Online Media & Society
Vol.5, No.2 (June, 2024), Pp.59-77
ISSN(online): 2790-1882, ISSN(print):2790-1874

Original Article **https://hnpublisher.com**

Exploring Health Information Exchange Trends among Diabetes Patients on International and Pakistani Online Platforms

Ayesha Mushtaq[1], Maliha Ameen[2], Inam Ullah Taj[3]

[1]MPhil Scholar, School of Creative Arts (SoCA), University of Lahore, Pakistan.
[2]Assistant Professor, School of Creative Arts (SoCA), University of Lahore, Pakistan.
[3]PhD Scholar, School of Creative Arts (SoCA), University of Lahore, Pakistan.
Correspondence: maleeha.ameen@soca.uol.edu.pk[2]

ABSTRACT

Aim of the Study: This study aims to compare internationally recognized online health communities (OHCs) such as PatientsLikeMe, Diabetes Daily, and DailyStrength with potential Pakistani counterparts like Oladoc, Sehat Kahani, ZMedHealth, and Marham. By discerning the strengths and weaknesses of these platforms, the study seeks to guide the development of tailored digital health solutions to address the specific needs of diabetic patients in Pakistan.

Methodology: The study conducted a comparative analysis of OHCs' usage patterns, types of OHCs utilized, duration of membership, perceived benefits, types of support received, and trust in shared information. Data were gathered through semi-structured interviews, meticulously coded, and categorized from the University of Lahore Teaching Hospital, Dental Hospital University of Lahore, Social Security Teaching Hospital, Al Khidmat Teaching Mansoorah Hospital, and Sehat Medical Complex, Lahore to analyze the frequency and percentage distribution of responses across various parameters.

Findings: The frequency of OHC usage varied, with 40% of respondents using OHCs daily and 16% using them frequently. Facebook emerged as the most utilized platform (70%), followed by Instagram (16%). Regarding the duration of OHC membership, 24% had been members for 2-3 years. Benefits of OHC usage included information access (16%) and emotional support (24%). Peer support (24%) and guidance on management strategies (24%) were the most common types of support received. Forty percent of respondents expressed trust in the information shared on OHCs.

Conclusion: The study highlights the widespread use and varied benefits of OHCs among diabetic patients in Pakistan. It underscores the importance of tailoring digital health solutions to local contexts while leveraging international best practices. Understanding the dynamics of OHCs can inform the development of effective interventions to support diabetic patients and enhance their healthcare.

Keywords: Health Information, Exchange Trends, Diabetes Patients, Online Platforms.

Article History

Received:
April 10, 2024

Revised:
June 11, 2024

Accepted:
June 16, 2024

Published:
June 21, 2024

Introduction

Web-based platforms known as online health communities offer information services such as online search, access, sharing, and transmission of health information to community members and health enthusiasts. The sharing of medical data is an essential component of virtual health networks requiring active participation from users. Users search for solutions to their health problems by sharing health information with their communities. Additionally, health information has major positive externalities that can encourage the dissemination of health knowledge and expertise.

In the context of diabetes prevalence in Pakistan, the country holds a significant position within the IDF MENA region, comprising 21 countries and territories. As of 2021, the global burden of diabetes stands at a staggering 537 million individuals, with 73 million affected within the MENA Region alone. Projections indicate a concerning escalation by 2045, with an estimated rise to 135.7 million cases. Specifically focusing on Pakistan, the statistics reveal a substantial challenge, with a total adult population of approximately 123.5 million. Within this demographic, diabetes affects a significant portion, with a prevalence of 26.7% among adults. This translates to an alarming total of approximately 32.9 million cases of diabetes among adults in Pakistan (International Diabetes Federation, 2021). These figures underscore the urgent need for comprehensive research and interventions tailored to the Pakistani population to address the multifaceted challenges posed by diabetes (Bhutta, et al., 2022) on which the current study has focused.

User-sharing activity is becoming increasingly significant in Pakistan as a new avenue for exchanging health and medical information and enhancing online interactions between patients and physicians with the efforts of the *Society of Obstetricians & Gynaecologists of Pakistan | FIGO*, 2014; *I-Care America*, 2024; *I-Care Foundation*, 2024; *Aman Foundation; Pakistan – Population Council* (Bowman, 2023) and *United Nations Population Fund*. Encouraging active participation and fostering a culture of information sharing among users are vital objectives for online health communities. By understanding the factors influencing users' willingness to share health-related content, these communities tailor their strategies to enhance user engagement and ensure sustained involvement. This proactive approach is crucial for maintaining digital health societies' seamless operation and effectiveness, ultimately contributing to improved health outcomes and support for members.

In Pakistan, several online healthcare platforms have emerged to address the evolving needs of patients and improve access to medical services. *PakMediNet* serves as a comprehensive medical information gateway, offering a vast repository of healthcare resources and facilitating knowledge dissemination within the medical community. Similarly, *Dawaai Private Limited* operates as an online pharmacy, providing individuals with convenient access to a wide range of medications at competitive prices. *Shifa4U* stands out as a one-stop healthcare solution, offering a spectrum of online healthcare services to users, including diagnostic tests, doctor consultations, and medication delivery.

Moreover, *PIERS on the Move (POM)* a notable initiative in Pakistan's healthcare landscape, focuses on leveraging e-health technology to support Lady Health Workers (LHWs) in providing care to women with pre-eclampsia. This mobile health application was tested between 2014 and 2016 and aimed to enhance the knowledge and self-efficacy of LHWs in managing pre-eclampsia cases through digital tools and resources (Chomutare, et al., 2011; El-Sappagh, et al., 2018; Kinshella, et al., 2021).

In today's ever-evolving digital landscape, the ethos of health information exchange continues to evolve, propelled by the advent of AI chatbots and other online medical facilities, such as virtual consultations and telemedicine platforms, the dissemination of medical data has reached unprecedented levels of accessibility and convenience.

In Pakistan, several AI chatbots and telemedicine services have emerged to bridge the gap between patients and healthcare providers, especially in areas with limited access to traditional healthcare facilities. Platforms like *Sehat Kahani*, *Oladoc*, Marham, and *DoctHers* utilize AI chatbots to offer

medical consultation services and appointment scheduling, providing users with immediate access to "Telehealth" and "Telemedicine" for basic healthcare information and assistance (Rudin, et al., 2014; Wang, 2023). Additionally, telemedicine services such as *FindMyDoctorPK* and *AugmentCare*, *MyDoctorPk,* and *Healthwire* connect patients with certified doctors for online consultations, enabling individuals to seek medical advice and prescriptions from the comfort of their homes. These innovative platforms leverage technology to overcome geographical barriers and improve healthcare accessibility, particularly in remote areas where access to medical facilities is limited.

In recent years, Pakistan has witnessed significant strides in the integration of digital health initiatives within both the private and public sectors. Esteemed institutions such as the *Agha Khan Hospital*, *COMSATS*, *Naya Jeevan* have spearheaded the adoption of e-health technologies, particularly telemedicine and digital information systems in their further initiatives (*Health Care Report, 2023)*. These advancements have been instrumental in extending healthcare access to remote areas, enhancing data analytics capabilities, and streamlining administrative processes across the board.

However, amidst these commendable efforts, a notable gap persists in the realm of online health communities tailored specifically for diabetic patients in Pakistan. Unlike their international counterparts, such as *HealthUnlocked, MyFitnessPal, PatientsLikeMe, Diabetes Daily*, and *DailyStrength*, which foster robust online support networks for individuals managing diabetes, Pakistan currently lacks dedicated platforms catering to this demographic.

In the dynamic landscape of online health communities (OHCs), where bytes of information traverse digital highways, a symphony of shared knowledge orchestrates the dance of empowerment and connectivity. This virtual agora transcends geographical boundaries, beckoning health seekers and enthusiasts alike to partake in the exchange of life-altering wisdom. In 2020, the Pakistani government, in collaboration with the World Health Organization (WHO), launched the groundbreaking "WhatsApp Corona Helpline" available in twenty different languages. This initiative provided crucial information and support to combat the COVID-19 pandemic, showcasing the power of technology in delivering vital healthcare resources to diverse communities.

Meanwhile, leading health and wellness brands like OMRON, Withings, and Qardio have revolutionized blood pressure monitoring with their state-of-the-art smart blood pressure monitors. These cutting-edge devices empower individuals to manage their cardiovascular health proactively, contributing to overall well-being and longevity. Furthermore, in diabetes management, brands like OneTouch®, Accu-Chek, and FreeStyle Abbott have pioneered innovative solutions for blood glucose testing. These advanced technologies enable individuals to monitor their blood sugar levels with precision and ease, enhancing their ability to manage diabetes effectively and live healthier lives.

In addition, home-based fetal monitors like Owlet US and Baby Doppler provide expectant parents with invaluable peace of mind by allowing them to monitor their baby's well-being from the comfort of their home. These devices offer real-time insights into fetal health, fostering a deeper connection between parents and their unborn child while ensuring early detection of any potential concerns. Together, these advancements in healthcare technology exemplify the remarkable progress in leveraging innovation to improve health outcomes and empower individuals to take control of their well-being. By harnessing the power of technology and collaboration, we can create a healthier and more resilient future for all.

With the rise of web-based platforms, the landscape of health information exchange has undergone a profound transformation, akin to a metamorphosis. Gone are the days when such exchanges were confined to the sterile confines of medical institutions. Instead, they now find vibrant expression in the digital realm, where platforms like Facebook Messenger Chatbox have become conduits for sharing vital medical data (Chudnovsky, 2020; NADRA, 2024). Here, the click of a keyboard key resonates with the collective wisdom and experiences of users, transcending physical boundaries and fostering connections based on shared expertise and lived realities.

Research Questions

1. How do diabetes patients utilize international and Pakistani online platforms for exchanging health-related information and experiences?
2. What are the similarities and differences in the modes of communication and information exchange between international and Pakistani online platforms among diabetes patients?
3. How do the features and functionalities of international and Pakistani online platforms influence the health information-seeking behavior and engagement of diabetes patients?

Study Objectives

1. To investigate the patterns of health information exchange among diabetes patients on both international and Pakistani online platforms.
2. To compare the modes of communication and information exchange utilized by diabetes patients on international and Pakistani online platforms.
3. To identify the factors influencing the utilization and engagement of diabetes patients with international and Pakistani online platforms for health information exchange.

In recent years, there has been a notable upsurge in scholarly interest, both nationally and globally, regarding the dynamics of health information sharing within online communities. However, despite this growing interest, there remains a stark gap in the availability of dedicated online health communities specifically tailored to meet the needs of individuals living with diabetes in Pakistan (Soroya, et al., 2021). This deficiency is particularly concerning given the prevalence of diabetes and the increasing reliance on online resources for health-related information and support. In this digital age, individuals with diabetes face numerous challenges in finding reliable information, connecting with peers facing similar health challenges, and accessing emotional support networks (Shahid, et al., 2022). The absence of dedicated online platforms exacerbates these challenges, leaving individuals with diabetes feeling isolated, uninformed, and unsupported in their journey towards managing their condition.

In Pakistan, institutions such as the *Punjab Healthcare Commission (PHC*), *Pakistan Medical and Dental Council (PMDC)*, and the *Prevention of Electronic Crimes Act, 2016 | PCSW (PECA*) play crucial roles in regulating and safeguarding healthcare information in the digital realm. However, despite their efforts, there remains a pressing need for comprehensive statutory safeguards to protect the privacy and digital rights of individuals in the healthcare sector. This is underscored by studies such as Daudpota (2016) highlighting the necessity for legal frameworks to address the privacy of health information. Additionally, research by Qureshi, et al. (2014) and Nisar & Shafiq (2019) emphasizes the challenges and prospects of e-health in Pakistan, indicating the importance of efficient utilization of social media and digital platforms in the healthcare sector.

In comparison to countries with well-established health online communities and functionalities, such as PatientsLikeMe and DailyStrength, Pakistan lags behind in terms of legal and regulatory frameworks governing digital rights in the health field. Institutions like the PMDC and PHC play vital roles in ensuring healthcare standards and regulations, but without comprehensive legislation like PECA, individuals' digital rights and privacy in healthcare remain vulnerable. To bridge this gap and foster the development of robust health online communities, Pakistan can draw lessons from countries with exemplary legal frameworks and digital health initiatives. By implementing stringent laws and regulations and leveraging the expertise of regulatory bodies, Pakistan can create an environment conducive to the growth of online health communities while safeguarding individuals' digital rights and privacy in the healthcare sector.

Moreover, the lack of diabetic online health communities in Pakistan hinders individual patient empowerment and self-management for healthcare professionals and administrators to engage with

patients in meaningful ways (Ittefaq & Iqbal, 2018). By analyzing online health discussions among diabetes patients, this study aims to address this critical gap and provide valuable insights into the information needs, communication preferences, and emotional support requirements of individuals with diabetes in Pakistan. Through tailored interventions and establishing a supportive online community, healthcare professionals and administrators can empower individuals with diabetes to take control of their health, improve treatment adherence, and ultimately enhance patient outcomes (Dehnavi, et al., 2021). This study holds significant promise in bridging the existing gap in diabetic online health communities and improving the overall well-being of individuals living with diabetes in Pakistan.

Literature Review

Information sharing denotes the process through which individuals convert knowledge into a format that is readily interpretable, absorbable, and applicable by others (Koch-Weser, et al., 2010; Bilgihan, et al., 2016; Ipe, 2003). With the prevalence of social media and digital platforms, online knowledge sharing has recently experienced exponential growth (Hung et al., 2015; Van Oerle, et al., 2016; Nazir & Soroya, 2021;). Moreover, information disseminated on online social platforms can be categorized as public or private, depending on whether it is shared with the broader public at no cost or with select users for a fee (Zhao & Zhang, 2017; Shaw & Johnson, 2011; Zhang, et al., 2013; Li, et al., 2020).

Since the advent of online technology, the proliferation of online communities and markets within the healthcare sector has been remarkable (Goh, Gao, & Agarwal, 2016). These platforms offer a novel avenue for healthcare professionals and patients to disseminate health-related information to the public (Guo, et al., 2017; Ramdani, et al., 2020; Joshi, et al., 2024). With the ability to transcend geographical boundaries, internet platforms afford medical professionals enhanced access to information recipients, including patients and their families (Carney, 2022; Duftschmid, 2019).

Previous research has underscored the positive impact of clinicians sharing information online, leading to improved patient outcomes (Barrett, Oborn, & Orlikowski, 2016; Kazi, et al., 2020; Abbate, et al., 2022; Mein Goh et al., 2016). Moreover, such practices have shown promise in reducing health disparities. Information is esteemed as a valuable resource in the knowledge economy, upon which organizations, enterprises, and society rely for effective exchange (Chen & Straub, 2015; Hao, Yang, & Shi, 2019; Koohang, et al., 2023).

Unequivocally, exploring the interplay between ‘informed decision-making’ (Varga, 2010; Huh, et al., 2013) and ‘trust in online health resources’ (Burge, et al., 2014; Eysenbach, et al., 2004; Rezaei Aghdam, et al., 2020) enhances ‘patient-provider interactions’ (Van der Eijk, et al., 2013) to encourage active patient participation (Willis, 2014; Chen, et al., 2019). Finally, in the digital era, such research informs targeted initiatives aimed at leveraging online platforms to bolster peer support networks (Chen, et al., 2019; Malik, et al., 2023) promote health information exchange, and improve outcomes for chronic conditions like diabetes (Esmaeilzadeh, et al., 2024).

In today's digital landscape, information sharing has become the primary mode through which users acquire and utilize information. As information technology continues to advance, the process of transferring health information from one interaction to another, termed health information-sharing practices, has gained significant attention (Peng, et al., 2020). The advent of Web 2.0 and online platforms facilitating the sharing of health data has spurred scholarly examination of in-person and virtual interactions as complementary settings for knowledge sharing (Lin et al., 2016; Li, et al., 2018; Friemel, 2016).

Academic discourse has specifically focused on the online exchange of health information, particularly exploring how social media platforms facilitate communication (Etikan, et al., 2016; Chan & Leung, 2018). While research on information sharing spans various academic fields, including formal and professional cooperation, commercial exchanges, and academic contexts, the emphasis on health-related information sharing has been relatively limited (Almehmadi et al., 2014; Dong, eta al., 2019; Pilerot,

2012; Savolainen, 2017; Talja, 2002; Wilson, 2010; Johnson & Case, 2012; Talja & Hansen, 2006; Veinot, 2009).

Despite the prevalence of health-related content sharing online, there has been a dearth of attention on the regular sharing of health information in face-to-face settings, particularly among older adults who may be more inclined to socialize offline (Friemel, 2016; Williamson, 1998; Liu, et al., 2018) underscores the significance of individuals' health knowledge, communication abilities, and the quality of relationships in determining their propensity to share health information.

Notably, studies focusing on interpersonal face-to-face encounters involving health information sharing are currently lacking, presenting a gap in the existing literature. From a service science perspective, platforms serve as physical or virtual environments for value co-creation, with consumers engaging in various value-creation activities (Ikävalko, et al., 2018; Smedlund, et al., 2018; Nambisan, 2002).

The concept of customer value co-creation, pioneered by McColl-Kennedy, et al., 2012;) and built upon the foundational works of Payne, et al., (2008; Akaka & Vargo, 2015) and Vargo & Lusch (2008), highlights the active involvement of customers in shaping their service experiences and outcomes. This paradigm shift underscores the increasing importance of customer participation in value-creation processes within various industries, including healthcare. The growing attention towards value co-creation and community outcomes in online community research signals a shift toward recognizing patients as active co-creators of value rather than passive recipients of care (Shirazi, et al., 2021).

In the context of online health communities (OHCs), such as *PatientsLikeMe* and *DailyStrength: Online support groups and forums*, the role of patients as active participants in value co-creation becomes evident (Kwon, et al., 2015). These platforms serve as central hubs for patients to share a wide range of health information, from diagnoses to treatments, fostering collaboration and support among members. Patients voluntarily contribute information about their symptoms, medical histories, and therapies, to assist others and gain insights into their health (Frost, 2011).

PatientsLikeMe, for instance, stands out as a practical example of an OHC where users find value in connecting with others who share similar health concerns. The platform facilitates interactions among members, providing a supportive environment for sharing experiences and accessing relevant information (Wicks, et al., 2010; Za, et al., 2020). Similarly, Daily Strength offers a space for individuals to seek emotional and informational support from peers facing similar health challenges (Aghdam, et al., 2021).

Problem Statement

The selection of *PatientsLikeMe* and *DailyStrength* for comparison in this study is rooted in their prominence as internationally recognized platforms dedicated to fostering online health communities. *PatientsLikeMe* is renowned for its comprehensive support networks and data-sharing features, facilitating extensive interactions among individuals managing various health conditions, including diabetes. Similarly, *DailyStrength* has gained widespread acclaim for its robust user engagement tools and diverse community forums tailored to address diverse health concerns effectively while *Diabetes Daily*, recognized for its specialized focus on diabetes management, offers a wealth of resources, forums, and expert insights tailored specifically to individuals navigating the complexities of diabetes. By juxtaposing these globally recognized platforms with potential Pakistani counterparts such as *Oladoc*, *Sehat Kahani*, *ZMedHealth and Marham*, this study aims to discern the unique strengths and weaknesses of local online health communities. Such a comparison promises to illuminate critical insights into the viability and adaptability of international best practices within the Pakistani healthcare landscape, thereby guiding the development of tailored digital health solutions to address the specific needs of diabetic patients in Pakistan.

Theoretical Background

Social Exchange Theory (SET), crafted by sociologists George Homans and Peter Blau in the mid-20th century, provides a rich framework for comprehending the intricacies of social interactions (Homans, 1958; Blau, 1964). At its essence, this theory illuminates how individuals engage in exchanges within relationships, driven by the principle of reciprocity. Within these exchanges, individuals seek to optimize rewards while minimizing costs, evaluating factors such as the value of exchanged resources, effort expended, and anticipated outcomes. Central to SET is the notion of equity, where individuals strive for fairness in relationships, maintaining a balance between received rewards and incurred costs acknowledging the influence of power dynamics, norms, and social structures in shaping social exchanges, to offer valuable insights into the complexities of human interactions (Kelley, 1959).

Within this theoretical framework, concepts like comparison levels and power dynamics play pivotal roles in elucidating individuals' expectations, satisfaction levels, and decision-making processes within relationships. Moreover, the interplay between norms and social structures provides a nuanced understanding of societal expectations and regulatory frameworks governing social exchanges (Molm, Collett & Schaefer, 2007). By applying Social Exchange Theory, the current study has tried to delve into the motivations, behaviors, and outcomes underlying health information-sharing practices, offering invaluable insights into how individuals navigate social exchanges in the realm of health communication and support.

Methodology

Research Design

This study adopts a qualitative research design to gain deeper insights into the phenomenon of health information sharing among individuals with diabetes in online communities for the exploration of complex social processes and the interpretation of participants' perspectives, making it well-suited for understanding the dynamics of online health information exchange (Pope & Mays, 2020).

Population

The target population consists of individuals residing in Lahore, Pakistan, who have been diagnosed with diabetes and actively participate in online health communities. Given the lack of specific data on the prevalence of diabetes in Lahore (Bhutta, et al., 2022), a diverse range of ages, genders, and educational backgrounds are considered for inclusion in the study. Participants from various socioeconomic backgrounds have been recruited to ensure a comprehensive understanding of health information-sharing practices in the local context.

In light of the substantial prevalence of diabetes in Pakistan, particularly in urban centers like Lahore, the selection of respondents for this research aligns with the pressing need to understand the dynamics of health information sharing within the diabetic population. Lahore, being one of the most populous cities in Pakistan, provides a diverse pool of individuals representing various demographic characteristics and experiences with diabetes.

Sampling Technique

In leveraging Lahore's rich cultural tapestry and socioeconomic diversity, this study of 50 respondents illuminates the intricate interplay between education, income, and healthcare access, offering profound insights into health information behaviors among individuals with diabetes, strategically addressing Pakistan's pressing health challenges with local relevance and global significance.

Strategically drawn from various healthcare facilities including the *University of Lahore Teaching Hospital, Dental Hospital University of Lahore, Social Security Teaching Hospital, Al Khidmat Teaching Mansoorah Hospital,* and *Sehat Medical Complex, Lahore*, the selection of 50 respondents sourced from platforms like Oladoc, Marham, and healthwirepk ensures a diverse representation within Lahore's

diabetic population. This deliberate sampling approach not only facilitates a thorough examination but also maintains practicality in data collection and analysis. By focusing on individuals accessing healthcare at these renowned institutions, the study aims to provide nuanced insights into health information-sharing practices among urban diabetics, contributing not only to Lahore's local context but also advancing a broader understanding of urban health research.

Data Collection Technique

Semi-structured interviews are conducted to gather comprehensive data from participants for the exploration of participants' viewpoints and experiences. Interview questions are designed to elicit insights into participants' health information-sharing practices, motivations, challenges, and perceived benefits (Hennink, Hutter & Bailey, 2020).

Interview Procedures

In the selected hospitals, the interview procedure delicately adhered to the principles of the Social Exchange Theory, which posits that individuals engage in social interactions to maximize rewards and minimize costs. Each participant engaged in semi-structured interviews, establishing a reciprocal exchange where both interviewer and participant contributed insights. This exchange was characterized by mutual respect and reciprocity, as the interviewer sought to understand the participant's experiences while offering validation and empathy.

By fostering an environment of trust and rapport, the interviews facilitated open dialogue, allowing participants to share their perspectives on health information behaviors without fear of judgment. Through this exchange, participants received the reward of being heard and understood, while the interviewer gained valuable insights into the complexities surrounding health information-sharing practices among urban diabetics. Moreover, recognizing the significance of mental health in diabetes management, the study integrated care for participants' psychological well-being, referred to as "psychological comorbidities" (Wu, et al., 2020), and offered assistance within the hospital vicinity, ensuring holistic support throughout the interview process as a commitment to ethical research practices and participant well-being.

Measurement Instruments

Interview questions ten in number are formulated to address the research objectives and facilitate a thorough exploration of participants' experiences with health information sharing in online communities. Participants are then queried about the types of information they typically share within OHCs, exploring their comparison levels regarding the content exchanged and the interactions undertaken within these platforms, perceptions regarding the role of social media platforms in fostering personal healthcare habits and addressing power dynamics within online health communities. Lastly, participants are asked about their engagement in relationship-building activities within OHCs and the perceived benefits or outcomes of such interactions along with their trust in the information shared within OHCs, addressing concerns related to the reliability and credibility of health information exchanged.

Online Forums and Websites

The study focuses on analyzing health information-sharing practices on both international and Pakistani online forums and websites. Three international platforms, including *PatientsLikeMe, DailyStrength,* and *Diabetes Daily*, are selected for comparison with four Pakistani platforms, namely *Oladoc, Sehat Kahani, ZMedHealth, and Marham*. These platforms represent diverse online health communities and provide valuable insights into the differences and similarities in health information-sharing behaviors across different cultural contexts.

Operationalization of Key Concepts

Key concepts such as reciprocity, equity, comparison levels, power dynamics, and norms & social structures have been operationalized through the design of interview questions that aim to elucidate participants' experiences and interactions within online health communities, aligning with the principles of Social Exchange Theory (Surma-Aho & Hölttä-Otto, 2022).

Analysis

The data analysis involves leveraging semi-structured interviews and applying the principles of the social exchange theory to interpret the obtained results. Interview transcripts undergo meticulous coding and categorization, unveiling recurrent themes, patterns, and insights regarding health information exchange among individuals with diabetes in online communities. This approach aims to capture the nuances of interpersonal exchanges and the underlying dynamics of information sharing within the context of digital health platforms, shedding light on the multifaceted nature of diabetic patients' interactions and experiences online.

Analysis of Interview Responses:

Table 1: *Frequency of Response (Total respondents= 50)*

Frequency of OHC Usage	**Frequency of OHC Usage**	**Daily**	**Frequently**	**Mostly**	**Sporadically**	**One or two times a month**	**Not used properly**	**No usage**
	Respondents	20	8	4	8	4	4	3
	Percentage	40%	16%	8%	16%	8%	8%	8%
Types of OHCs Used	PatientsLikeMe DailyStrength DiabetesDaily Marham SehatKahani *ZMedHealth Oladoc*	Facebook	Instagram	WhatsApp Health Groups	Reddit Communities InstaCare	Diabetes support groups	Twitter	Not specified
	Respondents	35	8	8	4	4	4	5
	Percentage	70%	16%	16%	8%	8%	8%	10%
Duration of OHC Membership	Duration of OHC Membership	2-3 years	6 months	5 years	Since 2017	2 years	More than 1 year	Not specified
	Respondents	12	4	4	4	4	4	6
	Percentage	24%	8%	8%	8%	8%	8%	12%
Benefits of Using OHCs	Benefits of Using OHCs:	Instant consultancy	Information access	Emotional support	Diverse perspectives	Treatment success stories	Insights into alternative treatments	Not specified
	Respondents	8	8	12	8	4	4	5
	Percentage	16%	16%	24%	16%	8%	8%	10%
Types of	Types of	Peer	Guidance on	Informa	Emotio	Coping	Practical	Not

Support Received	Support Received	support	management strategies	tion exchange	nal validation	strategies	advice	specified
	Respondents	12	12	11	8	4	8	4
	Percentage	24%	24%	22%	16%	8%	16%	8%
Trust in Information Shared on OHCs	Trust in Information Shared on OHCs	yes	No					
	Respondents	20	4					
	Percentage	40%	8%					

Discussion

The results of the analysis as shown in table 1 offer a nuanced understanding of the intricate interplay between diabetic patients and online health communities (OHCs). Through the lens of qualitative inquiry, the frequency of OHC usage emerged as a dynamic spectrum, ranging from regular engagement to sporadic interactions. This variance reflects the diverse needs and preferences within the diabetic population, illustrating the complex ontology of health-seeking behaviors in digital spaces.

In exploring the types of OHCs utilized by respondents, a rich tapestry of platforms unfolded, with the Facebook pages of Patientlikeme, *DailyStrength,* and *Diabetes Daily* reigning supreme as the preferred choice for many. However, the inclusion of lesser-known platforms such as Reddit health communities and the Marham app showcases the epistemological richness inherent in the diabetic community's information ecosystem. Each platform offers a unique terrain for knowledge exchange, embodying distinct epistemological paradigms that shape the dissemination and reception of health-related information.

Furthermore, the duration of OHC membership unveils a temporal dimension to diabetic patients' engagement with online communities, underscoring the evolving nature of their health-seeking journeys. While some adhere to longstanding memberships, others navigate transient affiliations, reflecting shifts in epistemological orientations and ontological perspectives over time.

The benefits derived from OHCs underscore the multifaceted nature of digital health experiences, ranging from practical assistance to emotional solace. This multiplicity of benefits speaks to the diverse epistemological frameworks through which diabetic patients navigate their illness narratives, drawing on a rich tapestry of knowledge sources to inform their self-care practices.

Similarly, the types of support received from OHCs illuminate the intricate web of social dynamics that underpin digital health interactions. From peer camaraderie to expert guidance, the varied forms of support reflect the nuanced epistemological stances adopted by individuals as they negotiate their diabetic identities within online spaces.

Finally, the question of trust in information shared on OHCs unveils the epistemological tensions inherent in digital health environments. While some express unwavering faith in the information disseminated, others approach it with a healthy dose of skepticism, navigating a complex terrain of competing epistemologies and ontologies.

The intricate nature of these findings emphasizes the necessity for a nuanced grasp of how diabetic patients navigate digital health landscapes. Recognizing the diverse ways individuals perceive and seek knowledge within online communities is essential for healthcare providers and policymakers to effectively cater to their evolving requirements in the digital realm. This entails understanding the

underlying structures and processes guiding patients' interactions with health information online, ultimately informing strategies to enhance support and engagement in the digital health sphere.

Conclusion

The analysis of semi-structured interview data sheds light on how diabetes patients utilize both international and Pakistani online platforms for exchanging health-related information and experiences (Q1). Frequencies in platform usage varied, with respondents utilizing platforms like Facebook, Instagram, WhatsApp, and others to seek information, share experiences, and connect with peers. Some participants preferred international platforms like *PatientsLikeMe, DailyStrength,* and *Diabetes Daily* for structured discussions, while others favored Pakistani platforms such as *Oladoc*, *Sehat Kahani*, *ZMedHealth, and Marham* for quick advice, inspirational stories and recommendations.

Moreover, the study examines the similarities and differences in modes of communication and information exchange between international and Pakistani online platforms among diabetes patients. International platforms offer structured forums and specialized discussion threads for in-depth conversations on treatment strategies and coping mechanisms, while Pakistani platforms leverage social media channels, and doctors' contact detailing for informal exchanges (Q2). Despite these differences, both types of platforms serve as valuable resources for diabetic patients, facilitating information exchange, emotional support, and empowerment within the community.

Additionally, the research investigates how the features and functionalities of international and Pakistani online platforms influence the health information-seeking behavior and engagement of diabetes patients (Q3). International platforms provide advanced search tools, comprehensive user profiles, and data visualization options, enhancing access to health information and fostering engagement. Conversely, Pakistani platforms prioritize ease of use and integration with social media, catering to users with varying digital literacy levels (Q3). These platform-specific characteristics shape information-seeking behaviors and engagement levels, highlighting the significance of platform design in supporting the needs of diabetic patients.

In the context of Pakistan, where access to specialized diabetes care may be limited, online forums like PatientsLikeMe, DailyStrength, and Diabetes Daily serve as invaluable resources for individuals managing diabetes. These platforms offer a virtual space for patients to connect with others facing similar challenges, share experiences, and access peer support. Given the prevalence of diabetes in Pakistan and the potential barriers to traditional healthcare services, these online communities play a crucial role in providing information, emotional support, and practical advice to individuals living with diabetes. Moreover, they empower patients to take an active role in their healthcare journey, fostering a sense of community and solidarity in navigating the complexities of diabetes management within the local context. As such, these forums serve as complementary sources of support and education for individuals seeking to optimize their diabetes care in Pakistan.

Recommendations

In the management of diabetes, a multidisciplinary approach involving various medical professionals is essential. These include endocrinologists, primary care physicians, nurse educators, dietitians/ nutritionists, pharmacists, ophthalmologists, podiatrists, and mental health professionals but, interactive diabetic online health communities should be more frequent on new digital health scenarios to make patients aware of loaded medical terms and conditions, treatment experiences, lifestyle adjustments information, peer support and anatomy of disease. The American Diabetes Association emphasizes the importance of coordinated care among these professionals to ensure comprehensive diabetes management that is visible and discernable on international eHealth forums. Each plays a crucial role, from medical diagnosis and treatment to patient education, lifestyle modification support, medication management, and monitoring for complications (American Diabetes Association, 2022).

Acknowledgements

None.

Conflict of Interest

Authors declared NO conflict of interest.

Funding Source

The authors received NO funding to conduct this study.

ORCID iDs

Ayesha Mushtaq [1] https://orcid.org/0009-0001-4108-5667
Maliha Ameen [2] https://orcid.org/0000-0001-6525-1618
Inam Ullah Taj [3] https://orcid.org/0009-0006-4043-151X

References

Abbate, S., Centobelli, P., Cerchione, R., Oropallo, E., & Riccio, E. (2022). Investigating healthcare 4.0 transition through a knowledge management perspective. *IEEE Transactions on Engineering Management, 70*(9), 3297-3310. doi: 10.1109/TEM.2022.3200889.

Accu-Chek. (n.d.). *Accu-Chek Diabetes Care Products Home | Accu-Chek*. https://www.accu-chek.com/

Admin, B. (2023, May 18). *DoctHERs – Connecting people. improving health. transforming lives.* https://docthers.com/

Aga Khan University Hospital. (n.d.). https://hospitals.aku.edu/Pages/default.aspx

Aghdam, A. R., Watson, J., Miah, S. J., & Cliff, C. (2021). A novel information sharing framework for people living with type-2 diabetes in the context of a group education program. *Health Information Science and Systems, 9*, 1-16.

Akaka, M. A., & Vargo, S. L. (2015). Extending the context of service: from encounters to ecosystems. *Journal of Services Marketing, 29*(6/7), 453-462.

Al Khidmat Teaching Mansoorah Hospital - SehatOnline. (2019, December 6). SehatOnline. https://sehatonline.com.pk/hospitals/al-khidmat-teaching-mansoorah-hospital/

Almehmadi, F., Hepworth, M., & Maynard, S. (2014). A framework for understanding information sharing: an exploration of the information sharing experiences of female academics in Saudi Arabia. *Information Research, 19*(4), 19-4.

Aman Foundation. (n.d.). EMPOWER FAMILIES FOR INNOVATIVE PHILANTHROPY. https://www.erfip.com/aman-foundation.html

American Diabetes Association Professional Practice Committee, & American Diabetes Association Professional Practice Committee:. (2022). 15. Management of diabetes in pregnancy: Standards of Medical Care in Diabetes—2022. *Diabetes Care, 45*(Supplement_1), S232-S243.

AugmentCare. (n.d.). Crunchbase. https://www.crunchbase.com/organization/augmentcare

Baby Doppler. (n.d.). *Sonoline Fetal Dopplers | Sonoline A, Sonoline B & Sonoline C Fetal Heart Rate Monitoring Devices*. https://www.sonoline.com/

Barrett, M., Oborn, E., & Orlikowski, W. (2016). Creating value in online communities: The socio-material configuring of strategy, platform, and stakeholder engagement. *Information systems research*, *27*(4), 704-723.

Bhutta, Z. A., Haq, Z. U., & Basit, A. (2022). Diabetes in Pakistan: addressing the crisis. *The Lancet Diabetes & Endocrinology*, *10*(5), 309-310.

Bilgihan, A., Barreda, A., Okumus, F., & Nusair, K. (2016). Consumer perception of knowledge-sharing in travel-related online social networks. *Tourism Management*, *52*, 287-296.

Bilgihan, A., Barreda, A., Okumus, F., & Nusair, K. (2016). Consumer perception of knowledge-sharing in travel-related online social networks. *Tourism Management*, *52*, 287-296.

Blau, P. M. (1964). Justice in social exchange. *Sociological Inquiry*, *34*(2).

Bowman, J. (2023, April 21). *Pakistan – Population Council*. Population Council – Ideas. Evidence. Impact. https://popcouncil.org/country/pakistan/

Burge, C. A., Mark Eakin, C., Friedman, C. S., Froelich, B., Hershberger, P. K., Hofmann, E. E., ... & Harvell, C. D. (2014). Climate change influences on marine infectious diseases: implications for management and society. *Annual review of marine science*, *6*, 249-277.

Calorie Tracker & BMR calculator to reach your goals | MyFitnessPal. (n.d.). https://www.myfitnesspal.com/

Carney, S. (2022). Reimagining our futures together: a new social contract for education: by UNESCO, Paris, UNESCO, 2021, 186 pages, ISBN 978-92-3-100478-0.

Chan, W. S., & Leung, A. Y. (2018). Use of social network sites for communication among health professionals: systematic review. *Journal of medical Internet research*, *20*(3), e8382.

Chen, L., & Straub, D. (2015). The impact of virtually crowdsourced social support on individual health: analyzing big datasets for underlying causalities.

Chen, L., Baird, A., & Straub, D. (2019). Fostering participant health knowledge and attitudes: an econometric study of a chronic disease-focused online health community. *Journal of Management Information Systems*, *36*(1), 194-229.

Chen, L., Baird, A., & Straub, D. W. (2019). An analysis of the evolving intellectual structure of health information systems research in the information systems discipline. *Journal of the Association for Information Systems*, *20*(8), 5.

Chomutare, T., Fernandez-Luque, L., Årsand, E., & Hartvigsen, G. (2011). Features of mobile diabetes applications: review of the literature and analysis of current applications compared against evidence-based guidelines. *Journal of medical Internet research*, *13*(3), e1874.

Chudnovsky, S. (2020, April 14). *World Health Organization launches Messenger Experience to help deliver accurate information on COVID-19*. Messenger News. https://messengernews.fb.com/2020/04/14/world-health-organization-launches-messenger-experience-to-help-deliver-accurate-information-on-covid-19/

COMSATS University Islamabad. (n.d.). *COMSATS University Islamabad*. https://www.comsats.edu.pk/

DailyStrength: Online support groups and forums. (2024, April 5). https://www.dailystrength.org/

Daudpota, F. (2016). Pakistan: Need for Statutory Safeguards as to Privacy of Health Information. *Available at SSRN 2886918*.

Dawaai Private Limited. (n.d.-c). *Online pharmacy | Buy medicines at best price in Pakistan*. https://dawaai.pk/

Dehnavi, Z., Ayatollahi, H., Hemmat, M., & Abbasi, R. (2021). Health information technology and diabetes management: A review of motivational and inhibitory factors. *Current diabetes reviews*, *17*(3), 268-279.

Dental Hospital University of Lahore Lahore - Top doctors, fees, contact number. (n.d.). healthwire.pk. https://healthwire.pk/hospitals/lahore/dental-hospital-university-of-lahore

Diabetes daily. (n.d.). Diabetes Daily. https://www.diabetesdaily.com/

Dong, M., Chen, L., & Wang, L. (2019). Investigating the user behaviors of sharing health and fitness-related information generated by Mi Band on Weibo. *International journal of human-computer interaction*, *35*(9), 773-786.

Duftschmid, G., Rinner, C., Sauter, S. K., Endel, G., Klimek, P., Mitsch, C., & Heinzl, H. (2019). Patient-sharing relations in the treatment of diabetes and their implications for health information exchange: Claims-based analysis. *JMIR Medical Informatics*, *7*(2), e12172.

El-Sappagh, S., Ali, F., El-Masri, S., Kim, K., Ali, A., & Kwak, K. S. (2018). Mobile health technologies for diabetes mellitus: current state and future challenges. *IEEE Access*, *7*, 21917-21947.

Esmaeilzadeh, P., Dharanikota, S., & Mirzaei, T. (2024). The role of patient engagement in patient-centric health information exchange (HIE) initiatives: An empirical study in the United States. *Information Technology & People*, *37*(2), 521-552.

Etikan, I., Musa, S. A., & Alkassim, R. S. (2016). Comparison of convenience sampling and purposive sampling. *American journal of theoretical and applied statistics*, *5*(1), 1-4.

Eysenbach, G., Powell, J., Englesakis, M., Rizo, C., & Stern, A. (2004). Health related virtual communities and electronic support groups: systematic review of the effects of online peer to peer interactions. *Bmj*, *328*(7449), 1166.

Find My Doctor PK: Book a Doctor Online & COViD-19 Test at home. (n.d.). https://findmydoctor.pk/

Friemel, T. N. (2016). The digital divide has grown old: Determinants of a digital divide among seniors. *New media & society*, *18*(2), 313-331.

Frost, D. M. (2011). Social stigma and its consequences for the socially stigmatized. *Social and Personality Psychology Compass*, *5*(11), 824-839.

Goh, J. M., Gao, G., & Agarwal, R. (2016). The creation of social value. *MIS Quarterly*, *40*(1), 247-264.

Guo, S., Guo, X., Fang, Y., & Vogel, D. (2017). How doctors gain social and economic returns in online health-care communities: a professional capital perspective. *Journal of Management Information Systems*, *34*(2), 487-519.

Hao, Q., Yang, W., & Shi, Y. (2019). Characterizing the relationship between conscientiousness and knowledge sharing behavior in virtual teams: an interactionist approach. *Computers in Human Behavior*, *91*, 42-51.

Health-Care-Report. (2023). digitalrightsfoundation.pk. https://digitalrightsfoundation.pk/wp-content/uploads/2023/02/Study-Health-Care-Report.pdf

HealthUnlocked | The social network for health. (n.d.). HealthUnlocked. https://healthunlocked.com/

Healthwire. (n.d.). HealthWire: Connecting Healthcare. healthwire.pk. https://healthwire.pk/

Hennink, M., Hutter, I., & Bailey, A. (2020). *Qualitative research methods*. Sage.

Homans, G. C. (1958). Social behavior as exchange. *American journal of sociology*, *63*(6), 597-606.

Home - I-Care America. (2024, April 30). i-Care America. https://i-care-america.org/

Home - I-Care Foundation. (2024, April 30). i-Care Foundation. https://i-care-foundation.org/?gad_source=1&gclid=Cj0KCQjw_-GxBhC1ARIsADGgDjuJVlMfnrdq-gbFWkH9s-NxQjMFXxs480Wtylwdrr2p0N6rO2rVS_4aAjFMEALw_wcB

Home | FreeStyle Abbott. (n.d.). https://www.freestyle.abbott/pk-en/home.html

Huh, J., Yetisgen-Yildiz, M., & Pratt, W. (2013). Text classification for assisting moderators in online health communities. *Journal of Biomedical Informatics*, *46*(6), 998-1005.

Hung, S. Y., Lai, H. M., & Chou, Y. C. (2015). Knowledge-sharing intention in professional virtual communities: A comparison between posters and lurkers. *Journal of the Association for Information Science and Technology*, *66*(12), 2494-2510.

Ikävalko, H., Turkama, P., & Smedlund, A. (2018). Value creation in the Internet of things: Mapping business models and ecosystem roles. *Technology Innovation Management Review*, *8*(3).

International Diabetes Federation. (2023, June 7). *Pakistan - International Diabetes Federation*. https://idf.org/our-network/regions-and-members/middle-east-and-north-africa/members/pakistan/

Ipe, M. (2003). Knowledge sharing in organizations: A conceptual framework. *Human resource development review*, *2*(4), 337-359.

Ittefaq, M., & Iqbal, A. (2018). Digitization of the health sector in Pakistan: challenges and opportunities to online health communication: A case study of MARHAM social and mobile media. *Digital health*, *4*, 2055207618789281.

Johnson, J. D., & Case, D. O. (2012). *Health information seeking* (Vol. 52). New York, NY: Peter Lang.

Joshi, V. D., Baral, S. K., Pitke, M., & Dwyer, R. J. (2024). Artificial Intelligence (AI) for Healthcare: India Retrospective. In *Analyzing Current Digital Healthcare Trends Using Social Networks* (pp. 26-53). IGI Global.

Kazi, A. M., Qazi, S. A., Ahsan, N., Khawaja, S., Sameen, F., Saqib, M., ... & Stergioulas, L. K. (2020). Current challenges of digital health interventions in Pakistan: mixed methods analysis. *Journal of medical Internet research*, *22*(9), e21691.

Kelley, H. H. (1959). *The social psychology of groups*. Transaction Publishers.

Kinshella, M. L. W., Sheikh, S., Bawani, S., La, M., Sharma, S., Vidler, M., ... & CLIP Working Group. (2021). "Now You Have Become Doctors": Lady Health Workers' Experiences Implementing aHealth Application in Rural Pakistan. *Frontiers in Global Women's Health*, *2*, 645705.

Koch-Weser, S., Bradshaw, Y. S., Gualtieri, L., & Gallagher, S. S. (2010). The Internet as a health information source: findings from the 2007 Health Information National Trends Survey and implications for health communication. *Journal of Health Communication*, *15*(sup3), 279-293.

Koohang, A., Nord, J. H., Ooi, K. B., Tan, G. W. H., Al-Emran, M., Aw, E. C. X., ... & Wong, L. W. (2023). Shaping the metaverse into reality: a holistic multidisciplinary understanding of opportunities, challenges, and avenues for future investigation. *Journal of Computer Information Systems*, *63*(3), 735-765.

Kwon, B. C., Kim, S. H., Lee, S., Choo, J., Huh, J., & Yi, J. S. (2015). VisOHC: Designing visual analytics for online health communities. *IEEE transactions on visualization and computer graphics*, *22*(1), 71-80.

Li, D., Hu, Y., Pfaff, H., Wang, L., Deng, L., Lu, C., ... & Wu, X. (2020). Determinants of patients' intention to use the online inquiry services provided by internet hospitals: Empirical evidence from China. *Journal of Medical Internet Research*, *22*(10), e22716.

Li, Y., Wang, X., Lin, X., & Hajli, M. (2018). Seeking and sharing health information on social media: A net valence model and cross-cultural comparison. *Technological Forecasting and Social Change*, *126*, 28-40.

Lin, W. Y., Zhang, X., Song, H., & Omori, K. (2016). Health information seeking in the Web 2.0 age: Trust in social media, uncertainty reduction, and self-disclosure. *Computers in Human Behavior*, *56*, 289-294.

Liu, M., Yang, Y., & Sun, Y. (2018). Exploring health information sharing behavior among Chinese older adults: a social support perspective. *Health Communication*.

Malik, A., Islam, T., Ahmad, M., & Mahmood, K. (2023). Health information seeking and sharing behavior of young adults on social media in Pakistan. *Journal of Librarianship and Information Science*, *55*(3), 579-595.

Marham - Find A Doctor. (n.d.). *Marham: Find a doctor | Book appointment or consult online*. www.marham.pk. https://www.marham.pk/

Marham - Find A Doctor. (n.d.-a). *Dental Hospital University of Lahore, Lahore | Doctors List, fee & Contact number | Marham*. www.marham.pk. https://www.marham.pk/hospitals/lahore/dental-hospital-university-of-lahore/sultan-town

Marham - Find A Doctor. (n.d.-b). *The University of Lahore Teaching Hospital, Lahore | Doctors List, fee & Contact number | Marham*. www.marham.pk. https://www.marham.pk/hospitals/lahore/the-university-of-lahore-teaching-hospital/bhubtian-chowk-raiwind-road

Marham - Find A Doctor. (n.d.-c). *Sehat Medical Complex, Lahore | Doctors List, Fee & Contact Number | Marham*. www.marham.pk. https://www.marham.pk/hospitals/lahore/sehat-medical-complex/multan-road

McColl-Kennedy, J. R., Vargo, S. L., Dagger, T. S., Sweeney, J. C., & Kasteren, Y. V. (2012). Health care customer value cocreation practice styles. *Journal of Service Research*, *15*(4), 370-389.

Molm, L. D., Collett, J. L., & Schaefer, D. R. (2007). Building solidarity through generalized exchange: A theory of reciprocity. *American journal of sociology*, *113*(1), 205-242.

MyDoctorPk. (n.d.). https://mydoctorpk.net/

NADRA. (2024, January 10). *E-Cards (Health) - NADRA*. NADRA - National Database & Registration Authority. https://www.nadra.gov.pk/e-cards-health/

Nambisan, S. (2002). Designing virtual customer environments for new product development: Toward a theory. *Academy of Management Review*, *27*(3), 392-413.

Naya Jeevan – delivers high quality health & wellness solutions. (2021, September 24). https://naya-jeevan.com/ Oladoc - Find the Best Doctors. (n.d.). *Find verified doctors in Pakistan | Book online appointment | Oladoc.com*. Oladoc - Find the Best Doctors. https://oladoc.com/

Nazir, M., & Soroya, S. H. (2021). Health informatics: use of internet for health information seeking by Pakistani chronic patients. *Journal of Library Administration*, *61*(1), 134-146.

Nisar, S., & Shafiq, M. (2019). Framework for efficient utilisation of social media in Pakistan's healthcare sector. *Technology in Society*, *56*, 31-43.

Oladoc - Find the Best Doctors. (n.d.). *The University of Lahore Teaching Hospital, Lahore | Doctors list, fee, contact number | Oladoc.com*. Oladoc - Find the Best Doctors. https://oladoc.com/pakistan/lahore/h/the-university-of-lahore-teaching-hospital/4648

OMRON Blood Pressure Monitors | Health & wellness products. (2024, May 1). OMRON Healthcare. https://omronhealthcare.com/

OneTouch® | Glucose meters, test strips & Diabetes Management. (n.d.). OneTouch®. https://www.onetouch.com/

Owlet US. (n.d.). *Owlet Baby Monitor: First-of-its-kind FDA-cleared smart baby monitor*. https://owletcare.com/

Pakistan Medical and Dental Council - Home. (n.d.). https://pmdc.pk/

PakMediNet. (n.d.). Medical Information Gateway of Pakistan. https://www.pakmedinet.com/

PatientsLikeMe. (n.d.). PatientsLikeMe. https://www.patientslikeme.com/

Payne, A. F., Storbacka, K., & Frow, P. (2008). Managing the co-creation of value. *Journal of the academy of marketing science*, *36*, 83-96.

Peng, Y., Yin, P., Deng, Z., & Wang, R. (2020). Patient-physician interaction and trust in online health community: the role of perceived usefulness of health information and services. *International Journal of Environmental Research and Public Health*, *17*(1), 139.

Pilerot, O. (2012). LIS research on information sharing activities–people, places, or information. *Journal of Documentation*, *68*(4), 559-581.

Pope, C., & Mays, N. (2020). *Qualitative research in health care*. John Wiley & Sons.

Prevention of Electronic Crimes Act, 2016 | PCSW. (n.d.). https://pcsw.punjab.gov.pk/prevention-of-electronic-crimes-act-2016

Qardio - State of the Heart Technology. (2024, March 6). *Qardio - #1 blood pressure management Solution*. Qardio. https://www.qardio.com/

Qureshi, Q. A., Qureshi, N. A., Khan, M. Z., Nawaz, A., & Shah, B. (2014). Issues and Prospects of e-health in Pakistan. *Mediterranean Journal of Medical Sciences*, *1*(1), 31-52.

Ramdani, B., Duan, B., & Berrou, I. (2020). Exploring the determinants of mobile health adoption by hospitals in China: Empirical study. *JMIR medical informatics*, *8*(7), e14795.

Rezaei Aghdam, A., Watson, J., Cliff, C., & Miah, S. J. (2020). Improving the theoretical understanding toward patient-driven health care innovation through online value cocreation: systematic review. *Journal of medical Internet research*, *22*(4), e16324.

Rudin, R. S., Motala, A., Goldzweig, C. L., & Shekelle, P. G. (2014). Usage and effect of health information exchange: a systematic review. *Annals of Internal Medicine*, *161*(11), 803-811.

Savolainen, R. (2017). Information sharing and knowledge sharing as communicative activities. *Information Research: an international electronic journal*, *22*(3), n3.

Sehat Kahani. (2023, November 27). *Home - Sehat kahani*. https://sehatkahani.com/

Shabir, G., Safdar, G., Hussain, T., Imran, M., Seyal, A.M. (2015). Media Ethics: Choosing the Right Way to Serve. *Research on Humanities and Social Sciences, 5*(3), 80-85.

Shabir, G., Safdar, G., Jamil, T., Bano, S. (2015). Mass Media, Communication and Globalization with the perspective of 21st century. *New Media and Mass Communication, 34*, 11-15.

Shahid, J., Ahmad, R., Kiani, A. K., Ahmad, T., Saeed, S., & Almuhaideb, A. M. (2022). Data protection and privacy of the Internet of healthcare things (IoHTs). *Applied Sciences*, *12*(4), 1927.

Shaw, R. J., & Johnson, C. M. (2011). Health information seeking and social media use on the Internet among people with diabetes. *Online journal of public health informatics*, *3*(1).

Shifa4U - One Stop Healthcare | your trusted online healthcare partner. (n.d.). © 2017 All Rights Reserved. Powered by Universal Digital Health Care. https://www.shifa4u.com/

Shirazi, F., Wu, Y., Hajli, A., Zadeh, A. H., Hajli, N., & Lin, X. (2021). Value co-creation in online healthcare communities. *Technological Forecasting and Social Change*, *167*, 120665.

Smart blood Pressure Monitors | Withings. (n.d.). Withings. https://www.withings.com/us/en/blood-pressure-monitors

Smedlund, A., Faghankhani, H., Ikävalko, H., & Turkama, P. (2018). Platform ecosystem orchestration for efficiency, development, and innovation. *Collaborative Value Co-creation in the Platform Economy*, 29-40.

Social Security Teaching Hospital. (n.d.). https://ssthlhr.com.pk/

Society of Obstetricians & Gynaecologists of Pakistan | FIGO. (2014, December 3). Figo. https://www.figo.org/society-obstetricians-gynaecologists-pakistan

Soroya, S. H., Ilyas, A., & Ameen, K. (2021). Understanding information behavior of diabetic patients: a case of the diabetic's institute Pakistan. *Library Management*, *42*(1/2), 1-21.

Surma-Aho, A., & Hölttä-Otto, K. (2022). Conceptualization and operationalization of empathy in design research. *Design Studies*, *78*, 101075.

Talja, S. (2002). Information sharing in academic communities: Types and levels of collaboration in information seeking and use. *New Review of Information Behavior Research*, *3*(1), 143-159.

Talja, S., & Hansen, P. (2006). Information sharing. In *New directions in human information behavior* (pp. 113-134). Dordrecht: Springer Netherlands.

United Nations Population Fund. (n.d.). United Nations Population Fund. https://www.unfpa.org/

University of Lahore Teaching Hospital. (n.d.). University College of Medicine and Dentistry. https://ucmd.uol.edu.pk/hospitals/

Van der Eijk, M., Faber, M. J., Aarts, J. W., Kremer, J. A., Munneke, M., & Bloem, B. R. (2013). Using online health communities to deliver patient-centered care to people with chronic conditions. *Journal of medical Internet research*, *15*(6), e115.

Van Oerle, S., Mahr, D., & Lievens, A. (2016). Coordinating online health communities for cognitive and affective value creation. *Journal of Service Management*, *27*(4), 481-506.

Varga, C. (2010). *Knowledge transmission in cyberspace. Discourse analysis of professional web forums as internet subgenre*. Universitat Pompeu Fabra.

Vargo, S. L., & Lusch, R. F. (2008). Service-dominant logic: continuing the evolution. *Journal of the Academy of Marketing Science*, *36*, 1-10.

Veinot, T. C. (2009). Interactive acquisition and sharing: Understanding the dynamics of HIV/AIDS information networks. *Journal of the American Society for Information Science and Technology*, *60*(11), 2313-2332.

Wang, T. C. (2023). *Telehealth and Telemedicine: The Far-Reaching Medicine for Everyone and Everywhere*.

WELCOME TO : Punjab Healthcare Commission. (n.d.-b). https://www.phc.org.pk/

Wicks, P., Massagli, M., Frost, J., Brownstein, C., Okun, S., Vaughan, T., ... & Heywood, J. (2010). Sharing health data for better outcomes on PatientsLikeMe. *Journal of medical Internet research*, *12*(2), e1549.

Williamson, K. (1998). Discovered by chance: The role of incidental information acquisition in an ecological model of information use. *Library & information science research*, *20*(1), 23-40.

Willis, E. (2014). The making of expert patients: the role of online health communities in arthritis self-management. *Journal of Health Psychology*, *19*(12), 1613-1625.

Wilson, T. D. (2010). Information sharing: an exploration of the literature and some propositions. *Information Research: An International Electronic Journal*, *15*(4), n4.

World Health Organization. (n.d.). https://www.who.int/news-room/feature-stories/detail/who-health-alert-brings-covid-19-facts-to-billions-via-whatsapp.

Wu, L. C., Lai, C. Y., Huang, C. J., Chou, F. H. C., Yu, E. T., & Yu, C. Y. (2020). Psychological distress and diabetes self-management in patients with type 2 diabetes and comorbid serious mental illness. *Archives of Psychiatric Nursing*, *34*(4), 218-223.

Your Health Management Guide, Tools and Planner with ZMedHealth | Pakistan. (n.d.). https://pk.zmedhealth.com/

Za, S., Pallud, J., Agrifoglio, R., & Metallo, C. (2020). Value co-creation in online communities: A preliminary literature analysis. In *Exploring digital ecosystems: Organizational and human challenges* (pp. 33-46). Springer International Publishing.

Zhang, Y., He, D., & Sang, Y. (2013). Facebook as a platform for health information and communication: a case study of a diabetes group. *Journal of Medical Systems*, *37*, 1-12.

Zhao, Y., & Zhang, J. (2017). Consumer health information seeking in social media: a literature review. *Health Information & Libraries Journal*, *34*(4), 268-283.