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Preparing Pre-Health Students to Address Rural Health Disparities: Outcomes of a Brief Intervention

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Abstract

Purpose: To assess the impact of a one-hour educational presentation on rural health disparities on knowledge and attitudes of pre-health professional students. Sample: 104 undergraduate and graduate students from a mid-sized Midwestern university participated between March–April 2025. Students represented multiple health career pathways, with occupational therapy (n=36), nursing (n=19), and medicine (n=15) most common.

Method: A pre-test/post-test quasi-experimental design was used. Students completed a pre-survey, attended a one-hour presentation on national and Iowa-specific rural health disparities, and then completed a post-survey. Surveys included demographic questions, Likert-scale measures of attitudes and understanding, and multiple-choice knowledge questions. Data were analyzed using descriptive statistics and independent t-tests.

Findings: Knowledge of rural health disparities increased by 23.8% from pre- to post-test ($p < .001$). Statistically significant improvements were also observed in attitudes toward rural health ($p < .05$) and self-reported understanding of rural disparities ($p < .001$). Participants' interest in working in rural health and belief that they could make a difference also increased significantly. The mean rating for presentation effectiveness was 4.75/5.

Conclusions: A brief, one-hour educational session significantly improved knowledge and

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attitudes regarding rural health disparities among pre-health students. This suggests that brief, low-resource interventions can raise awareness of rural health issues and may serve as an entry point for integrating rural content into undergraduate and graduate health curricula. Future research should examine longitudinal impacts and application to professional practice.

Keywords: Rural health disparities, pre-health students, brief educational intervention, rural health knowledge and attitudes, rural health education

Preparing Pre-Health Students to Address Rural Health Disparities: Outcomes of a Brief Intervention

Health in rural America presents unique challenges compared to urban areas. As of the 2020 Census, approximately 57.5 million Americans live in rural areas representing around 20% of the U.S. population (U.S. Census Bureau, 2022). Despite the many positive attributes and assets associated with working and living in rural communities, many rural American populations experience significant health disparities. Health disparities are preventable differences in health status and outcomes when compared to the population overall, often characterized by indicators such as higher incidence of disease and/or disability, higher mortality rates, lower life expectancies, and higher rates of chronic pain (Higgins, 2021). Rural risk factors for health disparities include geographic isolation, lower socioeconomic status, higher rates of health risk behaviors, limited access to healthcare providers and specialists, and limited job opportunities (James et al., 2017; Singh et al., 2019; Weeks et al., 2023). Rural residents are also less likely to have employer-sponsored health insurance coverage. Individuals living in rural areas who fall below or near the federal poverty level may face additional barriers to insurance coverage, particularly in states with limited Medicaid eligibility or gaps in coverage (Chartis, 2025).

Rural America has higher rates of chronic diseases, poorer health outcomes, and lower life expectancy compared to their urban counterparts (Chartis, 2025; Leider et al., 2020). The life expectancy gap between rural and urban areas has been widening over the years. For example, life expectancy at birth is now 1 to 2 years greater in wealthier urban counties compared to rural ones, and as much as 5 years between wealthy and poor counties (Leider et al., 2020; Holford et al., 2025). People living in rural areas are more likely to die early from many of the leading causes. Rural residents have higher rates of heart disease deaths, and cancer mortality rates are higher in rural areas due to lower rates of screenings, early detection, and treatment (Singh et al., 2019). Rural areas experience more deaths from unintentional injuries and have higher rates of smoking and exposure to environmental pollutants, contributing to increased chronic lower respiratory disease deaths (Garcia et al., 2019). Stroke mortality is also higher in rural areas, exacerbated by limited access to emergency care and preventive services (Higgins, 2021; Cierny et al., 2021).

Rural residents face significant challenges in accessing healthcare, often having to travel long distances for care (Higgins, 2021; Chartis, 2025). There is a shortage of healthcare professionals in rural areas, including primary care physicians, specialists, and mental health providers (Rural Health Information Hub, 2025a; Rural Health Information Hub, 2025b; MacDowell et al., 2010). Additionally, rural hospital closures have reduced access to healthcare in many rural communities, and workforce shortages are problematic even in areas that have retained their healthcare facilities (Chartis, 2025; Council on Graduate Medical Education, 2022). Since 2010, 182 rural hospitals have closed or converted to an operating model that excludes inpatient care, and as of 2025, 46% of rural hospitals are operating in the red, with 432 hospitals at risk of closing (Chartis, 2025). The loss of rural hospitals has created "care deserts" for vital services such as obstetrics and chemotherapy, with 293 rural hospitals stopping obstetric services and 424 ceasing chemotherapy services between 2011 and 2023 (Chartis, 2025). Cybersecurity is also becoming an increasing concern for rural healthcare organizations. Limited financial and technical resources can make rural hospitals and clinics particularly vulnerable to cyberattacks such as ransomware incidents, electronic health record breaches, and disruptions to telehealth systems, which can compromise patient data and interrupt care delivery (Hassell & Niblock, 2023).

Role of Education for Health Professionals in Addressing Rural Health Disparities

Education for health professionals plays a pivotal role in addressing rural health disparities. Education programs can increase awareness among health professionals about the unique challenges faced by rural populations. Training in cultural competence helps health professionals provide care that is respectful of and responsive to the cultural and linguistic needs of rural patients, which helps build trust and improve the patient-provider relationship (Njoku, 2019; Sabo et al., 2015). Additionally, education programs that promote interdisciplinary collaboration can enhance the delivery of comprehensive care in rural settings by working together to address the multifaceted health needs of rural populations (Thackrah et al., 2017; Vandermause et al., 2024).

Educating pre-health professionals about rural health disparities is crucial for addressing the unique challenges faced by rural populations. Implementing effective education strategies, such as incorporating rural health into curricula and providing rural clinical rotations, can help prepare pre-health professionals to tackle the unique challenges of rural healthcare (Adams, 2023). To date, most research on educating pre-health professionals has focused on graduate-level teaching, which allows for more involved methods like service learning, curricular focuses, or immersive experiences such as living in a rural area for a period (Njoku, 2019; Sabo et al., 2015; Thackrah et al., 2017; Vandermause et al., 2024; Chen et al., 2017). Clinical training models designed to expose students to underserved populations have also been studied. Examples include community-based rotations in medically underserved areas, service-learning experiences with rural or

marginalized communities, and immersive rural placements where students live and train in rural communities for extended periods (Caretta-Weyer & Hess, 2022).

Although a growing body of literature examines strategies for preparing health professionals to address health disparities, much of this research has focused on graduate-level curricula or immersive experiences such as service-learning, rural clinical rotations, or extended community placements (Njoku, 2019; Sabo et al., 2015; Thackrah et al., 2017; Vandermause et al., 2024). These models often require significant time, resources, and curricular restructuring, which can limit their feasibility in many undergraduate and pre-professional programs.

Less attention has been given to scalable, brief educational interventions that can be embedded within existing coursework for students who are still exploring health professions. Understanding whether short, targeted educational sessions can improve awareness and attitudes toward rural health disparities among pre-health students may provide a practical entry point for integrating rural health topics earlier in the professional development pathway.

Therefore, the purpose of this study was to assess the impact of a one-hour educational presentation addressing rural health disparities on the knowledge, attitudes, and perceived understanding of undergraduate and graduate pre-health professional students.

Methods

Sampling and Subjects

This study used purposive sampling to focus on future healthcare professionals at a mid-sized university in Iowa which is considered a rural State. After receiving approval from the Institutional Review Board, emails were sent to instructors of various graduate and undergraduate health sciences courses. These courses included undergraduate and graduate health sciences classes that enroll students pursuing careers in fields such as nursing, occupational therapy, medicine, pharmacy, and public health. A total of 104 students participated in the study.

Data Collection and Study Design

The one-hour educational sessions took place during regular class periods for each course. A pretest–posttest quasi-experimental design was used from March to April 2025. Participants completed a pre-survey, attended the one-hour educational session addressing rural health disparities in the United States and Iowa, and then completed a post-survey immediately following the presentation. To maintain anonymity, no identifying information was collected in the surveys.

The survey was developed by the research team based on existing literature examining health disparities education and rural health awareness. The instrument included demographic questions, Likert-scale items measuring attitudes toward rural health

disparities and perceived understanding, and multiple-choice knowledge questions derived from the educational session content. Survey items were reviewed for clarity by faculty with expertise in rural health and health professions education.

Before completing the survey, each participant consented via electronic informed consent. The pre-survey consisted of 13 questions, including demographic questions, career goals, age, and whether the participant was pursuing an undergraduate or graduate degree. Participants rated their attitudes toward rural health disparities using a 5-point Likert scale ranging from strongly disagree to strongly agree. They also rated their perceived understanding of rural health disparities using a 4-point scale ranging from no understanding to extensive understanding. Finally, there were 8 knowledge-based questions about the topics covered in the presentation, using a multiple-choice format. The post-survey contained the same questions assessing knowledge and understanding as the pre-survey. Additionally, the post-survey included four questions evaluating the effectiveness of the presentation using a 5-point Likert scale ranging from strongly disagree to strongly agree.

Educational Intervention

The educational intervention consisted of a one-hour presentation delivered during regularly scheduled class sessions. The session was delivered in person by the research team using a structured slide presentation. The presentation addressed several key topics, including definitions and scope of rural health disparities in the United States, demographic and socioeconomic characteristics of rural populations, major rural health outcomes such as chronic disease prevalence and mortality trends, healthcare access challenges including workforce shortages and hospital closures, Iowa-specific rural health indicators and workforce needs, and potential roles for future health professionals in addressing rural disparities.

The session incorporated brief discussion prompts and opportunities for students to ask questions throughout the presentation. The learning objectives were to increase students' awareness of rural health disparities, improve understanding of contributing structural and healthcare system factors, and encourage reflection on potential roles of future health professionals in addressing rural health challenges.

Data Analyses

Descriptive statistics were computed for the pre-survey subscale scores, post-survey subscale scores, and subscale change scores for both knowledge and attitudes. Independent t-tests were used to determine statistically significant differences between pre- and post-survey means for each set of questions.

Additionally, statistically significant changes in knowledge were assessed by comparing the graded results from the knowledge-based questions. The scores out of ten were analyzed using an independent t-test assuming equal variance. Grading was

conducted by the researchers, with entries randomly double-checked for accuracy. There were seven multiple-choice questions with one correct answer each and one multiple-choice question with three correct answers, with each correct answer assigned one point. The scores out of ten were compared between the pre- and post-survey.

Ethics Approval

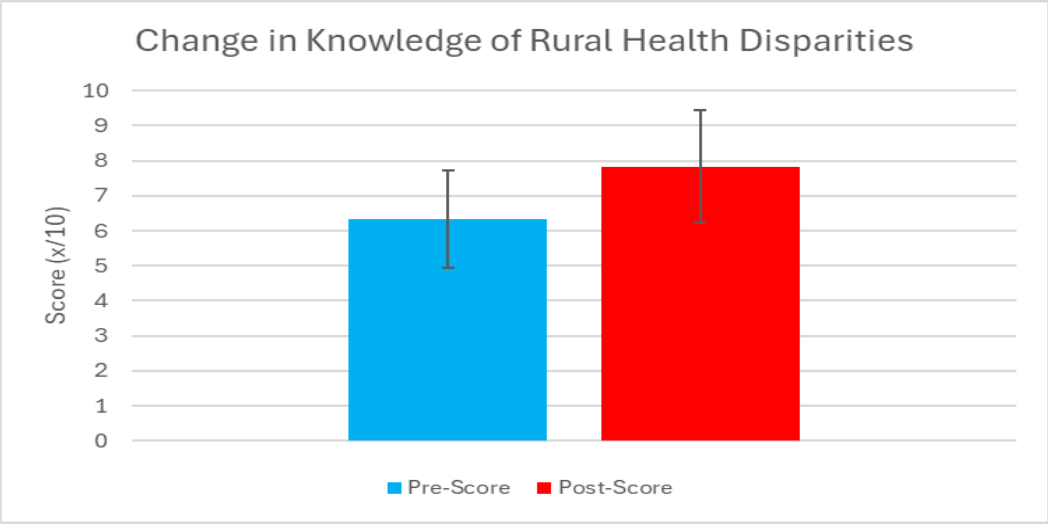
This study was approved by the Institutional Review Board at a mid-sized private Midwestern university on February 28, 2025 (IRB Proposal #: 2024-25074).

Results

There were 104 participants in this study consisting of both graduate (n=29) and undergraduate (n=75) students. Occupational therapy was the most common career goal (n=36), followed by nursing (n=19), medicine (n=15), pharmacy (n=8), health care administration (n=7), public health (n=6), physical therapy (n=1), and other (n=8). Because the data was not matched by participant, independent t-tests assuming equal variances were used. Knowledge of rural health disparities increased by 23.8% from pre- to post-survey ($p < .001$).

Figure 1

Mean change in knowledge between pre- and post-survey scores +/- SD.



These findings suggest that a brief, structured educational intervention can increase awareness, knowledge, and attitudes related to rural health disparities among future health professionals.

There was a statistically significant increase from pre- to post-survey in all questions assessing attitudes (Figure 2) and perceived understanding (Figure 3) of rural health disparities.

Figure 2

Mean Likert score for attitudes towards rural health for both pre- and post-survey (maximum score = 5).

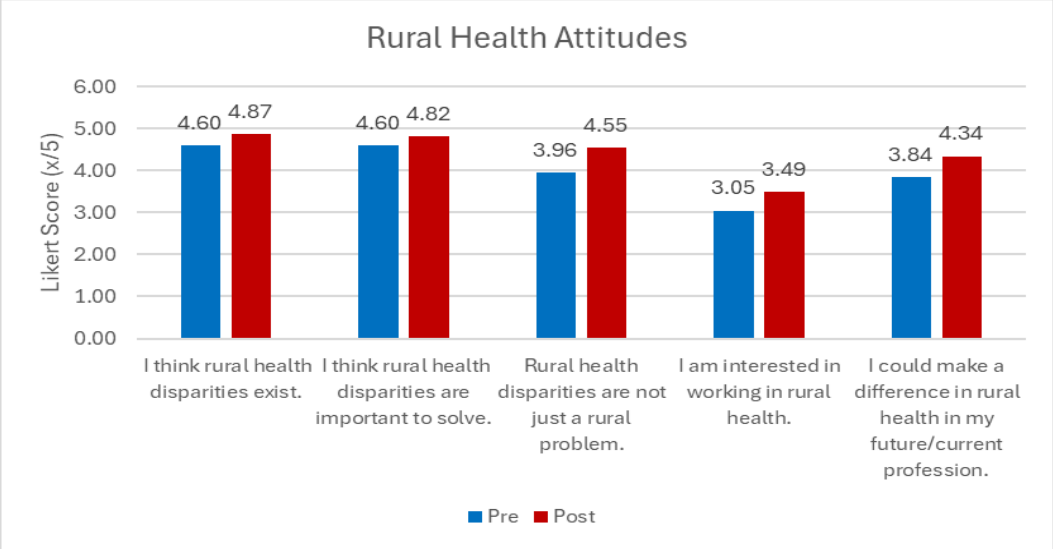
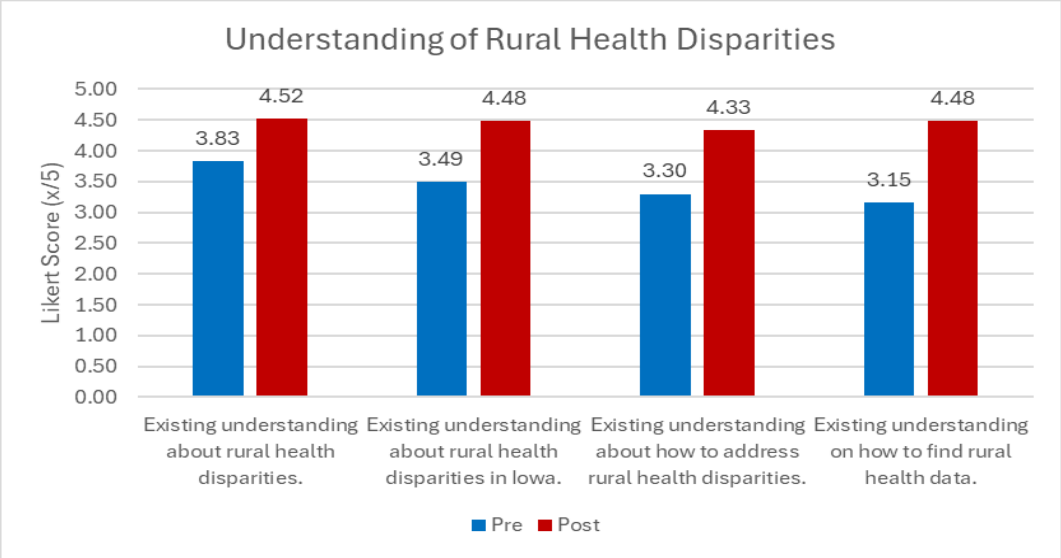


Figure 3

Mean Likert score for perceived understanding of general rural health disparities for both pre- and post-survey (maximum score = 5).



The post-survey included an additional four questions assessing the perceived effectiveness of the presentation; the average score for all four questions was 4.75 out of 5 on a scale ranging from strongly disagree (1) to strongly agree (5).

Table 1

Question scores and statistical significance using independent t-tests.

Question	Pre Mean +/- SD	Post Mean +/- SD	P Value
Rural health disparities exist.	4.60 +/- 0.95	4.87 +/- 0.63	0.011
Rural health disparities are important to solve.	4.60 +/- 0.88	4.82 +/- 0.76	0.030
Rural health disparities are not just a rural problem.	3.96 +/- 1.05	4.55 +/- 1.08	< 0.001
I am interested in working in rural health.	3.05 +/- 1.08	3.49 +/- 1.09	0.003
I could make a difference in rural health in my future/current profession.	3.84 +/- 0.97	4.34 +/- 0.84	< 0.001
Existing understanding about rural health disparities.	3.83 +/- 0.63	4.52 +/- 0.50	< 0.001
Existing understanding about rural health disparities in Iowa.	3.49 +/- 0.81	4.48 +/- 0.50	< 0.001
Existing understanding about how to address rural health disparities.	3.30 +/- 0.72	4.33 +/- 0.54	< 0.001
Existing understanding on how to find rural health data.	3.15 +/- 0.82	4.48 +/- 0.54	< 0.001
Knowledge-Based	6.33 +/- 1.38	7.83 +/- 1.61	< 0.001

Discussion

Key Findings

Following the one-hour educational session, participants demonstrated statistically significant gains across all primary outcomes. Knowledge about rural health disparities increased by 23.8% ($p < .001$), and attitudes and perceived understanding of rural health disparities also improved significantly (all p values ranging from $< .05$ to $< .001$). Interest in working in rural health and perceived ability to influence rural health disparities also increased. As summarized in Table 1 and illustrated in Figures 1–3, these findings suggest

that a brief, structured educational intervention can increase awareness and foundational knowledge of rural health disparities among pre-health students.

These results are notable given the short duration and low-resource nature of the intervention. Much of the existing literature on rural health education has focused on more intensive strategies such as immersive rural rotations, service-learning experiences, or extended community placements. While these models can provide valuable experiential learning, they often require substantial institutional resources and curricular restructuring. The present findings suggest that even brief educational sessions embedded within existing coursework may serve as an accessible entry point for introducing students to rural health disparities and encouraging early consideration of rural health issues.

Implications for Practice

The findings from this study suggest that brief educational interventions can be an effective strategy for increasing awareness and foundational understanding of rural health disparities among pre-health students. Because the intervention required minimal time and resources, similar sessions could be integrated into existing undergraduate and graduate health professions courses without requiring major curricular restructuring.

For example, a one-hour module on rural health disparities could be incorporated into courses addressing population health, health promotion, health policy, or social determinants of health. Such sessions may also serve as introductory content prior to rural clinical placements, service-learning experiences, or community health projects. Increasing students' awareness of rural health challenges early in their educational pathway may encourage greater interest in rural practice and improve understanding of the structural factors affecting rural populations.

Additionally, similar brief educational sessions could be adapted for continuing education opportunities for healthcare professionals or incorporated into workforce development initiatives designed to support preparation for practice in rural and underserved communities. Academic institutions, health systems, and community organizations could collaborate to incorporate brief rural health education modules into training and professional development programs as part of broader strategies to strengthen pathways to rural practice and workforce development.

Implications for Research

Although the results demonstrate improvements in knowledge, attitudes, and perceived understanding immediately following the intervention, additional research is needed to better understand the longer-term impact of these educational approaches. Future studies should examine whether knowledge gains are retained over time and whether increased awareness influences students' career intentions related to rural practice.

Research involving multiple institutions and larger student populations would help determine the generalizability of these findings. In addition, future studies could compare

different educational delivery formats, such as in-person presentations, asynchronous modules, or simulation-based learning, to identify the most effective approaches for integrating rural health disparities education into health professions curricula.

Further work could also explore whether early exposure to rural health disparities education influences students' participation in rural clinical experiences, rural workforce initiatives, or eventual employment in rural communities. Understanding how brief educational interventions fit within broader strategies to prepare the healthcare workforce for rural practice may help inform curriculum development across health professions education programs.

Limitations

Several limitations should be considered when interpreting these findings. The study was conducted at a single private university located in a metropolitan area within a predominantly rural state, which may limit the generalizability of the findings to other institutions or geographic regions. Participants may also have entered the session with some baseline awareness of rural health disparities due to the regional context.

Operational constraints prevented matching individual pre- and post-survey responses, limiting the ability to conduct individual-level change analyses. Additionally, minor variation in the timing of the presentations across courses and incomplete post-survey responses in some sections resulted in differences in sample size between pre- and post-survey measures. Future studies using matched longitudinal designs and multi-site samples would strengthen the evidence base and provide additional insight into the impact of brief rural health education interventions.

Conclusion

Rural health disparities continue to contribute to significant differences in health outcomes between rural and urban populations in the United States. Educating future health professionals about these disparities is an important step in preparing the healthcare workforce to address the unique challenges faced by rural communities.

This study demonstrated that a one-hour educational presentation on national and state-level rural health disparities significantly improved knowledge, attitudes, and perceived understanding among pre-health students. These findings suggest that even brief educational interventions can play a meaningful role in raising awareness of rural health issues among future health professionals.

As health professions programs continue to explore ways to address health disparities through education, brief and scalable approaches such as the intervention described in this study may offer a practical starting point for integrating rural health content into existing curricula. Continued research and curricular innovation will be important for ensuring that future health professionals are prepared to address the persistent health challenges faced by rural populations.

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