Natural Resources for Human Health
eISSN: 2583-1194

Original Research

Received 25 July 2026
Revised 29 Aug 2026
Accepted 15 Sep 2026

Natural Resources for Human Health 2026, Vol. 6 (22s): 194–210

KEYWORDS:
telemedicine; older adults; digital health; health policy; digital divide; health services; interoperability; implementation; health technology

Telemedicine as a Health-System Strategy for Older Adult Care: A Systematic Narrative Review of Access, Equity, Implementation and Sustainability

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ABSTRACT:

Objectives: To systematically synthesise recent evidence on telemedicine for older adult care from a health-policy-and-technology perspective, with emphasis on access, digital equity, operational and economic value, stakeholder adoption, implementation capability, interoperability, governance and sustainable hybrid-care design.

Methods: A systematic narrative evidence review was conducted using literature published from January 2022 to 28 August 2026. Evidence identification was based on PubMed-indexed literature and citation chaining from high-relevance reviews, while publisher webpages were used for bibliographic verification. Search concepts covered technology, older-adult population and health-policy/management domains. The verified candidate corpus comprised 26 unique records. All records were re-screened against predefined eligibility criteria; 25 peer-reviewed publications were retained for analytical synthesis and one Brazilian regulatory document was retained separately for policy and legal interpretation. Study selection was reported using a PRISMA 2020-adapted flow diagram, and heterogeneous evidence was synthesised narratively rather than statistically pooled.

Results: Evidence was most consistent for improved geographic reach, reduced travel burden and increased specialist access when telemedicine was integrated into existing care pathways. Benefits were conditional on digital capability, caregiver and technical support, workforce acceptance, interoperability and clear escalation arrangements. Economic findings were promising but context dependent, particularly after implementation and hidden labour costs were considered. Across the evidence base, selective hybrid care was more defensible than universal substitution of face-to-face services.

Conclusions: Telemedicine should be treated as a health-system service strategy rather than a stand-alone digital platform. Policy and organisational decisions should link technology adoption to patient selection, digital inclusion, interoperable information systems, stakeholder capability, accountability, pathway-level economic assessment and balanced performance indicators. For older adult care, sustainable scale depends on preserving physical alternatives while expanding virtual care where it demonstrably improves access and value.

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1. INTRODUCTION

Population ageing is increasing pressure on health systems to provide continuous, coordinated and accessible care to growing numbers of older adults with multimorbidity, functional limitations and complex care needs. Older people commonly require repeated interaction with primary care, specialist services, rehabilitation, palliative care and community-based services, while mobility limitations and caregiver dependence can increase the burden associated with conventional place-based healthcare. Telemedicine has consequently developed from an emergency or supplementary communication mechanism into a potentially important health-service technology capable of redistributing selected consultations, monitoring activities and follow-up across location and time [1–6]. For health systems facing workforce constraints and geographically unequal specialist capacity, the strategic importance of telemedicine increasingly extends beyond technological adoption to service design and health policy.

Existing evidence demonstrates several potential benefits of telemedicine for older adults. Reviews of ageing care and primary healthcare indicate that virtual consultations can improve service reach, facilitate routine follow-up and increase access to healthcare professionals when appropriate patients and clinical activities are selected [1,3–5]. Rural geriatric evidence additionally suggests that reduced travel requirements and improved access to specialist expertise can generate meaningful value for patients and caregivers [6]. More recent evidence concerning geriatric assessment, palliative care and dementia similarly indicates that telemedicine can support particular elements of assessment, monitoring, communication and continuity, although its effectiveness varies according to intervention type, patient capability and clinical context [20–22]. Collectively, this literature supports selective virtual care but provides limited justification for replacing physical services universally.

Access, however, represents only one component of technology-enabled healthcare. Older adults may face substantial barriers associated with device ownership, connectivity, digital literacy, sensory impairment, cognitive limitations and dependence on informal or professional support [2,7,11–13,20]. Studies of technology acceptance indicate that perceived usefulness, ease of use, confidence and trust influence willingness to engage with telemedicine [7,19]. Digital-health equity reviews further show that introducing a virtual channel does not automatically create equitable access because socioeconomic circumstances, infrastructure and support systems determine whether patients can successfully enter and complete digital care pathways [11–13]. Telemedicine can therefore reduce geographical exclusion while simultaneously creating or reinforcing technology-related exclusion. This tension is particularly relevant to health policy because the success of digital transformation should be assessed through completed and equitable access rather than consultation volume alone.

Economic and organisational evidence presents a similarly conditional picture. Recent reviews suggest that telemedicine may reduce patient travel costs, improve use of physical capacity and generate cost advantages in some geriatric settings, but economic outcomes depend strongly on the intervention, costing perspective and implementation context [8,23]. Virtual care can also create additional work through patient onboarding, technical troubleshooting, digital documentation, remote-data review and escalation. These burdens become particularly important when platforms operate separately from existing clinical information systems [10,24]. Workforce acceptance, training, organisational readiness and interoperability therefore influence whether telemedicine produces genuine operational value or simply adds another layer to existing healthcare processes [9,10,24–26]. A health-technology assessment perspective must consequently consider access, quality, workforce effects, implementation costs, interoperability and patient burden alongside conventional clinical outcomes.

The policy and governance environment adds another dimension. Regulation can enable technology-mediated healthcare, but legislation alone does not determine which patients should receive virtual care, how information should be integrated, who is responsible for monitoring remote information or how escalation to physical care should occur. Brazil provides an informative applied context because it combines a universal public health system, a substantial private healthcare sector, marked geographical inequalities and a formal regulatory framework for telemedicine [14–18,26]. Brazilian evidence suggests that telemedicine is more likely to extend healthcare access when digital services are integrated with primary care, supported institutionally and linked to structured teleconsultation or referral pathways [14–16]. These experiences illustrate the broader distinction between authorising telemedicine as a technology and implementing it as a sustainable health-service strategy.

Previous research has commonly examined individual dimensions of this problem. Existing reviews have addressed the feasibility and acceptability of telehealth in ageing care [1], telemedicine in older-adult primary care [5], cost-effectiveness and patient satisfaction [8], professional acceptance [9], virtual-care implementation and sociotechnical conditions [10], digital-health inequalities [11–13], geriatric assessment [20], palliative care [21], dementia outcomes [22], economic consequences [23] and

implementation architecture [24]. This literature provides a substantial evidence base, but these domains are usually examined separately. Consequently, policy-makers and health-service leaders still require an integrated interpretation of how access, digital equity, economic value, stakeholder adoption, interoperability, implementation capability and governance interact when telemedicine is scaled for older-adult care.

The present review addresses this gap by integrating these dimensions within a single health-policy-and-technology framework. Its novelty lies not in reassessing telemedicine solely as a clinical intervention, but in evaluating it as a health-system service strategy whose value depends on the interaction between technology, patients, professionals, organisational processes and policy conditions. Six connected domains are examined: access and service reach, equity and digital inclusion, operational and economic value, stakeholder adoption, implementation capability and interoperability, and governance and strategic sustainability. The review additionally distinguishes peer-reviewed analytical evidence from regulatory material so that policy context is not interpreted as evidence of effectiveness.

The aim of this systematic narrative review was therefore to synthesise evidence published from January 2022 to August 2026 on telemedicine for older-adult care from a health-policy-and-technology perspective. Specifically, the review sought to evaluate how telemedicine influences access and service reach; examine digital-equity and inclusion challenges; assess operational and economic implications; identify patient, caregiver and workforce factors affecting adoption; determine organisational and interoperability requirements for sustainable implementation; and translate the evidence into policy and governance implications for hybrid models of care. The review question was: How does telemedicine contribute to access, equity, operational and economic value, stakeholder adoption, implementation capability and sustainable service delivery for older adults, and what organisational and policy conditions influence these outcomes?

2. MATERIALS AND METHODS

2.1 Review design and reporting approach

This study used a systematic narrative evidence-synthesis design to evaluate telemedicine for older-adult care from a health-policy-and-technology perspective. A narrative synthesis was selected because the eligible evidence included heterogeneous systematic and scoping reviews, qualitative studies, cross-sectional research, health-service evaluations, technology-acceptance studies, implementation research and economic reviews. Differences in study design, population, telemedicine modality, setting and outcome definition prevented meaningful statistical pooling.

The review was structured according to PRISMA 2020 principles for transparent reporting of identification, eligibility, study selection and synthesis. The review window covered literature published between January 2022 and 28 August 2026. The final analytical evidence base comprised 25 peer-reviewed publications [1–16,18–26], while one official Brazilian regulatory document [17] was retained separately to support interpretation of the legal and policy environment.

The review was designed to synthesise evidence relevant to six interconnected health-policy-and-technology domains: access and service reach, equity and digital inclusion, operational and economic value, stakeholder adoption, implementation capability and interoperability, and governance and strategic sustainability. The purpose was not to estimate a single clinical treatment effect, but to identify policy-relevant patterns, implementation conditions, risks and boundary conditions associated with telemedicine for older adults.

2.2 Review question and analytical framework

The review question was operationalised through six health-policy-and-technology domains: (1) access and service reach; (2) equity and digital inclusion; (3) operational and economic value; (4) stakeholder adoption; (5) implementation capability and interoperability; and (6) governance and strategic sustainability. These domains were selected because they represent decisions that policy-makers, health-service leaders and technology providers can influence directly and correspond to recurring outcomes in the retained evidence.

Table 1. Health-policy-and-technology framework used for the review

Domain	Evidence focus	Policy/management decision
Access and service reach	Distance, waiting, specialist reach, travel burden and referral completion	Where can virtual delivery redistribute access without reducing quality?
Equity and digital inclusion	Devices, connectivity, literacy, sensory/cognitive capability and caregiver support	Who may be excluded, and what assisted or physical alternatives are required?
Operational and economic value	Patient travel, provider workload, capacity, implementation cost and cost-effectiveness	Does a pathway create value after technology and workforce costs are included?
Stakeholder adoption	Patient usefulness, usability, trust and professional acceptance	What makes patients, caregivers and staff willing and able to use the service?
Implementation and interoperability	Workflow, training, technical support, information integration and continuity	What organisational and technical capabilities are prerequisites for scale?
Governance and sustainability	Regulation, accountability, indicators, hybrid design and long-term resourcing	How should virtual and physical channels be governed and evaluated over time?

objectives:

1. To evaluate how telemedicine influences access, service reach and travel burden in older-adult care.
2. To examine digital-equity and inclusion barriers that may affect successful participation in virtual care.
3. To assess operational, resource-use and economic implications associated with telemedicine delivery.
4. To identify patient, caregiver and workforce factors influencing telemedicine acceptance and adoption.
5. To determine the organisational, technical and interoperability conditions required for implementation and scale.
6. To synthesise governance, regulatory and sustainability implications for hybrid models of older-adult care.

2.3 Eligibility criteria

Eligibility criteria were defined before re-screening the verified corpus. Evidence was included when it directly addressed telemedicine, telehealth, virtual care, remote consultation, remote monitoring or digital health and contributed to at least one review domain. Studies could focus directly on older adults or on a health-service context with clear relevance to older-adult access, implementation, equity or system design. Regulatory evidence was separated from analytical evidence so that legal context was not treated as evidence of effectiveness.

Table 2. Inclusion and exclusion criteria

Criterion	Included	Excluded
Publication period	January 2022 to 28 August 2026	Published before January 2022
Population / setting	Older adults, geriatric care, residential aged care, older-adult primary care, palliative care, dementia, or health-system evidence with direct relevance to older-adult telemedicine	No meaningful older-adult or health-service relevance

Technology	Telemedicine, telehealth, virtual care, remote consultation, remote monitoring or digital health used for health-service delivery	Purely technical digital systems without healthcare-service implications
Outcomes	Access, utilisation, equity, digital inclusion, cost, resource use, workflow, coordination, acceptance, interoperability, implementation, governance, regulation or sustainability	No outcome relevant to health policy, service delivery or technology implementation
Evidence type	Peer-reviewed systematic/scoping reviews, empirical studies, qualitative/mixed-method studies, service evaluations, implementation studies and economic reviews	Conference abstracts, editorials, non-peer-reviewed summaries and unverified web material
Policy/regulatory material	Official regulatory material retained only for legal/policy interpretation	Policy descriptions used as if they demonstrated effectiveness or clinical benefit

2.4 Information sources and search logic

Evidence identification was centred on PubMed-indexed literature and citation chaining from recent high-relevance reviews. Publisher webpages were used only for bibliographic verification and were not treated as independent bibliographic databases. The search framework combined three concept blocks representing the technology, target population and health-policy or management dimensions of the review.

Technology-related concepts included telemedicine, telehealth, virtual care, remote consultation, remote monitoring and digital health. Population-related concepts included older adult, elderly, geriatric, ageing, aging and aged. Health-policy and management concepts included access, utilisation, cost, cost-effectiveness, implementation, workflow, acceptance, equity, sustainability, interoperability, management and service delivery. The evidence window was restricted to publications from January 2022 to 28 August 2026.

Citation chaining from high-relevance reviews was used to identify additional peer-reviewed studies that contributed distinct evidence regarding access, economics, digital equity, implementation, stakeholder adoption or governance. Bibliographic details, including title, publication year, journal and DOI or PMID information where available, were verified using PubMed records and publisher webpages.

The archived review materials preserved the search concepts, eligibility framework and final verified evidence corpus but did not preserve the original database-export files, initial database-hit counts or exact line-by-line PubMed search syntax. These elements were therefore not retrospectively reconstructed. To avoid introducing unsupported identification numbers, the PRISMA flow begins with the 26 unique records contained in the verified candidate corpus. This limitation is acknowledged because it restricts full reproducibility of the earliest identification stage.

2.5 Study selection and PRISMA flow

The verified candidate corpus contained 26 unique records, with no duplicate references identified within the retained corpus. Each record was re-screened against the predefined eligibility criteria shown in Table 2. Eligibility assessment considered publication period, population or service-setting relevance, telemedicine or digital-health content, contribution to at least one review domain, evidence type and availability of verifiable publication information.

All 26 full reports were available for eligibility assessment. Twenty-five peer-reviewed publications met the criteria for inclusion in the systematic narrative synthesis. One official Brazilian regulatory document [17] did not constitute peer-reviewed analytical evidence and was therefore excluded from the effectiveness synthesis; however, it was retained separately to support interpretation of the legal and policy environment.

Natural Resources for Human Health
eISSN: 2583-1194

Accordingly, 25 peer-reviewed publications formed the final analytical evidence base. The study-selection process is presented in Figure 1. Because the original database-identification records were unavailable, no retrospective or hypothetical identification counts were introduced into the PRISMA flow.

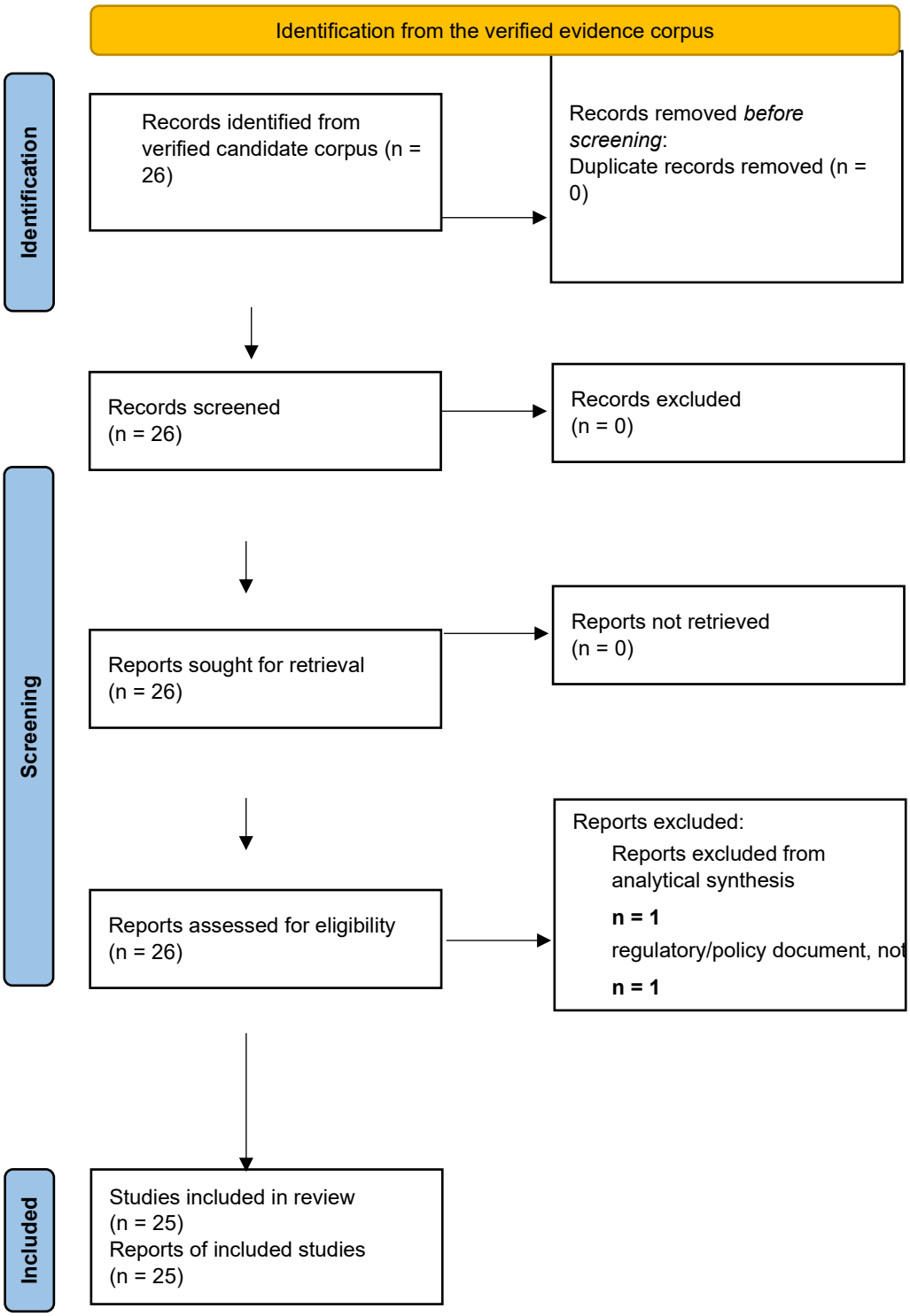


Figure 1. PRISMA 2020-adapted flow diagram for the verified evidence corpus. The flow begins with the 26 unique records contained in the verified candidate corpus because the original database-export files and initial search-result counts were not preserved. No retrospective or hypothetical database-identification counts were imputed.

2.6 Quality appraisal

Methodological quality was considered using design-sensitive principles derived from Joanna Briggs Institute critical-appraisal guidance. Because the evidence base contained multiple study designs, appraisal criteria were matched to the methodological characteristics of each source rather than applying a single scoring system to all publications.

Systematic and scoping reviews were considered in relation to clarity of the review question, appropriateness of the search approach, transparency of eligibility and study-selection procedures, critical appraisal of included evidence and coherence between findings and conclusions. Qualitative and mixed-method studies were considered in relation to congruence among the research question, sampling, data collection, analysis and interpretation. Cross-sectional studies, implementation studies and service evaluations were considered in relation to sampling appropriateness, measurement validity, potential confounding and credibility of reported outcomes.

A universal numerical cut-off was not applied because numerical scores would not be directly comparable across heterogeneous study designs. Instead, appraisal findings informed the interpretive weight assigned to individual sources during narrative synthesis. Greater weight was given to evidence with transparent methods, appropriate sampling or selection procedures, clearly described analyses and conclusions proportionate to the reported data. No peer-reviewed study was excluded solely because of a numerical quality score.

The official Brazilian regulatory document [17] was not subjected to effectiveness appraisal because it was used only to describe the legal and policy context and was not treated as evidence of clinical, economic or implementation effectiveness. Detailed design-specific appraisal findings are presented in Supplementary Table S1, while the Results section summarises how methodological quality influenced the interpretation of the evidence.

2.7 Data extraction and synthesis

A structured evidence matrix was used to organise information from each included peer-reviewed publication. Extracted variables included publication year, study design or evidence type, population or health-service setting, telemedicine model or intervention, relevant health-policy-and-technology domain, principal findings, reported implementation conditions and major limitations relevant to interpretation.

Evidence was coded against the six predefined analytical domains: access and service reach, equity and digital inclusion, operational and economic value, stakeholder adoption, implementation capability and interoperability, and governance and strategic sustainability. Secondary coding captured recurring issues including caregiver support, digital literacy, workforce acceptance, technical support, workflow redesign, interoperability, escalation processes and hybrid-care design.

Narrative synthesis was undertaken by comparing the direction, consistency and contextual relevance of findings across studies. Particular attention was given to areas of convergence, contradiction and boundary conditions. Evidence was not treated as statistically independent when primary studies may have also contributed to included evidence syntheses. Accordingly, findings were interpreted according to consistency and context rather than by counting publications as independent effect estimates.

Quantitative pooling was not undertaken because of substantial heterogeneity in study design, population, setting, telemedicine modality and outcome definition. The synthesis therefore focused on policy-relevant patterns and conditions under which telemedicine appeared to create benefit, introduce risk or require organisational adaptation.

Table 3. Evidence groups and their role in the synthesis

Evidence group	References	Role in synthesis
Core older-adult / aged-care analytical evidence	[1,3-16,19-22] (n = 19)	Direct evidence on older-adult telemedicine, access, acceptance, equity, aged-care systems, Brazilian primary care, palliative care and dementia.
Supplementary peer-reviewed policy / implementation evidence	[2,18,23-26] (n = 6)	Cross-cutting evidence on digital health and ageing, Brazilian context, economic consequences, implementation architecture, developing-country adoption and healthcare management.

Regulatory context	[17] (n = 1)	Brazilian legal framework; used for policy interpretation only and not as evidence of effectiveness.

2.8 Protocol and registration

A protocol for this review was not prospectively registered. The review question, eligibility criteria and analytical domains were nevertheless defined before re-screening the verified evidence corpus. The absence of prospective protocol registration is acknowledged as a methodological limitation.

3. RESULTS AND DISCUSSION

3.1 Study selection

Twenty-six unique records in the verified evidence corpus were assessed for eligibility. Twenty-five peer-reviewed publications met the criteria for analytical synthesis. One official Brazilian regulatory document [17] did not constitute peer-reviewed effectiveness evidence and was therefore retained only to interpret the legal environment for telemedicine. The analytical evidence comprised 19 core sources with direct older-adult, aged-care or service-delivery relevance and six supplementary peer-reviewed sources that strengthened economic, implementation, management or policy interpretation (Figure 1; Table 3).

3.2 Characteristics and overall evidence pattern

Methodological quality varied across the included evidence because the review incorporated systematic and scoping reviews, qualitative research, cross-sectional studies, implementation studies, service evaluations and economic evidence. Appraisal was therefore interpreted according to study design rather than through a single pooled numerical score.

Across the evidence base, greater interpretive weight was assigned to studies that reported clearly defined research questions, transparent eligibility or sampling procedures, appropriate data-collection and analytical methods, and conclusions that were proportionate to the reported findings. Systematic and scoping reviews with transparent search and selection procedures provided stronger support for cross-cutting conclusions concerning access, digital equity, implementation and economic implications. Empirical studies contributed important contextual evidence concerning patient experience, professional acceptance and health-service implementation.

No peer-reviewed publication was excluded solely because of an appraisal score. Instead, methodological limitations were considered during synthesis when assessing the consistency, transferability and strength of each finding. The Brazilian regulatory document [17] was not appraised as effectiveness evidence because it was retained only to support interpretation of the legal and policy context. The included peer-reviewed evidence represented a heterogeneous body of systematic and scoping reviews, qualitative studies, cross-sectional research, prospective implementation studies, technology-acceptance studies, economic reviews and broader health-system analyses. Nineteen publications contributed directly to older-adult, aged-care or related service-delivery questions, while six additional peer-reviewed sources provided complementary evidence concerning digital health, economics, implementation, governance and healthcare management. Collectively, the evidence was strongest for access, stakeholder acceptance and implementation conditions, whereas direct evidence concerning provider productivity and long-term economic outcomes remained comparatively limited.

Design-specific critical-appraisal findings for the included peer-reviewed publications are reported in Supplementary Table S1.

Table 4. Characteristics and policy contribution of included peer-reviewed evidence

Study	Design / context	Policy contribution
[1]	Scoping review of systematic reviews	Feasibility, effectiveness, cost and acceptability of telehealth in ageing care.
[2]	Digital-health review / perspective	Opportunities and access barriers for ageing populations.
[3]	Primary-care scoping review	Service reach, access and implementation of telehealth in primary health care.

[4]	Systematic review	Effectiveness and service substitution in primary-care teleconsultations.
[5]	Systematic mixed-studies review	Telemedicine in older-adult primary care and implementation conditions.
[6]	Qualitative rural geriatric study	Travel burden, specialist access and caregiver value.
[7]	Technology-acceptance study	Usefulness, ease of use and willingness among older adults.
[8]	Systematic review	Cost-effectiveness and patient satisfaction in geriatric telehealth.
[9]	Systematic review	Professional acceptance and organisational adoption in elderly care.
[10]	Systematic review using SEIPS	Workflow, interoperability, training and sociotechnical implementation.
[11]	Systematic qualitative review	Digital health equity and inclusive implementation.
[12]	Scoping review	Digital inequalities and policy recommendations.
[13]	Scoping review	Age-related digital divide and multilevel implementation.
[14]	Prospective multicentre study	Primary-care access and implementation in Brazil.
[15]	Cross-sectional health-services study	Institutional support and telehealth uptake in Brazilian primary care.
[16]	Brazilian health-system analysis	Tele-assistance, policy and organisational design in the Unified Health System.
[18]	Brazilian telemedicine history / system context	Development, challenges and advantages of telemedicine in Brazil.
[19]	Qualitative older-adult study	Trust, communication and pathway fit.
[20]	Scoping review	Tele-geriatric assessment, access and implementation barriers.
[21]	Systematic review	Palliative telehealth barriers and facilitators.
[22]	Systematic review of RCTs	Telemedicine outcomes in older adults with dementia.
[23]	Scoping review of economic evaluations	Financial consequences of telehealth for older adults seeking unplanned care.
[24]	Rapid umbrella review	Implementation architecture, governance and organisational integration.
[25]	Systematic review	Implementation and adoption lessons from a developing-country context.
[26]	Healthcare-management study	Managerial adoption factors in telemedicine.

3.3 Access and service reach

Access was the most consistently positive policy outcome. Primary-care evidence indicates that telehealth can extend service reach and reduce the effect of distance and limited specialist availability [3,4]. Similar benefits were reported for older adults where mobility is limited or geriatric expertise is geographically concentrated [1,5,20]. Rural patients and caregivers identified reduced travel and easier specialist access as meaningful benefits [6]. Telemedicine can therefore function as a mechanism for distributing capacity rather than simply as a convenience technology.

Brazilian evidence shows that access gains depend on integration with existing primary care rather than on an isolated digital platform. The UBS+Digital multicentre study demonstrated that telehealth could extend physician reach through established primary-care units in underserved settings [14]. Other Brazilian evidence similarly links uptake to institutional support, local service organisation and structured tele-assistance [15,16]. Relevant performance indicators therefore include waiting time, avoided travel, specialist reach, referral completion and continuity within local pathways.

3.4 Equity and digital inclusion

Telemedicine can reduce geographic barriers while simultaneously creating technology-related barriers. Older adults may experience difficulty because of connectivity, device access, digital literacy, hearing or visual impairment, cognitive limitations and dependence on caregivers [2,7,11-13,20]. Perceived usefulness and ease of use influence willingness to use telemedicine [7], but access to a virtual appointment does not guarantee successful completion of care.

The policy implication is that digital equity must be designed into the service. Systematic and scoping evidence supports accessible interfaces, assisted digital access, education, caregiver support and continuing non-digital alternatives [11-13]. Equity indicators should therefore include failed connections, channel switching, missed appointments, caregiver dependence and differences in completion across geographic or socioeconomic groups, not only the number of virtual visits delivered.

3.5 Operational and economic value

Telemedicine may create operational value by reducing travel, replacing selected low-value face-to-face visits and shifting monitoring away from physical facilities. The geriatric cost-effectiveness review reported potentially meaningful savings in some settings, although results varied by intervention and costing perspective [8]. Economic evidence for older adults seeking unplanned care similarly demonstrates that financial consequences depend on how patient, provider and system costs are defined [23].

Provider-level efficiency cannot be assumed. Virtual care may add work through patient onboarding, technical troubleshooting, remote data review, documentation and escalation, particularly when digital platforms are poorly integrated [10,24]. A defensible business case should therefore distinguish patient-level savings from provider operating costs and wider system value. Technology, connectivity, cybersecurity, training, support and integration costs should be assessed alongside capacity released, attendance, emergency use, patient travel and caregiver burden [8,23].

3.6 Stakeholder adoption and care experience

Sustainable adoption requires both patient and workforce acceptance. Among older adults, willingness is influenced by perceived usefulness, ease of use, confidence, trust and the fit of telemedicine with existing routines [7,19]. In palliative care, patient adoption similarly depends on usability, trust, support and the perceived ability of remote care to meet needs without losing appropriate face-to-face contact [21].

Professional acceptance is equally conditional. A systematic review of care personnel in elderly care found adoption to be influenced by organisational, staff, patient and technology factors [9]. Wider management evidence likewise indicates that adoption decisions depend on perceived value, organisational readiness and the ability to integrate digital delivery into established workflows [26]. Stakeholder engagement should therefore be treated as a design requirement rather than a post-implementation communication exercise.

3.7 Implementation capability and interoperability

Infrastructure alone does not produce effective telemedicine. Recurrent implementation requirements include workforce competence, technical support, patient support, workflow redesign and organisational readiness [9,10,24,25]. Systems evidence in residential aged care demonstrates that inadequate training, workflow disruption and poor interoperability can offset access benefits [10]. Developing-country evidence similarly emphasises planning, staffing, infrastructure and service integration [25].

Interoperability is particularly important because a virtual platform outside the main clinical information system can create duplicate documentation and weaken continuity [10,24]. Procurement should therefore assess integration with scheduling, clinical records, identity management, reporting and escalation workflows. Training should cover patient selection, virtual communication, documentation and escalation in addition to software operation.

3.8 Regulation, governance and sustainability

Brazilian regulation provides a legal foundation for technology-mediated medical services [17], while the national history of telemedicine illustrates the close interaction among policy, professional practice and service organisation [18]. Regulation enables telemedicine but does not by itself specify an operationally safe or equitable service model. Governance must therefore define patient selection, informed consent, privacy, documentation, responsibility for reviewing remote information, escalation thresholds and continuity with physical services.

Across the evidence base, long-term sustainability was most consistent with a hybrid model. Telemedicine can improve resilience by adding delivery channels and extending specialist reach, but older-adult care still requires physical examination and complex assessment in many situations [5,10,20-22]. Sustainable scale therefore depends on selective substitution, assisted access, interoperable information, workforce support and balanced performance measurement rather than on virtual-volume targets alone.

4 DISCUSSION

4.1 Principal findings and health-policy significance

The synthesis indicates that telemedicine is best understood as a health-system service strategy rather than as a stand-alone platform. Its strongest contribution is the redistribution of access: selected interactions can move away from place-based delivery, reducing travel and extending specialist expertise. However, this benefit is conditional on digital inclusion, pathway design, stakeholder capability and organisational integration. Technology adoption without those conditions can shift barriers from geography to connectivity, usability or workflow.

This finding is directly relevant to health-technology policy because it changes the decision from whether telemedicine should be adopted to where, for whom and under what conditions it creates value. Routine follow-up, monitoring, medication discussion, caregiver communication and specialist input are comparatively suitable for remote delivery, whereas complex assessment, changing cognition or function and examination-dependent care often require physical review [5,10,19-22].

4.2 Hybrid care as the strategic model for older adults

Hybrid care is the most defensible cross-cutting model because older adults vary in clinical complexity, digital capability and support needs. A hybrid pathway allows channel choice to follow clinical task, safety and patient preference while preserving physical access for patients who cannot use remote channels safely or effectively. It also reduces the risk that digital transformation becomes a mechanism of exclusion.

For policy-makers, the relevant unit of design is therefore the care pathway rather than the virtual consultation. Pathway mapping should identify which activities can move online, what triggers escalation, who owns remote information and how face-to-face capacity is reallocated. Selective scale is preferable to universal digital substitution because it links technology use to demonstrable service value rather than to adoption volume.

4.3 Health technology assessment, economics and performance indicators

The evidence also supports a broader approach to health technology assessment. Evaluation should include access, equity, cost, quality, workforce effects, usability, interoperability and continuity. A programme that increases virtual activity while increasing hidden labour, failed connections or exclusion may not represent effective technology adoption even when consultation volumes rise.

Economic assessment should be conducted at pathway level. Patient travel, caregiver time and transport costs can be meaningful even when provider savings are modest [6,8,23]. Conversely, provider costs may rise when telemedicine is layered onto existing processes without removing unnecessary work. Business cases should therefore include implementation and recurring technology costs, staff time, technical support, integration, capacity released and downstream utilisation rather than assuming that a virtual contact is inherently cheaper.

4.4 Stakeholder engagement, interoperability and implementation governance

Stakeholder engagement is a core implementation variable. Older-adult acceptance depends on perceived usefulness, ease of use, trust and support [7,19], while professional adoption depends on workflow fit, organisational support and confidence in

the model of care [9,26]. Co-design with patients, caregivers, clinicians and administrative staff can identify accessibility and workflow problems before scale.

Interoperability should be treated as a governance and procurement requirement rather than a technical preference. Fragmented digital systems can create duplicate documentation, unclear accountability and loss of continuity [10,24]. Policy and purchasing specifications should therefore require integration with the main clinical record, scheduling and reporting systems, while governance should define ownership of remote data and escalation responsibilities.

4.5 Relevance to Brazil and comparable health systems

Brazil illustrates both the potential and the constraints of telemedicine. Formal regulation creates an enabling legal environment, but regional differences in connectivity, specialist availability and organisational capability mean that implementation cannot be standardised by technology alone [14-18]. Telemedicine is more likely to improve equity when it is anchored in primary care, supported institutionally and linked to structured referral and teleconsultation pathways [14-16].

The same policy lesson extends beyond Brazil. Health systems facing ageing populations, workforce shortages and geographic inequality need technology strategies that preserve access while managing implementation capacity. Developing-country evidence reinforces the importance of planning, training, workflow redesign and infrastructure [25]. Thus, national regulation and digital investment should be accompanied by local service capability, interoperability standards and outcome-based monitoring.

5. IMPLICATIONS FOR HEALTH POLICY AND TECHNOLOGY

5.1 Policy-makers and health-system leaders

Policy-makers should avoid treating telemedicine volume as an end point. National and organisational strategies should define minimum requirements for accessibility, interoperability, privacy, clinical accountability, technical support and physical alternatives. Funding and reimbursement should support pathway redesign and integration rather than simply reward the number of virtual contacts.

A balanced performance dashboard should combine access, equity, operational, quality, experience and economic indicators. Examples include waiting time, specialist reach, travel avoided, referral completion, failed connections, channel switching, staff time, cost per episode, capacity released, escalation, readmission, patient/caregiver experience and digital exclusion. Monitoring these measures over time allows decision-makers to distinguish sustainable technology diffusion from superficial adoption.

5.2 Providers and workforce leaders

Providers should begin with patient and pathway segmentation. Routine follow-up, symptom monitoring, education, medication review and caregiver communication are reasonable candidates for virtual care when patient capability is adequate. Services should quantify both physical capacity released and new digital work created, because unmeasured technical and documentation tasks can undermine efficiency.

Workforce preparation should extend beyond platform training. Clinicians and administrative staff need competencies in virtual communication, patient selection, documentation, escalation and management of technology-related failure. Professional acceptance should be monitored as a signal of workflow quality and organisational readiness rather than interpreted simply as willingness or resistance to innovation.

5.3 Technology providers and procurement

Technology providers should support accessible design, low-friction connectivity, integration with core clinical systems and reliable reporting. For older adults, usability should account for sensory, cognitive and literacy needs. Procurement should evaluate not only feature sets but also interoperability, identity management, technical support, data governance, implementation burden and the ability to generate indicators required for health-system evaluation.

Table 5. Evidence synthesis and implications for health-policy and technology decisions

Policy domain	Evidence pattern	Principal risk	Recommended action
Access	Reduced travel and stronger specialist reach in suitable pathways [3-6,14]	Digital access may not translate into completed care	Integrate telemedicine with local care; track waiting, referral completion, specialist reach and travel avoided.
Equity	Benefits vary by literacy, devices, connectivity, sensory/cognitive capacity and support [2,7,11-13,20]	Digital exclusion may widen existing inequalities	Provide assisted access, accessible design and non-digital alternatives; monitor failed connections and channel switching.
Economics	Potential savings are context specific [8,23]	Implementation and hidden labour costs may be omitted	Use pathway-level economic cases including technology, support, staff time, patient burden and capacity released.
Stakeholder adoption	Usefulness, usability, trust and workflow fit influence uptake [7,9,19,21,26]	Low acceptance can produce underuse or parallel work	Co-design pathways, train staff and monitor patient/caregiver and workforce experience.
Implementation	Interoperability, training and organisational readiness shape outcomes [10,24,25]	Fragmented systems can duplicate work and weaken continuity	Require integration with core records, clear escalation and ongoing technical support.
Governance	Regulation enables but does not operationalise safe scale [17,18]	Unclear accountability can fragment care	Define consent, privacy, documentation, ownership of remote data, escalation and performance review.
Sustainability	Hybrid care is more defensible than universal substitution [5,10,20-22]	Volume targets may drive inappropriate substitution	Scale selectively where value is demonstrated and retain physical care for examination, complexity and preference.

6. STRENGTHS AND LIMITATIONS

This review integrates older-adult clinical-service evidence with digital-equity, implementation, economic and policy evidence in a single framework that is directly relevant to technology adoption and health-system decision-making. The evidence window extends through August 2026 and includes recent work on cost-effectiveness, geriatric assessment, sociotechnical implementation, digital equity, implementation architecture and health-service management [8,10-13,20,23-26]. The analytical distinction between peer-reviewed evidence and regulatory context also reduces the risk of treating policy description as proof of effectiveness. Several limitations remain. First, the evidence base is heterogeneous in design, intervention, population and outcome, which precluded meta-analysis and limits direct comparison of effect magnitude. Second, the archived search record did not preserve the original database-export files or initial record counts. Consequently, Figure 1 begins with the verified 26-record candidate corpus and does not claim unobserved identification numbers. This improves transparency but limits full reproducibility of the earliest search stage. Third, the review includes both evidence syntheses and primary studies, creating potential overlap in the underlying evidence base; findings were therefore interpreted by convergence and context rather than treated as independent effect estimates. Finally, direct evidence on provider productivity and long-term economic outcomes remains less developed than evidence on access, acceptance and implementation.

4. CONCLUSION

Telemedicine can contribute to sustainable older-adult care when it is embedded in health-service pathways rather than deployed as a stand-alone technology. The most consistent benefits are improved specialist reach, reduced travel burden and additional options for routine follow-up, monitoring and caregiver communication. These benefits are conditional on patient capability, digital inclusion, stakeholder acceptance, workforce readiness, technical support and interoperability. The central policy challenge is not adoption alone but safe and equitable integration. Health-system leaders should use pathway-level economic assessment, explicit governance, interoperable information systems and balanced indicators that capture access, equity, quality, experience, workload and cost. Technology volume should not substitute for evidence of service value. For older adults, selective hybrid care is the most defensible strategy. Virtual channels should be used where they reduce burden and preserve quality, while face-to-face care remains available for examination, complex assessment and patients who cannot use digital pathways safely or effectively. Future research should compare alternative hybrid-care models using consistent measures of operating cost, workforce impact, equity and long-term service value.

ACKNOWLEDGEMENTS

The authors acknowledge the academic and institutional support provided by the Professional Master's Programme in Administration (PMPA), Universidade do Contestado (UNC), Campus Mafra, Brazil, during the development of this systematic narrative review.

AUTHOR CONTRIBUTIONS

Valéria Panigada: Conceptualization, Methodology, Literature Search, Data Curation, Formal Analysis, Investigation, Writing – Original Draft, and Manuscript Preparation.

Renato da Costa dos Santos: Conceptualization, Methodology, Supervision, Validation, Critical Review, and Writing – Review & Editing.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

ETHICS STATEMENT

Not required because this systematic review used previously published literature and did not involve human participants or identifiable personal data.

DATA AVAILABILITY STATEMENT

All evidence analysed in this review is derived from publicly available published sources identified in the reference list.

FUNDING

The authors received no specific funding for this study.

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Natural Resources for Human Health
eISSN: 2583-1194

APPENDICES

Supplementary Table S1. Design-specific critical appraisal and provisional interpretive confidence of the included peer-reviewed evidence

Study	Study design	Appraisal framework	Key appraisal domains	Overall judgement
[1]	Scoping review of systematic reviews	JBI-aligned review appraisal	Search transparency; eligibility; study selection; synthesis coherence	Moderate confidence
[2]	Digital-health review/perspective	Design-appropriate appraisal	Source transparency; evidence support; relevance	Moderate confidence
[3]	Scoping review	JBI-aligned review appraisal	Search strategy; eligibility; screening; synthesis	Moderate confidence
[4]	Systematic review	JBI systematic-review checklist	Search; selection; appraisal; synthesis	Higher confidence
[5]	Systematic mixed-studies review	JBI-aligned review appraisal	Search; mixed-study handling; synthesis	Higher confidence
[6]	Qualitative study	JBI qualitative checklist	Sampling; congruity; data collection; interpretation	Moderate confidence
[7]	Technology-acceptance study	JBI analytical cross-sectional checklist	Sampling; measurement; confounding; analysis	Moderate confidence
[8]	Systematic review	JBI systematic-review checklist	Search; appraisal; economic interpretation; synthesis	Higher confidence
[9]	Systematic review	JBI systematic-review checklist	Search; selection; appraisal; synthesis	Higher confidence
[10]	Systematic review	JBI systematic-review checklist	Search; SEIPS application; appraisal; synthesis	Higher confidence
[11]	Systematic qualitative review	JBI systematic-review checklist	Search; appraisal; qualitative synthesis	Higher confidence
[12]	Scoping review	JBI-aligned review appraisal	Search; eligibility; synthesis; policy interpretation	Moderate confidence
[13]	Scoping review	JBI-aligned review appraisal	Search; selection; synthesis	Moderate confidence
[14]	Prospective multicentre study	JBI cohort/service-evaluation domains	Sampling; exposure/intervention; outcomes; follow-up	Higher confidence
[15]	Cross-sectional study	JBI analytical cross-sectional checklist	Sampling; measurement; confounding; analysis	Moderate confidence
[16]	Health-system analysis	Design-appropriate appraisal	Data sources; analytical transparency; interpretation	Moderate confidence
[18]	Health-system/context study	Design-appropriate appraisal	Evidence base; transparency; policy interpretation	Moderate confidence
[19]	Qualitative study	JBI qualitative checklist	Sampling; congruity; analysis; interpretation	Moderate confidence
[20]	Scoping review	JBI-aligned review appraisal	Search; selection; mapping; synthesis	Moderate confidence
[21]	Systematic review	JBI systematic-review checklist	Search; selection; appraisal; synthesis	Higher confidence
[22]	Systematic review of RCTs	JBI systematic-review checklist	Search; RCT appraisal; synthesis; conclusions	Higher confidence
[23]	Scoping review of economic evaluations	JBI-aligned review appraisal	Search; economic evidence selection; synthesis	Moderate confidence

[24]	Rapid umbrella review	JBI umbrella-review domains	Search; review selection; overlap; synthesis	Higher confidence
[25]	Systematic review	JBI systematic-review checklist	Search; selection; appraisal; synthesis	Higher confidence
[26]	Healthcare-management study	Design-appropriate appraisal	Sampling; measurement; analysis; interpretation	Moderate confidence