

# Equitable Cancer Outcomes for Rural and Remote Communities

## Implementation strategies for evidence-based healthcare interventions in rural and remote settings: a scoping review



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### Summary

Globally, people living in rural and remote areas experience poorer healthcare access and outcomes than urban populations. Applying implementation strategies that support the translation of evidence-based healthcare interventions may help reduce these inequities; however, real-world implementation is complex, and it remains unclear how strategies are applied and tailored to rural and remote contexts. This scoping review synthesised evidence on implementation strategies for healthcare interventions in rural and remote settings of high-income countries. Five databases (Ovid MEDLINE, Embase, Cochrane CENTRAL, CINAHL, Web of Science) were searched for peer-reviewed studies published between 1/1/2000 and 25/10/2024. Extracted data were synthesised using a descriptive narrative approach. From 11,887 records, 78 papers (75 studies) met inclusion criteria. Implementation efforts were multifaceted, commonly drawing on strategies from three Expert Recommendations for Implementing Change clusters: *train and educate stakeholders* (n = 70, 93%), *use evaluative and iterative strategies* (n = 55, 73%), and *develop stakeholder interrelationships* (n = 48, 64%). Few studies (n = 21; 28%) reported rural-specific design features. Although implementation in rural and remote contexts has focused on provider-level strategies, there is a need to also address system-level determinants to implementation. Context-specific design, meaningful engagement with

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local communities and stakeholders, and clearer reporting are essential to optimise implementation and reduce rural-urban health disparities.

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### Research in context

#### Evidence before this study

Prior research has documented implementation efforts within individual studies; however, no comprehensive synthesis exists on how implementation strategies have been applied, designed, or reported in rural and remote healthcare settings. As a result, it remains unclear to what extent implementation efforts have accounted for the unique characteristics of rural and remote contexts.

#### Added value of this study

This scoping review is the first to synthesise evidence on implementation strategies for healthcare interventions in rural and remote settings of high-income countries. Across 75 included studies, implementation efforts were multifaceted and heavily relied on provider-focused approaches such as education, training, and evaluative strategies. Emerging evidence of rural-specific tailoring of implementation strategies was identified, despite few studies

explicitly reporting design features linked to rural and remote contexts. By mapping strategies and highlighting gaps in rural-specific tailoring and reporting, this review advances understanding of how implementation has been performed in these contexts.

#### Implications of all the available evidence

Although implementation has largely focused on provider-level strategies, there is a vital need to also address system-level determinants and actively involve rural and remote communities and services in the co-design of implementation efforts. Strengthening implementation will require context-specific design, partnership with local stakeholders, and clearer reporting. Such approaches are essential to improve intervention effectiveness and reduce the persistent gap in healthcare access and outcomes between rural and urban populations.

## Introduction

Globally, populations residing in rural and remote communities experience marked, persistent disparities in health access and outcomes compared to their urban counterparts.<sup>1,2</sup> Sparse population distributions over large geographical landmasses make the delivery of healthcare challenging in these contexts.<sup>3,4</sup> A maldistribution of the health workforce across rural and remote areas, in addition to other systemic factors, contributes to inequity and adds to the complexity of implementing evidence-based interventions.<sup>2,4,5</sup>

Effective implementation of evidence-based healthcare interventions—broadly defined as the evidence-based practice, program, policy, process, or guideline recommendation(s) being implemented<sup>6</sup>—is necessary for improving healthcare quality and outcomes, including for rural and remote populations.<sup>7</sup> Over the past two decades, research examining how to translate evidence-based interventions into practice has increased substantially.<sup>8</sup> Yet, implementation is a complex process, and in many cases, effective interventions are not adopted, implemented, or sustained.<sup>9</sup> Given the chronic workforce and health inequity challenges in rural and remote healthcare settings,<sup>5,10</sup> the uptake and integration of evidence-based interventions is even more complex.<sup>11</sup>

Implementation strategies encompass the methods and techniques used to enhance the adoption,

implementation, and sustainability of evidence-based interventions.<sup>12</sup> The Expert Recommendations for Implementing Change (ERIC) compilation<sup>13</sup> offers a comprehensive framework to categorise these strategies, facilitating standardised description, comparison, and evaluation. The compilation comprises 73 discrete implementation strategies, which have been categorised into nine clusters: *use evaluative and iterative strategies, provide interactive assistance, adapt and tailor to context, develop stakeholder interrelationships, train and educate stakeholders, support clinicians, engage consumers, utilise financial strategies, and change infrastructure*.<sup>14</sup> To date, it remains unclear how ERIC-defined strategies are being applied in rural and remote healthcare contexts. Furthermore, there is limited understanding of how implementation strategies are designed to meet the distinct needs of rural and remote healthcare settings.

Previous reviews have documented the barriers and facilitators to implementation in rural healthcare settings<sup>15</sup> and examined the application of theories, models, and frameworks in rural health research.<sup>16</sup> However, no synthesis efforts have systematically identified the implementation strategies being applied in rural and remote healthcare settings, nor summarised the outcomes used to evaluate implementation efforts. This knowledge gap is important, given that the ‘how’ of implementation—the strategies designed to

effect behavioural and organisational change—is critical to bridging the research-to-practice divide and improving health equity.<sup>17</sup> To address this, a scoping review was undertaken to synthesise the available evidence relating to implementation strategies for evidence-based healthcare interventions in rural and remote areas of high-income countries. The review was limited to high-income contexts because variations in health system structures, infrastructure, workforce, and policy environments between high- and low-income countries markedly influence how implementation occurs.<sup>18</sup> Specific objectives were to:

- (1) describe the characteristics of studies applying implementation strategies for evidence-based interventions in rural and remote healthcare settings.
- (2) identify the implementation strategies being used and determine if and how they were designed for the rural and remote context.
- (3) document the outcomes used to report on the implementation of evidence-based healthcare interventions in rural and remote settings.

While this review is part of a broader series on equitable cancer care in rural and remote areas, the scope was intentionally expanded to encompass all healthcare interventions, generating key insights applicable across diverse rural and remote settings.

## Methods

This scoping review was conducted in accordance with Joanna Briggs Institute (JBI) methodology<sup>19</sup> and reported following the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) guidelines.<sup>20</sup> The protocol was prospectively registered on Open Science Framework (<https://doi.org/10.17605/OSF.IO/NX8ZG>). A scoping review methodology was selected due to the exploratory focus of the review, which aimed to understand the breadth of evidence and identify gaps regarding implementation strategies in rural and remote healthcare contexts.

## Search strategy

Studies were identified through searching Ovid MEDLINE, Embase (Elsevier), Cochrane CENTRAL, CINAHL (EBSCOhost), and Web of Science (Clarivate). The search strategy comprised controlled vocabulary and free-text terms for the following concepts: rural and remote healthcare, implementation, and intervention. The search was limited to publications from January 1, 2000 onwards, coinciding with the formalisation of implementation science as a distinct discipline in the early 2000s,<sup>8</sup> and the subsequent development of implementation frameworks and taxonomies (including the ERIC compilation,<sup>13</sup> published 2015) used in this

review for systematic coding of strategies. The search was current as of 25 October 2024. The search strategy is presented in [Table S1](#). A librarian with expertise in systematic searching reviewed the search strategy and its translation across databases. All records were imported into EndNote (Clarivate), and duplicate records were identified and removed using the SRA DeDuplicator tool.<sup>21</sup> Additional deduplication occurred when the records were imported into Covidence (Veritas Health Innovation, Melbourne, Australia) for screening.

## Eligibility criteria

Studies were included in this review if they met the eligibility criteria outlined in [Table 1](#).

## Study selection and data extraction

A single reviewer (HB) undertook the initial screening in EndNote using title text mining to exclude clearly ineligible studies, such as those conducted in non-OECD countries or involving animal subjects (e.g., mice). The remaining records were imported into Covidence. Each record was screened in a standardised manner by two reviewers independently (from AC, HB, CW, AU, AWS, EAJ, HJ, RJB, SR, and CES). Records were screened based on title and abstract, and then full text. Disagreements between reviewers were resolved through discussion (AC, HB). Reasons for exclusion at the full-text stage were documented.

## Data extraction

One reviewer (CJG) extracted data from included studies using a standardised Microsoft Excel template. A second reviewer (AC) checked the extracted data for accuracy and completeness by checking extractions against the original studies. Discrepancies were resolved through discussion between reviewers, with consultation of a third reviewer when consensus could not be reached. Extracted variables encompassed study characteristics (e.g., country, clinical setting, rurality classification, health condition or area of focus, and study design), intervention description, implementation strategies, adaptations of strategies for rural and remote settings, justifications for the implementation strategies, and intervention, service, and client outcomes.

## Data synthesis

Data were synthesised using a descriptive narrative approach, guided by the review objectives. Extracted data were managed and analysed in Microsoft Excel. Categorical data (e.g., country, clinical setting, and rurality classification) were grouped (where appropriate) and presented in frequency tables. Rurality classifications were extracted and reported as described by the authors of included studies. Health conditions were categorised using International Classification of Diseases 11th Revision codes.<sup>23</sup> Implementation theories, models, and frameworks were classified

Criteria	Inclusion	Exclusion
Population	Human populations across the lifespan residing in rural and/or remote settings as defined by study authors.	Human populations residing in metropolitan, urban, or non-rural/remote settings.
Concept	Implementation strategies for interventions explicitly described by study authors as evidence-based, defined as: <ul style="list-style-type: none"> <li>• Clinical practice guidelines</li> <li>• Established models of care referenced to evidence or policy</li> <li>• Healthcare interventions with reference to research evidence</li> </ul> Interventions delivered by regulated health professionals (i.e., physicians, nurses, allied health professionals, pharmacists, licenced healthcare providers) or healthcare support workers under professional supervision. Interventions addressing any health condition or chronic disease risk factor.	Interventions without explicit author designation as evidence-based or reference to guidelines/research. Informal care models: care provided by family members, volunteers, or community members outside formal healthcare systems. Unstructured health programs: activities without defined protocols, standardised procedures, or systematic delivery approaches. Interventions delivered solely by individuals without healthcare credentials. Interventions not addressing health conditions or disease risk factors.
Context	Rural and/or remote settings, as defined by study authors (a formal geographical classification system not mandatory). High-income countries (OECD) <sup>22</sup> . Healthcare settings: primary care, First Nations health organisations, community health services, residential aged care, hospitals (inpatient/outpatient), admitted home-based care. Original research: case studies, qualitative, quantitative, mixed-methods. Published from 1 January 2000 onwards. Published in English.	Settings described as metropolitan, urban, regional, or non-rural. Implementation strategies not applied to rural/remote contexts. Low- and middle-income countries (non-OECD). Non-healthcare settings: schools, workplaces, community organisations, home-based screening interventions. Publication types: Opinion pieces, editorials, grey literature reports, unpublished theses, commentaries, study protocols, book chapters, conference abstracts or posters, systematic or literature reviews.

Note: OECD, Organisation for Economic Co-operation and Development. <sup>22</sup>The OECD is an international organisation of 38 member countries committed to democracy and market economy, working together to promote policies that improve economic and social well-being. These nations represent economically similar high-income countries with comparable healthcare systems and data collection capabilities.

**Table 1: Eligibility criteria according to the Population, Concept, and Context (PCC) framework.**

according to established typologies that focus on their function (e.g., determinant framework, process model, evaluation framework, strategy framework).<sup>24,25</sup> Implementation strategies were mapped to the 73 strategies in the ERIC compilation<sup>13</sup> and further categorised according to Waltz et al.'s nine strategy clusters.<sup>14</sup> Subsequently, data on how strategies were designed for rural and remote settings were thematically analysed then presented as frequencies. Reported outcomes were coded using Proctor's Implementation Outcomes Framework.<sup>26</sup> All coding and mapping of implementation theories, models, and frameworks, as well as implementation strategies and outcomes were initially completed by one reviewer (CJG) and subsequently checked by a second reviewer with expertise in implementation science (AC).

## Results

### Search results

Electronic database searches yielded 11,887 records, of which 5639 were duplicates (Fig. 1). Following the exclusion of records during text mining (n = 2223 records), title and abstract screening (n = 3726), and full text assessment (n = 299), 78 papers reporting on 75 studies were included in this review.

Results are presented in line with the review objectives: (1) to describe the characteristics of studies applying implementation strategies in rural and remote healthcare settings; (2) to examine how these strategies were applied and designed for the rural and remote context; and (3) to document the outcomes reported in the included studies.

### Study characteristics

The characteristics of the included studies are provided in Table S2, with a summary presented in Table 2. Publications in this area have increased markedly since 2000, with two thirds of included studies published between 2016 and 2024 (n = 50, 66.7%). Most included studies were conducted in the United States (n = 53, 70.7%), with many studies also conducted in Australia (n = 15, 20.0%). Although the authors described the implementation contexts as rural and/or remote, epidemiological rurality classification systems defining rurality status and/or geographical remoteness were reported for only 17 studies (22.7%). Healthcare settings where implementation occurred were mainly primary care (n = 37, 49.3%) and hospitals (n = 20, 26.7%). Interventions targeted a diverse range of health conditions and risk factors, with cardiovascular disease (n = 10, 13.3%), cancer (n = 8, 10.7%), and diabetes (n = 8, 10.7%) the most common. Over half the studies utilised pre-post designs (n = 42, 56.0%) or pre-post designs with non-equivalent controls (n = 4, 5.3%). The most common types of healthcare interventions were focused on treatment/management (n = 29, 38.7%), screening/assessment (n = 20, 26.7%), and guidelines (n = 14, 18.7%). Few studies reported applying an implementation theory, model, or framework to guide an aspect of their implementation (17.3%), with process models the most commonly applied (n = 5, 6.7%).

### Application of implementation strategies

For each study, the implementation strategies and their coding to the ERIC strategies are provided in Table S3.

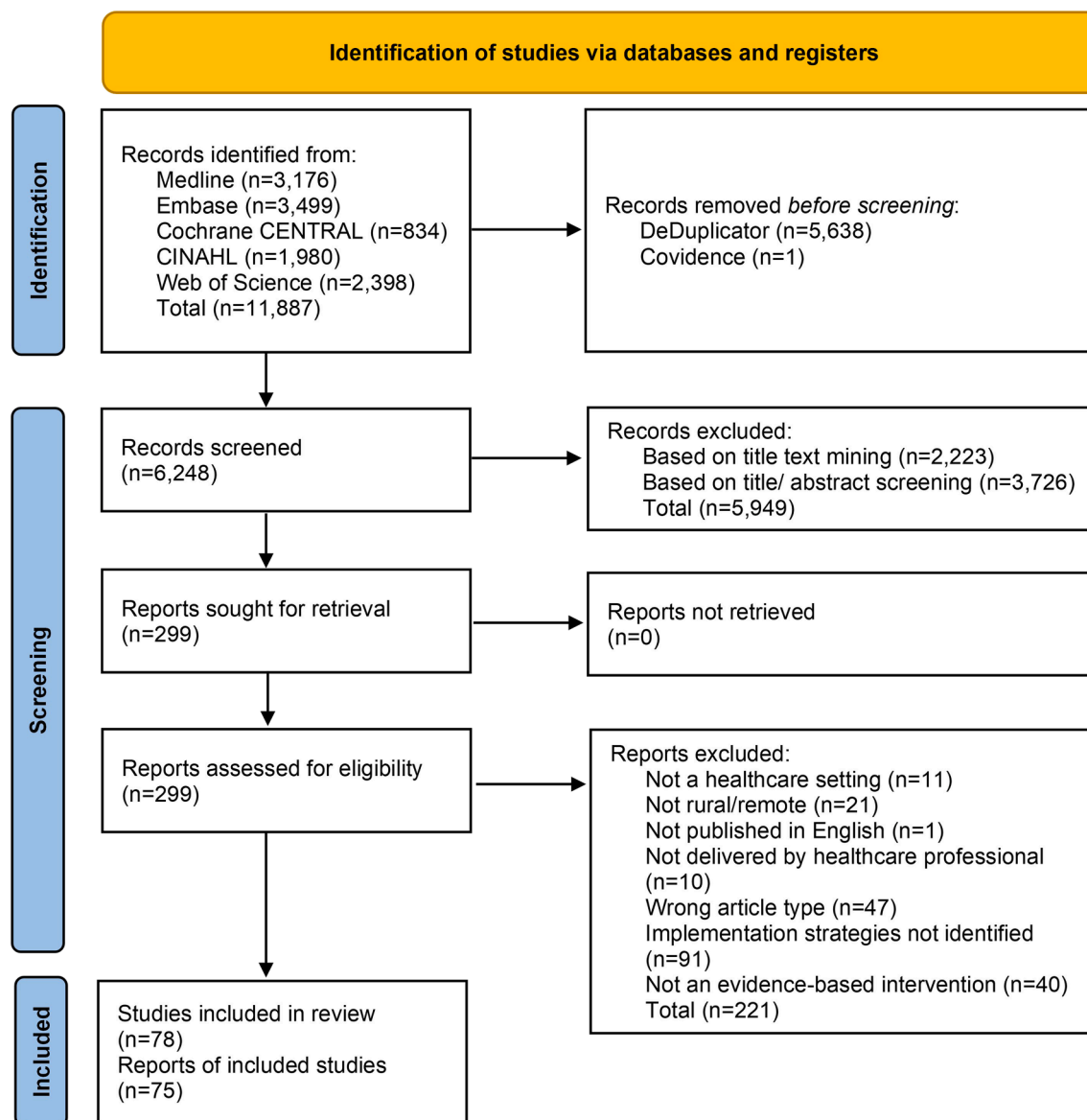


Fig. 1: PRISMA flow diagram of the literature search and study selection.

Between 1 and 14 unique ERIC strategies were identified in each of the studies (mean = 6.5 strategies, SD 3.1). Table 3 contains the ten most frequently identified discrete implementation strategies, as coded to the ERIC compilation.<sup>13,14</sup> The three most reported strategies were from the *train and educate stakeholders* cluster, with *conduct educational meetings* evident in over half the studies (n = 47, 62.7%).

Frequency of ERIC strategy clusters across studies, and the mean number of individual strategies used in each cluster are provided in Table 4. Strategies from the *train and educate stakeholders* cluster were used in almost all studies (n = 70,

93.3%). Strategies from an additional two clusters (*use evaluative and iterative strategies*, and *develop stakeholder interrelationships*) were used in over half the studies. When strategies from these three clusters were used, it was common for studies to use more than one strategy from the same cluster (Table 4). Across studies, strategies from between one and seven of the nine ERIC clusters were identified (mean = 3.7 clusters, SD 1.3). Strategies from within all three of these clusters (*train and educate stakeholders*, *use evaluative and iterative strategies*, *develop stakeholder interrelationships*) were used together in almost half the studies (n = 35, 46.7%).

Characteristic	Number of studies (%)
<i>Publication year</i>	
2001–2005	5 (6.7%)
2006–2010	8 (10.7%)
2011–2015	12 (16.0%)
2016–2020	25 (33.3%)
2021–2024	25 (33.3%)
<i>Country</i>	
United States	53 (70.7%)
Australia	15 (20.0%)
Canada	4 (5.3%)
Greece	1 (1.3%)
South Korea	1 (1.3%)
Spain	1 (1.3%)
<i>Rural classification</i>	
Not reported	58 (77.3%)
Rural-Urban Commuting Area (RUCA) codes <sup>27,28</sup>	6 (8.0%)
Australian Statistical Geography Standard (ASGS)–Remoteness Area <sup>29</sup>	3 (4.0%)
Frontier status	2 (2.7%)
Other standard definitions	6 (8.0%)
<i>Clinical setting</i>	
Primary care	37 (49.3%)
Hospitals	20 (26.7%)
Multiple types of settings	8 (10.7%)
Outpatient clinics	4 (5.3%)
Communities	3 (4.0%)
Private homes	2 (2.7%)
Aged care	1 (1.3%)
<i>Health condition focus</i>	
Cardiovascular diseases	10 (13.3%)
Cancer	8 (10.7%)
Diabetes	8 (10.7%)
Obesity	3 (4.0%)
Metabolic syndrome	1 (1.3%)
Opioid use disorder	4 (5.3%)
Dementia	2 (2.7%)
Other mental, behavioural or neurodevelopmental disorders	6 (8.0%)
Stroke	2 (2.7%)
Chronic obstructive pulmonary disease	1 (1.3%)
Asthma	5 (6.7%)
Lung infections	2 (2.7%)
Pain	4 (5.3%)
Viruses	2 (2.7%)
Other or multiple health conditions	4 (5.3%)
Vaccinations	2 (2.7%)
Falls in healthcare settings	3 (4.0%)
Clinical care/medical interventions	6 (8.0%)
Other	2 (2.7%)
<i>Study design</i>	
Pre-post	42 (56.0%)
Post-implementation only	12 (16.0%)
Case study	4 (5.3%)
Pre-post with non-equivalent control	4 (5.3%)
Time series	4 (5.3%)
Cluster randomised trial	4 (5.3%)

(Table 2 continued on next column)

Characteristic	Number of studies (%)
(Continued from previous column)	
Randomised controlled trial	1 (1.3%)
Delayed treatment, pre-post	1 (1.3%)
Other <sup>a</sup>	3 (4.0%)
<i>Intervention type</i>	
Treatment/management	29 (38.7%)
Screening/assessment	20 (26.7%)
Guidelines	14 (18.7%)
Models of care	5 (6.7%)
Clinical care pathways	3 (4.0%)
Prevention	2 (2.7%)
Vaccination	2 (2.7%)
<i>Implementation theory, model, or framework</i>	
Process model	5 (6.7%)
Determinant framework	3 (4.0%)
Evaluation framework	3 (4.0%)
Strategy framework	2 (2.7%)
Not reported	62 (82.7%)

<sup>a</sup>Other includes: prospective, multi-site formative implementation evaluation (n = 1); participatory design with a pilot randomised controlled trial (n = 1); Qualitative longitudinal process evaluation (n = 1).

**Table 2: Summary of characteristics of included studies.**

While Tables 3 and 4 summarise which implementation strategies were used, mapped to ERIC strategies and clusters, Table 5 presents the thematic analysis of how strategies were adapted for rural and remote contexts. In most studies (n = 54, 72.0%), it could not be determined from the strategy descriptions whether the implementation strategies had been designed specifically for rural or remote settings. Among the studies for which rural and remote design considerations were identified (n = 21, 28.0%), several themes were generated through the thematic analysis (Table 5). The most common were *online training and education* (n = 7, 9.3%), which leveraged web-based platforms, tele-education, and virtual learning networks to provide cost-effective, accessible education for rural clinicians,<sup>30–36</sup> and *tailoring of resources to local rural communities* (n = 6, 8.0%), which involved adapting materials to local languages, literacy levels, cultural norms, and rural service realities, including rural-specific case studies.<sup>37–42</sup>

Other features included *local workforce engagement* (n = 4, 5.3%) through recruitment of staff from within rural communities, including Indigenous health workers;<sup>37,39,43,44</sup> *interprofessional, peer, and workforce-wide learning approaches* (n = 3, 4.0%) such as extending training beyond physicians to support the broader rural health workforce;<sup>31,42,45</sup> *remote access to specialist support* (n = 3, 4.0%) utilising telehealth or virtual consultations to connect rural providers with off-site specialists<sup>46–48</sup>; and *standardised rural tools and protocols* (n = 3, 4.0%) tailored to address challenges such as low volume caseloads and high staff turnover.<sup>36,41,49</sup>

ERIC compilation implementation strategy <sup>13</sup>	ERIC strategy cluster <sup>14</sup>	Number of studies (%)
Conduct educational meetings	Train and educate stakeholders	47 (62.7%)
Distribute educational materials	Train and educate stakeholders	36 (48.0%)
Develop educational materials	Train and educate stakeholders	28 (37.3%)
Audit and provide feedback	Use evaluative and iterative strategies	27 (36.0%)
Use advisory boards and workgroups	Develop stakeholder interrelationships	26 (34.7%)
Assess for readiness and identify barriers and facilitators	Use evaluative and iterative strategies	22 (29.3%)
Conduct local consensus discussions	Develop stakeholder interrelationships	21 (28.0%)
Develop a formal implementation blueprint	Use evaluative and iterative strategies	20 (26.7%)
Conduct ongoing training	Train and educate stakeholders	19 (25.3%)
Conduct local needs assessment	Use evaluative and iterative strategies	18 (24.0%)

**Table 3: Ten most frequently reported implementation strategies, coded to the Expert Recommendations for Implementing Change (ERIC) compilation.**

Additional strategies included changing delivery sites to *mobile services* (n = 2; 2.7%) to overcome transportation and access barriers;<sup>37,44</sup> *onsite facilitation by external experts* (n = 1; 1.3%);<sup>38</sup> *periodic training for skill maintenance* in low-volume settings (n = 1; 1.3%);<sup>50</sup> *role optimisation and task sharing* to maximise workforce capacity (n = 1; 1.3%)<sup>45</sup>; and utilisation of *special funding mechanisms* like public–private partnerships (n = 1; 1.3%).<sup>45</sup>

ERIC strategy cluster <sup>14</sup>	Number of studies (%)	Mean number of strategies (SD) <sup>a</sup>
Train and educate stakeholders	70 (93.3%)	2.37 (1.19)
Use evaluative and iterative strategies	55 (73.3%)	2.22 (1.36)
Develop stakeholder interrelationships	48 (64.0%)	1.77 (0.94)
Support clinicians	29 (38.7%)	1.14 (0.34)
Utilise financial strategies	20 (26.7%)	1.15 (0.36)
Change infrastructure	20 (26.7%)	1.10 (0.30)
Adapt and tailor to context	17 (22.7%)	1.00 (0.00)
Engage consumers	11 (14.7%)	1.00 (0.00)
Provide interactive assistance	9 (12.0%)	1.00 (0.00)

Note: SD, standard deviation. <sup>a</sup>Mean (SD) number of strategies per ERIC cluster, calculated among studies that employed one or more strategies within that cluster.

**Table 4: Frequency of reported implementation strategies organised into the Expert Recommendations for Implementing Change (ERIC) clusters, and mean number of strategies used per cluster.**

## Outcome reporting

When coded to Proctor's Implementation Outcomes Framework, almost all studies reported outcomes that mapped to at least one implementation, service, or client outcome (n = 72, 96%; Table 6, Tables S4–S6). Implementation outcomes were the most frequently reported (n = 69, 92%), followed by client outcomes (n = 31, 41.3%), and service outcomes (n = 16, 21.3%). Within implementation outcomes, adoption was the most prevalent outcome, reported in nearly three-quarters of included studies (n = 55, 73.3%). Other implementation outcomes—acceptability, feasibility, costs, sustainability, appropriateness, and fidelity—were reported in less than a fifth of studies; no studies assessed outcomes that mapped to penetration (defined as the integration of a practice within a service setting and its subsystems). When reported, client outcomes (n = 31, 41.3%) most often addressed function (n = 20, 26.7%) and satisfaction (n = 14, 18.7%), whereas service outcomes were infrequently reported (n = 16, 21.3%).

## Discussion

This review provides a comprehensive synthesis of implementation strategies employed to support healthcare professionals delivering interventions in rural and remote settings in high-income countries. Across the included studies, implementation efforts were multifaceted, commonly drawing on strategies from three ERIC clusters: *train and educate stakeholders*, *use evaluative and iterative strategies*, and *develop stakeholder interrelationships*. The predominant use of education-focused strategies, alongside evaluative approaches such as audit and feedback, aligns with prior reviews of implementation research in other areas.<sup>51–53</sup> While these strategies remain important to address gaps in provider knowledge and performance, the dominance of such approaches in the literature indicates that implementation in rural and remote settings has largely been framed around provider-level barriers, with less attention to system-level determinants such as geographic vastness, workforce shortages, and funding constraints, which are particularly salient in these contexts.<sup>15</sup> This emphasis on provider-targeted behaviour change strategies may reflect the perception that these determinants are more readily modifiable within the constraints of funded research projects, whereas broader system-level factors (also referred to as Outer Setting constructs) are often seen as difficult to change and, consequently, are assessed less frequently.<sup>54</sup>

Strategies from within the *develop stakeholder interrelationships* cluster were reported in over half the studies, reflecting the important role that partnerships play in rural health research and practice. Partnerships are widely recognised in rural health policy as a core

Theme	Theme description	Rural/Remote Context Considerations	Number of studies (%)
Online training and education	Use of web-based training, tele-education strategies, and virtual learning networks to deliver cost-effective, accessible education for rural clinicians.	Overcoming geographic distance and isolation; cost-effectiveness compared to in-person training; accessibility for geographically dispersed workforce.	7 (9.3%)
Tailoring resources to local rural communities	Designing materials and resources to fit rural populations (languages, literacy, cultural norms) and rural providers (rural case studies, toolkits, availability of facilities and services).	Language diversity; literacy levels; cultural norms and values; limited availability of local facilities and services; rural-specific case studies and examples.	6 (8.0%)
Local workforce engagement	Engaging and hiring staff from local populations, including Indigenous staff, to build trust, cultural fit, and local workforce capacity.	Building trust and cultural fit with local communities; developing local workforce capacity; addressing workforce recruitment and retention challenges.	4 (5.3%)
Interprofessional, workforce-wide learning	Group-based, peer-to-peer, and interprofessional training strategies that support isolated rural clinicians and extend education beyond physicians to the broader rural healthcare workforce.	Supporting isolated rural clinicians through peer networks; extending education to address workforce limitations; maximising limited workforce capacity.	3 (4.0%)
Remote access to specialist support	Telehealth and virtual consultation models to connect rural clinicians with urban-based or off-site specialists.	Overcoming geographic distance to specialist services; addressing lack of on-site specialist expertise; reducing need for patient/provider travel.	3 (4.0%)
Standardised rural tools and protocols	Use of decision support tools, protocols, and forms adapted for rural healthcare delivery settings to address low-volume caseloads, workforce shortages, and staff turnover.	Addressing caseload volume and clinical exposure; managing workforce shortages and high staff turnover; supporting less experienced or isolated practitioners.	3 (4.0%)
Mobile services	Delivery of care via mobile units or in-home services to overcome transportation barriers and improve rural reach.	Overcoming transportation barriers; addressing large geographic distances; improving access for remote populations with limited mobility.	2 (2.7%)
Onsite facilitation by external experts	Visiting coaches or facilitators provide in-person training, coaching, or support to build local capacity.	Building local capacity where internal expertise is limited; providing hands-on support in resource-constrained settings; addressing isolation of rural practitioners.	1 (1.3%)
Periodic training for skill maintenance	Periodic retraining to maintain competencies in low-volume rural settings.	Addressing caseload volume where skills may deteriorate; maintaining competencies in infrequently performed procedures.	1 (1.3%)
Role optimisation and task sharing	Efficient use of workforce through enabling clinicians to more fully utilise their full scopes of practice and delegating appropriate tasks (including to support staff) to address rural workforce constraints.	Maximising limited workforce capacity; addressing workforce shortages and recruitment challenges; distributing workload across available staff.	1 (1.3%)
Special funding mechanisms	Leveraging specific funding models (e.g., public-private partnerships) to facilitate rural program delivery and access.	Addressing limited local funding and resources; facilitating program sustainability in under-resourced rural settings; supporting program delivery where traditional funding is insufficient.	1 (1.3%)
Not reported	No explicit details on how strategies were designed to fit the rural and remote healthcare context.	Not applicable.	54 (72.0%)

**Table 5: Themes and frequencies for how implementation strategies were designed for the rural and remote healthcare contexts.**

principle of effective and sustainable healthcare delivery.<sup>55</sup> The effective engagement of rural and remote stakeholders, including healthcare professionals, services and cross-sector partners, is essential to build trust, foster buy-in, and support more equitable outcomes, and should therefore be considered in all place-based healthcare research.<sup>56</sup> A strong focus on forging deep, sustained, and diverse relationships within and across rural healthcare services represents an important opportunity for strengthening implementation in these contexts.

Findings also highlight the relatively low reported engagement of patients, carers, and community members, as evidenced by only 14.7% of studies reporting strategies from the *engage consumers* cluster. This represents a significant gap, particularly in rural and remote settings, where strong social connectedness and community ties make consumer perspectives essential for culturally relevant, acceptable, and sustainable

implementation.<sup>57,58</sup> Evidence from a recent systematic review shows that involving rural communities in healthcare decisions, particularly with high-level partnership approaches (consumer-led, partnership, and involving), leads to better physical health outcomes, stronger connections between researchers and communities, and fairer healthcare access.<sup>58</sup>

A key finding of this review was the emerging evidence of rural-specific tailoring of implementation strategies, although a critical concern is that few studies explicitly reported design features linked to rural and remote contexts. While 28% of studies described rural-focused features—such as tele-education for geographically dispersed clinicians, tailoring resources to suit local communities and populations, engaging the local workforce to build trust and capacity, or adapting tools and protocols for lower-volume rural settings—most studies did not explain or justify their design choices in relation to rural-specific needs.

Outcomes coded to Proctor's IOF <sup>26</sup>	Number of studies (%)
<i>Implementation outcome</i>	
Acceptability	14 (18.7%)
Adoption	55 (73.3%)
Appropriateness	4 (5.3%)
Costs	11 (14.7%)
Feasibility	13 (17.3%)
Fidelity	1 (1.3%)
Penetration	0 (0.0%)
Sustainability	6 (8.0%)
Any implementation outcome	69 (92.0%)
<i>Service outcome</i>	
Efficiency	8 (10.7%)
Effectiveness	4 (5.3%)
Safety	3 (4.0%)
Equity	1 (1.3%)
Timeliness	1 (1.3%)
Patient-Centredness	0 (0.0%)
Any service outcome	16 (21.3%)
<i>Client outcome</i>	
Function	20 (26.7%)
Symptomatology	7 (9.3%)
Satisfaction	14 (18.7%)
Any client outcome	31 (41.3%)
<i>Any outcome</i>	72 (96.0%)

**Table 6: Number of studies reporting implementation, service, and client outcomes, coded to Proctor's Implementation Outcome Framework (IOF).**

Additionally, only 4% of studies grounded their selection of implementation strategies in determinant frameworks or theory-informed context assessments, representing a missed opportunity to systematically select and tailor strategies to the factors influencing rural healthcare implementation. Barriers to the use of implementation science frameworks may include perceived complexity, limited local expertise, and resource constraints<sup>39</sup>; addressing these through simplified or adaptable frameworks, practical guidance, and capacity-building could enhance uptake. Further, several studies reported using strategies such as preparing and using champions, or securing leadership buy-in, however, while these are broadly applicable, it was common for studies to not describe if or how they were adapted for rural and remote contexts. In the absence of such detail, it cannot be assumed that they were tailored to rural realities. This shortfall in reporting represents a significant limitation in the available literature, constraining the ability to determine whether and how strategies were designed to fit rural contexts, and limiting opportunities to learn from and build upon previous implementation research efforts. Without transparent reporting of context-specific design features, it is difficult to assess fidelity, feasibility, and transferability of strategies across diverse rural and remote healthcare settings. Furthermore,

when reporting does not clearly articulate rural-specific rationale, there is a risk that metropolitan-centric approaches are inappropriately transferred into rural and remote contexts. Without explicit consideration of rural and remote realities, implementation efforts risk not only inefficiency but futility, potentially reinforcing the inequities they aim to address.

This review also highlighted that the emerging use of digital platforms in the design of implementation strategies, such as online training and remote access to specialist support, provides promising avenues for overcoming geographic and resource barriers that are inherent in rural and remote settings. However, the gaps in the literature highlight the need for future research to rigorously evaluate the effectiveness, equity implications, and acceptability of digital-based implementation strategies across diverse rural settings.<sup>60</sup> Additionally, future implementation efforts in rural and remote areas could consider incorporating other design features identified in this review when designing or adapting implementation strategies for their given contexts, such as role optimisation and task sharing to address workforce challenges or leveraging specific funding models to facilitate rural program delivery and access. The design of such strategies should ideally be based on co-design principles that involve rural communities and healthcare providers to increase the likelihood that choices are culturally appropriate, feasible, and responsive to the needs of rural settings.<sup>61,62</sup>

Few included studies reported their implementation strategies or outcomes using established taxonomies or frameworks, necessitating extensive post-hoc coding by researchers with expertise in implementation science. While this approach added rigour, the extracted data remain constrained by the detail and quality of the original reports. Further, a clear indication of 'implementation success' was not possible in this review due to the diversity of interventions, study designs and health foci. Consistent with other implementation reviews,<sup>63,64</sup> adoption emerged as the most frequently reported outcome, with other implementation outcomes infrequently reported.

The infrequent reporting of sustainability (8.0%) represents a notable gap in the literature, as sustainability is a key outcome of the implementation process.<sup>65</sup> Among the six studies that did report on sustainability, findings included gradual declines in service delivery over time, interventions ending when funding ceased, and disruptions due to staff turnover. The limited attention to sustainability restricts understanding of how interventions can be maintained over time. Future implementation research in rural and remote settings should prioritise the systematic assessment and reporting of sustainability outcomes, including strategies to support long-term maintenance and the barriers and facilitators influencing sustained implementation.

Together, these observations underscore the urgent need for broader use of existing taxonomies (e.g., ERIC<sup>13</sup>), frameworks (e.g., Proctor's Implementation Outcomes Framework<sup>26</sup>), and reporting standards such as the StaRI framework<sup>6</sup> to support more comprehensive collection and reporting of implementation strategies and outcomes. Additionally, applying guidance from Proctor, Powell, and McMillen,<sup>12</sup> specifically the "Name it, Define it, Operationalise it" approach, could improve reporting quality of strategies, with particular attention to context. Enhanced and standardised reporting will facilitate comparability, replication, and synthesis in future rural implementation research.

This review was restricted to peer-reviewed empirical research and did not include grey literature sources. While this decision was made to ensure sufficient methodological detail for framework-based coding of implementation strategies, it may have resulted in publication bias toward successful implementation efforts and location bias by potentially missing locally relevant program reports or policy documents. Future research examining implementation in rural contexts could benefit from complementary reviews of grey literature to capture unpublished implementation efforts and context-specific innovations.

The search strategy focused on implementation science terminology (including 'implementation,' 'dissemination,' 'knowledge translation') and evidence-based practice concepts (guidelines, best practices, evidence-based interventions). While the broad intervention-focused terms would capture studies using quality improvement or practice change approaches when describing evidence-based interventions, 'quality improvement' and 'practice change' were not explicitly included as discrete search terms. Given the conceptual overlap and terminology variation across these fields, studies that used exclusively quality improvement or practice change terminology without mentioning implementation or evidence-based practice may have been missed. However, the use of the truncated term 'implement' and comprehensive intervention-related terms likely captured the majority of relevant literature addressing implementation strategies in rural settings.

Data extraction was conducted by a single reviewer (CJG) with verification by a second reviewer (AC), rather than independent dual extraction. While this approach included systematic quality checks through the verification process, with discrepancies resolved through discussion and consultation of a third reviewer when needed, independent dual extraction may have further reduced the potential for extraction errors. Furthermore, formal quality appraisal of included studies was not conducted, consistent with scoping review methodology. However, this limits our ability to comment on the methodological rigor of the evidence base beyond descriptive study design characteristics.

The evidence base was characterised by predominantly observational study designs (primarily pre-post studies), with few randomised trials. This limits the ability to draw strong causal inferences about implementation strategy effectiveness. Additionally, the infrequent reporting of key implementation outcomes such as sustainability, fidelity, and penetration constrains understanding of longer-term implementation success in rural and remote settings.

Furthermore, the predominance of studies conducted in very specific contexts, namely hospitals and primary care settings in the United States and Australia, limits the generalisability of findings to rural contexts in other high-income countries and other service environments, such as residential aged care and community health centres. Expanding future implementation research efforts to include a broader range of rural settings and healthcare services is essential to advancing equitable health outcomes globally. It is also notable that very few included studies used recognised rurality classification systems to define rurality status, limiting consistency and clarity in understanding the specific rural contexts targeted. Heterogeneity in rurality measurement represents a significant barrier to evidence synthesis in rural health research. To address this challenge, the research team has developed a harmonisation framework that maps existing rurality classification systems to enable consistent rural-urban coding across OECD countries.<sup>66</sup> Future rural health implementation research should prioritise transparent and standardised rurality definitions using established harmonisation approaches to enhance the precision and relevance of findings.

## Conclusion

This review synthesises current evidence on implementation strategies supporting healthcare professionals delivering interventions in rural and remote settings within high-income countries. Despite the large number of studies, a key gap identified was the frequent lack of explicit description of rural-specific design features, the limited use of context assessments to guide implementation strategy selection, as well as limited consumer engagement. Policymakers, healthcare leaders, and researchers should prioritise comprehensive, context-specific assessments to guide the selection and operationalisation of strategies. Equally important is the clear, standardised description and reporting of implementation strategies using recognised taxonomies and frameworks. Incorporating co-design principles that actively engage rural communities and healthcare providers may further enhance relevance, feasibility, and acceptability. While the design features identified in this review emerged from rural and remote implementation contexts, many considerations (such as addressing cultural diversity,

literacy levels, workforce constraints, and access barriers) are relevant across diverse healthcare settings, including urban areas. The principles of context-specific assessment, stakeholder engagement, and tailored implementation design have broad applicability to implementation efforts regardless of geographic location. Together, these approaches have the potential to deepen the understanding of implementation in rural health services and contribute to reducing persistent inequities between rural and metropolitan populations.

#### Contributors

AC, HB, AU, and SM developed the study concept. HB led the development and registration of the study protocol, with input from all authors. HB and CW implemented the search strategy. HB conducted title text mining during the initial screening phase. AC, HB, CW, AU, AWS, EAJ, HJ, RJB, SR, and CES contributed to title and abstract screening; AC, HB and HJ contributed to full-text screening. AC and HB resolved any discrepancies during the screening process. CJG performed data extraction, which was quality-checked by AC. CJG and AC conducted data synthesis and drafted the manuscript. All authors contributed to manuscript revision.

#### Data sharing statement

Not applicable.

#### Declaration of interests

All authors declare no conflicts of interest.

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#### Appendix A. Supplementary data

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.lanwpc.2025.101732>.

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