



Research Article

Telemedicine in Regional Prospects Towards Globalization: An Overview of the Telehealth Utility in Region Around Pakistan, Challenges and Opportunities from Neighbourhood

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ABSTRACT

The use of ICT in the healthcare industry overwhelmingly impacts and enriches service quality, improves availability and endorses healthcare management using electronic healthcare delivery systems (e-Health). Even though the implementation of low threshold, flexible and cost-effective e-health mediations in various settings of healthcare seems very promising, there is an enduring challenge to design, develop, implement and evaluate such HIT interventions within the multifaceted healthcare system consisting of high-pressured, rapid-paced and dispersed settings of healthcare delivery practised amongst different countries. Hence integration of ICT significantly impacts healthcare delivery in developing economies. If missioned to import from neighbouring technology-advanced states for assistance in underdeveloped and developing countries, it remains an opportunity as well as a major challenge. In this research, scholars have investigated the growth of Telemedicine in different regional countries around Pakistan as a future potential generic solution towards regional collaboration. It is also found that this part of the globe exhibits a unique picture with China and India leap-frogging with ICT including HICT whereas Pakistan, Bangladesh, Iran and Sri Lanka still stay infantile in HICT execution. A regional telemedicine network may emerge as having the potential of better health consultation for neighbours from neighbouring countries.

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INTRODUCTION

Partnerships working in health management and social scenarios refer towards the changes where various establishments or sectors amalgamate and exert together for the provision of better quality of services. A range of new healthcare concepts supplemented by technological environment has emerged during last era (Badri et al., 2018). One such, "E - health" is generally used as an umbrella term to pronounce the mutual usage of Information Communication Technologies (ICTs) in the health sector (Jin et al., 2020). Hence like many other sectors, the healthcare sector is experiencing rapid digitalization and

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growing number of healthcare users from developed, developing or transitional economies are using ICT-based distance health care delivery programs. Many countries across the globe have also drafted valid policies and strategies to transform their health economy into an HIT based economy.

Developing countries however are confronting enormous difficulties in delivering adequate and equitable healthcare mainly because of deficient fiscal, human and technological resources. There is acute constraint of qualified, trained and experienced doctors, nurses and paramedics who more so are often concentrated in urban areas. Inaccessibility to health care is identified as one most significant barrier in the delivery of equitable healthcare. Accessibility underpins the inequalities and the burden is most often borne by socially disadvantaged groups and regions. The situation is more prevalent in developing or under developed countries (Guo & Li, 2018). However, in developed countries, ICT is assisting in provision of innovative, more productive and more user-friendly means for accessing and delivering quality healthcare. The application of ICTs in healthcare (Christodoulakis et al., 2017) is thus a promising arena that can be effectively practiced to extend the delivery of quality of healthcare to people in different parts of the world across the state boundaries thus including the geographically inaccessible and socially under privileged populations. The speedy growth of ICTs has enabled radically novel practices of cybernetic alliance at remote locations. For delivering quality healthcare in particular for remote and rural regions, yet another potential stratagem is the use of Telemedicine (Palozzi et al., 2020) derecognizing the geographical boundaries.

Objective

To evaluate the efficiency of Telemedicine in Pakistan and its neighbouring countries with a view to study the prospects of regional telemedicine networks.

METHODOLOGY

To validate the research perspective, list of research engines and bibliographical sources were engaged for exploring appropriate peer-reviewed English-language text from various databases like MEDLINE, PubMed, Web of Science and Research Gate. The search included articles published from January 2015 onwards using key words. Additional search was undertaken by scrutiny of reference lists from retrieved articles. The keywords used in the search were: Telehealth; Telemedicine; Informational Health Technology; Healthcare delivery; eHealth and / or (China, India, Bangladesh, Iran, Sri Lanka, Pakistan). The constraints were made to search for (1) articles only, (2) articles published in English, and (3) articles published from 2015 to 2023.

Table 1

Database Search

	MEDLINE	PubMed	Web of Science	Research Gate
Identification	Records Identified through data base searching: 1148			
Screening	Records after duplicates (n: 168) removed Screened Records: 980 Excluded records reading title, abstract and introduction (n: 794)			
Eligibility	Full Text assessed foe Eligibility: 186			
Included	Studies included for qualitative study: 45 Excluded articles included non-English language, articles discussing scenarios (assumptions), time range, etc.			

We conducted a systematic literature review using large databases. Research studies of any design that deliberated telehealth applications undertaken in chosen list of countries in English language were considered eligible for inclusion. We performed a qualitative content analysis to extract information from each of the included articles. Maximum of the studies were found for China followed by India, whereas few studies addressing telehealth in settings of Pakistan and Iran. Studies were found in varied disciplines including internet hospitals to individual diseases like Diabetes Mellitus to individual settings like Intensive care unit, Emergency Medicine, etc.

No formal assessment was undertaken for quality of the included studies. A narrative summarization of the in hand and prospective infrastructure, policy and challenges was extracted for all discussed states. After rejecting studies having repetition of information and those which did not meet the inclusion

standards, 56 articles are referred. Studies generally stated the objectives but few stated research question or hypothesis. Maximum number of studies verified the efficacy of Telemedicine however its use was found limited in most of the countries due to poor infrastructure and perceived ability of telehealth mainly by healthcare seekers.

TELEMEDICINE IN REGIONAL COUNTRIES

Literature review reveals Telemedicine is now considered to be a valid option for wider adoption within and amongst countries to improve accessibility to quality healthcare. The issue of outpatient treatment through Telemedicine has further drawn attention with the advent of novel Covid 19 infection. However, telemedicine has a poor record of implementation (Dodoo et al., 2021) and a very patchy history of adoption. The foremost e-Health adoption concerns prevail in low- and middle-income states. It is important to understand the performance regional modules of ICT working in health to create a bigger horizon of e health interventions in region and to create officious health outcomes.

Telemedicine is appropriate to reinforce international collaborations and extend professional support of inaccessible medical specialties to underserved populace. In precise, regional alliances are desirable if telemedicine is chosen to help strengthening weak healthcare systems. The efforts may be directed towards a regional e-health system where the technology can aid the neighbouring less developed countries from more developed e-health neighbours. This would also assist in scrutinizing if standard HIT adoption readiness model can be developed in neighbouring developing countries.

Bangladesh

Peoples Republic of Bangladesh is an over-populated regional country with a massive population of 166,303,498, in 2021, spread over an area of 148,460 sq. kms. Roy et al., (2017) stated that over 70 % of state's populace is rural residents. Health and education levels of Bangladesh are relatively low. Like most of the developing countries Bangladesh is also a country with inadequate scattering of its health resources. The healthcare system in Bangladesh is highly pluralistic (Joarder et al., 2019). Nearly 75% of registered clinicians are working in urban regions due to deprived infrastructure in rural healthcare centres and villages. The present ratio of doctor-patient in state is 5.26 doctors per 10,000 populations, which according to WHO, places Bangladesh at second from the bottom, amongst the South Asian states. Similarly, Alam et al., (2016) found that countryside societies frequently have restricted accessibility to affordable health services. Uddin and Uddin (2018) further asserted that affordable healthcare is a daunting task for Bangladesh because of its very concentrated population density and feeble healthcare setup.

e-Health / Telemedicine

Luckily the telecommunication network in Bangladesh has wide spread coverage turning Telemedicine a potential tool for augmenting the existing healthcare performance for rural, under served and under privileged populations. For integrating the use of HICT into existing healthcare system, the network readiness index for Bangladesh is 40.93 (Dutta & Lanvin, 2019) although it still remains very challenging for Bangladesh. Steele et al., (2017) noted that 99% of the populace of Bangladesh has accessibility to mobile telephone networks, hence over 90 % of the land of Bangladesh is covered by mobile telecommunication networks and over 95 % of households are in possession of at least one mobile phone. Public healthcare centres are also furnished with desktops, laptops and internet connections (Hoque et al., 2014) to provide proficient telemedicine, m-Health and other e-health services to consumers.

Telemedicine Association of Bangladesh was established in 2001 but because of inappropriate deliberations, the e-health services remained inaccessible for the needy underprivileged and remotely located population. In public care hospitals, telemedicine was introduced in 2010 on a limited scale as initial step towards the Digital Vision of Bangladesh, 2021. Their practice in clinical practices in hospitals is found extremely sluggish. Presently, there are 84 telemedicine centres in 488 Upazila (sub district) hospitals. 27 specialized; district-level and medical college hospices are integrated to deliver telemedicine facilities for rural telemedicine centres. A central database is also established for proper record keeping, including data of all government employed doctors (Ahmed et al., 2014). M-Health services, ante natal

care through SMS, populace health registry online are the common e-health practices in public sector hospices in Bangladesh (Hoque et al., 2014).

Five of the public hospitals namely Bangabandhu Sheikh Mujib Medical University, Cancer Hospital, Dhaka Medical College and Hospital, National Institute of Kidney Diseases & Urology and Shaheed Shurawardy Medical College Hospital make use of telemedicine to increase accessibility for remotely situated rural population (Rahman & Shuvo, 2015). Presently, most of the private hospices in main cities of Bangladesh exercise some telemedicine application. The main private sector hospitals in Dhaka i.e., Apollo Hospital, Lab Aid Hospital, Square Hospital, United Hospital, Medinova Hospital and BIRDEM Hospital are using their intrinsic database system for patients' health records. Apollo Hospital has also organized a telehealth system to link patients and the doctors for better outcomes at a reasonable price (Faruqi, 2018).

Challenges of Telemedicine Adoption

Farzin et al. (2021) has debated that the outcomes of telemedicine in Bangladesh are varying and unreliable due to scarcity of empirically conducted studies. However, it is noted that to execute a well-managed, synchronized and equitable healthcare management system of Bangladesh, there is a pressing necessity to adequately harmonize HICT (Khan et al., 2019). Deficiency of adequate telemedicine infrastructure, technical and technological issues, implementation and sustainability costs, with insufficient amenities and irregular power supply are considered the major reasons for telemedicine projects failures in Bangladesh (Hossain et al., 2019). Although rapid HICT progress has impressively broaden the scope of e-health services, however the successful instituting of telemedicine services still needs a broad set of aptitudes of technologists, academics, scientists, engineers and healthcare providers (Jones et al., 2021) which are not that widely available in Bangladesh.

Sri Lanka

Sri Lanka is also a thickly populated state with a population of 21,582,910 in 2021, inhabitant over an area of 65,610 sq. km. The bulk of its citizens are poor (average household income < £ 40 per month), about four-fifths of Sri Lankans live in rural settlements. Sri Lanka's public healthcare model of free of cost primary health delivery is wide spread all across island. However, the healthcare delivery system is instituted with limited resources and is under increasing pressure (Kumar, 2019) from the heavy load of non-communicable illnesses, growing elderly care needs and the rising out of pocket spending for chronic diseases. Chapman and Dharmaratne (2019) found that the populace in rural and secluded areas of Sri Lanka has marginal accessibility to specialist consultations. Further evidence of lack of resources is very evident in Sri Lankan healthcare system (Saha et al., 2018). Private hospitals offer much more skilled and caring service than the public sector hospitals, but they are generally limited to Colombo and its suburbs and other leading cities only. Charges in private hospitals are very high and most patients are unable to pay as out of pocket expenditures.

e-Health / Telemedicine

The Government of Sri Lanka has already chalked out healthcare priorities for year 2020 and onwards articulating main intentions including better accessibility and improved quality delivery through the application of ICT. The government shaped national level e-health Steering Committee and e-health Technical Committee in June 2010 who succeeded in 2013 to create a national e-health Policy, e-health Standards and Guidelines and e-health Strategy. The network readiness index for Sri Lanka is 46.94. Many Telemedicine solutions have appeared in Sri Lanka over the past decade including video and audio consultations, tele prescriptions and prescriptions sent by SMS. The Sri Lankan Medical Association proposed a solution – “Doc Call” telemedicine service connecting people from all over Sri Lanka with highly trained healthcare providers 24/7 for primary health consultation (Karunathilake et al., 2022). HIMs is also practiced in large hospitals of the state. Identifying the needs of the population, Suwasariya (Health net) was established as a nationwide program for health education, promotion and delivery (Karannagoda, 2019). Suwasariya has a round the clock health help seeking call centres to offer assistance to resolve non-emergency medical issues by well experienced community physicians and medical officers.

The stratagem of developing eHealth HR in Sri Lanka is two-fold. HICT skilled doctors and IT professionals for the sake of planning, development, monitoring and evaluation of eHealth projects, graduate from a course being a joint project between the University of Colombo and the University of Oslo, Norway. The professionals are positioned all across the public health sector in Sri Lanka. This makes Sri Lanka as one of the very few republics across the globe to acquire such specialty. The next stratagem is the expansion of HICT literacy for entire healthcare workforce through workshops, seminars and conferences. The government of Sri Lanka plans to transform their healthcare delivery system from the medical centre concept to the whole country being a virtual community, having accessibility to healthcare providers through ICT. However, Si et al., (2017) contend that ICT-based healthcare services in Sri Lanka are still in their infancy; despite the very high mobile communication capability – a condition similar as in Bangladesh and Pakistan.

Challenges of Telemedicine Adoption

Although Telemedicine is one of the major components of national healthcare policy aims in Sri Lanka, the country is yet to harness its full prospective. A critical study published in 2016 advocated the impact of socio-culture construct and components of e health readiness on the implementation of telemedicine in remote areas of Sri Lanka with power supply and internet connectivity at rural areas are still worth focusing by Sri Lankan government.

Iran

Iran is an upper-middle-income country located in the south west of Pakistan. It is 1,648,195 sq. kms divided into 30 provinces and 336 districts. The current population of the Islamic Republic of Iran is 86,033,279 of which more than 65% are urban residents. By February 2017, around 14% of the Iran's population - 11 million individuals lived under the poverty mark. As per the World Bank, there are significant urban / rural variances. Iran has achieved notable progress in the health sector during the last 20 years showing upgradation in various health indices. The higher density of healthcare personnel in urban areas versus smaller cities / rural areas badly impacts the accessibility and quality of medical services (Chimeh & Behbahani, 2017). The bulk of private infirmaries are situated in urban areas which are reachable to individuals who can pay expensive charges. Hence studies show disparities in healthcare management in Iran supporting rich (Rezaeian et al., 2018). It was discovered that around 71 % of hospices are sited in vicinity of wealthy residents and only 29% were found in the locations of living of vulnerable groups of citizens. Moreover, there is also scarcity of specialists like neurology, orthopaedics, radiology, otolaryngology in remote regions. Hence virtual services can improve the accessibility in remote regions. The privatization process of the healthcare delivery in Iran has taken place without proper monitoring and evaluation. As cited by a researcher from Shiraz University "... the health service in Iran has no master plan and is in a state of chaos. The system is fragmented not only in financial resources, but also in leadership".

e-Health / Telemedicine

The network readiness index for Sri Lanka is 43.66 (Dutta & Lanvin, 2019). Saghaeiannejad et al. (2017) while investigating telemedicine in designated hospices of Isfahan University of Medical Sciences found positive operating probability as majority of practitioners believed that anticipated system will resolve many of the job challenges. But e-Health / Telemedicine is not included in routine delivery of healthcare services in Iran. Literature showed only few insignificant projects of text messaging, telephone support or home-based e-healthcare in the past years in Iran. There also exist important factors inclining the state of Islamic Republic of Iran towards telemedicine. It is estimated that 33% of the populace will turn over 60 years by 2050 getting increased probability of developing geriatric illnesses like Diabetes, Alzheimer's disease, etc. since around 80% of elderly have at least one of such chronic illness. This imposes serious problems on quality of sufferers' life, job productivity and further on health capital due to increased consultations. Studies showed that tele monitoring leads to a better-quality life for such intervention groups. Using telemedicine thus appears a gainful substitute in secluded, rural / urban dwellings especially in the project of "Family Physician" proposed by Iranian Ministry of Health and Medical Education (MOHME) (Doshmangir et al., 2017). MOHME have already executed tele-health services during of COVID-19.

Challenges of Telemedicine Adoption

Telehealth services in Iran have several challenges. The foremost include the absence of any definite strategy, vague and complex IT organization, cultural and awareness issues, funding e-health system and weak implementation (Ghafari et al., 2019). Another common obstacle towards implementing telehealth is the lack of motivation and ethos in the public. Ethical concern also exists in deprived areas of the country. Similarly, Asadzadeh et al., (2022) expressed the constrained information and experience of telemedicine amongst healthcare providers.

India

India is the world's second most populous country with a populace of 1,406,631,776 in year 2022. It is a pluralistic, multilingual and multi-ethnic society. Healthcare workers in India extend health provision to approximately 1.40 billion individuals, 60% of who reside in rural region with significant differences in built-up metropolitan urban areas and the rural areas mainly because of ill-equipped infrastructure and absence of professionals.

e-Health / Telemedicine

India is a country with massive unmet medical necessities. Mathur et al., (2017) advocated that telemedicine can potentially offer efficient and cost-effective healthcare delivery for underserved populace in India. The pilot project of Telemedicine in India was introduced by Indian Space Research Organization (ISRO) in 2001. The Health Ministry later organized a National Telemedicine Taskforce in 2005. Other national programs running in India include Integrated Disease Surveillance Project, National Cancer Network, National Rural Telemedicine Network, Digital Medical Library Network, etc. The public sector has also established an incorporated health information system including telemedicine and m-Health (Vijitha, 2018) for remote populace. Telemedicine technology in India has gradually but steadily extended its foothold. Ayushman Bharat Digital Health Mission (ABDM) is focused to develop the foundations of an integrated national digital health infrastructure in India, linking different stakeholders of the healthcare ecosystem via digital pathways.

Presently the Indian government telemedicine projects include country wide 382 hospitals, telemedicine services linked with 60 super-specialty hospitals (Mathur et al., 2017). Data reveals that over 300,000 health related concerns have already been addressed using telemedicine. Nahar et al., (2017) established that m-Health is one preferable and viable option for remote societies in India. Nearly 500 Village Resource Centers established in the country have been developed to offer a number of services including tele-education and telemedicine thus dragging the expert doctors' services to the distant villages. International ventures including Pan-African e-Network Project and the SAARC Telemedicine Network Project have also been initiated, strategically uplifting telemedicine in India. Telemedicine has also been employed in delivering healthcare during mass assemblies, like; Maha Kumbha melas through Mobile Telemedicine vans capable of videoconferencing enabling to deliver telemedicine-enabled medical and super specialty consultations. Recognizing the potential of telemedicine in healthcare, the Board of Governors of Indian Medical Council has approved the "Telemedicine Practice Guidelines" overarching both principles and the applied outline of telemedicine. It has also been encompassed as an amendment of Indian Medical Council (Professional Conduct, Etiquette and Ethics) Regulations, 2002.

The Indian Government has also incorporated private healthcare entities to deliver various e-Health applications. In fact, some of Indian healthcare provider organizations are now found at par even with the advanced western counterparts (Khan, 2018). Apollo Private Hospital, India has employed advanced telemedicine and tele radiology webs and offer support to Bangladesh, Nepal, Sri Lanka, Bhutan, Kazakhstan and Burma even assists US. Some other major private hospitals like Narayana Hrudayalaya, Asia Heart Foundation, etc. have also deployed telemedicine. In India, telemedicine is also stretched to include traditional medicine as well. The National Rural AYUSH Telemedicine Network intends to sponsor the traditional medicinal method to population using telemedicine. It is estimated that around 20 percent of the healthcare ecosystem will shift to tele-consultations, virtual care and remote nursing and monitoring out of hospital care in the coming years.

Challenges of Telemedicine Adoption

Despite all the success stories, this digitization of healthcare is yet to make its way through the government entities. The important issues critical in the delivery of telemedicine services needs addressing by stakeholders like the perception about Telehealth services amongst the public as well as the healthcare workers. The reliability, validity, privacy of information also needs strengthening. The training of technical support for staff is another important component in fostering proper system use as studies found the productivity from telemedicine relies on users' proficiency in explicit skills, which vary from those used during traditional face-to-face attendance system. Lastly, the rural infrastructure specifically the broad band and speed of internet needs further focusing.

China

China stands as world's highest populous country, having a populace of 1,449,962,989 individuals at a growth rate of 0.29 % spreading over an area of approximately 9.6 million sq kms. Presently China has the most number of active mobile phones in the world, with around 1.6 billion subscribers as in year 2022. China has also the highest number of internet and broadband users' - around 904 million, having 64.5% internet penetration rate in April 2020, as per the China Internet Network Information Center.

An emphasis on community health and preventive medicine has been the focus of the Chinese health policy since early 1950s. Although the traditional Chinese medicine practice is very strongly endorsed by the Chinese government, the western medicine has also gained increasing recognition during 1970s and 1980s. Traditional medicine includes herbal treatments, acupressure, acupuncture, moxibustion, cupping, qigong, tui na and such other traditionally unique practices. China undertook major health reforms since the Mao era in 2006 (Bu, 2017). The government initiated the New Rural Co-operative Medical Care System (NRCMCS) for the renovation of healthcare system, with particular intentions to turn healthcare delivery further affordable for the needy and the non-affording. Under the system, around 800 million rural inhabitants got access to basic, tiered medical coverage. With the "Healthy China 2020" ingenuity, the Chinese government was determined for providing inexpensive basic healthcare to all inhabitants by 2020. The healthcare infrastructure of Beijing, Shanghai and such like other major cities is now as per the developed-world standards but it differs in the rural interior. Public hospices and clinics remain accessible in major cities but the quality fluctuates with location. High quality healthcare resources are concerted in the developed Eastern region of China (Zhang et al., 2017), while the Central and the Western regions have comparable dearth of healthcare resources.

Sufficient numbers of doctors and nurses are regularly qualified, but majority of them aim to flee the rural areas, causing deficiencies in countryside. Privatization has also entered in China's healthcare industry with strong foot holds. China has also emerged as amongst major market for multinational pharmaceutical companies like Astra Zeneca, Eli Lilly, and Merck turning China a rising centre for medical research and development. However, despite the overall improvement, unfair distribution of healthcare resources amongst urban and rural areas, between areas of different economic developments, and between different communities of people have cause critical upsurge in the difficulties of healthcare delivery reducing the overall efficiency of the system. A health report of 2018 disclosed 10.91 medical technicians per 1000 individuals in China's urban zones, whereas only 4.63 in rural areas (Cui et al., 2020).

e-Health / Telemedicine

In China, growth of telemedicine commenced in 1980s. In 1997, Jinwei Medical Network was formally inaugurated to offer distant, real-time live video consultations for severely ill patients (Cheng et al., 2021). Thereafter, the medical institutions throughout China were instigated to explore and develop telemedicine (Zhai et al., 2020). By the year 2017, 22 provinces had instituted telemedicine platforms connecting 13,000 medical establishments, delivering tele diagnosis, tele consultation as well as remote medical education. The Internet Hospital has been introduced as an innovative organization and service module in the China's health industry. In 2014, initial internet hospital was established in Guangdong Province. The internet hospitals are internet based medical platforms which link online medical institutions for provision of different e-health services. It provides both clinical as well as nonclinical services varying from making and managing appointments or renewing prescriptions using telecommunication technology to arrange

face-to-face communicate with clinicians through internet.

First Affiliated Hospital of Zhejiang University established Zhejiang First Internet Hospital in 2016 which is linked with the tertiary care hospital. Till January 2019, the enlisted internet hospitals had stretched to around 130 (Han et al., 2020) across 25 Chinese provinces, accounting 73.5% of provinces or province-level municipalities of China. This integration of internet hospitals is sponsored as government-led, hospital-led, and enterprise-led integrations. In short, internet hospitals are flourishing in Chinese healthcare as joint efforts of public and private stakeholders to improve the simultaneity of scarcities of healthcare resources and unexploited medical amenities. Other than the internet hospitals, the medical consultants from large hospitals of developed provinces also provide tele diagnosis for patients in rural and faraway areas. Telemedicine hence is used as vital means for medical reforms and several programs have been assumed to adopt telemedicine in China.

Challenges of Telemedicine Adoption

With the marvellous growth of HIT in China, a number of healthcare organizations have instituted their own secluded platforms. It is essential to disrupt the barriers amongst diverse platforms and attain harmonization in between different platforms. Besides, there also exists discrepancy between the different modules of e-health like Health Information Management System, Imaging Platforms, etc which causes difficulties for users to get interconnected.

Pakistan

Pakistan is another South Asian densely populated country with a populace of 229,488,994 as of year 2022, spanning over 881,913 sq km. The humanitarian situation in Pakistan has displayed a very insignificant improvement as the country still has to take care of huge number of refugees and illegal immigrants creating social issues including healthcare support. As of year 2021, about 110,000 doctors are registered in Pakistan. The doctor to population ratio is significantly low falling far below the WHO revised standard of 1:600. Under such circumstances there is considerable evidence that adoption of HIT can contribute well in improving the situation. The National Health Vision 2016 – 25, as defined by the government of Pakistan is the improvement in health of all, particularly women and children by delivering access to affordable and meaningful healthcare services employing a resilient and responsive healthcare system, proficient of accomplishing the Sustainable Development Goals (SDGs) and satisfactorily fulfilling global health responsibilities (Shaikh et al., 2018). During the last government, Sehat Sahulat Program was regarded as crucial building block towards universal health coverage in deleveraging cost-free in-patient care for individuals / families living on less than 2 USD per day.

Presently, around 90 % of Pakistanis reside within the areas of mobile phone net coverage and over half of all Pakistanis have access to cell phone with Jazz (70.27 million), Telenor (49.44 million), Zong (40.69 million) and Ufone (22.91 million) subscribers. With 184 million mobile phone subscribers in July 2021, Pakistan had the highest mobile phone penetration rate in South Asia. 3G and 4G subscribers stood at around 100 million till July 2021. Pakistan also holds 8th largest population group of internet users around the world. There are 111.0 million internet users in Pakistan till January 2024.

Pakistan is currently amongst high disease burdened countries in the world which till time is found unable to grade itself of having a value worth healthcare delivery system (Javed & Liu, 2018). In Public sector, the therapeutic healthcare is delivered through primary, secondary and tertiary healthcare delivery system. A major strength is the primary healthcare outreach, which relies at lady health workers at community level. The primary care is delivered via Basic Health Units and Rural Health Centers. BHUs and RHCs offer healthcare services to a population around 100,000 within their respective catchment areas. The essential components of primary healthcare services at BHU mainly includes Maternal and Child Healthcare (MCHC), Health education, Immunization services and treatment of common diseases. In addition to services delivered at the BHU, the RHCs also provide diagnostic services as well. Secondary care encompasses a population of 1 to 3 million providing referral facilities, ambulatory and inpatient hospital care by Tehsil Headquarter and District Headquarter Hospitals. Majority of THQ hospitals have 40 to 60 beds for indoor patients in addition to OPD and diagnostic services. Specialist services are also available at THQ hospitals. Finally, the tertiary healthcare includes mostly the teaching hospitals.

The private health sector in Pakistan has not been adequately documented so far. Complementary, alternative and traditional healing practices are also popular in Pakistan. In addition, Pakistan Army Medical Corps is providing free medical services to far flung and isolated civilian population free of cost. Similarly, the non-state philanthropic sector has immense contribution to the landscape of healthcare services delivery in Pakistan. The state is facing a notable disparity in healthcare services amongst urban and rural societies (Mumtaz et al., 2017). Like other developing countries, Pakistan even after 75 years of establishment is facing serious problems in its healthcare services delivery (Roshan et al., 2018) as equitable and accessible healthcare services are not available at remote district levels. Pakistan has set an ambitious target of attaining Universal Health Coverage (UHC) for all Pakistanis by 2030.

Pakistan like all other developing countries is also facing acute shortage of essential medical workforce (physicians, nurses, LHVs and midwives, etc.). Pakistan is presently employing 1.69 essential health force individuals per 1000 population against target standard of 4.45 by 2030. Approximately 64% of the people live in countryside (Khan et al., 2019), whereas only 22% of the physicians work in the underserved rural communities. Despite, the number of lean strategies opted with resource distribution and HR management, the existing healthcare delivery system in Pakistan in present shape does not support the massive out of proportionate attendance of patients in outdoor consultation.

Telemedicine / e-Health

Limited use of IT and inappropriate infrastructure is perceived in healthcare system of Pakistan. A series of telemedicine projects have already been launched in Pakistan since 1998. In 1998, telemedicine was first introduced in Pakistan by Exilir Technologies USA, for teleconsultation from Holy Family Hospital Rawalpindi. The necessity of telemedicine was more earnestly realized after 2005 earthquake of Pakistan. Pak-US partnership led to establishment of a preliminary telemedicine / e-health training centre. However, the government started realizing e-Health as a useful modality for rebuilding of earthquake hit areas.

A pilot project of Universal Service Fund was later initiated in 2010 in 2 recognized healthcare centres i.e. Jinnah Post Graduate Medical College Karachi & Holy Family Hospital Rawalpindi. Later another telemedicine centre was established at Nishtar Medical College Multan. Despite basic infrastructure and planning, noteworthy use of tele health for therapeutic use is found lacking in all these projects, gradually diminishing its existence and value worth services for patients' health management. Similarly, amongst private sector, many short-lived health-tech startups surfaced during past decades. The novel COVID-19 pandemic has further pushed the course of our economy, society and healthcare towards IT mediated solutions. To bring quality medical practice to Pakistan during COVID-19 outbreak, some Pakistani origin specialists abroad stretched through Yaran-e-witan program to extend their services using telemedicine. More than 30 Pulmonologists and Critical Care consultants joined the e-health applications during this critical period but could offer only limited services. In private sector, hospitals like Aga Khan University Hospital Karachi and Shalamar Hospital Lahore launched limited free online telemedicine services during Covid outbreak.

Challenges of Telemedicine Adoption

The ministry of Health in Pakistan has no clear policy for technology application, telemedicine and its substructure growth. According to Telemedicine survey by WHO of 2016, telemedicine laws or regulations does not exist in Pakistan. Accordingly, most of the healthcare educational institutes have very limited tools and technology to produce HICT professionals. The procedure of certifying, licensing is found extremely weak and appraisal of the performance of healthcare professional is not conducted in the country.

CONCLUSION

The application of ICT and other digital healthcare interventions encompass the remarkable prospective to shrink inequalities between the countries and within the countries. Causal to the existing global novel covid-19 scenario causing high scores of infectivity (Khachfe et al., 2020) from each other and adding to it, the inequalities / inaccessibility to hospital or healthcare, a new trend of delivering healthcare service is persuaded and found already functioning useful (Kaambwa et al., 2017) to varying degrees in different

countries. It was the re advocacy of the mounting recognition of the potential benefits of the provision of therapeutic services at a distance (Lee, 2020) using Telemedicine. Telemedicine is now considered to be a valid option for wider adoption in developing countries with improved efficiency by overcoming the bottlenecks of time and cost in addition to deliver continuing medical education and training (Kanneganti et al., 2020). Cognizant of this fact, it is in fact high time to introduce innovative, IT based, flexible and responsive methods with the participation of all stakeholders i.e. healthcare users as well as healthcare providers. The challenge of today's researchers is to comprehend as how HICT grounded strategies, in real time local circumstances, can enhance and sustain "access to adequate equitable healthcare" in underprivileged areas and population and even in between countries. The facilities of e-Health distinguish no geographic limits and are not limited by brick-and-mortar partitions, making healthcare services accessible to all.

This part of Asia exhibits unique picture on regional canvas with China and India in possession of high IT technology including HIT. Experts in the field and IT literate populace are also high whereas Pakistan, Iran, Sri Lanka and Bangla Dash stay infantile in the use of advance HIT. The alarming query remains as if this proposed innovative e - technologies can deliver valid and requisite results under specific circumstances across each country that may be entirely different from where the technologies were developed as a welcome add-on to. Moving ahead, the accuracy and the safety of technology, the sustainability of e health interventions / telemedicine in developing countries also remains questionable (Quaglio et al., 2019). However, when suitably designed and applied, this supporting technology is believed to enrich efficiency as well as capacity well above the existing levels and telemedicine advanced countries can deliver assistance in equitable and specialist healthcare delivery to the neighbouring less technologically advanced countries across geographical boundaries to create a global village in healthcare. In this context, we opted to articulate a reflexive paper to present an overview of healthcare and eHealth in a global region which can be considered as a regional telemedicine village of technology rich and technologically weak states.

Future Research

- Trials with large participants from different segments of society with different constructs should be studied in order to generalize the findings of this study. Further studies should be undertaken in the particular scenario of neighbouring countries to further elaborate the constructs including any new constructs as per the political, social, financial, cultural and infrastructural environments of their existing healthcare delivery system.
- Research studies in the scenario of neighbouring countries to elaborate the prospects, resources and perception of healthcare seekers and healthcare providers in order to determine the real time picture execution of trans-border pilot project. Studies should also incorporate both the public and the private healthcare sector to generate a holistic view.
- Research studies to explore the potential of Telemedicine as adjunct or core feature in managing healthcare of the regional spectrum will also aid in determining the future directions.

Competing Interests

The authors has declared that no competing interests exist.

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