

Exploring the Challenges to Digital Health Literacy among University Students and Senior Faculty: A Cross-National Comparison Between China and Pakistan

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Abstract

The growing use of the internet demands the digitalization of health services worldwide. For this purpose, Information and Communication Technology (ICT) is used to access, understand, evaluate, and use online health information and services. Despite the rapid expansion of e-health technologies, university students and senior faculty continue to face numerous challenges that hinder the effective use of digital health resources, particularly in countries with diverse technological, linguistic, and sociocultural contexts. We conducted 16 focus groups and 30 interviews with students and senior faculty members, respectively, across two countries and sampled general and medical/health universities. Data were analyzed using thematic analysis in NVIVO and manual code segmentation (deductive and inductive). Results indicated that the major challenges faced by the university students and senior faculty across China and Pakistan were inadequate adoption of e-health technology, lack of English language proficiency to understand e-health sites, digital incompetence, lack of trustworthiness, socio-cultural restrictions, information overflow, content evaluation, confusing terminologies/abbreviations about health, along with the socio-psychological stumbling blocks in achieving digital health expertise. In conclusion, e-health literacy was driven by technological advancements and the digitalization of e-health services among educated inhabitants of China and Pakistan. Combined efforts by the government and university administration could enhance the acceptance and adoption of e-health services among educated youth.

Keywords: Exploring, Challenges, Digital Health Literacy, University Students, Senior Faculty, Cross-National Comparison, China, Pakistan

Introduction

With innovative technological advancements, global concerns shifted towards digitalizing health management among educated youth. The historical record shows that the term “Health Literacy” originated in the 1970s. This term initially referred to the ability to read, write, and understand health information. Later, in the 1990s, the term expanded to include digital tools such as computers, mobile phones, and the internet to support online consultations with doctors (Bin Naeem et al., 2021). In the 2000s, the term Digital Health Literacy (DHL) was officially introduced. It mainly refers to a person's ability to seek, understand, and use health information from digital platforms to make informed health decisions. It is an evolving

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concept that was characterized by digital health concerns, including blogs, forums, websites, and online health courses (Estrela et al., 2023).

Previous literature has shown that health-literate people understand the prerequisites and dynamics of their health issues. In recent years, the term DHL means i) reading, writing, and conceptualizing skills; ii) the process of learning; iii) applied, practiced, and situated skills; and iv) understanding an individual as an agent suffering through various physiological and health challenges (Sørensen et al., 2012). Furthermore, DHL can be accessed through various tools, techniques, and services, including apps, social media websites, and online platforms. These digital pathways equip individuals with technical skills, information literacy tools, and critical thinking to comprehend their health domains. Digital literacy empowers individuals to take control of healthcare service provision (Dadaczynski et al., 2021; Saad et al., 2022).

Over the last decade, the fast-changing IT environment has made newly developed e-tools more integrated, immersive, and task-oriented to support multiple online health consultations with physicians (Berg, 2014). In this phase, one of the promising revolutions in internet services was 5G networking. With this technological innovation, educated communities (especially youth) are more willing to seek online health consultations with doctors for several reasons, such as self-care, preventive measures, health risk awareness, doctor-patient online communication, and medical consultations (Ahad et al., 2020). Similarly, previous theoretical reflections indicated that educated communities used e-health services for several reasons, including access to online healthcare tools, belief in faster recovery through online consultations, and lower physician fees for digital consultations (Wilson et al., 2024).

The digitalization of health care services is spreading across the globe, from developed countries to economically disadvantaged regions. Still, technologically advanced countries use more digital healthcare tools, techniques, and procedures than underdeveloped countries (Shi et al., 2023). A report from the Pew Internet and American Life Project demonstrated that the prevalence and use of IT are spreading faster than population growth worldwide (i.e., 7.9% versus 1.4%). Another Pew report found that more than 52% of smart tool users, such as Android phone users, searched for a health issue more than once. The Ministry of Youth Affairs in Pakistan also demonstrated that the educated segment of society used the Internet to search for health-related apps, websites, and blogs more than the uneducated community (Adil et al., 2021). The statistical data from China, as reported by Internet World Stats, show that the number of internet users increased from 22 million in 2000 to 1010 million in 2022, with a current internet penetration rate of 69.8%. The primary uses of the internet for e-health apps were focused on providing healthcare support, conducting online consultations with doctors, and reading blogs, articles, and websites to find health information (Zhao et al., 2024).

Given the rapidly fluctuating trends in digital healthcare services, the primary aim of the present study was to explore the major challenges faced by the educated community in the two digitally polarized countries of China and Pakistan (Adil et al., 2021; Jiang et al., 2024). DHL's significance is evident in its cost-effectiveness, accessibility, and availability across the regions studied. Despite these benefits, literate people worldwide face various obstacles in using e-health services. These challenges varied across indigenous contexts, including access to online health systems, understanding the languages and patterns of online tools, and engaging with preventive measures. Moreover, elders' digital incompetencies, local restrictions on online consultations, lack of trust in the digitalization of medical services, and language barriers were major hurdles to the polarization of e-health accessibility (Khan et al.,

2019; Yao et al., 2022). By investigating the determinants, challenges, and opportunities associated with digital health literacy, this study aims to contribute to a more inclusive and effective digital healthcare ecosystem.

Methodology

Study site

The present study was conducted in two geographically adjacent and technologically polarized South Asian countries, i.e., China and Pakistan. These research locales were selected to identify the primary use of digital health services among educated youth. From each country, two technologically diverse cities were selected: Wuhan and Putian (China), along with Lahore and Multan (Pakistan). These cities were technologically equipped but differed in the usage, proficiency, and barriers towards e-health services among university students. Putian and Lahore are well known for their excellence in electronics and the spread of technology-based medical facilities. On the other hand, Wuhan and Multan are also being invigorated by digitalization, but they still fall behind Putian and Lahore.

Research design and sampling procedure

To explore the phenomenon under study, the researchers used intra-method triangulation using In-Depth Interviews (IDIs) and Focus Group Discussions (FGDs). This study design allowed the researchers to provide an in-depth understanding of individuals' behavior in accessing, using, and mastering e-health services. The inclusion criterion for the interviewees was subsequently mentioned: i) have access and expertise with e-health websites, ii) have sufficient proficiency in English/Chinese/Urdu for the conduct of interviews, iii) have expressed their willingness to participate in the research process, and iv) sampled students must not be involved in any illegal/non-compliance activities (such as behavioral misconduct). The data were collected from one health sector/medical university and one general university in each selected city. University students from two majors, “medical-related” and “non-health-related/general,” were included in the sample. We purposively selected four cities (Lahore, Multan, Wuhan, and Putian) from the two countries (Pakistan and China). We selected two public-sector universities from each city (one in the health sector and one in the general sector). In total, we conducted 16 FGDs with enrolled students in the Master's/M.Phil./Ph.D. programs in general universities. In health-related/medical universities, we selected students from MBBS, BDS, and other associated medical programs (see the sample derivation in Tables 1 & 2).

While conducting the FGDs, we appointed one moderator from each university with the proficiency, experience, and relevant degree to lead the group discussions. For this purpose, we appointed four moderators (two Chinese and two Pakistani), each holding a relevant degree and at least 3 years of experience conducting FGDs. Afterward, we conducted 3-5 IDIs with the Pro-Vice Chancellor, the Dean of the relevant faculty, or the senior-most teachers (in the promotion hierarchy) from each university. In aggregate, we conducted 30 IDIs (14 from Pakistan and 16 from China) across the four sampled universities. Two interviewers (one Chinese and one Pakistani) were appointed, each holding a degree in Public Health/Sociology/Psychology (with a major in qualitative research) and at least 3 years of experience in collecting qualitative data in the given research settings.

The first author collected the data from Pakistan, while the second author collected data from Chinese universities. In addition, two students from Pakistan also contributed to data collection. These students were pursuing Ph.D. and postdoctoral studies in Sociology, and published various research articles in reputable, high-impact-factor journals.

Instrumentation

To enrich the data through triangulation, the researchers used two data-collection tools: an Interview Guide (for IDIs) and a Discussion Guide (for FGDs). To achieve data saturation, interview questions were semi-structured, with relevant points written by the interviewer to facilitate informants' understanding of the research process. The tool included open-ended questions to explore interviewees' real-life stories, narratives, and opinions, and to inductively develop themes. Additionally, as DHL is a new phenomenon with limited literature and theoretical insights, individual and group viewpoints from university students would help explore new dimensions of the topic and provide a range of perspectives.

Ethical considerations

Data collection followed ethical guidelines for research on the use of e-health services among educated youth and senior faculty members. The first ethical parameter was to ensure that participants' names, telephone numbers, university names, and other relevant personal information (during FGDs and IDIs) would be kept confidential. Subsequently, the researchers acquired the participants' verbal and written consent before conducting FGDs and IDIs. The researchers obtained ethical approval from the Ethical Review Board (ERC) of the sampled universities.

Data analysis

Data were analyzed using thematic analysis with NVIVO software and manual code segregation. After audio-recording, the researchers transcribed the IDIs and FGDs (using verbatim transcription). The interviews were conducted in two languages, i.e., Chinese and Urdu. Subsequently, the transcriptions were back-translated with the consent of the interviewees and discussants. Two Ph.D. scholars in Public Health and Sociology, along with one M.Phil. scholar in Medical Sociology, conducted and analyzed the verbatim transcription. After transcribing and translating the interviews, we developed and sorted codes (deductive and inductive) using NVIVO software. We constantly compared the codes to manually analyze the flow of data between the two countries. Subsequently, we bracketed the themes against the data. We reviewed the transcripts multiple times to identify transitions, inconsistencies, flow, disagreements, and points of consensus among participants during IDIs and FGDs. We compiled the consensual codes and then grouped them into themes.

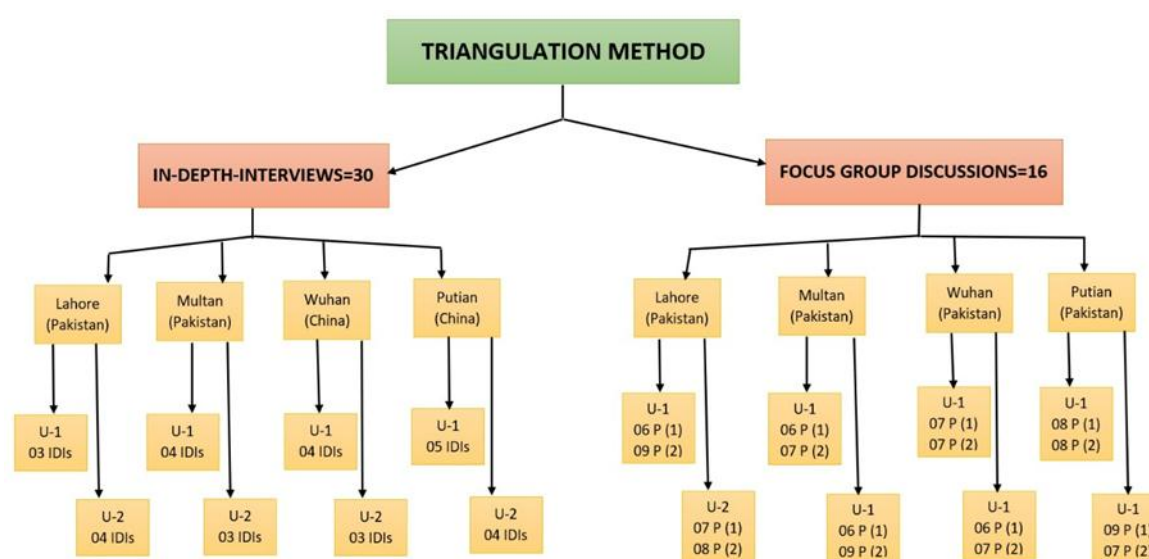
Table-1: FGDs conducted in Pakistan and China (N=16 FGDs: China=8 FGDs, Pakistan=8 FGDs) (117 Discussants: Pakistan=58, China=59)

City serial	University Serial	FGDs Serials	Number of participants in FGDs
City-1 (Lahore)	University-1	FGD-1	06
City-1 (Lahore)	University-1	FGD-2	09
City-1 (Lahore)	University-2	FGD-1	07
City-1 (Lahore)	University-2	FGD-2	08
City-2 (Multan)	University-1	FGD-1	06

City-2 (Multan)	University-1	FGD-2	07
City-2 (Multan)	University-2	FGD-1	06
City-2 (Multan)	University-2	FGD-2	09

Table-2: IDIs conducted in Pakistan and China (N=30) (Pakistan=14 IDIs) (China=16 IDIs)

Country	City serial	University Serial	Number of participants in IDIs
Pakistan	City-1 (Lahore)	University-1	03
Pakistan	City-1 (Lahore)	University-2	04
Pakistan	City-2 (Multan)	University-1	04
Pakistan	City-2 (Multan)	University-2	03



Results

Descriptive analysis

FGDs from China and Pakistan indicated that the discussants were at the M.Phil/MS or Ph.D. level at general universities, whereas at the MBBS level at Health-Sector/Medical universities. The age range was 18 to 35 years. In Pakistan, a significant majority of students belonged to the extended and joint family system, while Chinese students were residents of nuclear and extended family types. Data on monthly income indicated that the FGD discussants from Chinese and Pakistani universities were from middle-class families. Additionally, IDI data indicated that participants' ages ranged from 50-65 years. Most of them were well educated, with doctoral degrees and postdoctoral experience. The IDIs revealed that the majority of participants were part of nuclear family systems at Chinese and Pakistani universities.

Thematic analysis

Inadequate adoption of e-health technology

FGDs indicated that digital infrastructure in China is more developed; therefore, students have improved access to health services. Discussants from General universities in Wuhan and Putain cities reported difficulties learning to use the new e-health sites/apps to address their medical problems. Health sector participants from China used e-health consultations for various purposes, including weight loss, muscular ailments, nutritional deficiencies (which reduced strength and muscle mass), headaches, eye irritation, body shape maintenance, and self-care. Medical discussants in Putain (China) argued that the purpose of this foreign communication was *“The completion of their medical assignments and making notes on the multifaceted lectures.”* An idea was recruited from FGD-1, University-2 of Wuhan (China);

“The students want to be educated through the digitalization of the health services, but they are unable to cope with the day-to-day launch of e-health sites.”

Transcribed data from Pakistani students showed that they faced impediments to accessing uninterrupted internet service due to limited data (MB/GB). Participants from general and medical universities who came from financially stable families had broadband services, leading to excessive internet data usage. Conversely, most discussants with mobile data packages experienced internet problems and weak signal issues. Pakistani students also reported that another hurdle to adopting new technology was a lack of adequate devices, such as mobile phones/computers/desktops/tablets. Participants from Multan (Pakistan) reported that females were strictly prohibited from using e-health services for the consultation of their private issues, such as menstrual problems, uterine swelling, vaginal bleeding, and ovarian cysts. In homogeneity, an idea was recruited from the FGDs conducted in Pakistan;

“The social fabric of Pakistan is based on seeking health cures through religious scholars (Aamil) or herbal/medicinal cures. Therefore, the older generation restricts youngsters from adopting new e-health apps to treat their medical illnesses.”

IDIs divulged that the Chinese faculty members have uninterrupted access to the internet and digital devices. The interviewees disclosed that they attended workshops and seminars (specifically designed to enhance their e-health awareness). Senior faculty members at the Chinese medical universities were renowned surgeons; still, they faced various impediments, such as difficulty adapting to newly launched health services, a lack of technical expertise in using e-health apps, and busy schedules, which resulted in limited interaction with the e-health world. A well-known 55-year-old Chinese surgeon from the Medical University of Wuhan argued that;

“Digitalization of health is the best scientific conquest, but most of us do not have enough time to adapt to the newly launched digital health apps. That’s why I feel irritated by putting all the complex health information in digital apps.”

The senior faculty members from general universities in Pakistan agreed that they mostly used *“Google”* to find the underlying causes of their muscle pain and headaches, as well as to maintain their body weight. Transcripts from Lahore (Pakistan) revealed that, due to low-budget universities, there was no proper training in using the newly launched online health services. Senior faculty members from general universities in Multan (Pakistan) agreed that they felt fear and panic about incorrect diagnoses in the e-health world. Physicians at medical

universities noted that non-cooperative social norms limited the full use of e-health services. Endorsing these viewpoints, a Dean of Social Science from the General University of Multan (Pakistan) argued that;

“I feel fear of putting the wrong information in the complicated e-health sites. I also feel dissatisfied: without touching the painful area, how can a doctor prescribe some medications and prescriptions?”

Lack of English language proficiency to understand e-health sites

Group discussions indicate that Chinese participants encountered greater difficulties with English proficiency on e-health sites. FGDs disclosed that the students had difficulty understanding, reading, writing, and speaking English. Even the government's official e-health websites were a mix of English and Chinese. Data from 2 FGDs indicated that they mostly used Google Translate to interpret English text into Chinese. Transcriptions from the general universities of Wuhan and Putain also revealed that the medical data on the e-health sites was presented as complex English-language pictorial representations of health ailments. This multifaceted data was understood only by medical students, not the general public. An idea was drafted from the Chinese discussants in Putain University-1 as follows;

“e-health websites mostly demonstrated their content in complex English-based pictorial format. It is not easy for a general student to understand the complicated diagrams and videos for their medical ailments.”

Discussants from the FGDs in Pakistan revealed that during their early education, the medium of instruction was Urdu, but as they grew older (especially at the intermediate or high educational levels), their courses were taught in English. Medical and general university students agreed that they faced less difficulty understanding e-health sites in English. The students from the Social Science and Languages departments of the general universities of Lahore and Multan revealed that they were unable to master English language skills. Transcribed data from Multan (Pakistan) illustrated that *“e-health sites are more beneficial to the Medical students as compared to the general university students.”* During a group discussion from Lahore (Pakistan), a consensual idea was generated as follows;

“Pakistani students have better proficiency in the English language. The major underlying challenge is understanding, reading, writing, or speaking the unique and specific medical terminologies in online consultations from the physician.”

Data from IDIs revealed that senior Chinese professors had easy access to e-health apps. Interviewees from both countries agreed that their busy schedules made it convenient to consult doctors online via e-health apps. Extending this argument, senior teachers from medical universities demonstrated that the e-health sites used difficult medical terminology that non-medical users do not understand. In a consensual argument, it was evident that senior faculty members from China faced various stumbling blocks such as i) trouble in putting the health information on the e-health sites ii) difficulty in understanding the UK and US-based English language iii) inability to understand the information required by the e-health services such as passwords, personal information, medical symptoms, food intake (such as excessive fiber, carbohydrates, proteins, etc.), along with the vitamin and mineral deficiency. A senior Chinese professor from the General University of Wuhan endorsed the argument of three interviewees from Putain;

“Sometimes we are ineffectual in understanding the newly launched e-health sites. Our inability to write accurate English on these apps resulted in hindrances in getting appointments from the concerned physicians/surgeons.”

The faculty members from Pakistan also faced challenges related to English proficiency for e-health consultations. The foremost hindrance was differentiating among UK-, US-, Australian, and Canadian-based variations of English on e-health sites. Moreover, demonstrating e-health apps/sites/services was difficult, as it required capturing all symptoms and medical ailments in the digital world. Extending these underlying problems, a Dean of Social Sciences from the General University of Lahore argued that;

“The complex presentation of the e-health sites in tough English terminologies is a big question mark for the e-health world. Even an educated person cannot use Google Translate to understand the pictorial presentation of health data.”

Digital incompetencies, lack of trustworthiness, and socio-cultural restrictions

Data from Chinese focus groups indicated that IT and medical students were more proficient in using digital health apps. Conversely, students in the Social Science and Natural Science departments faced hurdles in booking online doctor appointments and using newly launched digital health apps/sites. In consensus, Chinese students questioned the anonymity and confidentiality of their health data. They revealed that their acquaintanceship stigmatized youngsters *“as mentally/psychologically ill”* who consult doctors for their anxiety, stress, and depression issues. Likewise, the teenage male students who wanted to inquire about their sexual problems were considered to be physically *“non-mannish.”* Chinese cultural norms also view online health apps as a *“hiding condition”* or an *“escaping phenomenon.”* An idea was recruited from the discussants of the general university situated in Wuhan;

“Ensuring trustworthiness and respecting the socio-cultural norms are the rudiments before using digital-health apps. Inappropriately, the e-health sites openly disclose the patients' history on their web pages.”

Transcribed data from Pakistan unveiled that the cultural web was based on male-dominated orthodox ideologies. Therefore, females were restricted from using health-related apps for their physical ailments. For example, young females were subjected to consult for their menstrual problems and sexual health, as it was strictly prohibited in the cultural nexus. Even male students were prohibited from discussing various mental health ailments and sexual issues. As Pakistani students faced economic problems, online consultations with doctors and solutions to their medical problems through e-health apps were economically infeasible. Endorsing the viewpoint of FGD-1, University-1 from Multan, the discussants from FGD-2, University-2 from Lahore (Pakistan) argued that;

“Doctors usually charge PKR 2500- 3500 for a consultation visit, but e-health appointments cost half, i.e., PKR 1000- 1500. Still, the university students avoid these economically suitable consultations due to a lack of privacy about their health data.”

Transliterated data from faculty members in China indicated that they lacked sufficient digital expertise to retrieve information from e-health websites. These participants also illustrated that over the age of 50 years, they faced various health ailments and muscular pains. In light of these arguments, a professor from the General University of Wuhan (China) argued that;

“Lack of expertise about e-health sites is the major challenge faced by people who are more than 50 years old. The major underlying reason is their busy schedule, academic duties, and administrative assignments, which distance them from getting expertise in mastering the e-health apps.”

In extension, the transcribed interviews from Pakistan disclosed that a person needed an “*approval of trust*” to show his/her body parts to the doctor for certain pains, spots, allergies, cuts, or scars. It was also reported that they developed a “*digital panic*” about erroneous information from an online consultation, which resulted in the physician prescribing the wrong medication. Participants from both countries illustrated that the government-operated websites were trustworthy, but the personal blogs and apps must be approved to “*ensure the ethical guidelines*” for the faculty members. During IDI, a senior surgeon from the Medical University of Lahore argued that;

“I think .gov is more trustworthy than .com. I believe that personal health blogs often cause panic among us. Youngsters often overcome this panic, but our generation always feels threatened that some serious disease is always waiting for us.”

Information overflow, content evaluation, and confusing terminologies/abbreviations about health

Transcribed data from Chinese university students showed that there is a large amount of information on the internet about health problems. It included various sites, apps, and emails that address curing viral diseases, maintaining body shape, and preventing contagious ailments. During the FGDs from the Medical University of Putin, the students argued that they constantly get health-related emails. A consensual regeneration was the “*receiving of spam emails about health*.” Similarly, the students said they faced hurdles in evaluating the accuracy of health content. Therefore, they drew inferences about websites, blogs, and apps solely from their titles. From the transcriptions, it was apparent that they were excited by the catchy content, but they often encountered disappointing results. For example, the blog title was “*Are you ready to detoxify your body and reach the ideal BMI?*” Relatedly, the medical students had some health knowledge, and the general university students “*just followed*” the guidelines in the content. Consistently, the female discussants from 4 FGDs in China reported using health apps to enhance their beauty, such as for hair growth, skin tightening, weight loss, or muscle mass gain. An idea was recruited from the FGD conducted at the General University of Wuhan;

“Students usually search for health content by attractive words such as weight loss in one month, skin tightening in one week, and detoxifying your body within three days. These statements sometimes led to disappointing results due to students’ inability to understand the specified medical terminology.”

The FGDs from Pakistan divulged that students faced many problems in identifying authentic websites and accurate health information. Discussants attributed counterfeit e-health content to information overload on the internet. A participant in the FGD from Lahore argued that females are attracted to diet plans such as KETO, high-protein, low-carb, and portion control. In this regard, general university students did not research the prerequisites and consequences of these diets, resulting in various health issues such as menstrual irregularities, hair loss, and muscle pain. In addition, the FGDs from Lahore and Multan showed consensus that general

university students had difficulty finding and understanding medical terminology and abbreviations. Discussants from 2 FGDs in Lahore and 1 FGD in Multan cited the major abbreviations as NCP, PTH, REB, SOP, CVA, IPF, and LLU. In addition, the highlighted medical terms from the transcribed data for Pakistan were collagen, Chem Panel, Sublingual, ear ointment, adhesions, Anemia, Antispasmodic drugs, Laparoscopic ovarian drilling/diathermy, Neural tube defects, and Pelvic congestion. An idea was recruited from the group discussions of the Medical students in Pakistan;

“We are medical students; therefore, we know about the health content terminologies and abbreviations. Conversely, the general students get chaotic about the complicated medical content and spam websites due to information overflow.”

The IDIs with senior faculty members from China substantiated the claim of information overload in the digital world. As a result, they struggled to find authentic websites about their health conditions. The senior faculty members from the medical universities of Wuhan and Putain also disclosed that they remained busy in their professional lives. As a result, they were unable to distinguish the originality of e-health websites. A senior faculty member from the Social Science department of Wuhan University disclosed that;

“Receiving spam emails and the bulk of websites on a single health ailment is confusing. I think the digitalization of healthcare is more beneficial for students and teachers in the medical field.”

Extending these arguments, transcribed data from senior faculty members in Pakistan showed that people over the age of 50 had more trust in indigenous medical systems, such as Hikmat and Dam Darood (Charms and Amulets), promoted by religious scholars (Mullahs). The data also showed that, unlike the students, senior faculty members were not attracted to the title content; instead, they searched for relevant information throughout the article. Endorsing the comments of the 4 IDIs from University-1 and University-2 of Multan, the senior faculty member from University-1 of Lahore illustrated that;

“I always prefer to search the whole article content rather than focusing on the attractive title. Although I find it difficult to understand medical terminology, I still look up its details on Google.”

Socio-Psychological stumbling blocks

Transcripts professed that Chinese students faced the social challenges of labeling, stigmatization, and psychological problems due to their health ailments. Students from FGD-2 and University-1 in Putain reported that their sedentary lifestyles during academic coursework led to various health issues. However, the mild psychological ailments converted into panic attacks when the students encountered scandalous health results. For example, it was mentioned in a group discussion conducted in Wuhan (University-1) by a 22-year-old female that she suffered from irregular menstrual cycles. She used government-supported websites/apps/online blogs/consultations to find the solution to her health problem. It was declared that she suffered from PCOS, which was considered to be the usual gynecological problem faced by young females. The situation became worse when it was mentioned on e-health sites that *“if left untreated, PCOS could be dangerous and lead to cancer and ultimately death of a female.”* An idea was procured from the group discussion at the Medical University of Wuhan;

“The social disallowance for the mental and sexual health problems of the university students is a big question mark on using the e-health sites. The situation gets worse when the students search for their health problem on an unauthentic website, which causes panic about their worsening health.”

The group dialogues from Pakistan divulged that female university students confronted numerous problems in addressing their health issues because society stigmatized them as physically inappropriate for marriage. Even the females who were insulin resistant were considered to be suffering from “*some incurable chronic disease*.” Transcripts from Lahore and Multan (Pakistan) revealed that female students faced social resistance when seeking weight loss, muscle building, BMI maintenance, skin glow tips, and body shape maintenance. Moreover, it was also reflected in the data that the obstinate cultural restrictions on females lead them towards “*panic attacks*” due to fear of their publicly open online health data. The consensus from the group discussions showed that social pressures push youngsters to prefer face-to-face consultations/appointments with doctors. The main reason was the lack of authenticity on e-health websites, in spam emails, and in consultations. The idea from the FGD-2, University-1 from Multan (Pakistan) divulged that;

“The students face societal stigmatization and psychological pressure while searching for their medical ailments on the e-health apps. These socio-psychological stumbling blocks restrain the students from opting for the e-health world.”

The IDIs from the senior faculty members from China and Pakistan illustrated that physical and psychological problems were reciprocally interrelated to each other. The senior faculty members from China said that due to their balanced diet, usage of warm water, and inclusion of exercise (as a lifestyle), they faced fewer physiological issues after the age of 50 years. In contrast, the Pakistani faculty members argued that they faced various health issues due to their poor dietary habits, overburdened work, absence of physical activity, and sedentary lifestyles. The major extracted viewpoints were i) fear of stigmatization about a certain disease, and ii) feelings of panic about the aftermath of their physical ailments. An IDI from Lahore (Pakistan) endorsed the statement of the three IDIs from Multan (Pakistan) that “*Suffering from muscular pains, headaches, migraine, or high blood pressure is an alarming sign that we are heading towards some serious disease.*” A faculty member aged 55 years from the General University of Putian also endorsed the viewpoint of the four senior faculty members from Wuhan University and demonstrated that;

“The social fabric expected me to take an authentic second opinion and to use the face-to-face consultation with the doctor.”

Discussion

The present study was designed to investigate the digitalization of healthcare services in Pakistan and China. The study presented access, utilization, and operationalization of e-health services through blogs, websites, apps, medical consultations, and web pages (Wisniewska & Rozycka, 2021). The e-health industry is clearly a promising medical advancement in the 21st century. Amid this, China was rapidly adopting e-health services at an annual rate of 29% (Hsu et al., 2014). Although educated youth are aware of the need for e-health consultations, inadequate digitalization of communication reflects the negative consequences of seeking online assistance for health ailments (Nandan et al., 2022).

The thematic analysis showed that the socio-demographic characteristics in the present study were divided into two age groups: university students and senior faculty members. Both age groups used e-health services, but the intensity of the challenges they faced varied. In addition, senior faculty members were unable to cope with the rapid growth of newly launched e-health consultation services. Supporting these findings, the aforementioned studies also showed that age is negatively associated with the use of e-health apps for medical ailments. These empirical validations also highlighted that younger, older, and migrant age groups were extensively using digitalization to treat their medical ailments. Still, use and access to these health services differed across these research groups (Choukou et al., 2022; Estrela et al., 2023).

Our findings also showed that China's social fabric was more supportive of accessing and using e-health services than Pakistan's. Supporting this finding, prior empirical evidence indicates that Chinese students were more likely to access newly launched digital health apps than Pakistani students (Mahdi et al., 2022; Wu et al., 2022). Conversely, the socio-cultural nexus in Pakistan was not supportive of using e-health consultations. The main underlying reasons were inadequate access, utilization, and expertise with e-health sites; limited economic resources to purchase digital health devices; interrupted internet services; and restrictions on females sharing their health issues on publicly accessible e-health websites. The authenticity of these findings was also confirmed by the research studies of Qureshi et al. (2014) and Tariq et al. (2020).

The empirical findings of the present comparative study indicated that more than 80% of the digital health landscape (apps/consultations/websites/blogs/webpages) was presented in English. In terms of diversification, the Chinese and Pakistani students faced problems with their English proficiency. Previous empirical evidence from South Asian and other developing countries has also supported this finding (see Aldosari et al., 2023; Mandirola et al., 2015). Extending this challenge, the major stumbling block for university students and senior faculty was a lack of expertise in conducting digital health consultations. The transcribed data also revealed that IT and medical students were more proficient in using e-health consultations than general university students. The senior age group, i.e., faculty members, also confirmed that they faced impediments in using the newly launched e-health apps/sites. In compliance with the present study findings, previous pieces of evidence also validated that individuals, regardless of age groups, i.e., youngsters and older people, faced problems in using, understanding, and accessing digital health apps (see the related studies of Liu et al., 2024; Melchiorre et al., 2020). In line with the present research findings, it was evident that medical students can understand the difficult terminology and content on e-health sites. Prior literature also reported that difficult vocabulary and content in e-health apps/websites were major reasons for avoiding online health consultations in the study areas (see Talwar et al., 2023; Zhang et al., 2023).

Transcriptions also revealed that the online health services were presented as purely medical content, consisting of abbreviations, specialized terminology, and information not understandable to the general population. Previous studies also found that complex pictorial presentations of medical terminology, along with beguiling content containing false information on websites, were major challenges to using e-health services (Saad et al., 2022; Yang et al., 2022). Data from senior faculty members revealed a lack of IT training, which created hurdles to developing digital health literacy. Students from general universities lacked the relevant IT skills. Only medical and IT students were experts in using e-health services. The participants and discussants from Lahore and Putian were more inclined to use e-health

consultations than those from Multan and Wuhan. Moreover, 10 students from Pakistan also reported not having digital devices (such as laptops, mobile phones, and tablets), which was a major obstacle to becoming digitally literate (Malik et al., 2021).

Our findings also showed that the lack of confidentiality, anonymity, and privacy on publicly accessible e-health sites/apps was the major concern for university students and faculty members in China and Pakistan. Major concerns among the educated population included fear, lack of trustworthiness, and digital incompetence in handling the potential harm posed by these e-health sites. It was ostensible that Pakistan faced more socio-cultural restrictions regarding the privacy and security policies of the digitalized health world as compared to China. The major reported reasons were the socio-cultural restrictions and patriarchal regimes that prohibited adolescents and young females from interacting with the physicians on the e-health sites. Previous studies also validated this finding that sensitive information, especially related to female gynecological problems, chronic mental health issues, and sexuality concerns, demands privacy in the e-health sites. Unfortunately, the digitalized health world lacks these prerequisites (Ahmad et al., 2021; Xiong et al., 2023).

Conclusion and Recommendations'

In conclusion, technological advancements demand the worldwide digitalization of health services. This paper provided an overview of e-health use among students and faculty members at universities in China and Pakistan. Students' and faculty members' inclination toward the IT environment and their trust in e-health consultations drove e-health service use. Faculty members and students faced various challenges in using e-health services. The highlighted challenges were the absence of training and coping strategies for newly launched e-health apps, the unavailability of internet services, inadequate technological expertise, busy academic schedules of students and faculty, and a non-cooperative social fabric for using e-health consultations among females. Moreover, digital incompetence, lack of trust, and sociocultural restrictions such as the absence of IT expertise, a preference for face-to-face e-health consultations with physicians, and hesitation to share personal information. In extension, information overload, content evaluation, and medically confusing terminology were also triggered by various hitches such as the proliferation of inauthentic websites, the receipt of spam emails, and difficult health-related content. The government and educational institutions needed to make rigorous efforts to promote digital health literacy among the educated segment of Pakistani society.

Based on the present research findings, we extracted the following recommendations for coping with the various challenges faced by participants in the two digitally diverse study vicinities.

1. Universities should organize workshops, seminars, and training sessions on using the newly launched e-health apps and tools to address the medical problems of students and senior faculty members.
2. Governments should ensure the privacy of patients' medical conditions by following the normative patterns of the study vicinities.
3. The e-health websites should be developed in Chinese and Urdu so that students and faculty members who do not possess English proficiency skills can also benefit from these health-based websites.

4. The universities should offer compulsory courses related to the expertise of e-health consultations. This way, students and senior faculty could acquire the digital skills needed to use e-health services.
5. Governments should guarantee the .gov e-health sites, signifying authentic consultations with physicians and surgeons. Additionally, bogus, unauthenticated e-health websites should also be banned.

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