

The Determinants of Telemedicine Utilization; A Systematic Review

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Abstract: *Telemedicine utilization expanded dramatically during the COVID-19 pandemic, transforming healthcare delivery across diverse clinical settings. Although numerous studies have examined predictors of telemedicine use, determinants remain conceptually fragmented across patient, provider, and policy domains. This systematic review synthesizes empirical evidence on the determinants of telemedicine utilization using an expanded multilevel framework grounded in the Andersen Behavioral Model. Following PRISMA guidelines, electronic databases (PubMed, Scopus, and Web of Science) were searched for peer-reviewed studies examining predictors, barriers, or facilitators of telemedicine use. Eligible designs included observational studies, surveys, cohort studies, systematic reviews, qualitative investigations, and policy analyses. Determinants were coded across individual, provider/organizational, and policy levels, and findings were synthesized narratively due to methodological heterogeneity. Forty-six studies met inclusion criteria. Individual-level determinants particularly age, race and ethnicity, socioeconomic status, digital literacy, and clinical need were the most frequently examined predictors. However, utilization patterns were consistently shaped by enabling resources such as broadband access, insurance coverage, and digital infrastructure. Provider and organizational factors, including workflow integration, technological readiness, and specialty-specific adaptability, further influenced adoption. At the policy level, reimbursement parity and regulatory flexibility emerged as critical structural drivers of telemedicine expansion. Despite rapid growth during the pandemic, persistent sociodemographic disparities suggest that policy reform alone is insufficient to ensure equitable access. Telemedicine utilization reflects a multilevel system of interacting structural, organizational, and individual determinants, underscoring the need for coordinated policy alignment, institutional readiness, and equity-focused digital inclusion strategies to support sustainable integration.*

Keywords: telemedicine adoption; Andersen model; multilevel analysis; digital health; structural determinants; healthcare access.

3. Introduction

Telemedicine has evolved from a peripheral digital innovation into a central modality of healthcare delivery. Early syntheses demonstrated its clinical effectiveness across multiple conditions while highlighting persistent implementation barriers, particularly at the provider and organizational levels (Ekeland et al., 2010; Totten et al., 2016). Despite evidence of comparable outcomes and improved access, large-scale integration into routine care remained uneven prior to the COVID-19 pandemic, constrained by reimbursement policies, licensure regulations, broadband limitations, and provider

gatekeeping (Whitten & Mackert, 2005; Uscher-Pines et al., 2018). The COVID-19 pandemic marked a critical turning point in telemedicine utilization. As in-person care was curtailed, health systems rapidly shifted to virtual modalities to maintain continuity of care (Greenhalgh et al., 2020). National reports and claims analyses documented substantial increases in telemedicine use, though patterns varied across specialties, populations, and modalities (Mehrotra et al., 2020; Patel et al., 2021; Mafi et al., 2022; Kim et al., 2026; Zhang et al., 2026).

However, expansion did not ensure equity. Observational studies consistently report disparities associated with age, race and ethnicity, socioeconomic status, education, and digital literacy (Eberly et al., 2020; Pierce et al., 2021; Campos-Castillo & Anthony, 2021; Lam et al., 2020; Rodriguez et al., 2021; Hsiao et al., 2021; Figueroa et al., 2023). Older adults and individuals with limited English proficiency were less likely to engage in video-based visits (Lam et al., 2020; Rodriguez et al., 2021), suggesting that telemedicine may simultaneously expand access while reinforcing existing structural inequities. Beyond patient characteristics, telemedicine utilization is shaped by provider behavior, organizational capacity, and policy environments. Variations in clinical workflows, institutional readiness, and reimbursement policies have been associated with differential adoption patterns (Roberts et al., 2021; Drake et al., 2022; Adler-Milstein et al., 2021). Policy reforms and regulatory flexibilities introduced during the pandemic further altered access conditions (Ortega et al., 2020; Benda et al., 2020), and utilization patterns continue to evolve in the post-pandemic period (Kim et al., 2026; Zhang et al., 2026).

Despite the growing body of empirical evidence, determinants of telemedicine utilization remain conceptually fragmented. Existing reviews categorize barriers and facilitators across patient, provider, and system domains (Kruse et al., 2020; Monaghesh & Hajizadeh, 2020; Cunha et al., 2023; Rabbani et al., 2025), yet few integrate these determinants within a unified theoretical framework. The Andersen Behavioral Model conceptualizes healthcare utilization as a function of predisposing characteristics, enabling resources, and need factors (Davis, 1989; Powell et al., 2017). However, telemedicine introduces additional technological, organizational, and policy dimensions that extend beyond traditional applications of the model. Accordingly, this systematic review synthesizes the empirical literature on telemedicine utilization using an expanded multilevel framework grounded in the Andersen model. By integrating evidence across individual, provider, organizational, and policy domains, this review aims to clarify the structural and individual drivers of telemedicine use and to inform equitable and sustainable digital health implementation.

4. Methods

This systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Page et al., 2021). The objective was to synthesize empirical evidence on the determinants of telemedicine utilization using an expanded multilevel framework grounded in the Andersen Behavioral Model (Powell et al., 2017). Given the heterogeneity of study designs, populations, and outcome measures across the literature, a systematic review with narrative synthesis was deemed the most appropriate methodological approach. The review process followed predefined eligibility criteria, structured screening procedures, and a theory-driven coding framework to ensure conceptual consistency and analytical rigor. A comprehensive literature search was conducted across major electronic databases, including PubMed, Scopus, and Web of Science. The search strategy combined keywords and controlled vocabulary terms related to telemedicine (“telemedicine,” “telehealth,” “virtual care,” “digital health”) and healthcare utilization (“use,” “utilization,” “adoption,” “determinants,” “barriers,” “facilitators”). Searches were limited to

peer-reviewed articles published in English. In addition, reference lists of relevant systematic reviews and included studies were manually screened to identify additional eligible publications and ensure completeness of coverage.

Studies were included if they examined telemedicine or telehealth services in healthcare settings and explicitly reported determinants, predictors, barriers, or facilitators of utilization. Eligible designs included observational studies, cross-sectional surveys, cohort studies, qualitative research, systematic reviews, meta-analyses, and policy analyses. Studies focusing exclusively on clinical effectiveness or patient satisfaction without examining determinants of use were excluded. Non-analytical commentaries without substantive evaluation of utilization factors were also excluded to maintain analytical coherence. Study selection was conducted in two sequential stages: title and abstract screening followed by full-text assessment. Articles meeting the predefined eligibility criteria were retained for inclusion in the final synthesis. Screening decisions were guided by the study objective and conceptual framework to ensure consistency. The overall selection procedure is summarized in Fig. 1 (The Systematic Review Process), which outlines identification, screening, eligibility assessment, and final inclusion of studies.

A standardized data extraction template was developed to capture study characteristics, including author, year, country, study design, population, telemedicine modality, and reported determinants of utilization. Determinants were coded using an expanded multilevel framework derived from the Andersen Behavioral Model (Powell et al., 2017). Variables were categorized into individual-level determinants (predisposing, enabling, and need factors), provider and organizational determinants, and policy-level determinants. This structured coding approach facilitated comparison across heterogeneous methodologies and health system contexts. Methodological quality was assessed using design-appropriate appraisal tools to ensure critical evaluation of study rigor. Observational and cross-sectional studies were evaluated using established critical appraisal criteria, while systematic reviews and meta-analyses were assessed using validated review appraisal frameworks. Quality assessments informed interpretation and weighting of evidence but were not used as exclusion criteria. Given methodological heterogeneity, findings were synthesized narratively using a multilevel analytic approach to identify recurring patterns, cross-level interactions, and contextual influences on telemedicine utilization.

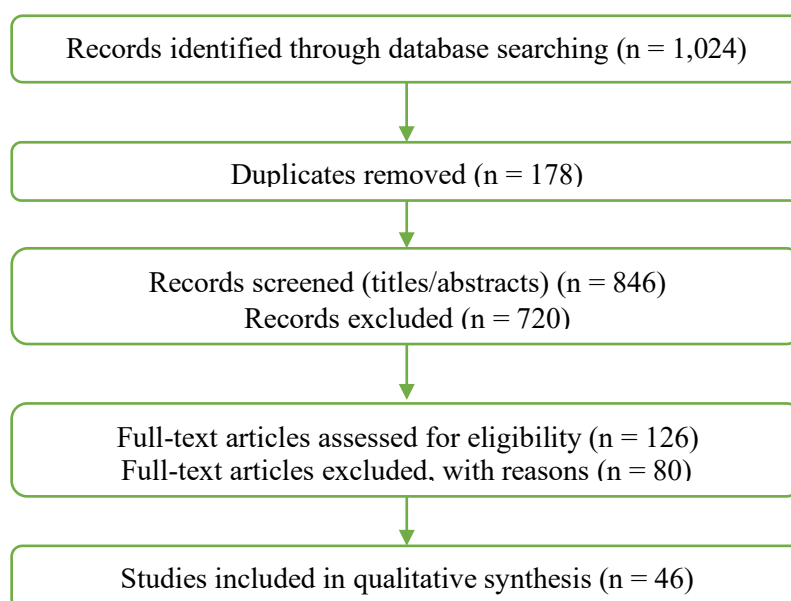


Figure 1: PRISMA 2020 Flow Diagram

5. Results

5.1 Study Characteristics

A total of 46 studies met the predefined inclusion criteria and were incorporated into the final synthesis. Table 1 provides a comprehensive overview of the included studies, summarizing their study designs and mapping each investigation across the multilevel determinant domains examined in this review (individual, provider/organizational, and policy levels). As shown in Table 1, the evidence base reflects substantial methodological heterogeneity, encompassing observational and cross-sectional studies, systematic reviews and meta-analyses, policy analyses, trend analyses, qualitative investigations, and theoretical contributions. Observational designs constituted the largest proportion of empirical studies, frequently relying on administrative, claims, or survey data to assess telemedicine utilization patterns (Eberly et al., 2020; Patel et al., 2021; Hsiao et al., 2021). Geographically, the majority of studies were conducted in the United States (Eberly et al., 2020; Reed et al., 2020; Figueroa et al., 2023), with additional contributions from Europe and other global contexts (Neumann et al., 2024; Shibabaw et al., 2024). This geographic concentration reflects the rapid expansion of telemedicine services in high-income health systems during the COVID-19 public health emergency, supported by large-scale administrative datasets and policy reforms (Mehrotra et al., 2020; Adler-Milstein et al., 2021).

However, the predominance of U.S.-based evidence may limit generalizability to settings characterized by different financing mechanisms, regulatory environments, and levels of digital infrastructure. Temporally, most empirical studies were situated within the COVID-19 pandemic period (2020–2022), during which telemedicine utilization expanded dramatically due to infection control measures and emergency regulatory flexibilities (Greenhalgh et al., 2020; Ortega et al., 2020; Benda et al., 2020). A smaller subset of studies examined pre-pandemic implementation barriers and adoption patterns (Whitten & Mackert, 2005; Uscher-Pines et al., 2018), while more recent analyses explored post-pandemic utilization trends and stabilization dynamics (Kim et al., 2026; Zhang et al., 2026). With respect to theoretical grounding, explicit use of formal conceptual frameworks was relatively limited. Although several studies assessed determinants consistent with the Andersen Behavioral Model (Powell et al., 2017), few explicitly referenced it. Technology acceptance constructs were occasionally invoked (Davis, 1989), yet rarely embedded within a comprehensive multilevel structure. This conceptual fragmentation further underscores the need for the integrative framework adopted in the present review.

5.2 Determinants of Telemedicine Utilization

5.2.1 Individual-Level Determinants

Across the included studies, individual-level determinants were the most consistently examined predictors of telemedicine utilization. These factors encompassed demographic characteristics, socioeconomic resources, digital access, and clinical need. Age emerged as one of the most robust determinants, with older adults demonstrating lower likelihood of engaging in video-based telemedicine visits compared to younger populations (Lam et al., 2020; Rodriguez et al., 2021; Hsiao et al., 2021). This pattern was frequently attributed to lower digital literacy, reduced access to appropriate devices, and technological discomfort among older individuals. Racial and ethnic disparities were also repeatedly documented, particularly in U.S.-based studies, where Black and Hispanic patients were less likely to utilize video visits relative to White patients (Eberly et al., 2020; Pierce et al., 2021; Campos-Castillo & Anthony, 2021). These disparities often persisted even after adjusting for insurance status and comorbidities. Socioeconomic status and enabling resources further shaped utilization patterns. Access to broadband internet and digital devices was strongly associated

with telemedicine use, highlighting the structural dimensions of digital access (Chang et al., 2021; Benda et al., 2020). Insurance coverage and reimbursement mechanisms also functioned as enabling conditions influencing patient-level engagement (Patel et al., 2021). Educational attainment and digital literacy were consistently linked to higher adoption rates, suggesting that telemedicine utilization is partially mediated by technological competence (Figueroa et al., 2023; Neumann et al., 2024). Collectively, these findings indicate that enabling resources frequently moderate the relationship between demographic characteristics and telemedicine uptake.

Clinical need factors also contributed to variation in utilization. Patients with chronic conditions or higher healthcare needs were more likely to adopt telemedicine services, particularly when continuity of care was disrupted during the pandemic (Reed et al., 2020; Ramaswamy et al., 2020). However, mental health-related avoidance behaviors and fear of in-person care during COVID-19 also influenced patterns of engagement (Ganson et al., 2020). Importantly, several studies suggested that need-based factors alone were insufficient to overcome structural and technological barriers, underscoring the interaction between medical necessity and enabling resources (Powell et al., 2017). Overall, individual-level determinants reflect an intersection of demographic predispositions, socioeconomic capacity, and perceived or evaluated health needs within broader structural constraints.

5.2.2 Provider and Organizational Determinants

Beyond individual characteristics, telemedicine utilization was strongly shaped by provider behavior and organizational capacity. Several studies emphasized that clinicians function as critical gatekeepers in determining whether telemedicine is offered and how it is integrated into routine care (Whitten & Mackert, 2005; Uscher-Pines et al., 2018). Variations in clinical workflow integration, scheduling protocols, and technological readiness significantly influenced adoption patterns across institutions (Roberts et al., 2021; Drake et al., 2022). Health systems with pre-existing digital infrastructure and established telehealth platforms were more likely to scale services rapidly during the COVID-19 pandemic. Organizational resources, including information technology support, training, and administrative alignment, further moderated telemedicine uptake (Adler-Milstein et al., 2021; Borges do Nascimento et al., 2023). Specialty-level differences were also consistently observed. For example, primary care, behavioral health, and chronic disease management demonstrated higher adaptability to telemedicine modalities compared to procedure-intensive specialties (Mafi et al., 2022; Hammersley et al., 2022). These differences reflect both clinical appropriateness and operational feasibility.

Provider attitudes and perceived effectiveness additionally influenced utilization patterns. Qualitative evidence suggests that clinicians' comfort with remote consultations, perceptions of diagnostic adequacy, and concerns regarding quality of care shaped telemedicine engagement (Uscher-Pines et al., 2021; Greenhalgh et al., 2020). In some contexts, organizational leadership and strategic prioritization of digital transformation acted as facilitators of sustained telemedicine integration (Lyles et al., 2023). Conversely, lack of training, workflow disruption, and uncertainty regarding reimbursement created barriers to long-term adoption (Kruse et al., 2020; Sharma et al., 2024). Overall, provider and organizational determinants operate as structural intermediaries between patient-level demand and policy-level conditions, shaping both access to and sustainability of telemedicine services.

5.2.3 Policy-Level Determinants

Policy environments played a decisive role in shaping telemedicine utilization, particularly during the COVID-19 pandemic. Regulatory flexibilities, reimbursement parity policies, and temporary waivers of licensure restrictions substantially expanded access conditions and enabled rapid scale-up of virtual care services (Ortega et al., 2020; Benda et al., 2020). In the United States, emergency federal and state-level reforms reduced administrative barriers and allowed providers to deliver telehealth services across geographic boundaries, thereby accelerating adoption across multiple specialties (Adler-Milstein et al., 2021; Mehrotra et al., 2020). These structural adjustments functioned as macro-level enabling factors that reshaped both organizational behavior and patient engagement. Reimbursement mechanisms were among the most influential policy determinants. Studies consistently found that payment parity between telemedicine and in-person visits was associated with higher provider participation and sustained utilization (Patel et al., 2021; Adler-Milstein et al., 2021). Conversely, uncertainty regarding long-term reimbursement policies created instability and hesitancy among health systems considering continued investment in digital infrastructure (Roberts et al., 2021). Broadband access policies also exerted significant influence, as geographic disparities in digital infrastructure limited equitable participation in telehealth services (Benda et al., 2020).

Importantly, policy-level determinants interacted dynamically with provider and individual-level factors. While emergency waivers increased availability, utilization remained uneven across sociodemographic groups, indicating that policy change alone was insufficient to eliminate structural inequities (Figueroa et al., 2023; Campos-Castillo & Anthony, 2021). Emerging post-pandemic analyses suggest that as temporary regulatory measures evolve or expire, telemedicine utilization patterns may stabilize or decline, depending on the durability of supportive policy frameworks (Kim et al., 2026; Zhang et al., 2026). Collectively, the evidence underscores that policy structures act as foundational conditions shaping the sustainability, equity, and institutionalization of telemedicine services.

5.3 Contextual and Moderating Factors

Beyond discrete multilevel determinants, several contextual factors operated as moderators influencing the strength and direction of telemedicine utilization patterns. Foremost among these was the COVID-19 pandemic, which functioned not merely as a temporal backdrop but as a structural shock that rapidly reconfigured healthcare delivery systems. Public health restrictions, infection control concerns, and emergency policy waivers collectively accelerated telemedicine adoption across care settings (Greenhalgh et al., 2020; Mehrotra et al., 2020). In many contexts, telemedicine shifted from a supplementary service to a primary mode of care delivery. However, studies indicate that this rapid expansion was uneven, with differential uptake across populations and specialties (Mafi et al., 2022; Drake et al., 2022). Health system characteristics further moderated telemedicine utilization. Variations in reimbursement structures, regulatory flexibility, organizational readiness, and digital infrastructure contributed to cross-system differences in adoption (Adler-Milstein et al., 2021; Roberts et al., 2021). Systems with integrated delivery models and pre-existing telehealth capacity demonstrated greater scalability during the pandemic period. Conversely, fragmented systems or those with limited digital maturity faced greater implementation challenges. These findings suggest that health system structure conditions the translation of policy reforms into actual service utilization. Socioeconomic context also functioned as a critical moderating layer. Broadband access disparities, neighborhood-level deprivation, and digital literacy gaps significantly influenced telemedicine engagement, even when services were technically available (Benda et al., 2020; Chang et al., 2021; Figueroa et al., 2023). Thus, contextual inequality operated across multiple levels

intersecting with individual demographic factors, provider capacity, and policy frameworks. Collectively, the evidence indicates that telemedicine utilization cannot be fully understood through isolated determinants; rather, it emerges from dynamic interactions between structural context, institutional capacity, and individual resources.

Table 1: Literature Review Matrix

No.	Authors (Year)	Study Design	Predisposing	Enabling	Need-Based	Provider / Organizational	Policy
1	Eberly et al. (2020)	Observational	✓	✓	✓		
2	Pierce et al. (2021)	Observational	✓	✓			
3	Patel et al. (2021)	Claims analysis		✓		✓	
4	Campos-Castillo & Anthony (2021)	Survey	✓	✓			
5	Kruse et al. (2020)	Systematic review	✓	✓	✓	✓	✓
6	Monaghesh & Hajizadeh (2020)	Systematic review		✓	✓	✓	✓
7	Gajjarawala & Pelkowski (2021)	Narrative review		✓		✓	
8	Nouri et al. (2020)	Commentary	✓	✓	✓	✓	✓
9	Scott Kruse et al. (2020)	Systematic review			✓	✓	
10	Ganson et al. (2020)	Observational	✓		✓		
11	Andrews et al. (2020)	Integrative review	✓			✓	
12	Chang et al. (2021)	Observational	✓	✓		✓	
13	Ortega et al. (2020)	Policy commentary		✓		✓	✓
14	Lam et al. (2020)	Cross-sectional	✓	✓			
15	Rodriguez et al. (2021)	Observational	✓	✓			
16	Reed et al. (2020)	Observational	✓	✓	✓	✓	
17	Ramaswamy et al. (2020)	Cohort study	✓		✓	✓	
18	Roberts et al. (2021)	Observational				✓	✓
19	Hsiao et al. (2021)	Cross-sectional	✓	✓			
20	Wong et al. (2020)	Commentary	✓		✓		
21	Neumann et al. (2024)	Cross-sectional survey	✓	✓	✓		
22	Cunha et al. (2023)	Systematic review	✓	✓	✓	✓	✓
23	Sharma et al. (2024)	Systematic review				✓	✓
24	Qu (2025)	Cross-sectional survey	✓	✓	✓		
25	Rabbani et al. (2025)	Meta-analysis	✓	✓	✓	✓	✓
26	Borges do Nascimento et al. (2023)	Review		✓		✓	✓
27	Shibabaw et al. (2024)	Meta-analysis		✓		✓	
28	Kim et al. (2026)	Trend analysis	✓	✓		✓	
29	Zhang et al. (2026)	Trend analysis	✓	✓		✓	
30	Uscher-Pines et al. (2021)	Qualitative study				✓	✓
31	Li et al. (2021)	Observational	✓	✓	✓	✓	
32	Drake et al. (2022)	Observational	✓	✓		✓	
33	Mafi et al. (2022)	Trend analysis		✓		✓	
34	Adler-Milstein et al. (2021)	Policy analysis				✓	✓
35	Hammersley et al. (2022)	Systematic review	✓		✓	✓	

No.	Authors (Year)	Study Design	Predisposing	Enabling	Need-Based	Provider / Organizational	Policy
36	Figueroa et al. (2023)	Observational	✓	✓			
37	Benda et al. (2020)	Policy-level analysis		✓		✓	✓
38	Mehrotra et al. (2020)	Report		✓		✓	✓
39	Totten et al. (2016)	Evidence mapping				✓	
40	Powell et al. (2017)	Observational	✓		✓	✓	
41	Ekeland et al. (2010)	Review of reviews			✓	✓	
42	Greenhalgh et al. (2020)	Practice guidance				✓	✓
43	Uscher-Pines et al. (2018)	Observational	✓	✓	✓	✓	✓
44	Lyles et al. (2023)	Literature synthesis	✓	✓		✓	✓
45	Whitten & Mackert (2005)	Conceptual study				✓	
46	Davis (1989)	Theoretical (TAM)	✓				

6. Discussion

6.1 Synthesis of Multilevel Determinants

This systematic review demonstrates that telemedicine utilization is shaped by dynamic interactions across individual, provider, organizational, and policy levels rather than by isolated patient characteristics alone. While demographic and socioeconomic factors were frequently examined predictors (Eberly et al., 2020; Hsiao et al., 2021), their influence was consistently conditioned by enabling resources and institutional capacity (Chang et al., 2021; Benda et al., 2020). These findings suggest that disparities in telemedicine use cannot be fully explained by individual predispositions, but must be understood within broader structural and infrastructural contexts. Enabling mechanisms emerged as critical mediators linking macro-level policy reforms to individual-level utilization. For example, reimbursement parity policies and regulatory flexibilities expanded provider participation during the COVID-19 emergency (Adler-Milstein et al., 2021; Ortega et al., 2020), while broadband infrastructure and digital access determined the extent to which patients could translate availability into actual engagement (Benda et al., 2020; Figueroa et al., 2023). This layered pattern reflects a cascading structure of influence in which policy reforms shape organizational incentives, organizational readiness shapes service delivery capacity, and capacity ultimately constrains or enables patient-level utilization.

Importantly, the persistence of sociodemographic disparities during the rapid pandemic expansion period (Pierce et al., 2021; Campos-Castillo & Anthony, 2021) indicates that emergency regulatory change alone is insufficient to achieve equitable digital transformation. Even in contexts of expanded coverage and relaxed licensure restrictions, utilization remained stratified across age and socioeconomic groups. This reinforces prior concerns regarding the digital divide and the potential for telemedicine to simultaneously expand access and reproduce inequality (Kruse et al., 2020; Lyles et al., 2023). Taken together, the evidence underscores that sustainable telemedicine integration requires coordinated alignment across regulatory frameworks, organizational capacity, and community-level digital infrastructure. The multilevel synthesis advanced in this review extends prior fragmented analyses by explicitly linking structural policy determinants with provider behavior and patient-level engagement within a unified framework.

6.2 Theoretical and Conceptual Implications

The findings of this review carry important theoretical implications for understanding healthcare utilization in digitally mediated environments. Although many included studies examined determinants consistent with the Andersen Behavioral Model particularly predisposing, enabling, and need-based factors (Powell et al., 2017) explicit theoretical integration was limited. The majority of empirical investigations treated telemedicine utilization as a set of isolated predictors rather than as a structured, multilevel process embedded within institutional and policy contexts. This review extends the Andersen framework by explicitly incorporating provider, organizational, and policy-level determinants as integral components rather than peripheral contextual variables. In traditional applications of the model, enabling resources often refer to individual or household-level access factors. However, in the context of telemedicine, enabling conditions are deeply institutional and infrastructural, encompassing reimbursement policies, broadband availability, licensure regulations, and digital platform capacity (Adler-Milstein et al., 2021; Benda et al., 2020). Thus, telemedicine utilization requires reconceptualizing “enabling resources” as cross-level constructs operating simultaneously at individual and structural levels.

Moreover, the findings suggest that telemedicine adoption cannot be fully explained by technology acceptance constructs alone (Davis, 1989). While perceived usefulness and ease of use may influence engagement, structural constraints such as reimbursement uncertainty or organizational readiness can override individual-level attitudes. This challenges purely behavioral or attitudinal models and underscores the necessity of integrating health services research frameworks with digital health theory. Conceptually, this review proposes that telemedicine utilization should be understood as a cascading multilevel system in which macro-level policy conditions shape meso-level organizational behavior, which in turn conditions micro-level patient engagement. By synthesizing determinants across levels, the present framework advances a more comprehensive model capable of explaining both rapid expansion during crisis conditions and persistent inequities in access. Such a framework may inform future empirical research seeking to disentangle cross-level interactions and causal pathways in digital health implementation.

6.3 Policy and Practice Implications

The findings of this review carry significant implications for policymakers, healthcare organizations, and clinical leaders seeking to sustain telemedicine integration beyond emergency conditions. First, evidence consistently indicates that reimbursement parity and regulatory flexibility are foundational conditions for telemedicine sustainability (Adler-Milstein et al., 2021; Patel et al., 2021). Policymakers should therefore prioritize stable and predictable payment frameworks that reduce uncertainty for providers and incentivize long-term investment in digital infrastructure. Temporary emergency waivers may facilitate rapid expansion, but durable institutionalization requires permanent policy alignment. Second, broadband expansion and digital infrastructure development are critical equity-focused interventions. Persistent disparities in telemedicine utilization linked to socioeconomic status and geographic digital access (Benda et al., 2020; Figueroa et al., 2023) suggest that health policy cannot be separated from broader digital inclusion strategies. Investments in community-level connectivity, device accessibility programs, and digital literacy initiatives are essential to prevent the reinforcement of structural inequities. Without such measures, telemedicine risks amplifying existing access gaps despite formal service availability.

At the organizational level, health systems should integrate telemedicine strategically rather than treating it as an auxiliary service. Evidence indicates that workflow integration, clinician training, and

leadership prioritization are key facilitators of sustained adoption (Roberts et al., 2021; Lyles et al., 2023). Specialty-specific adaptation is also necessary, as clinical appropriateness varies across service lines (Mafi et al., 2022). Health systems should therefore adopt differentiated implementation strategies aligned with clinical context and patient population characteristics. Finally, equity monitoring mechanisms should be embedded within telemedicine programs. Routine stratification of utilization data by age, race, language proficiency, and socioeconomic indicators can enable early identification of disparities (Campos-Castillo & Anthony, 2021; Pierce et al., 2021). Policymakers and healthcare leaders should move beyond aggregate utilization metrics toward equity-sensitive performance indicators. Sustainable digital transformation requires coordinated action across regulatory, organizational, and community domains to ensure that telemedicine expansion translates into equitable access rather than digital stratification.

6.4 Limitations and Future Research

This review should be interpreted in light of several limitations. First, the included studies exhibited substantial methodological heterogeneity in study design, data sources, and operational definitions of telemedicine utilization. Variability in outcome measurement ranging from administrative claims to self-reported survey data limited direct comparability and precluded quantitative meta-analysis. Although a structured multilevel coding framework was applied, differences in measurement approaches may have influenced the synthesis of determinants. Second, the evidence base was geographically concentrated, with a predominance of studies conducted in the United States. While this reflects the scale of telemedicine expansion during the COVID-19 public health emergency (Mehrotra et al., 2020), it may limit generalizability to health systems operating under different regulatory, financing, and infrastructural conditions. Comparative cross-national research remains limited and represents an important direction for future investigation. Third, most empirical studies were conducted during the COVID-19 pandemic period, when telemedicine adoption was influenced by extraordinary contextual conditions (Greenhalgh et al., 2020). Utilization patterns observed under emergency waivers may not fully reflect long-term stabilization dynamics. Future longitudinal research is needed to examine whether multilevel determinants shift as temporary regulatory flexibilities evolve or expire. Additionally, explicit theoretical integration across studies was limited. Although several investigations examined determinants consistent with established behavioral and health services frameworks (Powell et al., 2017), few adopted comprehensive multilevel models capable of testing cross-level interactions. Future research should prioritize theoretically grounded designs and multilevel analytic approaches to clarify causal pathways linking policy environments, organizational readiness, and individual engagement. Finally, although disparities in telemedicine utilization were frequently documented (Pierce et al., 2021), fewer studies evaluated targeted interventions designed to reduce them. Future scholarship should move beyond descriptive disparity analyses toward equity-focused implementation research that tests strategies to mitigate digital exclusion.

7. Conclusion

This systematic review synthesizes a rapidly expanding and conceptually fragmented body of literature on the determinants of telemedicine utilization. The findings demonstrate that telemedicine use is shaped by interconnected factors operating across individual, provider, organizational, and policy levels. While demographic characteristics and socioeconomic resources influence engagement, their effects are mediated by institutional capacity, digital infrastructure, and regulatory frameworks. Telemedicine utilization therefore cannot be understood as a purely behavioral choice; rather, it

reflects a multilevel system of structural and contextual influences. The COVID-19 pandemic accelerated telemedicine expansion and revealed both its transformative potential and its structural vulnerabilities. Although emergency policy reforms enabled rapid scaling, persistent disparities highlight the limits of regulatory change in the absence of broader digital inclusion and organizational readiness strategies. Sustainable and equitable telemedicine integration requires coordinated alignment across policy stability, infrastructure investment, clinical workflow integration, and equity-focused monitoring. By integrating determinants within an expanded multilevel framework grounded in the Andersen Behavioral Model, this review advances a more comprehensive conceptual understanding of telemedicine utilization. Future research and policy efforts should prioritize cross-level alignment and equity-oriented implementation to ensure that digital health transformation enhances, rather than stratifies, access to care.

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