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Factors increasing telemedicine adoption across adult non-healthcare professionals: A systematic review of observational studies published between 2021 and 2025

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ABSTRACT

Background: Telemedicine has emerged as a key digital healthcare platform, offering convenient access to medical services for the public. Despite its potential, widespread adoption remains hindered by lingering consumer skepticism.

Objectives: The aim of this systematic review was to investigate the factors increasing telemedicine adoption across adult non-healthcare professionals.

Materials and methods: This was a systematic review conducted of primary observational studies published between 2021 and 2025. Adhering to PRISMA guidelines, the authors systematically searched three online databases (PubMed, ProQuest, and Science Direct) and screened articles using the PRISMA Flow Chart to identify eligible studies based on predefined inclusion criteria. The Joanna Briggs Institute's (JBI) critical assessment techniques were used to evaluate the quality of the research findings.

Results: From the reviewed secondary data derived from primary studies, 22 original articles were selected for analysis. Four major themes emerged as drivers of telemedicine utilization, including: 1) socioeconomic-demographic, such as age, education, income, employment, marital status, and social influence, 2) user's perceived benefits factors like perceived usefulness, benefits, ease of use, and trust, 3) health-related problems, such as frequent healthcare demands, caregiving responsibilities, having chronic disease, and mental health conditions, and 4) internal factors or technological factors of telemedicine systems: price, service, and system quality.

Conclusion: In conclusion, telemedicine adoption is influenced by a multifaceted interplay of socioeconomic and demographic factors, a user's perceived benefits, individual health needs, and systemic features.

Introduction

The digital revolution has fundamentally transformed various sectors, including healthcare. One of the most prominent advancements in recent years is the rise of telemedicine, which refers to the provision of medical services remotely using information and communication technologies.[1] Telemedicine encompasses a wide range of applications from real time video consultations and remote patient monitoring to mobile health apps and virtual health education platforms. This innovation has redefined how healthcare is accessed and delivered, particularly for populations with geographical, physical, or systemic barriers to in person care.[2]

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The urgency of adopting telemedicine became especially apparent during the COVID-19 pandemic, where lockdowns, physical distancing measures, and overwhelmed health facilities necessitated a shift towards remote healthcare solutions. In this context, telemedicine not only functioned as an emergency response but also demonstrated long term potential in enhancing the resilience, efficiency, and inclusivity of health systems. Consequently, governments, health organizations, and private sectors have increasingly invested in telemedicine infrastructure, policy frameworks, and public awareness campaigns.[3]

However, despite the growing infrastructure and policy support, the adoption of telemedicine remains inconsistent and fragmented across different populations, regions, and health contexts. Numerous studies have shown that while some groups embrace telemedicine rapidly, others exhibit hesitation, low usage rates, or complete avoidance.[4] This disparity raises crucial questions: What drives or hinders telemedicine adoption? Are there specific sociodemographic, psychological, or contextual factors that consistently predict usage? How do perceptions of technology usability, healthcare needs, or trust influence decision-making? Understanding these factors is essential because the success of telemedicine relies not only on technological availability but also on its acceptance and meaningful utilization by intended users.[5]

Given this background, there is a pressing need to synthesize findings from existing quantitative studies to identify robust, evidence-based determinants of telemedicine use across different demographics. This study aimed to identify the nature and scope of available research literature on factors increasing telemedicine adoption across adult non-healthcare population.

Materials and methods

This study was a systematic review. The articles were obtained from several online databases such as PubMed, ScienceDirect, and ProQuest. The basic query developed for the literature search was: ("adult non-healthcare professionals") AND ("determinants" OR "factors") AND ("telehealth" OR "telemedicine") AND ("observational study"). The Boolean operators in this query were adjusted to fit the specifications of each database.

We followed five steps in conducting a systematic review, which included 1) framing questions for a review, 2) identifying relevant work, 3) assessing the quality of studies, 4) summarizing the evidence, and 5) interpreting the findings.

Studies were included if they met the following criteria: 1) full-text articles examining factors influencing the adoption, use, or preference for telemedicine services among individuals or patients in the general population (≥18 years old), regardless of their specific health needs; 2) studies involving non–healthcare provider populations (i.e., general community members or patients); 3) articles published in English; 4) publications from the last five years (2021-2025); 5) studies that applied quantitative analyses, including at least univariate or bivariate analysis.

Studies were excluded if they met any of the following conditions: 1) articles with themes unrelated to telemedicine utilization as defined in this study, 2) studies with anonymous authorship or unclear authorship, 3) articles that did not employ quantitative analyses, such as those lacking univariate or bivariate results, 4) studies where the dependent variable focused on broader digital health concepts (e.g., e-health, digital health, mobile health, virtual clinics) instead of telemedicine specifically, 5) review articles, case reports, or purely descriptive studies, and 6) studies in which respondents were healthcare providers (e.g., physicians, nurses, or other medical professionals) rather than telemedicine users or the general population.

The authors followed the PRISMA flow chart guidelines for the search process and selection of eligible articles based on the inclusion criteria. The conclusions of this study were derived from secondary data obtained from the primary studies reviewed.

The study selection process was carried out by three independent reviewers, consisting of three authors of this review (except the third author). Each reviewer was assigned one online database to screen. All reviewers extracted the initial search results into separate Excel spreadsheets to ensure systematic organization and transparency.

After individual screening, the reviewer authors compared their extracted lists using Mendeley reference management software to identify duplicates and consolidate the records. Any discrepancies or conflicts regarding study relevance, duplication status, or eligibility were discussed collectively among the reviewers. In cases where disagreement persisted, the team referred to the predefined inclusion and exclusion criteria as well as the study appraisal guidelines to reach a consensus. This multi-reviewer approach strengthened the accuracy and rigor of the study selection and data extraction process.

A comprehensive search was conducted across five online databases, yielding a total of 1,515 records. Specifically, the search identified 654 from PubMed, 273 from ProQuest, and 296 from ScienceDirect. During the identification phase, all retrieved records were screened for duplication. A total of 1,086 duplicate records were removed. After this removal, 429 unique articles remained and were taken forward for title and abstract screening. The 429 articles underwent screening based on their titles and abstracts. From this process, 385 articles were excluded because they did not meet the eligibility criteria. The remaining 44 articles appeared to fit the review objectives and were moved to full-text assessment. Full-text screening was conducted on 44 articles. After a thorough review, 22 articles were excluded for various reasons. After

applying all eligibility criteria, 22 studies met the inclusion requirements. These studies were ultimately included in the qualitative synthesis for the systematic review (Figure 1).

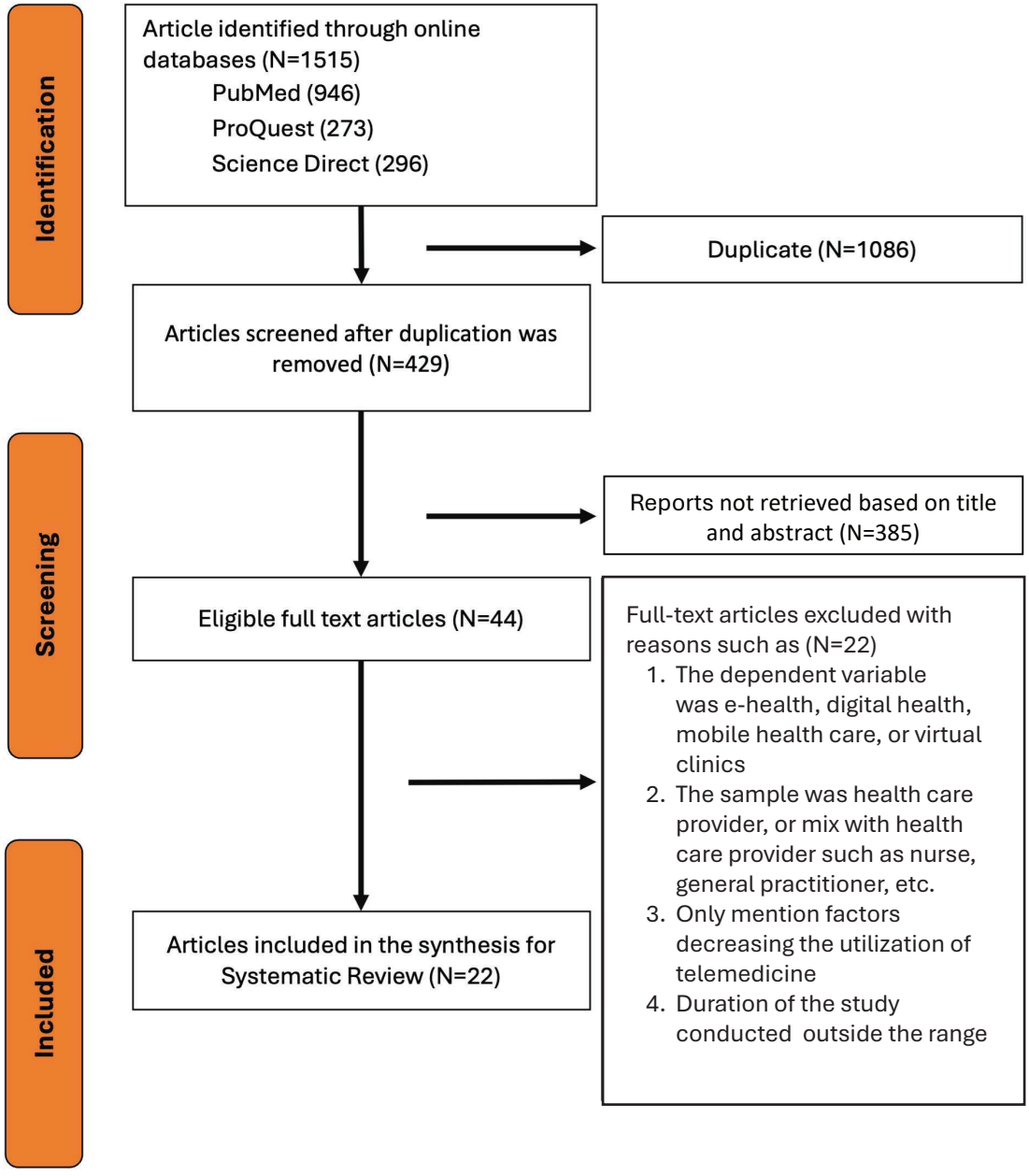

Figure 1. *PRISMA diagram of factors associated with the adoption of telemedicine.*

To assess the quality of the studies, we used the JBI critical appraisal tool for observational studies (Table 1) and for cohort studies (Table 2). The appraisal of the cross-sectional studies showed that 19 studies had a low risk of bias, while one study demonstrated a moderate risk of bias. Both cohort studies were assessed as having a low risk of bias.

Table 1. Risk of bias for cross-sectional studies using the JBI cross-sectionals studies checklist.

	Were the criteria for inclusion in the sample clearly defined?	**Were the study subjects and the setting described in detail?**	**Was the exposure measured in a valid and reliable way?**	**Were objective, standard criteria used for measurement of the condition?**	**Were confounding factors identified?**	**Were strategies to deal with confounding factors stated?**	**Were the outcomes measured in a valid and reliable way?**	**Was appropriate statistical analysis used?**	**Overall appraisal**
An *et al.*[17]	Y	Y	Y	Y	Y	Y	Y	Y	9/9 Low Risk
Anil *et al.*[12]	Y	Y	Y	Y	NA	NA	Y	Y	7/9 Moderate Risk
Athavale *et al.*[22]	Y	Y	Y	Y	Y	Y	Y	Y	9/9 Low Risk
Bhuyan *et al.*[5]	Y	Y	Y	Y	Y	Y	Y	Y	9/9 Low Risk
Cobb *et al.*[11]	Y	Y	Y	Y	Y	Y	Y	Y	9/9 Low Risk
Jeon *et al.*[13]	Y	Y	Y	Y	Y	Y	Y	Y	9/9 Low Risk
Kabir *et al.*[1]	Y	Y	Y	Y	Y	Y	Y	Y	9/9 Low Risk
Li *et al.*[18]	Y	Y	Y	Y	Y	Y	Y	Y	9/9 Low Risk
Lin *et al.*[19]	Y	Y	Y	Y	Y	Y	Y	Y	9/9 Low Risk
Mackwood *et al.*[8]	Y	Y	Y	Y	Y	Y	Y	Y	9/9 Low Risk
Meraya *et al.*	Y	Y	Y	Y	Y	Y	Y	Y	9/9 Low Risk
Muehlensiepen *et al.*[6]	Y	Y	Y	Y	Y	Y	Y	Y	9/9 Low Risk
Odebunmi *et al.*[7]	Y	Y	Y	Y	Y	Y	Y	Y	9/9 Low Risk
Praha *et al.*[10]	Y	Y	Y	Y	Y	Y	Y	Y	9/9 Low Risk
Shao *et al.*[9]	Y	Y	Y	Y	Y	Y	Y	Y	9/9 Low Risk
Tan *et al.*[4]	Y	Y	Y	Y	Y	Y	Y	Y	9/9 Low Risk
Tsatsos *et al.*[15]	Y	Y	Y	Y	Y	Y	Y	Y	9/9 Low Risk
Wang *et al.*[16]	Y	Y	Y	Y	Y	Y	Y	Y	9/9 Low Risk
Yan *et al.*[20]	Y	Y	Y	Y	Y	Y	Y	Y	9/9 Low Risk
Yao *et al.*[3]	Y	Y	Y	Y	Y	Y	Y	Y	9/9 Low Risk

Note: Y: yes, N: no, NA: not applicable

Table 2. Risk of bias for cohort studies using the JBI cohort studies checklist.

	Mao *et al.*[21]	**Williams *et al.*[2]**
1. Were the two groups similar and recruited from the same population?	Y	Y
2. Were the exposures measured similarly to assign people to both exposed and unexposed groups?	Y	Y
3. Was the exposure measured in a valid and reliable way?	Y	Y
4. Were confounding factors identified?	Y	Y
5. Were strategies to deal with confounding factors stated?	Y	Y
6. Were the groups/participants free of the outcome at the start of the study (or at the moment of exposure)?	Y	Y
7. Were the outcomes measured in a valid and reliable way?	Y	Y
8. Was the follow up time reported and sufficient to be long enough for outcomes to occur?	Y	Y
9. Was follow up complete, and if not, were the reasons to loss to follow up described and explored?	Y	Y
10. Were strategies to address incomplete follow up utilized?	N	N
11. Was appropriate statistical analysis used?	Y	Y
Overall appraisal	**8/9 Low Risk**	**8/9 Low Risk**

Note: Y: yes, N: no, NA: not applicable

Results

A total of 24 studies were included, covering diverse geographical settings. Most were conducted in China (5 studies) and the United States (7 studies), followed by South Korea (2 studies) and Thailand (2 studies), while Bangladesh, Greece, Ireland, Malaysia, Germany, and Saudi Arabia each contributed one study. The combined sample encompassed 2,885,667 individuals (Table 3).

Table 3. Primary article Included in qualitative analysis.

No	Author (year)	Study Design	Study Location	Sample Size	Population	Intervention	Outcome (Factors Increasing Telemedicine Utilize)
1	An *et al.*[17]	Cross-sectional	South Korea	471	Individuals aged ≥30 years	Acceptance of telemedicine	Perceived usefulness, Perceived ease
2	Anil *et al.*[12]	Cross-sectional	USA	215	Individuals >18 years of age	Utilize telemedicine	Economic stability
3	Athavale *et al.*[22]	Cross-sectional	USA	256	Patients aged 18 years and older with a clinical diagnosis of cirrhosis who had at least 1 hepatology clinic visit within the prior 6 months	Utilize telehepatology	Participants with greater pandemic stress
4	Bhuyan *et al.*[5]	Cross-sectional	USA	4,502	Individuals diagnosed with depression	Utilize telemedicine	Individuals diagnosed with depression, women, being married or living with a partner, frequent healthcare visits, and health insurance coverage
5	Cobb *et al.*[11]	Cross-sectional	USA	252	Adults aged 18 years or older	Utilize telemedicine	Having regular doctor and having chronic disease
6	Jeon *et al.*[13]	Cross-sectional	South Korea	552	Participants aged 19-69 years	Utilize telemedicine and teleconsultation	Noncapital residents
7	Kabir *et al.*[1]	Cross-sectional	Bangladesh	1,038	Bangladeshi population	Utilize telemedicine	Perceived benefit, perceived concern, predisposition, age < 20 years, age 20-29 years, unmarried, graduate, higher secondary school certificate, student, urban
8	Li *et al.*[18]	Cross-sectional	China	400	Urban seniors aged 60 and above	Utilize telemedicine	Perceived usefulness
9	Lin *et al.*[19]	Cross-sectional	China	1,006	Not specified population	Utilize telemedicine	Perceived usefulness and perceived ease of use
10	Mackwood *et al.*[8]	Cross-sectional	USA	19,280	Patiens with Cancer	Utilize telemedicine	Patient age (increased use in age < 45 and 85 years and older) and urban residence
11	Mao *et al.*[21]	Longitudinal	Ireland	2,607	Community-dwelling adults aged 50 years and over	Utilize telemedicine	People with more chronic conditions, poorer mental health, and having private health insurance
12	Meraya *et al.*[14]	Cross-sectional	Saudi Arabia	466	Adults aged 60 or above	Utilize telemedicine	Perceived usefulness

Table 3. Primary article Included in qualitative analysis (continued).

No	Author (year)	Study Design	Study Location	Sample Size	Population	Intervention	Outcome (Factors Increasing Telemedicine Utilize)
13	Muehlensiepen *et al.*[6]	Cross-sectional	Germany	438	Patients with RMD	Utilize telemedicine	The possibility that telemedicine services were offered by a rheumatologist, younger age, internet access at home and having RMD diseases.
14	Odebunmi *et al.*[7]	Cross-sectional	USA	1,056	Patients aged between 45 and 75 years who were eligible for colorectal cancer screening	Utilize telemedicine and telepharmacy	Adults younger than 55 years, those with a regular provider health care and long travel times, people who rated pharmacy service quality higher
15	Praha *et al.*[10]	Cross-sectional	Thailand	159	Patients Undergoing Continuous Ambulatory Peritoneal Dialysis	Utilize telemedicine	Older age, higher perceived usefulness
16	Shao *et al.*[9]	Cross-sectional	China	514	Patients with diabetes who are aged ≥18 years	Utilize telemedicine	Social influence, age, education, and family income, patients with a higher family income
17	Tan *et al.*[4]	Cross-sectional	Malaysia	119	Adults aged ≥60 years	Utilize telemedicine	Perceived usefulness
18	Tsatsos *et al.*[15]	Cross-sectional	Greece	90	Adult participants with eye diseases in a single practice office	Utilize telemedicine Care	Perceived usefulness
19	Wang *et al.*[16]	Cross-sectional	China	150	Participants with rehabilitation	Utilize telerehabilitation	Health condition, performance expectancy, and perceived trust
20	Williams *et al.*[2]	Retrospective Observational	USA	2,850,831	Adults aged 19 years and older	Utilize telemedicine	Patients who were employed full-time, patients with a bachelor's degree or higher, patients in the 18-44-year age group
21	Yan *et al.*[20]	Cross-sectional	Thailand	385	Thai individuals aged 18-65 years	Utilize telemedicine	Trust, ease of use, system quality, benefits of use, price, and service quality
22	Yao *et al.*[3]	Cross-sectional	China	880	Middle-aged and older patients with chronic conditions	Utilize telemedicine	Patients with chronic respiratory diseases, education level, monthly income, patients who required caregiving

Most of the studies employed cross-sectional designs (20 studies), with additional longitudinal and retrospective observational designs. Several studies examined telemedicine within specific service areas such as telehepatology, telepharmacy, and telerehabilitation.

Thematic synthesis identified four major domains influencing telemedicine use: 1) socioeconomic and demographic factors; 2) the user's perceived benefits; 3) health-related needs and clinical conditions; and 4) internal or technological system factors.

Socioeconomic and demographic factors

Socioeconomic and demographic characteristics such as age, education, income, employment, marital status, and social influence were examined in 13 studies, [1–13] making this the most frequently assessed category. Several factors consistently supported greater telemedicine uptake. For example, higher educational attainment was positively associated with telemedicine use. [1-4,9]

Evidence regarding geographical location showed that both urban and non-capital (rural) residents demonstrated higher use of telemedicine, as reported by Jeon *et al.*[13] and Kabir *et al.*[1], respectively. Additional enabling factors included having health insurance,[5,21] home internet access,[6] higher or stable household income,[4,5,9,12] full-time employment,[2] and longer travel times to health facilities.[7]

Findings on age were mixed. While Mackwood *et al.*[8] reported no significant age effect, Praha *et al.*[10] found that older adults were more likely to use telemedicine. In contrast, several studies documented higher uptake among middle-aged adults or younger age groups.[1,2,6,7,9]

Marital status also yielded inconsistent findings. Bhuyan *et al.*[5] identified marriage as a facilitator of telemedicine use, whereas Kabir *et al.* reported lower uptake among married individuals.[1] Social influence emerged as an important determinant.[9] Participants who received recommendations from their physician[6] or who had a regular doctor [7,11] were more likely to use telemedicine services.

User's perceived benefits

User perceptions were highlighted in 10 studies[1,4,10,14–20] and represented one of the strongest thematic drivers of telemedicine adoption. Key perceptual determinants included perceived usefulness[4,10,14,15,17-19] perceived benefits,[1,20] ease of use,[17,19,20] and trust in the system or provider.[16,20] All these factors were associated with increased likelihood of telemedicine use.

Health-related needs and clinical conditions

Health-related needs were identified in six studies[3,5-6,11,21,22] and demonstrated a strong positive association with telemedicine uptake. Individuals with chronic conditions including diabetes, respiratory disorders, and rheumatic or musculoskeletal diseases reported higher use of telemedicine.[1,3,6,21] Similarly, those experiencing mental health conditions such as stress or depression[5,21,22] were more likely to use telemedicine services. High healthcare utilization, such as frequent appointments or ongoing medical management, also increased engagement with telemedicine.[3,5]

Internal technological system factors

Technology-related determinants were reported in one study,[20] which identified system quality, service quality, and cost or price considerations as influential factors shaping telemedicine adoption.

Discussion

This systematic review synthesized evidence from 22 studies conducted across multiple countries to identify factors influencing telemedicine adoption. The findings demonstrate that telemedicine utilization is shaped not only by access to technology but also by a multidimensional interplay of socioeconomic-demographic, perceptual, clinical, and systemic determinants. Taken together, these factors reveal that telemedicine adoption is a behavioral, structural, and contextual phenomenon not simply a technological one.

Socioeconomic position consistently emerged as a strong predictor across studies. Individuals with higher education,[1-4] greater income stability[3,4,12] and insurance coverage[5,21] were more likely to adopt telemedicine, reflecting longstanding patterns described in the digital divide framework, where economic and educational advantages translate into greater digital participation. These patterns indicate that telemedicine may inadvertently reinforce existing inequities if socioeconomic barriers are not addressed.

Geographical differences offer an important contrasting picture. Although urban residence often facilitated telemedicine use due to better digital infrastructure,[23] this pattern did not hold across all settings. For example, higher uptake among non-capital residents in South Korea[13] contrasted sharply with findings from Bangladesh where urban populations dominated telemedicine use.[1] This divergence suggests that geographical effects probably are deeply intertwined with system-level variables such as national investment in rural telehealth, local digital literacy, and the maturity of healthcare networks rather than geography alone. Thus, geographical findings cannot be interpreted uniformly without considering broader policy, and infrastructural contexts.

Age, often be assumed to a straightforward determinant, also yielded mixed results. Instead of age itself driving adoption, the evidence suggests that it functions as a proxy for more salient constructs such as digital literacy,[24] prior technology experience,[25] and perceived usefulness key components of technology acceptance model (TAM) and unified theory of acceptance and use of technology (UTAUT).[26] Younger adults often used telemedicine more due to higher

familiarity with digital tools[1,2,6,7,9] yet older adults in certain clinical contexts (e.g., peritoneal dialysis) showed higher adoption when telemedicine addressed specific health needs.[10] These nuances imply that telemedicine adoption is less about chronological age and more about the alignment between the technology and the user's perceived functional value and self-efficacy.

Marital status also showed contradictory associations. In populations dealing with depression, partnered individuals demonstrated higher telemedicine use, likely due to emotional and logistical support that reduces barriers to using digital platforms.[5] In contrast, studies from general community samples found higher uptake among unmarried individuals, possibly due to autonomy in decision-making or lack of alternative health support.[1] These mixed patterns demonstrate that the role of marital status is context-dependent and shaped by health needs, cultural norms, and household responsibilities, rather than acting as a universal facilitator or barrier.

Differences in methodological rigor further help explain these inconsistencies. The vast majority of included studies were low risk, providing relatively stable evidence on socioeconomic and perceptual determinants. The only moderate-risk study, conducted by Anil *et al.* examined economic stability. Its isolated focus and higher risk level may reflect limitations in sampling and confounder control, but importantly, it did not intersect with domains where the strongest contradictions appeared (e.g., age, geography, marital status).[12] This suggests that the inconsistencies observed are more likely driven by genuine contextual variation than by differences in methodological quality.

Beyond demographics, recommendations from trusted healthcare providers consistently facilitated telemedicine use. This aligns with UTAUT's construct of social influence, wherein endorsement from credible sources significantly shapes behavioral intention.[27] Telemedicine systems integrated into primary care workflows might be particularly effective, reinforcing the importance of clinician buy-in for sustained adoption.

Perceived benefit,[7,25] perceived usefulness, convenience,[20,21,25] and, trust,[25,27] emerged as one of the most powerful predictors of telemedicine uptake. These findings are central to both TAM and UTAUT, which emphasize that individuals adopt health technologies when they perceive them as efficient, easy to use, and reliable.

Clinical needs also had a strong influence. Individuals with chronic conditions, frequent healthcare visits, or mobility limitations were more likely to adopt telemedicine because the technology reduces logistical burdens, and, supports ongoing monitoring.[3,5,6,11,21] Mental health populations similarly demonstrated higher uptake, suggesting that telemedicine helps address barriers such as stigma, transportation, or appointment availability.[5,21,22] These patterns illustrate that telemedicine adoption is partly driven by how well the technology aligns with the user's clinical needs a core principle of technology task fit theory.

Finally, system-level features such as cost, service, and system quality played a decisive role. Positive experiences smooth scheduling, responsive consultations, and stable platforms reinforced adoption. In contrast, poor system performance or additional financial burdens quickly eroded trust, and led users to abandon telemedicine.[20] These findings emphasize that telemedicine implementation must prioritize affordability, reliability, and seamless user experience to ensure sustainable adoption.

Conclusion

Telemedicine adoption is influenced by multifaceted socioeconomic and demographic factors, user's perceived benefits, health-related needs and clinical conditions and internal or technological system factors. Furthermore, persistent challenges (such as financial constraints, inadequate digital literacy, privacy concerns, and weak system integration) are continuing to limit equitable implementation. Advancing telemedicine necessitates equity-focused measures, including affordable broadband access, structured digital literacy programs, enhanced data-protection mechanisms, workflow alignment, and culturally responsive design. Policy directions should emphasize digital equity and provider support, while future research need to assess long-term usability, and contextual variations across diverse populations to ensure telemedicine develops into an inclusive, reliable, and sustainable element of modern healthcare systems.

Ethical approval

Not applicable. The study intends to perform a systematic review of available literature and requires formal ethics committee approval. Participants do not need to give their informed consent. This technique reflects the ideals established in the Declaration of Helsinki, supporting ethical standards in literature reviews.

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Conflict of interest

The authors declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

CRediT authorship contribution statement

Trisakti Halimah Delimasari: conceptualization, study design, methodology, protocol development, literature search strategy, data curation, formal analysis, data synthesis and interpretation, writing: original draft, visualization, project administration, supervision; **Elsa Tursina**: literature screening and selection, data

extraction, quality assessment of included studies, writing: review and edit; **Annisa' Arifatul Hikmah**: data extraction, risk of bias assessment, evidence synthesis support, writing: review and editing; **Riska Fajar Fatony**: literature screening, data validation, reference management, writing: review and edit.

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Appendix A. Search strategy

A1. Databases searched

The literature search was conducted across the following electronic databases:

- PubMed
- ScienceDirect
- ProQuest

The search strategy was adapted for each database to accommodate specific indexing systems and search interface requirements.

A2. Search terms and boolean operators

The core search string used was:

("adult non-healthcare population") AND ("determinants" OR "factors") AND ("telehealth" OR "telemedicine") AND ("observational study")

For each database, Boolean operators, truncation symbols, and field tags were modified as needed. The search included both keywords and subject headings (MeSH) when available.

A3. Filters applied

Across databases, the following filters were applied consistently:

- Publication year: 2021–2025
- Language: English
- Population: Adults (≥18 years)
- Article type: Quantitative or observational studies (cross-sectional, cohort, case-control)

A4. Date of last search

- Last search conducted: 30 June 2025

A5. Number of records retrieved

Below is the number of articles retrieved from each database before deduplication:

Database	Search Results Retrieved
PubMed	946
ScienceDirect	273
ProQuest	296
Total Retrieved	1,515

A6. Deduplication

All records were imported into a reference manager (Mendeley) and duplicate entries were removed prior to screening with total after deduplication: 1,086