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The Continuum of HIV Care in Rural Communities in the United States and Canada: What Is Known and Future Research Directions

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Abstract

The nature of the HIV epidemic in the United States and Canada has changed with a shift toward rural areas. Socioeconomic factors, geography, cultural context, and evolving epidemics of injection drug use are coalescing to move the epidemic into locations where populations are dispersed and health care resources are limited. Rural–urban differences along the care continuum demonstrate the implications of this sociogeographic shift. Greater attention is needed to build a more comprehensive understanding of the rural HIV epidemic in the United States and Canada, including research efforts, innovative approaches to care delivery, and greater community engagement in prevention and care.

Keywords

HIV; rural health; continuum of care; United States; Canada

INTRODUCTION AND BACKGROUND

The first described cases of HIV infection in the United States (US) and Canada occurred in large cities in the early 1980s, and the HIV epidemic quickly became established in urban areas.[1,2] Resources for HIV prevention and care have since been largely concentrated in urban areas. However, recent data from the US Centers for Disease Control and Prevention (CDC) and the Public Health Agency of Canada (PHAC) show that the HIV epidemic has migrated from primarily urban centers to more rural locales.[1,3–6] In addition, a recent outbreak of HIV infection in rural Indiana called attention to the potential for rapid spread of HIV infection in rural areas impacted by the evolving opioid epidemic and changing patterns of injection drug use (IDU).[7,8] In small towns and remote areas in the United States and Canada, persons from minority groups, Indigenous populations, and women are disproportionately represented among new HIV infections.[1,9–11] Furthermore, evidence indicates rural residence is a risk factor for lower rates of HIV testing, later HIV diagnosis, later adoption of advances in antiretroviral therapy (ART), and consequently, increased HIV-related mortality.[12–17] Also, rural residents with HIV infection often face challenges such as stigma, social isolation, long distances to care, limited transportation, and lack of access to providers with HIV expertise.[17–20]

HIV-related stigma can significantly impact care utilization and health outcomes including quality of life and medication adherence and people living in rural regions often experience high levels of HIV-related stigma.[21,22] People living with HIV (PLWH) in rural and Northern Ontario, Canada report higher levels of perceived HIV-related stigma compared with those living in nonrural or Southern Ontario (D.J., MD and M.L., MD, unpublished data, personal communication, January 6, 2017). In the Southern United States, where HIV is impacting many rural communities, cultural conservatism, and policies such as abstinence-based sex education have contributed to high levels of HIV-related stigma.[18]

The HIV epidemic in both the United States and Canada is no longer an exclusively urban phenomenon—the epicenters are moving toward suburban and rural areas, necessitating a better understanding of how this sociogeo-graphical shift impacts HIV risk and

epidemiology, prevention, diagnosis, care linkage, and engagement, and outcomes. This article reviews what is currently known about the nonurban HIV epidemic in 2 contiguous countries: the United States and Canada, including identification of barriers to diagnosis and care demanding further investigation to devise solutions.

EMERGING EPIDEMIC WITHIN THE UNITED STATES AND CANADA

In the United States and Canada, rates of HIV infection are increasing in nonurban centers, particularly in areas previously considered to have low prevalence rates such as the Southern United States and the Canadian Prairies.[1,4,6] As the epidemiology of HIV has evolved over time, more nonurban areas, such as these, have become important new epicenters of the epidemic. In 2011, the Southeastern United States had the highest incidence of HIV and prevalence of AIDS; southern states account for 68% of AIDS cases while only 38% of the US population lives in these southern states.[6,23] In Canada, Indigenous peoples (First Nations, Inuit, and Métis peoples), who typically live in predominantly nonurban locations, are overrepresented in the HIV incidence and AIDS prevalence. Although they represent approximately 4.3% of the Canadian population, Indigenous peoples represented 16% of new HIV cases in 2014.[24]

Nonurban United States

In the United States, approximately 1.2 million people aged 13 or older were living with HIV as of 2011.[25] HIV incidence has remained stable for the past decade with approximately 50,000 new diagnoses annually. Notably, nonurban regions are the only areas with increasing AIDS diagnoses in the United States with the southeastern region of the country representing the current epicenter of HIV incidence (21, 893 new diagnoses in 2014) and prevalence (402, 681 prevalent cases as of 2013).[4] Black people/African- Americans are disproportionately affected by HIV in urban as well as nonurban settings; they comprise only 13% of the general US population, but 44% of new HIV infections and over half of these new infections were in Black/African American men who have sex with men (MSM).[25,26] This racial disparity is particularly profound in the Southeastern United States.[9]

The dynamics of new and established infections have shifted from a predominantly urban-centered challenge to become a nonurban-centered problem. Some nonurban counties in the Southeastern United States now have a higher HIV prevalence than most large US cities.[1,3,4,9,25] Higher rates of poverty and opioid abuse combined with fewer health care resources and lower educational attainment make the nonurban Southeastern United States a particularly vulnerable region for increased HIV transmission. As illustrated by the recent outbreak in Scott County, Indiana in which 184 people were infected with HIV through IDU in a county where only 5 cases of HIV were documented in the 10 years preceding the outbreak, the significant threat of rapid spread of HIV posed by the nonurban opioid abuse epidemic is evident.[7,27] This outbreak represents a shift in the epidemiology of HIV infection in the United States and illustrates a weakness within the prevention and testing infrastructure as there are no universally adopted prevention and testing approaches for nonurban IDU and nonwhite MSM populations. Rather, approaches tested and implemented

in urban settings are applied to nonurban environments where their validity and generalizability have not been evaluated.

Nonurban Canada

Since 1995, HIV incidence rates have dropped notably in all regions except Manitoba and Saskatchewan, areas with significant nonurban populations.[28–30] The highest incidence rate in Canada since 2006 is in Saskatchewan (14.4 per 100,000 population in 2009) followed by Manitoba (8.1 per 100,000 in 2015). Saskatchewan is a province with few urban centers and a predominantly nonurban distribution of population.[31] The HIV cases in Saskatchewan have mirrored this nonurban distribution and represent an incident rate which is 2.5 times that of the national average.[5,29,32,33]

In Saskatchewan and Manitoba, Indigenous people accounted for 12% and 15% of the population, respectively, but accounted for 79% and 37% of new HIV infections in those provinces in 2009.[34–36] Not only is this group disproportionately affected by HIV, but most Indigenous peoples in both Manitoba (54%) and Saskatchewan (53%) live on First Nations reserves.[37,38] Reserve communities, a byproduct of colonization, are sections of land allocated to various Indigenous peoples by Treaties. First Nations reserves are often remote and isolated from urban areas with limited access to health care resources, including HIV prevention, care, and treatment.[39] In Saskatchewan, many PLWH reside in reserve communities. Within Saskatchewan's on-reserve population, the overall HIV incidence is 67.6 cases per 100,000 population and is as high as 95 cases per 100,000 population in the Indigenous reserves in the South Central part of the province.[32] Even more alarming is the prevalence of HIV among individual Indigenous communities, reaching as high as 3.5%.[32,40] A major barrier to care in these communities is the lack of provincial and federal health care coordination.[32]

Other important epidemiologic characteristics of the HIV epidemics in the Canadian Prairies (Alberta, Saskatchewan, and Manitoba) are the higher proportion of infections in women and the strong association with drug use. In Saskatchewan, 40% of the prevalent HIV cases are in women compared with 23% nationally.[5,29] The main mode of transmission in Manitoba is heterosexual transmission compared with IDU in Saskatchewan.[41]

THE HIV CONTINUUM OF CARE IN THE NONURBAN CONTEXT

The HIV continuum of care has become a standard framework for understanding the HIV epidemic and developing interventions. It underlies the UNAIDS 90-90-90 targets, which call for 90% of persons with HIV to be aware of their HIV infection, 90% of all diagnosed will be on ART, and 90% of people on ART will have an undetectable HIV viral load.[42] The continuum of care facilitates consideration of the challenges and potential solutions surrounding HIV in nonurban areas. Barriers that contribute to this continued epidemic are many, and include lack of access to primary care, lack of prevention and harm reduction services, limited affordable transportation, and lack of culturally congruent services.[43]

Prevention/Testing/Diagnosis

Nonurban residence has been associated with lower likelihood of HIV testing and later HIV diagnosis in multiple US settings and populations, including rural South Carolina (SC), a nationally representative population, and the US Veterans Health Administration (VHA).[13,14,44–46] Moreover, in the United States, rurality has been associated with reduced likelihood of HIV testing in young adults aged 18–25; for example, in a national study lifetime HIV testing rates were 66% for nonurban participants versus 88% for urban participants.[47] A 2013 study of MSM found that 70% of the men in nonurban United States focus groups had ever had an HIV test, which was significantly lower than in the urban settings (91% of the men surveyed in Seattle and 88% of the men from Atlanta).[48] The National HIV Behavioral Surveillance (NHBS) System found that 67% of MSM in the United States reported being tested in the past 12 months; however, rates are much lower within the Southeast.[49] For example, 34.6%−38.5% of sexually active MSM, for whom annual testing is advised by CDC, within North Carolina (NC) communities reported of being tested in the past 12 months.[50]

Population characteristics may predict testing uptake in nonurban settings, but they vary widely. In a population of women in nonurban Mississippi, domestic violence shelters, 35% consented to be tested for HIV. In this group, higher perceived HIV susceptibility and higher post-traumatic stress disorder symptoms predicted a greater likelihood of test acceptance. Lack of time was the most common reason given for not testing followed by not feeling at risk for HIV and not wanting to test at the shelter.[51] In nonurban South Florida, an area of high HIV prevalence, only 21% of a population of migrant and seasonal farmworkers had been tested for HIV. Most of the tests were associated with prenatal care. Being male, having fewer than 12 years of education, and being undocumented were negatively associated with having been tested.[52]

Although numerous other studies have documented lower testing rates in nonurban settings, there is evidence that concerted efforts can reverse such discrepancies. For example, an emergency department serving a semirural/semiurban population implemented a universal opt-out HIV screening program among adolescents and adults and achieved a 91% acceptance rate.[53] In addition, one NC town serving a nonurban Black/African American population had success with integrating rapid HIV screening into a primary care setting. During a 2-month period in 2012, 100 of the 138 (72%) patients offered an HIV test agreed to be tested.[54]

Providers in nonurban settings may not offer HIV testing despite knowledge of CDC recommendations. In interviews from 2011 to 2012 with NC primary care providers, including many who practice in nonurban locations, two-thirds were aware of and agreed with routine HIV testing recommendations. Only approximately 10% reported adhering to the recommendation.[55,56] Barriers identified by these physicians included current HIV-related policies (eg, third-party reimbursement, requirement for written consent), stigma and lack of confidentiality in nonurban communities, practice financial environment, physician attitudes, and patient acceptance.[56]

The cost-effectiveness of routine testing strategies in nonurban communities is unknown, primarily because of the limited characterization of HIV prevalence in non-rban regions. Background testing rates are lower in nonurban communities—and rates of late diagnosis higher—which implies more favorable cost-effectiveness for routine compared with risk-based testing. There is a need for additional studies to determine the exact prevalence of HIV in nonurban communities in the United States and Canada as well as the feasibility and estimated cost-effectiveness of routine testing strategies in nonurban health care settings.

In Canada, an increased need for point-of-care (POC) testing in rural settings has been shown despite the national health system.[35] A pilot epidemiologic study of testing conducted in Manitoba found that, of those individuals who received a POC test in an urban emergency department with a large rural catchment area, 1.4% were found to have HIV.[57] However, a more extensive and sustained POC program was not implemented because of cost and staffing challenges.[57] Saskatchewan has implemented POC testing in many of its health regions, yet some of the highest incidence regions still lack access to POC testing; at present, only 4 Indigenous communities of 72 have on-reserve POC testing.[35] Finally, there is a need to expand access to a variety of health care services.[35]

Linkage to Care

For PLWH in nonurban areas, delayed linkage to care is associated with increased mortality.[13] These delays are likely multifactorial and somewhat context-dependent.[58] In nonurban Arkansas, the United States, more recent year of diagnosis, being male and being insured were associated with a shorter delay in linking to HIV care.[59] In the United States, many nonurban PLWH travel to urban centers for medical care because of concerns about confidentiality or a lack of confidence in the local providers' HIV knowledge.[60,61] In addition, there may be limited access to local nonurban HIV care. The Ryan White Comprehensive AIDS Resources Emergency (CARE) Act is an attempt to address the needs of uninsured or underinsured PLWH by providing federal funding to clinics and community-based organizations for care of PLWH in the United States. However, 95% of nonurban counties in the United States lacked a presence of a federally subsidized Ryan White HIV medical provider compared with 69% of urban counties.[62] In British Columbia, CA, 67% of PLWH were linked to care as of 2011.[63] Most urban health authorities (Vancouver Coastal) had a higher proportion of PLWH linked to care (97%) compared with the other, more rural health authorities.[64]

ART Provision and Retention in Care

Compared with urban PLWH, nonurban PLWH are less likely to take ART. In a 2005 study, nonurban PLWH were less likely to be prescribed ART if their race/ethnicity was Black/African American.[65] Moreover, in the US VHA, an equal-access health care system, one study found slower adoption of a novel HIV therapy among nonurban compared with urban Veterans with HIV.[12] In Canada, again an equal-access system rurality was associated with a longer time to uptake of the newer ART agents assessed.[66]

Expanding access to ART is essential to both reduce HIV transmission and decrease mortality.[67,68] Because of current barriers inherent in the nonurban context of HIV infection, this goal may be difficult to meet.

Nonurban PLWH assign higher severity ratings to barriers to care than those living in urban areas.[60] In 2005, PLWH in nonurban areas were found to be less likely to have at least 4 annual outpatient HIV visits than urban PLWH.[65] There are regional differences in both HIV diagnoses and practice patterns within the United States, and trends in the Southeast are worse. For example, PLWH in the Southeast United States have worse outcomes and initiate ART later than in other regions.[69]

Medication Adherence and Virologic Suppression

Although the direction of effect differs depending on the study, the data suggest that there are important differences between urban and nonurban settings for adherence, virologic suppression, and mortality. One study of the US veteran population identified a positive association between rural-small town/remote residence and high ART adherence during the year after ART initiation, and another study of a nonurban population showed no difference at diagnosis but significantly more rapid progression to AIDS in the nonurban group.[10,70] Even within the same state, however, findings conflict. In contrast to the findings of no difference in virologic suppression at one year, another study in SC in which statewide viral load values from 2005 to 2012 were analyzed found that mean viral load decreases were significantly affected by urban versus nonurban residence with urban residents having better viral load decreases.[71] In a separate study of nonurban PLWH across 12 US states, half reported less than 100% adherence to prescribed ART in the past 7 days and 10% reported deviating from their prescription instructions at least daily. The authors reported that this is likely higher than most estimates for PLWH in urban areas.[72] A study assessing adherence barriers of a sample of Mississippi patients found higher reports of patients being nonadherent because of “running out of medications” than had been found in more urban cohorts, although many of the sampled Mississippi patients had free access to ART through AIDS Drug Assistance Program, Medicaid, or private insurance. The authors suggest that this finding might be due to difficulties in accessing care or making use of existing services in the geographic region.[73] In Canada, degree of rurality has been associated with a worse Programmatic Compliance Score, which is a validated metric associated with quality of HIV care and all-cause mortality.[74]

The determinants of urban/nonurban differences in ART adherence are not known but may be mediated by culture and behaviors, including health-related beliefs, coping mechanisms, social stressors, and substance abuse. Studies of PLWH in the Southeastern United States demonstrate the complexity of this issue. In a sample of PLWH in nonurban NC, the United States, where the majority believed that HIV was a serious condition that could be controlled with medication, participants were more likely to take ART if they believed that HIV was caused by events beyond their control: chance, bad luck, or God’s will.[75] For a sample of nonurban HIV positive women with depression, satisfaction with social support and coping focused on managing HIV disease were positive predictors of high self-reported ART adherence.[76] In nonurban Louisiana, demographic and behavioral factors such as illicit drug

use and depression were not associated with nonadherence, but problem drinking was associated with lack of adherence to ART over the preceding week.[77]

OVERVIEW OF BARRIERS ACROSS THE CONTINUUM OF HIV CARE IN NONURBAN SETTINGS

Frequently identified barriers to HIV care in nonurban areas include lack of provider expertise, transportation barriers, medication costs, lack of childcare, inadequate support services, and stigma.[19,78,79] The barriers across the continuum of care in nonurban settings are summarized in Table 1.The situation in the nonurban Southeast United States includes many complex factors such as isolation and lack of transportation, limited health care access, conservative climate of nonurban communities (including anti-immigration sentiment), religiosity and stigma, concerns about confidentiality if tested (especially among undocumented persons), lack of provider training and screening programs, and limited knowledge or resources. All these are barriers to effective HIV prevention and care.[80,81] Similarly, in comparing 3 nonurban Canadian communities with matched urban regions, respondents living in nonurban regions were less knowledgeable about HIV/AIDS and were less likely to have spoken with others about the disease.[82] In addition, in these conservative nonurban communities, roll out of the necessary harm reduction programs including needle distribution are systematically missing. Members of the nonurban HIV care community (eg, providers, patients, and advocates) perceive a lack of visible governmental acknowledgment or action to address the root causes of the nonurban HIV epidemic including poverty, racism, and other forms of stigma, historical and multigenerational trauma, poor pain management, and addictions.[83] Furthermore, until recently, data on HIV did not encompass nonurban settings. Interventions were largely urban and were not sustainable, and were often developed without including local perspectives.[84]

FUTURE DIRECTIONS FOR RESEARCH AND DEMONSTRATION PROJECTS

Strategies to address the wide range of barriers to HIV care in nonurban areas need to be multidisciplinary and consider the social determinants of health that contribute to HIV and other health outcomes among persons living in nonurban areas. In US and Canadian nonurban areas where there is a large Indigenous population affected by HIV, interventions need to consider the historical and ongoing impact of colonialism and provide services that address power imbalances and are respectful of cultural beliefs around illness, disease, and healing.[85,86] This can only be achieved when members of the local community are invited to develop the necessary interventions and maintain leadership roles.[87]

A comprehensive strategy to address HIV in nonurban United States and Canada must also address the socioeconomic factors that perpetuate health disparities among people living in nonurban areas, including, but not limited to, mitigating financial barriers to ART uptake by providing universal access. With these considerations providing an underlying framework, the next sections will discuss specific interventions with potential or demonstrated benefit in improving HIV care in nonurban regions.

Community Engagement

Successful approaches to mitigating the barriers of language and cultural differences rely on community engagement and cultural congruence. Community-based research involving individuals who identify as members of that community is a promising approach to bridge these gaps. A lay health advisor intervention (HoMBReS) for Spanishspeaking men who belonged to soccer teams in nonurban communities in NC increased both condom use and HIV testing.[88,89] The CDC has now designated HoMBReS as a best-evidence community-level risk reduction intervention, the only one of its type.

The situation in Saskatchewan, Canada provides another good example of how community engagement can help address the complexity of the continuum of care in a nonurban setting. In response to their HIV epidemic, Saskatchewan developed a 4-year provincial public health strategy in 2010, which was built around 4 strategic pillars: (1) community engagement and education; (2) prevention and harm reduction; (3) clinical management; and (4) surveillance and research (Saskatchewan Ministry of Health). Successes from this strategy included the formation of a Saskatchewan HIV Provincial Leadership team; the implementation and expansion of peer-to-peer programming; the formation of multidisciplinary clinics that deliver care to remote and nonurban areas as well as Indigenous communities; and the roll-out of a more aggressive provincial HIV testing policy (Saskatchewan Provincial Leadership Team, 2015). Harm reduction and prevention programming was also expanded, resulting in a 15% increase in clean needle distribution between 2009 and 2014 (Saskatchewan Provincial Leadership Team, 2015). Saskatchewan's prevention and risk reduction programs and services have been highly used, tallying over 50,000 visits between 2013 and 2014 with 78% of visitors self-identifying as Indigenous.[90]

Leveraging Existing Data Sources

The lack of an understood definition of rurality impacts data collection and the ability to make important comparisons across studies, populations, and regions. In this article, we chose to use the term "nonurban" given the lack of a universally accepted definition of "rurality." For example, estimates of HIV prevalence in nonurban areas are sensitive to the method used to define nonurban areas.[91] A person's perception of his/her relative "rurality" may be more relevant than an objective measure. In a survey of PLWH in SC, patients' self-perception of rural or urban residence did not correlate with standard rural urban definition. (Weissman et al, unpublished data) Consensus among HIV researchers on a definition of "rurality" across nonurban United States and Canada is essential to improve prevention and care planning, resource allocation, and reporting of nonurban epidemiology and outcomes. To address the overall paucity of large-scale data on nonurban HIV, there is a need to access existing observational cohorts and, ultimately, create a cohort of nonurban PLWH. Although conclusions from cohort studies are limited by size considerations, and the cohorts themselves may not be representative of the larger population, cohort collaborations can improve statistical power, allow regional comparisons, provide data more representative of the population at large, and enhance the expertise of the investigative team by including more collaborators.

Human Resource Capacity Development and Innovative Service Delivery

A lack of health care provider capacity poses a significant barrier to HIV care in nonurban regions. A report published by the Canadian Institute for Health Information in 2005 found that about 16% of family physicians and 2.4% of specialists were located in nonurban or small towns, whereas 21.1% of the population of Canada resided in nonurban or small towns at that time.[92] This physician shortage may be coupled with lack of HIV expertise in nonurban areas, although no formal needs assessment has been published on the HIV competencies of nonurban health care providers. Efforts to increase interdisciplinary HIV health care capacity, such as the AIDS Education and Training Center Program in the United States and the Ontario HIV Treatment Network Residency in HIV Care, have contributed predominantly to urban HIV primary care, but similar programs could be used to develop nonurban capacity. A needs assessment for nonurban health care providers may help to identify training needs and develop programs suitable to support HIV care in nonurban and remote regions. A model of interdisciplinary HIV outreach clinics to nonurban areas in Vermont demonstrated similar HIV-related outcomes to urban HIV clinics.[93] This model, which embeds an HIV clinic in local hospitals and brings expert providers to nonurban communities, rather than requiring service users to travel, can be also be applied in other nonurban settings.

Interventions to increase HIV prevention, testing, and care in the nonurban setting need to be innovative and should not be clinic-based exclusively. Other possible venues for promoting HIV testing include pharmacies and emergency departments (EDs). During a 2003 survey, community pharmacists from urban and nonurban areas in New Mexico possessed adequate basic HIV knowledge, but they did not demonstrate adequate HIV screening or in-home HIV test knowledge; however, this could easily be changed by leveraging existing HIV education resources to include outreach to community pharmacists.[94] In nonurban areas, where contact with the health system may be limited, using a community resource such as a pharmacist could be invaluable to increase HIV testing and adherence counseling. Increasing education efforts to this group about HIV screening and in-home testing could increase access to information for people in nonurban areas.

The ED serves as point of entry for many at-risk persons, including those in urban and nonurban communities and its potential to increase testing rates has not yet been fully realized. A study of universal opt-out HIV screening in a southeastern ED serving a semiurban-semirural population achieved a linkage to care rate of almost 75% through their protocol which consisted of counselors establishing a time within a week and a location to deliver the HIV test result in person. For patients who were diagnosed with HIV, blood was obtained for CD4 and viral load, and HIV counselors offered to arrange follow-up treatment in the adult infectious disease clinic.[53]

Technology-based and social media approaches offer great promise for increased education and training about HIV testing. The VA developed a distance learning model to offer an effective HIV rapid testing training via live audiovisual online technology to educate clinicians at a remote outpatient primary care VA facility.[95] The online training was found to be equivalent to in-person sessions based on supervisor observation, participant satisfaction surveys, and follow-up results. Spreading expertise in this way saves time and money,

requires fewer personnel, and affords access to expert trainers regardless of geographic location.[95] Another strategy to increase HIV testing among MSM in nonurban communities leveraged existing locally focused social media. Trained interventionists provided basic education about HIV and promoted testing in social media sites commonly used for social and sexual networking among MSM. These social media sites included A4A/Radar, BlackGayChat, and Craigslist, and Gay.com. Using a randomized matched-community trial design with 2 intervention and 2 comparison communities, intervention communities were 2.9 times more likely to have past 12-month HIV testing than the comparison communities.[50]

Telehealth has potential to improve access to high-quality healt hcare for PLWH in nonurban areas by facilitating primary and specialist care and reducing travel times for recipients. Telehealth encompasses a wide range of technologies and models, and is defined by the US Health Resources and Services Administration (HRSA) as “The use of electronic information and telecommunications technologies to support long-distance clinical health care, patient and professional health-related education, public health and health administration.”[96] Small studies in the United States suggest that interactive video visits allow HIV specialists to deliver care in remote settings, such as nonurban clinics and prisons, with high levels of patient satisfaction, acceptability, and care quality.[97–99] A pilot study in the VHA demonstrated the feasibility of a telehealth collaborative care model that combined HIV specialty care delivered using telehealth with primary care delivered in nonurban clinics.[97] A separate VA study showed that a telemedicine clinic was associated with reduction in missed clinic visits for patients with HIV infection, suggesting that telehealth may improve retention in HIV care in nonurban settings.[97,99] Studies evaluating the effect of telehealth models have found similar or even improved HIV and quality-of-life–related outcomes between individuals receiving telehealth HIV care and conventional HIV care.[100–102]

In addition to these patient-level telehealth models, several health care systems have experimented with provider-level telehealth models to support HIV care in nonurban areas, including HepCNet in Ontario, Canada and Extension for Community Health Outcomes (ECHO) in the United States.[103] Originally developed for hepatitis C care, ECHO links primary care teams in nonurban settings with specialized care teams to create regional communities of practice. ECHO sessions combine didactic sessions with case-based learning to increase the capacity of nonurban primary care teams to deliver specialized care. The potential for the ECHO model to improve access to high-quality HIV care in nonurban settings is as yet untested, with one study indicating that uptake by primary care providers and patients was very low in settings where PLWH had historically traveled to distant HIV specialty clinics for care.[104]

Transportation and associated costs pose significant barriers to HIV care in nonurban regions. The Canadian HIV Women’s Sexual and Reproductive Health Cohort Study found that in Northern Ontario, 20% of women needed to travel at least 3 hours to receive HIV care and 14% of women had moved their place of residence to obtain HIV care.[105]Secure and adequate funding to reimburse travel costs and to cover childcare expenses is a simple

first step to mitigating this barrier. For example, in nonurban Uganda, provision of transportation reimbursement has been found to be effective in facilitating ART initiation.[106]

Strategies that shrink physical and psychological distance and that therefore promote better care coordination and client empowerment may be particularly appealing to HIV providers and PLWH in nonurban settings. Short message systems (SMS) and mobile applications (apps) are approaches that can be applied both to linkage and retention in care. The use of SMS to promote HIV care has been documented in a number of studies, many of which were in resource-limited settings. These methods, which focused mostly on medication adherence, showed feasibility and acceptability and were perceived as supportive across various cultures.[107–113] Others have explored the features of apps desired by PLWH to assist with HIV disease management.[114,115] Apps offer a greater range of possible functionality ranging from delivery of information in multiple formats including video, self-monitoring of medication adherence and/or other behaviors or experiences related to adherence; coordination of care; and social support. Flickinger et al report the development of a mobile app, Positive Links that includes many of these features and that has shown promise in nonurban communities in Virginia. Of note, the participants most likely to engage with the app-embedded anonymous community message board were nonwhite, without private insurance, and with a detectable viral load at baseline, all demographic characteristics that have been associated with poor engagement in care.[116]Further exploration of the use of apps as a tool to enhance retention in care activities is warranted.

In addition to technology's ability to facilitate optimal progression along the continuum of care, it can also help address key barriers to engagement, such as substance abuse and mental illness. Technology-delivered interventions for substance use have been found to be feasible and acceptable to PLWH and people at risk for acquiring HIV.[117] Telephone-based cognitive-behavioral therapy shows promise for decreasing depressive symptoms and the use of mobile apps may improve social support, particularly for geographically isolated and socially marginalized PLWH (Table 2).[116,118]

CONCLUSIONS

The incidence and prevalence rates of HIV in nonurban United States and Canada represent a critical shift in the North American HIV infection trends. Profound HIV-related health disparities persist due to stigma and enhanced risk associated with sexual orientation, particularly in communities of color. Moreover, racial minorities and Indigenous peoples represent the disproportionate nature of HIV infections in the United States and Canada, particularly in nonurban areas where high rates of poverty, racism, drug use, and poor access to care may be more profound than in urban locales.[7,119] In addition to these well-known but persistent disparities, an evolving opioid abuse epidemic poses a looming threat for increased HIV transmission. In light of the ambitious UNAIDS 90-90-90 goal, the nonurban HIV epidemic poses a challenge given that research demonstrates that outcomes are worse than their urban counterparts.[13] Future research should focus on understanding the challenges in nonurban settings and implementing novel interventions that could rapidly make a difference. The variability of rurality definitions must be considered when planning, performing, and assessing research, policy, and practice in the field of nonurban HIV care.

Despite the tremendous advances in the field of HIV across the continuum of care, much work remains to be done in the nonurban HIV epidemic, including establishing and using consistent definitions of rurality, contextualizing each phase along the continuum for the local population, and addressing the barriers unique to nonurban settings that affect every step from testing to virologic suppression. Evidence-based and novel best practices for HIV care should be funded urgently and disseminated to nonurban communities.

Advances in HIV prevention and care have led to optimism in the worldwide fight to control the HIV epidemic. If we are to achieve our goals for controlling HIV infection in the relatively resource-rich nations of the United States and Canada, it is essential that we do not ignore the ongoing impact of HIV infection in rural settings. The HIV outbreak in Indiana heralds the significant threat of rapid spread of HIV posed by the nonurban opioid abuse epidemic. Tools to identify communities with features that mirror those in Scott County may serve as an early warning system. However, efforts must increase to develop and implement comprehensive prevention policies, including evidence-based HIV prevention methods such as syringe exchange, to avert a similar crisis. Although costs incurred related to the outbreak response have not yet been published, Herculean efforts, including a public health state of emergency, were required to arrest it, and the need for funding to support the care of those who were infected will continue.[8,120,121] Instead, funding agencies should increase support for research that seeks to understand the unique barriers that exist across the HIV care continuum in rural settings, and the interventions required to overcome these barriers.

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TABLE 1.

Barriers Across the Continuum of Care in Nonurban Settings

• Shortage of health care providers and limited HIV expertise
• Scarcity of funding for widespread testing and treatment programs in nonurban areas of the United States and Canada
• Lack of systematic harm reduction programs and programs to address the root causes of HIV acquisition (eg, opioid addiction, trauma, poverty)
• Increased geographic distance to providers and lack of transportation options
• Insufficient HIV awareness and knowledge at the community level
• High rates of poverty, low educational attainment, substandard housing and food insecurity
• Stigma, isolation, and heightened fear of discrimination
• Socially conservative climate, racism, anti-immigrant sentiment
• Limited community leadership and political support

TABLE 2.

Recommended Questions for Future Research

Prevention
How are HIV prevention messages best disseminated in nonurban settings?
What are effective and scalable strategies for delivering pre-exposure prophylaxis in nonurban settings?
How can HIV prevention, testing, and linkage to care be integrated with ongoing efforts to improve substance use treatment services in nonurban areas to combat the opioid epidemic
Testing/diagnosis
Why are nonurban populations less likely to be tested for HIV?
What is the cost-effectiveness of routine testing in lower prevalence settings?
What it the role of community-based testing, such as rapid testing in pharmacies?[107,108]
Linkage to care
How can specific barriers to linkage to care be overcome in nonurban settings (eg, stigma, substance use, and mental health)?
Retention in care
Does the gap in engagement in HIV care between nonurban and urban still exist? Is it widening or closing?
What role does migration (eg, for employment) play?
Does telemedicine improve retention in care among nonurban PLWH currently traveling to specialty clinics in urban settings?
Prescribed ART
How can the adoption of novel HIV therapies be facilitated in nonurban settings?
Achieved viral suppression
How do the community viral loads of nonurban and urban communities compare?
What are the measurable differences comparing nonurban and urban settings?
What are the implications of living in a nonurban setting on aging with HIV?
Can telehealth collaborative care models offer comprehensive primary care for aging PLWH in nonurban settings?