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Distance as a Barrier to HIV Testing Among Men Who Have Sex with Men in the Rural South

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Bachelor of Science
Villanova University
2020

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An abstract of
A thesis submitted to the Faculty of the
Rollins School of Public Health of Emory University
in partial fulfillment of the requirements for the degree of
Master of Public Health
in Global Epidemiology
2022

Abstract

Distance as a Barrier to HIV Testing Among Men Who Have Sex with Men in the Rural South

By Alyssa Clausen

Men who have sex with men (MSM) are disproportionately affected by HIV. Living in a rural area as well as living in the Southern United States are known risk factors for HIV diagnosis, and MSM who live in the rural South face barriers to accessing HIV testing. We used data from a cross-sectional study of MSM living in the South and assessed the effect of various factors on time since last HIV test, including distance and time traveled to test and rural compared to non-rural residence. We found that those who traveled a longer distance to their most recent HIV test were more likely to have not been tested for HIV in the past 12 months, and those who lived in a rural residence were more likely to have not been tested in the past 12 months. There was no effect of time traveled to most recent HIV test on prevalence of testing for HIV in the past 12 months. The disparity in testing by distance traveled to test persisted even after controlling for known factors that contribute to testing indication such as condomless anal sex. These results suggest that living in areas without geographically proximal HIV testing providers contributes to lower testing frequency among this population.

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Introduction

Men who have sex with men (MSM) are disproportionately affected by human immunodeficiency virus (HIV) and other sexually transmitted infections (STIs). The Centers for Disease Control and Prevention (CDC) estimate a lifetime risk for HIV infection among MSM of one in six, compared to the risk among heterosexual men of one in 524 (Hess, Hu, Lansky, Mermin, & Hall, 2017). The geographic area of the United States with the greatest incidence of HIV diagnoses is the South, which comprises over half of the new cases (Centers for Disease Control and Prevention, 2022). Recent evidence suggests that in addition to MSM and southern location being risk indicators for HIV infection, rural residence is a risk factor for decreased rates of testing, later adoption of new treatments, and increased mortality from HIV (Lahey et al., 2007; Ohl et al., 2013). In rural areas, 77% of new diagnoses are among MSM, and an additional 7% of diagnoses in rural areas are among MSM who inject drugs (Centers for Disease Control and Prevention, 2018). Furthermore, those with HIV in rural areas face lack of accessible transportation, lack of health care professionals who are adequately trained in HIV prevention and care, and long distances to travel to care (Reif, Golin, & Smith, 2005). MSM who live in rural areas of the southern United States, therefore, have three of the major risk indicators for HIV infection.

Much of the focus on HIV prevention, care, and treatment has been centered on MSM in urban areas because the prevalence of HIV is higher in urban counties than in rural counties (Ahrens, Burgess, Munk, & Ziller, 2021). However, many rural counties in the South have prevalence rates in the top decile in the country (Sullivan et al., 2020). Furthermore, people in rural areas are more likely to have a late diagnosis of HIV, indicating that prevalence estimates in some rural areas likely underestimate the true disease burden (Trepka et al., 2014). Lack of

knowledge of infection leads to increased morbidity, reduced survival, and increased opportunities for onward transmission (Thompson et al., 2012). The incidence of having AIDS upon diagnosis or within one year of diagnosis is significantly higher for rural residents compared to urban residents (HIV.gov, 2021; Schafer et al., 2017; Weissman et al., 2015).

CDC recommends HIV testing for MSM in the U.S. at least annually, and in some cases every 3-6 months (Branson, 2016). Screening is essential for diagnosis, to begin antiretroviral treatment (ART) and other forms of care, and to enter into PrEP care for those testing negative and at increased risk. Many recent studies have shown the disparity of prevention and testing between rural and urban MSM. In one study investigating lifetime HIV testing rates among young adults aged 18-25, the rate of having ever been tested was 66% for nonurban participants and 88% for urban participants (Wallace, McLellan-Lemal, Harris, Townsend, & Miller, 2011). Another study also investigated lifetime testing rates and found that 70% of the MSM in the nonurban group had ever been tested for HIV and 91% and 88% of the MSM in the two urban groups, Seattle and Atlanta respectively, had ever been tested (Goldenberg, McDougal, Sullivan, Stekler, & Stephenson, 2014). In a study testing different classifications of rurality, rural MSM were less likely to have been tested in the past 12 months or ever than non-rural MSM across all measures of rurality (Jones, Zlotorzynska, Villarino, & Sanchez, 2022).

Numerous factors affect one's ability to get tested for HIV in rural areas including lack of access to a testing site, lack of knowledge about testing, and stigma (Pharr, Lough, & Ezeanolue, 2015). Evidence has shown that 13% of MSM live in PrEP deserts where they have no access to PrEP care within 30 minutes, and Southern location and lower urbanicity were associated with living in a PrEP desert (Siegler, Bratcher, & Weiss, 2019). Data from the Louisiana Department of Health found that among 12 parishes in the rural northeast area of the state, there was one

testing site available per 640.3 square miles compared to the metropolitan area of New Orleans, which had one site for every 90.1 square miles (Louisiana Department of Health, 2017). The longer distance required to travel for HIV prevention and treatment services is a major barrier to care in rural areas.

This study aims to continue the research on the barriers to testing that MSM living in the rural South face by specifically investigating how access to testing locations affects the likelihood of recent or regular testing. The purpose of the present study is to evaluate the effects of distance and time travelled to an HIV/STI testing center on whether one was tested in the last 12 months among cisgender MSM who live in the rural South.

Methods

Study Design and Data Collection

Data were collected as part of the Combine Study: Preferences for a HIV prevention app among MSM in the rural southern US, a cross-sectional survey to identify preferences of potential end users for a sexual health app for sexual minorities in the rural southern United States. The study population consisted of individuals assigned male at birth who have sex with men or individuals assigned female at birth who are not cisgender women who have sex with men, are age 18-34, and live in the southern region of the United States. Participants were surveyed on demographics, sexual behavior in their lifetimes and in the past 12 months, access to healthcare, and HIV/STI testing history. Individual- and structural-level factors were also collected. Of the 909 survey takers, 619 responded 'Yes' to having ever been tested for HIV. Of those 619 respondents, 30 were excluded for missing answers or responses of 'Don't Know' or 'Prefer not to answer' for the question of whether or not they received an HIV test in the past 12 months. The final study sample included 589 participants who had reported receiving an HIV test in their lifetime.

Primary Outcomes

Time since last test data was collected by asking participants if they had received an HIV test in the past 12 months. Distance traveled to last test was collected by asking participants how far they had traveled to obtain their most recent HIV test with choices of less than 10 miles, 10-20 miles, and more than 20 miles, which we dichotomized as 20 miles or fewer versus more than 20 miles. Time traveled to last test was collected by asking participants how long they had traveled for to obtain their most recent HIV test with choices of 15 minutes or less, 16-30

minutes, 31-60 minutes, and more than 1 hour, which we dichotomized as 30 minutes or less versus more than 30 minutes.

Other Measures

Other data used from the survey for this study included age, race/ethnicity (categorized as Hispanic, Non-Hispanic Black, Non-Hispanic White, or Other/Multiracial), education level (categorized as high school or lower, some college, or college graduate or more), household income (categorized as $0 to $19,999, $20,000 to $39,999, $40,000 to $74,999, or $75,000+), insurance status (categorized as private, public, combination/other, or none), and condomless anal sex in last 6 months. All of these variables are known or presumed to be associated with HIV testing based on prior research. Given the research on differences between urban and rural access to HIV care and testing, demographic characteristics and information on last HIV test will be reported for the rural and non-rural subsets in addition to the total sample.

Data analyses

Stratified demographics were calculated and presented for both rural and non-rural sub-groups. Log binomial regression models were estimated with time since last test as the dependent variable. Unadjusted models were estimated for each of the demographic variables, distance traveled to last test, and time traveled to last test to determine the corresponding unadjusted prevalence ratios for time since last HIV test. Next, a single model was estimated with all covariates to determine adjusted prevalence ratios for time since last HIV test. SAS 9.4 statistical software package was used for all analyses.

Results

Of the 589 survey takers included in the study, 115 (20%) identified as living in a rural area. The median age of the total study sample was 27 years (IQR: 24-31). 114 (20%) participants identified as Hispanic, 136 (23%) identified as Non-Hispanic Black, 289 (49%) identified as Non-Hispanic White, and 48 (8.18%) identified as another race or multiracial. Other demographic characteristics are listed in Table 1.

A total of 139 (24%) participants were last tested for HIV more than 12 months prior to the survey: 40 (34.78%) rural participants and 99 (20.89%) non-rural participants (Table 2). Distance traveled to the last HIV test differed by rurality. Twenty-seven (23.48%) rural participants traveled more than 20 miles to receive their last HIV test, but only 22 (4.64%) non-rural participants traveled over 20 miles for their last test. With respect to time traveled to last test, 12 (10.43%) rural participants and 29 (6.12%) non-rural participants traveled for more than 30 minutes for their last test.

In unadjusted analyses there was a statistically significant association between distance traveled to last HIV test, rural status, income level of $0 to $19,999, and income level of $20,000 to $39,999 on time since last test. Those who traveled more than 20 miles to their last test were 1.96 (95% CI: 1.37, 2.81) times as likely to have not been tested in the last 12 months compared to those who traveled 20 miles or less to their last test. Those who lived in a rural area were 1.67 (95% CI: 1.23, 2.26) times as likely to have not been tested in the last 12 months than those who lived in a non-rural area. Participants who reported an income level of $0 to 19,999 were 0.56 (95% CI: 0.36, 0.88) times as likely to have not been tested in the last 12 months than those who reported an income level of $75,000 or greater. Similarly, participants who reported an income

level of $20,000 to $39,999 were 0.64 (95% CI: 0.42, 0.97) times as likely to have not been tested in the last 12 months than those who reported an income level of $75,000 or greater.

After adjusting for all covariates, distance traveled to last HIV test (PR=2.66; 95% CI: 1.45, 4.89) and income level of $0 to $19,999 (PR=0.50; 95% CI: 0.26, 0.96) remained significantly associated with time since last test. The effect of rural residence (PR=1.34; 95% CI: 0.87, 2.07) and income level of $20,000 to $39,999 (PR=0.66; 95% CI: 0.39, 1.12) on time since last test were attenuated after adjusting for all other covariates. All unadjusted and adjusted regression analyses are listed in Table 3.

Table 1. Demographics of respondents who have ever been tested for HIV

	Total (n=589)	Rural (n=115)	Non-Rural (n=474)
Age - avg (IQR)	27.08 (24-31)	27.17 (24-31)	27.05 (24-31)
Race/Ethnicity - no. (%)			
Hispanic	114 (19.42)	12 (10.43)	102 (21.61)
Non-Hispanic Black	136 (23.17)	27 (23.48)	109 (23.09)
Non-Hispanic White	289 (49.23)	70 (60.87)	219 (46.40)
Other/Multiracial	48 (8.18)	6 (5.22)	42 (8.90)
Education Level - no. (%)			
High school or lower	106 (18)	24 (20.87)	82 (17.30)
Some college	210 (35.65)	55 (47.83)	155 (32.70)
College graduate or more	273 (46.35)	36 (31.30)	237 (50.00)
Household Income - no. (%)			
$0 to $19,999	136 (23.09)	32 (27.83)	104 (21.94)
$20,000 to $39,999	153 (25.98)	35 (30.43)	118 (24.89)
$40,000 to $74,9999	150 (25.47)	35 (30.43)	115 (24.26)
$75,000+	114 (19.35)	6 (5.22)	108 (22.78)
Insurance - no. (%)			
Public	55 (9.34)	16 (13.91)	39 (8.32)
Combination	9 (1.53)	2 (1.74)	7 (1.48)
Other	13 (2.21)	6 (5.22)	7 (1.48)
None	132 (22.41)	28 (24.35)	104 (21.94)
Private	372 (63.16)	60 (52.17)	312 (65.82)
Condomless Anal Sex in the Last 6 Months - no. (%)			
Yes	441 (95.87)	73 (94.81)	368 (96.08)
No	19 (4.13)	4 (5.19)	15 (3.92)

Table 2. Information on Last HIV Test by Rural Status

	Total (n=589)	Rural (n=115)	Non-Rural (n=474)
Time Since Last Test - no. (%)			
Over 12 months	139 (23.60)	40 (34.78)	99 (20.89)
Less than 12 months	450 (76.40)	75 (65.22)	375 (79.11)
Distance Traveled to Last Test - no. (%)			
More than 20 miles	49 (8.32)	27 (23.48)	22 (4.64)
20 miles or less	540 (91.68)	88 (76.52)	452 (95.36)
Time Traveled to Last Test - no. (%)			
More than 30 minutes	90 (15.28)	29 (25.22)	61 (12.87)
30 minutes or less	499 (84.72)	86 (74.78)	413 (87.13)

Table 3. Unadjusted and Adjusted Prevalence Ratios for Time Since Last HIV Test

	Not Tested for HIV in Past 12 Months	Unadjusted Prevalence Ratio	Adjusted Prevalence Ratio
	no. (%)	PR (95% CI)	PR (95% CI)
Distance Traveled to Last Test			
More than 20 miles	21 (42.86)	**1.96 (1.37, 2.81)**	**2.66 (1.45, 4.89)**
20 miles or less	118 (21.85)	Ref	Ref
Time Traveled to Last Test			
More than 30 minutes	25 (27.78)	1.22 (0.84, 1.76)	0.58 (0.32, 1.07)
30 minutes or less	114 (22.85)	Ref	Ref
Rural Status			
Rural	40 (34.78)	**1.67 (1.23, 2.26)**	1.34 (0.87, 2.07)
Non-Rural	99 (20.89)	Ref	Ref
Race/Ethnicity			
Hispanic	22 (19.30)	0.84 (0.44, 1.60)	1.09 (0.49, 2.42)
Non-Hispanic Black	19 (13.97)	0.61 (0.31, 1.19)	0.72 (0.31, 1.69)
Non-Hispanic White	87 (30.10)	1.31 (0.76, 2.27)	1.51 (0.74, 3.05)
Other/Multiracial	11 (22.92)	Ref	Ref
Education Level			
High school or lower	23 (21.70)	0.82 (0.54, 1.24)	0.87 (0.50, 1.49)
Some college	44 (20.95)	0.79 (0.57, 1.10)	0.78 (0.51, 1.20)
College graduate or more	72 (26.37)	Ref	Ref
Income Level			
$0 to $19,999	24 (17.65)	**0.56 (0.36, 0.88)**	**0.50 (0.26, 0.96)**
$20,000 to $39,999	31 (20.26)	**0.64 (0.42, 0.97)**	0.66 (0.39, 1,12)
$40,000 to $74,9999	41 (27.33)	0.87 (0.59, 1.26)	0.69 (0.42, 1.14)
$75,000+	36 (31.58)	Ref	Ref
Insurance			
Public	12 (21.82)	0.93 (0.55, 1.59)	0.73 (0.36, 1.51)
Combination	2 (22.22)	0.95 (0.28, 3.27)	0.77 (0.13, 4.73)
Other	2 (15.38)	0.66 (0.18, 2.39)	0.81 (0.22, 2.95)
None	32 (24.24)	1.04 (0.73, 1.48)	0.94 (0.61, 1.46)
Private	87 (23.39)	Ref	Ref
Condomless Anal Sex in the Last 6 Months			
Yes	93 (21.09)	1.34 (0.47, 3.83)	1.56 (0.56, 4.38)
No	3 (15.79)	Ref	Ref

Discussion

We examined the associations between distance and time traveled to last HIV test with time since last HIV test among MSM in the southern United States. We found a significant positive association between traveling more than 20 miles to the last HIV test and not having a test in the last 12 months. The results also showed a significant positive association between rural residence and not having a test in the last 12 months. There was not a significant association between traveling more or less than 30 minutes and time since last test. These findings expand on prior research that suggests an association between traveling a longer distance to HIV testing sites and later diagnosis of HIV as well as an association between distance from HIV testing sites and lower likelihood of getting tested for HIV (Cope et al., 2016; Leibowitz & Taylor, 2007).

Our finding that traveling a greater distance to receive the last HIV test is associated with a greater time since receiving the last test is consistent with past findings that people living further away from testing were less likely to be tested for HIV in Los Angeles, CA (Taylor, Leibowitz, Ong, & Simon, 2004). The present study looked at this association specifically among MSM in the South due to the known disparities of HIV prevalence among MSM in the rural South (Centers for Disease Control and Prevention, 2018, 2022). This finding suggests that the distance required to travel to receive HIV screenings is a major barrier to testing in this population even after controlling for other factors that may be associated with a lower likelihood of HIV testing. This finding is consistent with previous research that suggests living in areas with lower provider density, as is typical in rural areas (Louisiana Department of Health, 2017), results in reduced frequency of HIV testing. We controlled for condomless anal sex, so indications for testing did not confound the relationship.

Our study does not examine factors affecting distance traveled to the last HIV test. There may be no other testing sites available in the area or there may be limited access to closer sites due to financial, stigma, or privacy concerns. Determining the cause of longer travel distance will help to determine the best strategies for mitigating this association.

Our results indicate that rural residence is predictive of a longer time since last HIV test. This result is expected based on the results of overall testing rates of HIV being lower for non-urban populations than urban populations (Jones et al., 2022; Wallace et al., 2011). After adjusting for all variables, the association between rural residence and time since last test is attenuated, yielding a positive association that is no longer significant. Our results indicate that a major factor in reduced rates of HIV testing among rural compared to non-rural MSM is due to the distance men must travel to access HIV tests. However, the association is not completely accounted for by distance, suggesting that there are other aspects of living in a rural area that operate as barriers to HIV testing.

We also showed that lower income level, both incomes of $0-$19,999 and $20,000-$39,999, were associated with more recent HIV testing times. This result is consistent with evidence that shows that young adults in the United States with a nonfunctional income are more likely to report HIV testing than those with a functional income (Nguyen et al., 2006). This relationship may be attributable to the increased health resources that are contributed to lower income populations.

This analysis is subject to several limitations. These data are cross-sectional and based on self-report. We are comparing individuals who received their last HIV test within the past 12 months and over 12 months ago, so there is a recall bias that may affect the group that has not

been tested in the last 12 months more significantly. Another limitation is the sample size, specifically of the rural residing cohort, decreasing the precision of our estimates.

Although we observed a strong association between distance traveled to most recent HIV test and time since last test, we did not observe a similar association between time traveled to most recent test and time since last test. We hypothesized that longer time traveled to previous test would be associated with a longer time since last receiving a HIV test. It is possible that factors affecting travel time besides distance (e.g., traffic, use of public transportation) are not major deterrents to HIV testing uptake.

This study yields important implications for access to testing for MSM in the South. MSM traveling a further distance to access HIV testing are more likely to not have been tested in the last year, even though the CDC recommends testing at least annually (Branson, 2016). Improvements in access should be targeted toward individuals who do not live near testing sites, specifically in rural areas, and efforts should be made to increase the availability of HIV testing for rural MSM, including via at-home self-testing (MacGowan et al., 2020).

Conclusions

We observed a significant association between distance traveled to last HIV test and likelihood to have not been tested in the past year as well as between rural residence and likelihood to have not been tested in the past year. These findings indicate a lack of access to HIV testing based on distance required to travel to a test and living in a rural area. Future work should further examine the factors affecting distance needed to travel to receive an HIV test and develop strategies to mitigate these factors.

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