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Original Research

Impact of Rural Clinical Experience on Medical Student Attitudes Toward Rural Practice

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Abstract

Background: Rural communities face persistent health disparities and physician shortages, making rural exposure in medical education increasingly important.

Objective: This study investigates the impact of short rural clinical rotations on medical students' interest in rural practice with housing assistance provided by the home institution.

Methods: Over a one-year time frame from May 10, 2024, to May 10, 2025, this study surveyed a total of 21 participating medical students within one week of starting and after completing a rural clinical rotation. A total of 17 medical students at Texas Tech University Health Sciences Center at the Permian Basin Campus completed both pre- and post-surveys during a one- to four-week rural rotations.

Results: Students expressed an increased likelihood of participating in a career in rural or underserved medicine (p=0.0005 via Wilcoxon signed-rank test), an increase familiarity with challenges and requirements of practicing in rural or underserved settings (p=0.0002 via Wilcoxon signed-rank test) and rated an increased confidence with their ability to meet the needs of these populations (p=0.03 via Wilcoxon signed-rank test). Post-survey analysis of 18 responses revealed that 16/18 expressed a positive influence in their interest to serve rural communities while 2/18 expressed no influence. Qualitative responses emphasized themes of community connection, broad physician scope of practice, and recognition of social determinants of health.

Conclusion: This study highlights the effectiveness of brief rural clinical rotations in shaping student perspectives, underscoring the potential role of targeted educational experiences in preparing and ushering the next generation of physicians for rural practice.

Keywords: Rural, Graduate Medical Education, Exposure

Background

Rural health represents a cornerstone of the healthcare landscape, yet it is a sector under

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mounting strain. Approximately 14% to 19% of the U.S. population reside in rural areas [1,2]. Rural populations are older and tend to have higher burdens of chronic disease and mortality than urban populations [1,3]. For example, national COPD prevalence is 12.0% in rural vs 5.9% in urban communities[4]. Cancer incidence was higher in nonmetropolitan at a rate of 460 per 100,000 individuals when compared to metropolitan counties with a rate of 447 per 100,000 [1]. This trend persists for mortality in cancer patients with a rate of 182 per 100,000 in non-metropolitan areas compared to 166 per 100,000 in metropolitan areas [1]. These healthcare gaps coincide with socioeconomic disparities: rural counties often have higher rates of poverty and uninsured individuals. Rural residents also often need to travel further for care, an average of 17 miles to the nearest hospital, with many rural counties have few or no providers [5,6]. These factors together produce higher overall mortality and worse outcomes for rural America. Rural communities face a critical shortage of clinicians. Only 10% of U.S. physicians practice in rural areas despite nearly 20% of the population living there [1,6]. Urban counties have roughly 1.6 times more primary care doctors per capita than rural counties [6]. Moreover, one-third of current physicians will reach retirement age in the next decade, with half being over 55 years of age [6]. Since 2005, 180 rural hospitals have closed nationwide, with two-thirds of those closures occurring in Southern states including Texas [5]. In Texas alone dozens of rural hospitals have shut in recent years, leaving many counties with no inpatient facilities [5]. Loss of local services forces has required hospitals to expand service areas and has widened gaps in emergency response times. Shortages in staffing is not limited to physicians, as rural nursing, physical therapists, and mental health specialists also have either urban practice tendencies or diminishing rural practices [7-9].

The implications of these shortages are clearer when comparing the services available to these communities. For example, screening rates for breast, colorectal, and other cancers are lower in rural areas than urban [1,10]. Mental health care is especially scarce in rural counties, with increased travel time being associated with poorer mental health and more comorbidities [3]. Telehealth expansion holds promise, but broadband access is lacking for a sizable portion of rural residents. Reimbursement and insurance factors further compound disparities [11]. Many rural residents are uninsured or underinsured with Texas amongst the highest rates in the country. Medicare and Medicaid payments often do not cover the higher costs of rural care. These system-level issues restrict care even when physical services exist. When evaluating ownership patterns of hospitals between rural and urban environments from 1988 to 2005, 41.3% of rural hospitals were government-run compared to only 28.49% of urban hospitals [12]. In addition to geographic factors, systemic barriers limit rural healthcare: cultural and linguistic barriers are important considerations that affect many rural communities in the South.

Substantial evidence indicates that exposing students to rural medicine during training boosts rural recruitment. In an integrative review, students with rural clinical placements were significantly more likely to choose rural practice after graduation [13]. Targeted medical school and residency programs that admit students from rural backgrounds and require rural rotations substantially increase the rural workforce [6,13]. However, currently only about 1% of graduate medical education programs are located in rural settings, and few medical students have sustained rural training

experiences [6]. Expanding rural-track residencies, locating training in community health centers and critical-access hospitals, strengthening loan repayment and incentive programs have been critical to addressing the under-supply of rural clinicians [6].

Objective

Our study evaluates how structured rural rotations with provided housing offers potential to address these gaps by assessing their impact on medical students' perceptions and interest in rural practice.

Methods

This study utilized a pre- and post-survey design conducted at Texas Tech University Health Sciences Center Odessa (TTUHSC). A list of all third year and fourth-year medical students that planned to participate in a pre-existing rural clinical rotation was obtained between May 10, 2024, to May 10, 2025. The inclusion criteria were enrollment in the School of Medicine, participation in either a one-week rural rotation for MS3s or a two- to four-week rural rotation for MS4s. TTUHSC provides the students housing during these rural rotations. This study evaluated this existing process with a pre-survey was distributed a week prior to the rural rotation for medical students and a post-survey was distributed within a week of completion of the assigned rotation. Students were given the opportunity of reimbursement for housing or were given placement by housing via TTUHSC.

Rural rotation sites were dependent on length of exposure and type of exposure. Rotation sites included Alpine, Texas; Marathon, Texas; Fort Stockton, Texas; and Presidio, Texas. The cities fall into Brewster, Pecos, and Presidio County are designated as rural by 2023 Rural-Urban Continuum Codes (RUCC) as codes 7, 7, 9, respectively [14].

Three Likert-scale survey questions remained the same between the pre- and post-survey: how likely are you to consider practicing medicine in a rural or underserved area, how familiar are you with the challenges and rewards of practicing in rural or underserved areas, and how confident are you in your ability to meet the healthcare needs of rural or underserved populations. The pre-survey included demographic questions including whether they have lived or consider themselves from a rural location, and interest in residency specialty. Students were also asked about prior rural healthcare exposure with an open-ended response. The post-survey gauged the quality of the rotation with questions including how valuable do you believe the rural clinical rotation was in providing insight into the healthcare needs of rural or underserved populations, how likely are you to recommend a similar rural clinical rotation experience to your peers, and to what extent do you feel the rural clinical rotation influenced your interest in rural or underserved practice. An open-ended meaningful experience prompt and comments prompt was used to discuss novel experiences and address issues that faced medical students during the rotation.

Statistics

Statistical software and reproducibility. Analyses were conducted in Python 3.10.4 on a 64-bit Windows 10 (10.0.26100) workstation (Intel® Core™ i7-12700KF, 32 GB RAM). Data handling used pandas 2.2.3 and NumPy 1.26.4; inferential tests (Wilcoxon signed-rank, paired t-test, Shapiro–Wilk) used SciPy 1.14.0; figures were produced with Matplotlib 3.10.1. All procedures in this pipeline are deterministic given the data and package versions; nevertheless, a fixed random seed (42) and recorded library versions were used to facilitate exact replication on other systems.

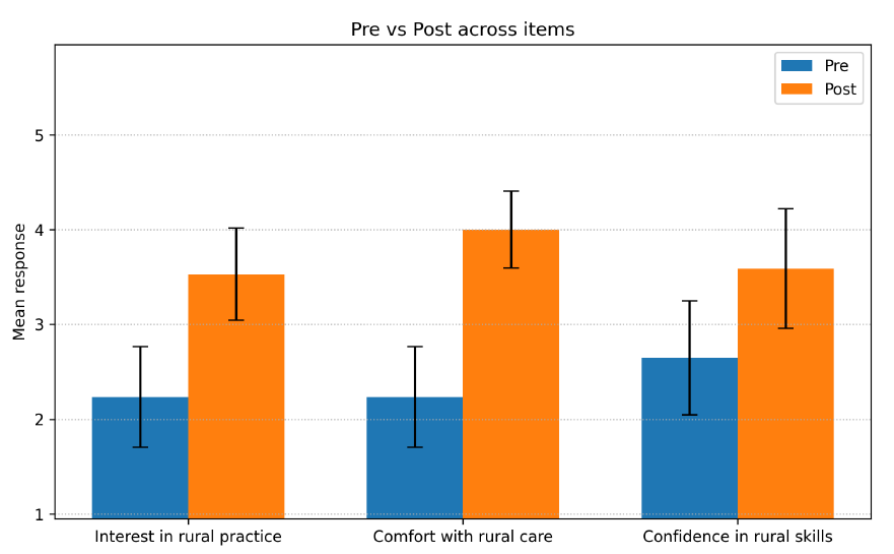

Figure 1. Mean response before and after rural healthcare exposure
The three rural questions were evaluated: interest in rural practice, comfort with rural care, and confidence in rural skills. Displayed are the average pre- and post-survey survey responses with a 95% confidence interval displayed.

Due to the use of single ordinal items, Wilcoxon signed-rank test as the primary inferential test to assess systematic pre and post shifts; the Wilcoxon p-value and the rank-biserial correlation (r, -1 to +1) were used as an effect size. Paired t-tests on numeric difference scores (post-pre) were run as robustness checks and Cohen's dz is reported for those analyses. To account for the three related tests, Holm (family-wise) and Benjamini–Hochberg (FDR) adjusted p-values. Descriptive statistics (mean, SD, median, IQR) are provided for each time point, and mean change with 95% CIs is shown to convey precision. All tests were two-sided, significance was defined as $p < 0.05$ unless otherwise noted for adjusted tests, and analyses were performed in R. Qualitative open-ended responses were analyzed thematically to identify recurrent domains for program improvement.

Ethics

This project was conducted as a Quality Improvement (QI) initiative and was reviewed and approved by the TTUHSC Quality Improvement Review Board (QIRB #24009). This project did not meet criteria for human subject's research requiring IRB oversight, as it was designed to improve internal processes. The QI project was carried out under the supervision of the QIRB, who ensured compliance with ethical standards and institutional policies. All involved team members received appropriate oversight, and the intervention aligned with professional responsibility and improvement objectives. Participation in the QI activities preserved anonymity: the data used were de-identified, no individual responses were traceable, and all analyses were conducted in aggregate. Participation did not affect academic standing or credit, and students were informed that involvement was voluntary and confidential.

Results

A total of 38 surveys were received; 20 medical students completed a pre-survey while 18 completed a post-survey for the

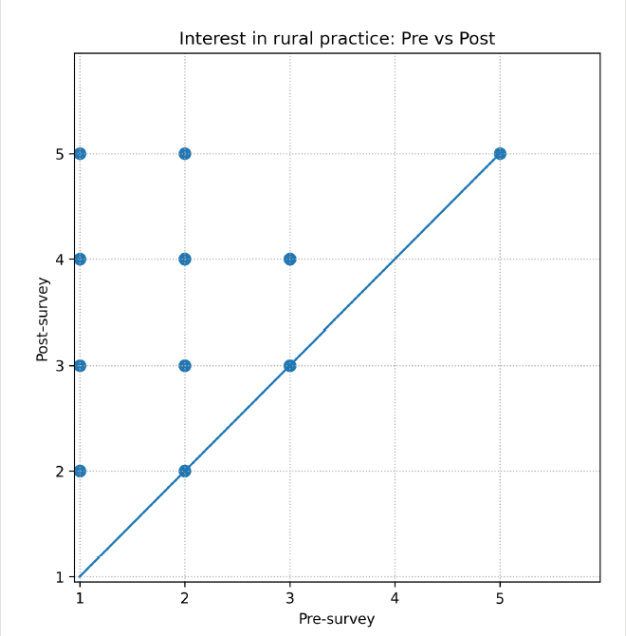

Figure 2. Effects of rural exposure on students' interest in rural practice
The graph above shows the pre-survey response on the x-axis and the post-survey response for same students on the y-axis. Points plotted to the left of the line indicate improved experiences with exposure, points plotted on the line indicate no change in interest, and points plotted to the right of the line indicate decreased interest in rural practice.

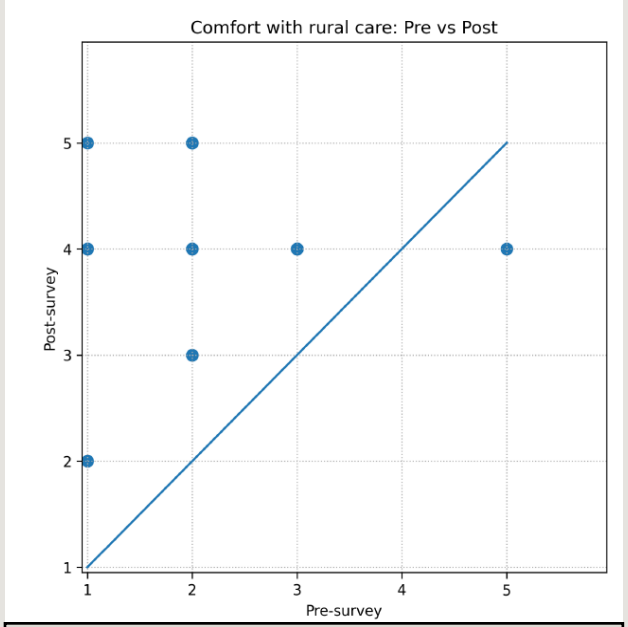

Figure 3. Effects of rural exposure on students' comfort within rural care
The graph above shows the pre-survey response on the x-axis and the post-survey response for same students on the y-axis. Points plotted to the left of the line indicate improved comfort with exposure, points plotted on the line indicate no change in comfort, and points plotted to the right of the line indicate decreased comfort in rural practice.

rural clinical rotations. Of those, 17 medical students provided both a pre- and post-survey resulting in 34 paired responses for analysis. Participation in these rural experiences led to significant improvements across all measured domains.

Of the 20 medical students that completed the pre-survey, 4 indicated having lived in a rural region before and 6 students indicated having prior rural healthcare exposure all of whom gained prior exposure due to opportunities through our medical school.

Three Likert-scale questions were analyzed between the matched 17 surveys via Wilcoxon signed-rank test. Students reported an increased likelihood of considering a career in a rural or underserved areas following the rotation ($p = 0.0005$). Figure 1 shows the average mean score for the first question as 2.24 which improved to 3.53 after the experience. Students also reported substantially greater familiarity with the challenges and requirements of practicing in rural or underserved settings, with post-survey scores showing a statistically significant increase from pre-survey scores with a mean of 2.24 to a post-survey mean of 4.00 ($p = 0.0002$). Confidence in their ability to meet the healthcare needs of these populations also increased with an average pre-survey rating of 2.65 to a post-survey rating of 3.59 ($p = 0.0327$).

Post-rotation responses to two additional items further corroborated the paired-analysis results. When asked, "How valuable do you believe the rural clinical rotation was in providing insight into the healthcare needs of rural or underserved populations" and "How likely are you to recommend a similar

rural clinical rotation experience to your peers?", all students (18/18) reported they found the rotation valuable in some capacity and would recommend the rotation to peers. When asked directly about the rotation's effect on career interest, "To what extent do you feel the rural clinical rotation influenced your interest in rural or underserved practice?", 16 of 18 students (89%) reported a positive influence (8 slight positive, 8 strong positive) while 2 (11%) reported no influence. Representative qualitative comments explained why the experience resonated: students described witnessing the personal, close-knit nature of rural patient–physician relationships; observing attendings develop broad clinical competence to manage care without nearby specialists; and gaining firsthand insight into social determinants that shape clinical decision making in resource-limited settings. Some statements from qualitative text-free experiences included: "Learned a lot of different ways of practice, learned about socioeconomic factors in the region," "Just interacting with the people from rural communities was an impactful experience. They are so grateful that you are there to help address their medical need," and "it was enjoyable to have patients pop in without appointments and really see the value of small-town medicine." Due to limited sample size, text analysis was not performed, but the experiences section was positive focusing on procedures performed, exposure to different clinical experiences, learning rural health difficulties, and better understanding of nuanced relationship between rural providers and their patients. Free text other comments for clinical rotations were completed by 7/18 students – 5/18 students described the exposure in further depth including "…amazing experience and I would strongly encourage…," "experience was quite unique…," and "I would highly recommend this experience." One student commented on their desire to practice in underserved areas and the last student commented on a desire to have more rural experience exposure "with OB and general surgery exposure as well."

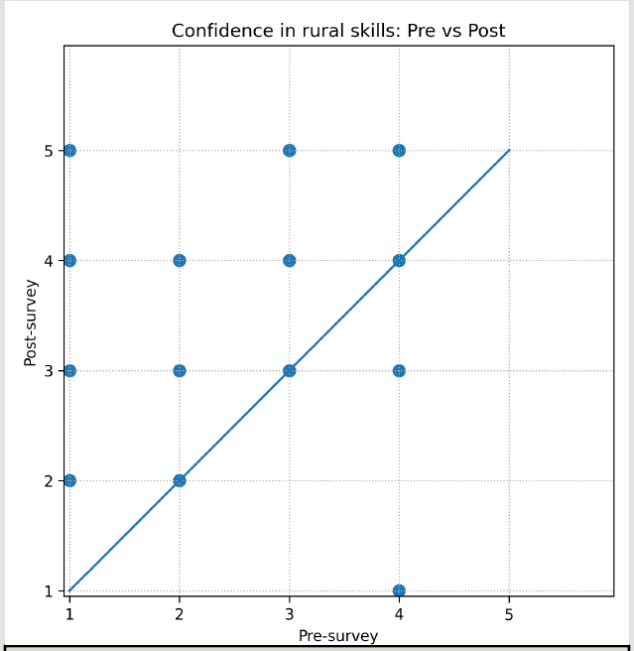

Figure 4. Effects of rural exposure on students 'comfort within rural care
The graph above shows the pre-survey response on the x-axis and the post-survey response for same students on the y-axis. Points plotted to the left of the line indicate improved confidence with exposure, points plotted on the line indicate no change in confidence, and points plotted to the right of the line indicate decreased confidence in rural practice.

Discussion

Rural Americans continue to experience substantially worse health outcomes than urban counterparts, with higher mortality from cardiovascular disease, cancer, respiratory illness and other conditions [11]. Despite occupying ~69% of Texas's landmass, rural Texans suffer disproportionately - for example, deaths from cancer, heart disease, and chronic lung disease are significantly higher in rural Texas than statewide averages [11].

Compounding these challenges is the fact that at least 17 rural hospitals closed in Texas from 2010-2019, a rate higher than any other state [15]. Medical education represents a key lever for change: prior studies and our findings indicate that even brief, structured rural rotations can enhance students' understanding of rural practice, strengthen their confidence in addressing community health needs, and increase openness to rural career paths [6,13]. This mirrors prior work showing that positive rural placements boost interest in rural careers [16].

Our results align with international studies demonstrating the impact of rural exposure. For example, Ray et al. found that students' interest in rural medicine rose after repeated rural clinical placements, especially when experiences were positive and community-focused [17]. Similarly, Washington State found that medical graduates who participated in a Rural Underserved Opportunities Program were nearly twice as likely to eventually practice in rural areas [16]. In our cohort, participants reported that the rural rotation was worthwhile and would recommend it to peers, underscoring high engagement. Students consistently noted improved familiarity with the unique challenges of rural medicine, greater confidence in their ability to provide care in underserved settings, and a heightened likelihood of considering a rural career. These findings support the notion that embedding rural clinical experiences shape perceptions. Notably, students in our study often entered with varied specialty interests; yet after their rural rotation they reported greater interest in rural practice, echoing other evidence that community immersion can promote health equity through proper distribution of physicians [16].

Despite these positive effects, important barriers remain. Rural health ventures generally receive less funding than urban counterparts. Recent legislative sessions have only begun to reverse this: from 2019-24 $64 million has been awarded to organizations to established new accredited rural based residencies, but longstanding underinvestment means many rural sites still struggle [18]. High educational debt is a major deterrent for students considering low-paying primary care or rural work, with 31-58% of residents having debt that exceeds $200,000. Recent federal rules capping graduate borrowing at roughly this level have raised alarms: by eliminating Grad PLUS loans and limiting total loans (e.g. $200K cap), policymakers risk excluding financially vulnerable students from medicine altogether [19]. Pathman et al. noted that while high debt can drive physicians into service-obligation programs (33% of obligated grads worked rurally vs 7% without obligations), it can also deter low-income applicants from entering medicine or choosing primary care [20]. These financial pressures compound the challenge of rural exposure: many students can only access rural training through independent away rotations, which often occur late in medical school [19]. Institutional coverage of housing may resolve some of the trepidation for these students that are considering rural careers but have little prior experience.

Rural Texans also experience more socioeconomic disadvantage: poverty and uninsured rates are higher in rural Texas with 76 rural counties exceeding 20% uninsured rate, creating both greater need and greater strain on rural providers [11] . Addressing this requires statewide collaboration, for example, Texas Tech University Health Sciences Center (serving the West Texas region) explicitly focuses on rural needs. Other Texas institutions have followed suit with UNT Health Fort Worth's ROME Rural Scholars track requiring extended rural clerkships. Medical schools could share rural training sites and jointly

develop rural curriculum to amplify impact; for instance, Texas Hospital Association has advocated incentives and support for rural training programs. Early exposure is also crucial: embedding rural medicine experiences in preclinical years may normalize rural practice and attract students before specialty choices harden [16]. Our findings suggest that even a few weeks of rural work can shift attitudes, so scaling up these opportunities across all Texas schools would likely strengthen the pipeline.

Further research is needed to confirm that attitude changes translate into career decisions. Longitudinal tracking of medical graduates (e.g. 5-10 years post-training) could quantify what fraction of those with rural rotation experience ultimately practice in rural settings. This trend is well-established in graduate medical education with a substantial increase in family medicine residents practicing in rural healthcare following residency exposure [21]. It would also be important to evaluate outcomes such as recruitment/retention rates in communities that host students. Policymakers and educators should examine mitigation strategies for financial barriers: for example, loan forgiveness for rural service, enhanced scholarships, and guaranteed faculty positions at rural hospitals. There is evidence that targeted financial incentives do increase retention of providers in underserved areas, so piloting such incentive programs in Texas would be valuable [20]. Curriculum innovations that involve multidisciplinary rural health teams (nurses, PAs, therapists) need further evaluation, especially within educational practice settings as many specialties do not have residencies for these types of exposure.

Limitations

Our study cannot prove causation; students who opt into rural programs may already be predisposed toward rural care. Our sample was also drawn from a single institution's program, so generalizability and replicability need to be further evaluated. Survey data may also be influenced by recall bias or misinterpretation of questions. Qualitative feedback suggests high satisfaction, but self-reported interest does not guarantee future practice. Furthermore, the smaller sample size of this study requires further investigation to verify the impact on a larger scale and cross-institutional validity. Moreover, broader social factors (e.g. family preferences, spousal career, income expectations) also influence career choice.

Conclusion

Rural healthcare is an important aspect that has been falling to the background in U.S. healthcare. Growing disparities are further heightened by larger amounts of specialization and a drive to practice in urban settings. Our findings indicate that increased exposure to rural health during clinical rotations for medical students has shown a greater interest in rural practice. This form of exposure could be the key to fostering additional physicians in our areas of medically underserved communities. These initiatives require a combination of healthcare policy and interdisciplinary pushes to develop sustainable and meaningful changes for our rural communities.

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