

Cancer Screening Rates, Disparities by Immigration Status and Predictors of Cancer Screening among Black Women with HIV

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V. Ayafor, S. Rajabiun, A. Downes, H.J. Cabral contributed to the conceptualization and study design. H.J. Cabral led the data analysis team made of V. Ayafor and X. Zhang. V. Ayafor, S. Rajabiun, A. Downes, H.J. Cabral, S. Lewis-Chery, R. Goodwin, L.Y. Spencer, and X. Zhang contributed to data interpretation. V. Ayafor and S. Rajabiun drafted the original manuscript. V. Ayafor and X. Zhang created tables with contributions from S. Rajabiun, A. Downes, H.J. Cabral,

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Ethics Approval Statement

This study protocol was approved by the Institutional Review Board for the Evaluation and Technical Assistance Provider at the University of Massachusetts Lowell (UML), Boston University Charles River Campus (BU), and Boston University Medical Campus (BUMC) (H-41438) and the local Institutional Review Boards of the 12 participating study sites in accordance with their respective guidelines.

Abstract

Introduction: People with HIV have a higher incidence and mortality from screenable cancers than the general population. Among women, the four most common cancers are breast, colorectal, lung, and cervical cancers. This study examined breast, colorectal, lung, and cervical cancer screening rates among Black women with HIV and disparities that exist by Immigration status.

Methods: With a sample of 604 women, we examined cancer screening rates for breast, colorectal, lung, and cervical cancers and examined the rates by country of origin. Generalized linear mixed models were used to examine potential factors affecting these rates and the odds of screening by country of origin: US-born women (USBW) and non-US-born women (NUSBW).

Results: Cancer screening rates were low for all cancer categories for both groups. A screening rate of 48.7% was estimated for breast cancer (NUSBW-35.9% versus USBW-50.4%), 6.3% for lung cancer, 25.5% for colorectal cancer, and 72.8% for cervical cancer. NUSBW had lower screening rates for all 4 cancers compared to USBW. Possible predictors for cancer screenings

were years of living with HIV (OR 1.11; 95% CI 1.07-1.14) and no viral suppression (OR 0.34; 95% CI 0.15-0.76).

Conclusion: Black women with HIV and much more immigrant subgroups may face additional barriers to accessing required cancer screening services in addition to being disproportionately affected by HIV. This emphasizes the urgent need for tailored, culturally relevant outreach and education to enhance cancer screening.

Keywords: HIV, Black, Women, Immigrant, Cancer, Screening

Introduction

Life expectancy for people with HIV (Human Immunodeficiency Virus) on long-term antiretroviral therapy and high CD4 counts has been estimated to be close to that of the general population.¹ People with HIV have a higher rate of comorbidities compared to their non-HIV counterparts.^{2,3} With this increased life expectancy and more comorbidities in this group, mortality causes are now driven by non-AIDS (Acquired Immune Deficiency Syndrome) related causes, with non-AIDS-defining cancers (NADC) accounting for 15% of all mortalities.⁴ People with HIV have higher incidences and mortality from screenable cancers than the general population, with these diagnoses often made at younger ages and advanced stages.⁵ In a CDC 2022 cancer screening report in the general population, the rate of breast cancer screening was 78%, 80% for cervical cancer and less than 70% for colorectal cancer.⁶ According to the American Cancer Society, the four most common cancers among women are breast cancer, colorectal cancer, lung cancer, and cervical cancer.⁷ In a cohort study of people with HIV in the Washington, DC area, the median age at the time of incident cancer diagnosis was 58 years for NADC.⁸ In this study, 41.2% of breast cancer diagnoses were made before the recommended age of screening.⁸

Despite this rising non-discriminatory impact of cancer in the general population, there is sparse data about cancer screening practices among people with HIV in general, much less Black women with HIV. The 2022 CDC report on HIV among women shows that Black women account for 47% of new HIV diagnoses in the U.S.⁹ Additionally, Black women are not a monolith,¹⁰ they are diverse regarding several factors including ethnicity, immigration, and language.¹¹ Few culturally specific interventions have been implemented among the population of Black women based on these diverse factors.¹² For example, in a study on PAP testing among African immigrant women, negative cultural beliefs were associated with an 83% decreased odds of receiving pap testing.¹³ Grouping Black women with HIV by immigration status, the rate of HIV diagnosis among non-US-born women (NUSBW) is 5.3 times the rate of US-born women (USBW).¹⁴ Unfortunately, there is limited data on cancer screening practices among Black women, particularly immigrant Black women with HIV, despite higher HIV incidence and disease burden in this group.

As this shift in cancer occurrence and increased risk for certain cancers among people with HIV is expected, targeted age and sex-specific screening for health problems including cancer screening is important.¹⁵ Timely screening and adequate intervention can reduce NADC morbidity and mortality and increase retention in care among people with HIV.¹⁶ It permits early detection of cancers like Kaposi Sarcoma which require only a thorough physical exam to clinically diagnose, enabling curative treatment options without disregarding adherence to antiretroviral therapy. In this study, we draw on data from a national multisite study of Black women with HIV to examine breast, colorectal, lung, and cervical cancer screening rates and disparities that exist by immigration status, describing predictors to receiving any of these cancer screenings among Black women with HIV.

Materials and Methods

Study Sample

The analytic sample of 604 women was obtained from the baseline data of the Black Women First (BWF) Initiative whose data collection period ranged from May 2021 to December 2022. Participants were adults aged 18 years or older, identified as Black, and female living in the US with a recent or past HIV diagnosis. Recruitment and enrollment were conducted at one of the 12 demonstration sites in the US. Among these 12 sites, 3 were in states that had not implemented Medicaid expansion, namely, Texas (1) and Georgia (2).¹⁷ These 12 sites were funded to adapt bundled interventions, defined as two or more interventions that produce better health outcomes when implemented together than when delivered separately. Details of the study methodology were previously published.¹⁸ In this study, all Black women born in the 50 states in the US or dependent territories were considered USBW, and those born outside of these states or territories¹⁹ were considered NUSBW.

Data Collection and Measures

Our data collection methods included questionnaires administered to participants at enrollment by trained staff and a review of medical charts before the start of the intervention. Using a questionnaire, we collected descriptive data on demographics and social determinants of health (level of education, health insurance, food security, transportation needs, housing needs, employment status, HIV stigma, and health literacy). We used previously published and approved scales for measuring stigma, mental health, and physical health-related quality of life, food security, and health literacy.¹⁸ Participant responses were computed to scores and mean score values were used to compare among groups. Both chart review and questionnaires were used to obtain clinical data on viral load, CD4 count, years of living with HIV, physical health, mental health, and smoking history. Participants with viral loads of less than 200 copies/ml were defined as virally suppressed.²⁰ Cancer screening measures were selected in consultation with BWF advisory council members that included health care providers for women with HIV.

The United States Preventive Services Task Force (USPSTF) guidelines were used to support these measures.

Primary Outcome Measure

Our primary outcome was cancer screening rates for breast cancer, lung cancer, colorectal cancer, and cervical cancer among Black women with HIV. Breast cancer screening was assessed for women older than 40 years of age,²¹ colorectal cancer screening for ages 50 and 75 years,²² cervical cancer screening starting at age 21 years.²³ Lung cancer screening was based on age 50 to 80 years with a 20-pack-year history currently smoking or quit smoking less than 15 years.²⁴ Among age-eligible participants, we obtained data about these screenings by reporting a 'yes' or 'no' for any eligible client ever receiving any of the screenings and documented the most recent screening dates.

Analytic Methods

Using Stata version 17, bivariate analyses were conducted to describe participants' characteristics using frequencies and percentages for categorical variables or means with standard deviations for continuous variables. Cancer screening rates for the overall sample were calculated and then further stratified to obtain the rates for USBW and NUSBW alongside their 95% confidence intervals. The chi-square test was used to estimate the differences in these proportions. Generalized estimating equations (GEE) models were conducted using SAS 9.4 to examine the effects of potential risk factors on the likelihood of getting cancer screening. Both crude and adjusted models were run to obtain the odds of screening for NUSBW compared to USBW. These models estimated odds ratios (OR) and 95% confidence intervals (CI) using logistic regression model. Clustering by study site was accounted for by the method of Fay and Graubard.²⁵ Confounders controlled by the model were age in years, years of living with HIV, health insurance, employment, total needs, health literacy score, and presence or absence of viral suppression. P-values <0.05 were considered statistically significant. The study was reviewed and approved by the Boston University Institutional Review Board (IRB) and determined exempt by the University of Massachusetts Lowell IRB. All local sites that participated in the study also received IRB approval from their local institutions.

Results

Participant Characteristics (Table 1)

Of 604 participants, 74 (12.3%) of them were NUSBW originating mostly from Africa (60.8%), then the Caribbean (33.8%), and smaller proportions from Europe and South America (2.7%, 2.7%) respectively. NUSBW were older compared to USBW (48.0 versus 43.7). Among NUSBW, 24.3% spoke a primary language other than English (predominantly African languages and Creole) compared to USBW with just two women speaking a primary language other than English (<1%). The mean number of years lived in the US for NUSBW was 15.3 years and 46.8 years for USBW (consisting of 4 participants considered as USBW per our definition who moved

to mainland US from Puerto Rico). For relationship status, most women in both groups identified as single and never married (58.6% for USBW and 46.0% for NUSBW).

Regarding the level of education, a similar proportion completed high school level between the 2 groups. Notwithstanding, NUSBW represented a higher proportion with a college or a post-college degree (18.9% versus 6.1%), while more USBW underwent some college or vocation compared to NUSBW (37.8% versus 31.1%). NUSBW had a higher proportion with no health insurance (25.7% versus 8.4%). Both groups shared similar needs for food assistance with low mean food security scores (2.1 and 2.5). Fewer NUSBW reported a need for housing assistance (28.4% versus 37.7%), and transportation assistance (34.3% versus 44.2%). Unemployment rates and health literacy scores were higher for USBW compared to NUSBW (66.8% versus 48.6%) and (17.2 and 15.8) for health literacy scores. NUSBW had higher mean stigma scores compared to USBW (22.8 versus 20.9).

Below the population mean of 50 for physical health-related quality of life for the non-institutionalized adult population in the United States, NUSBW had a higher mean physical health score (44.1) compared to USBW (38.8). Both groups had similar mental health-related quality of life scores (44.1 and 45.1). NUSBW had lower tobacco smoking rates compared to USBW (20.3% versus 67.3%). Viral suppression rates were lower among NUSBW (68.2%) compared to USBW (70.7%). Mean CD4 counts were similar in both groups and NUSBW had lower mean years of living with HIV (12.0 versus 15.3).

Cancer Screening Rates (Table 2)

Generally, and notably, cancer screening rates were low for all cancer categories for both groups. Among age-eligible women, 48.7% received breast cancer screening, with lower rates among NUSBW (35.9%) compared to USBW (50.4%). For lung cancer, 6.3% underwent screening, with lower rates among NUSBW (1.9% versus 7.0%). For colorectal cancer, 25.5% received screening, with NUSBW having lower rates compared to USBW (11.1% versus 27.5%). Similarly, with cervical cancer screening, the overall rate was 72.8% and was much lower among NUSBW compared to USBW (65.4% compared to 73.8%).

Odds of Cancer Screening by Immigration History (Table 3)

In the adjusted generalized linear mixed model, NUSBW were approximately 31% less likely to have received any of the 4 cancer screenings compared to USBW (OR 0.69; 95% CI 0.41-1.16). Years of living with HIV and no viral suppression strongly predicted the odds of receiving any cancer screening (OR 1.11; 95% CI 1.07-1.14 and OR 0.34; 95% CI 0.15-0.76), respectively. Regarding smoking history and age, in the crude regression model, women who smoked or ever smoked and older women were more likely to receive a cancer screening compared to those who never smoked and younger women (OR 1.61; 95% CI 1.09-2.37 and OR 1.07; 95% CI 1.04-1.11), respectively. However, when controlling other factors, these relationships were no longer statistically significant. When adjusted for other confounders, participants with no insurance had increased odds of receiving cancer screening compared to those with insurance (OR 2.44;

95% CI 1.13-5.24). There were no significant associations between education level, insurance status, health literacy score, employment, smoking history, stigma scores, and total needs with cancer screening.

Discussion

The goals of this study were to examine breast, colorectal, lung, and cervical cancer screening rates and disparities that exist by immigration status, describing predictors of receiving any of these cancer screenings among Black women with HIV. Our study highlighted the gaps in preventive services experienced by all Black women with HIV, emphasizing an even wider gap for the immigrant subgroup. Major findings of this study are the low cancer screening rates among Black women with HIV for the most prevalent cancers among women and much lower rates among immigrant Black women with HIV compared to the general population. Viral suppression rates, recent HIV diagnosis, and smoking history were highlighted as potential factors influencing rates of screening for Black women with HIV. This is a significant addition to the existing literature about cancer screening as there is limited information quantifying the screening of these prevalent cancers among women, specifically for Black women with HIV who are disproportionately affected.

Current HIV treatment guidelines recommend that women with HIV have two PAP tests during the year after diagnosis and then annually. If three consecutive tests are normal, then follow-up PAP tests are every 3 years.²⁸ However, cervical cancer screening rates were low (72.8%) in our study compared to the general population (80%). This low cervical cancer screening rate questions the utilization level and the efficacy of the existing guidelines for cervical cancer screening among women with HIV and Black women in particular. In a 2015 study on cervical cancer among Black women with HIV, lack of knowledge about this screening and low perceived susceptibility to this cancer were reported as barriers to getting a PAP test.²⁹ This was not the case in our study, as health literacy scores were high among both groups. We are again faced with the question of whether factors affecting these low screening rates go beyond individualized to structural and systemic barriers. The 2024 CDC statistic estimates 11,500 new cervical cancer diagnoses yearly in the USA,³⁰ emphasizing the burden of this preventable and treatable cancer. Employing adequate age-screening cancer interventions beyond HIV medical care can substantially decrease late-stage diagnosis, which is disproportionately higher among Black women³¹, and limit mortality associated with it.

Low cancer screening rates may be explained by limited access to a primary care provider and the lack of universal Medicaid expansion.^{26,27} For women with HIV, it is recommended that a visit occur at least every 6 months and more frequently depending on viral load status. A recent 2023 study showed that patients in states that had an expanded Medicaid option received timely cancer screening and diagnoses and were more likely to receive appropriate cancer treatment with amelioration in overall cancer health outcomes.^{26,27} Although our data reflects participants from states that have this expansion (8) and those that don't (4), we controlled for

the site effect in our analysis and will lean towards recent literature concluding that expanding these services across all states can significantly increase the screening rates. Furthermore, all women in this study were eligible to receive Ryan White services (a federal program that provides medical care, medications and support for underserved, uninsured and low-income individuals with HIV), which will also explain higher odds for cancer screening seen with participants with no insurance. It could be that the Ryan White providers facilitated access to cancer screening and specialists but did not directly provide the cancer screening nor had sufficient time or staff to ensure women were completing referrals for screening. Further research is warranted to identify the relationship between access to Medicaid and Ryan White programs for women with HIV compared to having private health insurance.

Concerning disparities in cancer screening by country of origin, NUSBW had lower overall cancer screening rates. Their lower viral suppression rate and fewer mean years of living with HIV compared to USBW sheds light on the burden and recency of HIV diagnosis in this group, compounding an already existing limitation to health care shown by higher rates of no health insurance. Though Ryan White program services can address some of the gaps in care faced by NUSBW, they often are reluctant to receive these services as they are classified under the public charge rule, which eventually penalizes them in attempts to obtain permanent immigration status.³² Also, assimilation in the US can negatively influence NUSBW's engagement in care, as they may have competing priorities with more focus placed on learning and adapting to the new lifestyle of daily living and meeting basic needs, such as food, housing, and employment, such that a lower priority is given to health needs. Additionally, HIV-related stigma could explain the existing difference as NUSBW reported higher stigma compared to USBW. Future research is warranted on the effect of basic needs and prioritization of HIV and other health care needs, specifically for immigrant Black women with HIV.

Limitations

We did not use the International Classification of Diseases (ICD) 10 codes or check current procedural terminology (CPT) to assess cancer screenings that may not have been documented in the electronic medical records (EMR) or were done at another facility. This may result in the under-reporting of our screening numbers. Second, it was beyond the scope of our study to collect incidents and prevalence of cancer diagnosis, as the overall goal of our study was to engage women in HIV care and treatment and improve viral suppression. These may be necessary next steps for future research. Third, data was collected during the early COVID pandemic, including the lockdown period, which may have limited access to screening. Additionally, we have not engaged with providers of Black women to understand contributing factors that lead to lower cancer screenings, whether it's a lack of clinical continuing education/exposure, guideline inconsistencies, or limited appointment time blocks.³³ Also, more work is critical to understanding the relationship between engagement in care, viral suppression, and other health indicators, especially as women age. Despite these weaknesses,

our study provides an estimate of cancer screening rates in a population severely impacted by HIV and informs on factors that could be contributing to lower screening rates.

Conclusion

Despite advances in healthcare accessibility and awareness campaigns, low cancer screenings among Black women with HIV persist. Black women, already disproportionately affected by HIV/AIDS, may face additional barriers to accessing essential cancer screening services. Structural limitations may include a lack of proper follow-up and documentation of screening if screening services are conducted outside of the HIV primary care setting. The screening rates are even lower among immigrant Black women, which underscores the urgent need for tailored, culturally relevant targeted outreach and education to enhance cancer screening. Current cancer screening guidelines may not adequately account for intersecting factors of race, immigration status, and HIV status which impact healthcare access and utilization among NUSBW. Tailored guidelines should incorporate culturally sensitive approaches to communication, confidentiality, education, and outreach to overcome these barriers. In developing guidelines, gaining input from immigrant Black women with HIV, community leaders, and healthcare providers should be prioritized. By promoting equity and inclusivity in health delivery, we can strive towards reducing the disparities in cancer screening rates and ensuring that all women have equitable access to lifesaving preventive services.

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Table 1: Characteristics of participants by country of origin (n=604)

Characteristics	US Born (n= 530)		Non-US Born (n= 74)	
	Frequency	%	Frequency	%
Demographic				
Age (years)				
Overall (Mean, SD)	48.0	12.6	43.7	11.7
18 - 54	336	63.4	57	77.0
≥ 55	194	36.6	17	23.0
Language				
English	528	99.6	56	75.7
Other than English	2	0.4	18	24.3
Relationship Status				
Single, never married	309	58.6	34	46.0
Married/in a committed relationship	119	22.6	20	27.0
Widowed/divorced/separated	99	18.8	20	27.0
Region of Origin(n=74)				
Africa	-	-	45	60.8
Caribbean Countries	-	-	25	33.8
Europe	-	-	2	2.7
South America	-	-	2	2.7
Interpreter/translation				
Needed interpreter assistance	2	0.4	5	6.8
Years Living in the US (Mean, SD)	46.8	13.0	15.3	11.9
Geographic location				
Medicaid expansion state	362	68.3	59	79.7
Non Medicaid expansion	168	31.7	15	20.3
Social Determinants of Health				
Education				
Below high school	134	25.4	14	18.9
High school level	162	30.7	23	31.1
Some college or vocation	199	37.8	23	31.1
College or Post-college graduate	32	6.1	14	18.9
Health Insurance				
Have insurance	482	91.6	55	74.3
No insurance	44	8.4	19	25.7
Food				
Needed food assistance	261	49.3	39	52.7
Food Security score, Range 0.0-6.0	2.1	2.3	2.5	2.3

(Mean and SD)				
Housing				
Needed housing assistance	200	37.7	21	28.4
Transportation				
Needed transportation assistance	234	44.2	25	34.3
Employment				
Employed	174	33.2	37	51.4
Unemployed	350	66.8	35	48.6
Health Literacy Score , Range 4.0-20.0 (Mean, SD)	17.2	3.7	15.8	4.5
Stigma Score ,* Range 13.0-52.0 (Mean, SD)	20.9	8.9	22.8	9.7
Clinical Characteristics				
Viral suppression rate	352	70.7	45	68.2
CD4 Counts (Mean, SD)	643.2	433.8	581.5	360.4
Years living with HIV (Mean, SD)	15.3	9.8	12.0	8.9
Mental health related quality of life Score* (Mean, SD), Range 5.50-71.07	44.1	13.0	45.1	12.9
Physical health related quality of life Score* (Mean, SD), Range 3.64-63.56	38.8	12.23	44.1	8.3
Has a case manager	325	61.6	41	55.4
Smoking History	354	67.3	15	20.3

*HIV perceived and internalized stigma was assessed using a 13- item scale that assesses perceived external stigma from the community and/or providers and internalized feelings of living with HIV. Adapted from Sowell, R., Lowenstein, A., Moneyham, L., Demi, A., Mizuno, Y., & Seals, B. (1997). Resources, stigma and patterns of disclosure in rural women with HIV infection. *Public Health Nursing*, 14(5), 302-312; Physical health related and mental health related quality of life were measured using the RAND 12-item scale (VR-12), sponsored by the Centers for Medicare & Medicaid Services, which assesses the domains of general health perceptions, physical functioning, role limitations, physical and emotional problems, bodily pain, energy fatigue, social functioning, and mental health cited in Kazis LE, Miller DR, Skinner KM, Lee A, Ren XS, Clark JA, et al. Applications of methodologies of the Veterans Health Study in the VA healthcare system: conclusions and summary. *J Ambul Care Manag*. 2006;29(2):182-8.

Table 2: Cancer Screening rates by country of origin (n=604)

Cancer type	Rate (%)	Immigration	Rate (%)	95% CI Lower	95% CI Upper	CHI-SQ test p value
Breast Cancer	48.7	US-Born	50.4	45.3	55.4	0.047
		Non-US Born	35.9	23.1	50.2	
Lung cancer	6.3	US-Born	7.0	4.6	10.1	0.149
		Non-US Born	1.9	0.0	9.9	
Colorectal Cancer	25.5	US-Born	27.5	23.1	32.2	0.010
		Non-US Born	11.1	4.2	22.6	
Cervical Cancer	72.8	US-Born	73.8	69.2	78.1	0.200
		Non-US Born	65.4	50.9	78.0	

Table 3: Odds of Cancer Screening (n=604)

Predictors	Unadjusted Odds Ratio		Adjusted Odds Ratio	
	(OR, CI)	P value	(OR, CI)	P value
Country of Origin		<0.001		0.161
US Born	Ref.		Ref.	
Non-US Born	0.42 (0.27, 0.65)		0.69 (0.41, 1.16)	
Age	1.07 (1.04, 1.11)	<0.001	1.04 (0.998, 1.09)	0.062
Years of Living with HIV	1.11 (1.09, 1.13)	<0.001	1.11 (1.07, 1.14)	<0.001
Education		<0.034		0.345
Below high school	1.90 (0.62, 5.84)		0.87 (0.28, 2.71)	
High school level	1.72 (0.46, 6.35)		1.22 (0.31, 4.79)	
Some college or vocation	2.61 (0.78, 8.73)		2.06 (0.48, 8.89)	
College graduate and Post-college graduate	Ref.		Ref.	
Insurance		0.822		0.023
Have insurance	Ref.		Ref.	
No insurance	0.88 (0.30, 2.60)		2.44 (1.13, 5.24)	
Relationship Status		0.137		0.157
Single, never married	Ref.		Ref.	
Married/in a committed	1.00 (0.41, 2.43)		1.06 (0.44, 2.56)	

relationship				
Widowed/divorced/separated	1.81 (0.99, 3.29)		1.71 (0.94, 3.10)	
Employment		0.128		0.888
Employed	Ref.		Ref.	
Unemployed	1.42 (0.90, 2.22)		1.05 (0.53, 2.10)	
Smoking History		0.017		0.315
Non-smoker	Ref.		Ref.	
Smoker or ever smoked	1.61 (1.09, 2.37)		1.38 (0.74, 2.60)	
Total Needs	1.01 (0.91, 1.12)	0.864	1.12 (0.999, 1.25)	0.052
Health Literacy Score	1.02 (0.94, 1.10)	0.645	1.00 (0.90, 1.11)	0.967
HIV Stigma Score	0.99 (0.97,1.01)	0.271	1.02 (0.998, 1.05)	0.069
Viral Suppression		0.012		0.008
Virally suppressed	Ref		Ref	
Not Suppressed	0.28 (0.10, 0.76)		0.34 (0.15, 0.76)	