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Motivation and Retention of Health Workers in Rural, Remote, and Border Areas: A Mixed-Methods Systematic Review

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Abstract

The unequal distribution of health workers across rural, remote, and border areas remains a global challenge because it directly affects equitable access to and sustainability of health services. This study aims to synthesize factors influencing the motivation and retention intention of health workers in underserved areas. A mixed-methods systematic review was conducted using the PRISMA 2020 reporting guideline and the Joanna Briggs Institute convergent integrated approach. The literature search was performed in Scopus and was limited to English-language, open-access journal articles published between 2015 and 2026. The final search was conducted on 5 April 2026. Of 42 records identified, 26 studies met the inclusion criteria and were synthesized thematically. The review shows that health workforce retention is a multilevel phenomenon shaped by individual and place-based determinants, financial and non-financial incentives, organizational conditions, career development, workforce governance, and digital capability. Financial incentives remain important for initial recruitment, but long-term retention depends more strongly on housing, workplace facilities, supportive supervision, professional learning, community attachment, and transparent career pathways. Rural, remote, and border settings also differ in their workforce challenges; therefore, retention policies require contextualized and multicomponent designs. This review contributes by integrating motivational theories, evidence from discrete choice experiments, organizational retention pathways, and digital support mechanisms into a unified framework for health workforce retention in underserved areas.

Keywords: *Retention Intention; Motivation; Health Workforce; Rural; Remote; Border Areas*

INTRODUCTION

The uneven distribution of health workers between urban centers and underserved territories remains one of the most persistent challenges in health-system governance. Rural, remote, and border communities frequently experience shortages of doctors, nurses, midwives, allied health professionals, and primary healthcare staff. This shortage undermines the continuity of service delivery, limits access to essential care, and weakens progress toward universal health coverage (Okoroafor et al., 2021; Safi et al., 2018; World Health Organization, 2020). Although the problem is global, it is particularly acute in areas characterized by geographic isolation, limited infrastructure, weak labour-market attractiveness, and restricted professional development opportunities (Mkoka et al., 2015; Russell et al., 2021; Wakerman et al., 2019).

Previous studies consistently show that health workers' decisions to accept and remain in underserved postings are influenced by multiple factors rather than a single determinant. Financial incentives, salary loading, hardship allowances, scholarships, and bonded-service schemes can increase initial willingness to work in rural and remote areas (Honda & Vio, 2015; Robyn et al., 2015). However, these mechanisms often have limited effects on long-term retention when they are not accompanied by adequate housing, functioning facilities, supportive management, professional supervision, personal safety, and clear career progression (Berman et al., 2021; Honda et al., 2019; Noya et al., 2021). Retention is therefore not merely a compensation issue but a complex human resource management problem involving motivation, work environment, professional identity, family circumstances, and organizational support (Abelsen et al., 2020; Eisenberger et al., 2020; Sriram et al., 2021).

The literature has also emphasized the role of individual and place-based determinants. Health workers with rural backgrounds, prior exposure to underserved communities, strong community attachment, or family compatibility with rural living tend to demonstrate stronger intention to

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remain (Asghari et al., 2020; Cosgrave, 2020; Cosgrave et al., 2019; Putri et al., 2020). Conversely, professional isolation, limited education for children, lack of spouse employment opportunities, and weak social integration increase the likelihood of turnover (Rajbangshi et al., 2017; Safi et al., 2018; Somerville et al., 2024). These findings suggest that retention is not only shaped by job attributes but also by the extent to which health workers can build meaningful personal, social, and professional lives in the place where they work (Campbell et al., 2016; Wieland et al., 2021).

In recent years, digital health, telemedicine, tele-mentoring, online learning platforms, and professional networking technologies have been introduced as complementary mechanisms to support rural and remote health workers. Digital solutions can reduce professional isolation, strengthen clinical confidence, and provide access to continuing education (Pit et al., 2022; Ramsden et al., 2022; Yagos et al., 2017). However, digital capability should not be treated as a substitute for basic working conditions, supportive supervision, fair incentives, or career development. Digital interventions are more likely to support retention when embedded within broader workforce governance and organizational support systems (O'Sullivan et al., 2020; Russell et al., 2021).

Despite the growing evidence base, several unresolved issues remain. First, previous reviews tend to focus on one component of retention, such as financial incentives, compulsory service, educational pathways, or rural recruitment, without integrating these determinants into a coherent multilevel framework (Esu et al., 2021; Noya et al., 2021; World Health Organization, 2020). Second, many reviews discuss rural and remote areas together, while the specific conditions of border areas, including cross-border mobility, peripheral governance, dual labour-market influences, and service-access disparities, receive limited attention (Putri et al., 2022; Zhu et al., 2019). Third, studies using discrete choice experiments, qualitative evidence, cross-sectional evidence, and policy reviews are rarely synthesized through an integrated mixed-methods approach. These limitations reduce the practical usefulness of existing evidence for designing context-sensitive retention policies (Lizarondo et al., 2020; Page et al., 2021).

This review addresses these gaps by synthesizing evidence on motivation and retention intention among health workers in rural, remote, and border areas. The review integrates motivational theories, evidence from discrete choice experiments, organizational and career-based retention mechanisms, and digital capability into a unified analytical framework (Berman et al., 2021; Honda & Vio, 2015; Robyn et al., 2015; Russell et al., 2021). Specifically, this study asks: What factors influence the motivation and retention intention of health workers in rural, remote, and border areas, and how can the interaction among these factors inform more effective and sustainable workforce retention policies?

Literature Review

Theoretical Foundations

This review is informed by three complementary theoretical perspectives: Self-Determination Theory, Herzberg's Two-Factor Theory, and the Job Demands-Resources model. These theories help explain why health workers may initially accept a rural or remote posting but later decide either to remain or leave. Self-Determination Theory explains that sustained motivation emerges when the needs for autonomy, competence, and relatedness are fulfilled (Deci & Ryan, 2000). In rural and remote health work, autonomy is reflected in meaningful professional discretion, competence is strengthened through supervision and continuing education, and relatedness is built through community acceptance and professional belonging (Campbell et al., 2016; Cosgrave, 2020).

Herzberg's Two-Factor Theory distinguishes hygiene factors from motivators. Salary, job security, housing, physical working conditions, personal safety, and basic resources are hygiene factors that prevent dissatisfaction, whereas recognition, responsibility, career growth, professional achievement, and meaningful contribution to underserved communities function as motivators (Herzberg, 1968). This distinction is important because financial incentives may attract health workers, but they do not automatically generate sustained commitment when professional growth and organizational support are absent (Berman et al., 2021; Honda & Vio, 2015; Noya et al., 2021).

The Job Demands-Resources model further explains retention by balancing the pressures faced by health workers with the resources available to them (Bakker & Demerouti, 2007; Demerouti et al., 2001). Rural, remote, and border postings often involve high workloads, limited referral systems, resource scarcity, emotional strain, and professional isolation (Dymmott et al., 2022; Malik et al., 2024; Mkoka et al., 2015). Retention

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intention increases when these demands are buffered by job resources such as supportive supervision, reliable infrastructure, teamwork, mentoring, flexible management, and digital professional networks (Argent et al., 2022; Pit et al., 2022; Ramsden et al., 2022). Together, these theories suggest that retention is a dynamic process shaped by the interaction between individual motivation, working conditions, organizational resources, and contextual embeddedness.

Conceptual Framework

Based on these theoretical foundations, this review conceptualizes retention intention as the outcome of four interrelated domains: individual and place-based determinants, incentive structures, organizational and career conditions, and digital capability. Individual and place-based determinants include rural background, place attachment, family situation, and life-stage compatibility (Asghari et al., 2020; Cosgrave et al., 2019; Wieland et al., 2021). Incentive structures include financial and non-financial attributes such as salary, housing, infrastructure, workload, and safety (Berman et al., 2021; Honda et al., 2019; Robyn et al., 2015). Organizational and career conditions include supervision, professional development, governance, career pathways, and workforce planning (Abelsen et al., 2020; O'Sullivan et al., 2020; Sriram et al., 2021). Digital capability includes telehealth, tele-mentoring, e-learning, and digital communities of practice (Pit et al., 2022; Ramsden et al., 2022; Yagos et al., 2017). These domains do not operate independently; they interact to shape the perceived attractiveness and sustainability of working in underserved areas.

METHOD

Review Design and Protocol

This study employed a mixed-methods systematic review design because the reviewed evidence included qualitative studies, cross-sectional studies, discrete choice experiments, and previous reviews. The review was guided by the PRISMA 2020 statement to improve transparency and reproducibility (Page et al., 2021). The synthesis followed the Joanna Briggs Institute convergent integrated approach, which allows findings from different methodological traditions to be transformed into comparable thematic categories (Lizarondo et al., 2020). The review protocol defined the research questions, database, search string, inclusion and exclusion criteria, screening procedures, data extraction fields, quality appraisal strategy, and synthesis approach before the final analysis was conducted.

Search Strategy

The literature search was conducted in the Scopus database because it provides broad interdisciplinary coverage of health workforce, human resource management, health services research, and rural health studies. The search was limited to English-language, open-access journal articles published between 2015 and 2026. The final search was conducted on 5 April 2026. The Boolean search string was: TITLE-ABS-KEY ("motivation") AND ("intention to stay" OR "retention" OR "turnover") AND ("health workforce" OR "primary healthcare staff") AND ("remote" OR "rural" OR "frontier" OR "cross-border" OR "island communities" OR "archipelagic regions"). The search and reporting structure followed systematic review transparency principles recommended by PRISMA 2020 (Page et al., 2021).

Eligibility Criteria

Table 1. Eligibility Criteria

Criterion	Inclusion/Exclusion Description
Publication year	Articles published from 2015 to 2026.
Language	English.
Document type	Peer-reviewed journal article.
Access type	Open access.
Population	Health workers, health students, doctors, nurses, midwives, allied health professionals, or primary healthcare staff.
Context	Rural, remote, border, frontier, island, archipelagic, or underserved areas.
Focus	Motivation, intention to stay, retention, turnover, recruitment, or retention-related preferences.
Exclusion	Studies outside the health workforce field, non-English articles, articles published before 2015, and records without sufficient relevance to motivation or retention.

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Studies were included when they met the following criteria: (1) published between 2015 and 2026; (2) written in English; (3) available as open-access peer-reviewed journal articles; (4) focused on health workers, health students, primary healthcare staff, or rural health professionals; and (5) addressed motivation, retention intention, willingness to stay, turnover intention, workforce attraction, or retention policies in rural, remote, border, island, frontier, or underserved areas. Studies were excluded when they were not related to the health workforce, did not address motivation or retention, were published outside the specified period, were not written in English, or were not available as open-access journal articles. These criteria were applied to maintain relevance and methodological transparency in accordance with PRISMA 2020 (Page et al., 2021).

Study Selection and Data Extraction

The selection process was conducted in two stages. First, titles and abstracts were screened against the eligibility criteria. Second, potentially relevant articles were reviewed in full text. Two reviewers independently assessed the eligibility of the articles, consistent with systematic review procedures that seek to reduce selection bias (Page et al., 2021). Disagreements were resolved through discussion, and a third reviewer was available if consensus could not be reached. The PRISMA flow identified 42 records from Scopus. After the exclusion of articles published before 2015 and non-English articles, 26 studies were included in the final synthesis.

Data were extracted using a predefined extraction form. The extracted information included author, year of publication, country or geographic context, study design, population, sample size where available, type of determinant, key findings, and relevance to motivation or retention intention. The determinants were then coded into thematic categories corresponding to the review questions and theoretical framework. This procedure is consistent with the convergent integrated approach, in which quantitative and qualitative evidence is transformed into a common narrative synthesis format (Lizarondo et al., 2020).

Quality Appraisal

Because the included studies used heterogeneous methods, methodological quality was appraised using design-sensitive criteria adapted from JBI and CASP principles (Lizarondo et al., 2020). Qualitative studies were assessed in terms of clarity of aims, appropriateness of design, sampling, data collection, reflexivity, analytical rigor, and credibility of findings. Quantitative studies and discrete choice experiments were assessed in terms of sampling clarity, measurement relevance, analytical appropriateness, reporting transparency, and consistency between results and conclusions. Review articles were assessed in terms of search transparency, inclusion criteria, synthesis strategy, and clarity of implications. The quality appraisal was used to interpret the strength of evidence rather than to automatically exclude studies that were relevant to the research questions.

Data Synthesis

A convergent integrated synthesis was applied. Quantitative findings, preference estimates, and qualitative themes were transformed into narrative statements and grouped into comparable thematic categories (Lizarondo et al., 2020). The synthesis proceeded through four steps: coding of determinants, grouping into analytical domains, comparison across settings and study designs, and development of an integrative retention framework. This approach was selected because the evidence base included diverse outcomes, contexts, and methodological designs, making meta-analysis inappropriate. Thematic synthesis was organized around the four research questions and interpreted through Self-Determination Theory, Herzberg's Two-Factor Theory, and the Job Demands-Resources model (Bakker & Demerouti, 2007; Deci & Ryan, 2000; Herzberg, 1968).

Findings

Characteristics of Included Studies

The 26 included studies represented diverse geographic and methodological contexts, including Asia-Pacific, Africa, Australia, Canada, China, India, Indonesia, Malawi, Nigeria, Uganda, and multi-country reviews. Study designs included qualitative studies, cross-sectional studies, discrete choice experiments, scoping reviews, systematic reviews, and policy-oriented analyses. The populations included doctors, nurses, midwives, community health workers, health students, allied health professionals, and general rural health workers (Abelsen et al., 2020; Asghari et al., 2020; Berman et al., 2021; Esu et al., 2021; Robyn et al., 2015; Russell et al., 2021).

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Table 2. Population characteristics

Thematic Domain	Key Factors	Synthesis of Evidence
Individual and place-based determinants	Rural background, place attachment, community embeddedness, family circumstances, life stage	Predict intention to accept and remain in underserved postings (Asghari et al., 2020; Cosgrave et al., 2019; Rajbangshi et al., 2017).
Financial and non-financial incentives	Salary, hardship allowance, housing, facilities, workload, safety	Financial incentives attract, while non-financial conditions sustain retention (Berman et al., 2021; Honda & Vio, 2015; Robyn et al., 2015).
Organizational and career factors	Supportive supervision, mentoring, career pathways, training, governance	Strengthen professional confidence and long-term commitment (Abelsen et al., 2020; O'Sullivan et al., 2020; Russell et al., 2021).
Digital capability	Telehealth, tele-mentoring, e-learning, digital professional networks	Reduces professional isolation but works best as a complement to organizational support (Pit et al., 2022; Ramsden et al., 2022; Yagos et al., 2017).

Theme 1: Individual and Place-Based Determinants

The first major theme concerns the role of personal background, place attachment, and life-stage compatibility. Health workers with rural backgrounds or prior exposure to underserved communities were more likely to express willingness to work in similar settings (Asghari et al., 2020; Putri et al., 2020; Rajbangshi et al., 2017). Rural upbringing may reduce perceived social distance between the worker and the community, increase familiarity with rural living conditions, and strengthen acceptance of the professional and social realities of remote service.

Place attachment also emerged as an important determinant. Health workers were more willing to remain when they felt socially accepted by the community, experienced meaningful relationships, and perceived their work as valuable to underserved populations (Cosgrave, 2020; Cosgrave et al., 2019; Wieland et al., 2021). This finding aligns with Self-Determination Theory, particularly the need for relatedness (Deci & Ryan, 2000). Retention is stronger when health workers do not merely occupy a post but develop a sense of belonging within the community.

Family circumstances and life stage shaped retention decisions. Spouse employment, children's schooling, personal security, and proximity to extended family influenced whether workers considered rural or remote service sustainable (Safi et al., 2018; Somerville et al., 2024). Younger workers may value career development and mentoring, while mid-career workers may prioritize family stability, safety, and education for children (Abelsen et al., 2020; Dymmott et al., 2022). These findings show that retention policies need to be sensitive to the changing needs of health workers across career and family life cycles.

Theme 2: Financial and Non-Financial Incentives

Financial incentives remain important but are insufficient as a stand-alone retention strategy. Higher salaries, hardship allowances, performance-based incentives, scholarships, and bonded-service schemes can improve initial recruitment and willingness to accept rural postings (Honda & Vio, 2015; Robyn et al., 2015). However, evidence from discrete choice experiments and qualitative studies indicates that financial incentives often function as threshold factors rather than comprehensive solutions (Berman et al., 2021; Honda et al., 2019). They help workers enter underserved areas but do not necessarily keep them there when other job and living conditions are poor.

Non-financial incentives are central to sustainable retention. Housing availability, adequate facilities, functional equipment, manageable workload, reliable medical supplies, personal security, transportation, and access to communication infrastructure strongly influence satisfaction and intention to remain (Ajisegiri et al., 2022; Berman et al., 2021; Honda et al., 2019; Putri et al., 2022). In several contexts, housing and workplace quality were valued as highly as or more highly than salary increases (Honda & Vio, 2015; Smitz et al., 2016). These findings support Herzberg's Two-Factor Theory: hygiene factors such as working conditions, safety, and housing must be addressed to prevent dissatisfaction (Herzberg, 1968).

The interaction between financial and non-financial incentives is particularly important. A salary supplement may become ineffective when health workers face unsafe housing, weak management, excessive workload, or lack of professional support (Mkoka et al., 2015;

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Rajbangshi et al., 2017). Conversely, non-financial improvements may have limited recruitment effects when baseline compensation is perceived as unfair (Robyn et al., 2015). The evidence therefore supports integrated incentive packages rather than isolated financial interventions (Esu et al., 2021; Noya et al., 2021; World Health Organization, 2020).

Theme 3: Organizational Conditions, Career Pathways, and Workforce Governance

The third theme highlights the organizational foundations of retention. Supportive supervision, mentoring, teamwork, flexible management, and clear communication strengthen health workers' professional confidence and reduce the psychological burden of remote practice (Abelsen et al., 2020; Argent et al., 2022; O'Sullivan et al., 2020). Workers in underserved areas often face complex clinical decisions with limited referral support. In such conditions, supervision and mentoring are not optional managerial activities but essential retention resources (Dymmott et al., 2022; Russell et al., 2021).

Career development is another major determinant. Health workers are less likely to remain when rural service is perceived as a career dead end. Structured career pathways, continuing education, recognition, postgraduate training opportunities, and transparent promotion systems increase the attractiveness of underserved postings (Asghari et al., 2020; Noya et al., 2021; Smitz et al., 2016). Early-career health workers in particular require hands-on learning opportunities and visible progression routes if they are expected to build long-term careers in rural or remote areas (Dymmott et al., 2022; O'Sullivan et al., 2020).

Workforce governance also shapes retention. Fragmented policy implementation, inconsistent incentives, weak coordination between national and local authorities, and competition with the private sector reduce the effectiveness of retention strategies (Sriram et al., 2021; Zhu et al., 2019). The evidence suggests that sustainable retention requires integrated workforce planning, alignment between education and deployment policies, decentralized training, and continuous monitoring of workforce stability (Abelsen et al., 2020; Putri et al., 2020; World Health Organization, 2020). Retention must therefore be treated as a system-level governance issue rather than a short-term staffing problem.

Theme 4: Digital Capability and Professional Connectivity

Digital capability emerged as a complementary retention mechanism. Telemedicine, tele-mentoring, e-learning, mobile applications, and digital professional networks can reduce professional isolation and expand access to clinical knowledge (Pit et al., 2022; Ramsden et al., 2022; Yagos et al., 2017). For health workers in remote and border settings, digital connectivity can increase confidence, facilitate consultation with specialists, and provide opportunities for continuing professional development without requiring physical relocation.

However, digital interventions have limitations. Poor internet connectivity, inadequate devices, lack of training, and weak integration with service workflows can reduce their effectiveness (Ramsden et al., 2022; Yagos et al., 2017). Digital tools do not replace the need for adequate facilities, supportive supervision, safe living conditions, or career pathways (Russell et al., 2021; World Health Organization, 2020). Instead, they strengthen retention when embedded within broader organizational and workforce support systems.

The synthesis indicates that digital capability should be conceptualized as an enabling resource within the Job Demands-Resources model (Bakker & Demerouti, 2007; Demerouti et al., 2001). It helps buffer the demands of isolation and limited professional networks, but it cannot compensate for persistent structural deficiencies (Pit et al., 2022; Ramsden et al., 2022). Effective digital strategies for retention must therefore combine technology infrastructure, user training, clinical governance, and institutional support.

Discussion

Integrative Interpretation of Findings

This review demonstrates that motivation and retention intention among health workers in rural, remote, and border areas are shaped by interacting individual, organizational, and system-level determinants (Abelsen et al., 2020; Russell et al., 2021; World Health Organization, 2020). The findings challenge the assumption that financial incentives alone can solve workforce maldistribution. Financial incentives are necessary in many settings, especially at the recruitment stage, but sustainable retention depends on whether health workers experience meaningful professional growth, safe living conditions, supportive relationships, and organizational

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fairness (Berman et al., 2021; Honda et al., 2019; Eisenberger et al., 2020).

The theoretical integration strengthens this interpretation. Self-Determination Theory explains why relatedness, competence, and autonomy matter for long-term commitment (Deci & Ryan, 2000). Herzberg's Two-Factor Theory explains why salary and housing may prevent dissatisfaction but must be accompanied by recognition, career development, and professional achievement (Herzberg, 1968). The Job Demands-Resources model explains why high workload, isolation, and resource scarcity increase turnover risk unless balanced by supervision, infrastructure, teamwork, and digital support (Bakker & Demerouti, 2007; Demerouti et al., 2001). Together, these theories show that retention is a motivational and organizational process rather than a simple labour-supply issue.

Differences between Rural, Remote, and Border Contexts

A key contribution of this review is the clarification that rural, remote, and border areas are related but not identical contexts. Rural areas are generally characterized by lower population density, limited local services, and weaker labour-market attractiveness compared with urban areas (Putri et al., 2022; World Health Organization, 2020). Retention policies in rural areas often emphasize rural background recruitment, decentralized education, community-based training, and improvement of basic service infrastructure (Asghari et al., 2020; Putri et al., 2020; O'Sullivan et al., 2020).

Remote areas involve a stronger element of geographic isolation. Distance from referral hospitals, limited transportation, harsh living conditions, and logistical barriers increase professional risk and personal burden (Wakerman et al., 2019; Wieland et al., 2021). In such contexts, retention depends heavily on housing, reliable supplies, regular supervision, flexible leave arrangements, and digital connectivity that can reduce clinical and social isolation (Berman et al., 2021; Pit et al., 2022; Ramsden et al., 2022).

Border areas add another layer of complexity. They may experience peripheral governance, uneven service investment, cross-border population mobility, cultural diversity, dual labour-market influences, and competition from neighbouring health systems (Putri et al., 2022; Zhu et al., 2019). Health workers in border regions may face challenges that are not fully captured by the rural or remote categories alone. Therefore, border health workforce policy should consider cross-border mobility, local cultural integration, security, and intergovernmental coordination in addition to conventional rural retention strategies.

Comparison across Countries and Evidence Types

The evidence shows both common patterns and contextual variations. In African settings, salary increases, housing, education opportunities, and facility quality frequently appear as key determinants of attraction and retention (Berman et al., 2021; Honda & Vio, 2015; Robyn et al., 2015). In Asia-Pacific contexts, government-funded medical education, rural background recruitment, and decentralized training are important policy levers (Efendi et al., 2016; Putri et al., 2020; Zhu et al., 2019). In Australia and Canada, qualitative evidence highlights place attachment, professional networks, flexible management, and community embeddedness as central to long-term retention (Cosgrave, 2020; Wakerman et al., 2019; Wieland et al., 2021). In India and other decentralized systems, governance fragmentation and institutional resistance may limit the effectiveness of well-designed policies (Rajbangshi et al., 2017; Sriram et al., 2021).

Discrete choice experiments provide useful evidence on job attribute preferences, particularly the relative value of salary, housing, facility quality, workload, and career opportunities (Berman et al., 2021; Honda et al., 2019; Honda & Vio, 2015; Robyn et al., 2015). Qualitative studies add depth by explaining why these attributes matter in everyday professional and family life (Mkoka et al., 2015; Rajbangshi et al., 2017). Systematic and scoping reviews provide broader policy patterns but may understate contextual differences (Esu et al., 2021; Noya et al., 2021; Russell et al., 2021). Integrating these evidence types provides a more balanced understanding than relying on any single method.

Policy and Managerial Implications

For policymakers, the findings indicate that workforce retention requires multicomponent packages. Governments should combine fair compensation with housing support, decentralized education, rural recruitment pathways, structured career development, and targeted investment in facility readiness (Ajuebor et al., 2020; Esu et al., 2021; World Health Organization, 2020). Policies should also differentiate between rural, remote, and border contexts rather than applying a uniform

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national retention package (Putri et al., 2022; Wakerman et al., 2019).

For healthcare institutions, retention should be managed through supportive supervision, mentoring, workload management, recognition, teamwork, and transparent communication (Abelsen et al., 2020; Argent et al., 2022; O'Sullivan et al., 2020). Managers should pay particular attention to early-career workers, female health workers, and workers with family responsibilities because their retention decisions are often shaped by both professional and household factors (Cosgrave et al., 2019; Dymmott et al., 2022; Safi et al., 2018).

For digital health strategy, technology should be positioned as an enabling support system. Telehealth, tele-mentoring, digital learning, and professional communities of practice should be integrated with clinical governance and workforce development (Pit et al., 2022; Ramsden et al., 2022; Yagos et al., 2017). Investment in digital infrastructure is important, but its retention effect depends on whether health workers are trained, supported, and able to use the technology in meaningful professional routines.

Limitations and Future Research

This review has several limitations. First, the search was conducted only in Scopus and was limited to English-language open-access articles, which may exclude relevant regional studies, grey literature, and non-English evidence. Second, the reviewed studies used diverse definitions of rural, remote, and border areas, making direct comparison difficult (Putri et al., 2022). Third, because of methodological heterogeneity, meta-analysis was not appropriate (Lizarondo et al., 2020). Future research should develop more precise operational definitions for border health workforce contexts, evaluate multicomponent retention packages longitudinally, and examine how digital capability interacts with supervision, workload, and career pathways in sustaining long-term retention (Russell et al., 2021; Somerville et al., 2024).

CONCLUSION

Health workforce retention in rural, remote, and border areas is a multilevel and contextual phenomenon (Russell et al., 2021; World Health Organization, 2020). Financial incentives remain important, especially for recruitment, but long-term retention is more strongly shaped by non-financial conditions, organizational support, career development, community attachment, and digital professional connectivity (Abelsen et al., 2020; Berman et al., 2021; Cosgrave, 2020; Ramsden et al., 2022). A single-incentive policy is therefore insufficient for sustaining workforce stability in underserved areas.

This review contributes by integrating motivational theories, evidence from multiple study designs, and contextual distinctions among rural, remote, and border areas (Bakker & Demerouti, 2007; Deci & Ryan, 2000; Herzberg, 1968; Lizarondo et al., 2020). The findings suggest that effective retention policy should move from fragmented interventions toward integrated workforce systems that align compensation, living conditions, supervision, career pathways, decentralized training, and digital support (Esu et al., 2021; Noya et al., 2021; O'Sullivan et al., 2020). Future studies should test these integrated retention models using longitudinal and context-sensitive designs, particularly in border regions that remain underrepresented in the health workforce literature.

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