet access further complicate EHR implementation efforts (Akinola & Telukdarie, 2023).

Internally, organizational cultures and access to ICT support play crucial roles in the EHR input process. Addressing workforce training needs and ensuring data standardization are vital for successful implementation. Additionally, considerations of outputs, such as disease-specific recommendations and workforce considerations, are integral to EHR interventions (Singh et al., 2022). Although EHR systems hold potential, obstacles such as organizational impediments, technical hazards, and ethical issues continue to exist. To tackle these difficulties, it is essential to conduct comprehensive assessments of company

cultures, worker preparedness, and ethical considerations. Collaboration among academia, policymakers, patients, and healthcare professionals is essential to effectively implement and use Electronic Health Records (EHR). Understanding the potential capabilities and constraints of Electronic Health Record (EHR) systems is crucial for building effective public health programs in Asia. EHR systems can significantly improve healthcare delivery and promote population health in the region by considering contextual variables, utilizing available resources, and executing effective techniques (Singh et al., 2022).

6.1 Case Study of Bhutan

Bhutan is actively pursuing the implementation of a digital health strategy aimed at delivering low-risk, low-cost healthcare services to its citizens and achieving universal health coverage. Central to this strategy is the utilization of mobile health apps tailored for healthcare providers, providing them with access to patient information, decision support tools, and communication channels (Gurung et al., 2019). To ensure successful adoption, comprehensive training programs for healthcare professionals on app usage and ongoing technical support will be essential. Additionally, Bhutan has made significant strides in web-based data collection, enhancing disease surveillance and health security. To enhance this feature, consistent training on data gathering methods and the implementation of established protocols are necessary. Interoperable technologies are essential for enabling smooth data flow among healthcare systems. IT workers and healthcare providers should get training sessions on interoperability standards and technology to enhance support in this area. The Ministry of Health is prioritizing the enhancement of workforce capacity through ICT education and training programs, which are provided through online modules and seminars. Phase 2 of the strategy will focus on sustaining momentum and enhancing digital health reforms, particularly in the areas of identity management, master patient index implementation, and better patient health information access (Gurung et al., 2019). Strong stakeholder engagement and governance structures are essential for successful implementation, requiring regular consultations, feedback mechanisms, and robust management frameworks. Lastly, a robust monitoring and evaluation framework will be crucial for measuring the impact and outcomes of digital health initiatives, ensuring continuous improvement and optimization of the healthcare system in Bhutan.

6.2 Case Study of Bangladesh

The digital transformation of Bangladesh's healthcare system has seen the implementation of various innovative tools and strategies aimed at strengthening health services and improving overall performance. One such initiative introduced in 2014 focuses on enhancing the performance measurement of public health facilities through routine online reporting mechanisms. This initiative incentivizes health managers by annually scoring the performance of health facilities, with top-performing facilities receiving national awards (Khan & Al Amin, 2021). The performance management tool is aligned with the World Health Organization's six building blocks of health systems and utilizes indicators at multiple levels to assess facility performance. Data for the tool are derived from routine health data, on-site inspections, and patient satisfaction surveys.

Another important advancement is the creation of standardized local health bulletins, offering convenient access to compiled indicator data for various healthcare facilities. The bulletins, created by analyzing data from interconnected databases, are important tools for health managers and policymakers. Bangladesh has achieved substantial progress in civil registration and vital statistics (CRVS) systems, with support from

the WHO. Using the International Form of Medical Certificate of Cause of Death and spoken autopsy procedures has enhanced the gathering and examination of data for mortality statistics. Incorporating CRVS into the national DHIS2 platform facilitates real-time analysis of community mortality data, leading to enhanced health outcomes (Bhuiyan & Ferdous, 2023).

The country's health workforce strategy, addressing issues of shortage and maldistribution of human resources, includes implementing a Human Resource Information System (HRIS). This electronic system captures and maintains human resource data, facilitating attendance monitoring and career planning. Additionally, videoconferencing technology is utilized for meetings and training sessions, fostering communication and collaboration among health managers and staff. Bangladesh's engagement with the community through digital pathways includes a complaints and suggestions management system, allowing citizens to provide feedback on healthcare services via SMS. Digital displays in public spaces disseminate health information and raise awareness on various health issues. Looking to the future, Bangladesh aims to leverage big data, artificial intelligence, and robotics to improve health service delivery further. The Ministry of Health and Family Welfare has hosted international conferences on big data for health, exploring opportunities for collaboration and capacity building in this emerging field. These digital innovations underscore Bangladesh's commitment to advancing healthcare accessibility, quality, and efficiency through technology-driven solutions (Bhuiyan & Ferdous, 2023).

7. Benefits and Impacts of Digital Health Transformation

Integrating Information and Communication Technology (ICT) strategically in healthcare systems in Asia has the potential to transform health services and play a vital role in achieving universal health coverage (UHC). Digital health, also known as eHealth, is considered a crucial element by the World Health Organization (WHO) and offers numerous chances to improve accessibility, quality, and affordability in the region's health systems (Marcelo et al., 2018). Two primary causes fuel the swift expansion of digital health solutions in Asia. Integrating Information and Communication Technology (ICT) strategically in healthcare systems in Asia has the potential to transform health services and play a vital role in achieving universal health coverage (UHC). Digital health, also known as eHealth, is considered a crucial element by the World Health Organization (WHO) and offers numerous chances to improve accessibility, quality, and affordability in the region's health systems. (Gurung et al., 2019). First, the explosive growth of ICT access is evident with unprecedented broadband coverage and mobile technology adoption. By the end of 2015, over 2.5 billion individuals were mobile phone subscribers, representing more than 60% of the population. Furthermore, the region's mobile penetration rate continues to outpace the global average, with an anticipated addition of 600 million new subscribers by 2020 (Bhavnani et al., 2008). The proliferation of 4G networks has further accelerated internet accessibility via smartphones. Secondly, the increasing demand for enhanced health systems is palpable as Asian countries mature. There is a growing demand for improved healthcare services, particularly for large and geographically dispersed populations, including migrant communities. Factors such as shifting disease profiles, rising incomes, changing lifestyles, and aging populations necessitate transitioning to patient-centric chronic care models. This demand for better health services underscores the urgency for leveraging digital solutions. Despite these opportunities, several challenges persist across the region. Many Asian countries lack robust regulatory frameworks and governance structures for digital health implementation. Insufficient expertise and resources hinder developing and deploying effective health informatics systems (Singh et al., 2022). The

prevalence of disjointed information systems impedes seamless data sharing and collaboration among healthcare providers. The absence of standardized patient identification systems complicates data management and continuity of care. Moreover, funding priorities are not always aligned with the Ministry of Health's objectives, and there is a need for stronger interagency and public-private collaboration.

Nevertheless, the increasing accessibility of ICT, coupled with rapid advancements in technology, offers a promising avenue for addressing these challenges. Digital health solutions can yield numerous benefits, including facilitating community engagement and behaviour change, providing access to specialized healthcare services in remote areas, and empowering healthcare workers with better access to training and diagnostic support. Additionally, digital health facilitates personalized patient monitoring and care delivery, optimizes record-keeping and data sharing, and improves resource allocation efficiency while reducing costs (Mbunge et al., 2021). However, realizing these benefits hinges on effective digital health governance. Interoperability among different technology systems and software applications is paramount for enhancing continuity of care and maximizing the impact of digital health interventions. Therefore, prioritizing robust governance frameworks is essential for harnessing the full potential of digital health transformation in Asia.

8. <u>Challenges and Barriers in Digital Health Transformation in Asia</u>

Regulatory frameworks can present significant obstacles to implementing and utilising digital health interventions in Asia. Unlike traditional medical devices and drug therapies, digital health interventions require specialized regulations that may not align with conventional health services and solutions. Technological advancements often outpace regulatory bodies, leading to outdated guidelines and legal ambiguities. In many developing countries, specific regulations for digital health solutions are lacking or insufficiently comprehensive, clear, and consistent (Kazi et al., 2020).

This regulatory ambiguity extends to defining digital health interventions, software, mobile applications, or devices, as well as determining the necessity for regulation and the predictability of its implementation. Fragmented regulations across developing countries hinder the effective use of digital health solutions and may create health risks. For instance, several countries in the Asia-Pacific region have multiple organizations regulating digital health, leading to inefficiencies and overlapping responsibilities (Fagherazzi et al., 2020).

Moreover, the absence of a comprehensive digital health policy framework in some Asian countries, including data protection considerations and domains like clinical, ethical, legal, and operational aspects, further impedes adoption and effective utilization of digital health solutions. While some progress has been made in removing regulatory obstacles in certain ASEAN countries, inconsistencies and gaps persist, particularly in telemedicine regulations (Kotenko & Bohnhardt, 2021).

The dynamic nature of digital health technology requires innovative and risk-based approaches to regulation and policymaking. Traditional methods for assessing and authorizing medical devices may not be suitable for digital health solutions involving ongoing device and software adjustments. Regulatory sandboxes and pre-certification schemes have been introduced in some countries to facilitate innovation while ensuring compliance and market entry. However, inconsistent approval and regulatory systems across countries can create non-technical barriers and deter innovation (Penno & Gauld, 2017).

International collaboration is crucial for establishing shared standards, guidelines, and agreements to harmonize legal frameworks and address complexities in cross-jurisdictional healthcare in digital health. This involves developing frameworks for data governance, liability, and patient rights that can be consistently applied across different legal systems at national and subnational levels.

9. Trends and Opportunities in Digital Asian Healthcare Systems

An emerging area of interest lies in accepting health technology solutions among older individuals, their families, and caregivers within Asian healthcare systems. Usability concerns regarding health technologies have been identified as a significant barrier, particularly among older users, whose decisions to adopt such technologies are influenced by factors such as education level, technological experience, and physical and cognitive abilities (Penno & Gauld, 2017).

Moreover, the appearance of technologies, such as whether robots appear human-like, and concerns regarding wearable technologies being stigmatised further impact their acceptance. The cost of technology also poses a significant impediment to uptake among older users, emphasizing the importance of debates surrounding funding access to technologies. Developers may address these issues by enhancing simplicity, developing multifunctional products, and designing products that grant users greater control (Ahmadi, 2024). However, the vast amount of personal data collected by health technologies raises concerns about data security and privacy among users, caregivers, and providers. Ensuring robust policy and legislative frameworks protect privacy is essential to reassure users that their data will be securely held.
Additionally, there is apprehension that technology may diminish human contact, raising concerns about the potential displacement of traditional caregiving roles and the quality of care. Users have also raised questions about the safety and reliability of technology-based products and the risk of increased social isolation. Governments and international health agencies are developing policy, implementation, and evaluation frameworks for health technologies to guide eHealth initiatives at a national level. However, there is considerable variation in the maturity of these frameworks across the Asia Pacific region. While some countries have well-established eHealth strategies, others still develop their policies. Furthermore, there is a growing emphasis on monitoring and regulating eHealth solutions, including more complex technologies like healthcare robots and 3-D printing (Hoe, 2022). However, the rapidly evolving nature of health technologies presents challenges for policymakers in designing flexible regulatory frameworks that balance innovation with user protection.

10. Recommendations

Addressing the digital health divide in Asia requires a comprehensive approach that considers context-specific factors and engages stakeholders at multiple levels. To begin with, conducting nationwide surveys similar to the Health Information National Trends Survey (HINTS) in the United States can provide valuable insights into the correlates of health information technologies across populations in Asian countries. These surveys should be designed to understand individual-level challenges such as low literacy and poverty, provider-level challenges such as lack of digital tools and training, community-based challenges including cultural issues, and systems-level challenges such as inadequate research and policies (Akinola & Telukdarie, 2023).

Moreover, field-testing the feasibility and acceptability of advanced interventions is crucial, with a focus on personalized care tailored to individual users' needs. Asian countries should prioritize adopting context-specific and personalized care in the digital health era to bridge the existing divide (Mbunge, Muchemwa & Batani, 2021). This necessitates engagement with multisectoral stakeholders at both local and global levels, leveraging regional forums and partnerships for collaborative efforts and resource sharing. Enhanced awareness and participation among stakeholders can be achieved through multipronged communication strategies. Asian nations should harness their collective social capital, regionally and globally, to address the digital health divide ethically and effectively (Singh et al., 2022). Strengthening health systems is imperative to ensure the availability of policies, regulatory frameworks, and institutional resources necessary for a coordinated and robust digital ecosystem.

Lessons from recent advancements in digital infrastructure in countries across Asia should be shared among nations to inform their digital health development efforts. Additionally, synthesizing local and global evidence on digital health is essential for informing evidence-based policies and programs tailored to the region's specific needs and challenges. By implementing these recommendations, Asia can move towards a more inclusive and equitable digital health landscape. Addressing these challenges requires a multifaceted approach encompassing policy reforms, improved governance, and innovative financing mechanisms. Efforts to enhance service quality, expand access, and promote equity must be underpinned by a commitment to social inclusion and gender equality (Bhatia, 2021). Only through concerted action and sustained investment can Asia's healthcare delivery system overcome these hurdles and pave the way for a healthier and more equitable future for all. A thorough and multi-faceted approach must support efforts to improve health outcomes and ensure universal healthcare access (Vandan et al., 2020). This involves improving healthcare infrastructure, enhancing health systems, addressing social determinants of health, encouraging collaboration across many sectors, and advocating for health equity and social inclusion.

11. **Conclusion**

In healthcare services and digital health system integration, it is crucial to acknowledge the absence of a one-size-fits-all solution. However, a systematic approach can facilitate managing risks and achieving successful digital health governance. The World Health Organization underscores the importance of promoting country and global governance with citizen and community participation, laying a strong foundation for accountability.

Consistent and comprehensive evaluations of progress and efficiency linked to health-related Sustainable Development Goals are paramount for monitoring and ensuring responsibility. An effective digital health governance structure should exhibit flexibility to adapt to evolving requirements and goals within the health industry. This necessitates the establishment of a digital health enterprise, recognition of stakeholders, and consensus on governance factors such as architecture, standards, and applications.

Good governance entails identifying leadership roles, assembling relevant agencies into national steering committees, and implementing customized governance frameworks tailored to each country's circumstances. Implementing performance measures and monitoring methods ensures accountability and drives continuous progress toward patient-centred and integrated care.

Amidst the complexities, it is essential to remain focused on providing equitable and affordable access to high-quality healthcare and enhancing population health outcomes. Countries can navigate challenges and harness the benefits of the digital health revolution by prioritizing good governance and overarching aims to build healthier and more resilient societies.

By embracing these principles and implementing robust governance structures, Asian healthcare systems can leverage digital health transformation to enhance healthcare delivery, improve patient outcomes, and ultimately contribute to the well-being of their populations in the digital age.

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