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Structural Barriers to Comprehensive, Coordinated HIV Care: Geographic Accessibility in the US South

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Abstract

Structural barriers to HIV care are particularly challenging in the US South, which has higher HIV diagnosis rates, poverty, uninsurance, HIV stigma, and rurality, and fewer comprehensive public health programs versus other US regions. Focusing on one structural barrier, we examined geographic accessibility to comprehensive, coordinated HIV care (HIVCCC) in the US South. We integrated publicly available data to study travel time to HIVCCC in 16 Southern states and District of Columbia. We geocoded HIVCCC service locations and estimated drive time between the population-weighted county centroid and closest HIVCCC facility. We evaluated drive time in aggregate, and by county-level HIV prevalence quintile, urbanicity, and race/ethnicity. Optimal drive time was ≤30 minutes, a common primary care accessibility threshold. We identified 228 service locations providing HIVCCC across 1,422 Southern counties, with median drive time to care of 70 minutes (IQR 64 minutes). For 368 counties in the top HIV prevalence quintile, median drive time is 50 minutes (IQR 61 minutes), exceeding 60 minutes in over one-third of these counties. Among counties in the top HIV prevalence quintile, drive time to care is six-fold higher for rural versus super-urban counties. Counties in the top HIV prevalence quintiles for non-

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COMPETING INTERESTS
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Hispanic Blacks and for Hispanics have >50% longer drive time to care versus for non-Hispanic Whites. Including another potential care source—publicly-funded health centers serving low-income populations—could double the number of high-HIV burden counties with drive time ≤30 minutes, representing nearly 35,000 additional people living with HIV with accessible HIVCCC. Geographic accessibility to HIVCCC is inadequate in the US South, even in high HIV burden areas, and geographic and racial/ethnic disparities exist. Structural factors, such as geographic accessibility to care, may drive disparities in health outcomes. Further research on programmatic policies, and evidence-based alternative HIV care delivery models improving access to care, is critical.

Background

Of the estimated 1.2 million Americans living with HIV, 40% are engaged in care, with fewer receiving effective antiretroviral therapy and achieving viral suppression (Bradley et al., 2014). In addition to receipt of comprehensive, coordinated HIV care (**HIVCCC**), system-level factors, or the structural and policy-related aspects of health care delivery, influence health outcomes (ONAP, 2015). Geographic accessibility to health care—i.e., travel time or distance to services—is an important structural determinant of effective care for chronic diseases (Brundisini et al., 2013). Inadequate geographic accessibility to care disproportionately affects racial/ethnic minorities (Onega et al., 2008; Peipins, Graham, Young, Lewis, & Flanagan, 2013), who may face additional barriers like poverty (Macartney, Bishaw, & Fontenot, 2013) and lack of car ownership (Raphael, Berube, & Deakin, 2006). However, scant evidence exists on geographic accessibility to HIV care, including disparities.

Structural barriers to health care remain challenging in the US South (Adimora, Ramirez, Schoenbach, & Cohen, 2014), which claims the highest HIV diagnosis rates nationally (CDC, 2015) and where poverty, uninsurance, and rurality are disproportionate relative to other regions (Desilver, 2014; Stephens, Artiga, & Paradise, 2014). These barriers contribute to striking racial/ethnic disparities: nearly 70% of HIV-positive Southerners are Hispanic or non-Hispanic Black (CDC, 2015; Prejean, Tang, & Hall, 2013), who, once diagnosed, are less likely to be linked to care (Tripathi et al., 2011), retained in care (Mugavero et al., 2009), or receive treatment (Johnson et al., 2013). HIV-positive Southerners are less likely to achieve virologic suppression (Hanna et al., 2013), and Southern states have some of the highest HIV case fatality rates (Hanna, Selik, Tang, & Gange, 2012).

In this context, we estimate drive time to **HIVCCC** in the US South, detailing disparities in drive time by urbanicity and race/ethnicity. We also describe how disparities might decrease when implementing an illustrative policy solution—publicly-funded health centers serving low-income populations as a potential source of HIV care.

Methods

Data

Service locations—We identified service locations providing **HIVCCC** in 16 Southern states plus the District of Columbia (DC) using four publicly available data sources: Tracking Accountability in Government Grants (DHHS, 2015), Health Resources and Services Administration (HRSA) Find Grants (HRSA, 2015b), HRSA Data Portal (HRSA, 2015a), and the federal HIV Testing Sites & Care Services Locator database (DHHS, 2016) (Figure 1). Service locations were defined as providing **HIVCCC** if HIV-related core medical services (e.g., antiretroviral prescriptions) and support services (e.g., case management) were offered.

Using federal grant numbers, we identified in the analytic database those clinics funded by the federal Ryan White Part C, Early Intervention Services program, since they represent a national model for providing HIVCCC. The US Ryan White HIV/AIDS program offers comprehensive treatment and care to approximately 500,000 HIV-positive Americans annually, providing clinical, support, and related services for vulnerable HIV-positive populations (e.g., racial/ethnic minorities) without adequate health insurance.

In sensitivity analysis, we included service locations of federally qualified health centers (FQHCs), which are federally funded outpatient clinics offering comprehensive primary care and support services to underserved communities. Eligible to receive Ryan White Part C funding, FQHCs serve patient populations similar to those seen in Ryan White Part C clinics (Weddle, Twilbeck, Toomey, Mincey, & McNamara, 2015), with nearly one-third of Ryan White clinics nationally also designated as FQHCs (HRSA, 2011).

Other data—We included publicly available HIV surveillance data from 2013 (AIDSVu). County-level adult and adolescent HIV diagnosed cases and diagnosed cases per population were reported for 1,270 Southern counties (of 1,422 total) and by race/ethnicity (non-Hispanic White, non-Hispanic Black, Hispanic). We focused on counties in the top HIV prevalence quintile, or counties with ≥264–3,442 HIV cases per 100,000 population (Box 1), for all diagnosed HIV cases regardless of race/ethnicity. To identify potential racial and ethnic disparities, we separately identified counties in the top HIV prevalence quintiles for non-Hispanic Whites, for non-Hispanic Blacks, and for Hispanics and examined drive time from counties in the top HIV prevalence quintile for each racial/ethnic group, but emphasize wide variation (≥131–1,437 cases per 100,000 population (non-Hispanic Whites); ≥1,141–10,049 (non-Hispanic Blacks); ≥603–15,785 (Hispanics)).

We used additional data on urbanicity, centers of population, and street networks. We adapted the US National Center for Health Statistics urban-rural classification (Ingram and Franco, 2014) to define a four-level measure of urbanicity (Box 1). We used county-level population-weighted centroids, defined as the latitude and longitude of the arithmetic center point of each county's population (Census Bureau, 2010). Finally, we included street network data from StreetMap Premium for ArcGIS. In sensitivity analysis, we incorporated bus transit data into the network, selecting urban bus transit networks with low (1 bus transit network serving 1 county in Mississippi), medium (3 networks serving 4 counties in South

Carolina), and high (9 networks serving 14 counties in North Carolina) levels of bus transit infrastructure.

Analytic approach

We estimated the fastest one-way drive time between each population-weighted county centroid and the closest **HIVCCC** service location using ArcGIS 10.3.1 and summarized data using Stata 14. We reported median drive time with interquartile ranges (IQR). Tests of statistical significance were not performed since analyses apply to the entire population of HIV-positive adults in the South. We evaluated the results using a 30-minute threshold for primary care accessibility, per a HRSA criterion for defining geographic health professional shortage areas (Government Publishing Office, 2016). This threshold is also used for state access standards for primary and specialty care in Medicaid managed care plans (Murrin, 2014).

We conducted two sensitivity analyses. First, we examined the impact of using bus transit time (bus time) on our findings. In the analytic database, we replaced drive time with bus time for those counties served by bus transit networks. Second, we performed an illustrative analysis examining how provision of **HIVCCC** at FQHCs might influence findings. While the analytic approach used was similar to baseline analyses, we restricted this sensitivity analysis to counties in the top HIV prevalence quintile to examine only counties with the highest HIV burden.

Results

Service locations

We identified 228 service locations providing **HIVCCC** in 134 (of 1,422) counties across the South (Figure 2). Of the 228 service locations, 61 (27%) are federally funded Ryan White Part C clinics, and almost half (110) are in four states (Florida, Texas, Virginia, North Carolina). Nearly 90% (204) are in super-urban or urban counties; over three-quarters (185) are in counties in the top HIV quintile.

Disparities in travel time

All counties—Median drive time across all 1,422 counties is 70 minutes (IQR 64 minutes) (Table 1), with drive time >30 minutes for over 80% (1,197) of all Southern counties. Excluding DC, median drive time is <40 minutes for only 1 state (South Carolina) and <50 minutes for three additional states (Maryland, North Carolina, Virginia). Rural counties have drive times more than double that of super-urban counties (median 95 (IQR 63) minutes versus 35 (IQR 34), respectively). Among 1,270 counties having HIV prevalence data, median drive time doubles between counties in the bottom and top HIV prevalence quintiles.

Counties in the top HIV prevalence quintile—We identified 368 counties in the top HIV prevalence quintile for all races and ethnicities. Median drive time to **HIVCCC** is 50 minutes (IQR 61), exceeding 30 minutes in two-thirds of these counties and 60 minutes in over one-third.

We found large differences in drive time when stratifying by urbanicity (Figure 3). Median drive time from rural counties in the top HIV prevalence quintile is >1 hour—nearly 700% the drive time in super-urban areas. In most states, drive time increases with increasing rurality, at times with wide variation: In Alabama, median drive time for rural counties is 71 minutes, >20 times longer than for super-urban counties.

We also evaluated drive time from counties in the top HIV prevalence quintile for different races and ethnicities, although underscore wide differences in HIV prevalence estimates in the top quintile by racial/ethnic group, complicating direct comparisons (≥131–1,437 (non-Hispanic Whites, n=233 counties); ≥1,141–10,049 (non-Hispanic Blacks, n=154 counties); ≥603–15,785 (Hispanics, n=70 counties)). Some counties (e.g., Miami-Dade, Florida) were in the top HIV prevalence quintile across multiple racial/ethnic groups.* Drive time in the top HIV prevalence quintile for non-Hispanic Whites is 32 minutes (IQR 60), increasing over 50% (+18 minutes) in the top HIV prevalence quintile for non-Hispanic Blacks and nearly doubling in the top HIV prevalence quintile for Hispanics (+26 minutes). Across urban counties, this drive time disparity increases to 70% longer for non-Hispanic Blacks and almost triples for Hispanics, although attenuates for peri-urban and rural counties. The disparity begins to reverse for super-urban counties: drive time from counties in the top HIV prevalence quintile for Hispanics (7 minutes) is nearly 30% less than that for other racial/ethnic groups.

Bus transit transportation

We examined changes in travel time **to HIVCCC** when bus transit was available. In Mississippi, South Carolina, and North Carolina, overall median travel time increases from 47 minutes (IQR 43) for drive time only to 51 minutes (IQR 45) for drive time or bus time. While median travel time increases by 5 minutes for both South Carolina and North Carolina, there are no differences in median travel time for Mississippi. However, when restricting to counties with bus transit networks, overall median travel time increases from 11 minutes drive time (IQR 19) to 91 minutes bus time (IQR 197), ranging from 6-fold (North Carolina) to 15-fold (Mississippi) increases in median travel time due to use of bus transit.

An illustrative policy solution

We identified 1,567 Southern FQHCs that were not providing **HIVCCC**. Drive time from counties in the top HIV prevalence quintile decreases 80% (from median 50 minutes to median 10 minutes) when including FQHCs as a potential source of HIV care. This illustrative policy solution for counties in the top HIV prevalence quintile results in 170 additional counties (+235%) and 34,815 more diagnosed HIV cases (from 279,106 to 313,921, or +12%) meeting the 30-minute travel time threshold (Figure 4).

For counties in the top HIV prevalence quintile, including FQHCs as a potential source of **HIVCCC** could reduce geographic disparities in travel time. Similar to analyses without

*Fewer counties are in the top HIV prevalence quintile for racial/ethnic minorities, since more Hispanic and non-Hispanic Black than non-Hispanic White county estimates for HIV prevalence are suppressed due to low numbers of cases.

FQHCs, travel time increases with rurality. However, when including FQHCs as a potential source of HIVCCC in high-burden counties, rural and peri-urban counties across the region see the greatest benefits, with drive time decreases of more than 50 minutes (versus –15 minutes and –4 minutes, for urban and super-urban locales).

Racial/ethnic disparities in travel time to HIV care could diminish if **HIVCCC** were offered either directly from or through partnerships with FQHCs. Median drive time to care decreases approximately 40 minutes from counties in the top HIV quintile for both non-Hispanic Blacks and Hispanics. The disparity in median drive time across counties in the top HIV prevalence quintile for different racial/ethnic groups narrows substantially to 2 minutes (for non-Hispanic Blacks) and 4 minutes (for Hispanics) compared to non-Hispanic Whites.

Discussion

Structural barriers to health care, particularly geographic proximity to care, remain challenging for persons living with HIV. We find that drive time to **HIVCCC** exceeds common thresholds for care accessibility in most Southern counties, including high HIV burden counties. We also find notable disparities by county urbanicity and race/ethnicity. When including an alternative care source, FQHCs, both overall drive time and disparities in drive time diminish markedly, although disparities still exist.

The current study highlights nuances in geographic proximity to care. In the highest prevalence quintile, drive time to care from rural counties greatly exceeds that of urban counties, with some states showing particularly wide variation by urbanicity. Several Texas counties, for example, have excessively high travel times due to the more urban clustering of clinics versus the wider geographic dispersion of HIV cases across this large state. Drive time is longer from counties in the top prevalence quintile for non-Hispanic Blacks and for Hispanics compared to those for non-Hispanic Whites. These disparities point to structural barriers to care, systematically disadvantaging rural residents and racial/ethnic minorities. While overall median travel time increases only modestly when including bus time estimates, for those counties with bus transit systems, bus transit availability substantially increases travel time, confirming previous work (Dasgupta et al., 2015).

Study findings highlight the need for targeted solutions that decrease disparities in geographic access to HIV care. If FQHCs were an additional source of HIVCCC in high-burden areas, drive time decreases markedly, with reductions in drive time disparities by urbanicity and race/ethnicity. This presents an optimistic, best-case scenario, given that generalist clinicians at FQHCs may not have the same HIV care expertise as those at specialty HIV clinics. However, generalist clinicians can develop expertise in HIV management through clinical experience and education, and expert generalists can provide high-quality HIV care (Landon et al., 2003; Landon et al., 2002). Further, evidence-based alternative care delivery models may make FQHC-based HIV care possible. Telemedicine allowing HIV specialists to remotely partner with generalist clinicians has shown promise for rural veterans living with HIV (Ohl et al., 2013); specialist tele-support for primary care providers through the Project ECHO model has expanded care for vulnerable populations with complex, chronic conditions (Arora et al., 2011) and is cost-effective in populations with hepatitis C (Rattay, Dumont, Heinzow, & Hutton, 2017). Yet real-world financial and operational challenges may limit the widespread feasibility of FQHCs as a policy solution. Ongoing federal funding for community health centers is uncertain (NACHC, 2017), and Southern FQHCs, particularly in non-Medicaid expansion states, may have more uninsured and underinsured individuals, lower revenue per patient, lower medical staffing ratios, and higher workforce recruitment and retention challenges (Paradise et al., 2017).

This study's findings contribute to an emerging literature on geographic proximity to HIV care in the US. Existing knowledge comes mainly from studies in select urban populations (Goswami et al., 2016). While geographic proximity is one of many factors influencing choice of service location (Eberhart et al., 2014), travel distance is a considerable barrier for some (Sutton, Anthony, Vila, McLellan-Lemal, & Weidle, 2010). The current study builds on this evidence by estimating travel time to care across an entire region and evaluating state-level variation, as well as racial/ethnic disparities in geographic accessibility to HIV care, which—like other structural barriers—could contribute to disparities in health outcomes.

Our findings contribute to a broader literature on geographic proximity to care for individuals with complex, chronic diseases. While trends in geographic and racial/ethnic disparities are similar, absolute drive time to HIV care appears far greater. Median travel time to specialized cancer care in the South (17 minutes) (Onega, et al., 2008) is nearly one-third that for high HIV prevalence Southern counties; mean travel distance nationally to dialysis facilities is approximately 8 miles (Stephens et al., 2013), likely with a far lower travel time than for even the highest HIV burden counties. Ultimately, longer travel time or distance to receive HIV care may be associated with poorer quality of care and health outcomes, as reported for cancer treatment (Lin et al., 2015) and diabetes management (Strauss, MacLean, Troy, & Littenberg, 2006), potentially exacerbating disparities.

Limitations

First, the data did not capture individual travel time to HIVCCC. Instead we relied on county travel time, capitalizing on publicly available data to glean broad insights on travel time to HIV care and disparities regionally. Second, baseline data did not include public transport networks, a realistic source of transportation in metropolitan areas. If we had fully incorporated public transportation data, estimated travel time would likely increase for counties with public transit (Eberhart, Share, Shpaner, & Brady, 2015); sensitivity analysis confirmed a substantial increase in travel time for counties served by bus transit networks but a modest overall increase. Further, while limited data inhibited our evaluation of the impact of public transit on disparities, disparities by urbanicity in travel time to HIV care would likely attenuate, while disparities by race/ethnicity would likely increase, since racial/ethnic minorities are more likely to use public transportation (Anderson, 2016). Third, the nature of the county-level HIV prevalence data made direct comparisons of travel time for different racial/ethnic groups in the top HIV prevalence quintile challenging, since prevalence thresholds varied by race/ethnicity. While we detected striking racial/ethnic disparities in drive time, future research should determine whether disparities persist at the individual level. Fourth, the data did not allow reliable identification of Ryan White Part B-funded sites, which receive federal funding indirectly (as allocated by US states and territories) to provide HIV core and support services. However, we identify and highlight Ryan White Part C clinics since there is substantial overlap between Part B and Part C clinics and they are a national model for the provision of a comprehensive suite of HIV services. Finally, the definition of HIVCCC not only included provision of two service classes, but required their co-location at a single facility. In reality, individuals may access medical and support services at different facilities. While the data did not allow for identification of facilities that partner in providing HIVCCC, future research can leverage individual-level data to examine the role of non-co-located services in geographic access to HIVCCC.

Conclusions

Geographic accessibility is an important, but often overlooked, structural barrier to HIV care and a potential contributor to disparities in accessing care. This study underscores its importance in future research, including on regional disparities, racial/ethnic disparities in access, and the relationship between travel time to care and HIV care quality. This evidence is timely as the current US health policy debate leaves the future of many federal programs uncertain, possibly limiting health care resources and intensifying geographic inaccessibility for vulnerable and minority populations, especially Southerners with HIV (Adimora, et al., 2014). Maintaining and expanding medical transportation services, implementing evidence-based telehealth solutions with primary care clinics, and investigating the acceptability of local nurse-managed care are critical next steps to addressing geographic barriers to care. Doing so promises further forward movement toward increasing access to care, reducing health disparities, and eliminating new HIV infections in the US.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Box 1

County-level classifications of HIV prevalence and urbanicity*

Quintile	HIV prevalence† (cases per 100,000)	Urban status	Definition
5th‡	≥264–3442	Super-urban	"Central" & "fringe" counties in metropolitan statistical areas§ ≥1 million
4th	144–263		
3rd	88–143	Urban	Counties in metropolitan statistical areas of 50,000–999,999
2nd	57–87	Peri-urban	Counties in micropolitan statistical areas¶
1st	17–56	Rural	Counties not in micropolitan statistical areas

*Based on the 2013 National Center for Health Statistics urban-rural classification scheme.

†Reflects adult and adolescent cases per 100,000 population.

‡In addition to aggregate estimates, we also report HIV prevalence in the top HIV prevalence quintile for different races and ethnicities: 131–1,437 (non-Hispanic Whites); 1,141–10,049 (non-Hispanic Blacks); and 603–15,785 (Hispanics).

§Metropolitan statistical areas are federally defined geographic areas with high population density, typically consisting of a core city (minimum population 50,000) and multiple adjacent counties which have strong social and economic ties. There are currently 157 metropolitan statistical areas represented in the South, or approximately 40% of all metropolitan statistical areas nationally.

¶Micropolitan statistical areas are federally defined geographic areas with lower population density, typically consisting of towns and communities with populations greater than 10,000 but less than 50,000. There are currently 213 micropolitan statistical areas in the US South, or approximately 40% of micropolitan statistical areas nationally.

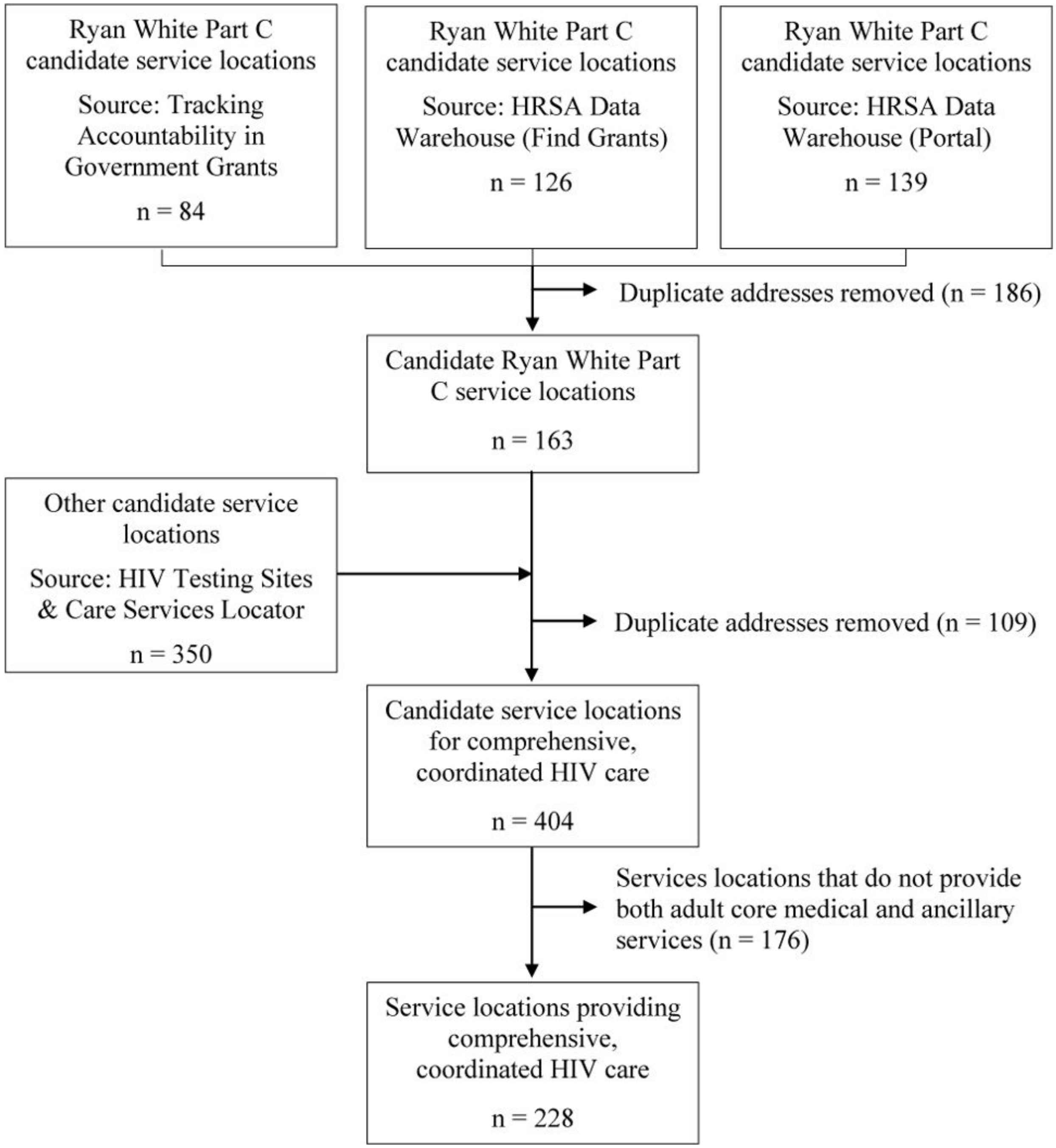

Figure 1.

Algorithm to identify service locations providing **HIVCCC**

This figure shows the process by which service addresses of facilities providing **HIVCCC** in the US South were identified. We began by identifying candidate service locations (versus administrative locations) of federally funded Ryan White Part C facilities from three public databases, since these clinics represent a national model for HIVCCC. After eliminating duplicate addresses, we integrated potential addresses of non-Ryan White Part C-funded service locations, eliminating service locations not providing both adult core medical and ancillary HIV services. This process resulted in 228 service locations providing comprehensive, coordinated HIV care across the region. *Abbreviation: HIVCCC = comprehensive, coordinated HIV care*

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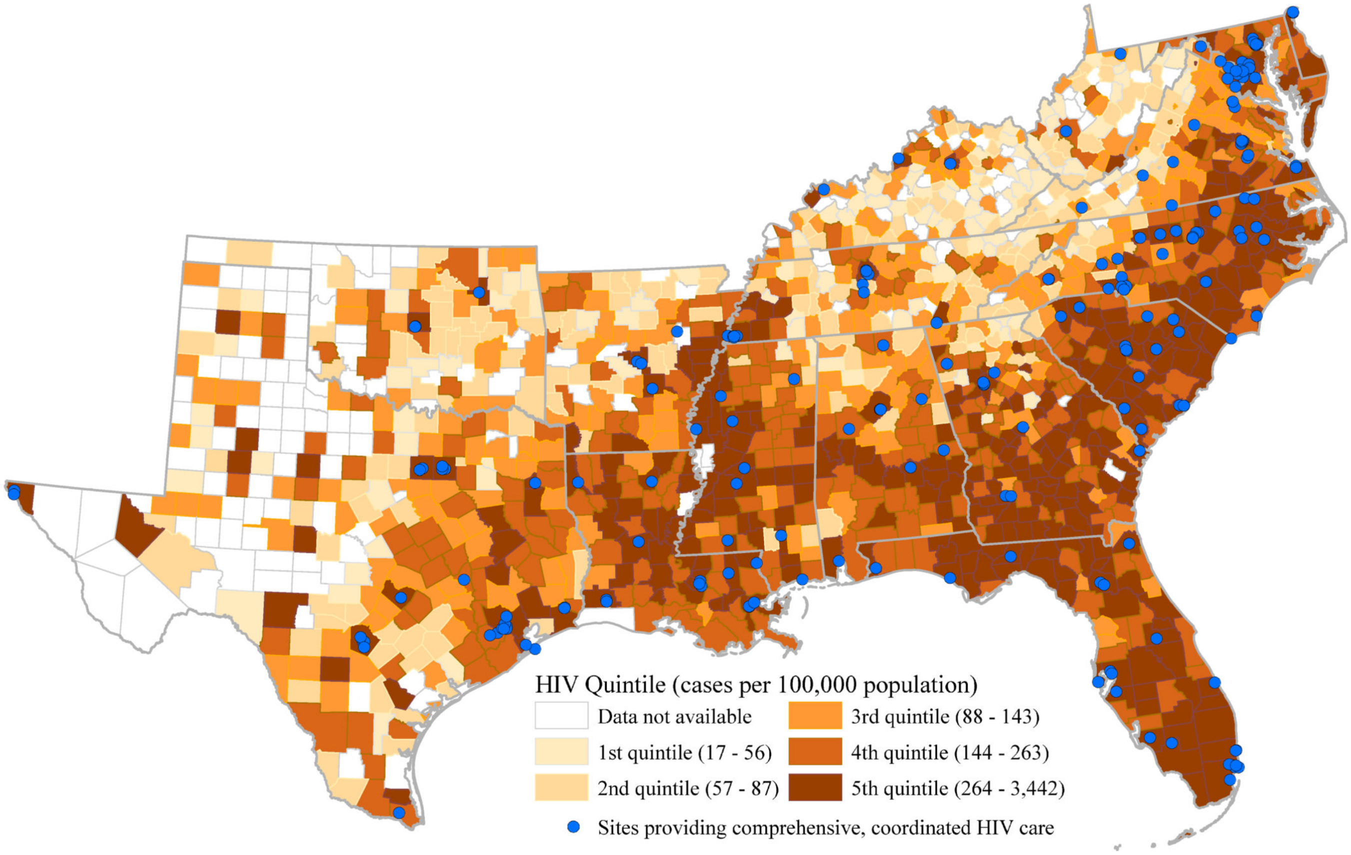

Figure 2.

County-level HIV prevalence and service locations providing **HIVCCC**

Abbreviation: HIVCCC = comprehensive, coordinated HIV care

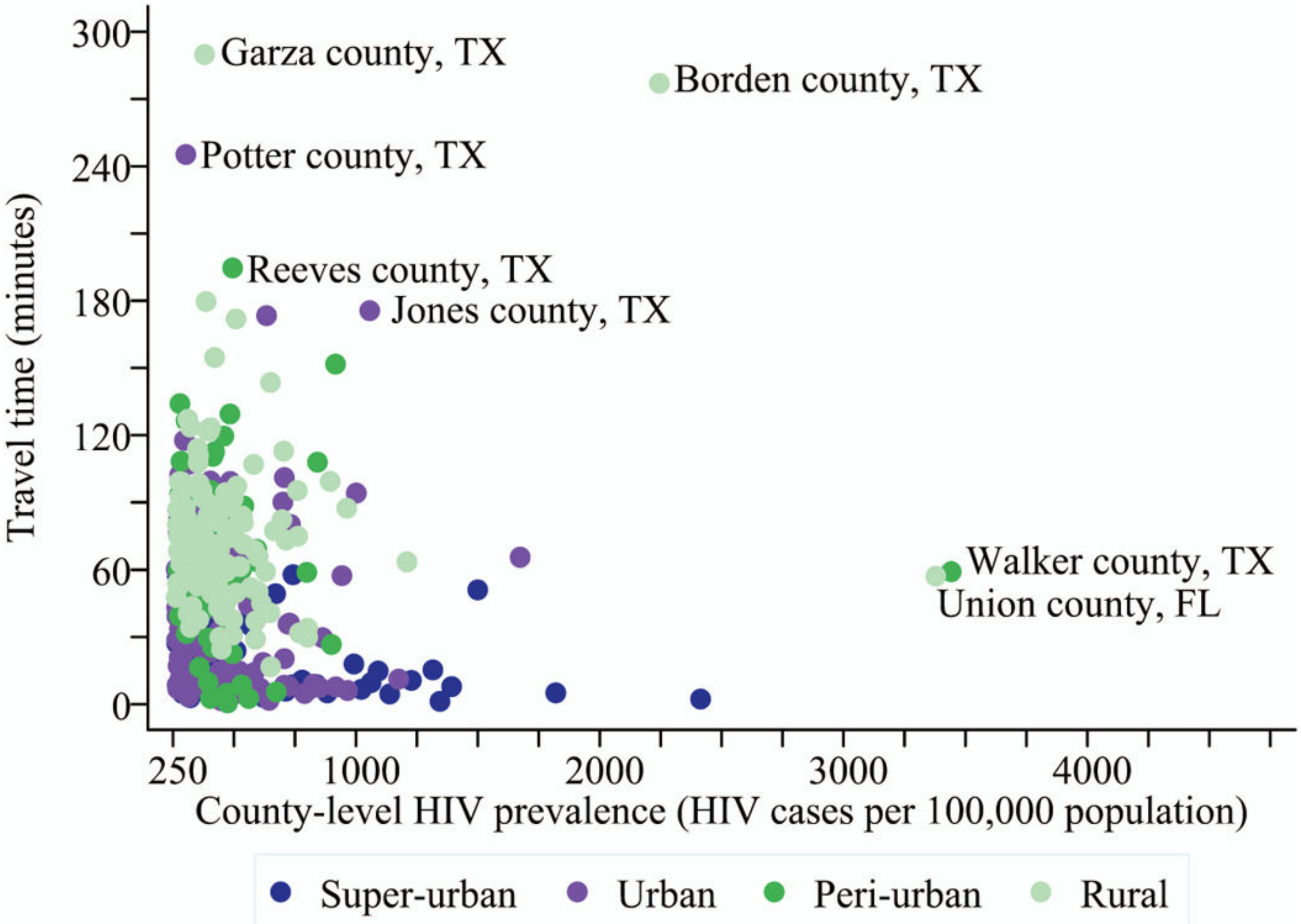

Figure 3.

Travel time from the population-weighted county centroid to **HIVCCC** in the top HIV prevalence quintile, by county urbanicity

This figure shows travel time by urbanicity in the top HIV prevalence quintile. On the horizontal axis is HIV prevalence, while travel time in minutes is shown on the vertical axis. Super-urban counties are shown in dark blue (◆), urban counties in purple (◆), peri-urban counties in green (◆), and rural counties in light green (◆). Less urban counties in the top HIV prevalence quintile have lower HIV prevalence but much higher travel time to HIV care, compared to more urban counties. Some of the highest HIV prevalence peri-urban and rural counties (labeled)—e.g., Union county, FL, Walker county, TX—have travel times to care exceeding 60 minutes. Some counties (also labeled) with lower HIV prevalence, but still in the top HIV prevalence quintile—such as Potter county, TX, and Garza county, TX—have travel time of over three hours. Most outliers are in Texas, due to the relative geographic clustering of clinics compared to the geographic dispersion of HIV cases across this large state. *Abbreviation: HIVCCC = comprehensive, coordinated HIV care*

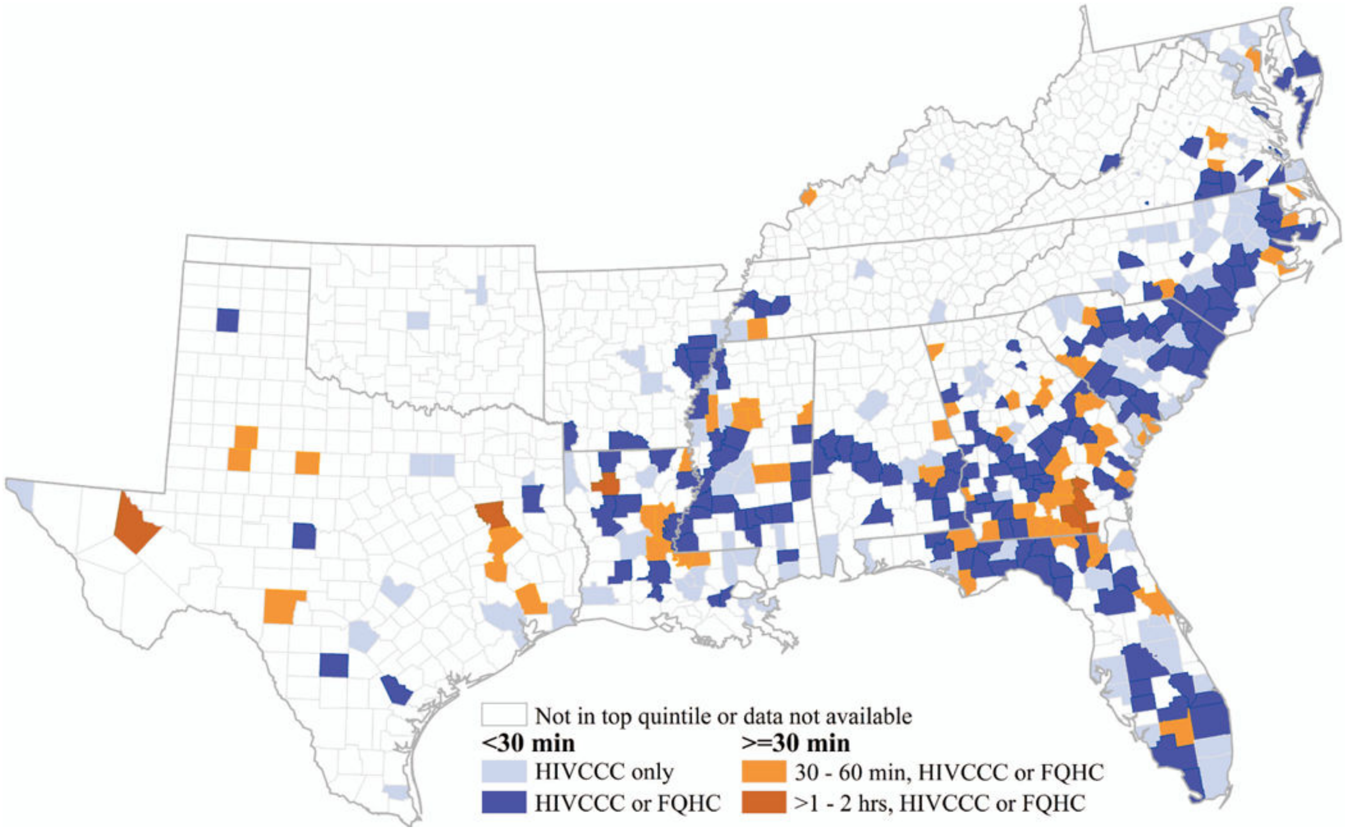

Figure 4.

Reductions in travel time if federally qualified health centers (FQHCs) could offer **HIVCCC** in high-HIV burden Southern counties: an illustrative example

This county-level map of the US South shows changes in travel time when including federally qualified health centers, or FQHCs, as a potential source of HIV care for counties in the top HIV prevalence quintile. If comprehensive, coordinated HIV care were available at all FQHCs in the top HIV prevalence quintile either directly or through an alternative care model (e.g., telepartnership with an existing Ryan White clinic), an additional 170 counties in the top HIV prevalence quintile (shown in bright blue, ■) would have travel times to care under 30 minutes, a commonly used threshold. This represents a more than 230% increase in the number of counties (shown in light blue, ■) meeting the 30-minute travel time threshold. However, even when FQHCs are a potential source of HIV care, a small number of counties still have travel times that do not meet the optimal threshold, with travel times between 30 and 60 minutes shown in light orange (■) and >60 minutes shown in dark orange (■).

Abbreviations: FQHC = federally qualified health center; HIVCCC = comprehensive, coordinated HIV care.

Table 1

Travel time from population-weighted county centroids to service locations providing comprehensive, coordinated HIV care in the Southern United States

		Number of counties, by travel time category (N (%*))				
	Median travel time (IQR), min	**≤30 min**	**>0.5 – ≤1 h**	**>1 – ≤2 h**	**>2 – ≤4 h**	**>4 h**
All counties	70 (64)	225 (16)	356 (25)	571 (40)	212 (15)	58 (4)
HIV prevalence quintile†						
5th	50 (61)	127 (35)	96 (26)	126 (34)	16 (4)	3 (1)
4th	62 (57)	45 (14)	108 (34)	128 (40)	39 (12)	2 (1)
3rd	66 (60)	41 (15)	77 (29)	106 (40)	33 (12)	10 (4)
2nd	88 (63)	7 (4)	50 (25)	93 (47)	44 (22)	4 (2)
1st	90 (47)	3 (3)	16 (14)	66 (58)	23 (20)	5 (4)
Urbanicity‡						
Super-urban	35 (34)	88 (40)	100 (46)	30 (14)	–	–
Urban	50 (61)	108 (29)	108 (29)	113 (30)	34 (9)	11 (3)
Peri-urban	77 (55)	19 (7)	60 (23)	138 (53)	34 (13)	10 (4)
Rural	95 (63)	10 (2)	88 (15)	290 (51)	144 (25)	37 (7)
State						
Alabama	64 (50)	9 (13)	20 (30)	30 (45)	8 (12)	–
Arkansas	99 (77)	5 (7)	15 (20)	28 (38)	26 (35)	–
Delaware	71 (90)	1 (33)	–	2 (67)	–	–
DC§	2 (–)	1 (100)	–	–	–	–
Florida	54 (53)	17 (25)	20 (30)	29 (43)	1 (1)	–
Georgia	68 (50)	21 (13)	42 (26)	84 (53)	12 (8)	–
Kentucky	79 (58)	12 (10)	27 (23)	60 (50)	21 (18)	–
Louisiana	58 (40)	16 (25)	20 (31)	27 (42)	1 (2)	–
Maryland	46 (57)	8 (33)	5 (21)	8 (33)	3 (13)	–
Mississippi	57 (43)	14 (17)	32 (39)	34 (41)	2 (2)	–
North Carolina	44 (45)	29 (29)	35 (35)	31 (31)	5 (5)	–
Oklahoma	101 (81)	5 (6)	11 (14)	32 (42)	26 (34)	3 (4)
South Carolina	35 (28)	13 (28)	24 (52)	9 (20)	–	–

		Number of counties, by travel time category (N (%*))				
	Median travel time (IQR), min	**≤30 min**	**>0.5 – ≤1 h**	**>1 – ≤2 h**	**>2 – ≤4 h**	**>4 h**
Tennessee	84 (49)	6 (6)	17 (18)	56 (59)	16 (17)	–
Texas	129 (157)	20 (8)	29 (11)	71 (28)	79 (31)	55 (22)
Virginia	41 (45)	44 (33)	47 (35)	39 (29)	4 (3)	–
West Virginia	76 (53)	4 (7)	12 (22)	31 (56)	8 (15)	–

Abbreviations: IQR = interquartile range; min = minutes; h = hours; DC = District of Columbia

*Percentages may not add up to 100% due to rounding. We represent the number of counties with a zero percentage contribution to the distribution with dashes (–).

†Travel time is reported for those counties with reported HIV prevalence estimates; counties with missing prevalence estimates are excluded. HIV prevalence quintiles are defined as follows: 5th, ≥264–3,442 cases per 100,000 population. 4th, 144–263 cases per 100,000 population. 3rd, 88–143 cases per 100,000 population. 2nd, 57–87 cases per 100,000 population. 1st, 17–56 cases per 100,000 population.

‡Urbanicity: Super-urban, counties in metropolitan statistical areas (MSAs) ≥1 million people. Urban, counties in MSAs of 50,000–999,999. Peri-urban, counties in micropolitan statistical areas. Rural, counties not in micropolitan statistical areas.

§For DC, state-level HIV prevalence estimates were used in the analysis.