8-20-2025

Strategies to Recruit and Retain Physicians in Rural Hospital Health Systems

Montoya Major
Walden University

Walden University

College of Management and Human Potential

This is to certify that the doctoral study by

Montoya Major

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

Review Committee
Dr. Miriam Ross, Committee Chairperson, Health Sciences Faculty
Dr. Matt Frederiksen-England, Committee Member, Health Sciences Faculty

Chief Academic Officer and Provost
Sue Subocz, Ph.D.

Walden University
2025

Strategies to Recruit and Retain Physicians in Rural Hospital Health Systems

by

Montoya Major

MHS, Nova Southeastern University, 2019

BS, Nova Southeastern University, 2019

BS, Alabama A&M University, 2017

Integrative Review Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Healthcare Administration

Walden University

August 2025

Abstract

Physician shortages in rural areas represent a serious and escalating challenge in the United States, with approximately 20% of the population residing in these regions while only about 9% of physicians practice there. The purpose of this integrative review was to identify key underlying factors contributing to physician shortages in rural hospital health settings and identify potential strategies to recruit and retain physicians. The review question concerned strategies and practices administrators use to attract and retain physicians in underserved rural areas. Herzberg's two-factor theory serves as the framework and offers a perspective on employee motivation and job satisfaction. A review of empirical and nonempirical literature published from 2019 to 2025 identified 125 articles. After exclusion criteria were applied, 25 articles were identified for in-depth analysis using the Johns Hopkins evidence-based practice model. The articles provided five main themes: improving physician education, strengthening physician autonomy, financial incentives, support for lifestyle/personal preferences, and enhancing understanding of government policies. Fourteen subthemes aligned with the main themes; the most significant were training and education opportunities, personal and professional development, positive work environment, a sense of belonging, and financial support programs. Recommendations included developing targeted recruitment strategies, offering rural-focused medical education, promoting professional collaboration, and encouraging community integration. Implementing these recommendations may enhance access to physicians in rural hospital health systems, thereby strengthening various social determinants of health and contributing to improved health outcomes for residents, ultimately fostering positive social change.

Part 1: Practice-Based Problem

Problem of Interest

Physician shortages in hospital health systems of the United States continue to escalate, exacerbating the difficulty in accessing essential healthcare services and emergency medical care in these underserved regions. This persistent shortfall in physician availability continues to worsen health outcomes in rural areas (Abbasi, 2022; Malayala et al., 2021). Rural residents are less likely to receive advised preventative care and resources than urban residents and rural hospitals have higher morbidity and mortality rates than urban hospitals (Mui, 2020; Shipman et al., 2019). Research indicates that more than 62% of all federally designated primary care Health Professional Shortage Areas are in rural regions, whereas approximately 11% of the physician workforce practices in these communities (Shipman et al., 2019). This gap in access to physician care is likely to be an important contributor to increased rural morbidity and mortality (Shipman et al., 2019).

Rural hospitals face considerable obstacles in recruiting and retaining healthcare professionals, particularly physicians (Figueiredo et al., 2023). These challenges stem from a variety of factors, including limited institutional resources, professional isolation, lower compensation, and reduced opportunities for professional development (Kulka & McWeeny, 2019). The increasing physician shortages in rural hospital health systems intensify health disparities between rural and urban populations (Zang et al., 2020). Understanding the physician shortages in rural healthcare may help address health disparities between rural and urban areas.

Healthcare Administration Problem

Background

Research shows that 20% of the U.S. population resides in rural areas, this includes more than 50 million people, and only about 9% of the nation's physicians practice in rural communities (Research Triangle Institute, 2023). This is similar to Shipman et al.'s (2019) finding that only 11% of physicians practice in rural areas. In 2022, 7.8% of U.S. counties did not have a primary care physician at all and the national ratio of primary care physicians was 83.8 per 100,000 population (Health Resources and Services [HRSA], 2023). Physician shortages have long posed a persistent challenge for rural communities (Zhang, 2020). Health administrators have struggled to obtain and retain physicians due to complex economic, social, and structural factors, some of which date back to the 1940s (Zhang, 2020). Rural health systems struggle with limited resources, lower salaries compared to urban areas, professional isolation, and fewer educational opportunities for career advancement (Michaeli, 2024). Numerous governmental and nonprofit groups attempted to alleviate these shortages in the middle of the 20th century by implementing rural health programs, such as debt payback plans and scholarships, for medical students who were willing to practice in rural regions (Kulka & Mcweeny, 2019).

A range of factors have contributed to the worsening of physician shortages from the 2000s to the present. This growing issue has been further exacerbated by an aging medical workforce, a decline in the number of young physicians choosing to practice in rural areas, and a rising prevalence of physician burnout (Abbasi, 2022; HRSA, 2023). Additionally, many rural hospitals face escalating financial challenges, primarily due to

the higher proportion of Medicare and Medicaid patients - populations that tend to have lower reimbursement rates (Vaughan & Edwards, 2024). As physician shortages persist, healthcare administrators are under increasing pressure to devise and implement evidence-based strategies to recruit and retain physicians. Without sufficient physician staffing, healthcare systems are at considerable risk of experiencing hospital closures, extended wait times, limited-service availability, and a deterioration in the quality of care (Germack, 2019; Streeter, 2020; Vaughan & Edwards, 2024).

Operational Problem

According to Abbassi (2022), physicians and other healthcare worker shortages, especially in rural and underserved areas have reached critically low and unsustainable levels. The patient-to-primary care physician ratio in rural areas is only 39.8 physicians per 100,000 people, versus 53.3 physicians per 100,000 in urban areas (Research Triangle Institute, 2023). Physician demand is projected to increase at a rate that exceeds supply in most scenarios, resulting in an anticipated shortage of 13,500 to 86,000 physicians by 2036 (Association of American Medical Colleges, 2024).

Rural populations tend to be older, have lower average incomes, and experience higher rates of chronic conditions (Mui, 2020). These factors contribute to reduced revenue for rural hospitals, underscoring the critical need for local healthcare providers (Mui, 2020; Research Triangle Institute, 2023). A limited supply of physicians in rural areas is associated with increased rates of preventable diseases, adverse health outcomes, and a lower quality of life for residents (American Hospital Association, 2022; Streeter, 2020). Rural residents often must travel long distances for medical care, leading to delays in treatment and poorer health outcomes (Streeter, 2020). The persistent physician

shortage in rural regions, the effects on healthcare outcomes and access, the need for focused policy, workforce development, and healthcare delivery solutions are all supported by data from government reports, advocacy groups, and scholarly studies (Gong, 2019; Machado et el., 2021).

Ideal State of Operations

A key objective for optimizing operations in rural hospitals is to increase the ratio of rural physicians, aiming to approach the national average of 83.8 physicians per 100,000 population (Germack et al., 2019; HRSA, 2023). An increase in the number of physicians would address existing shortages and contribute to better health outcomes for both chronic and acute conditions, as well as reduce risk factors related to adverse health events and mortality among rural populations (Vaughan & Edwards, 2024). Initiatives aimed at mitigating physician shortages have the potential to expand access to high-quality care, enhance affordability, promote public health, improve quality of life, and support the development of more sustainable rural hospital systems that effectively serve the community (American Hospital Association, 2022).

Professional Practice Gap Statement

The healthcare administration problem is the impact of physician shortages in rural areas, which limits access to care and threatens hospital sustainability (Vaughan & Edwards, 2024). The shortage of healthcare professionals in rural areas can limit access to healthcare services, which can negatively impact health and life expectancy. Rural hospitals rely heavily on physician services and if physicians are scarce, rural hospitals may be forced to close because of lost revenue. In rural regions, there are 39.8 physicians per 100,000 individuals, compared to 53.3 physicians per 100,000 in urban areas

(Research Triangle Institute, 2023). Although achieving the urban ratio of 53.3 physicians per 100,000 individuals may be challenging, it remains an important target for strengthening rural hospital health systems. Progress toward this goal can enhance the comprehensiveness, accessibility, and sustainability of healthcare delivery in underserved communities, while also supporting physician well-being (American Hospital Association, 2022).

Summary of Evidence

Multiple studies have documented the negative impact of physician shortages in rural regions, noting that urban areas typically have 50% more physicians than their rural counterparts (Gong et al., 2019; Michaeli, 2024). These shortages are well recognized among medical professionals and contribute to significant challenges for rural hospital systems in both recruiting and retaining physicians (Kulka & McWeeny, 2019; Vaughan & Edwards, 2024). Addressing physician shortages in rural and remote areas necessitates comprehensive policies and targeted interventions to enhance the recruitment and retention of healthcare workers in these locations (American Hospital Association, 2022; Figueiredo et al., 2023). States and hospital systems should leverage available programs effectively and prioritize the retention of rural physicians following their service commitments (Figueiredo et al., 2023; Malayala et al., 2021). Rural hospitals are highly dependent on physicians and the income derived from surgical procedures and hospital admissions; therefore, physician shortages have a direct and adverse effect on these facilities (Germack et al., 2019). The closure of rural hospitals often has substantial consequences for local communities, and challenges in recruiting physicians to rural counties have been linked to long-term declines in the sustainability of these hospitals

(Germack et al., 2019). Furthermore, when a hospital closes, physicians may be compelled to leave the area to seek employment opportunities elsewhere (Mui et al., 2020).

Purpose of the Integrative Review

The purpose of this integrative review was to identify key underlying factors contributing to physician shortages in rural hospital health settings, assess the impact of these shortages on patient outcomes and community health, and identify potential strategies to recruit and retain physicians in rural hospital systems. By analyzing and combining results from various studies, this review contributes to the body of evidence on recruitment and retention of rural physicians and the challenges health systems face with physician shortages (Arredondo et al., 2023; Kulka & McWeeny, 2019). Additionally, this review explored how physician shortages in rural hospital health systems overlap with social determinants of health, including socioeconomic status, education, geographic location, and access to healthcare services. The findings will inform policies that address disparities in care and improve health outcomes in rural communities (Gong et al., 2019; Michaeli et al., 2024).

Integrative Review Question

The following is the review question for this project: What strategies and practices can administrators use to recruit and retain physicians in rural hospital systems?

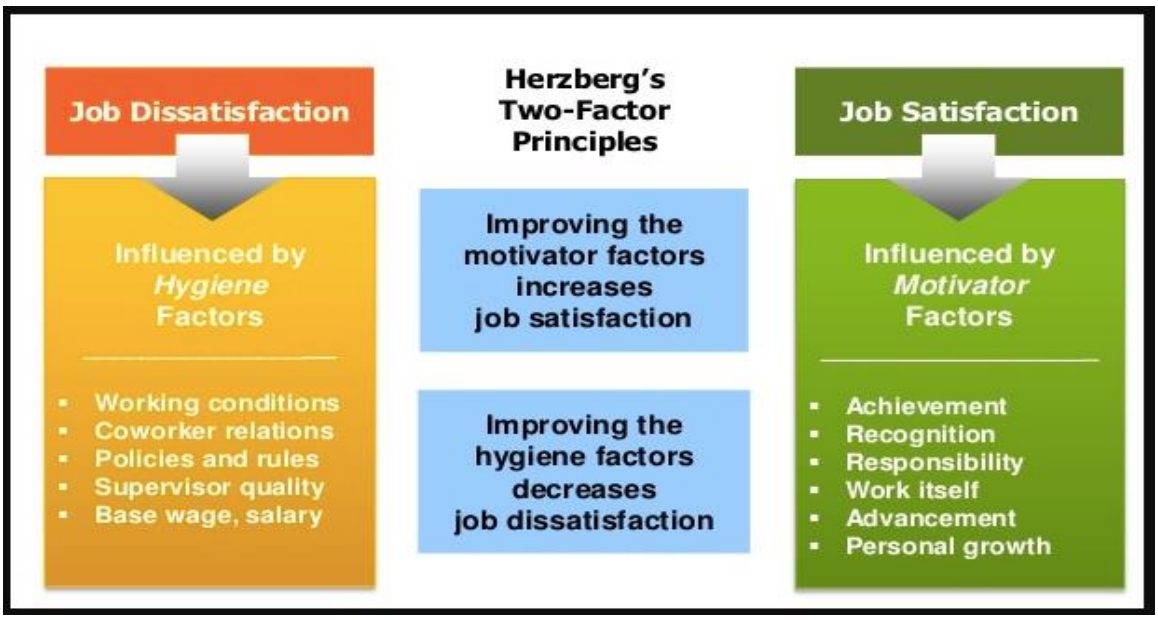
Theoretical and/or Conceptual Framework

Herzberg's two-factor theory offers a robust framework for analyzing employee motivation and job satisfaction, yielding critical insights that organizations can use to foster a more engaged, satisfied, and productive workforce (Herzberg et al., 1959). The

theory categorizes factors affecting job satisfaction into hygiene factors, which mitigate dissatisfaction, and motivators, which drive satisfaction and performance (Herzberg et al., 1959). In the context of this study, Herzberg's two-factor theory is particularly pertinent as it explains factors relevant to physician retention issues within rural hospital health systems (Herzberg et al., 1959). Figure 1 depicts the Herzberg's two-factor theory, illustrating the role of these elements in shaping employee motivation and satisfaction, as well as highlighting potential consequences, such as deficiencies, when these factors are lacking.

Figure 1

Illustration of Herzberg Two-Factor Theory



Many rural physicians struggle with workplace challenges, ranging from high stress and burnout to understaffing and reduced income—often in combination (Abbasi, 2022; Michaeli et al., 2024). Herzberg two-factor theory aligns with this study by explaining how hygiene factors such as improving salaries and work conditions reduce

dissatisfaction. Rural physicians are often offered additional monetary incentives, educational opportunities and fellowships, loan repayment programs, and scholarships to increase retention (Arredondo et al., 2023). By addressing both hygiene factors (to prevent dissatisfaction) and motivators (to increase satisfaction and encourage long-term commitment), rural hospitals can create an environment that promotes a positive workplace for physicians (Association of American Medical Colleges, 2024).

Conclusion

Physician shortages in rural hospitals are a documented and expanding concern, with rural regions experiencing more pronounced shortages than urban areas (Gong, 2019; Machado et al., 2021; Stringer, 2020). The implementation of effective recruitment and retention strategies by healthcare administrators is important for maintaining healthcare services, particularly in rural communities with limited resources (Figueiredo et al., 2023). Herzberg's two-factor theory categorizes factors influencing job satisfaction as either hygiene factors or motivators (Herzberg et al., 1959), offering a framework for understanding how to improve physician recruitment and retention. The application of this theoretical framework may facilitate the identification of factors influencing physician stability in underserved regions. Current projections suggest that shortages of rural physicians will continue in the absence of targeted interventions (Abbasi, 2022; Malayala et al., 2021).

Part 2: Literature Review, Quality Appraisal, and Analysis

Literature Search Strategy

An integrative review of literature published between 2019 and 2025 was conducted. The databases used for this review included EBSCO, PubMed, Google Scholar, Walden Library, ProQuest, and Research Gate. Additionally, through the Walden library, Boolean logic was used to further refine search results with specific criteria that included key words related to *physician retention, rural versus urban physician populations, key access issues, physician satisfaction, and best practices in recruitment.* Keywords were combined using AND (to narrow the search) and OR (to broaden the search) across the databases. Handsearching, along with both forward and backward reference list searching, produced successful outcomes across all databases included in the study. Furthermore, the literature search addressed both primary and specialty care physicians, focusing on recruitment and retention strategies influenced by financial incentives, professional development opportunities, community support, work-life balance, and policy interventions. Studies in English and those that provided quantitative, qualitative, or mixed-methods data on physician retention and recruitment were accepted.

In addition to the search parameters detailed in Appendix B, the inclusion and exclusion criteria presented in Table 1 served as a critical framework for concentrating on core issues relevant to this study's review question regarding best practices in the recruitment and retention of rural physicians. By limiting the scope to exclude other medical professions and focusing on articles published between 2019 and 2025, the collected information remains both current and pertinent to this integrative review.

Table 1

Inclusion and Exclusion Criteria Used for the Search

Inclusion search criteria	Exclusion search criteria
• English language • 2019-2025 • Physician recruitment • Physician retention • Physician satisfaction • Rural physicians	• Staff other than physicians • Articles older than 2019 • Urban areas

Search Process

A total of 125 articles were initially identified as relevant for the review on rural physician recruitment and retention. Of these 125 articles 50 themes were also extracted from the literature (Table 2). After thoroughly reviewing reference lists, omitting duplications across different databases, I adjusted the final count of relevant articles and conducted a screening process based on the titles and abstracts of the articles using the predefined inclusion and exclusion criteria. Articles were included if they focused on factors influencing rural physician recruitment or retention and excluded if they were focused on urban areas, did not mention physicians specifically, or lacked relevant context. This screening process resulted in the exclusion of 35 articles, leaving 65 articles for further analysis. Next an additional 30 articles excluded, leaving 35 articles for further analysis. During the full-text review, 10 more articles were excluded for the following reasons: (a) insufficient focus on physician retention strategies specific to rural areas, (b) studies based on general healthcare workforce trends rather than rural settings, (c) articles that did not involve adequate research measures, (d) studies lacking adequate geographic

context, and (e) sample sizes that were not representative of the rural healthcare system. After this process, a total of 25 articles were included in the final integrative review. The search strategy and more details about the selection process are outlined in Appendix B: Rural Physician Recruitment and Retention Search Log. No Institutional Review Board (IRB) approval was required for this integrative review, as it was based on previously published studies.

Table 2

All Themes from Appendix D

Sustainable careers	Cost-effective care	Satisfied physicians
Workforce retention	Return of service initiatives	Lower burnout /higher retention
Financial incentives	Personal/professional development	commitment to rural practice
Quality of life recruitment and retention strategies	rural pipeline factors	Sense of community and belonging
Rural education	Effective incentives	Physician autonomy
Positive work environment	Salary and benefits Quality incentive program	Medical training
Improve work flexibility	Job satisfaction	Recruitment to rural lifestyle
Improve lifestyle	Rural exposure	Government policies
Rural health policies	Family and community life	Personal characteristics
Job demand improvements	Community resources	Acceptability of telehealth
Work remotely	Physician origins	Lifestyle and personal preferences
Rural community connections and exposure	Financial support programs	Work life balance
Physician retention	Diversity, equity and inclusion	Immigration and licensing regulations
Loan forgiveness	Flexibility of practice	
Working conditions	Locum tenens physicians	
Educational opportunities	Training and education	

Quality Appraisal

A total of 25 articles were appraised for quality using the Johns Hopkins Evidence-Based Practice Model (JHEBP) and Research Evidence Appraisal Form (see Appendix C). This tool rated 22 articles as having a strength of evidence at Level III,

three articles as having a strength of evidence at Level IV. Of the 25 articles, 19 were appraised as high quality, and five were appraised as good quality, and one was appraised as low quality. Collectively, the articles show overall good quality of evidence, produce consistency within their findings, contribute to a broader understanding or physician recruitment and retention, and effective conclusions, relevance, and applicability. For more details on the quality appraisal results, see Appendix C: Critical Appraisal Results Log.

Thematic Analysis of Literature

Recruiting and retaining rural physicians is a complex challenge, but several articles explained strategies that can be employed to address the unique needs of rural healthcare settings (Figueiredo, et al., 2023; Holst, 2019). The thematic analysis conducted on the 25 articles yielded five major themes and 14 subthemes. These themes were highlighted in the literature and related to topics that concerned education, physician autonomy, financial incentives, lifestyle and personal preferences, and government policies which may influence physicians to practice and remain in rural settings (Koebisch et al., 2020). These strategies focus on improving both the personal and professional experiences of physicians and making rural practice more appealing in the long term (Morris et al., 2023).

Creating a sustainable rural healthcare workforce involves addressing the financial, professional, social, and family-oriented needs of rural physicians while ensuring that they feel supported, valued, and connected to their communities (Ferreira et al., 2024). Innovative recruitment strategies, such as targeted efforts to recruit physicians with rural backgrounds or offering rural rotations during medical training, can also help

create a pipeline of physicians who are more likely to remain long-term (Darbyshire et al., 2021; Figueiredo et al., 2023; Holst, 2019). Retention programs that offer long-term bonuses and regular feedback from healthcare administrators can help maintain physician satisfaction and loyalty to rural practices (De Vries et al., 2023; Rabinowitz et al., 2022). The scholarly sources referenced in this project provide valuable insights by identifying themes that address the challenges encountered by rural physicians and offer strategies to facilitate the recruitment and retention of medical professionals in rural communities.

Final Themes and Subthemes

Table 3

Review of Main Themes and Subthemes

Main themes	Subthemes
Education	Training/ education opportunities Personal/ professional development
Physician Autonomy	Positive work environment Feasibility and acceptability of telehealth Job satisfaction
Financial Incentives	Loan forgiveness Salary and benefits Quality incentive programs
Lifestyle and personal preferences	Sense of belonging Quality of life Work-life balance
Government policies	Rural health policy Financial support programs Immigration and licensing regulations

Conclusion

In conclusion, the literature review, quality appraisal, and thematic analysis of the 25 articles offer insights into the various challenges and strategies related to physician

retention and addressing physician shortages in rural hospital health settings. This analysis identifies five major themes: financial incentives, physician autonomy, lifestyle, education, and government policies. Aligning these themes with Herzberg's two-factor theory highlights the significance of social, economic, and professional factors in increasing physician motivation and job satisfaction. Healthcare administrators may benefit by focusing on these areas to develop effective strategies for improving recruitment, retention, and overall healthcare delivery in rural communities.

Part 3: Presentation of Results and Interpretation of Findings

Healthcare administrators are faced with numerous challenges and obstacles to assist in the alleviation of physician shortages within rural hospital health systems. In this review, 25 articles were selected as being appropriate for further review which resulted in five major themes and 14 subthemes covering multifactorial approaches for potentially improving physician shortages. This section provides an explanation of the themes and subthemes and an interpretation of the findings.

Thematic Concepts Map

Once the five themes and 14 subthemes were determined, they were arranged strategically within the thematic concepts map (see Appendix E). The five major themes are the following: (a) improve physician education, (b) strengthening physician autonomy, (c) initiate financial incentives, (d) support lifestyle/personal preferences, and (e) enhance understanding of government policies. They each play a crucial role in understanding the broader landscape of improving rural healthcare. The 14 subthemes are linked to the five main themes and each other at many different levels. In addition, the map serves as supplementary data to demonstrate the connection between rural physician recruitment and retention. By mapping these elements, key areas can be identified where intervention or improvement is necessary to ensure that rural communities are sustainable for physicians, who are essential for rural residents' well-being.

Theoretical Foundation

Herzberg's two-factor theory provided an important role in attracting and retaining physicians within rural healthcare. It is valuable to explain connections between theory and research themes as it makes it simpler to identify which elements are critical

in obtaining and increasing physicians within underserved regions (Abbasi, 2022; Michaeli et al., 2021). Using this theory as it pertains to physician shortages in rural hospital health systems may be an insightful way for healthcare administrators to understand the true dynamics that impact physician decisions on whether to move or stay within rural practices. Salary is important to physicians, but even more important are motivators such as opportunities for advancement, teamwork, and recognition (Abbasi, 2022).

Explanation of Themes and Subthemes

The five themes and 14 subthemes are explained in this section and while each of them is important for this review, a few carry more weight in the practice of retaining rural physicians. If a physician is willing to make a commitment to practicing in a rural area, the lifestyle benefits need to be strongly encouraged as quality of life and a sense of belonging are what help physicians find satisfaction in their professional and personal lives (Herzberg et al., 1959). These qualities apply to Herzberg's two-factor theory related to intrinsic motivators, whereas the importance of extrinsic motivators is also important in regard to financial benefits that support the life-style and financial security of rural physicians (Abbasi, 2022).

Enhance Physician Education

Providing educational opportunities in rural communities can help physicians and potential physicians learn about rural health management and become familiar with rural settings. This may encourage them to return after completing their education (Figueiredo et al., 2023). Two subthemes are as follows:

- ***Training and education opportunities*** – Implementing educational programs within medical schools and residency training that are specifically designed for rural healthcare settings could encourage physicians to choose a rural setting (Asghari et al., 2020).
- ***Personal/professional development*** – Offering educational initiatives that ensure continuing medical education and facilitate peer networking opportunities helps reduce physician isolation and fosters professional satisfaction (Cosgrave, 2020).

Strengthen Physician Autonomy

Physicians' freedom and independence in making clinical decisions based on their professional judgment and medical knowledge may enhance their capacity to make independent decisions and broaden their scope of practice (Koebisch et al., 2020). This theme has three subthemes:

- ***Positive work environment*** – In rural healthcare environments, it is crucial for physicians to experience a sense of support, respect, appreciation, and value (Mohammadiaghdam et al., 2020).
- ***Implement telehealth*** – Using telehealth services in rural practices can enhance the convenience and accessibility of health services for residents in underserved areas, which may aid in retaining rural physicians (Butzner & Cuffee, 2021).
- ***Job satisfaction*** – Job satisfaction contributes to an overall sense of fulfillment, gratification, and enthusiasm in a physician's career and

workplace, promoting the achievement of needs, wants, and expectations within the professional environment (De Vries et al., 2023).

Support Lifestyle / Personal Preferences

By accommodating lifestyle and personal preferences for physicians working in rural healthcare settings, their needs are both professionally and personally prioritized and valued (DeMiglio et al., 2024). Subthemes for this theme are as follows:

- ***Sense of belonging*** – Physicians need to experience a sense of cultural belonging, form meaningful relationships with patients and staff, and maintain social connections within the community. Consequently, they perceive their workplace and practice environment as highly suitable (Dillion et al., 2022).
- ***Quality of life*** – Maintaining the comfort and wellbeing of physicians is important for their physical health, emotional health, and social relationships (Hu et al., 2022).
- ***Work life balance*** – Physicians must effectively balance the demands of their professional responsibilities with their personal life, family, and health. This balance enables them to manage their duties more efficiently and ensures that their commitments are equitably maintained (Kumar & Clancy, 2021).

Initiate Financial Incentives

The use of monetary benefits and compensation initiatives can be essential in attracting and retaining physicians to work in rural and underserved communities (Esu et al., 2021). Three subthemes fall under this theme:

- ***Loan forgiveness –*** Reducing or eradicating a physician's student loans can incentivize them to work for health systems for a set period (Figueiredo et al., 2023).
- ***Salary and benefits*** – Physicians working in underserved areas should be provided with higher base salaries and additional benefits such as rural practice premiums, sign-on bonuses, and relocation and housing allowances (Darbyshire et al., 2021).
- ***Quality incentive programs*** – This benefit aims to incentivize physicians for providing high-quality and effective patient care, based on measurable outcomes and clinical performance (Noya et al., 2021).

Enhance Understanding of Government Policies

Improved strategies for understanding programs within state, federal, or local governments may enhance physicians' willingness to work in underserved areas (Kumar & Clancy, 2021). This theme has the following three subthemes:

- ***Financial support programs*** – Initiatives such as government grants enhance the accessibility of rural physician practices by providing financial support and resources for rural health systems (Hu et al., 2021).
- ***Rural health policies*** – To address physician shortages rural health policies often expand the practice scope for rural physicians through regulations, training programs, and system design (Ferreira et al., 2024).
- ***Immigration and licensing regulations*** – Policies that provide support for international medical graduates have the potential to enhance the number of

physicians practicing in rural hospital health systems (Arrendondo et al., 2023).

Interpretation of Findings

Improve Physician Education

Research indicates that increasing the number of physicians who opt for rural practice requires addressing medical education across three distinct phases of a family physician's career: pre-medical school, medical school, and post-medical school (Asghari et al., 2020). Strategies must offer incentives throughout all three phases to effectively attract and retain physicians in rural hospital health systems (Asghari et al., 2020; Figueiredo et al., 2023). The introduction of rural curricula within medical schools has been associated with an increased likelihood of physicians choosing to practice in rural health systems after graduation (Figueiredo et al., 2023). Consequently, education serves as a crucial initial step in attracting and retaining rural physicians, acting as a catalyst to spark interest among physicians from an early stage to practice within rural communities (Holst, 2020; Ogden et al., 2020). Education factors that are utilized to attract and retain rural physicians align with Herzberg's two-factor theory regarding various motivators (Herzberg et al., 1959). These Herzberg factors serve dual roles: as motivators by offering opportunities for growth, purpose, and fulfillment, and as hygiene factors by reducing dissatisfaction through support and incentives (Mitsakis & Galanakis, 2022).

Training/Education Opportunities

Studies have shown that educational interventions have a positive outcome with increased rural retention of physicians and health care workers (Russel et al., 2021). Educational initiatives, including subsidized medical education programs, preferential

selection of rural students, and distributed training in rural locations, have been linked to the retention of physicians in rural hospital health systems (Rusell et al., 2021). Rabinowitz et al. (2022) found that students enrolled in the physician shortage area program are more likely to practice in rural communities after completing a clinical rotation in a rural area. Evidence indicates that earlier intervention before and during medical educational rotations increases residents' likelihood of future practice within rural healthcare settings (Lafortune & Gustafson, 2019; Rabinowitz et al., 2022). Early intervention and medical training have been established as significant factors in a multifactorial approach to attracting and retaining physicians in rural health systems (Lafortune & Gustafson, 2019).

Personal / Professional Development

Several studies have identified that a lack of professional development opportunities negatively impacts the retention of rural and remote physicians (Cosgrave, 2020). Hu et al. (2022) found that physicians are more likely to choose urban areas for "career advancement." Consequently, physicians are often attracted to rural practices due to the opportunities for professional growth, such as engaging in a broader scope of practice that these settings frequently offer (Hu et al., 2022). Research indicates that physicians who have access to continuing medical education, such as web-based training, mobile medical simulations, and other methods for career advancement, are likely to remain in rural practice (Hu et al., 2022).

Strengthen Physician Autonomy

Physician autonomy plays a crucial role in both attracting and retaining physicians in rural health systems as it gives physicians the ability to make independent

clinical and operational decisions. Rural physicians often have a greater possibility of autonomy due to having a broader scope of practice and working in smaller institutions that have a smaller layer of administration (Koebisch et al., 2020). Administrators have also developed strategies to facilitate the recruitment of physicians, such as contracting with locum tenens providers, which has proven effective in attracting physicians to work in rural hospitals (Ferreira, 2024). Locum tenens professionals are contracted on a temporary basis to fill vacancies or provide coverage for permanent physicians. The advantages of using locum providers include offering physicians' greater autonomy, part-time work opportunities, reduced workplace stress, and flexible work-life balance (Ferreira, 2024). However, contracting with locum tenens can be costly due to premium pay rates, agency fees, and added expenses like travel and housing. It may also disrupt continuity of care and team cohesion, as temporary providers often lack familiarity with patients, staff, and workflows. Additionally, onboarding, credentialing, and varying provider quality can create administrative burdens and impact care consistency (Ferreira, 2024). Physician autonomy is strongly associated with Herzberg's Two-Factor Theory, as granting physicians the ability to make independent decisions enhances job satisfaction. This increased satisfaction is a critical motivator for physicians to remain with rural organizations, ultimately improving rural physician retention (Jaffar et al., 2024).

Positive Work Environment

Mohammadiaghdam et al. (2020) found that positive working conditions significantly influence physician retention in rural areas. A working environment with high morale, flexibility, and non-hierarchical team structures has been associated with doctors' intention to stay and reduced workplace conflict (Raman, 2024). When elements

such as workplace safety, adequate work policies, and positive reinforcement are present, physicians are more likely to feel motivated, satisfied, and committed to the rural community they serve (Morris et al., 2023).

Telehealth

Rural medical practices have proposed solutions such as virtual care options, including video telehealth, to enhance access to specialized healthcare. Telehealth has increasingly become a valuable tool adopted by numerous health systems. It is particularly important for rural practices as it enables physicians to expand treatment access and reduce barriers to care in these settings (Butzner & Cuffee, 2021). Research by Butzner and Cuffee (2021) and Noya et al. (2021) indicated that telemedicine has the potential to address the persistent shortage of healthcare professionals in rural areas by enhancing physician recruitment and retention.

Job Satisfaction

Raman et al. (2024) evaluated the impact of low job satisfaction on increased job turnover. Job satisfaction emerged as the primary factor that researchers examined, consistently identified as a significant explanatory variable influencing hospital doctor recruitment and retention. At least 15 studies have shown that high job satisfaction is associated with increased physician retention (Raman et al., 2020). Research suggested that physicians who perceive their jobs as valuable are more likely to experience higher job satisfaction and successful job retention (De Vries et al., 2023; Raman et al., 2020). Physicians who find their work environment satisfactory, characterized by supportive colleagues, mutual respect, and a positive organizational culture, are inclined to view

rural positions favorably. Conversely, those experiencing low job demands, high stress levels, and workplace burnout are likely to discontinue rural practice (Renjel, 2019).

Support Lifestyle and Personal Preferences

A significant factor affecting physicians' decisions to practice in rural healthcare settings is the interplay of personal and lifestyle considerations (DeMiglio et al., 2024). The origins of physicians from rural areas are among the most reliable predictors for retaining practitioners in these regions (Noya et al., 2021). Studies consistently demonstrate that physicians with rural backgrounds are more inclined to establish their practices within rural communities (Hu et al., 2022). For physicians, considering working in rural settings lifestyle preferences can have a huge impact on their decision. Factors that attract physicians to rural practice include the desire to return to a small town, the aspiration to raise a family in a rural environment, and preference to practice a broader scope of medicine with more professional autonomy (Rabinowitz et al., 2022).

Physicians whose lifestyles align with those commonly found in rural communities tend to have a greater retention rate in rural practice (Ogden et al., 2020). Lifestyle and personal preference factors are directly associated with the hygiene factor category within Herzberg's Two-Factor theory. When these factors align with rural physicians' personal values, they can enhance job satisfaction. Herzberg's two-factor theory highlights the motivational attributes of a positive lifestyle, which may play a critical role in improving retention by increasing the physician's overall satisfaction (Mitsakis & Galanakis, 2022).

Sense of Belonging

The study conducted by De Vries et al. (2023) identified that the absence of a sense of belonging can lead to feelings of loneliness, social isolation, and alienation. Physicians are more likely to remain in a practice where they consistently feel heard and valued. An individual's sense of belonging is consistently influenced by their personal satisfaction with future life goals and how this aligns with the community. To attract and retain physicians the capability to establish meaningful connections with those in the community whether at work or not are essential for physicians' ability to stay (Dillion et al., 2022). Physicians who relocate to rural areas and experience ongoing social alienation and loneliness are likely to leave regardless of financial incentives. Consequently, it is essential for organizations to invest in strategies that effectively integrate physicians and their families into the community (Cosgrave, 2020).

Quality of Life

A strong positive infrastructure, opportunities for social interaction, children's education, and spouses' work prospects are significant aspects of personal support that impact physicians' quality of life (Hu et al., 2022). Koebisch et al. (2020) indicated that many physicians tend to choose cities based on the employment opportunities available for their spouse or partner. Research has shown that physicians whose spouses possess college degrees are less likely to practice in rural locations unless they can also find personally fulfilling careers (De Miglio et al., 2024). The quality of life in rural areas encompasses more than just compensation or clinical work; it involves creating a comfortable, supportive, and fulfilling environment for both the physician and their

family. Enhancing these aspects is often the most effective long-term strategy to improve the appeal and retention of physicians in rural regions (Raman et al., 2024).

Work Life Balance

Although rural areas present certain challenges, they offer a slower pace of life and more close-knit communities, which can enhance work-life balance. Maintaining a healthy equilibrium between personal and professional lives is highly valued by physicians, particularly as it helps prevent burnout (De Vries et al., 2023). Three aspects were identified by physicians as influencing their attitudes about their jobs: (a) finding significance in their work, (b) feeling heard and valued, and (c) social support and camaraderie with colleagues (Dillon et al., 2022). Work-life balance is significantly influential for rural physicians as it precisely affects well-being, job satisfaction and the probability of staying long term (Kumar & Clancy, 2021).

Implement Financial Incentives

Financial incentives include all additional monetary advantages provided to health professionals, such as bonuses, in-kind benefits, and other perks designed to reduce the opportunity costs of living and working in rural areas and attract physicians to these regions (Esu et al., 2021). Esu et al. (2021) suggested that financial incentives may enhance both short-term retention and recruitment, specifically during any period of obligation associated with payments. Hu et al. (2022) conducted a comprehensive literature analysis on the factors that influence primary care physicians' location choices and discovered that one of the most significant underlying factors affecting primary care physicians was financial incentives.

Financial incentives such as loan forgiveness, salary / benefits, and quality incentive programs can attract physicians by reducing financial strain (Lafortune & Gustafson, 2019). According to the Herzberg two factor theory, while financial incentives may not inherently enhance job satisfaction, they play a crucial role in preventing dissatisfaction. This aligns directly with Herzberg's framework, which advocates motivational factors that focus on fostering positive internal satisfaction (Herzberg et al., 1959).

Loan Forgiveness

The most prevalent incentive programs available within rural healthcare settings are loan repayment programs (Figueiredo et al., 2023). These programs aim to attract physicians by offering student loan repayment in return for a commitment to provide services over an extended duration. Healthcare administrators utilize this system to retain physicians who are interested in alleviating their student loan debt through prolonged service commitments (Arredondo et al., 2023). In the research article by Russell et al. (2021), it was found that physicians who received loan repayment incentives continued to practice in rural areas for an extended period, with more than half remaining there after 17 years.

Salary and Benefits

Physician retention is significantly influenced by extrinsic rewards provided by employers, such as salary and benefits (Arredondo et al., 2023). Predictably, the decision of physicians to continue working in their field is impacted by their salary (Morris et al., 2022). Darbyshire et al. (2021) further substantiated this assertion, demonstrating that

higher income correlates with lower turnover rates, whereas those who left the specialty had lower incomes compared to those who remained.

Quality Incentive Programs

To improve retention, Russell et al. (2021) proposed various professional and personal support strategies. These included providing more paid vacation time, housing grants, additional allowances, and transportation support based on a physician's service quality. Incentive structures focused on quality, rather than volume, are intended to appeal to physicians who seek meaningful and impactful work, with the potential for regional or national recognition for high-quality performance (Esu et al., 2021). Participants reported that physicians appreciate quality incentives, including bonuses and higher reimbursement rates, as these contribute to enhanced patient outcomes (Noya et al., 2021). It was also suggested that the organizational culture should prioritize the well-being of both current patients and physicians (Dillion et al., 2022).

Enhance Understanding of Government Policies

Incentives, training opportunities, and financial support are the main ways that government policies influence the recruitment and retention of doctors in rural areas (Kumar & Clancy, 2021). With an emphasis on expanding the number of doctors accessible to assist rural populations, these policies can have a direct influence on doctors' decisions whether to practice in rural communities. The policies have been known to be most effective when combined with the financial security of life-long government employment, effective implementation or with adequate financial and non-financial incentives, sufficient to overcome the increased cost, hardship and livability challenges in rural areas (Kumar & Clancy, 2021).

In alignment with the Herzberg two-factor theory, healthcare administrators who are well-versed in government policies and benefits can effectively disseminate information and facilitate the implementation of these policies (Purohit & Bandyopadhyay, 2014). This approach may enhance physician motivation and foster appreciation and loyalty towards the organization. Herzberg's two-factor theory offers valuable strategies for enhancing the attractiveness of rural areas. These strategies provide growth opportunities, and a sense of purpose aligned with various government policies and programs, thereby improving job satisfaction (Mitsakis & Galanakis, 2022).

Financial Support Programs

In middle and low-income rural countries, financial incentives for physicians may be more effective where the average income of the health workforce is below the cost of living (Kumar & Clancy, 2021). Financial support programs reduce the financial burden of medical education, improve income stability, and make rural practice more viable. Physician financial incentives such as signing bonuses upon accepting a job, moving stipends for relocation costs, and housing allowances or subsidized accommodation are some methods rural health systems us to attract and retain physicians for an extended amount of time. Physicians choosing rural practice locations are more likely to be motivated by compensation (Hu et al., 2021)

Rural Health Policies

Rural health policies frequently aim to broaden the practice scope for rural physicians in response to workforce shortages and the scarcity of specialists (Ferreira et al., 2024). These policies facilitate, endorse, and validate the expanded roles of rural doctors through regulatory measures, training programs, and system design. The National

Rural Health Association (NRHA) is the primary federal program that provides education, advocacy, policies, and research to further medical care in rural counties (NRHA, 2025). Furthermore, rural grants and policies contribute to transforming the rural experience into a sustainable long-term career option (Raman et al., 2024). These initiatives are instrumental in improving physician retention in rural areas by addressing the core issues that cause doctors to leave or hesitate to commit for extended durations.

Immigration and Licensing Regulations

States commonly offer waivers of the J-1 visa, which removes the requirement that J-1 visa holders return to their home countries for a minimum of 2 years after completing their training, to entice international medical graduates to health professional shortage areas (Hu et al., 2022). Instead, international medical students who agree to work for at least three years in a federally designated health professional shortage area (HPSA), which usually rural or underserved, can begin practicing in the United States immediately after the full completion of their training thanks to the J-1 visa waivers (Arrendondo et al., 2023). In addition to addressing current labor shortages, the waiver allows these regions to access and retain highly qualified medical professionals who would otherwise be prohibited from remaining in the United States (Hu et al., 2022).

Conclusion

Given the increasing shortage of physicians in rural communities, it is important for healthcare administrators to prioritize and implement strategies that attract and retain medical professionals. Interventions to increase rural physician retention should target factors such as (a) improving physician education, (b) strengthening physician autonomy, (c) initiating financial incentives, (d) supporting lifestyle/personal preferences, and (e)

enhancing understanding of government policies. Although research demonstrates that many factors are important, physicians' decisions to practice in rural areas are generally shaped by multiple considerations. Therefore, conducting an in-depth analysis of the specific incentives motivating physicians to choose rural practice is essential for developing more effective recruitment and retention strategies. Such approaches should encompass the entire span of a medical career and address the needs of both practitioners' families and rural communities. Improving physician retention in non-metropolitan regions holds the potential to enhance the health and wellbeing of populations living in rural and remote areas.

Part 4: Recommendation for Professional Practice and Implications for Social Change

When strategies are implemented to increase the number of physicians in underserved areas, several important outcomes can occur. An expansion in the physician workforce results in greater accessibility to primary care, preventive services, and specialist referrals. This advancement supports increased health equity within communities, reinforces public health systems, and helps reduce health disparities that are often present in rural regions (Arrendondo, 2023). Implementing a comprehensive model focused on enhancing recruitment and retention will significantly influence various aspects of care, including (a) improving physician education, (b) strengthening physician autonomy, (c) initiating financial incentives, (d) supporting lifestyle and personal preferences, and (e) increasing understanding of government policies.

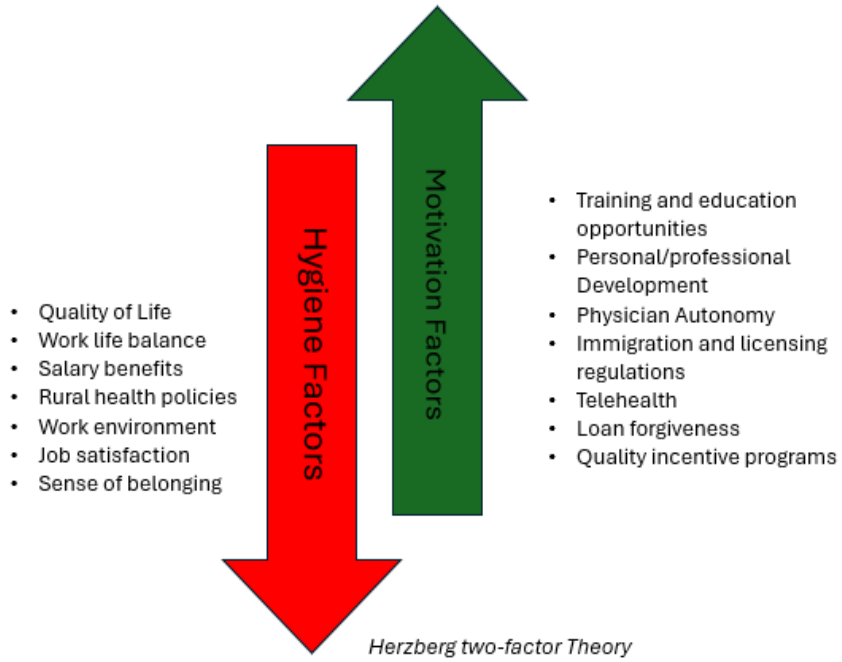
Theoretical Framework

Herzberg's two-factor theory posits that job satisfaction and dissatisfaction are influenced by distinct factors: motivators and hygiene factors. By implementing Herzberg's two-factor theory, which categorizes these factors into motivators (intrinsic job satisfaction) and hygiene factors (extrinsic job dissatisfaction), a focused model can be developed to enhance and retain physicians in underserved areas (Abbasi, 2022; Michaeli et al., 2021). This can be achieved by aligning key themes and subthemes to formulate strategies that address both what genuinely motivates physicians and what mitigates their dissatisfaction (Herzberg et al., 1959). This framework provided essential insights for healthcare administrators to effectively recruit and retain physicians within their health system. Motivation factors and hygiene factors play a significant role in influencing employee job satisfaction, motivation, wellbeing, positivity, and employee

turnover (Mitsakis & Galanakis, 2022). Consequently, when healthcare administrators implement this framework, it can help enhance employee job satisfaction and motivation. Additionally, healthcare administrators can identify and address barriers to mitigate physician shortages in the overall healthcare system (Mitsakis & Galanakis, 2022).

Figure 2

Relationship of Herzberg's Two Factor Theory to the Retention of Physicians



Recommendations for Professional Practice

Recommendation 1: Healthcare Administrators Should Utilize Targeted Recruitment Strategies to Promote Their Organization to Physicians

Administrators can develop an informed and customized approach to enhance their vision and promote initiatives aimed at increasing the appeal of careers within rural health systems for physicians (Figueiredo et al., 2023). Consequently, administrators can

create focused recruitment strategies designed to attract physicians. Implementing these targeted strategies is crucial for health systems to draw in candidates efficiently, leading to significant improvements in hiring processes and yielding positive outcomes for both the organization and its patients.

Herzberg's two-factor theory suggests that incentives play a significant role in influencing workers, including physicians, to affiliate with an organization. Effective recruitment strategies may encompass the offer of competitive salaries and financial incentives such as signing bonuses and student loan repayments. Additionally, funding initiative packages for physicians, including relocation reimbursement, housing assistance, and daycare cost coverage, can provide substantial incentives to attract and retain physicians in the area (Asghari et al., 2020). Nevertheless, although monetary incentives can be advantageous, they do not always ensure that physicians will remain with a practice over the long term.

Health administrators can formulate strategies aimed at professional development and individual autonomy. Specifically, they can establish clear career progression pathways that encompass leadership development programs (e.g., medical director training) and opportunities for research or academic affiliations (Cosgrave, 2020). Additionally, administrators can strategize engagement in rural health policy and provide training in advocacy, public health policy, or grant writing. This approach enables physicians to assume roles such as state rural health board members and public health advisors. Consequently, this offers long-term professional objectives beyond clinical care, facilitating professional development opportunities and career advancement for physicians (Hu et al., 2022).

Recommendation 2: Administrators in Rural Organizations Should Seek Ways to Establish Collaborations With Regional Education Institutions and Create Medical Education and Training Programs Specifically Tailored to Rural Communities

Medical education and training focused on rural areas are important strategies for increasing the presence of physicians in rural and underserved regions. Programs targeting students from rural backgrounds (Russel et al., 2021) significantly improve the chances of rural practice post-graduation. Students exposed to rural environments during their medical school and residency programs become acquainted with rural patients, health systems, and lifestyles.

Herzberg's two-factor theory posits that the connections and incentives experienced by students from rural backgrounds may influence their decision to practice in rural areas. However, other physicians will benefit from tailored curricula that address the clinical, cultural, and logistical challenges of rural medicine. These specialized programs can equip rural doctors with a comprehensive range of skills necessary for rural settings (Rabinowitz et al., 2022). Training in telemedicine, emergency care, and chronic disease management can enhance doctors' preparedness and confidence to practice independently in remote areas.

The Rural Physician Associate Program (RPAP) is a program designed to prepare medical students for practice in rural areas. Third-year medical students at the University of Minnesota who reside and train in rural areas of Minnesota and western Wisconsin participate in the 9-month RPAP, which is a community-based training experience (NRHA, 2025). As they provide care for patients of all ages, RPAP students gain practical experience related to clinical medicine, procedures, community health, and

medical business. RPAP students follow patients and their families through the course of a pregnancy or illness, experiencing the entire range of rural medical treatment. As students develop close relationships with patients and communities over time, the program also offers a special chance to understand how socioeconomic determinants of health impact rural patients (NRHA, 2025).

Recommendation 3: Rural organizations Should Develop Interprofessional Collaboration and Teamwork, Which May Contribute to Increased Physician Retention, Potentially Benefiting Staff, Patients, and Peers

Interprofessional collaboration has the potential to significantly enhance physician recruitment and retention in rural hospital health systems by creating a more supportive, productive, and fulfilling work environment. Physicians often face considerable challenges, especially in rural settings. By distributing clinical responsibilities among nurse practitioners, physician assistants, social workers, pharmacists, and other healthcare professionals, the likelihood of physician burnout can be reduced (Koebisch et al., 2020). Physicians are more likely to remain in settings where they are not overworked and can concentrate on providing high quality patient care. Newly trained or early-career physicians typically feel more connected and supported, which creates a team-oriented environment that boosts job satisfaction and retention, especially in rural areas where feelings of isolation are prevalent (Ferreira, 2024). Care coordination is enhanced, mistakes are decreased, and socioeconomic determinants of health are more effectively addressed through collaborative care.

Herzberg's two-factor theory supports intrinsic benefits that extend beyond tangible incentives, engaging physicians on a personal level. An organization aligned

with such initiatives is the A&M Health Rural Engagement Program. This program is important as it assists rural healthcare providers by pooling resources from various university colleges to enhance access and quality of care in rural areas (Texas A&M Rural and Community Health Institute [ARCHI], 2025).

Recommendation 4: Administrators in Rural Communities Should Actively Participate in Community Activities to Foster Partnerships Between the Community and Healthcare Providers

Addressing the challenges faced by rural doctors, such as social isolation and burnout, requires focusing on community integration. Establishing a more welcoming and supportive environment, fostering a sense of community, and promoting work-life balance are crucial for attracting and retaining physicians in rural hospital health systems (Morris et al., 2023). Physicians are more likely to remain in their positions when they feel a sense of belonging within their community. Community engagement facilitates long-term retention by helping doctors and their families form connections, identify social and recreational opportunities, and feel valued and supported (Mohammadiaghdam et al., 2020).

Initiatives like the Texas A&M Rural and Community Health Institute (ARCHI), a health extension center under Texas A&M Health, provide a crucial connection between researchers, academic institutions, rural healthcare organizations, and policymakers (ARCHI, 2025). Its main goal is to lessen health disparities while enhancing rural areas' access to and quality of healthcare. ARCHI supports workforce development and integrated rural healthcare teams in collaboration with the Telehealth Institute and the Colleges of Medicine, Nursing, and Pharmacy at Texas A&M (ARCHI,

2025.). In addition to improving patient safety and operational effectiveness, its initiatives also assist recruit and retain rural workers, guarantee the sustainability of critical access hospitals, and influence national rural health policies.

Implications for Social Change

For several decades, rural communities in the United States have experienced persistent physician shortages, with projections indicating that these deficits may reach between 37,800 and 124,000 by 2034 (Research Triangle Institute, 2023). Rural areas frequently lack adequate medical services, demonstrate lower average income levels, and face multiple barriers to healthcare access (Arredondo et al., 2023). This integrative review was conducted to analyze key themes associated with attracting and retaining physicians in rural settings, aiming to inform strategies for fostering positive social change through improved healthcare delivery.

The development of targeted recruitment strategies, coupled with the implementation of medical education and training programs that foster interprofessional collaboration and teamwork, can effectively enhance partnerships between communities and healthcare providers (DeMiglio et al., 2024). Such initiatives are instrumental in ensuring that individuals residing in rural areas have access to high-quality medical care, thereby advancing public health outcomes. Physician retention in rural areas promotes health equity by facilitating the delivery of consistent care, reducing barriers to access, and fostering trust within underserved communities - contributing positively to social determinants of health (Arredondo et al., 2023; DeMiglio et al., 2024). Addressing these social determinants is further advanced through healthcare services that prioritize preventive measures such as cancer screenings, maternal health care, and chronic disease

management, all of which help diminish disparities. Sustained physician presence in rural hospitals reinforces positive social change by ensuring reliable healthcare availability and bolstering public confidence in medical services when needed (Hu et al., 2022).

Limitations

This integrative review analyzed sources concerning rural physician retention and identified strategies that can be used to recruit and retain physicians in rural and underserved areas. However, this review has limitations that may affect the interpretation of findings. Several studies included in this integrative review employed small sample sizes, which may limit the ability to detect true effects and reduce representativeness across diverse rural populations. In addition, several studies lacked precise definitions of the rural environment, resulting in considerable differences across rural areas regarding geography, infrastructure, and healthcare systems, which makes generalization of results difficult. Although the research identified several determinants influencing physician retention, it did not quantify the relative impact of each factor. Recruitment and retention are shaped by a range of educational, personal, professional, financial, and governmental influences, making it difficult to attribute outcomes to any single cause. Additionally, variables such as “sense of belonging” and “job satisfaction” present empirical measurement challenges.

Conclusion

To sum up, interprofessional collaboration, community integration, targeted recruitment tactics, and medical education and training with a rural focus are all essential to improving the recruitment and retention of rural physicians. These strategies collectively address the professional and personal factors that influence a physician’s

decision to practice and remain in rural areas (Arredondo et al., 2023). They do this by coordinating recruitment efforts with the unique needs and values of rural communities, preparing future physicians through specialized educational pathways, encouraging collaboration among healthcare professionals, and integrating physicians into the social fabric of the communities they serve. When combined, they produce a stable and encouraging atmosphere that draws in skilled medical professionals and fosters a sustained dedication to rural healthcare.

Healthcare administrators looking to improve the recruitment and retention of rural physicians will also find this review to be a useful resource. It offers a thorough framework for well-informed decision-making by combining evidence-based tactics and emphasizing the connections between hiring, training, teamwork, and community involvement. Administrators can use these insights to create focused policies, make efficient use of resources, and put supportive programs in place that are suited to the difficulties associated with providing healthcare in rural hospital health systems. In the end, this review gives healthcare executives the information they need to build more robust rural healthcare systems and promote stable physician staffing in the future.

References

Abbasi, J. (2022). Pushed to their limits, 1 in 5 physicians intend to leave practice. *JAMA*, *327*(15), 1435–1437. https://doi.org/10.1001/jama.2022.5074

American Hospital Association. (2022). *Strengthening the health care workforce*. https://www.aha.org/system/files/media/file/2022/09/Strengthening-the-Health-Care-Workforce-Complete-20220909.pdf

Asghari, S., Kirkland, M., Blackmore, J., Boyd, S., Farrell, A., Rourke, J., Aubrey-Bassler, K., Godwin, M., Oandasan, I., & Walczak, A. (2020). A systematic review of reviews: Recruitment and retention of rural family physicians. *Canadian Journal of Rural Medicine*, *25*(1), 20–30. https://doi.org/10.4103/cjrm.cjrm_4_19

Association of American Medical Colleges. (2024, March). *The complexities of physician supply and demand: Projections from 2021 to 2036*. https://www.aamc.org/media/75236/download

Arredondo, K., Touchett, H. N., Khan, S., Vincenti, M., & Watts, B. V. (2023). Current programs and incentives to overcome rural physician shortages in the United States: A narrative review. *Journal of General Internal Medicine*, *38*(Suppl 3), 916–922. https://doi.org/10.1007/s11606-023-08122-6

Butzner, M., & Cuffee, Y. (2021). Telehealth interventions and outcomes across rural communities in the United States: Narrative review. *Journal of Medical Internet Research*, *23*(8), Article e29575. https://doi.org/10.2196/29575

Cosgrave, C. (2020). The whole-of-person retention improvement framework: A guide for addressing health workforce challenges in the rural context. *International*

Journal of Environmental Research and Public Health, *17*(8), Article 2698. https://doi.org/10.3390/ijerph17082698

Darbyshire, D., Brewster, L., Isba, R., Body, R., Basit, U., & Goodwin, D. (2021). Retention of doctors in emergency medicine: A scoping review of academic literature. *Emergency Medicine Journal: EMJ*, *38*(9), 663–672. https://doi.org/10.1136/emermed-2020-210450

Darves, B. (2023, January 30). *Demystifying urban versus rural physician compensation*. NEJM Career Center. https://resources.nejmcareercenter.org/article/demystifying-urban-versus-rural-physician-compensation/#

Davis, C. E., Lamson, A. L., & Black, K. Z. (2022). MEDFTs' role in the recruitment and retention of a diverse physician population: A conceptual model. *Contemporary Family Therapy*, *44*(1), 88–100. https://doi.org/10.1007/s10591-021-09627-0

De Figueiredo, A. M., De Labry Lima, A. O., De Figueiredo, D. C., De Melo Neto, A. J., Rocha, E. M. S., & De Azevedo, G. D. (2023). Educational strategies to reduce physician shortages in underserved areas: A systematic review. *International Journal of Environmental Research and Public Health, 20*(11), Article 5983. https://doi.org/10.3390/ijerph20115983

DeMiglio, L., Jolicoeur, J., Lamb, I. R., Cousins, M., Nutbrown, L., & Orrantia, E. (2024). Draw to practice: A qualitative study examining factors attracting physicians to rural northern Ontario. *Cureus*, *16*(2), Article e55074. https://doi.org/10.7759/cureus.55074

DeVries, N., Boone, A., Godderis, L., Bouman, J., Szemik, S., Matranga, D., & de Winter, P. (2023). The race to retain healthcare workers: A systematic review on

factors that impact retention of nurses and physicians in hospitals. *Inquiry: A Journal of Medical Care Organization, Provision and Financing*, *60*, Article 469580231159318. https://doi.org/10.1177/00469580231159318

Dillon, E. C., Tai-Seale, M., Meehan, A., Martin, V., Nordgren, R., Lee, T., Nauenberg, T., & Frosch, D. L. (2020). Frontline perspectives on physician burnout and strategies to improve well-being: Interviews with physicians and health system leaders. *Journal of General Internal Medicine*, *35*(1), 261–267. https://doi.org/10.1007/s11606-019-05381-0

Esu, E. B., Chibuzor, M., Aquaisua, E., Udoh, E., Sam, O., Okoroafor, S., Ongom, M., Effa, E., Oyo-Ita, A., & Meremikwu, M. (2020). Interventions for improving attraction and retention of health workers in rural and underserved areas: A systematic review of systematic reviews. *Journal of Public Health, 43*(Supplement_1), i54–i66. https://doi.org/10.1093/pubmed/fdaa235

Ferreira, N., McKenna, O., Lamb, I. R., Campbell, A., DeMiglio, L., & Orrantia, E. (2024). Approaches to locum physician recruitment and retention: A systematic review. *Human Resources for Health*, *22*(1), Article 24. https://doi.org/10.1186/s12960-024-00906-z

Figueiredo, A. M., Labry Lima, A. O., Figueiredo, D. C. M. M., Neto, A. J. M., Rocha, E. M. S., & Azevedo, G. D. (2023). Educational strategies to reduce physician shortages in underserved areas: A systematic review. *International Journal of Environmental Research and Public Health, 20*(11), Article 5983. https://doi.org/10.3390/ijerph20115983

Germack, H. D., Kandrack, R., & Martsolf, G. R. (2019). When rural hospitals close, the

physician workforce goes. *Health Affairs*, *38*(12), 2086–2094. https://doi.org/10.1377/hlthaff.2019.00916

Gong, G., Phillips, S. G., Hudson, C., Curti, D., & Philips, B. U. (2019). Higher US rural mortality rates linked to socioeconomic status, physician shortages, and lack of health insurance. *Health Affairs (Project Hope)*, *38*(12), 2003–2010. https://doi.org/10.1377/hlthaff.2019.00722

Health Resources and Services Administration. (2023). *State of the primary care workforce, 2023*. U.S. Department of Health and Human Services. https://bhw.hrsa.gov/sites/default/files/bureau-health-workforce/data-research/state-of-primary-care-workforce-2023.pdf

Herzberg, F., Mausner, B., & Snyderman, B. B. (1959). *The motivation to work* (2nd ed.). John Wiley.

Holst, J. (2020). Increasing rural recruitment and retention through rural exposure during undergraduate training: An integrative review. *International Journal of Environmental Research and Public Health*, *17*(17), Article 6423. https://doi.org/10.3390/ijerph17176423

Hu, X., Dill, M. J., & Conrad, S. S. (2022). What moves physicians to work in rural areas? An in-depth examination of physician practice location decisions. *Economic Development Quarterly*, *36*(3), 245–260. https://doi.org/10.1177/08912424211046600

Koebisch, S., Rix, J., & Holmes, M. (2020). Recruitment and retention of healthcare professionals in rural Canada: A systematic review. *Canadian Journal of Rural Medicine*, *25*(2), 67–78. https://doi.org/10.4103/cjrm.cjrm_43_19

Kulka, A., & McWeeny, D. (2019, December 12). *Rural physician shortages and policy intervention*. SSRN. https://doi.org/10.2139/ssrn.3481777

Kumar, S., & Clancy, B. (2020). Retention of physicians and surgeons in rural areas—what works? *Journal of Public Health*, *43*(4), e689–e700. https://doi.org/10.1093/pubmed/fdaa031

Lafortune, C., & Gustafson, J. (2019). Interventions to improve recruitment and retention of physicians in rural and remote Canada: A systematic review. *University of Western Ontario Medical Journal*, *88*(1), 16–19. https://doi.org/10.5206/uwomj.v88i1.6184

Machado, S. R., Jayawardana, S., Mossialos, E., & Vaduganathan, M. (2021). Physician density by specialty type in urban and rural counties in the US, 2010 to 2017. *JAMA Network Open*, *4*(1), Article e2033994. https://doi.org/10.1001/jamanetworkopen.2020.33994

Malayala, S. V., Vasireddy, D., Atluri, P., & Alur, R. S. (2021). Primary care shortage in medically underserved and health provider shortage areas: Lessons from Delaware, USA. *Journal of Primary Care and Community Health*, *12*, Article 215013272199401. https://doi.org/10.1177/2150132721994018

Michaeli, D. T., Michaeli, J. C., Albers, S., & Michaeli, T. (2024). The healthcare workforce shortage of nurses and physicians: Practice, theory, evidence, and ways forward. *Policy, Politics & Nursing Practice*, *25*(4), 216–227. https://doi.org/10.1177/15271544241286083

Mitsakis, M., & Galanakis, M. (2022). An empirical examination of Herzberg's theory in the 21st century workplace. *Psychology*, *13*, 264–272.

https://doi.org/10.4236/psych.2022.132015

Mohammadiaghdam, N., Doshmangir, L., Babaie, J., Khabiri, R., & Ponnet, K. (2020). Determining factors in the retention of physicians in rural and underdeveloped areas: A systematic review. *BMC Family Practice*, *21*(1), Article 216. https://doi.org/10.1186/s12875-020-01279-7

Morris, M. E., Brusco, N. K., McAleer, R., Billett, S., Brophy, L., Bryant, R., Carey, L., Wright, A. C., East, C., Eckert, M., Edvardsson, K., Fetherstonhaugh, D., Fowler-Davis, S., Frederico, M., Gray, R., McCaskie, D., McKinstry, C., Mitchell, R., Oldenburg, B., . . . Blackberry, I. (2023b). Professional care workforce: A rapid review of evidence supporting methods of recruitment, retention, safety, and education. *Human Resources for Health*, *21*(1), Article 95. https://doi.org/10.1186/s12960-023-00879-5

Mui, P., Gonzalez, M. M., & Etz, R. (2020). What is the impact on rural area residents when the local physician leaves? *Family Medicine*, *52*(5), 352–356. https://doi.org/10.22454/FamMed.2020.337280

Noya, F., Carr, S., Freeman, K., Thompson, S., Clifford, R., & Playford, D. (2022). Strategies to facilitate improved recruitment, development, and retention of the rural and remote medical workforce: A scoping review. *International Journal of Health Policy and Management*, *11*(10), 2022–2037. https://doi.org/10.34172/ijhpm.2021.160

Ogden, J., Preston, S., Partanen, R. L., Ostini, R., & Coxeter, P. (2020). Recruiting and retaining general practitioners in rural practice: Systematic review and meta-analysis of rural pipeline effects. *The Medical Journal of Australia*, *213*(5), 228–

236. https://doi.org/10.5694/mja2.50697

Rabinowitz, H. K., Motley, R. J., Markham, F. W., & Love, G. A. (2022). Lessons learned as Thomas Jefferson University's Rural Physician Shortage Area Program (PSAP) approaches the half-century mark. *Academic Medicine*, *97*(9), 1264–1267. https://doi.org/10.1097/acm.0000000000004710

Raman, S. S., McDonnell, A., & Beck, M. (2024). Hospital doctor turnover and retention: A systematic review and new research pathway. *Journal of Health Organization and Management*, *38*(9), 45–71. https://doi.org/10.1108/jhom-04-2023-0129

Renjel, R. A., Ficalora, R., & Canaris, G. (2019). Internal medicine physician job satisfaction in rural Montana and Northern Wyoming - A qualitative analysis. *Journal of Community Hospital Internal Medicine Perspectives*, *9*(5), 384–391. https://doi.org/10.1080/20009666.2019.1663590

Research Triangle Institute. (2023, January 17). *Overlooked Americans: The toll of chronic disease in rural America*. Research Triangle Institute. https://www.rti.org/publication/overlooked-americans-toll-chronic-disease-rural-america.

Russell, D., Mathew, S., Fitts, M., Liddle, Z., Murakami-Gold, L., Campbell, N., Ramjan, M., Zhao, Y., Hines, S., Humphreys, J. S., & Wakerman, J. (2021). Interventions for health workforce retention in rural and remote areas: A systematic review. *Human Resources for Health*, *19*(1), Article 103. https://doi.org/10.1186/s12960-021-00643-7

Streeter, R. A., Snyder, J. E., Kepley, H., Stahl, A. L., Li, T., & Washko, M. M. (2020). The geographic alignment of primary care Health Professional Shortage Areas

with markers for social determinants of health. *PLOS ONE*, *15*(5), Article e0231443. https://doi.org/10.1371/journal.pone.0231443

Shipman, S. A., Wendling, A., Jones, K. C., Kovar-Gough, I., Orlowski, J. M., & Phillips, J. (2019). The decline in rural medical students: A growing gap in geographic diversity threatens the rural physician workforce. *Health Affairs*, *38*(12), 2011–2018. https://doi.org/10.1377/hlthaff.2019.00924

Stringer, B., Thacker, C., Reyes, J., Helmer, S. D., & Vincent, K. B. (2020). Trouble on the horizon: An evaluation of the general surgeon shortage in rural and frontier counties. *The American Surgeon*, *86*(1), 76–78. https://doi.org/10.1177/000313482008600132

Vaughan, L., & Edwards, N. (2024, April). The problems of smaller, rural, and remote hospitals: Separating facts from fiction. *Future Healthcare Journal, 7*(1), 38–45. https://doi.org/10.7861/fhj.2019-0066

Zhang, X., Lin, D., Pforsich, H., & Lin, V. W. (2020). Physician workforce in the United States of America: Forecasting nationwide shortages. *Human Resources for Health*, *18*(1), Article 8. https://doi.org/10.1186/s12960-020-0448-3

Appendix A: DHA Practice-Based Problem Literature Review Matrix

Author/date	Theoretical/ conceptual framework	Research question(s)/ hypotheses	Methodology	Analysis & results	Conclusions	Implications for future research	Implications for practice	Empirical research? (Yes or No)
1.Germack, H. D., Kandrack, R., & Martsolf, G. R. (2019). When rural hospitals close, the physician workforce goes. *Health Affairs*, *38*(12), 2086–2094. https://doi.org/10.1377/hlthaff.2019.00916	Quality of care	Potentially dynamic relationship between hospital closures and the supply of physicians in rural communities	Used publicly available data from the Area Health Resources Files for all US counties over the years 1997–2016	The final analytic sample consisted of 1,541 rural counties over a twenty-year period (30,820 county-years). 309 rural counties experienced at least one year with a hospital closure, and 71 counties experienced more than one year with a closure. Specifically,1q estimated a 9.2 percent average annual decrease in the supply of all physicians in counties after a closure.	Rural hospital closures were associated with long-term decreases in the supply of physicians in rural counties	Dynamic relationship between physician supply and hospital closures has been largely unexamined Preventing hospital closures could be a policy priority to sustain rural health care systems	Alternative institutions and potential new models are necessary to keep hospital closures from having a devastating impact on the health of rural communities.	yes
2.Malayala, S. V., Vasireddy, D., Atluri, P., & Alur, R. S. (2021). Primary care shortage in medically underserved and health provider shortage areas:	Quality of Care	To examine the reasons contributing to the physician shortage in the country's medically underserved areas using the state of	A survey interviewing the physicians recruited through this program to identify any challenges faced by them	Thorough review of the "Conrad 30 J1 VISA waiver program" The number of primary care physicians providing direct patient care in Delaware in 2018	The state of Delaware has a significant physician shortage due to multiple factors. The existing programs to	Future research could explore the effectiveness of telemedicine in alleviating primary care shortages, particularly for routine	Healthcare systems should consider expanding the role of nurse practitioners (NPs) and physician assistants (PAs)	Yes

Lessons from Delaware, USA. *Journal of Primary Care and Community Health*, *12*, 215013272199401. https://doi.org/10.1177/2150132721994018		Delaware as a focus state.	was designed and conducted.	had declined about 6% from 2013	recruit physicians to underserved areas seem to be inadequate.	consultations, chronic disease management, and preventive care.	to improve access to care, particularly in underserved and rural areas.	
3.Vaughan, L., & Edwards, N. (2024, April). The problems of smaller, rural, and remote hospitals: Separating facts from fiction. *Future Healthcare Journal, 7*(1), 38–45. https://doi.org/10.7861/fhj.2019-0066	Theoretical	A quarter of all smaller hospitals in the USA are now thought to be on the brink of closure.	Focus on problems associated with how remote hospitals function.	Quantitative	There is substantial evidence that hospital closures cause direct harm to patients, increase the burdens on the system and contribute to deprivation and health inequalities.	Examine financial models that could help sustain rural hospitals, such as partnerships with larger hospitals or changes in reimbursement policies.	Alternative structures, policies and funding mechanisms, based on the evidence, are urgently needed to support smaller hospitals in the UK and elsewhere.	Yes
4. Health Resources and Services Administration (HRSA). (2023). *State of the primary care workforce, 2023*. U.S. Department of Health and Human Services. https://bhw.hrsa.gov/sites/default/files/bureau-health-workforce/data-research/state-of-	none	Improving access to primary care services and increasing the number of practicing PCPs are key components to achieving national objectives in the Health Resources and Services Administration	Data collected from health workforce data analysis	65.5% of designated primary care HPSAs are in rural areas. Based on a minimum adequate population-to-primary care physician ratio of 3,500 to 1, HRSA estimates that the United States needs 17,396 additional physicians to	The primary care workforce is not distributed equally among geographic areas, many rural areas face low rates of physicians.	It would be valuable to examine factors that influence physicians' decisions to practice in rural versus urban areas, including financial incentives, lifestyle preferences, and professional	Healthcare organizations and policymakers should consider targeted recruitment strategies to recruit medical professionals to rural and underserved areas.	no

primary-care-workforce-2023.pdf		(HRSA) strategic plan,		remove all primary care shortage destinations.		development opportunities.		
5, American Hospital Association. (2022). *Strengthening the health care workforce*. American Hospital Association. https://www.aha.org/system/files/media/file/2022/09/Strengthening-the-Health-Care-Workforce-Complete-20220909.pdf	none	Strategies and resources to aid in supporting and strengthening the healthcare workforce	Bureau of Labor Statistics (BLS) data on national trends and benchmarks:	Report on shortages in physicians located in rural areas	The resulting shortages have led to some challenges, but also some creative solutions to think about workflow	Further research into the mental and emotional toll on healthcare workers in isolated environments.	Support for staff retention strategies, training, and mental health resources for rural healthcare professionals.	No
6.Kulka, A., & McWeeny, D. (2019, December 12). *Rural physician shortages and policy intervention*. SSRN. https://ssrn.com/abstract=3481777 or http://dx.doi.org/10.2139/ssrn.3481777	Quality of life	We analyze the effects of incentive programs intended to eliminate physician shortages.	Data collection Census from Bureau, the Bureau of Labor Statistics, the Federal Bureau of Investigation, the Federal Emergency Management Agency, and the Dartmouth Atlas of Healthcare,	Using differences in differences analysis. As a result, current incentive payments are too small to eliminate shortages	Using a differences-in-differences identification strategy, the study shows that student loan forgiveness programs increase the number of physicians by about three physicians per rural county.	Due to persistent severe shortages Future research into understanding why this is the case requires a more thorough analysis of physicians' preferences and their responsiveness to incentives	Policy makers should expand loan forgiveness programs	yes
7. Shipman, S. A., Wendling, A., Jones, K. C., Kovar-Gough, I., Orlowski, J. M., & Phillips, J. (2019).	Theoretical	Study reports on the fifteen-year decline in the number of rural medical students,	Obtained data on applicants and matriculants from the	We examined the trend in numbers of applicants and matriculants from rural and urban	This study has made it clear that students from a rural background	Efforts to reinforce the rural pipeline into medicine warrant further	Policy makers and other stakeholders should recognize the	yes

The decline in rural medical students: A growing gap in geographic diversity threatens the rural physician workforce. *Health Affairs*, *38*(12), 2011–2018. https://doi.org/10.1377/hlthaff.2019.00924		culminating in rural students' representing less than 5 percent of all incoming medical students in 2017.	American Medical College Application Service for the period 2002–03 through 2017–18	backgrounds and compared rural and urban counterparts. There were 618,856 applicant records and 281,845 matriculants who satisfied our inclusion criteria. The number of applicants from a rural background declined 18 percent during the study period,	are an increasingly underrepresented group in medical school.	investment and ongoing evaluation.	growing risk created by the decline in medical students with rural backgrounds, particularly in the absence of robust options to enhance the rural workforce.	
8 Machado SR, Jayawardana S, Mossialos E, Vaduganathan M. Physician Density by Specialty Type in Urban and Rural Counties in the US, 2010 to 2017. *JAMA Netw Open.* 2021;4(1):e2033994. doi:10.1001/jamanetworkopen.2020.33994	Theoretical	This study examined recent trends in physician density by specialty category across rural and urban US counties.	The study uses data from the American Medical Association Physician Masterfile to examine physician density by specialty type across metropolitan and rural US counties from 2010 to 2017.	Overall, 3142 counties were assessed. From 2010 to 2017, the median physician density was higher in urban counties compared with rural counties. small or medium metropolitan counties had a mean (SD) increase of 8.8 (46.2) physicians per 100 000 persons, and rural counties had a mean (SD) decrease of 3.1 (35.5) physicians per 100 000 persons.	This cross-sectional study of the US population showed a higher density of primary care physicians and specialists in urban compared with rural counties.	Further research is needed to evaluate potential multifaceted policies to improve equity of physician distribution and attendant implications for access to care and overall health system quality.	Physician shortages may contribute to current gaps in population health	yes

9. Arredondo, K., Touchett, H. N., Khan, S., Vincenti, M., & Watts, B. V. (2023). Current Programs and Incentives to Overcome Rural Physician Shortages in the United States: A Narrative Review. Journal of general internal medicine, 38(Suppl 3), 916–922 https://doi.org/10.1007/s11606-023-08122-6	Theoretical	The purpose of our study is to conduct a narrative review of the literature to identify and compare current incentives that are offered by rural physician shortages.	Reviewed published peer-reviewed articles from 2015–2022 to identify incentives and programs designed to address physician shortages in rural areas	Data was extracted from each program, incentive, and published report. Data were aggregated using spreadsheets and reviewed by 2 authors for consensus. A total of 247 programs and incentives were included and coded by funding/incentive type:	Overall, 120 programs/incentives were available exclusively to physicians, while a little over half (n = 127) were available to physicians and other healthcare professionals. only 5 programs and incentives focused on recruitment & retainment.	Future research should investigate trends of previous programs and incentives offered in comparison to current programs and incentives to see how efforts to recruit and retain providers have changed over time.	Providing a broad overview of the incentives offered in rural areas will help illuminate whether diverse and appealing incentives are offered in the most vulnerable areas and guide future efforts to address these issues.	yes
10. Figueiredo, A. M., Labry Lima, A. O., Figueiredo, D. C. M. M., Neto, A. J. M., Rocha, E. M. S., & Azevedo, G. D. (2023). Educational strategies to reduce physician shortages in underserved areas: A systematic review. *International Journal of Environmental Research and Public Health, 20*(11), 5983.	Theoretical	Analyze the effectiveness of initiatives in medical education aimed to increase the supply of physicians in rural or underserved areas	Systematic review for studies published between 1999 and 2019 in six databases, following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.	Two reviewers independently extracted the data and summarized the most relevant information of all articles included in the review. These results indicate that specific admission programs of students from rural areas have been effective in increasing the number of	Demonstrate the effectiveness of medical education interventions in increasing the number of physicians in rural or underserved areas and increasing the number of doctors who	Future research should be implemented as there are gaps in the evaluation of the effectiveness of interventions carried out in medical education, generating difficulties in guiding the formulation and implementation	Policymakers should be necessary to expand these interventions to ensure the supply of physicians in rural or urban underserved areas.	yes

https://doi.org/10.3390/ijerph20115983				physicians in rural areas.	choose FM as a specialty	of public policies.		
11. Darves, B. (2023, January 30). *Demystifying urban versus rural physician compensation*. New England Journal of Medicine . https://resources.nejmcareercenter.org/article/demystifying-urban-versus-rural-physician-compensation/	Theoretical	The compensation difference might not be significant as some young physicians think.	N/A	National compensation survey showed only minor differences in first-year primary care physicians' guaranteed compensation for non-metropolitan areas and urban ones — a median of $205,588 in smaller areas versus $200,000 in larger metropolitan ones.	Survey data from the American Medical Group Association (AMGA) supports physicians are getting paid 5 to 10 percent more in rural areas	Future research should be conducted to ensure that rural physicians pay is accurate	Implications for future practice would ensure that new physicians understand pay and incentives within rural health systems which hopefully aid in recruitment of new physicians.	yes
12. Michaeli DT, Michaeli JC, Albers S, Michaeli T. The Healthcare Workforce Shortage of Nurses and Physicians: Practice, Theory, Evidence, and Ways Forward. *Policy, Politics, & Nursing Practice*. 2024;25(4):216-227. doi:10.1177/15271544241286083	Theoretical	Summarize current trends in healthcare workforce development across the globe, review theoretical concepts of workforce shortages, and discuss policies to address them	Theoretical macroeconomic models suggest that supply shortages may result from too low wages, supply lagging behind demand, and social perception.	Theoretic frameworks suggest that simply raising the wage rate for healthcare professionals could increase the labor supply and thereby reduce shortages if income is found to be elastic.	New estimates suggest that there will be a shortage of 400,000 doctors and 2.5 million nurses across 32 Organization for Economic Cooperation and Development (OECD) countries by 2030	Future research should investigate alternative workforce models, such as the expanded role of nurse practitioners (NPs), physician assistants (PAs), and other non-physician healthcare providers in addressing gaps in care.	Healthcare systems may need to adapt delivery models to be more flexible and team-oriented, focusing on task-shifting and expanding the roles of non-physician providers.	yes

13. Zhang, X., Lin, D., Pforsich, H. *et al.* Physician workforce in the United States of America: forecasting nationwide shortages. *Hum Resour Health* 18, 8 (2020). https://doi.org/10.1186/s12960-020-0448-3	Theoretical	This study is to examine current and future physician job surplus/shortage trends across the United States of America from 2017 to 2030	Using projected changes in population size and age, the authors developed demand and supply models to forecast the physician shortage (difference between demand and supply) in each of the 50 states.	the number of states receiving a grade of "D" or "F" for their physician shortage ratio will increase from 4 in 2017 to 23 by 2030, with a total national deficit of 139 160 physician job	There will be physician workforce shortages throughout the country in 2030 causing many states to face severe physician workforce shortages	Future studies could examine trends that could potentially yield a surplus of physicians.	Outcomes of this study provide a foundation to discuss effective and efficient ways to curb the worsening shortage over the coming decades and meet current and future population demands.	yes
14. Streeter, R. A., Snyder, J. E., Kepley, H., Stahl, A. L., Li, T., & Washko, M. M. (2020). The geographic alignment of primary care Health Professional Shortage Areas with markers for social determinants of health. *PLOS ONE*, 15(5), e0231443. https://doi.org/10.1371/journal.pone.0231443	Theoretical	The purpose of this study is to offer a county-level view of at-risk, high-need populations across the United States by examining pcHPSA designations for all three types of pcHPSAs	Used descriptive statistics and multiple correspondence analysis to assess how HRSA's pcHPSA designations align geographically with other established markers of medical, economic, and geographic vulnerability	Nearly all U.S. counties have segments of their populations with one or more risk factors for health service access limitations and poor population health	Access to primary care, however, remains a significant challenge in the United States, as more than 6,000 areas in the nation have been classified as primary care Health Professional Shortage Areas	Future research could explore additional SDOH not fully covered in this study. For instance, mental health, housing stability, and transportation may be important factors affecting health outcomes in underserved populations.	Findings may have relevance for strengthening the delivery of primary care and addressing social determinants of health in areas beset by provider shortages.	yes
15 Abbasi, J. (2022). Pushed to their limits, 1 in 5	Theoretical	Worsening staffing issues are now the biggest	Larry A. Green Center in Virginia	February 2022 survey, 62% of 847 clinicians had	"The evidence shows that health	Future research should further investigate the	Healthcare organizations and	yes

physicians intend to leave practice. *JAMA*, 327(15), 1435–1437. https://doi.org/10.1001/jama.2022.5074		stressor for clinicians.	launched an ongoing survey of COVID-19's effects on primary care practices. Over the past 2 years, more than 36 000 survey responses.	personal knowledge of other primary care clinicians who retired early or quit during the pandemic and 29% knew of practices that had closed up shop.	workers have been leaving the workforce at an alarming rate over the past 2 years,"	underlying causes of burnout among physicians.	policymakers must take immediate and long-term actions to reduce burnout by improving work conditions, providing mental health support, and advocating changes.	
16 Gong, G., Phillips, S. G., Hudson, C., Curti, D., & Philips, B. U. (2019). Higher US Rural Mortality Rates Linked To Socioeconomic Status, Physician Shortages, And Lack Of Health Insurance. *Health affairs (Project Hope)*, *38*(12), 2003–2010. https://doi.org/10.1377/hlthaff.2019	Theoretical	All-cause mortality rates have been higher in rural than in urban areas of the US, and the gap has been widening	Obtained age-adjusted all-cause mortality rates and population sizes of rural and urban counties in the US in 2016.	Constructed the Wellbeing Index by principal component analysis according to the ten socioeconomic deprivation variables in rural and urban areas for each US state	The higher mortality rates generally seen in rural (as opposed to urban) areas of US states can largely be explained by three characteristics that are more pervasive in rural areas: socioeconomic deprivation physician shortages.	Future research could further explore how different aspects of socioeconomic inequality contribute to poorer health outcomes in rural populations, particularly those with chronic conditions or high mortality risks.	Implications for practice health administrators can conduct strategies to address shortages and improve healthcare delivery in rural settings.	yes
17 Mui, P., Gonzalez, M. M., & Etz, R. (2020). What Is the Impact on Rural Area Residents When the Local	Theoretical	This pilot study explores aspects of access to care, both within and outside of primary care	Study participants through convenience and snowball sampling, and	Analysis revealed three significant themes: rural-specific access to care concerns, relationships	Issues of social cohesion and local health leadership affected by	Themes from interviews highlight issues related to physician loss that deserve	Findings can inspire young clinicians to consider a career in rural medicine and	yes

Physician Leaves?. *Family medicine*, *52*(5), 352–356. https://doi.org/10.22454/FamMed.2020.337280		settings, that result from loss of a rural family physician.	in-person interviews of up to 60 minutes. audio recorded and transcribed the interviews (May to August, 2018), then analyzed transcripts using immersion crystallization.	valued for being both community and care based, and loss felt specific to the integrated community leadership roles occupied by family physicians	physician loss should be addressed by policy makers and educators charged with designing patient-centered solutions to improve health outcomes in rural communities	further investigation.	the varied opportunities for health leadership found in small communities.	
18 Research Triangle Institute. (2023, January 17). *Overlooked Americans: The toll of chronic disease in rural America*. Research Triangle Institute. https://healthcare.rti.org/insights/chronic-disease-and-rural-health-disparities	Theoretical	Rural Americans face a disarray of chronic diseases this us greatly due to limited access to healthcare services and is the primary culprit of health disparities.	Quantitative study using data from population sources to determine rates of chronic diseases.	For the 60 million people living in rural areas – about 19% of the U.S. population – the odds of dying prematurely from chronic illness are significantly higher than those faced by their urban counterparts.	The patient-to-primary care physician ratio in rural areas is just 39.8 physicians per 100,000 people, versus 53.3 physicians per 100,000 in urban areas.	Future research could delve deeper into the social determinants of health that exacerbate chronic diseases in rural areas, such as access to education, income disparities, social isolation, and housing conditions	Health policy makers should address issues and provide alternatives to increase telemedicine and improve infrastructure of their health system.	yes
19 Stringer, B., Thacker, C., Reyes, J., Helmer, S. D., & Vincent, K. B. (2020). Trouble on the horizon: An evaluation of the	Theoretical	The number of general surgeons presently practicing in rural communities is critically low. Rural surgeon to	Hospital administrators were contacted by phone. We were able to successfully contact 66	Median coverage ratios of 0 surgeons per 100,000 residents for frontier, rural, and densely settled rural counties	Kansas has a shortage of surgeons based on benchmark data from other studies	Future research could investigate the specific factors contributing to the general surgeon	Addressing this shortage requires comprehensive efforts from policymakers, healthcare	yes

general surgeon shortage in rural and frontier counties. *The American Surgeon*, 86(1), 76–78. https://doi.org/10.1177/000313482008600132		population declined 21 percent	hospitals (27frontier, 21 rural, and 18 densely settled rural), for a response rate of 67 per cent	show that there is indeed a shortage of general surgeons providing coverage to rural Kansas counties		shortage in rural and frontier counties, such as low compensation, lifestyle preferences, or limited professional development opportunities in these areas.	institutions, and the medical profession to implement strategies that make rural surgical practice more sustainable, recreative, and accessible to both surgeons and patients.	

Appendix B: DHA Review Question Search Log

Database or location name	Search Terms	Results	Notes
Walden Library - EBSCO	Rural physician shortages, recruitment and retention strategies, physician satisfaction, physicians or doctors or medical professionals, physician satisfaction and retention	10	Search yielded many results but only 10 were specific to this study.
Google Scholar	Rural physician retention, physician job satisfaction, retention of rural physicians, retention of physicians "rural areas", physician satisfaction and retention	40	
PubMed	Rural physician retention, best practices and strategies for retention of physicians, physician satisfaction and retention	48	Search yielded many results pertaining to strategies to retain and satisfaction of physicians.
Research gate	Rural physician retention, best practices and strategies for retention of physicians, physician satisfaction and retention	1	
ProQuest	Rural physician retention, best practices and strategies for retention of physicians, physician satisfaction and retention	1	

Appendix C: DHA Appraisal Results Log

Author, date, and title	Evidence level and quality rating	Focus: HSO type, research domain, and specific problem being addressed	Findings that help answer the review question(s)	Metrics and measures if used	Source limitations
1. Arredondo, K., Touchett, H. N., Khan, S., Vincenti, M., & Watts, B. V. (2023). Current programs and incentives to overcome rural physician shortages in the United States: A narrative review. *Journal of General Internal Medicine*, *38*(Suppl 3), 916–922 https://doi.org/10.1007/s11606-023-08122-6	Level III, High Quality	Rural Health system, Human resource management, Programs and incentives to overcome Rural physician shortages	Programs/ incentives were available exclusively to physicians, while a little over half (n=127) were available to physicians and other healthcare professionals. Most programs and incentives were focused on recruiting providers to rural areas (n=218)	Quantitative	Programs that did not have a publicly accessible recruitment information during our search were not identified in the literature review. Thus, our review provides a snapshot of programs and incentives currently offered,
2. Morris, M. E., Brusco, N. K., McAleer, R., Billett, S., Brophy, L., Bryant, R., Carey, L., Wright, A. C., East, C., Eckert, M., Edvardsson, K., Fetherstonhaugh, D., Fowler-Davis, S., Frederico, M., Gray, R., McCaskie, D., McKinstry, C., Mitchell, R., Oldenburg, B., . . . Blackberry, I. (2023b). Professional care workforce: A rapid review of evidence supporting methods of recruitment, retention, safety, and education. *Human Resources for Health*, *21*(1). https://doi.org/10.1186/s12960-023-00879-5	Level III, high quality	Health System, Human resource management, the focus was on issues related to retention and education.	When reviewing the literature, it became clear that specific strategies are needed for different health and care categories. Our review indicated that industry could play a pivotal role in removing barriers to care worker recruitment, retention, education and safety.	Qualitative	The focus was over 8 recent years, and relevant studies outside of this time period were excluded. The search strategy also excluded studies published in languages other than English, and may have overlooked meaningful cultural contexts
3. Mohammadiaghdam, N., Doshmangir, L., Babaie, J., Khabiri, R., & Ponnet, K. (2020). Determining factors in the	Level III, high quality	Rural Health systems, quality	The major affecting factors in physicians'	Quantitative	Additional research needed related to

Author, date, and title	Evidence level and quality rating	Focus: HSO type, research domain, and specific problem being addressed	Findings that help answer the review question(s)	Metrics and measures if used	Source limitations
retention of physicians in rural and underdeveloped areas: A systematic review. *BMC Family Practice*, *21*(1). https://doi.org/10.1186/s12875-020-01279-7		improvement, the focus was on the retention of physicians in rural areas.	retention in rural and underdeveloped regions were classified into the following six categories: 1) financial; 2) career and professional; 3) working conditions; 4) personal; 5) cultural; and 6) living conditions factors.		rural areas and physician retention
4. Asghari, S., Kirkland, M., Blackmore, J., Boyd, S., Farrell, A., Rourke, J., Aubrey-Bassler, K., Godwin, M., Oandasan, I., & Walczak, A. (2020). A systematic review of reviews: Recruitment and retention of rural family physicians. *Canadian Journal of Rural Medicine*, *25*(1), 20. https://doi.org/10.4103/cjrm.cjrm_4_19	Level III, High quality	Rural health systems, human resource management, rural physician shortages	The three most often cited categories resemble three distinct phases of a family physician's life: pre-medical school, medical school and post-medical school.	Quantitative	We could not perform, or find articles, that included meta-analysis
5. . De Figueiredo, A. M., De Labry Lima, A. O., De Figueiredo, D. C., De Melo Neto, A. J., Rocha, E. M. S., & De Azevedo, G. D. (2023). Educational strategies to reduce physician shortages in underserved areas: A systematic review. *International Journal of Environmental Research and Public Health, 20*(11), 5983. https://doi.org/10.3390/ijerph20115983	Level III, high quality	Rural health system, Human resource management, analyze the effectiveness of initiatives in medical education aimed to increase the supply of physicians in rural or underserved areas	The studies reported four broad categories of medical education interventions: specific admission programs for students from areas with professional shortages, implementation of medical schools and medical residency programs outside of large cities, and learning experiences in	Quantitative	This review only included studies on the increase in physicians or family physicians in underserved areas and, therefore, did not evaluate strategies concerning the expansion of physicians of other specialties in underserved areas.

Author, date, and title	Evidence level and quality rating	Focus: HSO type, research domain, and specific problem being addressed	Findings that help answer the review question(s)	Metrics and measures if used	Source limitations
			rural and underserved areas.		We suggest further studies to identify strategies in medical education to increase the number of other.
6. Darbyshire, D., Brewster, L., Isba, R., Body, R., Basit, U., & Goodwin, D. (2021). Retention of doctors in emergency medicine: A scoping review of academic literature. *Emergency Medicine Journal: EMJ*, *38*(9), 663–672. https://doi.org/10.1136/emermed-2020-210450	Level III high quality	Rural health systems, Quality improvement, Retention of doctors in emergency medicine	Multiple factors were identified as linked with retention, including perceptions about teamwork, excessive workloads, working conditions, errors, teaching and education, portfolio careers, physical and emotional strain, stress, burnout, debt, income, work–life balance and antisocial working patterns.	Qualitative	Limitations have described the factors that influence retention but not the scale of influence of each factor.
7. Russell, D., Mathew, S., Fitts, M., Liddle, Z., Murakami-Gold, L., Campbell, N., Ramjan, M., Zhao, Y., Hines, S., Humphreys, J. S., & Wakerman, J. (2021). Interventions for health workforce retention in rural and remote areas: A systematic review. *Human Resources for Health*, *19*(1), 103. https://doi.org/10.1186/s12960-021-00643-7	Level III, high quality	Rural health systems, human resource management, examine the quantifiable associations between interventions to retain health workers in rural and	Evidence suggests that policy makers can be confident that selecting professional students based on rural background, encouraging distributed training based in rural and remote areas during their basic and subsequent training.	Quantitative	There remain significant gaps in our knowledge and a stronger evidence base is required. Future research should seek to address methodological limitations.

Author, date, and title	Evidence level and quality rating	Focus: HSO type, research domain, and specific problem being addressed	Findings that help answer the review question(s)	Metrics and measures if used	Source limitations
		remote areas of HICs.			
8. Noya, F., Carr, S., Freeman, K., Thompson, S., Clifford, R., & Playford, D. (2022). Strategies to facilitate improved recruitment, development, and retention of the rural and remote medical workforce: A scoping review. *International Journal of Health Policy and Management*, *11*(10), 2022–2037. https://doi.org/10.34172/ijhpm.2021.160	Level III, High quality	Rural health systems, Strategic planning and marketing. The focus was on strategies to improve retention in rural areas.	This scoping review found implementation strategies classified as Educational, Financial, and Multidimensional were successful for recruitment, retention, and development of the rural and remote medical workforce.	Quantitative	There is a possibility that the database did not contain all the available literature, potentially limiting our findings from a global perspective.
9. Ogden, J., Preston, S., Partanen, R. L., Ostini, R., & Coxeter, P. (2020). Recruiting and retaining general practitioners in rural practice: Systematic review and meta-analysis of rural pipeline effects. *The Medical Journal of Australia*, *213*(5), 228–236. https://doi.org/10.5694/mja2.50697	Level III, high quality	Rural health system, Health resource management, effects of rural background and experience in rural areas during medical training	GPs working in rural areas are more likely to have rural backgrounds than those in metropolitan practices. GPs who have completed any form of rural placement or training program are more likely to work in rural practices, including GPs without rural backgrounds, showing the value for rural GP recruitment of rural clinical education for all medical students and postgraduate GP trainees.	Qualitative	Many studies did not closely define the rural environment (eg, degree of rurality, community type, duration of experience) or used different classifications of rural area for exposure and outcome.

Author, date, and title	Evidence level and quality rating	Focus: HSO type, research domain, and specific problem being addressed	Findings that help answer the review question(s)	Metrics and measures if used	Source limitations
10. Esu, E. B., Chibuzor, M., Aquaisua, E., Udoh, E., Sam, O., Okoroafor, S., Ongom, M., Effa, E., Oyo-Ita, A., & Meremikwu, M. (2020). Interventions for improving attraction and retention of health workers in rural and underserved areas: a systematic review of systematic reviews. *Journal of Public Health*, *43*(Supplement_1), i54–i66. https://doi.org/10.1093/pubmed/fdaa235	Level III, high quality	Rural health system, the focus was how Health resource management, to interest physicians in underserved areas.	Regulatory measures were able to attract health workers to rural and underserved areas, particularly when obligations.	Quantitative	many studies measured turnover as a proxy for retention, which is not useful.
11. Raman, S. S. S., McDonnell, A., & Beck, M. (2024). Hospital doctor turnover and retention: a systematic review and new research pathway. *Journal of Health Organization and Management*, *38*(9), 45–71. https://doi.org/10.1108/jhom-04-2023-0129	Level III, high quality	Health systems, Health resource management, physician turnover and ways to retain them.	When organizations invest in gaining an understanding of what motivates their employees to stay in the job. This can result in enhanced job performance, increased productivity and higher employee retention rates	Quantitative	Selection criteria concentrated on doctors who worked in hospitals, which limited knowledge of one area of the healthcare environment.
12. Kumar, S., & Clancy, B. (2020). Retention of physicians and surgeons in rural areas—what works? *Journal of Public Health*, *43*(4). https://doi.org/10.1093/pubmed/fdaa031	Level III, High quality	Rural health system, Health resource management, to evaluate interventions and strategies used to recruit and retain primary care doctors internationally	Universal retention factors for health professionals in a rural environment include rural background, positive rural exposure in training early postgraduate years and personal support.	Quantitative	Literatures search demonstrated a publication bias, with most of the evidence coming from high-income countries and primary care.
13. Ferreira, N., McKenna, O., Lamb, I. R., Campbell, A., DeMiglio, L., & Orrantia, E. (2024). Approaches to locum physician recruitment and retention: A systematic review.	Level III, High quality	Rural health systems, Health resource management, to	Locum physicians are essential to the delivery of quality healthcare services	Quantitative	Some search terms such as region-specific terminology used to describe

Author, date, and title	Evidence level and quality rating	Focus: HSO type, research domain, and specific problem being addressed	Findings that help answer the review question(s)	Metrics and measures if used	Source limitations
Human Resources for Health, *22*(1). https://doi.org/10.1186/s12960-024-00906-z		synthesize current evidence on the strategies used to facilitate the recruitment and retention of LT physicians	across Canada and other parts of the world.		locums, were not included
14. Holst, J. (2020). Increasing rural recruitment and retention through rural exposure during undergraduate training: An integrative review. *International Journal of Environmental Research and Public Health*, *17*(17), 6423. https://doi.org/10.3390/ijerph17176423	Level IV, Good quality	Rural health system, Health resource management, Rural exposure during undergraduate medical training is promising as a means for overcoming the shortage of physicians.	This review confirms that rural exposure during undergraduate medical training contributes to recruitment and retention in nonurban settings. It can play a role within a broader strategy for overcoming the shortage of rural practitioners.	Mixed methods	the availability of studies with good and reliable empirical evidence is rather low
nowitz, H. K., Motley, R. J., Markham, F. W., & Love,)22). Lessons learned as Thomas Jefferson University's ysician Shortage Area Program (PSAP) approaches the tury mark. *Academic Medicine*, *97*(9), 1264–1267. oi.org/10.1097/acm.0000000000004710	Level IV, high quality	Rural health system, organizational dynamics and governance, to help increase the supply and retention of rural family physicians, Thomas Jefferson University initiated the Physician Shortage Area Program	Extensive experience and outcomes research from Jefferson's PSAP and several other medical school rural programs over the past half-century has clearly shown their success in increasing the supply and long-term retention of rural physicians.	Qualitative	The sampling was small, and more research should be conducted.

Author, date, and title	Evidence level and quality rating	Focus: HSO type, research domain, and specific problem being addressed	Findings that help answer the review question(s)	Metrics and measures if used	Source limitations
16. Koebisch, S., Rix, J., & Holmes, M. (2020). Recruitment and retention of healthcare professionals in rural Canada: A systematic review. *Canadian Journal of Rural Medicine*, *25*(2), 67. https://doi.org/10.4103/cjrm.cjrm_43_19	Level III, high quality	Rural health system, Health resource management, which factors are most important in the recruitment and retention of professionals in rural practice in Canada.	Wide scope of practice and attraction to the rural lifestyle were considered the most important for recruitment and to a lesser extent, retention, among the five papers studies.	quantitative	The factors discussed within our review were but a small sample of the reasons why practitioners choose rural practice.
17. DeVries, N., Boone, A., Godderis, L., Bouman, J., Szemik, S., Matranga, D., & de Winter, P. (2023). The race to retain healthcare workers: A systematic review on factors that impact retention of nurses and physicians in hospitals. *Inquiry: A Journal of Medical Care Organization, Provision and Financing*, *60*, 469580231159318.https://doi.org/10.1177/00469580231159318	Level III, good quality	Health system, quality improvement, explore the prevalence of physicians who are intent on leaving their position at hospitals and the main determinants influencing job retention.	Findings have shown that the determinants identified in this systematic review, namely personal characteristics, job demands, employment services, working conditions, work relationships and organizational culture, impact, the job retention of physicians.	Mixed methods	Considering the simplified screening of non-EU studies, there is the possibility of bias, and, as such, the outcomes should be considered with caution.
18 Dillon, E. C., Tai-Seale, M., Meehan, A., Martin, V., Nordgren, R., Lee, T., Nauenberg, T., & Frosch, D. L. (2020). Frontline perspectives on physician burnout and strategies to improve well-being: Interviews with physicians and health system leaders. *Journal of General Internal Medicine*, *35*(1), 261–267. https://doi.org/10.1007/s11606-019-05381-0	Level IV, High quality	Health systems, quality improvement, The focus of this study was physician burnout.	These interviews contribute personal insights about how physicians experience burnout and solutions they believe would enhance well-being, This study aimed at understanding	Qualitative	Interview participants worked at one predominately fee-for-service organization Future research should seek the perspectives of physicians in other

Author, date, and title	Evidence level and quality rating	Focus: HSO type, research domain, and specific problem being addressed	Findings that help answer the review question(s)	Metrics and measures if used	Source limitations
			perspectives of frontline physicians and health system l solutions.		specialties with high rates of burnout.
19 Lafortune, C., & Gustafson, J. (2019). Interventions to improve recruitment and retention of physicians in rural and remote Canada: A systematic review. *University of Western Ontario Medical Journal*. https://doi.org/10.5206/uwomj.v88i1.6184	Level III, High quality	Health systems, Health resource management, physician shortages, recruitment and retention strategies	To provide Canadian governments, hospitals, and medical schools with a summary of current research to assist with implementation of evidence-based strategies aimed to increase the supply and retention of rural physicians	Qualitative	Future areas of research should focus on methods to improve equity throughout the medical school admissions process for students who grew up in a rural or remote environment.
20. Cosgrave, C. (2020). The whole-of-person retention improvement framework: A guide for addressing health workforce challenges in the rural context. *International Journal of Environmental Research and Public Health*, *17*(8), 2698. https://doi.org/10.3390/ijerph17082698	Level III, high quality	Health systems, general management, retention improvement	The WoP-RIF encourages evidence-informed, whole-of-community responses that address both individual and workforce level needs and, as such, is a significant response to, and resource for, addressing avoidable rural health workforce turnover that rural health services and communities can harness in-place.	Qualitative	Small sample size

Author, date, and title	Evidence level and quality rating	Focus: HSO type, research domain, and specific problem being addressed	Findings that help answer the review question(s)	Metrics and measures if used	Source limitations
21. Butzner, M., & Cuffee, Y. (2021). Telehealth interventions and outcomes across rural communities in the United States: Narrative review. *Journal of Medical Internet Research*, *23*(8), e29575. https://doi.org/10.2196/29575	Level III, Good quality	Rural health systems, information management, telehealth interventions in rural communities.	The study reported positive outcomes and experiences of telehealth use in rural populations including acceptability and increased satisfaction; other notable benefits included improved physician recruitment and retention,	Qualitative	Publication bias is possible within this study as we leveraged only PubMed MEDLINE and omitted grey literature such as reports, government documents and releases, working papers, and evaluations.
22. Hu, X., Dill, M. J., & Conrad, S. S. (2022). What moves physicians to work in rural areas? An in-depth examination of physician practice location decisions. *Economic Development Quarterly*, *36*(3), 245–260. https://doi.org/10.1177/08912424211046600	Level III, High quality	Rural health systems, Health resource management, rural physician recruitment and retention were the focus of the study.	This research confirmed that rural origin is an important and reliable predictor for rural practice and revealed that new and experienced physicians have different priorities in location choice	Quantitative	First, it is difficult to account for the diversity of rural areas. Second, data reveals that slightly more than half of physicians practice at more than one location.
23. DeMiglio, L., Jolicoeur, J., Lamb, I. R., Cousins, M., Nutbrown, L., & Orrantia, E. (2024). Draw to Practice: A qualitative study examining factors attracting physicians to rural northern Ontario. *Cureus*. https://doi.org/10.7759/cureus.55074	Level III, good quality	Rural health systems, Health resource management, Rural physician recruitment and retention.	This was a qualitative study that discussed how to retain rural physicians through reviews with participants. Many factors were mentioned related to QOL.	Qualitative	Applicability of these findings to the broader rural North as well as other rural health regions in Canada and abroad may be limited.

Author, date, and title	Evidence level and quality rating	Focus: HSO type, research domain, and specific problem being addressed	Findings that help answer the review question(s)	Metrics and measures if used	Source limitations
24. Davis, C. E., Lamson, A. L., & Black, K. Z. (2022). MEDFTs' role in the recruitment and retention of a diverse physician population: A conceptual model. *Contemporary Family Therapy*, *44*(1), 88–100. https://doi.org/10.1007/s10591-021-09627-0	Level III, Low quality	Rural health systems, Health resource management brings attention to recruitment and retention data across medical educational and career stages.	The intent of this article is to address the critical need to recruit and retain medical students, residents, and practicing physicians that represent the demographics of patients in the U. S.	Qualitative	Actual study data was not performed to fully know the extent of the framework and the ability to attract and retain physicians in rural practice.
25. Renjel, R. A., Ficalora, R., & Canaris, G. (2019). Internal medicine physician job satisfaction in rural Montana and Northern Wyoming - A qualitative analysis. *Journal of Community Hospital Internal Medicine Perspectives*, *9*(5), 384–391. https://doi.org/10.1080/20009666.2019.1663590	Level III, Good quality	Rural health systems, quality improvement, Focus is physician satisfaction in rural areas.	All other participants appeared committed to rural practice. Most internists reported that a rural background or appeal of a rural lifestyle is a reason for a rural practice.	Qualitative	The main limitation of our study is our small sample size that may not be representative of all rural populations

Appendix D: DHA Thematic Analysis Results

Author(s) and date	Data (General Information) Extracted	Preliminary Problem-Solving Themes
Arredondo, K., Touchett, H. N., Khan, S., Vincenti, M., & Watts, B. V. (2023).	Identify incentives and programs designed to address physician shortages in rural areas. Programs and incentives are used to recruit and retain rural physicians to aid in decreasing physician shortages.	Rural health workforce development Educational opportunities Increasing retention
Morris et al., 2023	Early career rural recruitment supports rural retention. Workload management is essential for the workforce's well-being.	Workforce Redesign Human Resources
Mohammadiaghdam, N., Doshmangir, L., Babaie, J., Khabiri, R., & Ponnet, K. (2020).	Shortage of physicians in underdeveloped areas. Financial, career and professional, working conditions, personal, living conditions, and cultural factors that influence retention of physicians.	Healthcare Worker distribution imbalance Improving Physician job satisfaction Work life integration
Asghari, S., Kirkland, M. C., Blackmore, J., Boyd, S., Farrell, A., Rourke, J., Aubrey-Bassler, K., Godwin, M., Oandasan, I., & Walczak, A. (2020).	Three distinct phases of a family physician's life: pre-medical school, medical school and post-medical school. To increase the number of physicians who choose to work in rural practice, strategies must encompass and promote continuity across all three of these phases.	Educational stages > lifestyle stages Childhood experiences> educational experiences> in-practice experiences. Retention strategies
Figueiredo, A. M., Labry Lima, A. O., Figueiredo, D. C. M. M., Neto, A. J. M., Rocha, E. M. S., & Azevedo, G. D. (2023).	Analyze effective initiatives in medical education to increase supply of physicians in rural areas.	Education strategies to reduce physician shortages Medical workforce distribution Universal health coverage

Author(s) and date	Data (General Information) Extracted	Preliminary Problem-Solving Themes
	Prioritizing development of specific skills to work in rural counties. Education, regulations, incentives, and professional and personal support	
Darbyshire, D., Brewster, L., Isba, R., Body, R., Basit, U., & Goodwin, D. (2021).	Retention of doctors in the emergency room. Addressing multiple factors rather than focusing on single factors will improve retention of physicians. Autonomy> Belonging> control	Sustainable careers Cost-effective care Satisfied physicians; work life balance; working conditions
Russell, D., Mathew, S., Fitts, M., Liddle, Z., Murakami-Gold, L., Campbell, N., ... & Wakerman, J. (2021).	Quantifiable associations between interventions to retain health workers in rural and remote areas. Seeking rural retention should strengthen rural training pathways and limit the use of strongly coercive interventions.	Workforce retention Return of service initiatives Lower burnout and higher retention
Noya, F., Carr, S., Freeman, K., Thompson, S., Clifford, R., & Playford, D. (2021).	Educational, Financial, and Multidimensional were successful for recruitment, retention, and development of the rural and remote medical workforce. Maldistribution of workforce contributed to heavy disparities between rural and urban populations. Rural background/ exposure is the single most important factor for rural workforce recruitment and retention.	Personal and professional development Continuity in rural and remote practice Low turnover rates Recruitment and retention strategies
Ogden, J., Preston, S., Partanen, R. L., Ostini, R., & Coxeter, P. (2020).	Effects of rural background and experience in rural areas during medical training. Physicians with rural backgrounds and rural experience are more likely to enter rural practice.	Rural pipeline factors Commitment to rural practice Rural education

Author(s) and date	Data (General Information) Extracted	Preliminary Problem-Solving Themes
Esu, E. B., Chibuzor, M., Aquaisua, E., Udoh, E., Sam, O., Okoroafor, S., ... & Meremikwu, M. (2021).	Interventions for improving attraction and retention of health workers in rural areas. Regulatory measures were able to attract health workers to rural and underserved areas, particularly when obligations were attached to incentives.	Global health workforce shortage Effective incentives
Seathu Raman, S. S., McDonnell, A., & Beck, M. (2024)	Discover valuable insight into what motivates physicians to remain and what could be done to enhance their work conditions. Establishing a positive work environment will promote employee well-being and job satisfaction. Which results in enhanced job performance, increased productivity and higher employee retention rates.	Physician Turnover Sense of community and belonging Positive work environment Job satisfaction
Kumar, S., & Clancy, B. (2020).	Successful strategies included student selection from rural backgrounds into medical school and undergraduate education programs. Bundled or multifaceted interventions may be more effective than single factor interventions. Influence of their family in their decision making. Adequate rural health facilities, living conditions, work-life balance and family.	Educational Training Personal preferences Work life balance Multifactorial interventions
Ferreira, Odessa McKenna, Iain R. Lamb, Alanna Campbell, Lily DeMiglio, & Eliseo Orrantia. (2024).	Healthcare providers work in a temporary capacity to fill vacancies or provide coverage for permanent physicians	Locum tenens physicians Physician autonomy Improve work flexibility

Author(s) and date	Data (General Information) Extracted	Preliminary Problem-Solving Themes
Holst J. (2020).	Rural exposure during undergraduate medical training contributes to recruitment and retention in nonurban settings. Rural-practice interventions in undergraduate medical education to measurably improve the recruitment and retention of rural practitioners.	Rural exposure Medical training Rural education curriculum >undergraduate training> adequate interventions
Rabinowitz, H. K., Motley, R. J., Markham, F. W., Jr, & Love, G. A. (2022).	Studies have shown that the program has been highly successful, with PSAP graduates 8.5–9.9 times more likely to enter rural family medicine than their peers. PSAP contributed 12% of all rural family physicians in Pennsylvania. Medical Schools Can Have a Critical Role in Addressing the Rural Physician Shortage	Physician shortage area program Family and community life. Community resources Medical training program >benefits attraction and retention
Koebisch, S. H., Rix, J., & Holmes, M. M. (2020).	Five themes – Personal/family matters, Community factors, Professional practice factors, Professional education factors and Economic factors – were generated in two domains, recruitment and retention. The ability to practice full-scope medicine was the most important factor in terms of physician recruitment.	Attraction to rural lifestyle>recreational activities, Scope of practice>rural training > incentives> attraction of physicians
De Vries, N., Boone, A., Godderis, L., Bouman, J., Szemik, S., Matranga, D., & De Winter, P. (2023)	Main determinants for job retention were job satisfaction, career development and work-life balance.	Personal characteristics, job demands, employment services, working conditions, work relationships, and organizational culture.

Author(s) and date	Data (General Information) Extracted	Preliminary Problem-Solving Themes
	Identifying these factors supports the development of multifactorial interventions, which can aid the formulation of medical strategies and help to maximize retention.	Improving turnover> lower burnout> higher retention
Dillon, E. C., Tai-Seale, M., Meehan, A., Martin, V., Nordgren, R., Lee, T., ... & Frosch, D. L. (2020).	Interviews reveal a variety of interacting factors contributing to physician burnout. Organizational factors as primary contributors to burnout and identified relevant solutions: (1) workload and work-life balance; (2) organizational structure and culture; (3) support staff, physician autonomy, and leadership; and (4) social support, feeling valued, and meaning in work.	Decrease workload>Decrease physician burnout> increased well-being>improve staff retention
Lafortune, C., & Gustafson, J. (2019).	The most effective strategies consistently appear to be those aimed at before medical education, specifically admitting medical students who have a rural background. Financial incentives have been shown to improve the recruitment and retention of rural physicians before, during, and after medical education.	Physician education in rural health> increases satisfaction and encourages likely to stay
Cosgrave, C. (2020).	The WoP-RIF clearly articulates the pre-conditions for workforce retention and offers an innovative approach for addressing health workforce retention in rural contexts. Three domains: Workplace/Organizational, Role/Career and Community/Place. The necessary	Improvement framework Rural health workforce stability and sustainability>job satisfaction> physicians stay longer

Author(s) and date	Data (General Information) Extracted	Preliminary Problem-Solving Themes
	pre-conditions for improving retention through strengthening job and personal satisfaction levels.	
Butzner, M., & Cuffee, Y. (2021).	Highlights the current scope of using telehealth interventions in rural populations across the United States. Telehealth models were associated with positive outcomes for patients and health care professionals, suggesting these models can be effective for continuing education and training in the workplace.	Feasibility and acceptability of telehealth, Working remotely> and on site> improves satisfaction and physician retention.
Hu, X., Dill, M. J., & Conrad, S. S. (2022).	Rural-originated physicians are 4.7 times more likely to practice in rural areas. Physicians choosing rural practice locations are more likely to be motivated by compensation, the resemblance of the environment to the one they grew up in, patient needs, and renegotiated service obligations or visa/immigration status.	Physician origin >rural exposure>Physician supply.
Lily, D., Jilayne, J., Lamb, I. R., Cousins, M., Lindsay, N., & Eliseo, O. (2024).	Participants described the draw to rural practice as being multifactorial and based on overlapping motivations. Interest in exploring new parts of the country, alignment with life plans, support of family. Fair compensation within the framework of a flexible and supportive contract also drew physicians to practice.	Rural community connection and exposure>lifestyle and personal preferences>career considerations> Physician attraction and retention. Physician supply and distribution.

Author(s) and date	Data (General Information) Extracted	Preliminary Problem-Solving Themes
Davis, C. E., Lamson, A. L., & Black, K. Z. (2022).	The conceptual model, MedFTs' Role in the Recruitment and Retention of a Diverse Physician population. Four World View includes the clinical, operational, financial, and training/education worlds. Each world is seen as necessary to sustain a successful healthcare system.	Medical education Diversity, equity, and inclusion > diverse workforce> recruitment, training, retention of physicians
Renjel, R. A., Ficalora, R., & Canaris, G. (2019).	A number of internists show ongoing commitment to practicing in rural areas despite shortages.	Breadth of practice, Flexibility of practice Work environment/administrative support, Job satisfaction>physician retention.

Appendix E: Final Concepts Thematic Map