New Diagnoses among HIV+ Men and Women in Puerto Rico: Data from the HIV Surveillance System 2003-2014

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Objective: Describe the age-standardized rates of new HIV diagnoses and compare sex and time disparities using data from the HIV/AIDS Surveillance System in Puerto Rico (PR).

Methods: The study comprises data of new HIV diagnoses of persons 13 years of age and older in PR reported from 2003-2014. Other variables included were age, sex, and health regions. We computed male to female ratio of new HIV diagnoses and assessed the trends in new HIV diagnoses using the annual percent change (APC) of the age-standardized rates (ASRs). The relative risk (RR) was estimated with 95% confidence intervals using Poisson regression models to assess the risk of new HIV diagnoses.

Results: The highest HIV diagnosis rates were observed in the metropolitan area. These rates decreased overall for both sexes for the periods 2007 onward. The risk of getting a new HIV diagnosis was significantly higher among males, ranging from an increased risk of more than 50% to almost 5-fold (p <0.05). Overall, a trend was observed in the 2011-2014 period were the risk increases as the age decreases. For the 13-24 age group, we observed a significant increased risk in new HIV diagnosis of 53% in the 2011-2014 period, when compared to 2003-2006 (p<0.05).

Conclusion: Our findings suggest a shift in the risk of getting a HIV diagnosis from older to younger males. A possible explanation could be that HIV spread among young men that have sex with men might be increasing. Targeted prevention strategies should be implemented in this age group. [*P R Health Sci J 2019;38:33-39*]

Key words: HIV, Epidemiology, PR, Health Disparities, Surveillance System

It is estimated that more than 1.2 million people are living with HIV and nearly 40,000 new infections are diagnosed every year in the United States of America (US) (1). In the US, HIV infection remains concentrated in specific groups by sexual orientation, race, ethnicity, age and gender. Among sexual orientation, gay and bisexual men are the most affected, accounting for 67% of all HIV diagnoses in 2014. Among race, while the group of Hispanic/Latino accounted for 23% of cases HIV, an increase occurred among young Hispanic/Latino MSM between the ages of 13 to 24, who saw an increase in HIV diagnoses of about 87% in the 2005-2014 period (1). Furthermore, this group is the most unaware of their infection with an estimate of 31,300 (51%) of them unknowingly living with HIV (2). In 2014, Puerto Rico (PR) occupied the seventh place in estimated incidence of AIDS cases in adults and adolescents 13 years or older among US states and territories, and the tenth place regarding number of cumulative cases of AIDS (3).

Understanding the HIV epidemic -particularly new diagnoses-, continues to advance through innovations in global estimates. Surveillance data for HIV cases can provide an estimate of the number of incident infections within this population and can therefore, help to develop more targeted prevention programs for the at-risk population. In order to have a broader view of new HIV diagnoses in the island, we developed an epidemiological profile of HIV in Puerto Rico. The purpose of this analysis is to describe the age-standardized rates of new HIV diagnosis and

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compare sex and time disparities of new HIV diagnoses using data from the HIV/AIDS Surveillance System in PR.

Methods

Study design and Population

The data source of this study was the PR HIV Surveillance System, which is part of the CDC's National HIV Surveillance System (NHSS) (4). All states and US territories report to NHSS demographic, behavioral, clinical, and laboratory data of persons diagnosed with HIV infection (5). NHSS collected information from hospitals, physicians, public and private clinics, and medical records systems (4). This study comprises data of new HIV diagnosis of persons aged 13 years and older in PR reported from 2003 to 2014. The study protocol was approved by the Institutional Review Board (IRB) of the University of PR Medical Sciences Campus.

Statistical analysis

To achieve the aims of this publication, the study was divided into 3 periods: (i) 2003 to 2006, (ii) 2007 to 2010 and (iii) 2011 to 2014. Other variables included in the analyses were age (5 categories), sex, and health care regions according to the PR Health Insurance Administration (PRHIA and known as ASES, for its acronym in Spanish) (6). We computed the male to female ratio of new HIV diagnosis, and assessed the trends in new HIV diagnosis using the annual percent change (APC) of the age-standardized rates (ASRs). We estimated the relative risk (RR) with 95% confidence intervals to assess the magnitude of the association between new HIV diagnosis and different demographic characteristics.

The age-standardized rates (ASRs) of new HIV diagnosis (x 100,000 individuals) were calculated using the direct standardization method and the age world population distribution as the reference population (7). Maps were created using the ASRs in tertiles to visualize the regions with the higher and lower ASRs. The ASRs were stratified by sex, and Poisson regression models were used with year of diagnosis as discrete predictor to estimate the APC (8,9).

Stratified analyses were performed and Poisson regression models were used to estimate the RRs of interest by sex, age group and study periods. An interaction assessment of these analyses was performed using the likelihood ratio test. All the statistical analyses were conducted using STATA/SE version 14.0 statistical software.

Results

Male to female ratio

The total number of new HIV diagnoses in persons aged 13 and older from 2003 to 2014 was 10,717. Of those, 7,708 (71.9%) were males and 3,009 (28.1%) females. The overall male to female ratio was 2.56 males per female. Across regions, male to female ratios remains alike of close to 70 males to 30 females. The lowest ratio was 2.12 males per female (Southeast region) while the highest was 3.21 males per female (Southwest region) (Table 1).

Table 1. Number of new cases by Healthcare regions, Overall

Region	Total n	Male n (%)	Female n (%)	Male:Female Ratio
East	1,283	939 (73.2)	344 (26.8)	2.73:1
Metro-North	2,234	1,588 (71.1)	646 (28.9)	2.46:1
Northeast	1,543	1,079 (69.9)	464 (30.1)	2.33:1
North	904	637 (70.5)	267 (29.5)	2.39:1
West	1,004	765 (76.2)	239 (23.8)	3.20:1
San-Juan	2,355	1,689 (71.7)	666 (28.3)	2.54:1
Southeast	628	427 (68.0)	201 (32.0)	2.12:1
Southwest	766	584 (76.2)	182 (23.8)	3.21:1
Total	10,717	7,708 (71.9)	3,009 (28.1)	2.56:1

Note: Percentages per row

Age -Standardized Rates

Figure 1 shows the ASR among males and females for each health care region according to PRHIA (6). PR's health care system is divided into eight health regions: North, Metro North, San Juan, Northeast, East, Southeast, Southwest and West. Overall, the highest rates were observed around the metropolitan area. This trend was similar for previous periods in PR (data not shown). Among males, the San Juan and Northeast regions had the highest ASR for the 2011-2014 period (≥ 40.99 new HIV diagnoses per 100,000 population). Among females, San Juan and Metro North were the regions with the highest ASR (≥ 13.78 new HIV diagnoses per 100,000 population).

Annual percent change (APC)

Figure 2 shows the trend of ASR of new HIV diagnosis stratified by sex. An overall reduction in new HIV diagnoses was observed for both sexes (Table 2). Among males, a reduction of 3.98% in the mid period when compared to the earliest one and a reduction of 2.93% in the latest period when compared to the mid one were observed. Women also showed a reduction in the APC (6.74% in the mid period and 9.13% in the latest period). Across regions, when comparing the earliest and mid periods, the most notable reductions were observed among females in the Southeast (APC: -17.13%), Southwest (APC: -13.48%), and North (APC: -12.13%) regions. Among males, the highest declines were observed in the East (APC: -9.69%), West (APC: -8.80%), and Southeast (APC: -8.78%) regions. When comparing 2007-2010 period with the latest period, the highest declines in new HIV diagnoses among females were observed in the West (APC: -17.23%), East (APC: -12.24%), and Metro North (APC: -10.52%) regions, and in the Southwest (APC: -7.87%), and West (APC: -6.69%) regions among males. All of the aforementioned APCs were statistically different from zero (p-value <0.05).

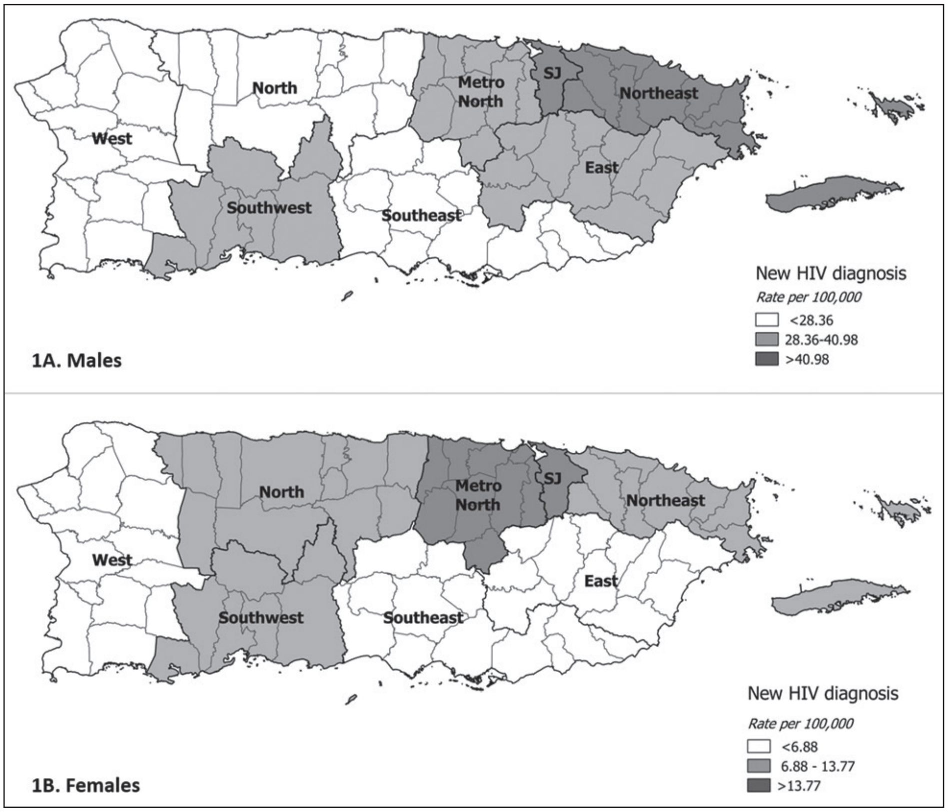

Figure 1. Age-standardized rates of new HIV diagnosis among males and females living with HIV/AIDS, PR, 2011-2014

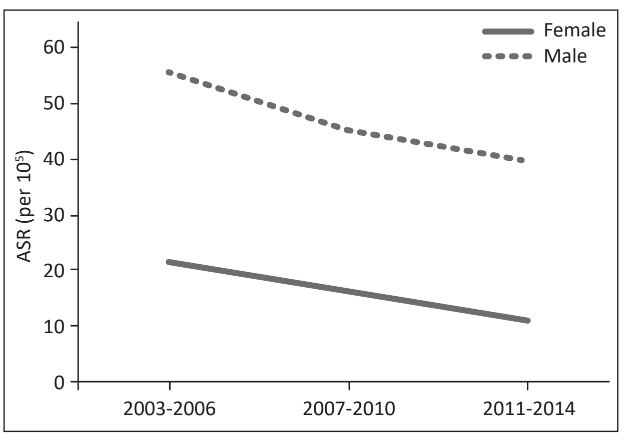

Figure 2. Age-Standardized Rate of New HIV Diagnosis, PR, 2003-2014

Magnitude of the association between new HIV diagnosis and sex

In the 2003-2006 period, North, San Juan, Southwest and overall regions had a significant interaction between age and gender. Overall, the highest estimated risk of new HIV diagnosis were on oldest males (55 years or more), when compared with females of the same age group ($\widehat{RR}^{(55+)}_{male\ vs.\ female} = 3.56$; 95% *CI*: 2.93, 4.32). The same pattern was observed in the North, San Juan, and Southwest regions, with higher risks of new HIV diagnosis in the older age groups for males when compared to females ($\widehat{RR}^{(45\text{-}54)}_{male\ vs.\ female} = 3.58$; 95% CI: 2.11, 6.08; $\widehat{RR}^{(55+)}_{male\ vs.\ female} = 5.04$; 95% *CI*: 3.10, 8.18 and $\widehat{RR}^{(55+)}_{male\ vs.\ female} = 7.33$; 95% *CI*: 3.29, 16.32) respectively (Table 3).

For the 2007-2010 period, there was no statistical significant interaction between age and sex (p-value>0.05). The lowest and highest estimated risks of new HIV diagnosis among males when compared to females were observed in the Southeast and Southwest regions (*adj.* $\widehat{RR}_{male\ vs.\ female} = 2.43$; 95% *CI*: 1.77, 3.33 and *adj.* $\widehat{RR}_{male\ vs.\ female} = 3.94$; 95% CI: 2.88, 5.39) respectively, after adjusting for age. Both RRs were statistically significant (p-value < 0.05) (Table 3).

During the 2011-2014 period, we observed a significant interaction between ages and sex overall, in the Metro-North, Northeast, and San Juan regions (p-value < 0.05). Overall, the lowest and highest estimated risks of new HIV diagnosis among males when compared to females were observed in the 35-44 age group ($\widehat{RR}^{(35\text{-}44)}_{male\ vs.\ female} = 2.62$; 95% *CI*: 2.2, 3.12) and in the youngest age group ($\widehat{RR}^{(13\text{-}24)}_{male\ vs.\ female} = 4.83$; 95% *CI*: 3.77, 6.19) (Table 3). In the Metro-North, Northeast, and San Juan regions the highest increase in risk of new HIV diagnosis were observed in the younger males ($\widehat{RR}^{(25\text{-}34)}_{male\ vs.\ female} = 4.32$; 95% *CI*: 2.88, 6.47; $\widehat{RR}^{(25\text{-}34)}_{male\ vs.\ female} = 5.48$; 95% *CI*: 3.09, 9.73 and $\widehat{RR}^{(13\text{-}24)}_{male\ vs.\ female} = 6.86$; 95% *CI*: 3.74, 12.58) respectively. In the East, North, West, Southeast, and Southwest regions there were not significant

Table 2. Annual Percent Change of HIV Incidence, 2003-2014

Region	APC2003-06 vs. 2007-10		APC2007-10 vs. 2011-14	
	Male	Female	Male	Female
Overall	-3.98*	-6.74*	-2.93*	-9.13*
East	-9.69*	-11.16*	-3.99	-12.24*
Metro-North	-5.69*	-6.26*	-3.20	-10.52*
Northeast	-3.57	-8.68*	-1.12	-6.53
North	-5.08	-12.13*	-1.60	-1.18
West	-8.80*	-5.85	-6.69*	-17.23*
San Juan	5.31*	5.23*	-1.98	-9.82*
Southeast	-8.78*	-17.13*	1.01	-8.90
Southwest	-8.06*	-13.48*	-7.87*	-7.64

APC indicates annual percent change. *Statistically different from zero (p < 0.05)

Table 3. Relative Risk of HIV stratified by health region and age group, 2003-2014

Region	Age Group	2003-2006 RR(95% CI)	2007-2010 RR(95% CI)	2011-2014 RR(95% CI)
Overall	13-24	1.58 (1.31-1.92)	2.10 (1.7-2.58)	4.83 (3.77-6.19)
	25-34	2.32 (2.04-2.63)	2.88 (2.48-3.34)	4.78 (3.93-5.8)
	35-44	2.92 (2.6-3.28)	2.89 (2.51-3.32)	2.62 (2.2-3.12)
	45-54	2.78 (2.41-3.2)	2.98 (2.55-3.48)	2.78 (2.34-3.29)
	55+	3.56 (2.93-4.32)	2.74 (2.24-3.34)	2.86 (2.3-3.54)
	Age-Adjusted RR	2.62 (2.45-2.79)*	2.78 (2.58-2.99)	3.35 (3.07-3.65)*
East	13-24	1.64 (0.99-2.71)	1.48 (0.84-2.6)	7.24 (3.46-15.16)
	25-34	3.03 (2.1-4.36)	3.87 (2.41-6.22)	5.50 (2.96-10.21)
	35-44	2.45 (1.79-3.35)	3.13 (2.07-4.75)	3.60 (1.98-6.56)
	45-54	2.61 (1.81-3.77)	3.24 (1.99-5.27)	3.47 (2.07-5.83)
	55+	3.27 (1.81-5.91)	3.06 (1.53-6.16)	3.17 (1.53-6.57)
	Age-Adjusted RR	2.57 (2.15-3.06)	2.98 (2.38-3.73)	4.33 (3.29-5.71)
Metro-North	13-24	1.97 (1.31-2.97)	2.59 (1.62-4.14)	3.44 (2.07-5.71)
	25-34	2.65 (2.02-3.48)	3.23 (2.29-4.56)	4.32 (2.88-6.47)
	35-44	3.40 (2.64-4.37)	2.50 (1.86-3.35)	1.78 (1.22-2.6)
	45-54	2.41 (1.8-3.23)	2.47 (1.74-3.51)	2.49 (1.71-3.63)
	55+	2.93 (1.92-4.46)	2.21 (1.42-3.44)	2.58 (1.56-4.26)
	Age-Adjusted RR	2.75 (2.39-3.16)	2.62 (2.23-3.08)	2.77 (2.3-3.34)*
Northeast	13-24	1.18 (0.67-2.08)	2.67 (1.53-4.66)	4.42 (2.53-7.73)
	25-34	2.27 (1.58-3.25)	2.63 (1.78-3.88)	5.48 (3.09-9.73)
	35-44	2.50 (1.89-3.31)	3.39 (2.31-4.97)	3.01 (1.96-4.61)
	45-54	1.97 (1.4-2.77)	2.20 (1.48-3.29)	1.87 (1.23-2.85)
	55+	3.15 (1.92-5.17)	2.87 (1.73-4.74)	5.25 (2.63-10.51)
	Age-Adjusted RR	2.24 (1.9-2.65)	2.74 (2.26-3.33)	3.38 (2.71-4.23)*
North	13-24	0.90 (0.41-1.96)	2.22 (1.06-4.66)	3.68 (1.69-8.02)
	25-34	1.81 (1.15-2.84)	2.71 (1.55-4.76)	2.46 (1.46-4.16)
	35-44	2.72 (1.86-3.98)	3.64 (2.15-6.16)	3.58 (1.92-6.66)
	45-54	3.58 (2.11-6.08)	3.48 (1.9-6.36)	2.70 (1.53-4.75)
	55+	2.20 (1.26-3.84)	3.01 (1.62-5.58)	1.49 (0.82-2.73)
	Age-Adjusted RR	2.32 (1.86-2.9)*	3.07 (2.35-4.01)	2.60 (1.99-3.39)
West	13-24	2.28 (1.19-4.36)	2.35 (1.17-4.74)	5.69 (1.97-16.39)
	25-34	2.55 (1.72-3.78)	3.04 (1.83-5.05)	9.78 (3.89-24.57)
	35-44	4.46 (2.97-6.7)	2.99 (1.82-4.93)	2.99 (1.5-5.95)
	45-54	3.79 (2.3-6.26)	3.11 (1.91-5.07)	5.87 (2.75-12.49)
	55+	4.95 (2.64-9.3)	2.47 (1.3-4.67)	3.19 (1.72-5.9)
	Age-Adjusted RR	3.51 (2.83-4.35)	2.87 (2.24-3.67)	4.69 (3.35-6.56)
San Juan	13-24	1.76 (1.13-2.75)	1.58 (1.05-2.4)	6.86 (3.74-12.58)
	25-34	1.94 (1.44-2.62)	2.56 (1.94-3.38)	5.12 (3.45-7.61)
	35-44	3.40 (2.53-4.55)	2.77 (2.12-3.62)	2.82 (2.01-3.96)
	45-54	3.67 (2.58-5.24)	3.19 (2.35-4.31)	2.50 (1.8-3.46)
	55+	5.04 (3.1-8.18)	3.55 (2.35-5.35)	3.38 (2.2-5.18)
	Age-Adjusted RR	2.91 (2.48-3.4)*	2.72 (2.36-3.13)	3.51 (2.95-4.17)*
Southeast	13-24	1.22 (0.66-2.26)	2.46 (0.88-6.9)	6.81 (2.04-22.76)
	25-34	1.78 (1.11-2.83)	1.85 (0.96-3.56)	5.30 (2.59-10.85)
	35-44	1.70 (1.11-2.61)	1.59 (0.92-2.73)	2.08 (1.09-3.96)
	45-54	1.47 (0.84-2.6)	5.55 (2.6-11.85)	6.86 (2.39-19.72)
	55+	2.82 (1.3-6.13)	2.69 (1.03-6.99)	2.10 (0.7-6.27)
	Age-Adjusted RR	1.69 (1.33-2.14)	2.43 (1.77-3.33)	3.87 (2.67-5.63)
Southwest	13-24	1.40 (0.73-2.7)	3.04 (1.3-7.11)	3.81 (1.56-9.31)
	25-34	2.29 (1.51-3.48)	4.56 (2.3-9.05)	5.90 (2.48-14.03)
	35-44	2.95 (1.91-4.55)	5.29 (2.76-10.11)	2.47 (1.08-5.64)
	45-54	6.11 (3.3-11.31)	3.93 (2.07-7.48)	3.68 (1.81-7.48)
	55+	7.33 (3.29-16.32)	2.44 (1.14-5.2)	2.76 (1.2-6.34)
	Age-Adjusted RR	3.18 (2.52-4.02)*	3.94 (2.88-5.39)	3.61 (2.51-5.19)

RR indicates relative risk. Reference group: Females. *Significant interaction terms between age and gender in the Poisson model ($p < 0.05$)

interaction between age and sex (p-value>0.05). In the aforementioned regions, the estimated risks of new HIV diagnosis among males when compared to females were ($adj.\widehat{RR}_{male\ vs.\ female} = 4.33$; 95% CI: 3.29-5.71, $adj.\ \widehat{RR}_{male\ vs.\ female} = 2.60$; 95% CI: 1.99-3.39, $adj.\ \widehat{RR}_{male\ vs.\ female} = 4.69$; 95% CI: 3.35-6.56, $adj.\ \widehat{RR}_{male\ vs.\ female} = 3.87$; 95% CI: 2.67-5.63 and $adj.\ \widehat{RR}_{male\ vs.\ female} = 3.61$; 95% CI: 2.51-5.19) respectively, after adjusting for age (Table 3).

Magnitude of the association between new HIV diagnosis and study period

Table 4 shows a reduction in risk of new HIV diagnosis on every age strata for both sexes except among males aged 13-24 years. In this group, we observed a significant increased risk in new HIV diagnosis of 53% in 2011-2014 period when compared to 2003-2006 (p-value < 0.05). This pattern was also observed in the East (RR: 1.61; 95% CI: 1.08-2.4), Northeast (RR: 2.87; 95% CI: 1.83-4.51), North (RR: 2.85; 95% CI: 1.47-5.56), and San Juan (RR: 1.81; 95% CI: 1.28-2.57) regions (data not shown).

Discussion

This study explores the rates of new HIV diagnoses from the HIV/AIDS Surveillance System in PR from 2003 to 2014. We observed sex and time period disparities with regards to HIV diagnosis. A higher number of new HIV diagnoses were observed among males when compared to females; also men were at higher risk of new HIV diagnosis. An overall reduction in new HIV diagnoses was observed for both sexes; however, the decrease rate of new diagnoses was lower in men (as compared to women). These diagnoses were higher around the metropolitan area for both sexes. Furthermore, youth males (13-24 years) were at higher increase risk of new HIV diagnoses in the most recent period when compared to earlier periods.

We found that the overall male to female ratio was 3:1 males per female, or a proportion of about 70 cases among males for every 100 cases reported. This finding is similar to what have been observed in other surveillance systems (10,11).

Table 4. Relative Risk of HIV diagnosis by study period, stratified by sex and age group, Overall

Sex	Period	RR (95%CI)				
		Age Group				
		13-24	25-34	35-44	45-54	55+
Female	2003-2006	Reference	Reference	Reference	Reference	Reference
	2007-2010	0.82 (0.65 -1.03)	0.70 (0.59 -0.82)	0.73 (0.62 -0.85)	0.78 (0.66 -0.94)	0.94 (0.75 -1.2)
	2011-2014	0.50 (0.38 -0.66)	0.40 (0.33 -0.50)	0.50 (0.42 -0.60)	0.69 (0.57 -0.83)	0.75 (0.58 -0.95)
Male	2003-2006	Reference	Reference	Reference	Reference	Reference
	2007-2010	1.09 (0.92 -1.28)	0.87 (0.78 -0.96)	0.72 (0.65 -0.79)	0.84 (0.75 -0.94)	0.73 (0.63 -0.84)
	2011-2014	1.53 (1.31 -1.79)	0.83 (0.75 -0.93)	0.45 (0.40 -0.51)	0.68 (0.61 -0.77)	0.60 (0.51 -0.70)

RR indicates relative risk

Regarding the ASR across the health care regions, the highest rates were observed in the metropolitan area. This behavior remains similar across previous periods in PR, and is similar to US HIV geographic distribution, in where HIV cases are mainly concentrated in urban areas (12,13). Because HIV diagnosis is not evenly distributed across the municipalities in PR, other strategies should be implemented, such as the inclusion of new policies to intensify HIV prevention efforts in the regions where HIV is more heavily concentrated and allocation of funds according to the geographic distribution of the HIV disease (14).

Overall, the annual rates of new HIV diagnoses decreased for both sexes from the 2007 period onward. This decreasing trend in new HIV diagnoses was observed across all healthcare regions. In regard to sex disparities, the decreased trend was more notably in females (9%) in the last period (2011-2014) and males (4%) in the mid period of study (2007-2010). This result is consistent with other studies in US that have reported a higher decreasing trend in females when compared to males in the periods of 2006 to 2009 (15), 2008 to 2013 (16), and 2005 to 2014 (1). Furthermore, we found that the risk of getting a new HIV diagnosis was significantly higher among males when compared to females, ranging from an increased risk of more than 50% to almost 5-fold. Moreover, in the most recent period (2011-2014) there was a trend of an increased risk in males as age decreases for the overall health region. However, for the earlier period of 2003-2006, the risk increased in males as the age increased. Additionally, we observed that the males 13 to 24 years of age have the highest risk of new HIV diagnosis in the most recent period (2011-2014), when compared to previous study periods. It is in the most recent period that the effect of new cases varies by age and sex. These findings suggest a shift from older to younger males in the risk of getting a HIV diagnosis.

A possible explanation for the increase in HIV diagnoses in young males could be that HIV spread among MSM might be increasing (17) and the majority of new transmissions come from this population (18–21). Although in this study the incidence rates by main mode of transmission for this sample cannot be calculated, studies show that 75% of new diagnoses among Hispanic/Latino in US are in MSM (22). These new transmissions in young MSM could be explained because youth populations have high risk factors such as low rates of HIV screening, low rates of condom use, have multiples sexual partners, and substance use before their last sexual intercourse that predispose them to a greater likelihood of contracting the infection (20). Another study documented that having a main partner may be linked to having unprotected sexual intercourse, less visits to the primary health care provider, and less HIV testing (23). Moreover, most of these relationships with main partners had a duration of less than six months on average.

Targeted strategies should be implemented to address the need of HIV/AIDS prevention and draw the attention to young males. Studies have documented an increasing HIV prevalence trend in younger age groups (23,24) and showed that the percentage of HIV testing in youths (13 to 24 years) is low, particularly in males (25). The effect of age and sex as contributors to disparities in young males, is mostly attributed because this population may have limited experience and might undergo barriers with obtaining care from healthcare systems (26). Strategies should be directed to educate this population regarding sexual health, making effective interventions to educate youths in schools, universities and community-based organizations, learn approaches to condom access, and increase the amount of HIV testing and treatment clinics in order to reach this population (25,27). Given the importance of targeting this group of young men, national strategies should contemplate youth as a targeted group, aligned with innovative and emerging strategies (14). Moreover, strategies should focus on incorporating social media, including mobile technologies and social networking sites (such as grinder), since they are being used increasingly as part of social and sexual networking (28). These technologies could also be used as tools to disseminate prevention messaging and treatment opportunities, particularly among young men.

The main limitation of our study was that it was not possible to measure the incidence by mode of transmission. Therefore, this limitation did not allow us to quantify which high risk group owns the highest proportion of new HIV diagnoses. Although we acknowledge that different methodologies and techniques have been used worldwide (29–35), this effort is beyond the scope of this study. This limitation affects our ability to explain, which subgroup specifically is attributed the new HIV cases in PR. Although similar to the US, an increase in HIV cases are recently observed among MSM, surpassing IDU transmission since 2012 (36), additional factors such as cultural differences can increase the risk by other modes of transmission, such as heterosexual of high risk and persons who inject drugs (22). This did not allow us to quantify which high risk group owns the highest proportion of new HIV diagnoses. Furthermore, the use of data from a surveillance system has limitations of its own, such as reporting delay and migration, which could lead to underestimating the incidence rates. Additional methods are necessary to better identify new HIV cases. For example, a study in Rome identified recent infections in individuals newly diagnosed with HIV by using an algorithm that combines clinical and serological information and the application of an avidity assay with serological test for recent infections (37). Since 2008, 25 US jurisdictions have an HIV incidence Surveillance System as a component of the National HIV Surveillance system, which is a system that collects HIV testing and antiretroviral use history. This data are combined using a statistical approach to identify trends of new HIV infections (38). Another method used to quantify the HIV epidemic was the development of the geographic area-based rate, which measures the number of new infections or cases in one year using the unit land area as denominator (39). Other studies in US used molecular HIV surveillance data with nucleotide sequences to assess and explain better the spread of HIV among risk groups (19,40).

In summary, the annual rates of new HIV diagnosis decreased throughout the study period. The risk of getting a new HIV diagnosis was significantly higher among males compared to females. We observed that the group of males ages 13 to 24 have the highest risk of new HIV diagnoses in the most recent period (2011-2014), when compared to other study periods. This finding suggests a shift in the risk of getting a HIV diagnosis from older to younger males. Targeted strategies should be implemented to address the need of HIV/AIDS prevention in this age groups. Moreover, future research efforts should consider the implementation of methods to estimate the population size of high-risk groups for the estimation of incidence rates, as well as to contemplate other socioeconomic health disparities that might have an impact on new HIV infections in the island.

Resumen

Objetivo: Describir las tasas estandarizadas por edad de diagnósticos nuevos de VIH y comparar disparidades de sexo y tiempo utilizando datos del Sistema de Vigilancia del VIH/SIDA en PR. Métodos: Datos de diagnósticos nuevos de VIH en personas de 13 años o más fueron reportados entre 2003-2014. Se analizó la edad, sexo y regiones de salud. Se calculó la proporción por sexo con un diagnóstico nuevo de VIH y se evaluaron tendencias utilizando el porcentaje de cambio anual de las tasas estandarizadas por edad. Se estimó el RR con un intervalo de confianza al 95% utilizando el modelo de regresión de Poisson. Resultados: Las mayores tasas de diagnósticos nuevos de VIH se observaron en el área metropolitana, sin embargo, disminuyeron en general para ambos sexos desde el 2007. El riesgo de obtener un diagnóstico nuevo de VIH fue mayor entre los varones ($p<0.05$), desde 50% hasta casi 5 veces mayor riesgo. En el periodo del 2011-2014 se observó una tendencia de aumento de riesgo en diagnósticos de VIH a medida que disminuía la edad. En el grupo de 13-24 años, se observó un aumento del riesgo en nuevos diagnósticos de VIH de 53% en el período de 2011-2014 en comparación con 2003-2006 ($p<0.05$). Conclusión: Nuestros hallazgos sugieren un cambio en el riesgo de obtener un diagnóstico de VIH siendo ahora mayor en hombres jóvenes en comparación con los mayores. Una posible explicación podría ser que la propagación del VIH entre los jóvenes que tienen sexo con hombres podría estar aumentando.

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