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Comparison of Individual and Area Level Factors Between HIV-Infected Cisgender and Transgender Individuals in Florida (2006–2014)

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Abstract

This descriptive study compares individual- and area-level factors among HIV-infected transgender and cisgender individuals in Florida using data from the Florida Department of Health HIV/AIDS surveillance system (2006–2014). Of those individuals diagnosed with HIV, 7 (0.01 %) identified as transgender males, 142 (0.3 %) as transgender females, 12,497 (25.7 %) as cisgender females, and 35,936 (74.0 %) as cisgender males. Transgender females resided in rural and urban areas, were disproportionately non-Hispanic black, and were more likely than cisgender women to be diagnosed with AIDS within 3 months of their HIV diagnosis. Results suggest HIV screening and outreach efforts should be enhanced for transgender women.

Keywords

HIV/AIDS; Gender identity; Transgender; Vulnerable populations

Introduction

Transgender individuals are exposed to discrimination and violence [1] and are at risk for unemployment and homelessness [2]. They have disparate access to health insurance and healthcare; most are not engaged in the medical system until a medical crisis occurs [2]. Data suggest they are at increased risk for HIV [3–5]. Prevalence of HIV among transgender females is estimated at 27.7 %, with 11.8 % aware of their status [5]; non-Hispanic black transgender females are disproportionately at greater risk compared to non-Hispanic white transgender females [5–7]. A syndemic of mental health issues, stigma, limited access to care, and violence affect both HIV risk and outcomes in this population [8]. Little is known

about differences in HIV-related outcomes among transgender compared with cisgender individuals. Most studies on HIV and gender identity are based on convenience, snowball, or targeted sampling, and few population-based studies exist [5].

The objective of this descriptive study is to compare individual factors such as demographic and transmission risk category, and area-level factors such as social determinants of poverty, unemployment, and education, between HIV-infected transgender and cisgender individuals in Florida using the state's HIV/AIDS reporting system. Gender variance is not binary, and dichotomizing this construct is limiting. Constraints of these data, however, require us to categorize gender identity into cisgender and transgender. We use the term transgender as an umbrella term to define individuals whose gender identity or expression differs from the culturally-bound gender associated with one's assigned sex at birth. We use the term cisgender to denote individuals whose gender identity or expression does not differ from the culturally-bound gender associated with one's assigned sex at birth.

Methods

De-identified records of Florida residents who were reported with HIV infection that met the Centers for Disease Control and Prevention (CDC) case definition [9] for the first time during 2006–2014 were obtained from the Florida Department of Health (DOH) Enhanced HIV/AIDS Reporting System (eHARS). The Florida eHARS is a laboratory-based surveillance system that employs active and passive surveillance techniques. Vital status was ascertained by linkage with death certificate records from the Florida DOH Office of Vital Statistics, Social Security Administration Death Master File, and National Death Index; the method for linkage is described more fully elsewhere [10]. Five-year estimates of ZIP code-level socioeconomic data from the 2007–2011 American Community Survey [11] were linked using ZIP code tabulation area (ZCTA) [12].

The US Census Bureau reports data by ZCTA. A ZCTA approximates a ZIP code and is built by aggregating US Census Bureau blocks based on the ZIP code of addresses in these blocks. ZIP code-level poverty was measured using the 5-year estimate of the percentage of population living below the poverty line in that ZCTA. Unemployment was measured as the 5-year estimate of the percentage of people aged 16 and older in a ZCTA who were unemployed. Educational attainment was measured as the 5-year estimate of the percentage of the population aged 18 and older who were high school graduates in that ZCTA. ZCTAs were divided into rural and urban areas using Rural–Urban Commuting Area data codes [13].

Data in the eHARS system are assessed and coded according to eHARS procedures and reporting guidelines. Information is obtained during HIV testing, from diagnostic and clinical laboratories, and in some cases extracted from medical chart reviews. Demographic data are obtained by self-report via the above sources. If discrepancies are identified by DOH staff, they are investigated. The surveillance record can be updated when additional information is available, including information about gender identity. Individual-level variables available in the eHARS dataset for cases included birth sex, current gender identity, month and year of HIV diagnosis and AIDS diagnosis (if applicable); country of

birth; age at HIV diagnosis; sex; race/ethnicity; HIV transmission mode; residential ZIP code and county at time of HIV diagnosis and AIDS diagnosis (if applicable); year of death (if applicable); first CD4 count or percent after HIV diagnosis; and whether the diagnosis occurred at a correctional facility. During 2006–2014, a case would meet the HIV case definition if the person's medical record indicated evidence of a confirmed positive HIV test or a detectable viral load; the AIDS case definition would be met if the person's medical record indicated the development of an AIDS-defining illness or had a CD4 lymphocyte count <200 cells/ μ L or CD4% of total lymphocytes <14 [14, 15]. Delayed diagnosis was defined as meeting the AIDS case definition within 3 months of being diagnosed with HIV infection. In eHARS data, transmission category is based on assigned sex at birth, thus leading to ambiguity in mode of transmission among transgender women. Currently, a transgender woman who was infected with HIV through sexual risk behaviors with male partners is placed in the men who have sex with men transmission category [16]. However, for accuracy, we created separate categories for transgender women who have sex with men and men who have sex with men. People were classified as being born in the United States if they were born in any of the 50 states, District of Columbia, or any US dependency. If a person was diagnosed in a state or federal prison, they would be classified as incarcerated at the time of diagnosis. Ascertainment of deaths within Florida was through 2014; for out-of-state deaths complete ascertainment was through 2013 due to reliance on the National Death Index.

Gender identity data were collected in the eHARS system anecdotally prior to 2009, and systematically thereafter. Prior to 2009, transgender status was reported in the comments section of the Adult HIV Confidential Case Report Form on a voluntary basis, which led to underreporting. In 2009, the form was changed to include a question for sex assigned at birth and current gender identity. Available responses for gender identity were limited to [cisgender] male, [cisgender] female, transgender/male to female, transgender/female to male, and transgender/unspecified. Coding of data followed the algorithms outlined by the CDC for HIV surveillance programs [16]. Specifically, if sex assigned at birth was reported as male, and current gender identity reported as male or missing, then an individual was coded as cisgender male. If sex assigned at birth was reported as male, and current gender identity reported as female or 'male to female' then an individual was coded as transgender female. If sex assigned at birth was reported as male and current gender identity was reported as 'female to male' or unknown, and record review did not yield resolution, current gender was coded as missing. A similar algorithm was used for coding when sex assigned at birth was female. During the period 2006–2014, there were 7 transgender males reported in the surveillance system; due to small numbers, meaningful analysis was not possible, thus we excluded data on transgender males in the analysis. Birth sex did not include a separate response category for intersex; this information however could be captured in the transgender/unspecified category. There were no responses in this category in the data. Therefore, we categorized people into cisgender males, cisgender females, and transgender females.

The objective of this report is to describe the distribution of variables relevant to HIV infection and outcomes by gender identity. Analysis primarily entailed determining proportions of each level of a categorical variable, or the mean or median of a continuous

variable, stratified by gender identity. We assessed if the distributions were different using Chi square tests and Kruskal–Wallis tests. For bivariate comparisons of gender identity, we adjusted the *p* value using a Bonferroni correction. We assessed difference in delayed diagnosis by gender identity using multi-level logistic regression (Glimmix Procedure), adjusting for covariates. We were unable to adjust for transmission risk category as presented in Table 1 due to multicollinearity, and therefore collapsed the categories men who have sex with men (MSM) and transgender women who have sex with men (TWSM) into a combined MSM and TWSM category, despite them being conceptually distinct categories. This was done because it was important to control for transmission risk category in the model. Dummy values (88,888 and 99,999 respectively) were assigned to individuals who were incarcerated or who had missing ZCTA to account for intraclass correlation in the models. Analyses were performed using SAS 9.4 (SAS Institute SAS Software, version 9.4. Cary, NC).

The institutional review boards of the Florida Department of Health and Florida International University approved the study protocol.

Results

Of 48,583 individuals diagnosed with HIV, 7 (0.01 %) identified as transgender males, 142 (0.3 %) as transgender females, 12,497 (25.7 %) as cisgender females, 35,936 (74.0 %) as cisgender males, and one individual for whom gender identity could not be determined. Subsequent analyses exclude transgender males due to low numbers and the individual with unknown gender identity. Between 2006 and 2010, 9–12 HIV cases per year were among transgender females, increasing in 2011 with 18 cases, 2012 with 23 cases, 2013 with 22 cases, and 2014 with 30 cases. Transgender females resided in 25 of 60 Florida counties, including rural and urban areas. There were too few deaths among transgender females (*n* = 5) for meaningful analysis of mortality.

Table 1 presents individual and area-level data by gender identity. Distribution of age varied significantly among cisgender females, cisgender males, and transgender females (<0.0001). Transgender females were younger compared with cisgender females and cisgender males, with 72 % age 20–39 and 8 % age 13–19. Distribution of race and ethnicity was significantly different among the three gender identity groups. There was a high percentage of non-Hispanic blacks among cisgender females (68 %) and transgender females (59 %). However, Hispanics composed a higher proportion of transgender females (23 %) compared to cisgender females (14 %). Similar to cisgender females, over 80 % of transgender females were racial or ethnic minorities.

Heterosexual transmission was the main risk category for cisgender females (77 %), while men who have sex with men was the main transmission risk category for cisgender males (66 %), and transgender women who have sex with men was the main transmission risk category for transgender females (90 %). A similar proportion of cisgender females and transgender females had injection drug use as a mode of transmission. Proportionally more transgender females were US born (82 %) compared to cisgender females (72 %) and

cisgender males (71 %). There was no difference in delayed diagnosis by gender identity in bivariate analysis.

The median percent unemployment, poverty, and lack of high school graduation in areas where transgender females lived was lower than where cisgender females lived but higher than where cisgender males lived.

In multilevel logistic modelling, designating transgender females as the referent group, and controlling for race and ethnicity, transmission risk category, diagnosis year, age, and neighborhood poverty, gender identity was significantly associated with delayed diagnosis. Cisgender females were less likely to have a delayed diagnosis (aOR 0.601, 95 % CI 0.402–0.900) compared to transgender females. There was no difference between cisgender males and transgender females in having a delayed diagnosis (aOR 0.881, 95 % CI 0.591–1.314). Transmission risk category was an important confounder between the association of gender identity and delayed diagnosis; adjusting for it in the model revealed the association between gender identity and delayed diagnosis.

Discussion

Limited data suggest that HIV-infected transgender females are at increased risk for poor health outcomes due to syndemic factors such as violence, discrimination, substance use, and poor mental health [8]. However, our data suggest that those in the eHARS database may have worse health outcomes (namely delayed diagnosis) compared to cisgender females, but perhaps similar to cisgender males. Nevertheless, these findings must be interpreted cautiously. Differences in distributions are significant, but small. Additionally, these data do not include those in Florida diagnosed with HIV outside of Florida or those who are undiagnosed. Given the available data showing that transgender females are at increased risk of exposure to discrimination, violence, unemployment, homelessness, and HIV, as well as disparate access to health care [1, 2, 5], it would not be unexpected that many HIV-infected transgender females are not diagnosed until they are symptomatic and need clinical care. In addition, once diagnosed, they may be at increased risk for not remaining in the continuum of care. Testing data from Florida publically funded testing sites (2006–2014) show that 2341 HIV tests [0.07 % of all tests] were done on those who identify as transgender females (Melinda Waters, Florida DOH, personal communication). Social and area-level factors can impact HIV-related incidence and outcomes. While median values of percent unemployment, poverty, and high school graduates in the areas in which transgender females live is in between that of cisgender males and cisgender females, these areas have higher median values of percent unemployment and poverty, and lower median percent high school graduates compared to all the ZIP-code areas in Florida. This suggests that transgender females tend to live in areas of higher risk for poorer HIV-related outcomes [17–19]. Addressing these social determinants as well as individual determinants is important.

A notable limitation is that gender identity likely is incompletely reported in the surveillance system given the recency of systematic reporting of gender identity; furthermore, it is likely that some transgender females may not disclose their gender identity. Both of these

limitations would lead to some transgender females being classified as cisgender females or cisgender males. Also, gender identity classification in the eHARS system does not address the full spectrum of gender variance, which may result in not fully capturing gender identity. Gender identity classification may improve over time as these new data elements in the eHARS system become more standard. In our logistic regression models we were unable to adjust for transmission risk category as presented in Table 1, where MSM and TWSM are in separate categories. Adjusting for transmission risk category where MSM and TWSM are combined may not sufficiently control for confounding, because they are conceptually distinct categories. In addition, data contained only limited clinical information, and data on individual-level socioeconomic status were unavailable.

Lastly, due to the small number of transgender males in the eHARS system, we were unable to describe the characteristics of transgender males infected with HIV living in Florida. Data on federally funded testing sites in Florida suggest few transgender males sought testing (276 tests [0.008 % of all tests] during the study period) (Melinda Waters, Florida DOH, personal communication). It is unclear if they are at high risk for HIV, as previous study findings differ [5, 7, 20, 21]. Health issues of transgender males are understudied.

The present study is important because it provides information about HIV-infected transgender females that are based on systematically collected surveillance data. It compares individual and social factors to cisgender males and cisgender females. It reports increased odds among transgender females of having a delayed diagnosis compared to cisgender females. Inclusion of social determinants helps us to understand how these factors are distributed by gender identity, and helps us to gain insight into issues of discrimination, poverty, education, and access to care. Future research is needed to explore the role area-level social determinants play in HIV-related outcomes among HIV-infected transgender females; in addition, it is important to determine how these influence health in general in the context of syndemic theory.

Conclusions

To our knowledge, this is one of few studies in the United States that uses systematically collected state-level data to describe characteristics of HIV-infected individuals by gender identity. Transgender females in the eHARS system disproportionately belong to racial/ethnic minority groups, live throughout the state, including rural areas, and are both US and foreign born. They are at increased risk for delayed diagnosis. Health workers must address transgender individuals' needs, while providing safe spaces, and increasing trust. As data become increasingly available worldwide, we can begin to understand more about this vulnerable population and better address their needs. In the meantime, efforts are needed to develop effective programs to enhance screening, outreach efforts, and timely HIV diagnosis and care in this population.

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Distribution of HIV cases reported in the Florida Department of Health Enhanced HIV/AIDS Reporting System by gender identity, Florida (2006–2014)

Table 1

	Cisgender females, N = 12,497	Cisgender males, N = 35,936	Transgender females, N = 142	χ^2	p value
Individual characteristics					
Age in years, N (%) ^a					
0–12	109 (0.9)	93 (0.3)	0 (0.0)	178	<0.0001
13–19	570 (4.6)	1220 (3.4)	11 (7.8)		
20–39	5726 (45.8)	17,311 (48.2)	102 (71.8)		
40–59	5343 (42.8)	15,120 (42.1)	28 (19.7)		
60+	749 (6.0)	2192 (6.1)	1 (0.7)		
Race and ethnicity, N (%) ^a					
Hispanic	1769 (14.2)	9283 (25.8)	33 (23.2)	3032.5	<0.0001
Non-Hispanic black	8466 (67.7)	14,185 (39.5)	83 (58.5)		
Non-Hispanic white	2031 (16.3)	11,696 (32.6)	19 (13.4)		
Other	231 (1.9)	772 (2.2)	7 (4.9)		
Transmission, N (%) ^a					
Risk category					
Injection drug use	1079 (8.6)	2463 (6.9)	12 (8.5)	62,297.4	<0.0001
MSM ^b	–	23,608 (65.7)	–		
TWSM ^b	–	–	129 (90.9)		
Heterosexual	9615 (76.9)	6507 (18.1)	1 (0.7)		
Other	1803 (14.4)	3358 (9.3)	0 (0.0)		
US Born, N (%) ^a	9041 (72.4)	25,491 (70.9)	116 (81.7)	16.5	0.0003
Delayed diagnosis ^c , N (%) ^a	3311 (26.5)	9680 (26.9)	33 (23.2)	1.9	0.4
Area-level characteristics ^d					
% unemployed <i>median (IQR)</i> ^e	8.0 (3.4)	6.9 (3.4)	7.7 (4.0)	1027.9 ^f	<0.0001
% below poverty <i>median (IQR)</i> ^e	19.9 (13.6)	17.3 (12.5)	19.0 (13.1)	802.7 ^f	<0.0001
% high school graduate or greater <i>median (IQR)</i> ^e	81.1 (13.7)	84.0 (11.5)	82.6 (10.5)	856.5 ^f	<0.0001
Living in rural area, N (%) ^a	776 (6.3)	2125 (6.1)	7 (5.0)	0.7	0.71

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^b Percents may not sum to 100 due to rounding

^b For cisgender males: Men who have sex with men (MSM). For transgender females: Transgender women who have sex with men (TWSM). The CDC reports these two groups in the surveillance system in one combined risk category

^c AIDS diagnosis made within 3 months of HIV diagnosis; indicator of access to care

^d 2948 people missing ZIP-code data, 6 of whom are transgender female; 1424 people incarcerated, two of whom are transgender female

^e Interquartile range

^f Kruskal–Wallis test