Digital Health Divide in South Asia:

Ethical Concerns, Challenges, and Recommendations

Md Mahbub Hossain, MBBS, MPH, CPH^{*1,2}

Wenting Weng, MEd¹

Sudip Bhattacharya, MBBS, MD³

Hoimonty Majumder, MBBS, MPS, MPH⁴

Farah Faizah, MBBS, MPH⁵

Abstract: *The continued development of digital health technologies is reforming health systems and services globally; however, the South Asian countries are experiencing a sub-optimal growth and use of such technologies. Thus, a digital divide in healthcare is affecting the potential transformations in health services and outcomes in this region. This implies inadequate access to the best possible health technologies for a majority of the population, raising ethical concerns for healthcare practice. We discuss such concerns and the underlying socio-ecological challenges at individual, community, society, and systems levels pertinent to the digital divide in healthcare and highlight the strategic recommendations to bridge the existing gaps. These challenges should be addressed through engaging key stakeholders in healthcare including patients, informal caregivers, healthcare providers, health services organizations, technological providers, local and regional regulatory organizations, and other entities who may inform the development and implementation of digital platforms for equitable health across populations in South Asia.*

Keywords: South Asia; Telemedicine; Digital Health; Health Disparities

¹ Texas A&M University, College Station, TX 77843, USA.

² Nature Study Society of Bangladesh, Khulna Bangladesh.

³ Himalayan Institute of Medical Sciences, Dehradun, India.

⁴ IPAS Bangladesh, Dhaka, Bangladesh.

⁵ United Nations Population Fund, Cox's Bazar, Bangladesh.

Corresponding author: Md Mahbub Hossain, Texas A&M University, College Station, TX 77843, USA.

Email: mhossain@tamu.edu

Introduction

Eight South Asian countries, namely Afghanistan, Bhutan, Bangladesh, India, Maldives, Nepal, Pakistan, and Sri Lanka, are home to more than 23% of the global population [1]. Moreover, South Asia shares a major proportion of the global burden of diseases where a double burden of both infectious and noncommunicable diseases (NCDs) exist alongside demographic and epidemiological transitions [2]. In addition, South Asian nations are also experiencing a divide in using digital technologies in healthcare unlike the global trends in digital revolution [3]. Digitalization has enabled several advancements in global health, which include early and more accurate diagnosis, increasing access to specialized care, delivering personalized therapies through mHealth and eHealth, and managing health services at community settings and healthcare organizations [4]. The continued growth of digital health services has significantly reduced mortality and morbidity, as reported in many evidence-based reviews and meta-analyses [5–7]. However, such advancements cannot be generalized for resource-constrained contexts like South Asia. For example, a systematic review of digital intervention facilitating patient-provider communication in cancer care found no digital intervention from South Asia [8], which has a high prevalence of cancer as per the regional estimates [9]. Another systematic review of digital interventions for NCDs in India found 13 digital interventions, which appears to be very low compared to the burden of NCDs in India [10]. Despite global advancements in digitalization of health services in a rapid pace, a digital divide exists in India and other South Asian countries [10], which imposes critical concerns on digital health equity and necessitates an ethical analysis of allied challenges to inform future approaches bridging this divide.

Digital divide and ethical concerns

Digitalization is perceived as a social change simultaneously occurring in both the developed and developing nations [3,11]. In addition to advanced diagnostic and therapeutic tools powered by digitalization, technological innovations are being used for promoting preventive and therapeutic care among patients and high-risk populations [12,13]. This creates a major concern for beneficence as people living in developed contexts may have access to such technologies, but people in South Asian countries may not experience those benefits [10]. Moreover, healthcare practitioners are pursuing the avenue of digital health technologies for delivering health-related information, reminders for medication and treatment adherence, electronic systems of patient data management, delivery of collaborative and referral care, providing self-reporting and self-management of symptoms; which have shown promising success in the developed countries [14,15]. However, such integration of digital services in clinical care is still limited in South Asia. Much of the digital health services are available in institutional and urban settings, whereas a majority of the marginalized population may not take the advantages of existing digital technologies [10]. Socioeconomic marginalization and related challenges may affect the adoption of such interventions among individuals [16], thus raising concerns for autonomy as those individuals do not have active participation in the digital health revolution. Also, using digital technologies may reduce repeated visits, cost of care, and minimize the socioeconomic burden of diseases [16,17]. At the current state of digital health in South Asia, a majority of the individuals do not have access to such technologies and, therefore, may continue experiencing the challenges within the traditional modalities of care [18]. From a global consideration, this problem can be analyzed as an issue pertinent to justice where populations in South Asia have a higher burden of diseases and lower access to technological advancements in healthcare, incurring high socioeconomic costs. Furthermore, the World Health Organization's constitution mentions health as “the

enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition [19].” In the era of digitalization, the digital divide in healthcare contradicts the above-stated health rights in South Asian nations, which should be critically evaluated to better understand the underlying challenges.

Challenges for digital health in South Asia

Several challenges may serve as bottlenecks in adopting digital technologies for healthcare in South Asia [10,20], which can be examined according to the socioecological levels starting from individual to systems-level in the context of South Asia. First, the availability of digital technologies may differ across populations and contexts, which may affect the implementation of advanced technological innovations [21]. For example, evidence-based digital applications requiring constant internet access or virtual reality-based devices may not achieve the desired level of success among rural populations in South Asia, who predominantly use non-compatible devices or have limited access to high-speed internet. Second, the pattern of using digital technologies may depend on individual behavioral factors [22]. Digital interventions developed without understanding the behavior of the potential users may lead to non-adherence and suboptimal consumption, resulting in an iatrogenic digital divide. Marginalized populations like people with low literacy or elderly adults who may not have similar digital behavior as young adults with higher literacy or behavior in adopting new technologies in a faster way [22,23]. Such issues may affect the adoption of digital interventions in South Asia. Third, generic digital contents like bulk text messages or generalized online resources may not fulfill the individual needs of the patients [24]. For this reason, digital interventions that worked in the developed nations may not be recommended in South Asia without evaluating the appropriateness of those applications. This lack of

personalized digital tools and contents for individual users in diverse socio-cultural contexts is another challenge contributing to the digital divide in South Asia [10]. Fourth, a critical lack of capacities among healthcare providers in South Asia, which can be a major concern for digital health in this region. Digital health is not widely taught in medical schools or health educational settings. In addition, most individual practitioners and institutional stakeholders may not have digital systems or adequate training in their professional settings to deliver digital health services [10]. This translational gap at the provider level may affect leveraging the benefits of digitalization in South Asian healthcare. Fifth, a low number of intervention studies conducted in South Asia also creates research gaps in this domain [10]. Little is known about the unintended consequences of digital interventions in the context of South Asia. Therefore, adopting innovative tools without fully understanding the adverse outcomes may create inadequate uptake and affect the trust of the users on digital systems as well as the healthcare providers who recommended the same. For example, a digital app providing reminders on medications and appointments, if not programmed robustly and pilot tested before mass implementation, may end up providing inappropriate information to the patients affecting the overall user experience. Last but not least, issues related to organizations and health systems can play an important role in shaping the development of digital health in South Asia [10,20]. In the pluralistic health systems in South Asian nations, many formal and informal providers may offer healthcare services that can be poorly regulated and standardized. Moreover, the existing health policies or regulatory measures provide little emphasis on the development of digital health across public health systems [10]. In such contexts, developing and implementing digital tools can end up being isolated efforts by individual providers or for-profit healthcare institutions. That may result in further inequalities, sporadic and uncoordinated development of technological innovations, poor

quality of digital interventions, and incur a higher cost to the users, providers, and society. An overview of these challenges is depicted in Figure 1.

Figure 1: Socioecological challenges contributing to the digital divide in South Asia

Potential strategies to address the digital divide in South Asia

It is essential to acknowledge that advancing digital health necessitates a deeper understanding of the context-specific factors, which should be extensively examined through local, national, and regional research. The findings of such research can profoundly inform how future interventions are likely to work in those contexts. For example, the Health Information National Trends Survey (HINTS) in the United States provides nationally representative data on health behavior related to digital health communications [25]. South Asian countries may consider developing such nationwide surveys for understanding the correlates of health information technologies across populations or incorporate key indicators within the pre-existing surveys to better understand the contextual factors. Furthermore, the feasibility and acceptability of advanced interventions should be field-tested and personalized

based on the recommendations of the users. In the developed nations, more emphasis is being given to promote personalized care to individual users considering the unique personal and clinical requirements [24]. In contrast, South Asian countries have a long way to go in implementing digital care systems ensuring individual needs of the patients. To bridge the existing digital divide, an early vision to adopt context-specific and personalized care in the era of digital technologies may facilitate the development of inclusive and equitable digital health in this region [10]. In addition, the engagement of multisectoral stakeholders, both at the local and global levels, can facilitate a meaningful exchange of knowledge and resources to develop inclusive and evidence-based digital health interventions in South Asia. Also, collaborative efforts by eight South Asian nations and regional forums like the South Asian Association for Regional Cooperation (SAARC) and other key institutional stakeholders may improve the availability and accessibility of digital health in this region. However, engaging people and institutions would be challenging unless the awareness on digital health is enhanced through multipronged communication strategies [10]. Improved knowledge and participation among the stakeholders may further help in mobilizing the community resources in respective nations and share the same across boundaries. For example, many healthcare researchers and experts in digital technologies from South Asia are working in developed countries, who can make meaningful collaborations contributing to the development of digital health in this region. The collective social capital of South Asian nations, both within the region and globally, should be mapped and analyzed to utilize the same in addressing the digital health divide in an ethical manner. Furthermore, the health systems must be strengthened to ensure the policies, regulatory frameworks, and institutional resources are available for designing a coordinated, quality-controlled, and robust digital ecosystem [20]. Without an enabling pro-digital health system and enhancing institutional capacities, it would remain challenging to bridge the gaps between local needs and global advancements in digital

health [10,20]. Recent advancements in India and Bangladesh have shown promising efforts in strengthening their digital infrastructures to provide optimal health services using digital technologies [20,26]. Lessons from those efforts and similar advancements in other South Asian nations should be shared among the nations to inform the development of digital health in this region. Lastly, synthesizing local and global evidence on digital health should be prioritized to inform the current gaps and develop evidence-based policies and programs for advancing digital health in South Asia.

Conclusion

South Asian nations continue to suffer a high burden of population health problems, whereas digitalization is transforming healthcare services and organizations and yielding improved health outcomes globally. It is essential to address the health disparities in this region through effective decision-making and improved access to care by leveraging digital health technologies. To achieve sustainable and high-quality digital health services, South Asian nations need to identify unique challenges and opportunities in this context, adopt evidence-based interventions customized as per the needs of the users, empower providers to use those technological in clinical settings, and engage key stakeholders to organize policies and resources needed to bridge the health divide in the era of digital revolution.

Funding: No funding was received at any state of preparing this manuscript

Acknowledgement: None.

Conflict of interest: We declare no conflicts of interest.

References:

1. World-Bank. The World Bank in South Asia [Internet]. 2019 [cited 2019 Dec 18]. Available from: <https://www.worldbank.org/en/region/sar>
2. Siegel KR, Patel SA, Ali MK. Non-communicable diseases in South Asia: Contemporary perspectives. Vol. 111, British Medical Bulletin. Oxford University Press; 2014. p. 31–44.
3. World-Bank. The Digital Economy in Southeast Asia Strengthening the Foundations for Future Growth. 2019.
4. Lewis J, Ray P, Liaw ST. Recent Worldwide Developments in eHealth and mHealth to more Effectively Manage Cancer and other Chronic Diseases - A Systematic Review. Yearbook of medical informatics. 2016. p. 93–108.
5. Hoch E, Preuss UW, Ferri M, Simon R. Digital interventions for problematic cannabis users in non-clinical settings: Findings from a systematic review and meta-analysis. Eur Addict Res [Internet]. 2016;22(5):233–42.
6. Allen C, Vassilev I, Kennedy A, Rogers A. Long-term condition self-management support in online communities: A meta-synthesis of qualitative papers. J Med Internet Res [Internet]. 2016 Mar;18(3).
7. Lattie EG, Adkins EC, Winquist N, Stiles-Shields C, Wafford QE, Graham AK. Digital Mental Health Interventions for Depression, Anxiety, and Enhancement of Psychological Well-Being Among College Students: Systematic Review. J Med Internet Res [Internet]. 2019 Jul 22;21(7):e12869–e12869.
8. Hong YA, Hossain MM, Chou WS. Digital interventions to facilitate patient-provider communication in cancer care: a systematic review. Psychooncology [Internet]. 2019 Dec 13 [cited 2019 Dec 24];pon.5310. Available from:

<https://onlinelibrary.wiley.com/doi/abs/10.1002/pon.5310>

9. Moore MA, Ariyaratne Y, Badar F, Bhurgri Y, Datta K, Mathew A, et al. Cancer epidemiology in South Asia - past, present and future. *Asian Pacific J Cancer Prev APJCP* [Internet]. 2010;11 Suppl 2:49–66.
10. Hossain MM, Tasnim S, Sharma R, Sultana A, Shaik AF, Faizah F, et al. Digital interventions for people living with non-communicable diseases in India: A systematic review of intervention studies and recommendations for future research and development. *Digit Heal* [Internet]. 2019 Jan 16 [cited 2019 Dec 24];5:205520761989615. Available from: <http://journals.sagepub.com/doi/10.1177/2055207619896153>
11. Borg K, Boulet M, Smith L, Bragge P. Digital inclusion & health communication: A rapid review of literature. *Health Commun* [Internet]. 2018 Jun 10;
12. Guta A, Voronka J, Gagnon M. Resisting the Digital Medicine Panopticon: Toward a Bioethics of the Oppressed. *Am J Bioeth* [Internet]. 2018 Sep;18(9):62–4. Available from: <http://10.0.4.56/15265161.2018.1498936>
13. Kalichman SC, Weinhardt L, Benotsch E, Cherry C. Closing the digital divide in HIV/AIDS care: development of a theory-based intervention to increase Internet access. *AIDS Care*. 2002 Aug;14(4):523–37.
14. Tombor I, Neale J, Shahab L, Ruiz M, West R. Healthcare providers' views on digital smoking cessation interventions for pregnant women. *J Smok Cessat* [Internet]. 2015 Dec;10(2):116–23.
15. Dor-Haim H, Katzburg S, Leibowitz D. A Novel Digital Platform for a Monitored Home-based Cardiac Rehabilitation Program. *J Vis Exp Jove* [Internet]. 2019 Apr 19;(146).
16. Latulippe K, Hamel C, Giroux D. Social health inequalities and eHealth: A literature

- review with qualitative synthesis of theoretical and empirical studies. Vol. 19, Journal of Medical Internet Research. Journal of Medical Internet Research; 2017.
17. Thibodeau LM, Schaper L. Benefits of Digital Wireless Technology for Persons with Hearing Aids. *Semin Hear* [Internet]. 2014 Aug;35(3):168–76. Available from: <http://10.0.4.31/s-0034-1383502>
 18. Majumdar A, Kar SS, S GK, Palanivel C, Misra P. mHealth in the Prevention and Control of Non-Communicable Diseases in India: Current Possibilities and the Way Forward. *J Clin Diagn Res* [Internet]. 2015 Feb [cited 2019 Jul 30];9(2):LE06-10. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/25859473>
 19. World Health Organization (WHO). Constitution of the World Health Organization [Internet]. [cited 2019 Dec 24]. Available from: <https://www.who.int/about/who-we-are/constitution>
 20. Bassi A, John O, Praveen D, Maulik PK, Panda R, Jha V. Current Status and Future Directions of mHealth Interventions for Health System Strengthening in India: Systematic Review. *JMIR mHealth uHealth* [Internet]. 2018 Oct 26 [cited 2019 Aug 6];6(10):e11440. Available from: <http://mhealth.jmir.org/2018/10/e11440/>
 21. Maffey G, Homans H, Banks K, Arts K. Digital technology and human development: A charter for nature conservation. *Ambio*. 2015 Nov 1;44:527–37.
 22. Czaja SJ, Charness N, Fisk AD, Hertzog C, Nair SN, Rogers WA, et al. Factors predicting the use of technology: Findings from the Center for Research and Education on Aging and Technology Enhancement (CREATE). *Psychol Aging*. 2006 Jun;21(2):333–52.
 23. Tsai HYS, Shillair R, Cotten SR. Social Support and Playing Around: An Examination of How Older Adults Acquire Digital Literacy with Tablet Computers. *J Appl Gerontol*. 2017 Jan 1;36(1):29–55.

24. Dinesen B, Nonnecke B, Lindeman D, Toft E, Kidholm K, Jethwani K, et al. Personalized telehealth in the future: A global research agenda. Vol. 18, Journal of Medical Internet Research. Journal of Medical Internet Research; 2016.
25. Nelson DE, Kreps GL, Hesse BW, Croyle RT, Willis G, Arora NK, et al. The Health Information National Trends Survey (HINTS): Development, design, and dissemination. Vol. 9, Journal of Health Communication. 2004. p. 443–60.
26. Ahmed T, Lucas H, Khan AS, Islam R, Bhuiya A, Iqbal M. EHealth and mHealth initiatives in Bangladesh: A scoping study. BMC Health Serv Res. 2014 Jun 16;14(1).