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SYSTEMATIC REVIEW

Barriers Leading to the Discontinuance of Telemedicine among Healthcare Providers: A Systematic Review

Barreras que Conducen a la Discontinuación de la Telemedicina entre los Proveedores de Atención Médica: Una Revisión Sistemática

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ABSTRACT

Introduction: telemedicine, once considered a groundbreaking innovation in healthcare, has seen a marked decline in usage, highlighting numerous barriers to its continued adoption. This systematic review aims to identify and analyze the socio-technological, individual, institutional, and behavioural factors that contribute to the discontinuance of telemedicine among healthcare providers.
Method: a comprehensive search of PubMed and Scopus databases was conducted, identifying 1,070 peer-reviewed articles published between 2020 and 2024. After applying inclusion and exclusion criteria, 22 studies were selected for detailed analysis.
Results: several socio-technological barriers were identified, including issues with system usability, unreliable infrastructure, and a lack of interoperability, all of which hinder the seamless integration of telemedicine into clinical workflows. Additionally, individual-level factors such as low technological self-efficacy, anxiety, and concerns about the depersonalization of care emerged as significant challenges. Institutional barriers, such as insufficient training, inadequate resource allocation, and high workloads, further complicate the adoption of telemedicine. Behavioural resistance, including reluctance to change and fears related to compliance and professional identity, also exacerbated the challenges faced by healthcare providers.
Conclusions: addressing the identified barriers requires a multifaceted approach. Technological improvements, enhanced usability, and targeted interventions aimed at reducing psychological resistance and improving institutional support are essential to promoting the sustained use of telemedicine in healthcare.

Keywords: Telemedicine; Discontinuance; Healthcare Providers; Socio Technological Barriers; Behavioural and Institutional Factors.

RESUMEN

Introducción: la telemedicina, que en su momento fue considerada una innovación revolucionaria en el ámbito de la salud, ha experimentado un marcado descenso en su uso, lo que pone de manifiesto numerosas barreras para su adopción continua. Esta revisión sistemática tiene como objetivo identificar y analizar los factores socio-tecnológicos, individuales, institucionales y conductuales que contribuyen a la discontinuación de la telemedicina entre los proveedores de atención médica.
Método: se realizó una búsqueda exhaustiva en las bases de datos PubMed y Scopus, identificando 1,070 artículos revisados por pares publicados entre 2020 y 2024. Tras aplicar criterios de inclusión y exclusión, se seleccionaron 22 estudios para un análisis detallado.

Resultados: se identificaron varios obstáculos socio-tecnológicos, entre ellos problemas con la usabilidad del sistema, infraestructura poco fiable y falta de interoperabilidad, todos los cuales dificultan la integración fluida de la telemedicina en los flujos de trabajo clínicos. Además, factores individuales como la baja autoeficacia tecnológica, la ansiedad y las preocupaciones sobre la despersonalización de la atención surgieron como desafíos significativos. Las barreras institucionales, como la capacitación insuficiente, la asignación inadecuada de recursos y las altas cargas de trabajo, complican aún más la adopción de la telemedicina. La resistencia conductual, incluidas la renuencia al cambio y los temores relacionados con el cumplimiento normativo y la identidad profesional, también agravaron los desafíos que enfrentan los proveedores de atención médica.

Conclusiones: abordar las barreras identificadas requiere un enfoque multifacético. Las mejoras tecnológicas, la optimización de la usabilidad y las intervenciones dirigidas a reducir la resistencia psicológica y mejorar el apoyo institucional son esenciales para promover el uso sostenido de la telemedicina en el ámbito de la salud.

Palabras clave: Telemedicina; Discontinuación; Proveedores de Atención Médica; Barreras Socio-Tecnológicas; Factores Conductuales e Institucionales.

INTRODUCTION

Telemedicine has become an essential component of healthcare delivery, significantly influenced by socio-technological advancements and changes in individual and institutional behaviours. Socio-technological advancements refer to the integration of modern technologies like telehealth platforms, mobile applications, and digital health records within healthcare systems.[1] These advancements enable remote care and real-time patient monitoring, enhancing healthcare accessibility, especially during crises like the COVID-19 pandemic. However, challenges such as data security concerns, poor interoperability of systems, and unreliable infrastructure persist.[2,3]

On the other hand, individual behaviours include how patients and healthcare providers interact with these technologies, influenced by factors such as digital literacy, trust in telemedicine, and the perceived ease of use of these systems.[4,5,6,7] Institutional behaviours involve how healthcare organizations integrate telemedicine into their workflows, provide training, and establish supportive policies. Organizational readiness, leadership commitment, and investment in telemedicine infrastructure are key factors that determine the long-term success of telehealth initiatives.[4,8] The pandemic accelerated telemedicine adoption but sustaining its use post-pandemic requires addressing both the socio-technological barriers and the individual-institutional behaviors that influence adoption.

Prior to the COVID-19 pandemic, telemedicine adoption faced challenges such as infrastructural barriers, limited reimbursement, and resistance from both healthcare providers and patients who preferred in-person consultations.[4,9] The pandemic, however, necessitated a rapid, "forced adoption" of telemedicine, as it became vital to maintaining healthcare services during lockdowns and social distancing measures.[10] Despite its pivotal role during the pandemic, the Trillant Health by Jain,[10] reported that post-pandemic trends indicate a decline in telemedicine use, attributed to patient preferences for in-person consultations, concerns over privacy, and infrastructural limitations.[3,11] Furthermore, factors such as technical challenges, the need for continuous provider training, and the absence of legal frameworks continue to hinder the sustained adoption of telemedicine in many regions.[4,11]

Building upon the socio-technological changes and individual-institutional behaviours that spurred the adoption of telemedicine during the COVID-19 pandemic, many studies have focused primarily on understanding the factors influencing telemedicine adoption from the patient's perspective. These studies frequently apply models such as the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT) to explore how factors like ease of use, perceived usefulness, and social influence shape patient adoption.[5,12,13] Additionally, concerns such as data security, technological literacy, and infrastructure have been major areas of focus in patient-centric research.[2,14,15] However, there are relatively few studies that explore telemedicine adoption from the perspective of physicians, despite the critical role they play in the successful implementation and sustained use of telemedicine. This study aims to address that gap by focusing on the barriers and facilitators affecting telemedicine adoption among healthcare providers.[16,17]

Physicians' perspectives on the barriers to adopting telemedicine are crucial because they are the primary users of these systems in healthcare delivery. Their acceptance and satisfaction with telemedicine directly influence its success and long-term integration into routine medical practice. If physicians are reluctant to adopt telemedicine due to concerns such as inadequate training, data security issues, or system inefficiencies, it can lead to suboptimal use or outright rejection of the technology.[16,17] Physicians' insights are vital for

identifying practical challenges, such as difficulties in conducting physical exams remotely or managing patient interactions via digital platforms, which policymakers and developers might overlook.[2,3]

Moreover, physicians are essential in shaping patient attitudes toward telemedicine. If they are confident in using the technology and communicate its benefits effectively, patients are more likely to adopt it. On the other hand, physicians' scepticism or discomfort can lead to lower patient trust and engagement (Pillay et al., 2021). Therefore, understanding physicians' concerns, whether related to technological infrastructure or the institutional support they receive, is key to designing telemedicine systems that meet their needs and facilitate wider adoption.[4,5] Without addressing the barriers physicians face, the full potential of telemedicine may remain unrealized, limiting its ability to transform healthcare delivery long-term.[8,18]

Several reviews on telemedicine, such as those by Maleka[19] and Nan[20], have examined the broad challenges and benefits of telemedicine, particularly during the COVID-19 pandemic. Soltanzadeh[21] examines how user interfaces and system designs impact the usability and effectiveness of telemedicine platforms, particularly during the COVID-19 pandemic. These reviews highlight systemic issues, patient outcomes, and the overall role of telemedicine in maintaining healthcare services during emergencies. On the other hand, Reinhardt[22] was one of the few or the only review that focuses specifically on physicians' perspectives, shedding light on the technical and usability challenges healthcare providers encountered. Although Reinthard addresses physician-related barriers, it does not explore in depth the socio-technological factors or individual and institutional behaviours that contribute to the discontinuation of telemedicine.

In contrast, this systematic offers a more comprehensive analysis. This review not only identifies technological challenges but also investigated the socio-technological factors, individual behaviours, and institutional dynamics that influence physicians' reluctance to continue using telemedicine. It provides a more in-depth understanding of how these factors interact to create resistance, distinguishing it from other reviews that do not explore these complexities as thoroughly.

Considering the socio-technological complexities and the interplay of individual and institutional behaviours affecting telemedicine adoption, this literature review focuses on understanding these dynamics from the physicians' perspective and seeks to address the following research questions:

1. What are the barriers in the adoption of telemedicine among healthcare providers?
2. What are the socio-technological factors that influence physicians and contribute to the decline in telemedicine utilization?
3. What are the individual and institutional behaviours that have led to the discontinuation of telemedicine by physicians?

By investigating these questions from the physicians' viewpoint, this literature review aims to offer a comprehensive analysis of the factors shaping their engagement with telemedicine and provide insights for fostering its sustained adoption in healthcare systems.

METHOD

This systematic literature review aimed to investigate the barriers to telemedicine adoption from the perspective of healthcare providers, particularly physicians. The search was conducted using two major databases, Scopus and PubMed, focusing on peer-reviewed articles published between 2020 and 2024. The search was designed to focus on recent developments in telemedicine adoption and the factors influencing its discontinuation.

The search strategy employed a combination of keywords related to telemedicine ("telemedicine," "teleconsultation," "telehealth," "electronic consultation," "remote consultation," "e-consultation," "virtual consultation") and barriers to its adoption ("barriers," "challenges," "inhibitors," "discontinuance," "discontinued use," "disconti*"). The search was further refined to include studies specifically focused on healthcare providers by including the terms "physicians" and "doctors." The full search string applied to both databases also included filters to limit results to English-language, open-access, peer-reviewed journal articles in the final publication stage. The search was restricted to subject areas relevant to healthcare and computing.

The search yielded a total of 1,070 records. After removing 19 duplicates, the remaining 1051 articles were screened based on titles and abstracts. Articles that did not meet the inclusion criteria were excluded, leaving 143 articles for full paper retrieval. There are 73 articles that cannot be retrieved. Leaving 70 articles eligible for full-text review process, 48 articles were further excluded, resulting in 22 studies that were included in the final analysis. The included studies specifically focused on the barriers to telemedicine adoption from physicians' perspectives and addressed both socio-technological factors and individual-institutional behaviours that influence the continued use of telemedicine. The selection process is summarized in figure 1.

Studies that were not focused on telemedicine, did not involve healthcare providers or physicians, or were not peer-reviewed were excluded. Additionally, non-journal articles such as conference papers, reviews, or editorials were excluded from the review.

To ensure the accuracy of the study selection process, two independent reviewers conducted the screening

of titles, abstracts, and full-text articles. Any discrepancies between the reviewers were resolved through discussion or consultation with a third reviewer. This validation process ensured a rigorous and unbiased selection of studies for the final analysis. The reviewed literature is summarized in table 1.

Furthermore, this review is registered on the Open Science Framework (OSF), an open-source platform that promotes transparency and collaboration in scientific research. OSF allows researchers to pre-register their study protocols, share materials, and increase the transparency of the research process. By registering on OSF, the review ensures accountability, prevents duplicative research efforts, and promotes adherence to the outlined methodology, thus enhancing the credibility and reproducibility of the findings.
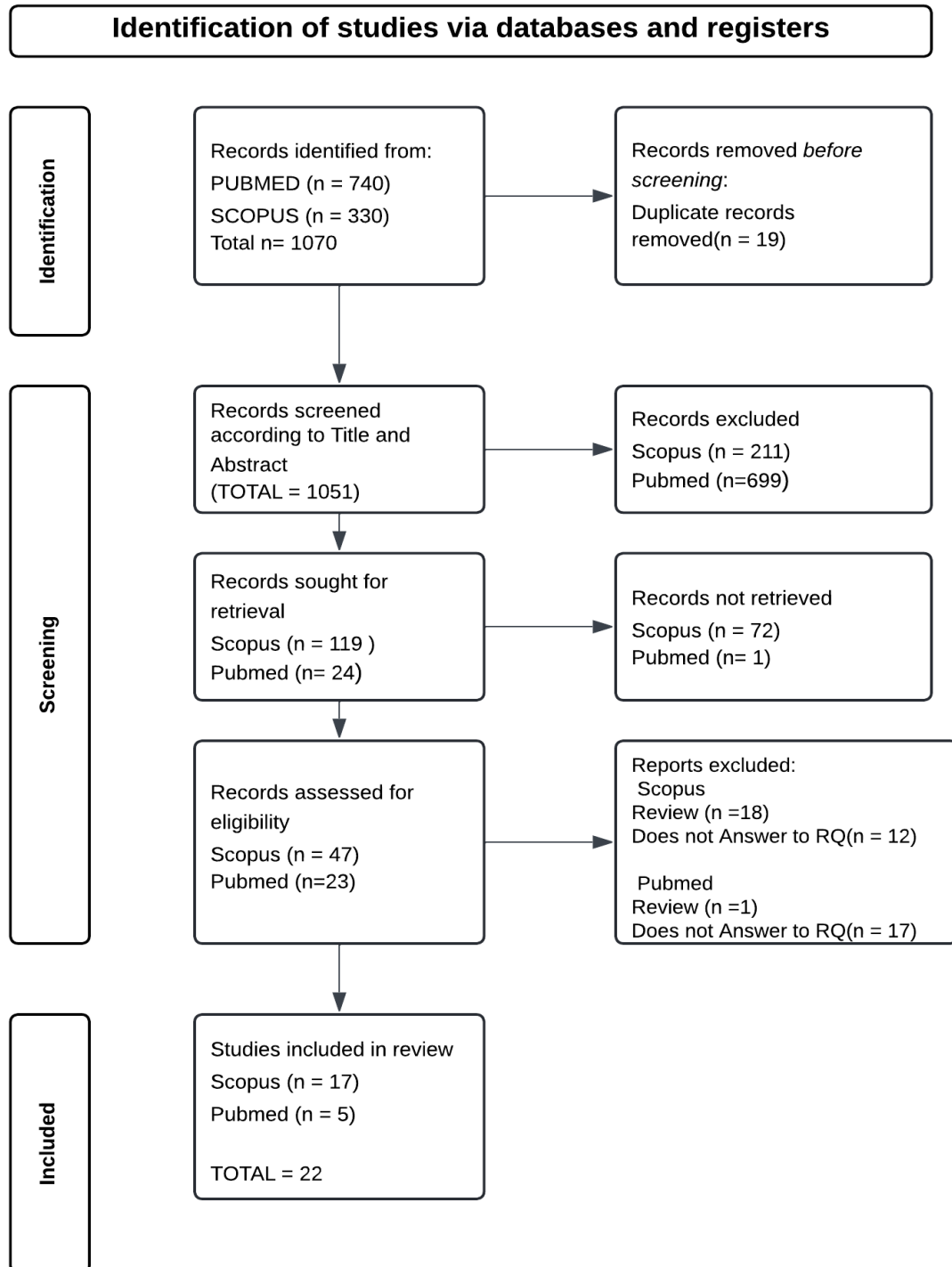
Identification of studies via databases and registers

Identification

Records identified from:
PUBMED (n = 740)
SCOPUS (n = 330)
Total n= 1070

Records removed *before screening*:
Duplicate records removed(n = 19)

Screening

Records screened according to Title and Abstract
(TOTAL = 1051)

Records excluded
Scopus (n = 211)
Pubmed (n=699)

Records sought for retrieval
Scopus (n = 119)
Pubmed (n= 24)

Records not retrieved
Scopus (n = 72)
Pubmed (n= 1)

Records assessed for eligibility
Scopus (n = 47)
Pubmed (n=23)

Reports excluded:
 Scopus
Review (n =18)
Does not Answer to RQ(n = 12)

 Pubmed
Review (n =1)
Does not Answer to RQ(n = 17)

Included

Studies included in review
Scopus (n = 17)
Pubmed (n = 5)

TOTAL = 22

Figure 1. Literature search with inclusion and exclusion criteria

Paper ID	Title	Theory	Method	Country	Time
	Table 1. Overview of reviewed literature				
P1	Differences in factors influencing the use of eRehabilitation after stroke; a cross-sectional comparison between Brazilian and Dutch healthcare professionals	No Theory	Quantitative	Brazil and the Netherlands	Not Mentioned
P2	Doctor-perceived-barriers to telephone clinics at KwaZulu-Natal hospitals during the COVID-19 pandemic	No Theory	Quantitative	South Africa	During Covid Pandemic
P3	Physiotherapists' perspective of telehealth during the Covid-19 pandemic	No Theory	Qualitative	Ireland.	During Covid Pandemic
P4	Telemedicine for patients with rheumatic and musculoskeletal diseases during the COVID-19 pandemic; a positive experience in the Netherlands	No Theory	Mixed methods design	Netherlands	During Covid Pandemic
P5	Health Information System's Responses to COVID-19 Pandemic in China: A National Cross-sectional Study	No Theory	Qualitative	China	During Covid Pandemic
P6	Barriers and benefits of mHealth for community health workers in integrated community case management of childhood diseases in Banda Parish, Kampala, Uganda: a cross-sectional study	Social-Ecological Model (SEM).	Qualitative	Uganda.	Post-Pandemic
P7	Digital health and primary care: Past, pandemic and prospects	No Theory	Qualitative	United Kingdom	Pandemic and post-pandemic considerations.
P8	Factors impacting clinicians' adoption of a clinical photo documentation app and its implications for clinical workflows and quality of care: Qualitative case study	sociotechnical framework	Qualitative	Switzerland and Germany	Pre Pandemic
P9	Factors influencing telemedicine adoption among physicians in the Malaysian healthcare system: A revisit	Technology Acceptance Model (TAM) combined with Kelman's Social Influence Theory	Quantitative	Malaysia	Post-Pandemic
P10	Factors influencing the elderly's adoption of mHealth: an empirical study using extended UTAUT2 model	Unified Theory of Acceptance and Use of Technology (UTAUT2)	Mixed Method	Bangladesh	Post-pandemic
P11	Health Care Providers' and Professionals' Experiences With Telehealth Oncology Implementation During the COVID-19 Pandemic: A Qualitative Study	Consolidated Framework for Implementation Research (CFIR)	Qualitative	United States,	During Covid Pandemic
P12	Health Information System's Responses to COVID-19 Pandemic in China: A National Cross-sectional Study	No Theory	Quantitative	China	During Covid Pandemic
P13	Health Seekers' Acceptance and Adoption Determinants of Telemedicine in Emerging Economies	Extended Technology Acceptance Model (TAM)	Quantitative	Bangladesh	Post-pandemic
P14	Implementing mhealth interventions in a resource-constrained setting: Case study from Uganda	Consolidated Framework for Implementation Research (CFIR)	Qualitative	Uganda.	Pre Pandemic
P15	Middle East and North African Health Informatics Association (MENAHIA)	No Theory	Qualitative	Countries in the MENA region	During and after the COVID-19 pandemic

P16	Needs, expectations, facilitators, and barriers among insurance physicians related to the use of eHealth in their work: results of a survey	No Theory	Quantitative	Netherlands	During Covid Pandemic
P17	Telemedicine as the New Outpatient Clinic Gone Digital: Position Paper From the Pandemic Health System REsilience PROGRAM (REPROGRAM) International Consortium (Part 2)	No Theory	Qualitative	United States, Italy, Canada, and Australia	During Covid Pandemic
P18	The Technology Acceptance of Video Consultations for Type 2 Diabetes Care in General Practice: Cross-sectional Survey of Danish General Practitioners	Technology Acceptance Model (TAM).	Quantitative	Denmark	During Covid Pandemic
P19	Transforming and facilitating health care delivery through social networking platforms: evidences and implications from WeChat	Levesque's health care accessibility model,	Qualitative	China	During Covid Pandemic
P20	Trust and Uncertainty in the Implementation of a Pilot Remote Blood Pressure Monitoring Program in Primary Care: Qualitative Study of Patient and Health Care Professional Views	the Technology Acceptance Model (TAM)"	Qualitative	Singapore	Pre Pandemic
P21	Use of video-based telehealth services using a mobile app for workers in underserved areas during the COVID-19 pandemic: A prospective observational study	No Theory	Qualitative	Korea	During the COVID-19 pandemic
P22	Utility, barriers and facilitators to the use of connected health to support families impacted by pediatric cancer: a qualitative analysis	Technology Acceptance Model (TAM)"	Qualitative	Ireland	During Covid Pandemic

Table 2. Thematic Analysis			
Category	Theme	Sub-themes	Sources
Technology			
	Infrastructure & Accessibility	Unreliable power supply Prohibitive internet connectivity and costs Expensive to purchase and maintain mobile devices Interoperability and integration with hospital systems Log-in difficulties and poor connectivity Technical issues like unstable internet connections	[14] (Uganda) [23] (Switzerland and Germany) [15] (China) [24] (Korea) [12] (Bangladesh) [6] (South Africa)
	Usability & System Quality	User interface complexity Perceived ease of use and accessibility of patient records User-friendly and clinically accurate multi-parameter dashboards	[5] (Bangladesh) [13] (Malaysia) [8] (United Kingdom)
	Security Concerns	Data security and risk Protecting network information security Cybersecurity incidents during the pandemic Privacy and security concerns	[25] (China) [15] (China) [26] (Ireland) [2] (Switzerland and Germany) [12] (Bangladesh) [27] (Netherlands)

Behavioral			
	Resistance to Change & Adoption	Trust issues and reluctance to share health information	[14] (Uganda)
		Resistance to digital adoption by both patients and healthcare providers	[2] (Switzerland and Germany)
		Resistance to change among physicians	[28] (United States)
		Cultural views on the use of mobile devices at work	[16] (United States, Italy, Canada, Australia)
		Resistance to telehealth adoption	[8] (United Kingdom)
			[29] (Denmark)
			[17] (Uganda)
	Behavioral Influences & Social Factors	Limited awareness about mHealth in communities	[14] (Uganda)
		Perceived usefulness and social influence	[13] (Malaysia)
		Compliance, internalization, and image considerations	[12] (Bangladesh)
Institutional			
	Resource Allocation & Integration	High costs and expenditures in training	[14] (Uganda)
		Existing demotivation among CHWs	[8] (United Kingdom)
		Infrastructure challenges	[2] (Switzerland and Germany)
		Lack of integration between public health and primary care Insufficient training for healthcare providers	[28] (United States)
			[18] (MENA region)
		Limited resources for digital health initiatives	[30] (Ireland)
	Organizational Processes & Workload		[2] (Switzerland and Germany)
		Ambiguous or complicated decision-making processes High workload	[25] (China)
		Issues with scheduling and EHR integration	[28] (United States)
Individual			
	Skills & Literacy	Inadequate skills, experience, and literacyLow digital literacy among the elderly	[14] (Uganda)
		Variability in personal experience with technology and attitudes toward technology and hange	[5] (Bangladesh)
			[2] (Switzerland and Germany)
	Psychological & Physical Barriers	Technology anxiety and effort in using mHealth systems	[5] (Bangladesh)
		Concerns about the lack of physical exam and biometric data	[28] (United States)
		Privacy and data security concerns impacting acceptance of telemedicine systems	[31] (Singapore)
		Low technological self-efficacy, anxiety, and stress	[24] (Korea)
		Language barriers	[32] (Brazil and Netherlands)
		Fear of losing contact with patients	[6] (South Africa)
			[33] (Netherlands)

DISCUSSIONS

This review highlights the key barriers and challenges in telemedicine adoption from the perspective of healthcare providers, with a focus on socio-technological factors and individual-institutional behaviours. Table 2 presents a summary of the thematic analysis, categorizing the primary factors that influence physicians' engagement with telemedicine.

Socio-Technological Factors
Infrastructure & Accessibility

Infrastructure and accessibility issues continue to be significant barriers to telemedicine adoption among physicians, particularly in low-resource and rural settings. In regions like Uganda and Bangladesh, unreliable power supplies create challenges in maintaining consistent telemedicine systems, leading to interruptions in patient care.[12,14] The lack of stable electricity in these areas can disrupt not only telemedicine consultations but also the necessary use of digital health records and communication tools, which are essential for providing effective remote healthcare. Additionally, the high costs associated with internet connectivity further exacerbate these challenges. In many regions, particularly in low-income countries, broadband and mobile data systems are expensive, making it difficult for healthcare providers to offer reliable telemedicine systems.[6,24] The financial burden is not only limited to connectivity but extends to the cost of purchasing and maintaining the required devices, such as laptops, smartphones, and other telemedicine equipment, which can be out of reach for many healthcare facilities.[2,12] As a result, the adoption of telemedicine in these regions remains restricted, preventing the expansion of healthcare systems through remote consultations.

In addition to these financial constraints, technological challenges present another layer of difficulty for healthcare providers looking to adopt telemedicine. One major issue is the lack of interoperability between telemedicine platforms and existing hospital systems, particularly electronic health records (EHR) systems. This lack of integration leads to inefficiencies, as healthcare providers must navigate between incompatible systems to access patient data, which complicates workflows and adds to physicians' already heavy workloads.[2,15] Physicians in many regions also face persistent log-in difficulties and connection problems, which can interrupt virtual consultations, reduce the quality of care, and frustrate both healthcare providers and patients.[14,24] Unstable internet connections, particularly in rural and remote areas, further impede the ability to maintain smooth telemedicine sessions, making it difficult for physicians to deliver care consistently. Addressing these infrastructure and accessibility challenges—both financial and technological—is essential to expanding telemedicine's reach and ensuring its successful and sustained implementation in healthcare systems worldwide.

On the other hand, most current research on telemedicine are conducted in developed economies, leaving a gap in understanding the unique barriers faced by developing countries like the Philippines, Uganda, and Bangladesh. In these regions, unreliable infrastructure and high costs of internet connectivity and equipment hinder the adoption of telemedicine.[12,14] There is a pressing need for research in the Philippine context to address similar challenges and develop strategies to overcome these barriers to telemedicine adoption.

Usability & System Quality

In addition to the infrastructure and accessibility challenges, usability and system quality are pivotal factors influencing the adoption of telemedicine by physicians. One of the most significant concerns raised by healthcare providers is the complexity of user interfaces. Physicians often report that telemedicine platforms are difficult to navigate, which disrupts their workflow and increases the time required for remote consultations.[5,8] The complexity of these platforms leads to a higher cognitive load, making it more difficult for physicians to focus on patient care.[13] In high-pressure healthcare environments, where time is a critical resource, a cumbersome user interface can result in frustration and decreased productivity. This issue is particularly problematic for physicians who need to handle large volumes of patients, as the additional time spent figuring out how to use the platform reduces the number of patients they can effectively consult in a given period.[5,8] Consequently, the complexity of these systems deters physicians from adopting telemedicine, as it is seen as adding more burdens rather than enhancing the efficiency of care delivery.[13]

he perceived ease of use of telemedicine platforms, particularly when it comes to accessing patient records, is another critical determinant of physician adoption. Healthcare providers need platforms that allow them to retrieve patient data quickly and without interruption, as the seamless flow of clinical information is essential for maintaining the quality of care.[8,13] If physicians encounter difficulties in accessing or updating patient records during a virtual consultation, it can lead to inefficiencies, miscommunications, and potentially adverse outcomes for patients.[5] The inability to easily access this critical information also adds to physician frustration, as it interferes with the smooth conduct of remote consultations.[13] Moreover, the user-friendly and clinically accurate multi-parameter dashboards that allow physicians to monitor various health metrics are essential for providing comprehensive care.[8] These dashboards must present accurate data in a format that is easy to understand and interact with, enabling physicians to make timely and informed decisions about

patient treatment.[5] If these systems are not designed with clinical accuracy and usability in mind, they can significantly erode physicians' trust in telemedicine platforms, further inhibiting their adoption.[5,8] Addressing these usability and system quality issues is crucial for improving the overall user experience and encouraging broader, sustained adoption of telemedicine in clinical practice.[13]

The gaps identified in these themes highlight issues with the complexity of telemedicine user interfaces, which increase cognitive load and disrupt workflows. There is also a lack of easy access to patient records during virtual consultations, leading to inefficiencies and frustration among healthcare providers. Additionally, the absence of user-friendly, clinically accurate dashboards further erodes trust in telemedicine platforms, limiting their adoption.

Security Concerns

Alongside the challenges of infrastructure and accessibility, security concerns continue to be a significant obstacle to the widespread adoption of telemedicine by physicians. Data security and the risk of breaches during telemedicine consultations have been a significant concern, especially in regions where network information security is difficult to guarantee.[25,27] The increase in cybersecurity incidents during the pandemic further heightened these concerns, as healthcare systems were targeted, and sensitive patient data was compromised. [2,26] Physicians are particularly wary of the privacy implications of telemedicine, as any breach of patient confidentiality could lead to serious legal and ethical consequences.[12] Protecting network information security is essential to gaining physicians' trust in telemedicine systems. In addition, the challenge of securing data across various regions, especially where there are significant infrastructure issues, exacerbates the issue.[15,27] Without addressing these privacy and security concerns through stronger cybersecurity measures and robust protocols, the adoption of telemedicine will likely remain hindered.

A major gap in this theme is the concern over data privacy and confidentiality, especially in regions with underdeveloped telemedicine infrastructure. Inconsistent security protocols across regions exacerbate the issue, leading to unequal protection of sensitive health data. Additionally, the rise in cybersecurity incidents during the pandemic has exposed vulnerabilities, undermining trust in telemedicine systems and hindering broader adoption.

Behavioral Factors

Resistance to Change & Adoption

Beyond socio-technological factors, behavioural influences significantly impact the adoption of telemedicine among healthcare providers and patients. One of the key barriers is the trust issue and reluctance to share health information electronically. Many healthcare providers and patients are concerned about data privacy, with a prevailing fear that sensitive health information could be mishandled or accessed by unauthorized parties.[2,14] This distrust in the security of digital systems contributes to hesitancy in embracing telemedicine solutions. Additionally, resistance to digital adoption is commonly observed in healthcare settings. Physicians, in particular, are often reluctant to replace traditional in-person consultations with digital alternatives due to concerns about the perceived quality of care provided through telemedicine.[16,28] This hesitation is exacerbated by the belief that telemedicine cannot replicate the thoroughness of physical examinations or face-to-face interactions, which remain central to their practice.

Cultural factors also play a role in resistance to telehealth adoption. In some settings, the use of mobile devices for healthcare is seen as a distraction rather than a tool for enhancing patient care.[8] Moreover, physicians are often resistant to telemedicine due to the perceived time and effort required for retraining and adapting to new digital systems.[17,29] Many healthcare providers view the integration of telemedicine platforms into their workflow as an additional burden, given the steep learning curve associated with these tools. Addressing these behavioral influences is essential for promoting a culture of acceptance and ensuring that telemedicine becomes a well-integrated component of healthcare systems worldwide.

The primary gaps in telemedicine adoption are centered around data security concerns and the reluctance of healthcare providers and patients to fully trust digital systems. Many physicians hesitate to adopt telemedicine due to doubts about its ability to replicate the quality of in-person care and the perceived complexity of using new digital platforms. Additionally, the time and effort required for retraining further deters adoption. These gaps highlight the need for improved security measures and streamlined user interfaces to enhance trust and ease of use.

Behavioral Influences & Social Factors

In addition to resistance to change and adoption, behavioral influences and social factors also play a critical role in the adoption of telemedicine by both healthcare providers and patients. A significant barrier is the limited awareness of mHealth and telemedicine technologies in communities, particularly in rural and underserved areas where digital literacy is low.[12,14] In such communities, the lack of understanding of how telemedicine

works and its potential benefits leads to hesitancy in its adoption. Without adequate education and information about the advantages of telemedicine, both patients and healthcare providers may be reluctant to engage with these technologies, slowing down their uptake.[17,28]

Furthermore, the perceived usefulness and social influence greatly impact telemedicine adoption. Research shows that healthcare providers are more likely to adopt telemedicine if they perceive it as valuable and effective in delivering care.[5,13] Social influence, particularly from peers and colleagues, can play a significant role in shaping a provider's decision to use telemedicine. If physicians see their peers successfully using telemedicine and recognizing its benefits, they are more likely to adopt the technology themselves[8]. Additionally, considerations related to compliance, internalization, and professional image influence behavior, as healthcare providers weigh how telemedicine adoption aligns with their professional standards and reputation.[12,16]

A significant gap in the adoption of telemedicine is the influence of social and professional image. Healthcare providers may be hesitant to adopt telemedicine if it conflicts with their professional standards or reputation. This highlights the need for more research on how social influence and concerns about professional image impact the long-term adoption of telemedicine, especially in areas where peer influence is a critical factor.

Individual Challenges
Skills & Literacy

Individual barriers refer to the personal limitations and challenges that hinder healthcare providers and patients from adopting telemedicine. These barriers can be deeply rooted in the individual's skills and literacy, particularly when it comes to navigating digital tools and telemedicine platforms. A key theme within this is the inadequate skills, experience, and literacy of both patients and healthcare providers, especially in regions with less-developed healthcare systems. Many healthcare providers lack the digital experience and training necessary to use telemedicine platforms effectively, leading to a reluctance to adopt these technologies[14]. In countries such as Bangladesh, this skills gap is especially pronounced, as both healthcare workers and patients struggle to engage with telemedicine systems due to their lack of familiarity with digital tools.[5]

Another significant aspect of individual barriers is the low digital literacy among the elderly. Older patients, and sometimes even older healthcare providers, often face difficulties in using smartphones, computers, and other telemedicine platforms, which limits their participation in digital healthcare solutions.[5,14] This challenge is compounded by the variability in personal experience with technology and attitudes toward technology and change. While some individuals are more comfortable using digital tools, others, particularly from older generations or those with limited exposure to technology, may feel overwhelmed or anxious about the transition to telemedicine.[2] This variability in skill and openness to technological change further impedes the widespread adoption of telemedicine.

Expanding on socio-technological challenges, individual limitations, such as low digital literacy among healthcare providers and patients, particularly in underdeveloped regions, hinder telemedicine adoption.[14] The elderly, who are critical telemedicine users, often struggle with technology, further slowing adoption.[5] Addressing these gaps through targeted digital literacy efforts is essential to overcome resistance and foster telemedicine acceptance.

Psychological & Physical Barriers

Psychological and physical barriers present ongoing challenges to the adoption of telemedicine, impacting both healthcare providers and patients. Technology anxiety is a significant factor, stemming from the discomfort many users feel when interacting with unfamiliar digital platforms, particularly in healthcare settings where precision is paramount.[5,14] Many healthcare providers and patients, especially those less familiar with technology, experience stress as they navigate the learning curve, which can seem overwhelming. This anxiety is compounded by fears of making mistakes, such as inputting patient data incorrectly or mismanaging technical features during a consultation.[12,24] These concerns lead to a perception that telemedicine requires more effort and presents more risk than traditional healthcare methods, which can significantly reduce the likelihood of adoption.[17] The challenge is particularly acute in fields like geriatrics or internal medicine, where physical assessments are essential for diagnosis and treatment. Many physicians' express doubts about the ability of telemedicine to replicate the hands-on evaluations they rely on, such as palpation or listening to heart/lung sounds, which are crucial in providing comprehensive care.[28,32]

Adding to these concerns are privacy and data security issues, consistently identified as significant barriers to telemedicine adoption. Both healthcare providers and patients express concerns about the confidentiality of sensitive health data, particularly in light of increased cybersecurity threats during the COVID-19 pandemic.[6,31] Cyber-attacks targeting healthcare systems have highlighted vulnerabilities in telemedicine platforms, eroding trust in their ability to safeguard personal information.[2,25] These concerns contribute to low technological self-efficacy, especially among individuals with limited digital skills, leading to increased anxiety about using telemedicine securely and effectively.[24,27] Furthermore, language barriers present additional challenges,

particularly in regions where telemedicine platforms lack adequate support for non-native speakers or those with low literacy levels, making it difficult for users to fully engage with the system.[5,33] For many healthcare providers, the fear of losing personal contact with patients also remains a significant concern. Physicians worry that telemedicine undermines the personal relationship they build with patients, as the lack of face-to-face interaction can limit the ability to read non-verbal cues or foster trust and rapport.[17,28]

The gaps identified here include technology anxiety and concerns about replicating essential physical exams, which hinder telemedicine adoption, especially among healthcare providers and patients with limited digital skills. Additionally, privacy concerns, cybersecurity risks, and fears of losing personal contact with patients further erode trust in telemedicine platforms.[2,5,14]

Institutional Behaviors
Resource Allocation & Integration
Institutional behavior refers to the actions, policies, and practices that healthcare organizations adopt, which significantly impact the implementation and success of new technologies like telemedicine.[2,28]These behaviors involve leadership decisions, organizational culture, resource distribution, and overall decision-making processes. Such elements are crucial as they dictate how effectively digital health tools like telemedicine are incorporated into healthcare systems, particularly regarding resource allocation, training, and infrastructure development. Effective institutional behavior can facilitate telemedicine integration, whereas a lack of organizational support can hinder its widespread adoption.[4,11] For instance, inadequate leadership support or an absence of institutional readiness can result in fragmented or unsuccessful telemedicine programs.[8,30]

Resource allocation and integration are key components of institutional behavior that play a critical role in the adoption and sustainability of telemedicine. High costs and expenditures for training healthcare workers present a significant challenge, especially in resource-constrained settings like Uganda. The financial burden of training, combined with inadequate support, demotivates healthcare workers, such as community health workers (CHWs), from fully engaging in telemedicine initiatives.[14] highlighted that this demotivation, coupled with infrastructure challenges, impedes the smooth adoption of telemedicine systems in Uganda. Similar trends are observed in the Middle East and North Africa (MENA), where the lack of resources and support limits the integration of digital health initiatives into healthcare systems.[18] These challenges are exacerbated by the complexity of integrating telemedicine with existing healthcare workflows, requiring significant investment in both technology and personnel.[8]

Moreover, the lack of integration between public health and primary care is another institutional barrier affecting telemedicine adoption. In many settings, telemedicine platforms are not fully synchronized with broader public health systems, causing fragmentation and inefficiency. Jacob[2] emphasize the need for cohesive integration between public and primary care systems in Switzerland and Germany to ensure telemedicine becomes a sustainable healthcare tool. Similarly, in the United States,[28] found that healthcare providers often lack sufficient training in telemedicine technologies, further hindering integration efforts. Limited resources for digital health initiatives, particularly in low-income countries, make it difficult to maintain these programs without external support or continuous funding.[30] As a result, insufficient training, lack of infrastructure, and limited resources collectively constrain the ability of healthcare institutions to scale telemedicine and integrate it into their healthcare delivery models.

Organizational Processes & Workload
In addition to resource allocation challenges, organizational processes and workload present significant obstacles to the successful adoption of telemedicine within healthcare systems. Complicated and often ambiguous decision-making processes in healthcare institutions create delays and confusion about how telemedicine should be integrated into existing practices. For instance, Jacob[2] found that in Switzerland and Germany, healthcare providers were often unsure about how to implement telemedicine due to unclear policies and inconsistent leadership guidance. Similarly, in China, Ye[25] highlighted those bureaucratic inefficiencies and the lack of a clear digital health strategy further slowed the rollout of telemedicine systems. These issues prevent healthcare providers from fully engaging with telemedicine tools and lead to fragmented adoption across different regions and healthcare facilities.[8,18]

High workload is another pressing issue that adds to the reluctance of healthcare providers to embrace telemedicine. Many physicians and healthcare workers, already burdened with high patient volumes and administrative duties, find it challenging to balance these responsibilities with the additional demands of telemedicine. Turner[28] reported that U.S. healthcare providers expressed frustration over the steep learning curve and time investment required to incorporate telemedicine into their workflows. They not only had to manage in-person appointments but also navigate telemedicine platforms, handle virtual consultations, and resolve technical issues—all without additional institutional support. This extra burden, coupled with insufficient compensation for the increased workload, serves as a major deterrent for many healthcare professionals,

leading to resistance in adopting telemedicine as a long-term solution.[6]

Moreover, scheduling and EHR integration challenges create further barriers to the seamless adoption of telemedicine. A critical issue identified by both Wu[7] and Ye[25] in China is the lack of integration between telemedicine platforms and existing electronic health records (EHR) systems. This disconnect causes inefficiencies, such as the need for duplicate data entry and inconsistent patient records, which undermines the potential benefits of telemedicine. Turner[28] found similar issues in the United States, where healthcare providers struggled with scheduling conflicts between virtual and in-person consultations, often resulting in missed or double-booked appointments. These integration issues not only disrupt clinical workflows but also contribute to provider frustration, further hindering telemedicine's broader implementation. Pagliari[8] emphasizes that addressing these organizational challenges—through clearer decision-making, workload management, and improved system integration—will be crucial for telemedicine to become a sustainable part of modern healthcare delivery.[30]

In summary the gaps are inadequate infrastructure, training, and integration with existing healthcare systems hinder telemedicine adoption, particularly in low-resource settings.[2,14] Additionally, high workloads and inefficient decision-making processes further complicate the sustainable implementation of telemedicine in healthcare.[8,28]

Limitations of the study

This systematic review has several limitations that must be acknowledged. First, the study utilized only two databases, Scopus and PubMed, which, while extensive, may not have captured all relevant research on telemedicine barriers, particularly from specialized or regional journals not indexed in these databases. As a result, some valuable insights from other sources may have been missed, potentially limiting the comprehensiveness of the findings.

Additionally, the review was restricted to open-access articles, excluding studies published in subscription-based journals. Although this was done to ensure accessibility, it may have unintentionally narrowed the diversity and scope of the data included. Important studies that might offer different perspectives or more in-depth insights were not considered due to this limitation.

Lastly, the review only focused on barriers to telemedicine adoption and excluded studies conducted before the COVID-19 pandemic. This means that the analysis primarily reflects the rapid adoption of telemedicine during the pandemic, potentially overlooking long-standing challenges that existed before this period. As a result, the review may underrepresent both pre-pandemic barriers and the facilitators of telemedicine, providing an incomplete picture of its adoption. Future research should aim for a more balanced perspective by integrating both barriers and facilitators.

CONCLUSION AND FUTURE RECOMMENDATION

In conclusion, this systematic review highlights the complex interplay of barriers that have led to the discontinuance of telemedicine among healthcare providers in the post-pandemic era. The study synthesizes key challenges across socio-technological, individual, and institutional dimensions that have hindered the sustained adoption of telemedicine. Key barriers include unreliable infrastructure, particularly in rural and resource-limited settings, high costs of internet connectivity, and a lack of integration between telemedicine platforms and existing hospital systems.[12,14,15] These technological limitations make it difficult for healthcare providers to maintain efficient workflows and patient care via telemedicine. Additionally, complications in accessing electronic health records (EHR), connection disruptions, and poor user interfaces increase the cognitive load on healthcare providers, further reducing telemedicine's practical effectiveness.[2,24] These issues are compounded by behavioural resistance, where concerns over data security, the quality of care provided, and the complexity of telemedicine platforms deter healthcare professionals from fully embracing the technology.[6,28]

From an institutional perspective, the study found that factors such as insufficient training for healthcare providers, high workloads, and unclear decision-making processes hinder the full integration of telemedicine into healthcare systems. Resource constraints, including inadequate investments in infrastructure and workforce development, prevent institutions from sustaining telemedicine systems over the long term.[8,18,28] This convergence of technological, behavioural, and institutional barriers creates a challenging environment where the benefits of telemedicine are overshadowed by practical obstacles, leading to its discontinuance in many healthcare settings.[8,30]

In addressing the review's research questions, the primary barriers to telemedicine adoption among healthcare providers are multifaceted. Technological barriers, such as poor platform integration, unstable internet connectivity, and high costs of telemedicine tools, make it difficult for healthcare providers to incorporate these systems into their routine practice.[2,12] Behavioural resistance due to concerns over privacy, data security, and the complexities of digital platforms further complicates adoption.[6,8] Additionally, institutional challenges such as insufficient leadership support, inadequate training, and a lack of resources further limit the

sustainability of telemedicine.[18,28] The socio-technological factors influencing physicians, such as high costs of telemedicine infrastructure, connection issues, and cumbersome user interfaces, also contribute to the decline in telemedicine use, as they disrupt clinical workflows and increase the burden on healthcare providers.[14,24] On an individual level, many healthcare providers prefer traditional in-person consultations due to concerns about the thoroughness of physical exams and the impersonal nature of telemedicine.[17,28] Institutionally, a lack of training programs, poor integration with existing healthcare systems, and insufficient resource allocation lead to the discontinuation of telemedicine.[8,18]

Finally, Future research should prioritize mixed method approaches to gain a more comprehensive understanding of physicians' perspectives on the discontinuance of telemedicine. Combining both qualitative and quantitative methods will provide richer insights into the complex barriers healthcare providers face when adopting and maintaining telemedicine systems. Qualitative research, such as interviews and focus groups, can explore in-depth experiences and perceptions of physicians, capturing the nuanced challenges they encounter with telemedicine tools, workflow integration, and patient interaction. Meanwhile, quantitative data can offer a broader, generalizable understanding of the prevalence of these issues across different regions and healthcare settings.

Additionally, future studies should explore models and frameworks that specifically address the factors leading to the discontinuance of telemedicine and other healthcare technologies. By focusing on the drivers behind why certain technologies fail to be fully integrated or are abandoned, researchers can identify critical points of failure in the adoption process. Such research can provide actionable insights for developing strategies to prevent the discontinuation of telemedicine and ensure its sustainability in healthcare delivery. This holistic approach will allow for a deeper investigation into both the individual and institutional behaviours contributing to telemedicine discontinuance, ultimately leading to more effective solutions that support long-term adoption that meets the needs of both healthcare providers and patients.

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