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Sociostructural Correlates of AIDS Progression for African American Women Living with Diagnoses of HIV Infection in the District of Columbia

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Abstract

Background: Among women living with HIV infection in the District of Columbia (DC), African American women are disproportionately affected, comprising > 90% of reported cases. Sociostructural exploration of local HIV epidemics among African American women has been understudied. We explored sociostructural correlates of health for HIV-infected African American women in DC to inform local HIV prevention and intervention efforts.

Methods: HIV surveillance data from the District of Columbia Department of Health for African American women living with HIV were reviewed. We analyzed data for sociostructural correlates for progressing to acquired immune deficiency syndrome (AIDS) (CD4 counts < 200 cells/ml) among African American women. Data were analyzed using SAS 9.2 and mapped by census tracts using ArcGIS.

Results: Of 4,619 women living with HIV, 4,204 (91%) were African American; 3,050 (72.5%) had census tract information available and were included. Median age at diagnosis was 36.6 years. Among these 3,050 African American women, 1,814 (59.4%) had ever progressed to AIDS, 1,109 (36.4%) had CD4 counts < 200 cells/µl (AIDS) at most recent clinical visit, and 208 of 1,109 (18.8%) had progressed to AIDS within 12 months of their HIV diagnosis (late testers). Women who progressed to AIDS had a higher probability of being diagnosed at private facilities compared with public facilities (PR=1.1, 95% CI=1.1-1.3) and of being exposed through injection drug use (IDU) compared to being exposed through heterosexual contact (PR=1.3, 95% CI=1.2-1.5). In multivariate and geomapping analyses, poverty, education levels and census tracts were not associated with an AIDS diagnosis.

Conclusion: Progression to AIDS is prevalent among HIV-infected African American women in DC. Increased, early routine HIV screening and intensified treatment efforts with African American women living with HIV infection in DC, regardless of socioeconomic status, are warranted, to improve outcomes and decrease disparities.

Keywords: Women; African American; AIDS; District of Columbia; HIV; Sociostructural determinants

Introduction

Although human immunodeficiency virus (HIV) in the United States (US) continues to disproportionately affect men, women are increasingly represented among persons living with HIV infection [1]. Among all persons diagnosed with stage-3 HIV infection or acquired immune deficiency syndrome (AIDS) from 1985 to 2011 in the United States, the estimated percentage among women (age ≥13 years) increased from 7% in 1985 to 25% in 2011 [1]. Among women living with HIV infection, an estimated 85% of transmission among women is attributed to heterosexual contact, and African American women are disproportionately represented [1]. In 2011, African American females accounted for 66% of all females with a diagnosis of HIV infection in the US [1] yet comprised only 14% of the total US female population [2]. Understanding the disproportionate burden of HIV infection among African American women is vital to improving our HIV prevention efforts and is required as we work toward achieving the goals outlined in the United States' National HIV/AIDS Strategy which include: reducing HIV incidence, ensuring access to HIV treatment and care, and reducing HIV-related health disparities [3]. One strategy for strengthening national HIV research and prevention efforts with African American women is to understand the drivers of HIV in local, high HIV morbidity jurisdictions, like the District of Columbia.

In 2009, the District of Columbia (DC) reported that an estimated 3.2% of residents ages 13 years and older were living with a diagnosis of HIV infection; this includes an increasing proportion of persons, including women, infected through heterosexual contact [4]. Between 2004 – 2008, the number of women living with HIV infection in DC increased by 29.3% [4]. Additionally, in 2009, DC had the highest AIDS cases diagnosis rate in the US among reporting jurisdictions for women (56.9 per 100,000), a rate nearly 9 times the national rate of diagnosed AIDS cases for women (6.7 per 100,000) [1,4]. Heterosexual contact was the leading mode of transmission (57.3%) for women in DC overall from 2004-2008 [4].

Among women living with HIV infection in DC, the racial/ethnic disparity is alarming. African American women comprise 91% of women living with HIV disease in DC. African American women also have a rate of infection that is approximately 17 and 4 times as high as the rates for non-Hispanic/Latino white and Hispanic/Latino women, respectively [4]. A dynamic interplay of environmental, cultural, and

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social/sexual network factors, including higher rates of concurrent sexual partnerships and perceived sex-ratio imbalances, may contribute to the excess risk of HIV for African American women, even in the absence of discernible "high-risk individual behaviors" [5-8]. Social determinants, or the sociostructural (e.g., economic, educational, insurance status) and environmental conditions in which individuals are born, live, and work, have also been linked to HIV infection and disease progression, [9-15] although research in this area remains limited [16]. Recent data suggest that poverty may be a factor driving HIV infection in urban areas with prevalent heterosexual transmission, regardless of race or ethnicity [17]. However, the factors that may be driving HIV infections and progression to AIDS for African American women in DC, an area with prevalent heterosexual transmission, are poorly understood and warrant new analytical approaches for examining data to better inform and strengthen local HIV education and prevention strategies. This study examined local and US Census and sociostructural data to describe correlates of AIDS progression among African American women living with an HIV infection in DC.

Methods

Data source

In DC, laboratories, physicians, hospitals, and other health care providers are required to confidentially report cases of HIV infection and AIDS to the Strategic Information Bureau of the HIV/AIDS Hepatitis, STD and TB Administration of the District of Columbia Department of Health (DC-DOH). HIV cases that were diagnosed through December 2008, but reported to DC-DOH through August 2009, were adjusted for reporting delays. We limited our analyses to African American adolescent and adult women aged 13 years and older who were alive on December 31, 2008, resided in DC at the time of their HIV diagnosis, and had sufficient address information to be geocoded and linked to US Census sociostructural information by census tract. Demographic, clinical, and behavioral information that were examined included: age at diagnosis, HIV diagnosis facility (public, private, federal, unknown), exposure category, insurance coverage (Medicaid, private, clinical trials, other, unknown), concurrent diagnosis of HIV/AIDS (diagnosed with both HIV and AIDS on the same day), most recent CD4 cell and viral load counts (based on most recent lab result through December 2008), disease progression (non-progressors: persons with an HIV diagnosis but had not progressed to AIDS; progressors: persons with an HIV diagnosis and had ever progressed to AIDS [includes both late and non-late testers]), and treatment/service referrals (informed of HIV infection, receiving/referred to HIV-related medical or substance abuse treatment services, received/receiving anti-retroviral drugs or PCP prophylaxis). The heterosexual exposure category, as defined by the DC DOH, is having sex with a person of the opposite sex as their primary HIV exposure and does not consider the sexual partners' HIV status or risk for an HIV infection. DC did not have HIV reporting prior to 2001. For cases prior to 2001, extensive chart reviews were conducted by a core team to determine HIV disease, including concurrent HIV/AIDS diagnosis (active surveillance).

HIV case data were aggregated to the census tract level (188 census tracts total in DC). These data were then joined to socio-structural data from the 2000 US Census by census tract. Census variables were also aggregated to the census-tract level and included poverty (percentage of African American residents living below the federal poverty line), highest education level (percentage of residents having a high school education or lower, some college, associate's degree, bachelor's degree or graduate degree), household type (percentage of households headed by single females with children), and home ownership (percentage of residents owning or renting). HIV care and treatment facility by census tract was also included from local DCDOH program data.

Statistical analysis

Descriptive statistics were conducted to provide a general profile of African American women living with HIV in DC. For bivariate analyses, data were stratified by CD4 count. Women who ever had a CD4 count < 200 cells/μL or who had a clinical documentation of an opportunistic infection, were classified to have progressed to AIDS or having an AIDS diagnosis. Women with CD4 counts ≥ 200 cells/μL were classified as not having progressed to AIDS. Women with AIDS were then compared to women without AIDS by demographic and sociostructural variables. Prevalence ratios (PR) [18] and 95% confidence intervals (CI) were estimated for associations between independent variables and progression to AIDS or having an AIDS diagnosis.

To assess the independent relationship between African American women living with AIDS and key variables, multivariate Poisson regression models were constructed with AIDS diagnosis as the dependent variable. Backward elimination was applied in the models with $p<0.1$ as the cut off value for variable inclusion. Adjusted prevalence ratios (APR) and 95% confidence intervals (95% CI) were used to examine the relationship between AIDS and the predictor variables. Variables with $p<0.05$ were considered statistically significant in the final model. Statistical analyses were performed using SAS version 9.3.

AIDS diagnosis and poverty were mapped by census tract and DC ward to examine the association between the two variables. ArcGIS software (version 9, Redlands, California) was then used to map the data by 'joining' or merging the surveillance data to a census tract layerfile through use of a common geographic identifier.

Results

Population characteristics

At the end of 2008, 4,619 women were living with an HIV infection in DC. Of these women 4,204 (91%) were African American. Among African American women living with HIV infection, 3,050 (72.5%) had sufficient address information and were included in the analysis. Demographic, clinical, and behavioral risk information for these women are displayed in Table 1. The largest percentage of women were diagnosed with HIV infection between the ages of 20-49 years (84.7%) with a median age at diagnosis of 36.6 years, exposed through heterosexual contact only (48.1%), had public health insurance/Medicaid (32.0%), and were diagnosed with HIV at a private facility (70.7%). Among women included in the analysis, 1,814 (59.4%) had ever progressed to AIDS, 1,109 (36.4%) had CD4 counts < 200 cells/μl (AIDS) at most recent clinical visit, and 208 of 1,109 (18.8%) had progressed to AIDS within 12 months of their HIV diagnosis (late testers).

Correlates of an AIDS diagnosis

Comparisons between African American women diagnosed and living with HIV infection (non-progressors) and African American women who had ever been diagnosed with AIDS (progressors) by demographic, clinical, behavioral, and sociostructural variables are displayed in Table 2, with progression to AIDS as the dependent variable. Compared with non-progressors, progressors had a higher probability of being diagnosed at private facilities compared to public facilities (PR=1.1, 95% CI=1.1-1.3) and of being exposed through injection drug use (IDU) only compared to women exposed through

Variables	N = 3,050	%
Age group at diagnosis, years		
< 20	117	3.8
20 – 29	716	23.6
30 – 39	1060	34.8
40 – 49	801	26.3
50 – 59	288	9.4
≥ 60	65	2.1
Missing	3	0.0
Diagnosis facility		
Public	757	24.8
Private	2157	70.7
Federal	14	0.5
Unknown	122	4.0
Exposure category		
Heterosexual contact only	467	48.1
IDU only	388	12.7
IDU and heterosexual contact	430	14.1
Other	13	0.4
Risk not identified	752	24.7
Insurance		
Medicaid	977	32.0
Private	507	16.6
No coverage	204	6.7
Other	412	13.5
Clinical trials/Government	74	2.4
Unknown	329	10.8
Missing	547	17.9
DC ward of residence at diagnosis		
1	316	10.4
2	150	4.9
3	14	0.5
4	316	10.4
5	504	15.5
6	412	13.5
7	619	20.3
8	719	23.6
Concurrent diagnosis of HIV/AIDS		
Yes	309	10.1
No	716	23.5
Missing	2025	66.4
Most recent CD4 count (cells/µl)		
<200	1109	36.4
≥200	1620	53.1
Missing	321	10.5
Most recent viral load (copies/ml)		
≤400	474	15.5
>400	991	32.5
Missing	1585	52.0
Disease progression		
Progressors	1814	59.4
Non-progressors	1107	36.2
Missing	129	4.2
Treatment and referral services		
Has this patient been informed of HIV infection?		
Yes	2746	90.0
No	111	3.6
Missing	193	6.4
This patient is receiving or has been referred for:		
HIV related medical services		
Yes	2310	75.7
No	614	20.1
Missing	126	4.1
Substance abuse treatment services		
Yes	532	17.4
No	2146	70.4
Missing	372	12.2
This patient received or is receiving:		
Anti-retroviral drugs		
Yes	1822	59.7
No	738	24.2
Missing	490	16.1
PCP prophylaxis		
Yes	996	32.7
No	1519	49.8
Missing	535	17.5

[1]Where HIV diagnosis was made
[2]HIV transmission category
[3]Insurance at diagnosis
[4]DC is divided into 8 geographic wards
[5]Diagnosed with both HIV infection and AIDS on the same day
[6]Last CD4 count result for each case as of 2008
[7]Last viral load result for each case as of 2008
[8]Status of HIV disease from the time of initial HIV diagnosis

Table 1: Demographic, clinical, and behavioral characteristics of African American women living with an HIV infection through 2008, District of Columbia.

heterosexual contact only (PR=1.3, 95% CI=1.2-1.5). Progressors were also more likely to: be informed of their infection (PR=1.3, 95% CI=1.1-1.6); be referred for medical services (PR=1.6, 95% CI= 1.4-1.9); be referred for substance abuse treatment (PR=1.3, 95% CI= 1.2-1.4); received antiretroviral drugs (PR=1.5, 95% CI= 1.3-1.7); and received pneumocystis pneumonia (PCP) prophylaxis (PR=1.8, 95% CI= 1.6-2.0. No significant differences between progressors and non-progressors were noted by DC ward of residence or by available census tract sociostructural variables, such as percent of African American residents below the poverty line (Figure 1), education level, presence of HIV treatment facility within their census tract, percent of female head of household families with children, and rented vs. owned residences.

In the multivariable Poisson regression model, an AIDS diagnosis (CD4 count < 200 cells/µL or a clinical documentation of an opportunistic infection) was independently associated with being referred to medical services (APR=1.5, 95% CI=1.3-1.8), substance abuse treatment (APR= 1.2, 95% CI= 1.1-1.3), PCP prophylaxis (APR=1.7, 95% CI: 1.3-1.6), other public funding (APR=0.7, 95% CI: 0.6-0.9), and clinical trials (APR=0.2, 95% CI: 0.1-0.6, although the numbers enrolled in clinical trials were small) (Table 3).

Discussion

To our knowledge, this is the first report describing sociostructural correlates of HIV/AIDS among a local sample of African American women, who are disproportionately affected by HIV among women in the U.S. Approximately 60% of African American women diagnosed and living with HIV infection in DC had ever progressed to AIDS, and 18.8% were late testers and progressed to AIDS within a year of their HIV diagnosis. Despite other evidence that sociostructural variables, such as poverty, may increase one's risk for progression to AIDS [17], these variables were not associated with progression to AIDS for African American women in our sample. The geospatial analysis (Figure 1) provides additional evidence of no association between DC poverty census tracts or ward areas and African American women who had ever been diagnosed with AIDS when compared ecologically; the poverty distribution shown in the figure is consistent with reports of

Variables	Progressors n = 1814 (%)	**Non-progressors** n = 1107 (%)	PR (95 CI%)	P Value
Age group at diagnosis, years				
<20	69 (3.8)	48 (4.3)	1	
20-29	415(22.9)	278(25.1)	1.1 (0.9-1.2)	
30-39	659 (36.3)	356 (32.2)	1.1 (1.0-1.2)	
40-49	496 (27.3)	267 (24.1)	0.9 (0.7-1.0)	
50-59	140 (7.7)	131 (11.8)	0.9 (0.7-1.3)	
≥60	35 (1.9)	27 (2.4)	1.0 (0.8-1.3)	
Diagnosis facility				
Public	420 (23.2)	305 (27.6)	1	
Private	1365 (75.3)	698 (63.1)	**1.1 (1.1-1.3)**	**0.0172**
Federal	8 (0.4)	6 (0.5)	1.0 (0.5-2.0)	
Unknown	21 (1.2)	98 (8.9)	0.3 (0.1-1.4)	
Exposure category				
Heterosexual contact only	874(48.2)	534 (48.2)	1	
IDU only	302 (16.7)	60 (5.4)	**1.3 (1.2-1.5)**	**<0.0001**
IDU and hetero-sexual contact	285 (15.7)	125 (11.3)	1.1 (1.0-1.3)	
Other	12 (0.7)	1 (0.1)	1.5 (0.8-2.6)	
Risk not identified	341 (18.8)	387 (35.0)	**0.8 (0.7-0.9)**	**<0.0001**
Insurance				
Medicaid	688 (37.9)	251 (22.7)	0.9 (0.7-1.0)	
Private	372 (20.5)	114 (10.3)	0.9 (0.8-1.1)	
No coverage	162 (8.9)	29 (2.6)	1	
Other	240 (13.2)	163 (14.7)	**0.7 (0.6-0.9)**	**0.0005**
Clinical trials/ Government	12 (0.7)	62 (5.6)	**0.2 (0.1-0.3)**	**<0.0001**
Unknown	340 (18.7)	488 (44.1)	**0.6 (0.5-0.8)**	**<0.0001**
DC ward of residence at diagnosis				
1	189 (10.4)	108 (9.8)	1.0 (0.5-2.1)	
2	97(5.4)	47 (4.2)	1.1 (0.5-2.3)	
3	8 (0.4)	5 (0.5)	1	
4	195 (10.8)	110 (9.9)	1.0 (0.5-2.1)	
5	279 (15.4)	205 (18.5)	0.9 (0.5-1.9)	
6	256 (14.1)	139 (12.6)	1.1 (0.5-2.1)	
7	376 (20.7)	223 (20.1)	1.0 (0.5-1.9)	
8	414 (22.8)	270 (24.4)	1.0 (0.5-2.0)	
Most recent CD4 count (cells/µl)				
<200	1038(57.2	0 (0.0)	2.2 (2.0-2.4)	
≥200	719 (39.6)	860 (77.7)	1	<0.0001
Missing	57 (3.1)	247 (22.3)	NA	
Most recent viral load (copies/ml)				
≤400	243 (13.4)	217 (19.6)	1	
>400	600 (33.1)	358 (32.3)	1.2 (1.1-1.4)	0.0252
Missing	971 (53.5)	532 (48.1)	NA	
Treatment/service referrals				
Has this patient been informed of HIV infection?				
Yes	1684(92.8)	963 (87.0)	1.3 (1.1-1.6)	
No	39 (2.2)	46 (4.1)	1	
Missing	91 (5.0)	98 (8.9)	NA	
This patient is receiving or has been referred for:				
HIV related medi-cal services				
Yes	1530 (84.3)	694 (62.7)	1.6 (1.4-1.9)	<0.0001
No	201 (15.7)	413 (37.3)	1	
Missing	83 (4.6)	43 (3.9)	NA	
Substance abuse treatment services				
Yes	393 (21.7)	121 (10.9)	1.3 (1.2-1.4)	<0.0001
No	1226 (67.6)	874 (78.9)	1	
Missing	195 (10.7)	112 (10.2)	NA	
This patient received or is receiving:				
Anti-retroviral drugs				
Yes	1256 (69.2)	496 (44.8)	1.5 (1.3-1.7)	<0.0001
No	327 (18.0)	385 (34.8)	1	
Missing	231 (12.7)	226 (20.4)		
PCP prophylaxis				
Yes	832 (45.9)	110 (9.9)	1.8 (1.6-2.0)	<0.0001
No	719 (39.6)	732 (66.1)	1	
Missing	263 (14.5)	265 (23.9)		
Percent of African American residents living below the federal poverty line				
≤30%	1046 (57.7)	615 (55.6)	1.0 (0.9-1.1)	
>30%	768 (42.3)	492 (44.4)	1	
Highest education level				
High school education or lower				
≤50%	296 (16.3)	165 (14.9)	1.0 (0.9-1.2)	
>50%	1519 (83.7)	941 (85.1)	1	
Some college				
≤15%	401 (22.1)	236 (21.3)	1.0 (0.9-1.1)	
>15%	1413 (77.9)	871 (78.7)	1	
Associates degree				
≤30%	1771 (97.6)	1068 (96.5)	1.2 (0.9-1.6)	
>30%	43 (2.4)	39 (3.5)	1	
Bachelor's degree				
≤30%	1765 (97.3)	1089 (98.4)	0.9 (0.6-1.1)	
>30%	49 (2.7)	18 (1.6)	1	
Graduate degree				
≤15%	1633 (90.0)	1006 (90.9)	1.0 (0.8-1.1)	
>15%	181 (10.0)	101 (9.1)	1	
HIV care and treatment facility within census tract				
Yes	893 (49.2)	534 (48.2)	1.0 (0.9-1.1)	
No	921 (50.8)	573 (51.7)	1	
Single-female household with children				
≤15%	1716(94.6)	1055 (95.3)	1	
>15%	98 (5.4)	52 (4.7)	1.1 (0.9-1.3)	
Place of residence				
Rented				
≤50%	711 (39.2)	404 (36.5)	1.0 (1.0-1.1)	
> 50%	1103 (60.8)	703 (63.5)	1	
Owned				
≤50%	1539 (84.8)	935 (84.5)	1.1 (0.8-1.1)	
>50%	275 (15.2)	172 (15.5)	1	

Table 2: Demographic, clinical, behavioral, and sociostructural correlates of AIDS progression/an AIDS diagnosis among African American women living with HIV infection through 2008, District of Columbia.

poverty disproportionately affecting the southern and eastern areas of DC. To decrease progression to AIDS for HIV-infected persons in DC who may be unaware of their infection and testing late for HIV, DC has expanded HIV testing and free treatment opportunities with local providers in recent years [19]. Optimal community-based efforts in DC should include low-income as well as high-income areas, when planning HIV prevention strategies with sexually-active women at-risk for or already living with HIV. Local partnerships between DC DOH and women-focused community based organizations (CBOs) in DC have also been expanding in response to recent increasing concerns about HIV among African American women in DC; these local CBOs have historically accessed large numbers of African American women in DC with educational information and preventive health services [20-22].

Almost 50% of women in our sample reported heterosexual contact only as their primary HIV exposure. However, almost 25% of women did not identify any discernible risk factor for HIV acquisition. These

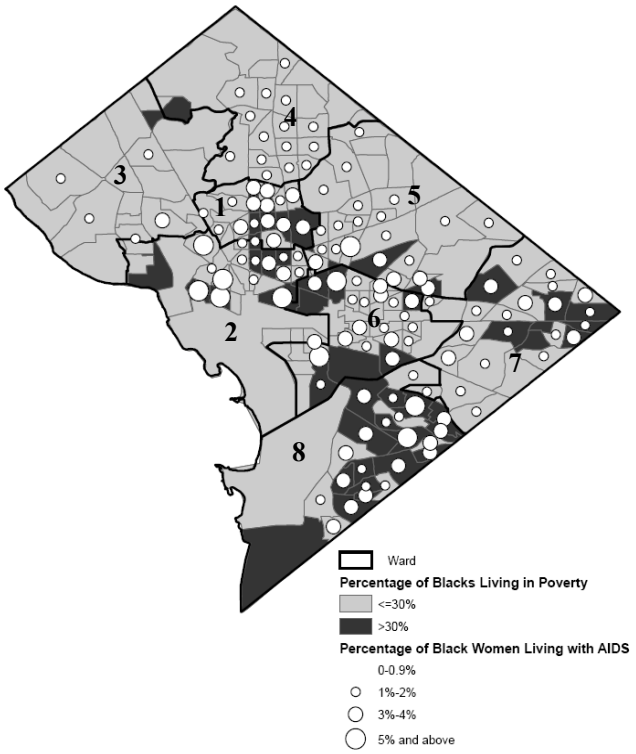

Figure 1: Percentage of African American Women Living with AIDS, and Percentage of African Americans Living in Poverty by Ward and Census Tract, District of Columbia, 2008. Data Sources: US Census 2000; DC Department of Health HIV Surveillance.

Factor	APR[1] (95%CI)[2]
Treatment/service referrals *This patient is receiving or has been referred for HIV*	
Medical services (Yes/No)	1.5 (1.3-1.8) ‡
Substance abuse treatment services (Yes/no)	1.2 (1.1-1.3)*
PCP prophylaxis (yes vs no)	1.7 (1.3-1.6) ‡
Insurance (vs. No coverage) Medicaid Private Other Public Funding Clinical trials Unknown	 0.9 (0.7-1.0) 0.9 (0.8-1.1) 0.7 (0.6-0.9) ‡ 0.3 (0.2-0.5) ‡ 0.8 (0.6-1.0)

[1]APR: adjusted prevalence ratio; [2]95%CI: 95 % confidence interval
*: P<0.05; ‡: P<0.0001

Table 3: Multivariate analysis: Factors associated with HIV disease progression to AIDS among African American women, District of Columbia, 2008.

findings warrant new approaches to understanding the HIV epidemic among African American women in DC, including greater focus on heterosexual partnerships as a female-male unit, decreased focus on partners' known "high-risk" behaviors, and increased consideration of the sociostructural contexts that exist for many African American women in DC. Innovative DC-DOH programs which offer free female and male condoms and free testing warrant further evaluation to: assess utilization by heterosexual pairs; determine efficacy for improved sexual health; and decrease HIV acquisition and AIDS progression among women in DC. A recent modeling evaluation of the female condom promotion program in DC was encouraging and suggested 23 averted HIV infections and substantial net cost savings for DC DOH [23].

In our sample, having an AIDS diagnosis was independently associated with being referred to medical services, substance abuse treatment, and PCP prophylaxis. In addition, African American women in DC who had progressed to AIDS were more likely have their HIV infection diagnosed in a private facility and 18.8% were late testers, suggesting possible missed opportunities for earlier diagnosis. This finding highlights the need for further exploration of potential missed opportunities for earlier HIV testing and linkage to care in private clinical settings. There is evidence that in general, physicians practicing in private clinical settings face several challenges which may prevent them from routinely offering HIV testing to their patients; this may need to be assessed locally in private clinical practices in DC [24,25]. However, challenges in routinely screening for HIV as recommended by the Centers for Disease Control and Prevention [26] and the United States Preventive Services Task Force [27] even in public health care settings are also prevalent and were recently described by a local DC HIV physician provider; improving health care provider awareness about routine HIV screening and accountability to perform HIV screening were suggested solutions [28]. Challenges reported by some physicians include discomfort engaging in sexual history discussions with patients, time constraints, confidentiality issues, and lack of knowledge regarding appropriate reimbursement procedures for HIV testing and treatment referrals [29-32]. Addressing HIV in DC also includes HIV education efforts with DC physicians and other providers to increase routine HIV testing efforts and to ensure rapid linkage to HIV care and treatment services for those who test positive. Reimbursement strategies for HIV testing and care referrals have also been described in an effort to remove barriers for primary care providers [32].

Although IDU was reported as the primary mode of HIV transmission by only 12.7% of our sample, African American women who progressed to AIDS in our sample were more likely to report being exposed to HIV infection through IDU only. A recent report found that approximately 33% of women who were exposed to HIV through IDU had progressed to AIDS within one year of receiving their HIV diagnosis; approximately 42% had progressed to AIDS three years after receiving their HIV diagnosis [33]. IDUs often have competing challenges, such as unstable employment and housing, which may impede their ability to access early HIV testing or timely treatment and care, if positive. For women who attend drug abuse treatment programs, incorporating HIV testing and counseling services into drug abuse treatment services can be a highly effective HIV prevention strategy [34]. However, HIV testing and counseling services at drug treatment facilities are reportedly suboptimal [34,35]. As such, a "seek, test, treat, and retain" approach has been suggested, in which substance users are engaged through outreach efforts, offered HIV testing and linkage to treatment (if positive), and provided support for retention in HIV care; a multi-site research trial is underway in the United States in which DC is one of the cities enrolling participants [36].

Our analyses are subject to several limitations. First, these data are limited to those African American women with diagnosed HIV infections; they are not representative of African American HIV-infected women living in DC who may be unaware of their infection. Second, our definition of an AIDS diagnosis only included mostly those women with CD4 counts < 200 cells/mL and some with opportunistic infections documented in their records; complete information regarding all AIDS-defining illnesses was not available for all persons in this analysis, therefore some women with AIDS were likely unintentionally excluded. Third, DC transitioned from a code-based

system of reporting HIV cases to confidential, name-based reporting in late 2006. DC-DOH estimates that 5% of the cases reported before 2006 were duplicate cases [4], but efforts to ensure fewer duplicate cases in later years are ongoing. Fourth, US census tract data were available for only 72.5% of the available HIV cases among African American women in DC, so a quarter of women could not be included in this analysis; no significant demographic differences were noted between women with and without census tract information. However, missing address/census tract information may correlate with greater poverty status; efforts to improve available census tract data will improve our ability to examine available sociostructural health variables, so that these factors can be better understood as part of local HIV prevention intervention efforts. Fifth, year 2000 census data were used. As the DCDOH HIV surveillance data are through 2008, there may be more recent sociostructural changes in DC that were not captured in the census data used.

In conclusion, African American women in DC, who are disproportionately affected by HIV, require novel approaches that facilitate a range of HIV prevention efforts and strategies to decrease HIV acquisition and slow progression to AIDS across demographic strata in DC. Early HIV testing opportunities are also being strengthened in public and private settings in all DC wards in an effort to reduce the proportion of women with HIV who are late testers and progress to AIDS within one year of diagnosis. Local-level analyses which include both individual- and sociostructural data are important to our overall understanding of HIV prevention needs, especially in areas like DC, where the burden of HIV disease is significant and where local data findings may imply different approaches compared with national-level analyses. By incorporating sociostructural determinants and geospatial techniques into our analytical approaches, we will be better able to understand local dynamics and develop interventions that improve our provision of targeted HIV prevention services to women, and meet the United States' National HIV/AIDS Strategy goals to reduce HIV incidence, ensure access to HIV treatment and care, and reduce HIV-related health disparities [3].

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