



# HIV RISK-RELATED BEHAVIORS AND WILLINGNESS TO USE PRE-EXPOSURE PROPHYLAXIS AMONG BLACK AMERICANS WITH AN ARREST HISTORY ASSOCIATION BETWEEN HIV TESTING AND HIV-RELATED RISK BEHAVIORS AMONG US-BORN AND NON-US BORN BLACK INDIVIDUALS LIVING IN THE US

## Citation

Uzoeghelu, Ugochukwu Chinedu. 2021. HIV RISK-RELATED BEHAVIORS AND WILLINGNESS TO USE PRE-EXPOSURE PROPHYLAXIS AMONG BLACK AMERICANS WITH AN ARREST HISTORY ASSOCIATION BETWEEN HIV TESTING AND HIV-RELATED RISK BEHAVIORS AMONG US-BORN AND NON-US BORN BLACK INDIVIDUALS LIVING IN THE US. Master's thesis, Harvard Medical School.

## Permanent link

<https://nrs.harvard.edu/URN-3:HUL.INSTREPOS:37368013>

## Terms of Use

This article was downloaded from Harvard University's DASH repository, and is made available under the terms and conditions applicable to Other Posted Material, as set forth at <http://nrs.harvard.edu/urn-3:HUL.InstRepos:dash.current.terms-of-use#LAA>

## Share Your Story

The Harvard community has made this article openly available. Please share how this access benefits you. [Submit a story](#).

[Accessibility](#)

## TABLE OF CONTENTS

Acknowledgments .....	3
Paper 1 .....	4
Tables.....	16
References.....	20
Paper 2 .....	22
Tables.....	36
References.....	41

## **ACKNOWLEDGMENTS**

The author acknowledges the guidance of faculty members of the Master of Medical Sciences in Clinical Investigation, the mentorship of Dr. Bisola Ojikutu, the collaboration of members of the thesis committee, and the support of the Harvard University Center for AIDS Research (CFAR).

## PAPER 1

### HIV RISK-RELATED BEHAVIORS AND WILLINGNESS TO USE PRE-EXPOSURE PROPHYLAXIS AMONG BLACK AMERICANS WITH AN ARREST HISTORY

**Ugochukwu Uzoeghelu, MD, MPH**, Harvard Medical School, Boston, MA.

Laura M. Bogart, PhD, RAND Corporation, Santa Monica, CA

Taylor Mahoney, MA, Boston University School of Public Health, Boston, MA

Musie S. Ghebremichael, PhD, Harvard University, Boston, MA

Jelani Kerr, MSPH, PhD, University of Louisville, Louisville, KY

Bisola O. Ojikutu, MD, MPH, Brigham and Women's Hospital, Harvard Medical School,  
Boston, MA

\*Corresponding Author: **Ugochukwu Uzoeghelu, MD, MPH**. Department of  
Postgraduate Education, Harvard Medical School, 25 Shattuck St, Boston, MA 02215.

Phone number: 617-678-7596

Email address: [ugochukwu\\_uzoeghelu@hms.harvard.edu](mailto:ugochukwu_uzoeghelu@hms.harvard.edu)

ORCID #: 0000-0002-9667-6229

#### **Acknowledgements**

We want to thank the National Advisory Committee who created the survey.

This publication was made possible with help from the Harvard University Center for  
AIDS Research (CFAR), an NIH funded program (P30 AI060354).

## **Abstract**

**Objective:** Black individuals in the U.S. are arrested and incarcerated at a significantly higher rate than White individuals, and incarceration is associated with increased HIV vulnerability. Pre-exposure prophylaxis (PrEP) reduces the risk for HIV transmission, but little is known about the relationship between HIV risk behavior and willingness to use PrEP among black individuals with an arrest history. **Method:** 868 individuals completed a nationally representative survey and provided baseline data on sexual risk. Participants were grouped as those with a history of arrest (N= 226) and those with no history of arrest (N=619) based on self-reported arrest history. Our study examined HIV risk behaviors associated with willingness to use PrEP between those with arrest history and those without arrest history. **Results:** Participants with an arrest history were more likely to have a lifetime history of anal sex ( $p<0.0001$ ) and sexually transmitted diseases ( $p=0.0007$ ). A history of multiple sexual partners in the past 3 months was associated with PrEP willingness in individuals with an arrest history [aPR 2.61 (1.77, 3.85),  $p<0.0001$ ], adjusting for other covariates in the model. **Conclusions:** Differences in risk behavior and willingness to use PrEP exist by arrest history. Understanding these risk behaviors are necessary to increase access to PrEP. PrEP uptake and adherence interventions, when recommended and made available for individuals at substantive risk of HIV infection at the time of arrest and during incarceration, are essential to reducing the spread of HIV in correctional facilities and in communities to which they return.

Keywords: HIV risk; PrEP; Willingness; Arrest history; Correctional facilities

## **Introduction**

HIV prevalence is 5 times higher among prison inmates than in the general population (1). Prior studies suggest that, compared with individuals with no criminal justice (CJ) involvement, individuals with histories of arrest and incarceration are more likely to report higher rates of sexually transmitted diseases (STDs), multiple sexual partners, inconsistent condom use, and are more likely to report drug use during sex (2–7). Individuals who have a history of arrest also have higher rates of mental health challenges, which increase their risk of substance use disorder and other HIV risk behaviors (8,9).

CJ settings present an important opportunity to provide and link at-risk individuals to PrEP services. Individuals who frequently come into contact with CJ systems are those from populations with a higher risk of HIV infection (i.e., people who inject drugs, black men who have sex with men, commercial sex workers) (10–15). HIV risk is substantially high upon release from prisons or jails, during re-entry to the community, when they face numerous competing risks such as substance use relapse, unstable housing, unemployment, lack of health insurance, loss of social support, stigma and discrimination, and untreated psychiatric disorders (16). These intersecting risks, exacerbated by involvement with the CJ systems, make it crucial to engage these subpopulations in HIV prevention interventions at the time of arrest, during incarceration, and during community re-entry.

Pre-exposure prophylaxis (PrEP) can dramatically reduce rates of HIV transmission if taken daily by HIV-negative individuals. The U.S. Food and Drug Administration (FDA) approved the use of emtricitabine/tenofovir disoproxil fumarate (Truvada) and

emtricitabine/tenofovir alafenamide (Descovy) in 2012 and 2019 respectively as PrEP for the prevention of HIV infection. The World Health Organization (WHO) has also recommended PrEP as part of comprehensive HIV prevention for key populations at risk of HIV infection (17,18), which includes adults with criminal justice involvement (19). Despite these recommendations, implementing PrEP in criminal justice settings and during community re-entry for individuals at high risk remains low (20,21). PrEP's optimal impact among inmates and subpopulations they intersect with after release depends on its awareness, acceptability, uptake, and adherence.

In the U.S., more than 10 million individuals are arrested per year (22). Given the higher risk for undiagnosed HIV infection within this population, routine HIV testing has been suggested during the intake process (23). HIV testing has been implemented successfully in several intake settings and has led to earlier diagnosis and treatment (24,25). The provision of an HIV test ensures the identification of PrEP candidates. Understanding best practices for PrEP screening and linkage during the course of an individual's CJ involvement is essential. This could happen at the time of arrest, during the first medical visit, or during re-entry to the community. Thus, the purpose of our study was to determine willingness to use PrEP among a national sample of black individuals with an arrest history, many of whom are at high risk and would benefit from PrEP use during initial contact with the CJ system.

## **Methods**

### *Study Sample and Data Collection*

Data for this study were drawn from the National Survey on HIV in the Black Community (NSHBC), a nationally representative survey of Black/ African-Americans in the U.S.

(26). The survey was conducted from February to April 2016. Participants were drawn from a probability-based web panel designed to represent adults living in U.S. households. Panel members were recruited through address-based sampling and random-digit dialing to ensure that households served by cell phones and without landline service were included. Households without internet access were provided with hardware and access.

### *Survey Development*

Cognitive interviews were performed to develop the survey with a sample of 30 self-identified black individuals in the Boston area between the ages of 18–50 (mean age was 39.1) to evaluate potential sources of response bias. Participants were recruited by word-of-mouth and flyers from local community-based organizations. Interviews were conducted at community-based settings and assessed respondent motivation, question comprehension, ability to recall information, cultural applicability, and the impact of social desirability bias regarding sensitive questions. The final survey comprised of questions and scales edited based on these findings.

### *Inclusion Criteria and Participants:*

Eligible participants had to: self-identify as Black/African American; be between 18 and 50 years of age; and be able to provide written informed consent. Ethical approval was obtained from the Boston Children's Hospital Institutional Review Board. 1,969 Black participants were sampled from the national web panel of more than 55,000 respondents. Of those 1,969 participants, 896 (46%) consented to complete a brief socio-demographic survey confirming their age and race. Of the 896 who consented, 868 (97%) were eligible and completed the NSHBC. Surveys were administered via



email. Participants completed the survey in 13 minutes (median). For the purpose of our study, of the 868 who completed the survey, 13 participants who reported known HIV infection were excluded. Post-stratification weights were created so that estimates represent adults living in the U.S. households according to benchmarks from the 2016 population survey (27).

### *Study Measures*

*Socio-Demographic Characteristics:* Demographic characteristics included age, gender identity, marital status, annual income, employment status, education level, and U.S. region. Arrest history, regardless of subsequent conviction or plea, was measured by asking participants to answer yes or no with the following statement, “In your lifetime, have you ever been arrested?”

*Sexual Risk:* Participants were asked if they had multiple sexual partners in the past 3 months, condomless sexual activity in the past 3 months, and a lifetime history of anal sex and STDs.

*PrEP Willingness:* PrEP willingness was assessed by asking participants to answer yes or no with the statement; “If a pill (drug/medication) that could prevent transmission of HIV from an infected (HIV positive) sex partner to an uninfected (HIV negative) partner were available I would take it.”

### **Statistical Analysis**

Descriptive statistics (such as mean, standard deviation, frequency, and percent) were used to summarize data. A chi-square test or two-sample t-test was used to assess the association between arrest history and various demographic and sexual risk variables. Bivariate analyses using post-stratification weighted robust Poisson regression models

were conducted to identify the potential associations between covariates of interest and PrEP willingness. To adjust for the effect of several covariates simultaneously, multivariate post-stratification weighted robust Poisson regression models were used. Multivariate models controlling for the possible confounding effects of participants' age and sex included covariates that were significant in the bivariate models ( $p < 0.05$ ), and were constructed separately for those with and without an arrest history. Prevalence ratios (PRs), adjusted prevalence ratios (aPRs), 95% confidence intervals (CIs), and p-values were calculated. A two-sided significance level of 0.05 was used for all statistical tests. SAS version 9.4 was used to conduct all statistical analyses.

## **Results**

### **Demographic Characteristic (Table 1)**

A total of 868 participants completed the survey. There were 226 participants reporting a history of arrest. The average age (SD) of participants with a history of arrest was 35.9 (8.58) years, and the majority were males (61.4% vs. 38.6% female). More than half of those with an arrest history (56.5%) were single, 68.5% were employed, 22.8% reported willingness to use PrEP, 31.8% had annual household incomes less than \$25,000 per year, and more than half (53.5%) reported some college or higher degrees. Demographics differences between individuals with a history of arrest and those with no arrest history are presented in Table 1. Compared to individuals with no history of arrest, those who reported arrest history were more likely to be males, older, and willing to use PrEP. There was also a significant association between arrest history and both level of education and income.

## **Sexual Risk and HIV Testing by Arrest History (Table 2)**

Sexual risk and HIV testing differ between individuals with a history of arrest and those without an arrest history. Compared to individuals without an arrest history, those with an arrest history were more likely to: have a lifetime history of anal sex (51.3% vs. 29.5%;  $p < 0.0001$ ), have a lifetime history of STD (36.9% vs. 24.4%;  $p = 0.0007$ ) and have tested for HIV in the last 12 months (36.2% vs. 24.5%;  $p = 0.0009$ ). There were no significant differences between individuals who had an arrest history and those without an arrest history in terms of condomless sex and multiple sexual partners in the past 3 months.

## **Models for Willingness to Use PrEP (Table 3)**

HIV risk behaviors and PrEP willingness differ between individuals with an arrest history and those without an arrest history. Among participants with an arrest history (Table 3A), in bivariate analysis, multiple sexual partners in the past 3 months [PR 2.51 (1.72, 3.68),  $p < 0.0001$ ] was associated with PrEP willingness. In multivariate analysis, adjusting for all other covariates in the model, multiple sexual partners in the past 3 months [aPR 2.61 (1.77, 3.85),  $p < 0.0001$ ], remained significant.

In the bivariate analysis for participants with no arrest history (Table 3B), individuals who reported single marital status [PR 1.69 (1.13, 2.53),  $p = 0.0101$ ], multiple sexual partners in the past 3 months [PR 1.79 (1.09, 2.96),  $p = 0.0225$ ] and had a lifetime history of anal sex [PR 1.54 (1.06, 2.23),  $p = 0.0231$ ] were more willing to use PrEP compared to their respective counterparts. In multivariate analysis, adjusting for all other covariates in the model, single marital status [aPR 1.69 (1.13, 2.53),  $p = 0.0113$ ] and a lifetime history of anal sex [aPR 1.46 (1.01, 2.12),  $p = 0.0429$ ], remained significant.

## **Discussion**

This study investigated the association between HIV risk behaviors and willingness to use PrEP in a sample of black individuals. We confirmed that individuals with a history of arrest were significantly more likely to have a lifetime history of anal sex and STDs. We also found an increased willingness to use PrEP among individuals with an arrest history who reported a history of multiple sexual partners. Willingness to use PrEP was also associated with single marital status and a lifetime history of anal sex in those with no arrest history.

Correctional institutions may serve as an optimal platform to offer PrEP to high-risk individuals at the time of arrest and during incarceration. Individuals who frequently come into contact with CJ systems experience a confluence of factors at the individual and community level, such as substance abuse, inconsistent condom use, lack of health insurance, and housing instability that heighten their risk of HIV infection. These intersecting risks make it crucial to engage this key population in HIV prevention interventions while in correctional institutions and upon release (16).

In this study, we hypothesized that willingness to use PrEP willingness would be associated with HIV risk behaviors. Participants might be more willing to use PrEP because they have a higher likelihood of engaging in risky sexual behaviors, supporting findings from previous studies that uptake and adherence to PrEP are directly related to and influenced by one's risk perception (18,28). We found that willingness to use PrEP was associated with a history of multiple sexual partners in individuals with an arrest history. Therefore, clinical screening for an arrest history as a social determinant of health may be needed to identify and respond to the health needs of Black individuals.

In addition, a history of criminal justice involvement should at least be screened for HIV risk and PrEP eligibility (28,33,34).

Implementing effective PrEP interventions at any time during arrest and incarceration and during community re-entry requires identification of best practices for the timing of screening and linkage to PrEP services, establishing guidelines and standards of PrEP care, determining the feasibility and acceptability of CJ-based PrEP provision, and training CJ-healthcare providers to assess and address risk and indication for PrEP (18). It is crucial that healthcare providers, public health practitioners, researchers, and those who work in the legal system fully understand the drivers of PrEP willingness and how to implement effective PrEP interventions in this key population. As biomedical HIV prevention expands, correctional facilities may serve as an effective platform to provide linkage to PrEP for at-risk individuals during the course of their CJ involvement.

### *Limitations*

This study has several limitations. Although our study was administered to a nationally representative sample of black individuals, findings may not be generalizable to other groups. However, we believe that responses from all members of this study sample are important in understanding willingness to use PrEP among the highest risk individuals. In addition, we used a cross-sectional study design in which HIV risks and a history of arrest were assessed as past behaviors, whereas PrEP awareness and willingness were measured as present beliefs; thus, we cannot draw causal inferences about the direction of associations. For example, it is possible that individuals with an arrest history were more willing to use PrEP because they have a higher likelihood of engaging in risky sexual behaviors. We reported having a history of anal sex and

multiple partners as HIV risk factors, but we did not assess whether protections such as condoms were used during sexual intercourse or for each partner, which would have decreased HIV risk. Also, we did not specifically target recruitment around high-risk individuals, and thus any effects of high-risk sexual behavior could have been underestimated. Our survey was self-reported and may be subject to social desirability and recall bias. The issue of social desirability bias, where anonymity and confidentiality cannot be guaranteed at the time of data collection, was minimized by anonymous administration via email. However, our findings regarding HIV risk behaviors and PrEP awareness and uptake are likely conservative estimates. We attempted to minimize recall bias by asking participants to recall sexual intercourse and other risk behaviors within a short timeframe prior to survey administration (e.g., history of condomless sex and multiple sexual partners within the past 3 months). In addition, as PrEP becomes more widely available in black communities, responses to this survey may be different in the current setting. Therefore, future investigations will need to reassess current trends of HIV risk behaviors in the context of PrEP and involvement with the criminal justice system. For example, people who had misconceptions about PrEP and other biomedical prevention options (such as treatment as prevention) at the time this survey was administered may have changed their minds with recent advances in HIV prevention programs and services.

### *Conclusion*

Our study adds to the current body of knowledge by exploring the differences in HIV risk behaviors and willingness to use PrEP among black individuals with an arrest history and those without an arrest history. We found that individuals with a history of arrest

were significantly more likely to have a lifetime history of anal sex and STDs. Also, a history of multiple sexual partners was associated with willingness to use PrEP among individuals with an arrest history. Understanding these risk behaviors are necessary to increase HIV testing and PrEP screening and linkage in correctional facilities. Future research should build on this study to reexamine current trends in HIV risk behaviors in the context of PrEP and criminal justice system involvement.

Table 1: Descriptive Statistics for Demographics of Study Sample by Arrest History

Characteristic	Total (n=855)	History of Arrest (n=226)	No History of Arrest (n=619)	P-value <sup>2</sup>
Age, mean (SD)	33.59 (9.20)	35.86 (8.58)	32.77 (9.30)	<0.0001
Gender, n (%)				<0.0001
Male	340 (45.6)	127 (61.4)	208 (39.6)	
Female	515 (54.4)	99 (38.6)	411 (60.4)	
Marital Status, n (%)				0.0821
Single (never married, widowed, divorced, separated)	533 (61.6)	130 (56.5)	395 (63.1)	
Others (married, living/cohabiting with partner)	322 (38.4)	96 (43.5)	224 (36.9)	
Employed, n (%)	610 (71.6)	151 (68.5)	450 (72.6)	0.2488
Education Level, n (%)				<0.0001
<High School	58 (11.0)	32 (21.2)	26 (7.5)	
High School or GED	175 (32.7)	42 (25.3)	131 (35.1)	
Some College or higher	622 (56.3)	153 (53.5)	462 (57.4)	
Annual Income, n (%)				0.0144
<\$25,000	314 (24.9)	98 (31.8)	210 (22.1)	
\$25,000 - \$49,000	208 (26.9)	54 (24.8)	150 (27.3)	
\$50,000 and above	333 (48.2)	74 (43.4)	259 (50.6)	



U.S. Region, n (%)				0.2562
Northeast	149 (18.2)	32 (16.5)	117 (19.0)	
Midwest	172 (17.1)	57 (20.6)	113 (15.8)	
South	433 (54.1)	111 (54.5)	316 (53.9)	
West	101 (10.6)	26 (8.4)	73 (11.3)	
PrEP Willingness	225 (26.0)	78 (22.8)	145 (34.3)	0.0008

<sup>1</sup>Unweighted counts, weighted percentages

<sup>2</sup>P-values generated from two-sample t-tests for continuous variables and chi-square tests of independence for categorical variables

Table 2: Risk-Related Variables and HIV Testing, by Arrest History

Characteristic	Total (n=855)	History of Arrest (n=226)	No History of Arrest (n=619)	P-value <sup>2</sup>
Condomless Sex, last 3 months	410 (57.8)	126 (63.4)	284 (56.1)	0.0729
Multiple Partners, last 3 months	80 (9.4)	28 (11.6)	51 (8.5)	0.1689
Anal Sex, lifetime	308 (35.7)	121 (51.3)	184 (29.5)	<0.0001
History of STD, lifetime	211 (28.0)	78 (36.9)	132 (24.4)	0.0007
HIV Testing, last 12 months	248 (27.6)	87 (36.2)	160 (24.5)	0.0009

<sup>1</sup>Unweighted counts, weighted percentages

<sup>2</sup>P-values generated from chi-square test of independence

Table 3A: Models for PrEP Willingness in Participants with an Arrest History

Factors	Bivariate			Multivariate	
	N	PR (95%CI)	P-value	aPR (95%CI)	P-value
Male (ref: female)	225	0.84 (0.54, 1.31)	0.4360	0.78 (0.51, 1.19)	0.2501
Age 25 to 34 (ref: all other ages)	225	1.03 (0.63, 1.69)	0.9167	0.94 (0.60, 1.49)	0.8055
Unemployed (ref: employed)	225	1.15 (0.73, 1.82)	0.5498		
Income <25K (ref: >=25K)	225	1.14 (0.74, 1.76)	0.5554		
Single (ref: others)	225	1.48 (0.90, 2.44)	0.1242		
Educational level <High school (ref: >=High school)	225	1.33 (0.77, 2.30)	0.3136		
Condomless Sex, last 3 months	207	1.24 (0.77, 2.00)	0.3842		
Multiple Partners, last 3 months	225	2.51 (1.72, 3.68)	<0.0001	2.61 (1.77, 3.85)	<0.0001
Anal Sex, lifetime	225	1.14 (0.72, 1.79)	0.5815		
HIV Testing, last 12 months	218	1.14 (0.73, 1.79)	0.5648		
History of STD, lifetime	208	1.39 (0.88, 2.20)	0.1525		
Knowledge of PrEP	225	1.27 (0.68, 2.37)	0.4525		

Table 3B: Models for PrEP Willingness in Participants with No Arrest History

Factors	Bivariate			Multivariate	
	N	PR (95%CI)	P-value	aPR (95%CI)	P-value
Male (ref: female)	615	0.83 (0.56, 1.24)	0.3748	0.85 (0.58, 1.24)	0.4036
Age 25 to 34 (ref: all other ages)	615	1.14 (0.78, 1.66)	0.4869	1.08 (0.75, 1.56)	0.6690
Unemployed (ref: employed)	615	1.37 (0.92, 2.02)	0.1184		
Income <25K (ref: >=25K)	615	1.41 (0.99, 2.00)	0.0538		
Single (ref: others)	615	1.69 (1.13, 2.53)	0.0101	1.69 (1.13, 2.53)	0.0113
Educational level <High school (ref: >=High school)	615	1.66 (0.88, 3.15)	0.1182		
Condomless Sex, last 3 months	507	0.99 (0.67, 1.45)	0.9478		
Multiple Partners, last 3 months	606	1.79 (1.09, 2.96)	0.0225	1.46 (0.87, 2.43)	0.1483
Anal Sex, lifetime	609	1.54 (1.06, 2.23)	0.0231	1.46 (1.01, 2.12)	0.0429
HIV Testing, last 12 months	590	1.25 (0.83, 1.89)	0.2753		
History of STD, lifetime	511	1.39 (0.94, 2.08)	0.1011		
Knowledge of PrEP	613	1.37 (0.88, 2.13)	0.1597		

## References

1. HIV by Group | HIV/AIDS | CDC [Internet]. 2019 [cited 2020 May 20]. Available from: <https://www.cdc.gov/hiv/group/index.html>
2. Canterbury RJ, McGarvey EL, Sheldon-Keller AE, Waite D, Reams P, Koopman C. Prevalence of HIV-related risk behaviors and STDs among incarcerated adolescents. *Journal of Adolescent Health*. 1995 Sep 1;17(3):173–7.
3. van der Meulen E. “It Goes on Everywhere”: Injection Drug Use in Canadian Federal Prisons. *Substance Use & Misuse*. 2017 Jul;52(7):884–91.
4. Stone J, Fraser H, Lim AG, Walker JG, Ward Z, MacGregor L, et al. Incarceration history and risk of HIV and hepatitis C virus acquisition among people who inject drugs: a systematic review and meta-analysis. *The Lancet Infectious Diseases*. 2018 Dec;18(12):1397–409.
5. Jürgens R, Nowak M, Day M. HIV and incarceration: prisons and detention. *J Int AIDS Soc*. 2011 May 19;14:26.
6. Khan MR, McGinnis KA, Grov C, Scheidell JD, Hawks L, Edelman EJ, et al. Past Year and Prior Incarceration and HIV Transmission Risk among HIV-positive Men who have Sex with Men in the US. *AIDS Care*. 2019 Mar;31(3):349–56.
7. Bourey C, Stephenson R, Bautista-Arredondo S. Syndemic Vulnerability and Condomless Sex Among Incarcerated Men in Mexico City: A Latent Class Analysis. *AIDS Behav*. 2018 Dec;22(12):4019–33.
8. Teplin LA, Elkington KS, McClelland GM, Abram KM, Mericle AA, Washburn JJ. Major Mental Disorders, Substance Use Disorders, Comorbidity, and HIV-AIDS Risk Behaviors in Juvenile Detainees. *Psychiatr Serv*. 2005 Jul;56(7):823–8.
9. Kingree JB, Betz H. Risky sexual behavior in relation to marijuana and alcohol use among African–American, male adolescent detainees and their female partners. *Drug and Alcohol Dependence*. 2003 Nov;72(2):197–203.
10. Kramer K, Comfort M. Considerations in HIV Prevention for Women Affected by the Criminal Justice System. *Women’s Health Issues*. 2011 Nov;21(6):S272–7.
11. Binswanger IA, Redmond N, Steiner JF, Hicks LS. Health Disparities and the Criminal Justice System: An Agenda for Further Research and Action. *J Urban Health*. 2012 Feb;89(1):98–107.
12. Beckwith C, Bazerman L, Gillani F, Tran L, Larson B, Rivard S, et al. The Feasibility of Implementing the HIV Seek, Test, and Treat Strategy in Jails. *AIDS Patient Care STDS*. 2014 Apr 1;28(4):183–7.

13. Rich JD, Chandler R, Williams BA, Dumont D, Wang EA, Taxman FS, et al. How Health Care Reform Can Transform The Health Of Criminal Justice–Involved Individuals. *Health Aff (Millwood)*. 2014 Mar;33(3):462–7.
14. Rich JD, DiClemente R, Levy J, Lyda K, Ruiz M, Rosen DL, et al. Correctional Facilities as Partners in Reducing HIV Disparities. *J Acquir Immune Defic Syndr*. 2013 Jun 1;63(0 1):S49–53.
15. Koehn JD, Bach P, Hayashi K, Nguyen P, Kerr T, Milloy M, et al. IMPACT OF INCARCERATION ON RATES OF METHADONE USE IN A COMMUNITY RECRUITED COHORT OF INJECTION DRUG USERS. *Addict Behav*. 2015 Jul;46:1–4.
16. Binswanger IA, Stern MF, Deyo RA, Heagerty PJ, Cheadle A, Elmore JG, et al. Release from Prison — A High Risk of Death for Former Inmates [Internet]. <http://dx.doi.org/10.1056/NEJMsa064115>. 2009 [cited 2020 May 21]. Available from: [https://www.nejm.org/doi/10.1056/NEJMsa064115?url\\_ver=Z39.88-2003&rfr\\_id=ori%3Arid%3Acrossref.org&rfr\\_dat=cr\\_pub++0www.ncbi.nlm.nih.gov](https://www.nejm.org/doi/10.1056/NEJMsa064115?url_ver=Z39.88-2003&rfr_id=ori%3Arid%3Acrossref.org&rfr_dat=cr_pub++0www.ncbi.nlm.nih.gov)
17. [cdc-hiv-prep-guidelines-2017.pdf](https://www.cdc.gov/hiv/pdf/risk/prep/cdc-hiv-prep-guidelines-2017.pdf) [Internet]. [cited 2019 Sep 25]. Available from: <https://www.cdc.gov/hiv/pdf/risk/prep/cdc-hiv-prep-guidelines-2017.pdf>
18. Brinkley-Rubinstein L, Dauria E, Tolou-Shams M, Christopoulos K, Chan PA, Beckwith CG, et al. The Path to Implementation of HIV Pre-exposure Prophylaxis for People Involved in Criminal Justice Systems. *Curr HIV/AIDS Rep*. 2018 Apr;15(2):93–5.
19. Underhill K, Dumont D, Operario D. HIV Prevention for Adults With Criminal Justice Involvement: A Systematic Review of HIV Risk-Reduction Interventions in Incarceration and Community Settings. *Am J Public Health*. 2014 Nov;104(11):e27–53.
20. Krakower DS, Mimiaga MJ, Rosenberger JG, Novak DS, Mitty JA, White JM, et al. Limited Awareness and Low Immediate Uptake of Pre-Exposure Prophylaxis among Men Who Have Sex with Men Using an Internet Social Networking Site. *PLoS One* [Internet]. 2012 Mar 28 [cited 2020 May 21];7(3). Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3314648/>
21. Rucinski KB, Mensah NP, Sepkowitz KA, Cutler BH, Sweeney MM, Myers JE. Knowledge and use of pre-exposure prophylaxis among an online sample of young men who have sex with men in New York City. *AIDS Behav*. 2013 Jul;17(6):2180–4.
22. Persons Arrested [Internet]. FBI. [cited 2020 Nov 29]. Available from: <https://ucr.fbi.gov/crime-in-the-u.s/2017/crime-in-the-u.s.-2017/topic-pages/persons-arrested>

23. Branson B. Current HIV epidemiology and revised recommendations for HIV testing in health-care settings. *Journal of Medical Virology*. 2007;79(S1):S6–10.
24. Routine HIV Screening During Intake Medical Evaluation at a County Jail — Fulton County, Georgia, 2011–2012 [Internet]. [cited 2020 Nov 29]. Available from: <https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6224a3.htm>
25. Routine Jail-Based HIV Testing --- Rhode Island, 2000--2007 [Internet]. [cited 2020 Nov 29]. Available from: [https://www.cdc.gov/mmwr/preview/mmwrhtml/mm5924a3.htm?s\\_cid=mm5924a3\\_w](https://www.cdc.gov/mmwr/preview/mmwrhtml/mm5924a3.htm?s_cid=mm5924a3_w)
26. Ojikutu BO, Srinivasan S, Bogart LM, Subramanian SV, Mayer KH. Mass incarceration and the impact of prison release on HIV diagnoses in the US South. *PLoS One* [Internet]. 2018 Jun 11 [cited 2020 May 21];13(6). Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5995372/>
27. Ojikutu BO, Amutah-Onukagha N, Mahoney TF, Tibbitt C, Dale SD, Mayer KH, et al. HIV-Related Mistrust (or HIV Conspiracy Theories) and Willingness to Use PrEP Among Black Women in the United States. *AIDS Behav*. 2020 Oct;24(10):2927–34.
28. Ojikutu BO, Bogart LM, Higgins-Biddle M, Dale S, Allen W, Dominique T, et al. Facilitators and Barriers to Pre-Exposure Prophylaxis (PrEP) Use among Black Individuals in the United States: Results from the National Survey on HIV in the Black Community (NSHBC). *AIDS Behav*. 2018 Nov;22(11):3576–87.
29. Belenko S, Langley S, Crimmins S, Chaple M. HIV risk behaviors, knowledge, and prevention education among offenders under community supervision: a hidden risk group. *AIDS Educ Prev*. 2004 Aug;16(4):367–85.
30. O'Brien CP, Charney DS, Lewis L, Cornish JW, Post RM, Woody GE, et al. Priority actions to improve the care of persons with co-occurring substance abuse and other mental disorders: a call to action. *Biol Psychiatry*. 2004 Nov 15;56(10):703–13.
31. Freudenberg N, Daniels J, Crum M, Perkins T, Richie BE. Coming Home From Jail: The Social and Health Consequences of Community Reentry for Women, Male Adolescents, and Their Families and Communities. *Am J Public Health*. 2005 Oct;95(10):1725–36.
32. Cotten-Oldenburg NU, Jordan BK, Martin SL, Kupper L. Women Inmates' Risky Sex and Drug Behaviors: Are They Related? *The American Journal of Drug and Alcohol Abuse*. 1999 Jan 1;25(1):129–49.
33. Rutledge R, Madden L, Ogbuagu O, Meyer JP. HIV Risk perception and eligibility for pre-exposure prophylaxis in women involved in the criminal justice system. *AIDS Care*. 2018 Oct 3;30(10):1282–9.

34. Importance of PrEP for People Involved in Criminal Justice Systems [Internet]. Infectious Disease Advisor. 2018 [cited 2020 Oct 6]. Available from: <https://www.infectiousdiseaseadvisor.com/home/topics/hiv-aids/importance-of-prep-for-people-involved-in-criminal-justice-systems/>

## PAPER 2

### ASSOCIATION BETWEEN HIV TESTING AND HIV-RELATED RISK BEHAVIORS AMONG US-BORN AND NON-US BORN BLACK INDIVIDUALS LIVING IN THE US

**Ugochukwu Uzoeghelu**, Harvard Medical School, Boston, MA.

Laura M. Bogart, RAND Corporation, Santa Monica, CA

Taylor F. Mahoney, Boston University School of Public Health, Boston, MA

Bisola O. Ojikutu, Brigham and Women's Hospital, Harvard Medical School, Boston, MA

*\*Corresponding Author:* **Ugochukwu Uzoeghelu**, Department of Postgraduate

Education, Harvard Medical School, 25 Shattuck St, Boston, MA 02215.

Phone number: 617-678-7596

Email address: [ugochukwu\\_uzoeghelu@hms.harvard.edu](mailto:ugochukwu_uzoeghelu@hms.harvard.edu)

ORCID ID #: 0000-0002-9667-6229

*Author Contributions:* All authors contributed to the study conception and design.

Material preparation and data collection were performed by Ugochukwu Uzoeghelu,

Laura Bogart and Bisola Ojikutu. Data analysis and interpretation were performed by

Ugochukwu Uzoeghelu, Taylor Mahoney and Bisola Ojikutu. The first draft of the

manuscript was written by Ugochukwu Uzoeghelu and all authors commented on

previous versions of the manuscript. All authors read and approved the final manuscript.



## **Abstract**

**Background:** Despite improvements in HIV prevention and treatment, Black individuals continue to be disproportionately affected by the HIV epidemic in the US. Using data from the National Survey on HIV in the Black Community, we examined the differences in demographic characteristics, risk behaviors, and HIV testing between US and non-US born black adults. **Methods:** 868 individuals completed the survey and provided baseline data on sexual risk. Participants were grouped as US-born (N= 763) and non-US born (N=101) based on self-reported place of birth. **Results:** Amongst US-born participants, males were less likely to test for HIV, whereas those who reported a lifetime history of anal sex and sexually transmitted diseases (STDs) were more likely to test for HIV. Non-US born participants who reported a single marital status were less likely to test for HIV, whereas those who reported a lifetime history of STDs were more likely to test for HIV. **Conclusions:** Some differences in predictors of HIV testing exist by place of birth. Understanding these differences is needed to develop HIV/AIDS prevention and treatment programs for US and non-US born black individuals.

Keywords: HIV/AIDS, Testing; Risk behaviors; US-born; non-US born

## **Introduction**

Black individuals living in the US are disproportionately affected by HIV (1). HIV prevalence is 8 times higher among young Black men than in their White counterparts (2). The black population in the US is diverse in many aspects, including by nativity or country of origin. Efforts have been made to identify and address barriers to HIV testing and prevention services in subpopulations within the black community at higher risk for HIV infection, such as people who inject drugs, those who engage in high-risk heterosexual sex, and men who have sex with men (3). However, there is more to be done to address risk factors and barriers to HIV testing and treatment faced by non-US born (i.e. foreign-born or immigrant) black individuals, many of whom have immigrated to the US from countries in the Caribbean and sub-Saharan Africa with high HIV prevalence. The Centers for Disease Control and Prevention (CDC) data on national population-based monitoring of the HIV epidemic in the US for Black Americans show important differences in HIV epidemiology and risk behaviors among black individuals related to the place of birth (4). According to the Census Bureau, about 10% of the black population in the US in 2016 was non-US born (5). National HIV surveillance data has shown that the number of annual HIV diagnoses among non-US born individuals in the US is growing (6). Despite this increase, few studies have examined the differences between US-born and non-US born Black individuals in regards to HIV risk-related behaviors and uptake of HIV testing at the national level (7–9).

Determinants of HIV testing and HIV-transmission risk factors among US-born black populations may differ from those among non-US born individuals. Non-US born individuals are more likely to face challenges in accessing health care than US-born

individuals due to lack of access to health insurance and health information, racial discrimination, language and cultural barriers, and immigration-related factors (3,10–14). A comprehensive approach to addressing these challenges is needed to better understand the health status and health education needs and guide the development of effective HIV prevention and treatment programs for this group. This paper expands on previous studies to better understand differences in demographic characteristics, risk-related behaviors, and uptake of HIV testing among US-born and non-US born black individuals.

## **Methods**

### *Study Sample and Data Collection*

Data for this study were drawn from the National Survey on HIV in the Black Community (NSHBC), a nationally representative survey of black individuals in the US (15) conducted from February to April 2016. Participants were drawn from a probability-based web panel designed to represent adults living in US households. Panel members were recruited through address-based sampling and random-digit dialing to ensure that households served by cell phones and without landline service were included. Households without internet access were provided with hardware and access(16).

### *Survey Development*

Cognitive interviews were performed to develop the survey with a sample of 30 self-identified black individuals in the Boston area between the ages of 18–50 (mean age: 39.1) to evaluate potential sources of response bias. Participants were recruited by word-of-mouth and flyers from local community-based organizations. Interviews were conducted at community-based settings and assessed respondent motivation, question

comprehension, ability to recall information, cultural applicability, and the impact of social desirability bias regarding sensitive questions. The final survey comprised of questions and scales edited based on these findings (16,17).

*Inclusion Criteria and Participants:*

Eligible participants had to: self-identify as Black; be between 18 and 50 years of age, and be able to provide written informed consent. Ethical approval was obtained from the Boston Children’s Hospital Institutional Review Board. A total of 1,969 black participants were sampled from the national web panel of more than 55,000 respondents. Of those 1,969 participants, 896 (46%) consented to complete a brief socio-demographic survey confirming their age and race. Of the 896 who consented, 868 (97%) were eligible and completed the NSHBC. Surveys were administered via email. Participants completed the survey in 13 minutes (median). Post-stratification weights were created so that estimates represent adults living in US households according to benchmarks from the 2016 population survey (16,18).

*Study Measures*

*Socio-Demographic Characteristics:* Demographic characteristics included age, gender identity, marital status, annual income, employment status, education level, and US region. Place of birth was assessed by asking participants to answer yes or no with the following statement, “Were you born in the United States or its territories (Puerto Rico, US Virgin Islands, etc.)?”

*Sexual Risk Factors:* Participants were asked if they had multiple sexual partners in the past 3 months, condomless sex in the past 3 months, and a lifetime history of anal sex and sexually transmitted diseases (STDs).

*HIV Testing:* HIV testing was assessed in all respondents by asking them to answer yes or no with the following statement, “Have you ever tested for HIV.”

## **Statistical Analysis**

Descriptive statistics (e.g., mean, standard deviation, frequency, percentages) were used to summarize data. A chi-square test or two-sample t-test was used to assess the association between birth country status and various demographic and sexual risk variables. Bivariate analyses using post-stratification weighted robust Poisson regression models were conducted to identify the potential associations between covariates of interest and lifetime HIV testing status. To adjust for the effect of several covariates simultaneously, multivariate post-stratification weighted robust Poisson regression models were used. Covariates that were found to be significant in the bivariate models ( $p < 0.05$ ) were included in the multivariate models. The multivariate models were constructed separately for those who were born in the US and those who were born outside of the US. Prevalence ratios (PRs), adjusted prevalence ratios (aPRs), 95% confidence intervals (CIs), and p-values were calculated. A two-sided significance level of 0.05 was used for all statistical tests. SAS version 9.4 was used to conduct all statistical analyses.

## **Results**

### *Demographic Characteristics*

A total of 868 participants completed the survey (Table 1). Of those, 101 (11.3%) were non-US born compared to 763 (88.7%) US-born participants. The average age (SD) of non-US born participants was 33.83 (8.63) years, and the majority were females (54.9%

vs. 45.1% male). More than half of non-US born participants (50.5%) were single, 68.9% were employed, 31.3% had annual household incomes less than \$25,000 per year, and more than half (61.3%) reported some college or higher degrees. Compared to non-US born participants, US-born participants were more likely to report single marital status. There was also a significant association between place of birth and participants' annual income level and US region of residence.

#### *Sexual Risk by Birth Place Status*

Some sexual risk factors differed by place of birth (Table 2). Compared to non-US born participants, individuals born in the US were more likely to have a lifetime history of anal sex (37.7% vs. 23.2%;  $p=0.0057$ ) and a lifetime history of STDs (30.2% vs. 16.1%;  $p=0.0088$ ). There were no significant differences by place of birth regarding condomless sex and multiple sexual partners in the past 3 months.

#### *Models for HIV Testing*

Patterns of HIV testing by demographic characteristics and risk behaviors differed by place of birth (Table 3). In the bivariate analysis for non-US born participants (Table 3A), single marital status [PR 0.55 (0.37, 0.81),  $p=0.0026$ ], income less than \$25,000 per year [PR 0.58 (0.37, 0.91),  $p=0.0184$ ], and a lifetime history of STDs [PR 1.49 (1.20, 1.85),  $p=0.0003$ ] were associated with HIV testing. In multivariable analysis, adjusting for all other covariates in the model, HIV testing was less prevalent in those who reported single marital status [aPR 0.63 (0.41, 0.96),  $p=0.0324$ ] and more prevalent in those who had a lifetime history of STDs [aPR 1.34 (1.08, 1.65),  $p=0.0067$ ].

Among US-born participants (Table 3B), in bivariate analysis, male sex [PR 0.83 (0.74, 0.95),  $p=0.0048$ ], reporting multiple sexual partners in the past 3 months [PR 1.26 (1.13,

1.41),  $p < 0.0001$ ], noting a lifetime history of anal sex [PR 1.36 (1.22, 1.51),  $p < 0.0001$ ], having a history of STD [PR 1.32 (1.21, 1.44),  $p < 0.0001$ ], having knowledge of PrEP [PR 1.14 (1.01, 1.30),  $p = 0.0401$ ], and indicating willingness to use PrEP [PR 1.23 (1.11, 1.36),  $p < 0.0001$ ], were found to be associated with HIV testing. In multivariable analysis, adjusting for all other covariates in the model, HIV testing was less prevalent in males [aPR 0.88 (0.78, 0.99),  $p = 0.0349$ ], and more prevalent in those who reported a lifetime history of anal sex [aPR 1.13 (1.02, 1.25),  $p = 0.0172$ ], reported a history of STDs [aPR 1.20 (1.11, 1.30),  $p < 0.0001$ ], and were willing to take PrEP [aPR 1.14 (1.05, 1.24),  $p = 0.0017$ ].

## **Discussion**

This study explored the association between HIV testing and HIV risk behaviors among US-born and non-US born black individuals in the United States. The Black population is diverse in many aspects, including by country of origin. While some immigrants have undergone acculturation, many have made efforts to maintain their indigenous native languages, religions, and culture. Therefore, formulating generalizable conclusions is challenging. However, determining whether US-born and non-US born black individuals are different in terms of HIV testing and risk-related behaviors is important, and findings should drive the development of appropriate strategies to improve access to services. This study found that differences do exist between US-born blacks and non-US born blacks.

Our results show that individuals born in the US were significantly more likely to have a lifetime history of anal sex and STDs. We also found that US-born participants who reported a lifetime history of anal sex and a history of STDs and who were willing to

take PrEP were more likely to test for HIV. However, non-US born individuals who are single are less likely to get tested for HIV. These findings suggest that individuals born in the US might be more likely to screen for HIV because they have a higher likelihood of engaging in risky sexual behaviors and are more aware of the factors that put them at risk for HIV. Compared to women, US-born men were less likely to get tested for HIV, perhaps because women are offered HIV testing as part of antenatal care, regardless of their behavioral risk factors (19). It may also be due to low-risk perception, stigma, and fear associated with HIV testing among young black men (20). Therefore, investing in public health education programs and campaigns to decrease stigma and discrimination and improve HIV awareness and knowledge may be vital in increasing HIV testing among black men.

Lack of basic HIV knowledge may limit one's ability to access HIV-related prevention services and prevent infection. The Centers for Disease Control and Prevention has invested in public health campaigns to improve HIV knowledge and awareness domestically and decrease stigma and discrimination. More so, through the President's Emergency Plan for AIDS Relief (PEPFAR), the US government has spent millions of dollars in Africa and the Caribbean on HIV education, knowledge, and advocacy. Yet, in this study, we found that non-US born individuals who reported single marital status were less likely to get tested for HIV. More efforts need to be undertaken to develop culturally appropriate and targeted HIV prevention outreach and programs that reach diverse immigrant communities. This work is complicated by other factors within these communities, such as lack of health insurance and challenges navigating the healthcare



system (21,22), cultural, religious, and traditional values (23,24), and low English proficiency (6,23).

Barriers to HIV testing specific to the immigrant experience, such as confusion over health care entitlements, undocumented status, and fear of deportation if one tests positive, have been noted here in the US in immigrant populations from Latin America (25). It is crucial that when HIV testing is offered to these individuals, they are informed that a positive test result will not lead to any legal issue or deportation. Through the HIV/AIDS Drug Assistance Programs that the Ryan White Care Act funds, these individuals must be made aware that treatment services are available and that the cost of PrEP can be covered regardless of immigration status.

For both US-born and non-US born individuals, a lifetime history of STD was associated with a greater likelihood of HIV testing. This finding underscores the importance of integrating HIV services into routine STD clinical care in expanding HIV testing and treatment for populations at risk of both infections.

### *Limitations*

This study has several limitations. The survey was administered to a sample of black individuals, and findings may not be generalizable. Second, our dependent variable was assessed by self-report, as opposed to determination from an objective source, such as a medical record. Self-report of HIV testing is subject to recall bias and tends to over-report actual HIV testing. Patients often assume that they have undergone HIV testing as a component of a routine evaluation when it has not occurred. However, because of our desire to capture individuals who may not access health care and have a record of testing available, we chose to assess HIV testing by self-report. Third, we did not ask for

information regarding immigration status. This is highly sensitive information, and it is likely that non-US born individuals with immigration issues and fear of deportation may be unwilling to report their actual immigration status. In addition, we do not have data regarding region or country of origin and the length of time since the initial immigration. Previous studies have suggested that the length of time since initial immigration is a predictor of not having had a recent HIV test. The survey was self-reported and may be subject to social desirability and recall bias. The issue of social desirability bias was minimized by anonymous administration via email. However, our findings regarding HIV testing and risk behaviors are likely conservative estimates. We attempted to minimize recall bias by asking participants to recall risk behaviors within a short timeframe prior to survey administration (e.g., history of condomless sex and multiple sexual partners within the past 3 months). As HIV education and testing become more widely available in black communities, responses to this survey may be different in the current setting. Therefore, future studies should reassess current trends of HIV testing and risk behaviors in the context of the country of birth and length of residency. For example, new immigrants who lacked basic HIV knowledge and unaware of their risk behaviors at the time the survey was administered may have now been educated on HIV and its related risk behaviors.

### *Conclusion*

Since the beginning of the HIV epidemic in the US, disparities by race and ethnicity in HIV seroprevalence have persisted. To overcome these disparities, there is a need to develop strategies that effectively address risk behaviors and improve access to HIV prevention and testing services, particularly in high-risk populations. Our study explored

the association between HIV testing and risk behaviors in US-born and non-US born black populations. We found that non-US born individuals who reported single marital status and US-born males are less likely to get tested for HIV infection. Our findings suggest that work remains to be done to increase HIV testing in black individuals. Therefore, it is crucial to invest in tailored and culturally appropriate HIV education and campaigns to improve HIV knowledge in this population.

Table 1: Descriptive Statistics for Demographics of Study Sample by Birth Place Status

Characteristics	Total (n=868)	US-Born (n=763)	Non-US Born (n=101)	P-value <sup>a</sup>
Age, mean (SD)	33.63 (9.20)	33.60 (9.28)	33.83 (8.63)	0.8198
Gender, n (%)				0.9262
Male	346 (45.4)	303 (45.6)	43 (45.1)	
Female	522 (54.6)	460 (54.4)	58 (54.9)	
Marital Status, n (%)				0.0158
Single (never married, widowed, divorced, separated)	541 (61.6)	486 (63.1)	53 (50.5)	
Others (married, living/cohabiting with partner)	327 (38.4)	277 (36.9)	48 (49.5)	
Employed, n (%)	618 (71.3)	546 (71.5)	68 (68.9)	0.5950
Education Level, n (%)				0.0741
<High School	62 (11.4)	49 (10.8)	12 (15.3)	
High School or GED	179 (32.8)	163 (34.1)	16 (23.4)	
Some College or higher	627 (55.9)	551 (55.2)	73 (61.3)	
Annual Income, n (%)				0.0007
<\$25,000	322 (25.3)	280 (24.5)	41 (31.3)	
\$25,000 - \$49,000	211 (27.0)	196 (28.9)	12 (10.6)	

\$50,000 and above	335 (47.7)	287 (46.6)	48 (58.1)	
US Region, n (%)				<0.0001
Northeast	152 (18.2)	115 (16.0)	36 (34.3)	
Midwest	175 (17.2)	155 (16.8)	19 (20.0)	
South	439 (54.1)	398 (56.4)	39 (36.6)	
West	102 (10.6)	95 (10.8)	7 (9.1)	
Ever Tested for HIV, Lifetime	627 (72.8)	557 (73.6)	68 (66.0)	0.1169

\*Unweighted counts, weighted percentages

<sup>a</sup>P-values are generated from two-sample t-tests or chi-square tests of independence, as appropriate

Table 2: Risk Variables by Birth Place Status

Characteristic	Total (n=868)	US-Born (n=763)	Non-US Born (n=101)	P-value <sup>2</sup>
Condomless Sex, last 3 months	417 (57.8)	375 (57.8)	41 (58.1)	0.9636
Multiple Partners, last 3 months	85 (9.6)	74 (9.6)	11 (9.9)	0.9289
Anal Sex, lifetime	318 (36.1)	292 (37.7)	25 (23.2)	0.0057
History of STDs, lifetime	219 (28.6)	206 (30.2)	13 (16.1)	0.0088

<sup>1</sup>Unweighted counts, weighted percentages

<sup>2</sup>P-values generated from chi-square test of independence

Table 3A: Model for HIV Testing among non-US Born Participants

Factors	Bivariate			Multivariate (N=81)	
	N	PR (95%CI)	P-value	aPR (95%CI)	P-value
Male (ref: female)	97	1.07 (0.75, 1.51)	0.7234		
Age 25 to 34 (ref: all other ages)	97	0.91 (0.60, 1.39)	0.6674		
Unemployed (ref: employed)	97	0.70 (0.45, 1.07)	0.0991		
Income <25K (ref: >=25K)	97	0.58 (0.37, 0.91)	0.0184	0.91 (0.59, 1.39)	0.6566
Single (ref: others)	97	0.55 (0.37, 0.81)	0.0026	0.63 (0.41, 0.96)	0.0324
Uninsured (ref: no)	87	1.04 (0.66, 1.63)	0.8788		
Educational level <High school (ref: >=High school)	97	0.52 (0.22, 1.19)	0.1187		
Condomless Sex, last 3 months	79	1.03 (0.73, 1.44)	0.8766		
Multiple Partners, last 3 months	95	1.22 (0.81, 1.84)	0.3446		
Anal Sex, lifetime	94	1.34 (0.98, 1.83)	0.0709		
History of STDs, lifetime	81	1.49 (1.20, 1.85)	0.0003	1.34 (1.08, 1.65)	0.0067
Knowledge of PrEP	97	0.84 (0.53, 1.34)	0.4669		

Willingness to take PrEP	96	0.89 (0.54, 1.46)	0.6472		
Any days with Depression in past 30 (ref: none)	97	0.95 (0.66, 1.37)	0.7728		
Quality of care received excellent, very good, or good (ref: poor or fair)	84	0.79 (0.55, 1.15)	0.2270		
Last seen doctor more than 1 year ago or never (ref: 1 year ago or less)	97	0.85 (0.54, 1.33)	0.4668		

Table 3B: Model for HIV Testing among US Born Participants

Factors	Bivariate			Multivariate (N=622)	
	N	PR (95%CI)	P-value	aPR (95%CI)	P-value
Male (ref: female)	732	0.83 (0.74, 0.95)	0.0048	0.88 (0.78, 0.99)	0.0349
Age 25 to 34 (ref: all other ages)	732	1.12 (1.00, 1.25)	0.0571		
Unemployed (ref: employed)	732	0.89 (0.77, 1.02)	0.0988		
Income <25K (ref: >=25K)	732	0.98 (0.87, 1.11)	0.7829		
Single (ref: others)	732	0.96 (0.85, 1.08)	0.5078		
Uninsured (ref: no)	676	1.00 (0.84, 1.18)	0.9800		

Educational level <High school (ref: >=High school)	732	1.14 (0.96, 1.36)	0.1413		
Condomless Sex, last 3 months	627	1.08 (0.97, 1.22)	0.1668		
Multiple Partners, last 3 months	725	1.26 (1.13, 1.41)	<0.0001	1.03 (0.93, 1.16)	0.5537
Anal Sex, lifetime	729	1.36 (1.22, 1.51)	<0.0001	1.13 (1.02, 1.25)	0.0172
History of STDs, lifetime	627	1.32 (1.21, 1.44)	<0.0001	1.20 (1.11, 1.30)	<0.0001
Knowledge of PrEP	729	1.14 (1.01, 1.30)	0.0401	1.08 (0.97, 1.20)	0.1864
Willingness to take PrEP	728	1.23 (1.11, 1.36)	<0.0001	1.14 (1.05, 1.24)	0.0017
Any days with Depression in past 30 (ref: none)	730	1.11 (0.99, 1.24)	0.0737		
Quality of care received excellent, very good, or good (ref: poor or fair)	589	0.96 (0.80, 1.15)	0.6292		
Last seen doctor more than 1 year ago or never (ref: 1 year ago or less)	730	0.89 (0.75, 1.05)	0.1586		



## References:

1. Statistics Overview | Statistics Center | HIV/AIDS | CDC [Internet]. 2020 [cited 2020 Dec 13]. Available from: <https://www.cdc.gov/hiv/statistics/overview/index.html>
2. HIV Surveillance | Reports| Resource Library | HIV/AIDS | CDC [Internet]. 2020 [cited 2020 Dec 13]. Available from: <https://www.cdc.gov/hiv/library/reports/hiv-surveillance.html>
3. Ojikutu B, Nnaji C, Sithole J, Schneider KL, Higgins-Biddle M, Cranston K, et al. All Black People Are Not Alike: Differences in HIV Testing Patterns, Knowledge, and Experience of Stigma Between U.S.-Born and Non-U.S.-Born Blacks in Massachusetts. *AIDS Patient Care STDS*. 2013 Jan;27(1):45–54.
4. Johnson AS, Hu X, Dean HD. Epidemiologic Differences Between Native-Born and Foreign-Born Black People Diagnosed with HIV Infection in 33 U.S. States, 2001–2007. *Public Health Rep*. 2010;125(Suppl 4):61–9.
5. Bureau UC. *Census.gov* [Internet]. *Census.gov*. [cited 2020 Dec 14]. Available from: <https://www.census.gov/en.html>
6. Johnson AS, Hu X, Dean HD. Epidemiologic Differences Between Native-Born and Foreign-Born Black People Diagnosed with HIV Infection in 33 U.S. States, 2001–2007. *Public Health Rep*. 2010;125(Suppl 4):61–9.
7. Kent JB. Impact of foreign-born persons on HIV diagnosis rates among Blacks in King County, Washington. *AIDS Educ Prev*. 2005 Dec;17(6 Suppl B):60–7.
8. Kerani RP, Kent JBM, Sides T, Dennis GM, Ibrahim AR, Cross H, et al. HIV Among African-Born Persons in the United States: A Hidden Epidemic? *Journal of Acquired Immune Deficiency Syndromes*. 2008 Sep;49(1):102–6.
9. Harawa NT, Bingham TA, Cochran SD, Greenland S, Cunningham WE. HIV Prevalence Among Foreign- and US-Born Clients of Public STD Clinics. *Am J Public Health*. 2002 Dec;92(12):1958–63.
10. Ojikutu B, Nnaji C, Sithole-Berk J, Bogart LM, Gona P. Barriers to HIV Testing in Black Immigrants to the U.S. *J Health Care Poor Underserved*. 2014 Aug;25(3):1052–66.
11. Prosser AT, Tang T, Hall HI. HIV in persons born outside the United States, 2007–2010. *JAMA*. 2012 Aug 8;308(6):601–7.
12. Wafula EG, Snipes SA. Barriers to Health Care Access Faced by Black Immigrants in the US: Theoretical Considerations and Recommendations. *J Immigrant Minority Health*. 2014 Aug 1;16(4):689–98.

13. Lebrun LA, Dubay LC. Access to Primary and Preventive Care among Foreign-Born Adults in Canada and the United States. *Health Serv Res.* 2010 Dec;45(6 Pt 1):1693–719.
14. Bustamante AV, Chen J, Fang H, Rizzo JA, Ortega AN. Identifying health insurance predictors and the main reported reasons for being uninsured among US immigrants by legal authorization status. *Int J Health Plann Manage.* 2014 Jan;29(1):e83–96.
15. Ojikutu BO, Srinivasan S, Bogart LM, Subramanian SV, Mayer KH. Mass incarceration and the impact of prison release on HIV diagnoses in the US South. *PLoS One* [Internet]. 2018 Jun 11 [cited 2020 May 21];13(6). Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5995372/>
16. Uzoeghelu U, Bogart LM, Mahoney T, Ghebremichael MS, Kerr J, Ojikutu BO. HIV Risk-Related Behaviors and Willingness to Use Pre-Exposure Prophylaxis Among Black Americans with an Arrest History. *J Racial Ethn Health Disparities.* 2021 Feb 5;
17. Ojikutu BO, Bogart LM, Higgins-Biddle M, Dale S, Allen W, Dominique T, et al. Facilitators and Barriers to Pre-Exposure Prophylaxis (PrEP) Use among Black Individuals in the United States: Results from the National Survey on HIV in the Black Community (NSHBC). *AIDS Behav.* 2018 Nov;22(11):3576–87.
18. Ojikutu BO, Amutah-Onukagha N, Mahoney TF, Tibbitt C, Dale SD, Mayer KH, et al. HIV-Related Mistrust (or HIV Conspiracy Theories) and Willingness to Use PrEP Among Black Women in the United States. *AIDS Behav.* 2020 Oct;24(10):2927–34.
19. Overview of HIV, Viral Hepatitis, STD, & TB During Pregnancy | CDC [Internet]. 2020 [cited 2021 Feb 19]. Available from: <https://www.cdc.gov/nchhstp/pregnancy/overview.html>
20. Jones J, Carter B, Wilkerson R, Kramer C. Attitudes toward HIV testing, awareness of HIV campaigns, and using social networking sites to deliver HIV testing messages in the age of social media: a qualitative study of young black men. *Health Educ Res.* 2019 Feb 1;34(1):15–26.
21. Francois F, Elysée G, Shah S, Gany F. Colon Cancer Knowledge and Attitudes in an Immigrant Haitian Community. *J Immigr Minor Health.* 2009 Aug;11(4):319–25.
22. Foley EE. HIV/AIDS and African immigrant women in Philadelphia: Structural and cultural barriers to care. *AIDS Care.* 2005 Nov;17(8):1030–43.
23. Rosenthal L, Scott DP, Kelleeta Z, Zikarge A, Momoh M, Lahai-Momoh J, et al. Assessing The HIV/AIDS Health Services Needs Of African Immigrants To Houston. *AIDS Education and Prevention.* 2003 Dec;15(6):570–80.

24. Hoffman S, Beckford Jarrett ST, Kelvin EA, Wallace SA, Augenbraun M, Hogben M, et al. HIV and Sexually Transmitted Infection Risk Behaviors and Beliefs Among Black West Indian Immigrants and US-Born Blacks. *Am J Public Health*. 2008 Nov;98(11):2042–50.
25. Latinos | Race/Ethnicity | HIV by Group | HIV/AIDS | CDC [Internet]. 2021 [cited 2021 May 6]. Available from: <https://www.cdc.gov/hiv/group/racialethnic/hispaniclatinos/index.html>