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Individual and neighborhood predictors of mortality among HIV-positive Latinos with history of injection drug use, Florida, 2000–2011

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Abstract

Background—The objectives are to examine disparities in all-cause mortality risk among HIV-positive Latinos with injection drug use (IDU) history, and to identify individual- and neighborhood-level predictors.

Methods—Florida surveillance data for persons diagnosed with HIV 2000–2008 were merged with 2007–2011 administrative data from the American Community Survey. Hazard ratios (HR) were calculated using multi-level weighted Cox regression adjusting for individual and neighborhood (ZCTA-level) factors.

Results—Of 10,989 HIV-positive Latinos, 10.3% had IDU history. Latinos with IDU history were at increased mortality risk compared with Latinos without IDU history after controlling for

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Conflict of interest

No conflict declared

Contributors

All authors were involved in the design of the study and interpretation of findings. LM provided and managed the dataset. DMS, MJT, KPF analyzed the secondary data. DMS drafted the manuscript and all authors reviewed and revised the final document. All authors read and approved the final manuscript for submission.

individual and neighborhood factors (adjusted HR [aHR] 1.61, 95% confidence interval [CI] 1.43–1.80). Factors associated with mortality for those with IDU history included: being 40–59 (aHR 6.48, 95% CI 1.41–121.05) and ≥60 years (aHR 18.75, 95% CI 3.83–356.45) compared with 13–19 years of age; being diagnosed with AIDS within 3 months of HIV (aHR 2.31, 95% CI 1.87–2.86); residing in an area with ≥50% Latinos compared with <25% Latinos (aHR 1.56, 95% CI 1.19–2.04); and residing in a rural compared with an urban area at the time of diagnosis (aHR 1.73, 95% CI 1.06–2.70). Race and neighborhood poverty were not predictors among those with IDU, but were among those without.

Conclusion—HIV-positive Latinos with IDU history are at increased mortality risk and have unique contributing factors. Tertiary prevention strategies should target those who are older, diagnosed at later stages, and those who live in predominantly Latino and rural areas.

Keywords

Latinos; human immunodeficiency virus; mortality; injection drug use; neighborhood

1. INTRODUCTION

The rate per 100,000 population of new human immunodeficiency virus (HIV) diagnoses is more than 3 times higher for Latinos than for non-Latino whites. Similarly, the rate of death among Latinos with HIV is 2 times higher than for non-Latino whites with HIV (Centers for Disease Control and Prevention (CDC), 2014). In 2011, there were 31,254 Latinos with HIV attributable to injection drug use (IDU) in the United States (US; CDC, 2014). Florida is among the top states in number of yearly HIV diagnoses and prevalent cases attributable to IDU (CDC, 2014). In 2011, among HIV cases attributable to IDU in Florida, 30% of males and 17% of females were Latino (Florida Department of Health, 2014a).

Latinos with HIV attributable to IDU experience poor outcomes along each step of the HIV care continuum when compared with Latinos in other HIV risk groups (Gant et al., 2014). Thus, it is expected that Latinos with HIV attributable to IDU have lower one and five year survival rates when compared with Latinos with HIV attributable to other transmission modes (Espinoza et al., 2008). In 2013, among individuals with HIV in Florida, 86% were linked to care, 55% were retained in care, 50% were receiving antiretroviral treatment, and 39% were virally suppressed (Florida Department of Health, 2014b). Outcomes along the HIV care continuum for injection drug users with HIV are partially affected by the availability of HIV and drug treatment programs, as well as related services in the area. Individuals living with HIV in Florida receive HIV services through the Acquired Immune Deficiency Syndrome (AIDS) Insurance Continuation Program (est. 1989), AIDS Drug Assistance Program (est. 1987), Ryan White HIV/AIDS Program (est. 1990), Medicaid/Medicare, non-governmental organizations, and case management programs (Florida Department of Health, n.d.). Statewide substance abuse treatment in Florida is primarily provided by the Substance Abuse and Mental Health Program under the Florida Department of Children and Families (Florida Department of Children and Families, 2014).

In addition to individual-level health care-related factors, neighborhood-level (e.g., as measured by census tract, zip code, county, etc.) social factors have been linked to HIV and drug use. HIV-positive injection drug users tend to reside in clusters and concentrate in high poverty areas (Martinez et al., 2014a). Living in socioeconomically disadvantaged areas is associated with high-risk injection drug use behavior (Buchanan et al., 2003; Genereux et al., 2010), HIV seroconversion (Maas et al., 2007), and low rates of drug use cessation among injection drug users (Genberg et al., 2011; Nandi et al., 2010). Contributing to the association between neighborhood disadvantage and drug use behaviors are increased psychological stress, decreased positive social networks, and fewer health and social support services (Boardman et al., 2001; Galea et al., 2003; Kirby and Toshiko, 2005). Neighborhood disadvantage also is associated with increased mortality risk among the general HIV-positive population (Hanna et al., 2008; Joy et al., 2008; McFarland et al., 2003). However, no studies to date have examined the association between neighborhood socioeconomic status (SES) and mortality among HIV-positive injection drug users.

Furthermore, neighborhood-level ethnic density (i.e., neighborhood racial/ethnic composition) is associated with health outcomes. Studies have shown lower all-cause mortality among the general Latino population who reside in neighborhoods with high Latino density (Bécares et al., 2012). Based on current data, the protective effect appears to be specific to Latinos (Bécares et al., 2012). Mechanisms for the ethnic density effect include lower perceived racism (Bécares et al., 2009; Whitley et al., 2006), enhanced social support (Das-Munshi et al., 2010; Halpern and Nazroo, 2000), and increased access to culturally appropriate health care (Benjamins et al., 2004; Whitley et al., 2006). The association between ethnic density and mortality has not been examined for individuals with HIV or who use illicit drugs.

Literature suggests interactions between HIV, drug use, and neighborhood factors. However, studies have focused predominantly on non-Latino populations. Thus, our objective was to: (a) examine disparities in mortality risk among HIV-positive Latinos with a history of IDU compared with those without a history of IDU, and (b) compare individual- and neighborhood-level predictors of mortality for these two groups.

2. METHODS

2.1. Datasets

De-identified HIV surveillance records were obtained from the Florida Department of Health enhanced HIV/AIDS reporting system (eHARS). Cases of Latinos age ≥13 who met the Centers for Disease Control and Prevention (CDC) HIV case definition (Schneider et al., 2008) during the years 2000–2008 were analyzed. Vital status was ascertained through 2011 by linkage with Florida Vital Records, the Social Security Death Master File, and the National Death Index. Cases with missing or invalid data for ZIP code at time of HIV diagnosis, and cases diagnosed in a correctional facility, were excluded. The 2007–2011 American Community Survey (ACS) was used to obtain data by ZIP code tabulation area (ZCTA) (ACS, 2014a). ZCTAs are ZIP code approximations used by the US Census Bureau to tabulate summary statistics (US Census Bureau, n.d.). Hereinafter, ZIP code/ZCTA-level data will be referred to as neighborhood-level data.

2.2. Individual- and neighborhood-level variables

The following individual-level data were extracted from eHARS: ethnicity, race, HIV diagnosis year, sex at birth, age at HIV diagnosis, HIV transmission mode, birth country, HIV-to-AIDS interval in months (if case progressed to AIDS), HIV-to-death interval in months (if individual died by December 31, 2011), residential ZIP code at time of HIV diagnosis, and whether the case was diagnosed at a correctional facility. Thirteen neighborhood-level SES indicators were extracted from the ACS (Niyonsenga et al., 2013): percent of households without access to a car, percent of households with ≥1 person per room, percent of population living below the poverty line, percent of owner-occupied homes worth ≥$300,000, median household income in 2011, percent of households with annual income <$15,000, percent of households with annual income ≥$150,000, income disparity (derived from percent of households with annual income <$10,000 and percent of households with annual income ≥$50,000), percent of population age ≥25 with less than a 12th grade education, percent of population age ≥25 with a graduate professional degree, percent of households living in rented housing, percent of population age ≥16 who were unemployed, and percent of population age ≥16 employed in high working class occupation. We additionally extracted percent of population who identified as Hispanic or Latino from the ACS.

Individual- and neighborhood-level data were merged by matching the ZIP code at time of HIV diagnosis of each case with the ZIP code's corresponding ZCTA. Cases with IDU, or IDU plus MSM, listed as a mode of HIV transmission were categorized as having a history of IDU. Data on mode of HIV transmission were self-reported during HIV testing, reported by a health care provider, or extracted from medical chart reviews. Latinos were coded as US-born if they were born in any of the 50 states, District of Columbia, Puerto Rico, or any US dependent area. The 2011 ACS/US Census Bureau Hispanic origin classification was used to define birthplace for the Central America and South America categories (ACS, 2014b). We defined late HIV diagnosis as an AIDS diagnosis within 3 months of HIV diagnosis (CDC, 2013). Income disparity was calculated as the logarithmic of 100 times the percent of households with annual income <$10,000 divided by the percent of households with annual income ≥$50,000 and was used as a proxy measure of the Gini-coefficient (Niyonsenga et al., 2013; Singh and Siahpush, 2002). All neighborhood-level indicators were coded so that higher scores meant higher poverty and were standardized (Niyonsenga et al., 2013). The percent of Latinos/Hispanics in a neighborhood was divided into 3 categories: <25%, 25–49%, and ≥50% (Alvarez and Levy 2012; Shaw et al., 2010). Categorization C of Version 2.0 of the Rural-Urban Commuting Area (RUCA) codes, developed by the University of Washington WWAMI Rural Research Center (WWAMI Rural Health Research Center, n.d.), were used to categorize neighborhoods into rural or urban status.

2.3. Statistical analyses

Following the analytical methods of Niyonsenga et al. (2013), we sought to develop an SES index using the 13 ACS indicators. First, we conducted a reliability analysis. The Cronbach's alpha for all 13 indicators was 0.9411. We selected 7 indicators based on the correlation of the indicator with the total index (high correlation), and the Cronbach's alpha if the item was deleted (low alpha). The 7 indicators selected were: percent below poverty, median household income, percent of households with annual income <$15,000, percent of households with annual income ≥$150,000, income disparity, percent of population age ≥25 with less than a 12th grade education, and highclass work. The resulting Cronbach's alpha increased (0.9564).

Second, we conducted a principal component analysis with and without varimax rotation, which revealed one factor with an eigenvalue greater than 1 (5.5632). These results are consistent with previous research (Krieger et al., 2003a, 2003b; Messer et al., 2006; Hogan and Tchernis, 2004). This factor accounted for 79.47% of the variance in the indicators. Because all the factor loadings were high (between 0.80 and 0.95), we retained all 7 indicators. The selected indicators were consistent with those chosen for the urban "poverty index" in Niyonsenga et al. (2013). Finally, we calculated a "poverty index" score by adding the standardized scores for the 7 variables and categorized the scores into quartiles.

Following development of the poverty index, we compared individual- and neighborhood-level characteristics by history of IDU. We used the Cochran-Mantel-Haenszel general association statistic for individual-level variables controlling for ZCTA, and the chi-square test for neighborhood-level variables. Third, we generated Kaplan-Meier survival curves for all-cause mortality by history of IDU and by neighborhood characteristics stratified by history of IDU. These analyses revealed a violation of the proportional hazard assumption. Therefore, the SAS macro PHSREG by Kohl and Heinze (2012) was used to run weighted Cox models. Multi-level (level 1: individual; level 2: neighborhood) modeling was used to account for correlation among cases living in the same neighborhood. Crude and adjusted hazard ratios and 95% confidence intervals were calculated comparing Latinos with history of IDU with those without history of IDU. To identify predictors of mortality for each group, separate models were estimated stratifying by history of IDU. Hazard ratios were adjusted for race, HIV diagnosis year, sex, age, birthplace, late diagnosis, poverty index (hereinafter referred to as "poverty"), neighborhood-level percent Hispanic/Latino, and rural/urban status. SAS software, version 9.3 (SAS Institute, Cary, NC 2002) was used to conduct analyses. The Florida Department of Health and Florida International University institutional review boards approved our study.

3. RESULTS

3.1. Participants

Of 10,989 Latinos who were 13 years of age and older and diagnosed with HIV in Florida between 2000 and 2008, 1,126 (10.3%) were reported as having a history of IDU (Table 1). Compared with Latinos without history of IDU, those with history of IDU were more likely to be diagnosed earlier in the epidemic (p-value <0.0001), be 40–59 years of age (p-value <0.0001), born in the US and Puerto Rico (p-value <0.0001), and have a survival after HIV diagnosis of less than 3 years (p-value <0.0001). Those with history of IDU were also more likely to live in an area in the highest quartile of neighborhood poverty (i.e., the poorest neighborhoods) (p-value <0.0029), an area with <25% Hispanics/Latinos (p-value <0.0001), and a rural area (p-value 0.0475).

3.2. Individual and neighborhood predictors of mortality

The risk of all-cause mortality risk was two times greater for Latinos with history of IDU compared with Latinos without history of IDU (crude HR 2.00, 95% CI 1.79–2.23) (Figure 1). The increased risk persisted after adjusting for individual- (aHR 1.64, 95% CI 1.45–1.83) and individual- and neighborhood-level variables together (aHR 1.61, 95% CI 1.43–1.80) (data not in table).

Mortality risk was higher for Latinos with history of IDU who were diagnosed in 2000–2002 compared with Latinos diagnosed in 2006–2008 (aHR 1.47, 95% CI 1.03–2.13), 40–59 (aHR 6.48, 95% CI 1.41–121.05) and ≥60 years of age (aHR 18.75, 95% CI 3.83–356.45) compared with 13–19 years of age, diagnosed late (aHR 2.31, 95% CI 1.87–2.86), and who lived in a rural compared with an urban area (aHR 1.73, 95% CI 1.06–2.70) (Table 2). Latinos with history of IDU who were of race other than black compared with white (aHR 0.29, 95% CI 0.20–0.40), lived in the 2nd (aHR 0.44, 95% CI 0.31–0.62) and 3rd (aHR 0.72, 95% CI 0.54–0.97) quartile of poverty compared with the 1st quartile, and in an area with <25% Latinos compared with ≥50% Latinos were at decreased risk of mortality (aHR 0.64, 95% CI 0.49–0.84).

Mortality risk was higher for Latinos without history of IDU who were black compared with Latinos who were white race (aHR 1.63, 95% CI 1.40–1.88), diagnosed in the year 2000–2002 compared with 2006–2008 (aHR 1.85, 95% CI 1.58–2.18), 40–59 (aHR 2.13, 95% CI 1.42–3.36) and ≥60 years of age (aHR 5.97, 95% CI 3.92–9.58) compared with 13–19 years of age, and diagnosed late (aHR 2.27, 95% CI 2.06–2.50) (Table 2). Mortality risk was also higher for Latinos without history of IDU who lived in the 2nd (aHR 1.40, 95% CI 1.20–1.64), 3rd (aHR 1.61, 1.39–1.87), and 4th (aHR 1.75, 95% CI 1.51–2.03) quartiles of poverty compared with the lowest quartile, and in an area with 25–49% Latinos compared with ≥50% Latinos (aHR 1.29, 95% CI 1.14–1.46).

4. DISCUSSION

In our study, the adjusted mortality risk for HIV-positive Latinos with history of IDU was two times that of their non-IDU counterparts. Black race was not associated with mortality for Latinos with history of IDU but was a risk factor for Latinos without history of IDU. Age and late diagnosis were individual-level predictors for both groups. Neighborhood poverty was not consistently associated with mortality for Latinos with history of IDU, and appeared to be protective, but was a risk factor for mortality for Latinos without history of IDU. Residing in a low Latino ethnic density neighborhood decreased the mortality risk for Latinos with history of IDU. Finally, residing in a rural neighborhood increased the mortality risk for Latinos with history of IDU only.

HIV-positive Latinos with history of IDU were at increased risk of mortality compared with HIV-positive Latinos without history of IDU even after controlling for individual- and neighborhood-level factors. This is consistent with results from Espinoza et al. (2008) who reported lower survival rates, and with Gant et al. (2014), who reported lower proportions of linkage to and retention in care and viral suppression, among HIV-positive Latinos with history of IDU compared with Latinos without history of IDU. Our findings are inconsistent with results from a study of HIV-positive individuals in a universal health care setting that found no disparity in mortality risk between injection drug users and non-injection drug users (Joy et al., 2008). However, our study differs in that our sample included only Latinos, and included individuals with and without access to care. While we were unable to find linkage to and retention in care rates for Latino injection drug users in Florida during our study period, a study of the general HIV-positive population showed that injection drug users are 2.5 times more likely to miss healthcare visits compared with those with HIV attributable to MSM (Horberg et al., 2013) and that adherence to HIV treatment is suboptimal among injection drug users (Bouhnik et al., 2002).

Race was a risk factor for mortality among Latinos without history of IDU, but not for Latinos with history of IDU. Race for Latinos is rarely included in studies of HIV-positive Latinos, often because of limited data collection methods for race and ethnicity. We were unable to find a study examining racial disparities in survival among HIV-positive Latinos to compare our results. However, our findings suggest that racial disparities in HIV/AIDS survival among Latinos are wider compared with racial disparities among the general HIV-positive population (Hanna et al., 2008, Oramasionwu et al., 2009, Trepka et al., 2013b). Of note, being born in Cuba was a significant predictor of mortality for Latinos without history of IDU after controlling for all other individual- and neighborhood-level predictors except for race (aHR 1.16, 95% CI 1.01–1.34), and disappeared only after controlling for race (aHR 1.04, 95% CI 0.90–1.20). Similarly, being born in Mexico was protective (aHR 0.72, 95% CI 0.58–0.89), but not after controlling for race (aHR 0.90, 95% CI 0.72–1.12).

Our findings suggest that age is additionally harmful for Latinos with history of IDU compared with Latinos without history of IDU. This effect might be biological or social in nature. Individuals diagnosed with HIV at older ages can experience faster disease progression (Langford et al., 2007; Nogueras et al., 2006). Evidence suggests that the use of drugs might also accelerate the progression of HIV to AIDS (Cole et al., 2015) by weakening the immune system, interacting with antiretroviral medication, and increasing social barriers to treatment access and adherence (Kapadia et al., 2005).

The relationship between neighborhood poverty and mortality differed for Latinos with and without history of IDU. Consistent with previous studies of the general HIV-positive population (Hanna et al., 2008; McFarland et al., 2003; Trepka et al., 2013b), neighborhood poverty was associated with increased mortality for Latinos without history of IDU. The effect was strong and persisted after controlling for individual and other neighborhood factors. However, our findings showed puzzling results for Latinos with history of IDU. Residing in the two middle quartiles of poverty was protective compared with the lowest quartile of poverty, but the effect disappeared for areas of highest poverty. The mechanisms through which poverty affects survival among HIV-positive Latinos (Boardman et al., 2001; Galea et al., 2003; Kirby and Toshiko, 2005) may not hold for Latinos with history of IDU. It is possible that more HIV prevention and treatment resources are allocated to higher poverty areas, as the injection drug using population in these areas is typically larger (Martinez et al., 2014a). However, the advantages of the increased targeting may not hold for areas in the highest quartile of poverty (Boardman et al., 2001; Galea et al., 2003; Kirby and Toshiko, 2005). Small numbers of Latinos with history of IDU in the lowest quartile of neighborhood poverty could have limited our ability to find an association.

Residing in an area with <25% Latinos compared with ≥50% Latinos was protective for Latinos with history of IDU. This effect was not observed among Latinos without history of IDU. These findings contradict the ethnic density literature for the general Latino population, which suggests that higher, rather than lower, ethnic density provides health benefits (Eschbach et al., 2004; Inagami et al., 2006). However, past ethnic density research has been limited to all-cause mortality among the general Latino population. We speculate that high levels of HIV-related stigma in high Latino density areas are preventing HIV-positive Latinos from utilizing the enhanced social support that leads to better health (Das-Munshi et al., 2010; Halperin and Nazroo, 2000; Smith et al., 2008). HIV-related stigma is higher among Latinos compared to non-Latino whites, and among less acculturated Latinos compared to more acculturated Latinos (Rajabiun et al., 2008). Latinos in high Latino density areas in Florida have been shown to have low acculturation levels (Schwartz et al., 2013).

Finally, our study indicates that residing in a rural compared with an urban area increases mortality risk for Latinos with history of IDU only. This effect was observed despite the relatively small number of rural residents, and the effect decreased after adjusting for individual-level and neighborhood-level factors. A previous study of HIV-positive individuals in Florida indicated no survival disparity between rural and urban residents (Trepka et al., 2013a), consistent with our findings for Latinos without history of IDU. Our finding for Latinos with history of IDU might have differed because the previous study examined individuals with AIDS of all races/ethnicities across all HIV-risk groups. The small number of rural cases did not allow us to perform subanalyses to identify associated factors. However, a study of 2,222 injection drug users and crack users in Florida found that urban participants were 2.57 times more likely to report utilizing drug treatment compared with their rural counterparts (Metsch and McCoy, 1999). Furthermore, only 4.8% of Latino rural participants reported ever being in drug treatment. Poor access to drug treatment—coupled with limited availability of HIV-related resources (Sutton et al., 2010), heightened IDU- and HIV-related stigma, and decreased confidentiality in rural and low HIV prevalence areas—may explain rural/urban mortality disparities among Latinos with history of IDU (Zukoski and Thorburn, 2009).

Our study has limitations. First, surveillance records provide data on history of IDU to describe likely mode of HIV transmission. Therefore, while we know the drug use occurred prior to HIV diagnosis, we had no information about current IDU. Nevertheless, it is likely that individuals in high-poverty neighborhoods continued to use drugs, as injection cessation is lowest among those who live in neighborhoods of high deprivation (Genberg et al., 2011; Nandi et al., 2010; Williams and Latkin, 2007). We also did not have data on history of drug abuse or use of non-IDU illicit or prescription drugs. Although the proportion of Latinos with history of IDU (10%) was consistent with previous studies (Espinoza et al., 2012), IDU might be underreported among Latinos (Johnson and Bowman, 2003), particularly among those who are foreign-born and undocumented. Second, we were limited to using ZIP codes to define neighborhoods. A study in San Francisco found that HIV-positive injection drug users traveled within a 0.87-mile activity space daily (standard deviation [SD] 2.4 miles) and Latino injection drug users traveled 2.8 miles (SD 3.4) (Martinez et al., 2014b). Therefore, we believe most of our IDU population had the potential to be affected by ZIP code-level characteristics, particularly in urban ZCTAs that tend to be smaller in area than rural ZCTAs. Related, a high proportion of HIV-positive injection drug users have unstable housing (Aidala et al., 2007). We had relatively complete information on ZIP code at time of diagnosis but no information on ZIP code throughout the follow-up period and incomplete ZIP code at time of death. While this is a limitation, the fact that injection drug users appear to move short distances (Martinez et al., 2014b) and that ZIP codes are relatively large suggests that most injection drug users may remain in the same general neighborhood. A study of individuals who died of AIDS in Florida found that 86% of those infected by injection drug use did not move after HIV diagnosis (Trepka et al., 2014).

Third, researchers have suggested that less complex SES indicators (such as poverty alone) might be useful in comparing results across studies, populations, and geographic areas (Krieger et al., 2002; 2003a). Although we used a poverty index, the index was highly correlated to poverty alone (i.e., the percentage of the population below the poverty level) (Pearson correlation 0.91). Results did not differ when using the poverty index vs. poverty alone; however, effect sizes were stronger for the poverty index. It is possible that for Latinos, this comprehensive measurement of poverty is better than poverty alone as it accounts for education and type of work—variables that might be related to differential access to care. It is also possible that the stronger effect size observed with the index is because quartiles of the poverty index are based on the distribution of scores among the HIV-positive population, in contrast to commonly used poverty quartiles of the general population. Fourth, data available through surveillance records are limited. Therefore, we were unable to control for variables such as individual-level socioeconomic status, health insurance, immigration status, or time in the US. Finally, our study examined Latinos diagnosed with HIV in Florida. The generalizability of the findings is therefore limited to this population.

Our study confirms disparities in mortality risk for Latinos with history of IDU and differing associated risk factors when compared with Latinos without history of IDU. Findings suggest that older age, late diagnosis, high Latino ethnic neighborhood density, and rural residence increase mortality risk for HIV-positive Latinos with history of IDU. Furthermore, black race and neighborhood poverty appear to be a strong predictor for mortality among Latinos without history of IDU, but not for Latinos with history of IDU.

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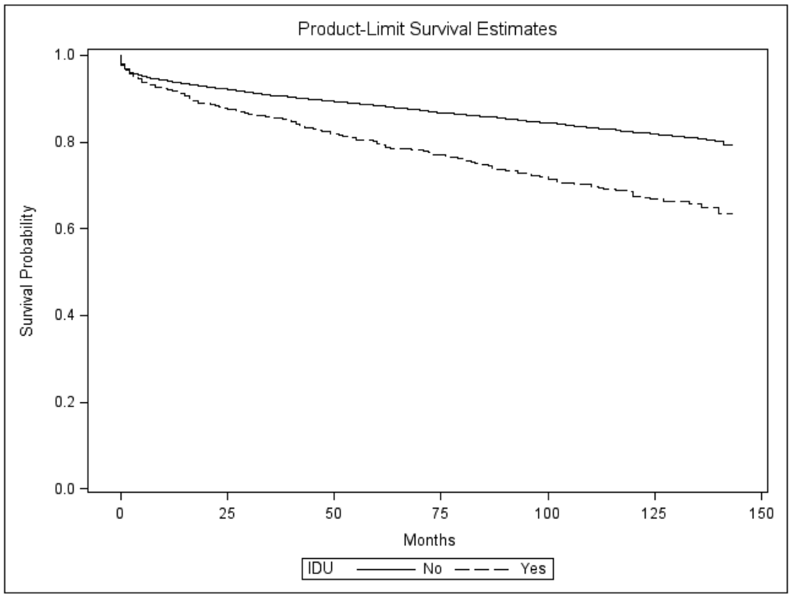

FIGURE 1.
Survival probability curves for Latinos reported with HIV by history of injection drug use (IDU), Florida, 2000–2011

TABLE 1

Characteristics of Latinos 13 years and older reported with HIV with a history of injection drug use vs. no history of injection drug use, Florida, 2000–2008

		History of injection drug use		
		Yes[a]	No	
Characteristic	**Total, n[b]**	**n (%)**	**n (%)**	**P-value[c]**
Total	10,989	1,126 (100)	9,863 (100)	
Individual-level variables				
Race				0.8596
Black	792	99 (8.8)	693 (7.0)	
White	8,712	862 (76.6)	7,850 (79.6)	
Other	1,485	165 (14.7)	1,320 (13.4)	
Year of HIV diagnosis				<0.0001
2000–2002	3,833	478 (42.5)	3,355 (34.0)	
2003–2005	3,669	363 (32.2)	3,306 (33.5)	
2006–2008	3,487	285 (25.3)	3,202 (32.5)	
Sex at birth				0.0954
Male	8,729	886 (78.7)	7,843 (79.5)	
Female	2,260	240 (21.3)	2,020 (20.5)	
Age group at diagnosis				<0.0001
13–19 years	238	12 (1.1)	226 (2.3)	
20–39 years	5,993	516 (45.8)	5,477 (55.5)	
40–59 years	4,232	565 (50.2)	3,667 (37.2)	
60 years or older	526	33 (2.9)	493 (5.0)	
US- vs. foreign-born				<0.0001
US-born [d]	4,396	769 (68.3)	3,627 (36.8)	
Foreign-born	6,593	357 (31.7)	6,236 (63.2)	
Birthplace				<0.0001
United States	3,299	461 (40.9)	2,838 (28.8)	
Puerto Rico	1,097	308 (27.4)	789 (8.0)	
Cuba	1,772	128 (11.4)	1,644 (16.7)	
Mexico	742	49 (4.4)	693 (7.0)	
Central America [e]	1,017	41 (3.6)	976 (9.9)	
South America [f]	1,386	64 (5.7)	1,322 (13.4)	
Other [g]	1,676	75 (6.7)	1,601 (16.2)	
Late HIV diagnosis (AIDS diagnosis within 3 months of HIV diagnosis)				0.2542
Yes	3,519	395 (35.1)	3,124 (31.7)	
No	7,470	731 (64.9)	6,739 (68.3)	
Three-year survival				<0.0001
Yes (alive)	9,918	965 (85.7)	8,953 (90.8)	
No	1,071	161 (14.3)	910 (9.2)	

		History of injection drug use		
		Yes[a]	No	
Characteristic	**Total, n[b]**	**n (%)**	**n (%)**	**P-value[c]**
Five-year survival				<0.0001
Yes (alive)	9,651	906 (80.5)	8,745 (88.7)	
No	1,338	220 (19.5)	1,118 (11.3)	
ZCTA-level variables				
Poverty index, quartiles[h]				0.0029
1 (lowest poverty)	2,769	258 (22.9)	2,511 (25.5)	
2	2,741	259 (23.0)	2,482 (25.2)	
3	2,790	285 (25.3)	2,505 (25.4)	
4 (highest poverty)	2,689	324 (28.8)	2,365 (24.0)	
Percent of population who self-identified as Hispanic/Latino				<0.0001
≥50	4,111	331 (29.4)	3,780 (38.3)	
25–49	3,307	347 (30.8)	2,960 (30.0)	
<25	3,571	448 (39.8)	3,123 (31.7)	
RUCA classification				0.0475
Rural	217	31 (2.8)	186 (1.9)	
Urban	10,772	1,095 (97.3)	9,677 (98.1)	

US=United States; ZCTA=ZIP code tabulation area; SES=socioeconomic status; RUCA=Rural-Urban Commuting Area. Percentages may not add up to 100 due to rounding.

[a]Includes cases reported as both injection drug use and both male-to-male sexual contact and injection drug use.

[b]Excludes cases diagnosed in a correctional facility, missing residential zip code at time of HIV diagnosis, or diagnosed under the age of 13.

[c]P-value for individual-level variables from Cochran-Mantel-Haenszel test controlling for residential zip code. P-value for neighborhood-level variables from chi-square test.

[d]Category includes cases born in any of the 50 US states, District of Columbia, or any US dependency.

[e]Includes cases born in the following countries: Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panama.

[f]Includes cases born in the following countries: Argentina, Bolivia, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay, and Venezuela.

[g]Includes cases identified as “Hispanic/Latino” and born in countries other than the United States, Puerto Rico, Mexico, Cuba, Central American and South America with the exception of Brazil. This category includes cases born in Brazil and the Dominican Republic.

[h]SES quartiles of standardized SES scores of the HIV-positive Latino population.

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TABLE 2

Weighted multilevel Cox regression hazard ratios for mortality and 95% confidence intervals for Latinos reported with HIV by history of injection drug use, Florida, 2000–2011

	History of injection drug use			
	Yes		No	
Characteristic	**Crude HR (95% CI)**	**aHR (95% CI)**	**Crude HR (95% CI)**	**aHR (95% CI)**
Individual-level variables				
Race				
Black	0.99 (0.70–1.38)	0.88 (0.54–1.14)	1.85 (1.61–2.12)	1.63 (1.40–1.88)
White	Referent	Referent	Referent	Referent
Other	0.37 (0.26–0.51)	0.29 (0.20–0.40)	0.14 (0.11–0.18)	0.12 (0.09–1.15)
Year of HIV diagnosis				
2000–2002	1.28 (0.90–1.85)	1.47 (1.03–2.13)	1.38 (1.18–1.62)	1.85 (1.58–2.18)
2003–2005	1.05 (0.73–1.55)	1.07 (0.74–1.58)	1.18 (1.01–1.40)	1.13 (0.96–1.33)
2006–2008	Referent	Referent	Referent	Referent
Sex at birth				
Male	1.03 (0.82–1.32)	0.87 (0.68–1.12)	1.03 (0.82–1.32)	1.07 (0.95–1.21)
Female	Referent	Referent	Referent	Referent
Age group at diagnosis				
13–19 years	Referent	Referent	Referent	Referent
20–39 years	4.06 (0.90–75.56)	3.81 (0.83–71.09)	1.30 (0.87–2.05)	1.29 (0.87–2.04)
40–59 years	7.32 (1.62–75.56)	6.48 (1.41–121.05)	2.43 (1.63–3.83)	2.13 (1.42–3.36)
60 years or older	24.54 (5.16–462.79)	18.75 (3.83–356.45)	6.72 (4.44–10.73)	5.97 (3.92–9.58)
Birthplace				
United States	Referent	Referent	Referent	Referent
Puerto Rico	1.18 (0.93–1.49)	1.06 (0.83–1.34)	1.27 (1.07–1.50)	1.09 (0.92–1.29)
Cuba	1.43 (1.06–1.90)	0.96 (0.68–1.33)	1.52 (1.33–1.74)	1.04 (0.90–1.20)
Mexico	0.82 (0.45–1.37)	0.72 (0.39–1.21)	0.89 (0.71–1.09)	0.90 (0.72–1.12)
Central America	0.53 (0.23–1.03)	0.38 (0.16–0.74)	0.81 (0.67–0.98)	0.69 (0.57–0.84)
South America	0.18 (0.07–0.40)	0.20 (0.07–0.45)	0.49 (0.40–0.59)	0.50 (0.41–0.61)
Other	0.74 (0.46–1.14)	0.56 (0.33–0.88)	0.77 (0.66–0.89)	0.75 (0.64–0.88)
Late HIV diagnosis (AIDS diagnosis within 3 months of HIV diagnosis)				
Yes	2.03 (1.67–2.48)	2.31 (1.87–2.86)	2.34 (2.12–2.57)	2.27 (2.06–2.50)
No	Referent	Referent	Referent	Referent
ZCTA-level variables				
Poverty index, quartiles				
1 (lowest poverty)	Referent	Referent	Referent	Referent
2	0.48 (0.34–0.66)	0.44 (0.31–0.62)	1.32 (1.13–1.53)	1.40 (1.20–1.64)
3	0.77 (0.58–1.02)	0.72 (0.54–0.97)	1.56 (1.35–1.81)	1.61 (1.39–1.87)
4 (highest poverty)	1.15 (0.90–1.48)	0.92 (0.71–1.20)	2.07 (1.80–2.39)	1.75 (1.51–2.03)

	History of injection drug use			
	Yes		No	
Characteristic	Crude HR (95% CI)	aHR (95% CI)	Crude HR (95% CI)	aHR (95% CI)
Percent of population who self-identified as Hispanic/Latino				
≥50	Referent	Referent	Referent	Referent
25–49	0.89 (0.71–1.13)	0.98 (0.76–1.27)	1.00 (0.89–1.12)	1.29 (1.14–1.46)
<25	0.60 (0.47–0.77)	0.64 (0.49–0.84)	0.91 (0.81–1.02)	1.10 (0.96–1.25)
RUCA classification				
Rural	1.91 (1.22–2.84)	1.73 (1.06–2.70)	1.35 (0.98–1.81)	0.89 (0.64–1.20)
Urban	Referent	Referent	Referent	Referent

HR, hazard ratio; aHR, adjusted hazard ratio; CI, confidence interval; ZCTA, zip code tabulation area; RUCA, Rural-Urban Commuting Area.