Telemedicine Adoption; A Concept Analysis

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Abstract: *Telemedicine adoption has emerged as a vital component of modern healthcare systems, yet its conceptual boundaries remain unclear and inconsistently applied across the literature. This study aims to clarify the concept of telemedicine adoption through a structured concept analysis using the Walker and Avant framework. A systematic examination of existing literature was undertaken to identify defining attributes, antecedents, consequences, empirical referents, and illustrative cases related to telemedicine adoption. The analysis demonstrates that telemedicine adoption is not limited to initial technology acceptance but represents a sustained, multidimensional process involving regular use, integration into clinical workflows, user competence, organizational support, and enabling policy environments. Key antecedents include technological infrastructure, digital literacy, leadership commitment, and regulatory readiness, while consequences encompass improved access to care, enhanced patient and provider satisfaction, continuity of services, and greater system efficiency. By offering a clear and comprehensive conceptualization, this study provides a theoretical foundation to support consistent measurement, guide implementation strategies, and inform future research and policy initiatives aimed at promoting sustainable and equitable telemedicine integration.*

Keywords: Telemedicine adoption; Concept analysis; Digital health; Healthcare access; Technology integration.

1. Introduction

Telemedicine has emerged as a central modality in contemporary healthcare delivery, enabling the remote provision of clinical services through digital and communication technologies. Its relevance has intensified in recent years as health systems worldwide have sought scalable solutions to address workforce shortages, rising chronic disease burdens, geographical inequities, and disruptions caused by public health emergencies. Evidence from multiple contexts demonstrates that telemedicine can enhance access to care, continuity of services, and patient engagement, particularly for populations residing in remote or underserved areas and for individuals managing long-term conditions. At the same time, telemedicine adoption has revealed substantial variation across countries, healthcare settings, professional groups, and patient populations, indicating that adoption is not merely a technical process but a complex and multidimensional phenomenon shaped by social, organizational, regulatory, and individual factors (Agbeyangi & Lukose, 2025; Garcia et al., 2024; Ezeamii et al., 2024).

Despite a growing body of empirical and review-based literature on telemedicine adoption, the concept itself remains inconsistently defined and operationalized. Studies have approached

telemedicine adoption through diverse theoretical lenses, including the Technology Acceptance Model (TAM), the Unified Theory of Acceptance and Use of Technology (UTAUT and UTAUT2), the Technology–Organization–Environment (TOE) framework, and systems-based approaches, each emphasizing different determinants such as perceived usefulness, ease of use, trust, readiness, policy support, and infrastructure availability (Ghiwaa et al., 2023; Anthony Jnr, 2024; Thabet et al., 2023). While these frameworks have advanced understanding of adoption predictors, they have also contributed to conceptual fragmentation, with telemedicine adoption alternately treated as a behavioral intention, a readiness state, an implementation outcome, or a utilization pattern. This lack of conceptual clarity limits comparability across studies and complicates the translation of research findings into coherent policy and practice strategies (Valencia-Arias et al., 2024).

The variability in telemedicine adoption is further compounded by contextual inequities. Empirical studies consistently report disparities linked to socioeconomic status, digital literacy, infrastructure readiness, regulatory environments, and professional capacity. Vulnerable groups such as financially distressed patients, rural populations, and individuals in low- and middle-income countries often face structural barriers that constrain equitable access to telemedicine services, even when such services are technically available (Hassan et al., 2022; Lestari et al., 2024; Ch et al., 2025). At the provider level, differences in professional readiness, attitudes, trust in technology, and perceived clinical appropriateness influence whether telemedicine is integrated into routine practice or remains underutilized (Schürmann et al., 2025; Tan et al., 2024; Garavand et al., 2022). These findings underscore the need for a shared and theoretically grounded understanding of what constitutes telemedicine adoption and how its core attributes, antecedents, and consequences are conceptualized.

Concept analysis offers a systematic method for addressing such ambiguity by clarifying the meaning, boundaries, and essential characteristics of complex and evolving concepts. The Walker and Avant approach, in particular, has been widely applied in healthcare and nursing research to disentangle overlapping terminology, identify defining attributes, and distinguish related or surrogate concepts. Recent concept analyses using this method have demonstrated its utility in refining abstract or inconsistently applied concepts such as professional curiosity, routine care, digital health literacy, and transitions in health-related roles, thereby strengthening theoretical coherence and empirical measurement (Taheri & Nasiri, 2024; Khaloobagheri et al., 2025; Ban et al., 2024; Hwang et al., 2022). Applying this approach to telemedicine adoption is especially timely given the rapid expansion of telehealth services and the ongoing shift from emergency-driven implementation toward long-term, sustainable integration.

Accordingly, the purpose of this study is to conduct a concept analysis of telemedicine adoption using Walker and Avant's methodological framework. By synthesizing evidence from the existing literature, this analysis seeks to clarify the defining attributes of telemedicine adoption, identify its antecedents and consequences, and delineate its empirical referents. Establishing conceptual clarity is essential for advancing theory, guiding empirical research, and informing policymakers, healthcare organizations, and practitioners seeking to design equitable, effective, and sustainable telemedicine strategies across diverse healthcare contexts.

2. Methodology

This study adopted Walker and Avant's concept analysis method to clarify the concept of telemedicine adoption. Concept analysis is appropriate for concepts that are frequently used but inconsistently defined across disciplines and contexts. Telemedicine adoption has been examined

through behavioral, technological, organizational, and policy lenses, resulting in fragmented interpretations and measurement approaches (Ghiwaa et al., 2023; Valencia-Arias et al., 2024). Walker and Avant's structured eight-step framework provides a systematic approach for identifying defining attributes, antecedents, consequences, and empirical referents, thereby strengthening conceptual clarity. This method has been widely applied in healthcare and digital health research to refine abstract and evolving concepts (Taheri & Nasiri, 2024; Khaloobagheri et al., 2025; Ban et al., 2024). A PRISMA-guided literature search supported the analytical process to ensure transparency and rigor.

2.1 Selection of the Concept

The concept selected for analysis was telemedicine adoption. This concept was chosen due to its increasing importance in healthcare delivery and its inconsistent use in the literature. Telemedicine adoption has been variably described as technology acceptance, behavioral intention, readiness, utilization, or implementation success, depending on theoretical orientation and research context (Garavand et al., 2022; Schürmann et al., 2025; Thabet et al., 2023). Such variability limits conceptual clarity and challenges the comparison of findings across studies. Additionally, empirical evidence shows substantial variation in telemedicine adoption across healthcare settings, professional groups, and patient populations, particularly among rural communities, financially distressed patients, and low- and middle-income countries (Agbeyangi & Lukose, 2025; Hassan et al., 2022; Lestari et al., 2024). These factors indicate that telemedicine adoption represents a multidimensional and context-dependent concept requiring systematic clarification.

2.2 Determination of the Aim of Analysis

The aim of this concept analysis was to clarify the meaning and boundaries of telemedicine adoption by identifying its defining attributes, antecedents, consequences, and empirical referents. Specifically, the analysis sought to distinguish telemedicine adoption from related concepts such as technology acceptance, readiness, and utilization. Previous studies have employed diverse theoretical frameworks, including TAM, UTAUT, UTAUT2, TOE, and systems-based approaches, each emphasizing different determinants of adoption (Ghiwaa et al., 2023; Anthony Jnr, 2024; Wang et al., 2023). While informative, this diversity has contributed to conceptual fragmentation. By synthesizing evidence across empirical, review, and policy-oriented studies, this analysis aims to establish a coherent conceptual foundation that can guide future research, measurement development, policy formulation, and sustainable telemedicine implementation (Jena et al., 2025; Valencia-Arias et al., 2024).

2.3 Identification of All Uses of the Concept

The identification of all uses of telemedicine adoption involved examining how the concept has been applied across research, clinical practice, and policy literature. In behavioral and technology acceptance studies, adoption is commonly operationalized as intention to use or acceptance, driven by perceived usefulness, ease of use, performance expectancy, and attitude (Tan et al., 2024; Khowaja et al., 2025). Organizational and systems-level studies describe adoption in terms of readiness, infrastructure availability, regulatory approval, and reimbursement mechanisms (Abimulyani & Kaluku, 2025; Alghamdi et al., 2025). In equity-focused research, telemedicine adoption is framed around access, inclusion, and disparities among vulnerable populations (Ch et al., 2025; Luo et al.,

2021). Clinical outcome studies implicitly link adoption to sustained utilization and improved patient outcomes, particularly in chronic disease management (Ezeamii et al., 2024; Peles et al., 2025). These diverse uses highlight the need to clarify telemedicine adoption as a multidimensional construct encompassing behavioral, structural, and outcome-oriented elements.

2.4 Determination of Defining Attributes

Analysis of the literature revealed several defining attributes of telemedicine adoption. First, intentional engagement reflects a deliberate decision to use telemedicine services rather than temporary or mandated use (Schürmann et al., 2025). Second, technological acceptance and trust, including confidence in system reliability, data security, and clinical appropriateness, emerged as a central attribute (Thabet et al., 2023; Wang et al., 2023). Third, readiness and capability, encompassing digital literacy, professional competence, and infrastructure availability, distinguishes adoption from mere access (Wubante et al., 2022; Abimulyani & Kaluku, 2025). Fourth, contextual embeddedness highlights the role of organizational, regulatory, and sociocultural environments in shaping adoption (Anthony Jnr, 2024; Jena et al., 2025). Finally, sustained integration into routine care differentiates adoption from short-term or crisis-driven utilization (Garcia et al., 2024; Peles et al., 2025).

2.5 Identification of a Model Case

A model case illustrates all defining attributes of telemedicine adoption. For example, a healthcare organization implements telemedicine for chronic disease management beyond the COVID-19 pandemic. The organization establishes regulatory compliance, reimbursement mechanisms, and digital infrastructure. Healthcare professionals receive training, trust the technology, and intentionally integrate telemedicine into routine workflows. Patients actively choose telemedicine due to improved access, continuity of care, and perceived effectiveness. Utilization is sustained over time, with monitoring of clinical outcomes and patient satisfaction. This case reflects intentional engagement, readiness, contextual support, trust, and sustained integration, representing full telemedicine adoption as described in the literature (Ezeamii et al., 2024; Adeogun & Faezipour, 2025; Peles et al., 2025).

2.6 Identification of Borderline, Related, and Contrary Cases

Borderline cases of telemedicine adoption demonstrate partial fulfillment of defining attributes, such as short-term use without sustained organizational integration. Emergency-driven telemedicine deployment during the COVID-19 pandemic reflects utilization motivated by necessity rather than long-term strategic adoption (Garcia et al., 2024). Related cases include technology acceptance and telemedicine readiness, which represent user attitudes or preparedness but do not ensure continued use or institutional embedding (Garavand et al., 2022; Wubante et al., 2022). Contrary cases occur when telemedicine infrastructure exists but remains unused due to resistance, lack of trust, regulatory uncertainty, or limited digital capacity. Studies in rural and resource-constrained settings highlight non-adoption despite system availability, emphasizing the distinction between access and actual adoption (Lestari et al., 2024; Venkataraman et al., 2023).

2.7 Identification of Antecedents and Consequences

Antecedents of telemedicine adoption include digital infrastructure, regulatory clarity, reimbursement mechanisms, digital literacy, organizational support, and perceived healthcare needs (Agbeyangi & Lukose, 2025; Jena et al., 2025; Abimulyani & Kaluku, 2025). Individual-level antecedents include attitudes, performance expectancy, and trust, while contextual antecedents include equity and policy considerations (Tan et al., 2024; Schürmann et al., 2025). Consequences of telemedicine adoption include improved access to care, continuity of services, patient satisfaction, and clinical outcomes, particularly in chronic disease management (Ezeamii et al., 2024; Adeogun & Faezipour, 2025). However, unequal adoption may exacerbate digital health disparities if antecedents are not adequately addressed (Hassan et al., 2022; Ch et al., 2025).

2.8 Definition of Empirical Referents

Empirical referents of telemedicine adoption are observable indicators demonstrating the presence of defining attributes in practice. These include actual utilization rates, frequency of virtual consultations, and sustained use across clinical contexts and time periods (Garcia et al., 2024). Adoption is also reflected through user behavioral intention, satisfaction, and continued engagement with telemedicine platforms (Thabet et al., 2023; Khowaja et al., 2025). Organizational referents include policy integration, reimbursement mechanisms, and workflow embedding within healthcare systems (Jena et al., 2025). At the provider level, empirical evidence involves perceived usefulness, ease of use, and positive clinical experience with telemedicine (Tan et al., 2024; Garavand et al., 2022). At the patient level, improved access, satisfaction, and stable clinical outcomes serve as measurable indicators of adoption (Adeogun & Faezipour, 2025; Peles et al., 2025).

The study selection process followed a structured and transparent approach to ensure comprehensive coverage of the literature on telemedicine adoption. Database searching and supplementary manual searches were conducted, followed by systematic screening, eligibility assessment, and final inclusion based on predefined criteria aligned with the concept analysis methodology. The progression of article identification, screening, exclusion, and inclusion is illustrated in Figure 1, demonstrating the rigor and transparency of the literature selection process.

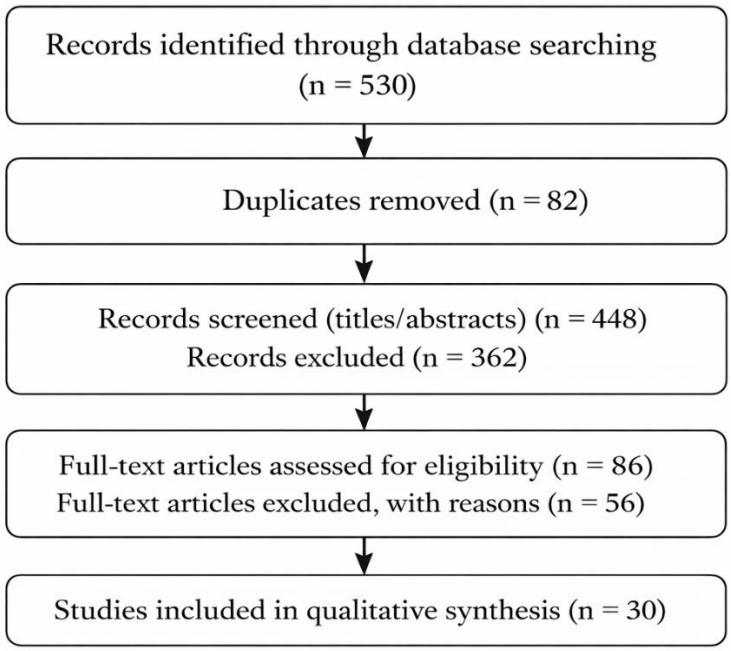

Figure 1. PRISMA-style flow diagram of article search, screening, and selection process

3. Results of Concept Analysis

The results of the concept analysis were derived from a systematic examination of empirical and review studies addressing telemedicine adoption across diverse healthcare settings, populations, and methodological approaches. As summarized in Table 1, the included studies encompass quantitative, qualitative, mixed-methods, and systematic reviews conducted in both developed and developing contexts, covering providers, patients, healthcare organizations, and policy environments. Through iterative comparison and synthesis of these studies, recurring patterns were identified and organized according to Walker and Avant's framework. This process enabled the clarification of the core characteristics of telemedicine adoption and the distinction of defining attributes from related or antecedent concepts. The analysis revealed that telemedicine adoption is a multidimensional phenomenon shaped by individual, technological, organizational, and contextual factors, with consistent emphasis on sustained use, perceived value, and system integration across the reviewed literature (Garcia et al., 2024; Anthony Jnr, 2024; Thabet et al., 2023).

3.1 Defining Attributes

Defining attributes represent the characteristics that appear repeatedly in the literature and distinguish telemedicine adoption from related concepts such as readiness, acceptance, or availability. Analysis of the studies presented in Table 1 identified five core defining attributes. First, actual and sustained utilization emerged as a central attribute, emphasizing that adoption extends beyond initial uptake to consistent use in routine clinical practice (Garcia et al., 2024; Peles et al., 2025). Second, perceived usefulness and clinical value were repeatedly highlighted, reflecting the extent to which telemedicine improves access, continuity of care, efficiency, or patient outcomes (Ezeamii et al., 2024; Adeogun & Faezipour, 2025). Third, ease of use and technological compatibility were identified as essential attributes influencing both provider and patient engagement with telemedicine platforms (Tan et al., 2024; Garavand et al., 2022).

Fourth, organizational and policy integration constituted a defining attribute, as adoption requires alignment with workflows, reimbursement structures, regulatory frameworks, and institutional support (Jena et al., 2025; Alghamdi et al., 2025). Finally, user acceptance and satisfaction encompassing provider confidence, patient trust, and positive experience was consistently reported as a distinguishing feature of successful telemedicine adoption (Thabet et al., 2023; Khowaja et al., 2025). Collectively, these attributes differentiate telemedicine adoption as an ongoing, value-driven, and system-embedded process rather than a temporary or situational use of digital health technologies.

The descriptive characteristics of the studies included in this concept analysis are summarized in Table 1. The table presents key information on authorship, study context, and conceptual or methodological focus, illustrating the diversity of research designs, healthcare settings, and theoretical perspectives used to examine telemedicine adoption. Collectively, these studies provide the empirical and conceptual foundation for identifying the defining attribute, antecedents, and consequences of telemedicine adoption across different healthcare systems and populations.

Table 1 : Descriptive data of the research studies

No.	Citation	Setting (Domain)	Key Attributes (Conceptual / Methodological)
1	Agbeyangi & Lukose (2025)	Sub-Saharan Africa (South Africa, Kenya, Nigeria)	National adoption patterns; service-specific use; infrastructure readiness; regulatory environment; digital literacy constraints
2	Schürmann et al. (2025)	Healthcare professionals; video consultation services	Perceived risks and benefits; trust referents (technology, treatment, provider, patient); transparency; qualitative EVF extension
3	Valencia-Arias et al. (2024)	Global telemedicine research	Adoption theories (TAM, UTAUT, TOE); variable trends; methodological gaps; sustainability perspective
4	Ghiwaa et al. (2023)	Global healthcare providers and patients	Technology Acceptance Model; UTAUT framework; behavioral intention; theoretical foundations of adoption
5	Ch et al. (2025)	Digital healthcare access and equity	Socioeconomic disparities; digital literacy gaps; geographic barriers; equity-oriented adoption considerations
6	Taheri & Nasiri (2024)	Nursing education and clinical practice	Walker & Avant concept analysis; defining attributes; antecedents and consequences; professional growth and care quality
7	Khaloobagheri et al. (2025)	Nursing care practice (routine care)	Walker & Avant eight-step model; multidimensional attributes; implementation antecedents; care quality outcomes
8	Hwang et al. (2022)	Maternal health and nursing care	Walker & Avant concept analysis; physical, psychological, and relational attributes; model, borderline, and contrary cases
9	Nagel et al. (2021)	Community-based primary healthcare	Walker & Avant framework; core service attributes; organizational antecedents; system-level outcomes
10	Ban et al. (2024)	Digital health and health literacy	Concept analysis methodology; defining attributes; antecedents and consequences; contextual influences
11	Garcia et al. (2024)	Medical and surgical specialties	Specialty-specific adoption variation; pandemic-driven expansion; clinical appropriateness; medical vs surgical adoption differences
12	Jena et al. (2025)	Healthcare policy and service providers	Policy innovation; regulatory support; reimbursement structures; digital infrastructure readiness
13	Anthony Jnr (2024)	Public health emergencies	Technology–Organization–Environment framework; crisis-driven adoption; organizational and policy factors
14	Luo et al. (2021)	Urban healthcare system during COVID-19	Socioeconomic determinants; demographic disparities; geographic variation in adoption
15	Wang et al. (2023)	Health systems and stakeholders	Systems approach; multi-level factors; feedback loops; adoption barriers and facilitators
16	Hassan et al. (2022)	Financially distressed cancer patients during COVID-19	Socioeconomic determinants; age and comorbidity effects; utilization patterns; equity-related adoption gaps
17	Tan et al. (2024)	Physicians in Malaysian healthcare system	TAM and social influence integration; perceived usefulness; ease of use; physician adoption behavior
18	Garavand et al. (2022)	Physicians across healthcare settings	Systematic review; TAM-based acceptance factors; attitude; self-efficacy; facilitating conditions
19	Wubante et al. (2022)	Private hospitals in Ethiopia	Professional readiness; knowledge and attitude; digital skills; infrastructure access
20	Khatri et al. (2025)	Individual telemedicine users (India)	Technology readiness; moderating effects; TAM extension; continued usage intention

No.	Citation	Setting (Domain)	Key Attributes (Conceptual / Methodological)
21	Lestari et al. (2024)	Rural communities in developing countries	Systemic adoption barriers; infrastructure and policy constraints; 5P framework (product, provider, public, place, policy)
22	Venkataraman et al. (2023)	Multi-stakeholder healthcare settings (India)	Infrastructural and regulatory barriers; privacy and security concerns; cost-related facilitators
23	Lee et al. (2025)	Emergency departments	Organizational and workload barriers; resistance to change; training and leadership as facilitators
24	Abimulyani & Kaluku (2025)	National telehealth systems	Digital infrastructure readiness; policy support; digital literacy and equity of access
25	Alghamdi et al. (2025)	Telehealth for COPD care	Regulatory clarity; governance frameworks; implementation facilitators and barriers
26	Ezeamii et al. (2024)	Chronic disease management and patient care	Improved clinical outcomes; enhanced access to care; patient engagement; chronic disease effectiveness
27	Thabet et al. (2023)	Individual telemedicine users	UTAUT2 and IS success integration; user satisfaction; perceived security; hybrid SEM–ANN modeling
28	Adeogun & Faezipour (2025)	Patient satisfaction during COVID-19	Continuity of care; satisfaction outcomes; access disparities; systemic enablers of adoption
29	Khowaja et al. (2025)	Healthcare professionals in LMIC settings	Performance expectancy; attitude mediation; behavioral intention; institutional preparedness
30	Peles et al. (2025)	Chronic disease outpatient care	Clinical outcomes; physician adoption patterns; utilization volume; comparative effectiveness

3.2 Antecedents

Antecedents refer to events or conditions that must exist prior to the occurrence of telemedicine adoption. Analysis of the reviewed studies identified several consistent antecedents operating at individual, organizational, technological, and policy levels. At the individual level, digital literacy, technology readiness, and positive attitudes toward digital health were repeatedly identified as prerequisites for adoption among both healthcare professionals and patients (Garavand et al., 2022; Wubante et al., 2022; Khatri et al., 2025). Provider-related antecedents also included prior experience with information technologies and perceived performance benefits, which shaped willingness to engage in telemedicine services (Tan et al., 2024; Khowaja et al., 2025).

At the organizational and system levels, availability of digital infrastructure, including reliable internet connectivity, interoperable electronic health records, and access to appropriate devices, was a critical antecedent (Abimulyani & Kaluku, 2025; Wang et al., 2023). Supportive institutional leadership, training programs, and workflow alignment further facilitated readiness for adoption (Anthony Jnr, 2024; Lee et al., 2025). Policy and regulatory antecedents were also prominent, with studies emphasizing the importance of clear licensing regulations, reimbursement mechanisms, and data security frameworks to enable adoption at scale (Jena et al., 2025; Alghamdi et al., 2025). Additionally, contextual triggers such as public health emergencies, particularly the COVID-19 pandemic, acted as catalytic antecedents by accelerating acceptance and experimentation with telemedicine across specialties and settings (Garcia et al., 2024; Luo et al., 2021).

3.3 Consequences

Consequences are events or outcomes that occur as a result of telemedicine adoption. The reviewed literature demonstrated a range of clinical, organizational, and societal consequences associated with successful adoption. One of the most consistently reported consequences was improved access to healthcare, particularly for rural populations, patients with chronic conditions, and underserved groups, through the reduction of geographic and logistical barriers (Ezeamii et al., 2024; Lestari et al., 2024). Enhanced continuity of care and patient engagement were also observed, especially in chronic disease management contexts such as diabetes, hypertension, and cancer care (Adeogun & Faezipour, 2025; Peles et al., 2025; Hassan et al., 2022).

At the provider and system levels, telemedicine adoption was associated with increased efficiency, optimized resource utilization, and reduced healthcare delivery costs, particularly when integrated into routine outpatient services (Garcia et al., 2024; Jena et al., 2025). Positive consequences also included higher patient satisfaction and perceived quality of care, provided that technology usability and provider support were adequate (Thabet et al., 2023; Adeogun & Faezipour, 2025). However, several studies highlighted unintended consequences, including the risk of exacerbating health inequities related to age, socioeconomic status, digital access, and regional infrastructure disparities (Luo et al., 2021; Hassan et al., 2022). These findings indicate that while telemedicine adoption yields substantial benefits, its outcomes are contingent on equitable implementation and sustained system support.

3.4 Empirical Referents

Empirical referents are the observable phenomena that demonstrate the existence of telemedicine adoption in practice and allow the concept to be measured or identified empirically. Across the reviewed studies, telemedicine adoption was most commonly operationalized through objective utilization indicators, such as the proportion of clinical encounters conducted via telemedicine, frequency of video or telephone consultations, and continuity of telemedicine use over time (Garcia et al., 2024; Peles et al., 2025). Additional empirical referents included self-reported usage behaviors and behavioral intention measures, often captured through validated survey instruments grounded in technology adoption theories such as the Technology Acceptance Model, UTAUT, and related extensions (Tan et al., 2024; Thabet et al., 2023; Khowaja et al., 2025).

At the organizational level, empirical referents encompassed the integration of telemedicine into routine workflows, reimbursement eligibility, availability of technical support, and institutional policies governing digital care delivery (Jena et al., 2025; Alghamdi et al., 2025). Patient-centered referents included satisfaction scores, perceived quality of care, accessibility metrics, and clinical outcome indicators, particularly in chronic disease management and oncology settings (Hassan et al., 2022; Adeogun & Faezipour, 2025; Ezeamii et al., 2024). Collectively, these referents enable researchers and practitioners to distinguish telemedicine adoption from preparatory states such as readiness or acceptance, thereby grounding the concept in measurable and observable practice.

3.5 Summary of Findings

This concept analysis clarifies telemedicine adoption as a multidimensional and dynamic process characterized by sustained utilization, perceived value, technological usability, organizational integration, and user satisfaction. Drawing on the reviewed literature summarized in Table 1, the

analysis identified clear antecedents related to individual readiness, infrastructure availability, institutional support, and regulatory frameworks, alongside consequences that include improved access to care, enhanced patient engagement, increased efficiency, and potential equity challenges. The defining attributes distinguish telemedicine adoption from related concepts by emphasizing routine and embedded use rather than temporary or situational implementation. Empirical referents further anchor the concept in observable indicators, supporting its measurement across diverse healthcare contexts. Together, these findings provide a coherent conceptual foundation for future research, policy development, and evaluation of telemedicine initiatives, particularly in efforts aimed at promoting equitable, effective, and sustainable digital healthcare delivery.

4. Discussion

The findings of this concept analysis clarify telemedicine adoption as a complex, multilevel phenomenon shaped by individual, organizational, technological, and policy-related dimensions. By synthesizing evidence across diverse study designs and contexts, the analysis moves beyond narrow definitions of adoption as mere technology use and instead positions it as a sustained, value-driven integration of digital care into routine healthcare delivery. The discussion highlights important theoretical contributions while outlining practical implications for healthcare managers and policymakers seeking to scale telemedicine in equitable and sustainable ways.

4.1 Theoretical Implications

From a theoretical perspective, this concept analysis contributes to telemedicine literature by refining and integrating fragmented adoption constructs into a coherent conceptual framework. While prior studies have relied heavily on technology acceptance theories such as TAM, UTAUT, and their extensions to explain individual behavioral intention (Garavand et al., 2022; Tan et al., 2024; Thabet et al., 2023), the present analysis demonstrates that telemedicine adoption extends beyond intention and acceptance to include routinization, institutional embedding, and continuity of use. This distinction helps resolve conceptual ambiguity observed in earlier studies that conflated readiness, acceptance, and adoption as interchangeable outcomes (Wubante et al., 2022; Khatri et al., 2025).

Additionally, the findings support systems-oriented and socio-technical perspectives that conceptualize telemedicine adoption as an interaction between users, organizations, infrastructure, and regulatory environments (Anthony Jnr, 2024; Wang et al., 2023). The identification of defining attributes such as sustained utilization, perceived usefulness, usability, trust, and organizational support reinforces the need for integrative theoretical models that combine behavioral, organizational, and policy-level determinants. Furthermore, by incorporating empirical referents related to clinical outcomes and patient experience, this analysis strengthens the theoretical linkage between adoption and value creation in healthcare delivery, particularly in chronic disease management and oncology care (Hassan et al., 2022; Peles et al., 2025; Ezeamii et al., 2024).

4.2 Management and Policy Implications

The results of this concept analysis have significant implications for healthcare management and policy development. For healthcare organizations, the findings emphasize that successful telemedicine adoption requires more than technological availability; it depends on leadership commitment, workflow integration, staff training, and ongoing technical support. Managers should prioritize user-centered system design, invest in digital literacy programs, and align telemedicine

services with clinical needs to promote sustained utilization among healthcare professionals and patients (Tan et al., 2024; Khowaja et al., 2025). Organizational readiness assessments should also extend beyond individual competence to include infrastructure reliability and interoperability.

From a policy perspective, regulatory clarity, reimbursement mechanisms, and digital infrastructure investment emerge as critical enablers of adoption. Studies consistently demonstrate that fragmented regulations, inconsistent reimbursement policies, and inadequate broadband access undermine telemedicine uptake, particularly among rural, financially distressed, and underserved populations (Jena et al., 2025; Lestari et al., 2024; Venkataraman et al., 2023). Policymakers should therefore focus on harmonizing telehealth regulations, ensuring data security and privacy protections, and promoting equitable access through targeted infrastructure development. Without such policy-level interventions, telemedicine adoption risks reinforcing existing healthcare disparities rather than mitigating them (Hassan et al., 2022; Adeogun & Faezipour, 2025).

4.3 Practical Applications

The clarified concept of telemedicine adoption offers actionable guidance for healthcare practitioners, administrators, and system designers. At the clinical level, adoption can be strengthened by embedding telemedicine into routine care pathways rather than treating it as a parallel or temporary service. Training programs should focus not only on technical competence but also on building clinician confidence, trust in digital systems, and skills for remote patient engagement, which have been shown to influence sustained use (Garavand et al., 2022; Tan et al., 2024). Clinical protocols should clearly define which conditions and patient groups are most suitable for telemedicine, particularly in chronic disease management and follow-up care, where positive outcomes and efficiency gains are consistently reported (Ezeamii et al., 2024; Peles et al., 2025).

At the organizational level, healthcare institutions should conduct structured readiness assessments that address infrastructure, workflow integration, data interoperability, and leadership support. Evidence indicates that usability, system reliability, and access to patient records are critical determinants of clinician adoption and satisfaction (Thabet et al., 2023; Khowaja et al., 2025). Practically, this requires investment in secure platforms, standardized documentation processes, and technical support teams. In resource-limited and rural settings, context-sensitive implementation strategies such as hybrid care models and mobile-based solutions can reduce access barriers and improve equity (Lestari et al., 2024; Venkataraman et al., 2023). Together, these applications translate the defining attributes of telemedicine adoption into operational practices that support long-term sustainability.

4.4 Future Research Directions

Despite growing evidence on telemedicine adoption, several research gaps remain. Future studies should move beyond cross-sectional designs to longitudinal and mixed-methods approaches that capture how adoption evolves over time and how initial acceptance translates into sustained use. In particular, research should examine the dynamic interactions between individual attitudes, organizational readiness, and policy environments, as highlighted by systems-based perspectives (Anthony Jnr, 2024; Wang et al., 2023). Comparative studies across healthcare systems and income settings are also needed to identify context-specific versus universal adoption determinants.

Further research should prioritize underrepresented populations, including older adults, financially distressed patients, and rural communities, to better understand equity-related barriers and facilitators of adoption (Hassan et al., 2022; Adeogun & Faezipour, 2025). Additionally, there is a need to develop and validate standardized measurement tools that operationalize telemedicine adoption using the defining attributes, antecedents, and consequences identified in this concept analysis. Such tools would support more consistent evaluation across studies and strengthen theoretical advancement. Finally, emerging areas such as artificial intelligence integration, remote monitoring technologies, and data governance warrant investigation to understand how they reshape the concept and practice of telemedicine adoption in future healthcare systems (Jena et al., 2025; Abimulyani & Kaluku, 2025).

5. Conclusion

This concept analysis clarifies telemedicine adoption as a multidimensional and dynamic process that extends beyond initial technology use to encompass sustained integration within routine healthcare delivery. By applying the Walker and Avant framework, the analysis systematically identified the defining attributes, antecedents, consequences, and empirical referents of telemedicine adoption, addressing long-standing conceptual ambiguity in the literature. The findings demonstrate that adoption is shaped by the interaction of individual readiness, organizational support, technological usability, and enabling policy environments rather than by isolated behavioral intentions.

Importantly, the analysis highlights that meaningful telemedicine adoption is associated with improved access to care, enhanced patient and provider satisfaction, and positive clinical and operational outcomes, particularly in chronic disease management and underserved populations. At the same time, the presence of infrastructure alone does not guarantee adoption, as barriers related to trust, digital literacy, workflow misalignment, and regulatory fragmentation may limit sustained use.

By offering a refined conceptual definition and clear analytical boundaries, this study provides a foundation for consistent measurement, theory development, and evidence-based implementation of telemedicine. The clarified concept can guide healthcare organizations, policymakers, and researchers in designing, evaluating, and scaling telemedicine interventions that are effective, equitable, and sustainable in diverse healthcare contexts.

Acknowledgement

The authors would like to express their sincere gratitude to all individuals and institutions who contributed, directly or indirectly, to the completion of this study. Their support, insights, and scholarly contributions were invaluable in facilitating the development of this research.

Conflict of Interest Statement

The authors declare that there is no conflict of interest regarding the publication of this study. The research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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