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Rural Health Equity: Expanding Rural Dermatology STI Clinics for Improved Access and Early Detection

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Abstract

Sexually transmitted infections (STIs) remain a significant public health challenge, with rural communities bearing a disproportionate burden due to geographic, socioeconomic, and infrastructural barriers. Limited access to healthcare, lack of reliable transportation, and a pronounced shortage of specialists—including dermatologists—create conditions where STIs are frequently diagnosed at more advanced stages. Later-stage diagnoses contribute to increased transmission rates, higher healthcare expenditures, and worse patient outcomes. Expanding access to dermatology-led STI clinics in rural areas offers a compelling, cost-effective intervention that addresses both diagnostic and preventive gaps in care. Key contributors to cost-effectiveness include earlier identification of cutaneous manifestations, timely initiation of treatment, reduced disease progression, and decreased reliance on emergency or long-term care services. A comprehensive evaluation of these variables reveals how integrating dermatologic expertise into rural STI care pathways not only improves clinical outcomes but also strengthens health system efficiency. Prioritizing the expansion of dermatology STI services in rural regions represents an urgent and actionable strategy to reduce structural health disparities and safeguard the well-being of medically underserved populations.

Keywords

Sexually Transmitted Infections, Rural Health, Dermatology Clinics, Healthcare Access, Cost-Effectiveness, Health Disparities, Healthcare

Infrastructure

1. Introduction

Sexually transmitted infections (STIs) remain a pressing public health issue, particularly in rural communities. These areas have limited healthcare access, and delayed diagnoses contribute to poorer outcomes and rising healthcare costs. Recent data from South Carolina further illustrates the disproportionate burden of STIs in rural areas and among underserved populations. South Carolina is among the top five states with high STI incidence rates. In comparison to other counties, the rural counties' Medicaid beneficiaries within the state had a higher prevalence of chlamydia and gonorrhea (aOR = 1.14). Racial and ethnic minorities also showed higher odds for chlamydia, gonorrhea, and HIV, which are most likely attributed to limited healthcare access. Notably, the majority of counties with the highest rates of chlamydia (73.9%), gonorrhea (72.7%), and HIV (60.9%) were rural [1]. Giannouchos *et al.* highlight the geographic and demographic disparities that could help address improved access to early diagnosis and treatment in rural communities. In addition to prevalence, patients in rural areas are more likely to rely on Medicaid for insurance coverage, which is associated with longer wait times. A recent study found that Medicaid patients wait an average of 13 days more for dermatology appointments than those with private insurance [2]. Dermatologists have a significant role in detecting STIs to prevent increased complications. Still, the lengthy waiting period for patients to schedule an appointment with a dermatologist can be a critical time frame where disease can progress, especially STIs. These findings build on a broader pattern of disparities in rural healthcare.

Beyond insurance-related barriers, geographic location plays a critical role in access to timely STI care. A study done with over 16,000 patients found that individuals living in micropolitan, small town, or rural areas face more significant delays in treatment and are less likely to receive care compared to those in metropolitan areas, due in part to reduced STI screening rates and the need to travel significantly farther for medical services [3]. Due to the lack of density of healthcare providers within rural areas, including dermatologists and STI specialists, these delayed diagnoses can be further exacerbated, which can contribute to diseases like HIV. Late HIV diagnosis is found to significantly increase the risk of death, serious complications, and transmission, which is primarily due to structural and personal barriers to testing, like healthcare access [4]. Collins emphasizes improving early STI screening and treatment access in rural areas. By bridging this gap, there is potential to reduce the spread of STIs and the burden of treatment costs. STI costs were estimated to be $15.9 billion in 2018 [5]. There is an urgent need to strengthen rural healthcare infrastructure regarding STI screening and specialty access, which can reduce poor patient outcomes and economic

burden.

In addition to the financial strain, the rising prevalence and incidence of STIs have clinical urgency, which calls for the need for STI-specific dermatology clinics in rural areas. Many STIs present with skin manifestations, making dermatologists well-trained to identify and manage these conditions. An example of an STI that commonly first presents as a skin lesion is syphilis, whose incidence has risen 80% over the past six years [6]. Dermatologists have the potential to bridge the gap between early diagnosis and the progression and spread of STIs due to their extensive diagnostic expertise in the care of STIs. Specialized skin lesions can be associated with diseases like syphilis, which may be misdiagnosed or overlooked, particularly in rural communities where healthcare providers might lack the training or resources to distinguish between harmful lesions and benign ones. This can include atypical rashes, ulcers, or papules in other STIs like genital herpes or HIV-related dermatoses. Dermatologists' extensive training in these areas can allow for earlier diagnosis and treatment to prevent complications and further transmission. Expanding dermatology-specific STI clinics would enhance timely detection and help reduce transmission rates, especially in rural communities, as there are higher rates of STIs. In addition, 90% of HIV diagnosed patients have some sort of skin manifestation, which then progresses to systemic implications [7]. Having dedicated dermatology STI clinics would let dermatologists focus specifically on STI-related skin issues, without having to divide their attention with other common skin conditions. Because of the higher rates in rural areas, dermatology STI-specific clinics should be placed in areas with limited access to care. In addition to the prevalence and incidence of STIs, they also pose a specific financial burden on the U.S. healthcare system. Expanding STI-specific dermatology clinics has the potential to significantly reduce healthcare costs and ease the overall economic burden associated with these infections. Since many STIs initially present with skin lesions, earlier detection by dermatologists can help lower morbidity and mortality rates, reducing patients' suffering and improving their health outcomes.

Although there has been growing awareness of the need to close the gap for rural healthcare disparities and the value of dermatology in STI detection, additional challenges are ongoing. Shortages of dermatologists are still an issue that limits access to timely care. Expanding training programs to recruit and educate future dermatologists can help address workforce shortages and increase access to care, particularly in underserved areas. Because of the high prevalence and incidence rates of STIs in rural areas, there is a challenge of the lack of STI-focused clinics. Limited funding and increased expenses in this area contribute to the disparity. Additionally, there is a call to bridge the gap in research on dermatology-led STI clinics and how they may improve STI transmission rates, healthcare costs, and patient outcomes. The integration of dermatologists into rural STI models can improve access and care for patients at risk. Dermatologists will be able to use their abilities from their specialized skill set in identifying hard-to-diagnose skin lesions, making it possible for dermatologists to use their abilities to reduce diag-

nostic delays and improve the outcomes of a large population of patients. These gaps and challenges should call for future research to evaluate the outcomes of this implementation and health policy initiatives to discuss expanding more accessible dermatology services to reduce the wait time, which is critical in the diagnosis of STIs. Addressing these challenges and gaps will take a combination of better training, more focused research, and innovative policy changes to make STI care more accessible and effective in rural communities.

2. Barriers to STI Care in Rural Areas

Rural communities experience a notable shortage of physicians and face considerable challenges in accessing specialized healthcare, particularly dermatological care. This poses a significant public health challenge regarding sexually transmitted infections (STIs), particularly in rural areas where their prevalence is increasing. The ongoing closure of healthcare facilities further impacts STI care [8] [9]. While many of these STIs have dermatological manifestations that can indicate early infection, limited access to specialized care can lead to delayed treatment. Although the percentage of dermatologists in rural areas has increased, the disparity in their availability between urban and rural communities has also widened. Additionally, rural areas tend to have an older dermatologist workforce as newly practicing dermatologists tend to practice in urban areas [10]. While there has been progress in increasing dermatological care in rural areas, disparities in access to healthcare remain. Moreover, the aging dermatologist workforce in rural areas could further exacerbate the physician shortage in the future, leading to worse clinical outcomes in rural communities.

Transportation can add to the barriers faced in rural communities in accessing dermatological STI care. Asbeck *et al.* found that only about 20 percent of patients referred to dermatology by their primary care physicians completed the referral, and approximately 40% of patients were lost to follow-up. The low completion rate was due to transportation barriers, with most patients who did not complete their dermatology referral indicating that the nearest dermatologist was located 20 to 30 miles from their home [11]. Transportation barriers, such as long travel distances and limited public transportation, compounded with the financial burden of travel, can have profound implications for seeking timely STI testing and treatment. Additionally, Merrell *et al.* discussed that individuals who traveled more than 20 miles to their most recent testing location were 1.74 times more likely not to have been tested in the previous 12 months compared to those who traveled 20 miles or less [12]. This can lead to untreated STIs progressing, severe long-term health conditions, and increased transmission rates. Due to privacy concerns, individuals in rural communities often travel to various locations for STI testing and treatment to ensure confidentiality [13]. Expanding dermatology STI clinics in rural areas could significantly improve access to STI care and address transportation-related barriers and confidentiality concerns, enhancing adherence to follow-up care and improving patient outcomes.

The stigma surrounding sexually transmitted infections (STIs) can discourage individuals from seeking STI screenings. Lichtenstein *et al.* reported that approximately 50% of individuals delayed or avoided seeking STI treatment due to feelings of embarrassment, with African Americans and religious individuals being more likely to postpone or not pursue treatment [14]. This highlights the necessity of establishing dermatology STI clinics in rural areas, as these facilities can foster a more discreet and less stigmatizing atmosphere for STI screening and treatment. Low health literacy has been associated with higher levels of stigma, which can create additional barriers to seeking STI care. Individuals with low health literacy are at a higher risk of acquiring an STI but are less likely to seek care. However, health providers can improve patients' confidence in seeking treatment and reduce stigma by providing a patient-centered care plan [15] [16]. This highlights the importance of establishing STI dermatology clinics in rural areas, allowing dermatologists to implement educational and community-focused initiatives aimed at reducing the stigma associated with STIs, specifically tailored to the community's needs.

3. Cost-Effectiveness of Expanding Dermatology STI Clinics

Multiple factors support the cost-effectiveness of dermatology clinics in rural settings. Most patients in rural settings have longer delays in diagnosis and management, which results in a higher likelihood of late-stage disease upon their initial visit. Delay in seeking care for sexually transmitted infections results in greater transmission rates, greater risk of additional infection or worsening infection, and more significant consequences of long-term sequelae such as infertility [17]. This results in increased overall healthcare costs due to more emergent care and may result in worse health outcomes. Each year, around two million people utilize STD clinics in the United States. The majority of the population utilizing STD clinics includes younger, nonwhite individuals with lower socioeconomic status [18] [19]. According to the CDC, the Centers for Medicare and Medicaid Services (CMS) has determined that screening for certain STIs such as chlamydia, gonorrhea, syphilis, and hepatitis B, and high intensity behavioral counseling (HIBC) is designated by the U.S. Preventive Services Task Force (USPSTF) as grade A and B recommendations for prevention and early detection of illness or disability [20]. Expanding dermatology STI clinics could improve financial barriers for patients by reducing the need for more expensive treatment regimens.

Early screening and counseling interventions significantly reduce healthcare costs and hospitalization [21]. A three-year study involving data from a comprehensive medical center for foster youth analyzed the reduction of direct and indirect costs through early testing, counseling, and treatment of STIs. Calculations based on CDC formulas adjusted for inflation. A total of 316 youth receiving medical services were enrolled in this study. Of this total, 206 were sexually active and underwent STI testing. Treatment was provided for 78 positive chlamydia tests, 37 positive gonorrhea tests, and six positive syphilis tests, and a total of $60,049.68

direct and $73,956.36 indirect costs were prevented [22]. This highlights the necessity of STI prevention, particularly in rural areas where healthcare and dermatology access are limited. STI clinics could act as an effective intervention for rural communities.

Effective STI prevention and screening tools reduce recurrent visits and severe disease sequelae. Fewer follow-ups translate to better patient adherence, reduced healthcare strain, and optimized use of medical resources in rural areas. Biomedical tools for STI prevention include consistent condom use, vaccination, pre-exposure prophylaxis, post-exposure prophylaxis, and expedited partner therapy. Additionally, condoms offer over 90% protection against HIV, Hepatitis B virus, and *Neisseria gonorrhoeae* [23] [24]. Nine-valent HPV vaccination has been shown to prevent HPV types causing 90% of cervical cancers [25]. There is no specific vaccine for chlamydia; however, current data from the CDC has shown that post-exposure prophylaxis with doxycycline can reduce chlamydia infection by 86% and syphilis by 80% [26]. Post-exposure prophylaxis with doxycycline has shown about 50% - 60% reduction in gonorrhea infection [27]. Individuals who follow proper prevention strategies will help reduce the overall incidence of STIs as well as transmission within the community. This ultimately will help decrease healthcare strain and cost.

4. Improved Patient Outcomes & Healthcare Access

Sexually transmitted infections (STIs) have been on the rise in recent years in rural communities. While many STIs have dermatological manifestations that can indicate infection, rural areas often lack access to dermatological care to identify STI signs and symptoms, leading to delayed treatment. Early intervention is essential in preventing severe outcomes from common STIs, such as infertility and systemic infection in both men and women [28] [29]. This underscores the need to expand dermatological STI care, which can improve screening availability and lead to early detection and better patient outcomes. A systematic review found that single-visit rapid immunochromatographic strip (ICS) testing and immediate treatment proved to be significantly more cost-effective than requiring patients to return for results and treatment, ultimately leading to reduced adverse outcomes [30]. This demonstrated the need to expand dermatological STI clinics, as it can result in improved treatment compliance and improved patient outcomes. For low-income individuals in rural areas, financial barriers can be compounded by the long distances they must travel to access health services. By establishing dermatology STI clinics, this can improve health outcomes but also reduce the common challenges faced by rural communities. Syphilis, which is currently on the rise in rural areas, can be treated effectively with a single intramuscular injection of benzathine penicillin G with early intervention. However, if treatment is delayed, the infection can lead to neurological complications and progress to latent or tertiary syphilis, which requires an extended clinical treatment regimen and subsequent clinical visits [8]. Expansion of dermatology STI clinics presents a

promising way to increase early detection and reduce intensive interventions that incur additional costs and further burden the financial barriers rural communities face.

Rural patients, on average, have to travel 20 miles to receive dermatological care [13], creating a significant barrier in the timely diagnosis of sexually transmitted infections. Although teledermatology has been proposed as a possible intervention to improve dermatology care in rural communities, its implementation has faced logistical challenges. Duniphin reported that patients preferred face-to-face patient visits over telehealth for dermatology visits, with the most significant concern being the lack of physical contact for the physical exam [31]. The preference for in-person clinic visits implies that although telehealth options may lessen transportation barriers, this may not be sufficient to improve access to dermatological care. While teledermatology may lower indirect costs related to patient absenteeism from work, the direct costs of untreated infections and long-term complications could increase financial burdens for healthcare systems and patients. Cutaneous manifestations of STIs may not be easily assessed through telehealth, and this has the potential to delay diagnosis. Additionally, Valentine *et al.* discussed that vulnerable communities, such as rural areas, were less likely to use telehealth services [32]. This can unintentionally exclude these patients from seeking care, especially those at increased risk for STIs. This underscores the need to expand dermatology STI clinics into rural areas, where accessible care can encourage individuals to pursue STI testing and treatment, ultimately enhancing health outcomes. Improving dermatology STI screening can be a cost-effective strategy for detecting and treating STIs in rural populations, resulting in a higher rate of successfully treated patients.

5. Challenges & Barriers to Clinic Expansion

Rural populations face distinct challenges with STI testing and treatment, including limited facility access, stigma, poverty, and resource shortages. Access to healthcare remains disproportionately limited in rural communities. Data from 2016 indicated that only 75% of rural counties had any access to HIV-related services, including STI testing, compared to 91% of urban counties [12] [33]. In addition to limited access to care, financial resources and economic hardship present as major obstacles to expanding STI care in rural settings. Many rural communities lack foundational healthcare infrastructure, such as updated medical facilities, diagnostic labs, and pharmacies, which are required to support specialized services. Opening a new STI clinic in these areas demands substantial up-front investment in construction and equipment and hiring and retaining qualified personnel. Long-term viability remains uncertain even when start-up grants or short-term funding are secured. Rural healthcare providers often serve smaller populations, perform fewer high-reimbursement procedures, and rely heavily on government payers or patients without insurance, making it difficult to generate sustainable revenue. Reimbursement models frequently fall short of covering the full

cost of care, especially for specialized services, such as STI testing. These challenges are intensified by competition from larger health systems that can drive up prices in local markets, leaving rural clinics struggling to stay financially afloat [34]. While expanding dermatology STI clinics to rural areas faces challenges, the long-term benefits in cost and improved health outcomes are significant and could address the disparities faced by rural areas.

Given the long-term cost-effective benefits of investing in healthcare infrastructure, it is crucial to explore potential funding sources at the state and federal levels that support investment in healthcare infrastructure in rural communities. The Rural Health Care Services Outreach Program, offered by the Health Resources and Services Administration (HRSA), supports organizations dedicated to expanding healthcare services in rural areas [35]. State-level funding and public-private partnerships could enhance federal funding and support the growth of dermatologic care in rural areas, which would contribute to long-term sustainability.

Primary care providers manage a significant portion of STI cases, rather than dedicated STD clinics [36] [37]. In some cases, testing outside of STD clinics has been reported to be more expensive, further exacerbating the economic burden that rural communities face. For instance, in Illinois, although emergency departments manage a higher volume of chlamydia cases than private practices, treatment through the ED can be up to 80% more expensive than treatment through STD clinics [38] [39]. Despite high upfront costs, expanding STI clinics in rural areas can be cost-effective over time. Early detection and treatment reduce transmission and prevent costly complications that often lead to emergency care. Increasing access to STI clinics in rural communities and bringing integrated dermatologic and STI services closer to patients will reduce excess expenses for care from outside providers and improve care efficiency, ultimately making healthcare more accessible and affordable for underserved rural populations.

Individuals living in rural communities consistently experience poorer health outcomes than those in urban areas, and a major contributor to this disparity is the geographic imbalance in the distribution of healthcare providers. Rural regions have far fewer physicians overall, which forces the limited workforce to manage a broader spectrum of complex medical issues with fewer resources and less specialty support [39]. Although approximately 19% of Americans live in rural areas, fewer than 12% of primary care physicians practice in these regions. In addition, access to care has worsened over time, with about 7% of rural hospitals closing since 2010 and another 25% currently at risk of closure [9]. These disparities underscore the urgent need to expand STI clinics in rural areas, where increased access to specialized, community-based care can help close the gap in prevention, diagnosis, and treatment for underserved populations.

A lack of graduate medical training opportunities contributes to the workforce shortage in rural communities. Although the federal government allocates a substantial amount of money, estimated at $16 billion in 2015, toward graduate med-

ical education (GME), the vast majority of this funding (about 99%) supports residency programs in urban areas [39] [40]. Investing in residency training opportunities in rural areas can help address the workforce shortage by exposing new physicians to rural healthcare settings, ultimately increasing access to dermatology care. Increasing residency opportunities could increase the feasibility of expanding dermatology STI clinics to rural areas, especially since they often choose to establish their practices near where they completed their residency, typically within a 100-mile radius [39] [41] [42]. Expanding residency and training programs in rural areas could help build a more sustainable workforce by increasing the likelihood that newly trained dermatologists and STI specialists practice in rural or underserved communities. This would ultimately improve access to timely care, reduce disease burden, and lower long-term healthcare costs by preventing advanced, costly complications of untreated skin and sexually transmitted infections.

6. Implementation Strategy for Rural Dermatology STI Clinics

Strengthening the current health system and medical education is essential to improving healthcare access in rural communities, as it would increase the number of health providers, such as physician assistants, nurse practitioners, and dermatologists, trained in providing STI care. Successful implementation within the existing rural healthcare infrastructure depends on collaboration across departments, including federally qualified health centers (FQHCs), rural health clinics, primary care practices, and local health departments. On the smallest scale, this project could be piloted in 1 - 2 pilot sites at existing rural health clinics with a significant need for STI care. Additionally, registered nurses can further support staffing needs and be supplemented with dermatologist oversight through in-person and telemedicine. A systematic review identified the implementation of nurse-led STI clinics for at-risk populations and increased training for general practitioners in STI screening as a way to leverage existing health infrastructure, noting an increase in STI screening rates [43]. Establishing a streamlined referral process between STI health clinics and primary care providers is essential to improve patient outcomes. Utilizing electronic consults in electronic medical records can improve care coordination between primary care providers and dermatologists. Additionally, the use of electronic clinician alerts is more feasible compared to paper-based methods and requires minimal staffing and maintenance costs once established, offering a sustainable solution to improve STI screening rates [43]. Electronic-based methods may be beneficial when implementing dermatology STI clinics in rural communities to promote STI care.

Moreover, the implementation plan should incorporate patient navigators and community health workers. These professionals can deliver targeted health education on sexually transmitted infections, assist patients in navigating the healthcare system, offer social support, and act as advocates for patients. The pilot

programs will evaluate the effectiveness of reducing sexually transmitted infections and improving access to health services. These metrics can be utilized with key stakeholders, such as public health officials, policymakers, healthcare centers, and community organizations, to demonstrate that the program is achieving its intended outcomes. It also ensures that funds are allocated to projects that improve community health, highlighting the importance of expanding dermatological care in rural areas and the need to invest in rural health care infrastructure.

7. Gaps in Research

The recent increase in sexually transmitted infections (STIs), especially in rural areas, underscores the importance of expanding STI dermatology clinics in these communities. Cutaneous manifestations can indicate early infection and aid in early diagnosis [28]. Screening as an early intervention tool is essential to improve patient outcomes and is cost-effective [44]. While cost-effective analyses have been conducted, the scope regarding the specific benefits for rural communities is limited. Prevention through STI testing and early detection can reduce the financial burden on patients, as subsequent clinical visits and medications can account for an additional 13% and 60% of lifetime costs. Additionally, previous systematic reviews have highlighted that point-of-care testing and treatment are more cost-effective compared to laboratory testing [30] [45] [46]. However, limited research is available on how integrating the expansion of dermatology STI clinics and public health impacts cost-effectiveness and can lessen the financial burdens on rural patients.

8. Future Directions and Conclusion

Expanding dermatology-specific STI clinics in rural areas is a critical step toward addressing disparities in healthcare access and improving healthcare outcomes. These clinics should focus on leveraging dermatologists' expertise in identifying skin manifestations of STIs for early detection and treatment, particularly for conditions like syphilis and HIV. Teledermatology services can further offer flexibility for virtual doctor appointments, which will allow reduced time for scheduling appointments and remove traveling barriers that rural areas present. Integrating teledermatology with in-person clinics allows for efficient initial screenings and convenient follow-up visits, enabling dermatologists to triage patients remotely and reserve in-person appointments for those requiring further evaluation or procedures. Additional research is required to assess the cost-effectiveness of expanding teledermatology compared to dermatology STI clinics in rural areas. Moreover, barriers such as limited internet access in these communities may impact patients' ability to utilize these resources and reduce cost-effectiveness. Furthermore, human resource development initiatives, such as expanding residency programs and providing incentives for dermatologists to practice in underserved areas, are essential to mitigate the shortage of dermatologic specialists. In addition, community education programs aimed at removing stigma and improving health

literacy around STIs and HIV can encourage individuals to seek timely care, resulting in healthier communities and reducing long-term healthcare costs. Addressing these challenges and implementing dermatology-led STI clinics can both address accessibility concerns and reduce the prevalence of STIs in rural communities. Researchers should continue to evaluate these interventions' cost-effectiveness to demonstrate their impact on reducing transmission rates, healthcare costs, and improving patient outcomes in rural areas, which could gain support from policymakers to prioritize funding for rural healthcare infrastructure.

The rising prevalence of STIs in rural areas stresses the need for targeted interventions in order to improve access to care. Dermatology-specific STI clinics offer a promising solution by employing dermatology expertise to identify STIs' skin manifestations, enabling an earlier diagnosis and treatment. However, significant barriers such as workforce shortages, geographic isolation, social stigma, and limited funding persist. Expanding dermatology STI clinics, incorporating evidence-based interventions, and enhancing community education are critical steps toward addressing these challenges. Workforce development initiatives and local policy advocacy for increased funding are essential to ensure sustainable and maintainable improvements in rural healthcare infrastructure. By prioritizing these efforts, the intent is to reduce health disparities, improve patient outcomes, and mitigate the economic burden associated with STIs in underserved, rural communities.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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