

# Does travel time matter?: Transportation vulnerability and access to HIV care among people living with HIV in South Carolina

Peiyin Hung,<sup>1,2</sup> Sayward E. Harrison,<sup>2,3</sup> Katie Green,<sup>4</sup> Sarah J. Miller,<sup>3</sup> Mariajosé Paton,<sup>3</sup> Divya Ahuja,<sup>4</sup> Sharon Weissman,<sup>4</sup>  
Caroline Rudisill,<sup>5</sup> & Tammeka Evans<sup>6</sup>

<sup>1</sup> Department of Health Services Policy and Management, University of South Carolina Arnold School of Public Health, Columbia, SC, USA; <sup>2</sup> South Carolina SmartState Center for Healthcare Quality (CHQ), University of South Carolina Arnold School of Public Health, Columbia, SC, USA; <sup>3</sup> Department of Psychology, College of Arts and Sciences, University of South Carolina, Columbia, SC, USA; <sup>4</sup> Department of Internal Medicine, University of South Carolina School of Medicine, Columbia, South Carolina, USA; <sup>5</sup> Department of Health Promotion, Education and Behavior, University of South Carolina Arnold School of Public Health; <sup>6</sup> ViV Healthcare, Research Triangle Park, NC, USA

## BACKGROUND

The southern United States (US) is disproportionately affected by HIV, with the highest rate of new diagnoses in the US<sup>1</sup> and a higher mortality rate than other US regions.<sup>2</sup> South Carolina (SC) exemplifies the HIV-related challenges that are common in the rural South, with only 71% of people living with HIV (PLHIV) in SC receiving any HIV care and only 56% retained in continuous care in 2019.<sup>3</sup>

A 2020 statewide situational analysis identified transportation barriers as the 'most frequent and often first reported barrier' to HIV care.<sup>4</sup> These barriers are common in the Southern US, which is characterized by high rates of poverty, inadequate public transportation infrastructure, and a shortage of HIV care providers.<sup>5</sup> Transportation issues have consistently been identified as barriers to HIV care, particularly in Southern states<sup>6</sup> and rural areas.<sup>7</sup> Transportation-related barriers include affordability concerns, insufficient public infrastructure, unreliable transportation systems, and limited transportation schedules.<sup>8</sup>

In rural areas, many PLHIV must travel excessive distances to their HIV care provider. Indeed, one study in North Carolina found that approximately half of participants traveled at least 60 miles to their care appointments with a quarter traveling over 90 miles.<sup>9</sup> Frequency of appointments was predicted by distance traveled to appointments.<sup>8</sup> Likewise, on a nationwide level, approximately 20% must travel more than 30 minutes to reach an HIV care provider.<sup>9</sup>

Access to safe and reliable transportation is necessary for PLHIV to access appropriate care in rural communities, particularly in areas where public transportation, walking or bicycling may not be feasible to reach a HIV care provider. Both transportation-related barriers and long travel distances might result in delayed linkage to care and missed appointments, leading to disease progression for PLHIV.

## AIMS

This study aimed to examine the extent of travel burdens, transportation barriers, and the associated consequences on HIV care among PLHIV in SC—a rural southern state in the US.

## METHODS

**Data Source:** 160 people living with HIV who were either re-engaging in HIV care after prolonged absence or in care but not virally suppressed were enrolled in a randomized controlled trial (RCT) to determine the efficacy of a concierge ridesharing intervention. At baseline, all participants completed a survey to provide information on transportation-related variables.

### Measures:

- Residential Proximity to Clinic.** Participants reported their residential zip code. Using ArcGIS, we geocoded the clinical site address and each residential zip code centroid to latitude and longitude coordinates. One way travel times were calculated based on the maximum official driving speed limits on the quickest driving route. Driving times were categorized into: <15 minutes, 15-30 minutes, and >30 minutes.
- Transportation Trouble.** Participants reported (i.e., 'yes', 'no') whether the cost of 1) gas or 2) transportation costs had ever prevented them from seeing their HIV care provider.
- Transportation Consequences.** Participants reported (i.e., 'yes', 'no') whether they had ever 1) cancelled or rescheduled HIV care appointments due to transportation problems, 2) been >30 minutes late to an appointment, 3) missed an appointment, 4) been prevented from seeing a doctor due to transportation difficulties, or 5) experienced difficulty reaching a pharmacy to pick up a refill.

### Analyses:

- Sociodemographic characteristics, transportation vulnerability, and transportation consequences were compared across residential proximity using Kruskal-Wallis tests.
- Multivariable logistic regression analyses were employed to identify the likelihood of transportation consequences for PLHIV 15-30 minutes and >30 minutes from the HIV clinic compared with <15 minutes.
- Multivariable logistic regression models included interactions between residential proximity and transportation trouble (i.e., gas-related or transportation cost-related barriers) on transportation consequences. The average predicted probability for each study outcome was calculated. Models controlled for age, marital status, sexual identity, gender, race, ethnicity, insurance, educational attainment, employment status, and annual household income.

## RESULTS

**Sociodemographic Characteristics.** The majority of participants were aged 45-64 years old (54.4%), single (never married, 77.0%), male (63.8%), heterosexual or straight (51.3% vs. 27.5% gay or lesbian), Black or African-American (77.5%), non-Hispanic (82.5%), insured by public insurance (50.6% vs. 10.6% private insurance), high school graduates (33.1%), unemployed (40.6%), and had less than \$10,000 annual income.

### Those living >30 minutes away compared with < 15 minutes away were more likely to:

- Report transportation problems (51.6% vs 73.5%,  $p = .048$ )
- Have missed HIV care appointments (41.9% vs 64.7%,  $p = .049$ )
- Report difficulty seeing doctors (39.4% vs 67.7%,  $p = .014$ )

### No differences were detected by residential proximity for:

- Needing to cancel/reschedule appointments
- Having been >30 minutes late for an appointment
- Having had difficulty reaching a pharmacy

### Residential Proximity.

Higher travel times were associated with being:

- Older
- Unmarried
- Male
- Employed
- Higher Income

	Travel Time to Care		
	<15 min (N=31)	15-30 min (N=94)	>30 min (N=34)
Adjusted Odds Ratio (95% CI)			
Because of Transportation Problems, You Had:			
Cancelled/Rescheduled Appointments	1.00 (1.00, 1.00)	0.87 (0.23, 3.29)	3.12 (0.66, 14.68)
>30-min Late	1.00 (1.00, 1.00)	1.69 (0.41, 7.04)	5.25 (1.06, 25.92)*
Missed Appointment	1.00 (1.00, 1.00)	1.41 (0.40, 4.97)	3.85 (1.04, 15.89)*
Prevent from seeing doc	1.00 (1.00, 1.00)	1.24 (0.33, 4.59)	7.06 (1.61, 30.99)**
Difficulty to reach the pharmacy	1.00 (1.00, 1.00)	1.43 (0.32, 6.49)	2.96 (0.59, 14.89)

**Residential Proximity to Clinic.** Nearly 20% of participants lived <15 minutes from the clinic, 59.1% lived 15-30 minutes, and 21.4% lived >30 minutes from the clinic.

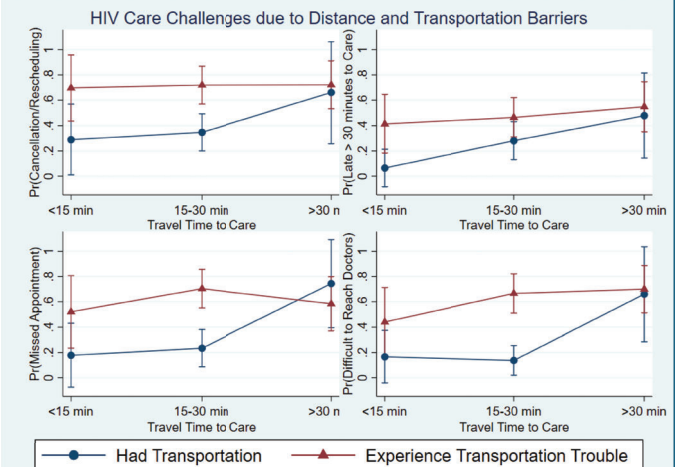


Figure 1. Adjusted Probability of HIV Care Consequences by Travel Time to Care and Transportation Trouble Experience

## CONCLUSIONS

Longer travel times (>30 minutes) to participants' HIV care clinic were associated with worsened HIV care access and use, including a greater likelihood of reporting transportation problems, missing HIV care appointments, and having difficulty seeing HIV care providers. Those who live further from an HIV care clinic are thus at risk for adverse outcomes, even when controlling for key sociodemographic variables. Prior research has found that providing transportation assistance reduces the effect of travel distance on mental healthcare and substance use treatment engagement<sup>10</sup> suggesting transportation interventions are necessary.

Residential proximity was not associated with reports of needing to cancel/reschedule appointments, being >30 minutes late for an appointment, or having difficulty reaching a pharmacy to refill medications. This suggests that other areas of vulnerability may affect care access and use. For example, prior research has identified that while public transportation options may exist, they can be unreliable and significantly delayed.<sup>6</sup> Those who live close to the clinic and have public transportation options may still be < 30 minutes late to their appointment due to transportation issues beyond cost.

## IMPLICATIONS

- Macro-level interventions such as improving public transit infrastructure are necessary to improve HIV care access. Local and statewide efforts to provide transportation to underserved communities are necessary. One such approach might be the use of ridesharing programs
- Clinics should prioritize transportation interventions for those who are physically distant from care, particularly in rural areas
- Clinics should offer flexible rescheduling options for patients who have transportation vulnerabilities affecting their ability to engage in HIV care



Check out more about  
our study here!

**REFERENCES:** 1. Center for Disease Control & Prevention (CDC). HIV Surveillance Report, 2019. Published online 2021. Accessed December 10, 2021. <https://www.cdc.gov/hiv/pdf/library/reports/surveillance/cdc-hiv-surveillance-report-2019-updated-vol-32.pdf>. 2. Centers for Disease Control and Prevention. Estimated HIV Incidence and Prevalence in the United States 2014-2018. HIV Surveill Suppl Rep. 2020;25(1). <http://www.cdc.gov/hiv/pdf/library/reports/surveillance/hiv-surveillance.html>. 3. South Carolina Department of Health and Environmental Control. Ending the HIV Epidemic: Plan South Carolina. Published online 2020. Accessed December 21, 2021. <https://www.scdhec.gov/sites/default/files/Ending%20the%20HIV%20Epidemic%20Plan%20South%20Carolina.pdf>. 4. South Carolina Department of Health and Environmental Control. Ending the HIV Epidemic: Plan South Carolina. Published online 2020. Accessed December 21, 2021. <https://www.scdhec.gov/sites/default/files/Ending%20the%20HIV%20Epidemic%20Plan%20South%20Carolina.pdf>. 5. State of South Carolina. HIV in the US Deep South. J Community Health. 2017;42(5):844-853. doi:10.1007/s10900-017-0325-8. 6. Sagrestano LM, Clay J, Finerman R, Gooch J, Rapino M. Transportation vulnerability as a barrier to service utilization for HIV-positive individuals. AIDS Care. 2014;26(3):314-319. doi:10.1080/09540121.2013.819403. 7. Samquist CC, Soni S, Hwang H, Topol BB, Madina S, Madonado YA. Rural HIV-infected women's access to medical care: Ongoing needs in California. AIDS Care. 2011;23(7):792-796. doi:10.1080/09540121.2010.515345. 8. Napravnik S, Eron J, McKaig R, G. Heine A, D. Menezes P, & Quinlan E. B. (2006). Factors associated with fewer visits for HIV primary care at a tertiary care center in the Southeastern U.S. AIDS Care - Psychological and Socio-Medical Aspects of AIDS/HIV, 18(SUPPL. 1). <https://doi.org/10.1080/09540120600333329>. 9. Massimo S, P. Martin, E. G. Bono, R. S. Dahman, B. Sabak, L. M. Begraw, F. Z. Adimora, A. A. & Kimmel, A. D. (2019). Suboptimal geographic accessibility to comprehensive HIV care in the US: regional and urban-rural differences. Journal of the International AIDS Society, 22(5), e25286. <https://doi.org/10.1002/jia2.25286>. 10. Whetten R., Whetten K., Pence, B. W., Reif, S., Conover, C. & Bouis, S. (2006). Does distance affect utilization of substance abuse and mental health services in the presence of transportation services? AIDS Care - Psychological and Socio-Medical Aspects of AIDS/HIV, 18(SUPPL. 1).

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