

Geographic and individual correlates of cervical cancer screening among HIV-infected women attending HIV Care and Treatment Programs in Kenya

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**Abstract**

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**Objective:** To identify correlates of cervical cancer screening among HIV-infected women in Kenya and to determine whether familiarity and knowledge of cervical cancer is associated with screening receipt.

**Methods:** We conducted a sub-analysis from a cross-sectional study of HIV-infected women attending large HIV Care and Treatment programs across Kenya. 3,007 HIV-infected women attending ART treatment and who were eligible for cervical cancer screening services were included. We examined demographic, clinical, and geographic correlates of cervical cancer screening and their association to the outcomes of historical and up to date screening receipt. We assessed descriptive statistics of knowledge and familiarity with cervical cancer screening and association with screening outcomes.

**Results:** 1,671 (56%) women reported ever being screened. Among women screened, 804 (48%) received screening services within the past 12 months and were classified as having up to date screening. Prevalence of screening was highest among women who were older (APR comparing age 35-49 to 18-24: 2.26, 95% CI: 1.68, 3.05), employed (APR: 1.55, 95% CI: 1.24,

1.93), married (APR: 1.27, 95% CI: 1.01, 1.59), had a secondary education or higher (APR: 1.45, 95% CI: 1.19, 1.77), and had been diagnosed with HIV for longer (APR: 1.09/year average increase, 95% CI: 1.04, 1.13). Women who were younger (APR comparing age 25-34 to 18-24: 0.58, 95% CI: 0.38, 0.87; APR comparing age 35-49 to 18-24: 0.41, 95% CI: 0.27, 0.64) and employed (APR: 1.83, 95% CI: 1.32, 2.55) were most likely to have up to date screening. Women with a history of screening were approximately twice as likely to correctly answer questions about cervical cancer (45-79%) as women who had never been screened (25-47%). Only 36% of women knew cervical cancer is treatable.

**Conclusions:** Kenyan women attending HIV Care and Treatment Programs may be more likely than the general population to receive cervical cancer screening. Characteristics linked to empowerment and social or economic capital were correlated with higher cervical cancer screening rates. Accurate knowledge of cervical cancer is associated with screening history, but knowledge of cancer treatment is lacking. Integrating cervical cancer services into HIV care can increase opportunities for screening and treatment among women attending ART clinics who may be less likely to access cervical cancer screening.

**Key words:** cervical cancer; Kenya; HIV

## INTRODUCTION

Cervical cancer is the leading cause of cancer-related death among women in Kenya and the fourth most common cancer in women globally.<sup>1-3</sup> HIV-infected women are disproportionately impacted by cervical cancer and have significantly higher risk of screening positive for cervical cancer compared to HIV-uninfected women.<sup>4-6</sup> Kenya's national guidelines recommend screening all HIV-infected women annually,<sup>7-8</sup> yet screening rates among women living with HIV are lower than HIV-uninfected women.<sup>9</sup> Lower screening rates among HIV-infected women may be attributed to vertically-focused programs and funding for HIV, but reasons for lack of screening coverage have not been well characterized.

Screen and treat technologies such as visual inspection with acetic acid (VIA) followed by cryotherapy and/or Loop Electrosurgical Excision Procedure (LEEP), have been successfully adopted in low- and middle-income countries (LMIC) and allow mid-level providers to offer integrated screening and treatment during primary care or regular antiretroviral therapy (ART) visits. Integration of reproductive health in HIV care has been shown to increase uptake of health services and is accepted by clients and healthcare workers.<sup>10-12</sup> However, integration can also introduce challenges of increased workload for service providers, fragmented care, and protectiveness over funds historically reserved for HIV-specific care.<sup>10,13,14</sup> Integrating cervical cancer screening into HIV care has been shown to be feasible and acceptable in many LMIC,<sup>15</sup> but success of integration efforts may be impacted by HIV burden.

Individual barriers to cervical cancer screening among HIV-infected women may be similar to HIV-uninfected women, including less education, lower income, rural residence, and lack of knowledge about cervical cancer or human papillomavirus (HPV).<sup>9,16-19</sup> Additionally, the complexity of Kenya's national guidelines, in which screening recommendations differ based on age, HIV status, and clinical equipment may introduce confusion and challenges to implementation at the provider-level.

It is important to identify geographic and individual-level factors that impact cervical cancer screening rates among HIV-infected women to improve integrated service delivery. We examined the relationship between county-level HIV burden and delivery of cervical cancer screening at facilities providing ART in Kenya and identified demographic factors associated with screening.

## **METHODS**

### *Study Design and Sampling*

We conducted a cross-sectional study of HIV-infected women to assess integration of family planning services in 108 HIV Care and Treatment Facilities serving more than 1,000 female ART clients annually in seven of eight regions of Kenya. The Northeastern region was excluded from sampling as there were no facilities with >1,000 female ART clients per year. Women were eligible for study participation if they were HIV-infected, between the ages of 15-49 years, reported having vaginal intercourse in the previous 6 months, able and willing to provide informed consent, and received care at the selected facilities included in the study. Women who were currently pregnant or previously underwent sterilization or a hysterectomy were excluded. The study was conducted between June and September 2016; in July 2016 questions on cervical cancer screening were added to the questionnaire for HIV-infected clients. In this study, we analyzed data from women aged 18-49 years who were asked questions about cervical cancer.

### *Study Procedures*

The survey was administered by a trained study nurse in a private area within each facility. Median duration of surveys was ~30 minutes and women were screened in local languages, as preferred. The survey assessed sociodemographics, obstetric history, sexual history, and HIV treatment. Women were asked a series of questions on their familiarity with cervical cancer screening including questions about receiving cervical cancer screening and true/false questions to assess knowledge about screening.

This study was approved by the University of Washington Institutional Review Board, the Kenya Medical Research Institute Scientific and Ethics Review Unit, and the Associate Director for Science at the U.S. Centers for Disease Control and Prevention.

### *Key Definitions and Statistical Analysis*

We defined up to date cervical cancer screening as screening within the past 12 months based on the Kenya National Guidelines recommendation for annual screening among HIV-infected women.<sup>7,8</sup> We defined ever screened for cervical cancer screening as being screened at least once with either a pap smear or VIA. County-level HIV burden was defined as designated by the Kenya Country Operation Plan (COP) 2015 Strategic Direction Summary.<sup>20</sup> Counties were classified based on the President's Emergency Plan for AIDS Relief (PEPFAR) Kenya strategy of

scale-up of funding to reach 80% ART coverage in high- and medium-HIV burden counties and passive or sustained financial support in low-burden counties.<sup>20</sup>

We accounted for facility-level clustering and applied a sampling weight to account for the subset of facilities that collected cervical cancer data in all analyses. Chi-square tests and t-tests with robust standard errors were used to compare continuous and categorical variables, respectively. We identified correlates of cervical cancer screening among HIV-infected women using univariate Poisson generalized linear models with a log-link function, which is appropriate for non-rare binary outcomes.<sup>21,22</sup> We assessed collinearity by calculating the variance inflation factor (VIF): VIF values <10 indicated lack of collinearity.<sup>23,24</sup> STATA 15 (College Station, TX) svy commands were used for all analyses.

ArcGIS 10 (Redlands, CA) was used to map the location of HIV Care and Treatment programs by county-level HIV burden. We calculated median cervical screening rates among women attending each facility and classified facilities with rates above the median as offering integrated cervical cancer screening.

## RESULTS

Overall, 3,007 clients attending 67 ART clinics in 21 counties across Kenya were included in this analysis. The mean age was 34 years old, 42% had a secondary education or higher, and 77% were employed (Table 1). The mean time since HIV diagnosis was six years. Nearly all women (97%) were on ART, with a mean duration of time on ART of five years. The majority (78%) attended clinics in a county designated as high- or medium-HIV burden (Figure 1). Demographic characteristics were similar by county HIV burden. However, women in low-HIV burden counties were slightly older, with more than half (55%) between the ages of 35-49, compared to 44% in high- or medium-burden counties ( $p=.008$ ). Almost half (47%) of women living in high- or medium-HIV burden counties reported traveling an hour or more to reach their clinic, compared to 38% of women in low-burden counties ( $p=.02$ ).

### *Cervical Cancer Screening*

1,671 (56%) women reported ever being screened. Among women screened, 804 (48%) received screening services within the past 12 months and were classified as having up to date screening. Receipt of cervical cancer screening was associated with secondary education or higher [prevalence ratio (PR): 1.24, 95% confidence interval (CI): 1.02, 1.50], being employed (PR: 1.83, 95% CI: 1.49, 2.25), and being married (PR: 1.25, 95% CI: 1.00, 1.56) (Table 2, Figure 2).

Compared to women aged 18-24 years, women 25-34 years old were 2.32 times more likely to be screened (PR: 2.32, 95% CI: 1.85, 2.91) and women aged 35-49 were 2.71 times more likely to be screened (PR: 3.55, 95% CI: 2.71, 4.66). For each additional year since HIV diagnosis, prevalence of screening increased 13% (PR: 1.13/year average increase, 95% CI: 1.10, 1.17), and for each year on ART, prevalence of screening was 12% higher (PR: 1.12/year average increase, 95% CI: 1.09, 1.16). Age, education, employment, marital status, and years since HIV diagnosis remained significantly associated with cervical cancer screening in a multivariate model (Table 2).

Women aged 18-24 were most likely to have received cervical cancer screening within the past 12 months (61%). Women aged 35-49 years were least likely (44%, PR compared to age 18-24: 0.50, 95% CI: 0.34, 0.73) to be up to date with screening, followed by women aged 25-34 (58%, PR compared to age 18-24: 0.66, 95% CI: 0.46, 0.96) (Table 3). Employed women were more likely to have up to date screening than unemployed women (50% vs. 38%, PR: 1.61, 95% CI: 1.18, 2.20). In a multivariate model adjusting for employment, women aged 25-34 and aged 35-39 were 42% and 59% less likely to be up to date with screening, respectively (APR comparing age 25-34 to 18-24: 0.58, 95% CI: 0.38, 0.87; APR comparing age 35-49 to 18-24: 0.41, 95% CI: 0.27, 0.64). Employment remained associated with up to date screening (APR: 1.83, 95% CI: 1.32, 2.55).

### *Knowledge and Familiarity with Cervical Cancer Screening*

Overall, women were knowledgeable about cervical cancer. The majority of women had heard of cervical cancer (92%) and cervical cancer screening (89%). Most women correctly answered questions about cervical cancer screening, symptoms, and prevention (59-63%), but only one third (36%) knew cervical cancer is treatable (Table 4). Women with a history of cervical cancer screening were approximately twice as likely to correctly answer questions (45-79%) as women who had never been screened (25-47%).

## **DISCUSSION**

In this large national evaluation in Kenya, we found half of women had a history of cervical cancer screening, and 48% of these women were up to date with screening. Cervical cancer screening among HIV-infected women was substantially higher than national estimates of 3-14%<sup>17,25</sup> and previously reported screening prevalence in other studies among the general population in Kenya (6-14%).<sup>9,18,19</sup> The high screening prevalence in our study may be attributed to higher engagement

in care, as nearly all women (97%) were on ART which requires regular contact with the health care system.

Our findings are consistent with previous research in Kenya that found women who were older, more educated, and wealthier—which is often linked to employment and being married—were more likely to receive cervical cancer screening.<sup>9,17,18</sup> However, few studies have assessed screening among HIV-infected women specifically. Women who are educated and employed are more likely to be empowered, have access to information, and have increased social and clinical support. These characteristics may increase social capital, which has been associated with cervical cancer screening.<sup>26,27</sup> We also found screening rates were higher among women with a longer time since HIV diagnosis, which may reflect more opportunities for screening due to longer engagement in care. These results reflect the importance of integrating cervical cancer screening into regular HIV care as a strategy to increase the number of opportunities for screening.

In our study, cervical cancer screening rates did not vary by county-level HIV burden (Figure 3a). These results are promising and suggest that facility-level factors that may differ by HIV burden, including funding for reproductive health services, provider training, and time for allotted for service provision do not impact cervical cancer screening delivery for HIV-infected women. While other studies have found that screening rates are lower among women living in rural areas, we did not find any association between travel time to clinic, which may serve as a proxy measure for rural residence, and cervical cancer screening. However, women in our study were on ART, which requires frequent visits to a clinic for treatment refills.

While older women were more likely to have ever received screening, they were less likely to have up to date screening (Figure 3b). Despite more opportunities for screening over time, these results may suggest that women receive screening at a younger age but may not receive screening in subsequent years when they are at highest risk of developing cervical lesions. Age is a well-documented risk factor for cervical lesions and progression to cancer.<sup>28</sup> It is important to balance the need to screen young HIV-infected women, while also prioritizing timely screening of women at highest risk of cervical lesions and cancer due to combined risk of age and HIV status. Since this study was conducted, the Kenya National Guidelines for screening HIV-infected women increased from 18 to 25 years, or at the time of diagnosis.<sup>7,8,29</sup> These updated guidelines more closely follow WHO recommendations to prioritize women aged 30-49 years old and continue to screen when diagnosed with HIV.<sup>28</sup> Monitoring and evaluation of cervical cancer screening rates following the release of these guidelines is critical to determine whether this guideline change will increase the proportion of women who receive annual screening.

We found that familiarity with, and knowledge of, cervical cancer screening and symptoms was higher among women who had previously been screened for cervical cancer. These results are consistent with prior research showing higher cervical cancer screening rates among women with knowledge of HPV and cervical cancer.<sup>9,16,18</sup> However, we found that only 36% of women knew that cervical cancer is a treatable disease, suggesting that patient education of cervical cancer treatment may not be as common as education of prevention and screening.

Our study had several strengths. We had a nationally representative sample of female clients who attend large ART facilities across the country. We also assessed up to date with screening according to national guidelines, which has not been well categorized in previous research in LMICs. Our participants included HIV-infected women, which allowed us to examine clinical factors related to HIV care and their relationship to screening outcomes. Our study also had some limitations. Results may not be generalizable to HIV-infected women who did not attend HIV Care and Treatment Programs or who sought care at lower volume clinics. We cannot distinguish between women who were not offered versus declined screening and did not ascertain detailed information about the workforce or technical capacity for providers in facilities to offer cervical cancer screening. We were also unable to assess temporality between knowledge of cervical cancer and screening receipt.

Integrating cervical cancer screening in HIV care has been shown to be an effective approach to improve screening coverage rates among women at highest risk for cancer.<sup>30</sup> We found a substantially higher proportion of HIV-infected women were screened compared to national estimates in the general population, suggesting that frequent interaction with HIV care may be associated with cervical cancer screening receipt. Focusing screening efforts on key populations who are at highest risk of cancer due to HIV infection and age should be combined with efforts to increase access to screening among women with limited social or economic capital. Integrating cervical cancer services into HIV care can increase opportunities for screening and treatment among women attending ART clinics who are unemployed, unmarried, or less educated and may be less likely to access cervical cancer screening. Further research is needed to classify structural and cultural barriers to screening and inform healthcare providers on how to reach clients who are at highest risk for missed screening opportunities. Additionally, research is needed to better understand facility-level barriers to delivery of screening to support integration efforts and equip facilities with the resources needed to deliver equitable, high quality screening services and subsequent treatment.

**Table 1** Characteristics of Kenyan women attending HIV Care and Treatment Programs, by county-level HIV burden, 2016

	High/Medium Burden County (n=2363)		Low Burden County (n=678)		Total (n=3041)	
	n <sup>1</sup>	n [%] or mean [SE]	n [%] or mean [SE]	n [%] or mean [SE]	n [%] or mean [SE]	
<b>Sociodemographic</b>						
Age Categories (years)	3041					
18 - 24		307 [13%]	63 [9%]	370 [12%]		
25 – 34		1007 [43%]	245 [36%]	1252 [41%]		
35 - 49		1049 [44%]	370 [55%]	1419 [47%]		
Age (years)	3041	33 [.31]	35 [.49]	34 [.28]		
Secondary Education or Higher	3040	992 [42%]	275 [41%]	1267 [42%]		
Employed	3032	1821 [77%]	524 [78%]	2345 [77%]		
Household Monthly Income ≥10,000 KSH	2499	1138 [43%]	216 [57%]	1354 [54%]		
Married	3029	1410 [60%]	370 [55%]	1780 [59%]		
≥1 Hour Travel Time to Clinic	3031	898 [47%]	319 [38%]	1217 [40%]		
Number of Lifetime Sexual Partners	2755	3 [.10]	3 [.14]	3 [.08]		
<b>HIV Clinical History</b>						
Years Since HIV Diagnosis	2912	6 [.16]	6 [.23]	6 [.13]		
Currently on ART	3041	2280 [96%]	663 [98%]	2943 [97%]		
Years on ART	2822	5 [.11]	5 [.27]	5 [.10]		
WHO Clinical Staging (Self-reported)	3041					
I/II (Early)		967 [41%]	228 [34%]	1195 [39%]		
III/IV (Advanced)		121 [5%]	19 [3%]	140 [5%]		
Don't Know		1275 [54%]	431 [64%]	1706 [56%]		
<b>Reproductive History</b>						
Number of Live Births	2722	3 [.07]	3 [.11]	3 [.07]		

<sup>1</sup> Number of observations with complete information included in the model.

**Table 2** Correlates of ever being screened for cervical cancer among Kenyan women attending HIV Care and Treatment Programs, 2016 (n=3007)

	Ever Screened							
	n (%) or mean (SE)				Poisson generalized linear models			
	n <sup>1</sup>	Yes	No	p <sup>2</sup>	Crude PR (95% CI)	p	Adjusted PR <sup>3</sup> (95% CI)	p
<b>Geographic</b>								
High/Medium-HIV Burden County	3007	1246 (41%)	1090 (36%)	.08	.66 (0.41, 1.06)	.08		
<b>Sociodemographic</b>								
Age Categories (in years)	3007			<b>&lt; .001</b>				
18 - 24		119 (4%)	243 (8%)		Ref	-	Ref	-
25 - 34		659 (22%)	580 (19%)		2.32 (1.85, 2.91)	<b>&lt;.001</b>	1.79 (1.40, 2.27)	<b>&lt;.001</b>
35 - 49		893 (30%)	513 (17%)		3.55 (2.71, 4.66)	<b>&lt;.001</b>	2.26 (1.68, 3.05)	<b>&lt;.001</b>
Secondary Education or Higher	3006	738 (25%)	521 (17%)	<b>.03</b>	1.24 (1.02, 1.50)	<b>.03</b>	1.45 (1.19, 1.77)	<b>&lt;.001</b>
Employed	2998	1370 (46%)	950 (32%)	<b>&lt; .001</b>	1.83 (1.49, 2.25)	<b>&lt;.001</b>	1.55 (1.24, 1.93)	<b>&lt; .001</b>
Household Monthly Income (KSH) ≥ 10,000	2473	798 (32%)	541 (22%)	.11	1.18 (0.96, 1.46)	.11		
Married	2996	1018 (34%)	742 (25%)	<b>.05</b>	1.25 (1.00, 1.56)	<b>.05</b>	1.27 (1.01, 1.59)	<b>.04</b>
≥1 Hour Travel Time to Clinic	2999	644 (21%)	559 (19%)	.14	0.87 (0.72, 1.05)	.14		
Number of Lifetime Sexual Partners	2728	3 [.12]	3 [.10]	.76	1.01 (0.96, 1.05)	.76		
<b>Clinical History</b>								
Years Since HIV Diagnosis (per year increase)	2886	7 [.16]	5 [.17]	<b>&lt; .001</b>	1.13 (1.10, 1.17)	<b>&lt;.001</b>	1.09 (1.04, 1.13)	<b>&lt; .001</b>
Years on ART (per year increase)	2793	5 [.14]	4 [.13]	<b>&lt; .001</b>	1.12 (1.09, 1.16)	<b>&lt;.001</b>	1.03 (0.99, 1.08)	.10
<b>Reproductive History</b>								
≥ 3 Live Births	2697	836 (31%)	580 (22%)	.16				

<sup>1</sup> Number of observations with complete information included in the model.

<sup>2</sup> Chi-square tests for proportions and t-tests for continuous measures.

<sup>3</sup> Adjusted for age (categorical), secondary education, employment, marital status, years since HIV diagnosis, and years on ART.

**Table 3** Correlates of up to date<sup>1</sup> cervical cancer screening among Kenyan women attending HIV Care and Treatment Programs, 2016 (n=1671)

	Ever Screened							
	n (%) or mean (SE)				Poisson generalized linear models			
	n <sup>2</sup>	Yes	No	p <sup>3</sup>	Crude PR (95% CI)	p	Adjusted PR <sup>4</sup> (95% CI)	p
<b>Geographic</b>								
High/Medium-HIV Burden County	1671	600 (36%)	646 (39%)	.98	1.01 (0.65, .56)	.98		
<b>Sociodemographic</b>								
Age Categories (in years)	1671			<b>&lt;.001</b>				
18 - 24		73 (4%)	46 (3%)		Ref	-	Ref	-
25 - 34		338 (20%)	321 (19%)		0.66 (0.46, 0.96)	<b>.03</b>	0.58 (0.38, 0.87)	<b>.009</b>
35 - 49		393 (24%)	500 (30%)		0.50 (0.34, 0.73)	<b>&lt;.001</b>	0.41 (0.27, 0.64)	<b>&lt;.001</b>
Secondary Education or Higher	1670	381 (23%)	357 (21%)	.06	1.29 (0.99, 1.68)	.06		
Employed	1669	688 (41%)	682 (41%)	<b>.003</b>	1.61 (1.18, 2.20)	<b>.003</b>	1.83 (1.32, 2.55)	<b>&lt;.001</b>
Household Monthly Income (KSH) ≥ 10,000	1427	384 (22%)	414 (22%)	.72	0.94 (0.68, 1.31)	.72		
Married	1664	490 (29%)	528 (32%)	.89	1.02 (0.78, 1.33)	.89		
≥1 Hour Travel Time to Clinic	1669	308 (18%)	336 (20%)	.88	0.98 (0.72, 1.32)	.88		
Number of Lifetime Sexual Partners	1531	3 [.11]	3 [.17]	.33	1.02 (0.98, 1.06)	.33		
<b>Clinical History</b>								
Years Since HIV Diagnosis (per year increase)	1612	7 [.17]	7 [.22]	.09	0.97 (0.94, 1.00)	.09		
Years on ART (per year increase)	1562	5 [.15]	5 [.17]	.16	0.98 (0.95, 1.01)	.16		
<b>Reproductive History</b>								
≥3 Live Births	1555	377 (24%)	459 (30%)	.20	0.86 (0.68, 1.09)	.20		

<sup>1</sup> Up to date cervical cancer screening defined as self-reported screening within the past 12 months.

<sup>2</sup> Number of observations with complete information included in the model.

<sup>3</sup> Chi-square tests for proportions and t-tests for continuous measures.

<sup>4</sup> Adjusted for age (categorical) and employment.

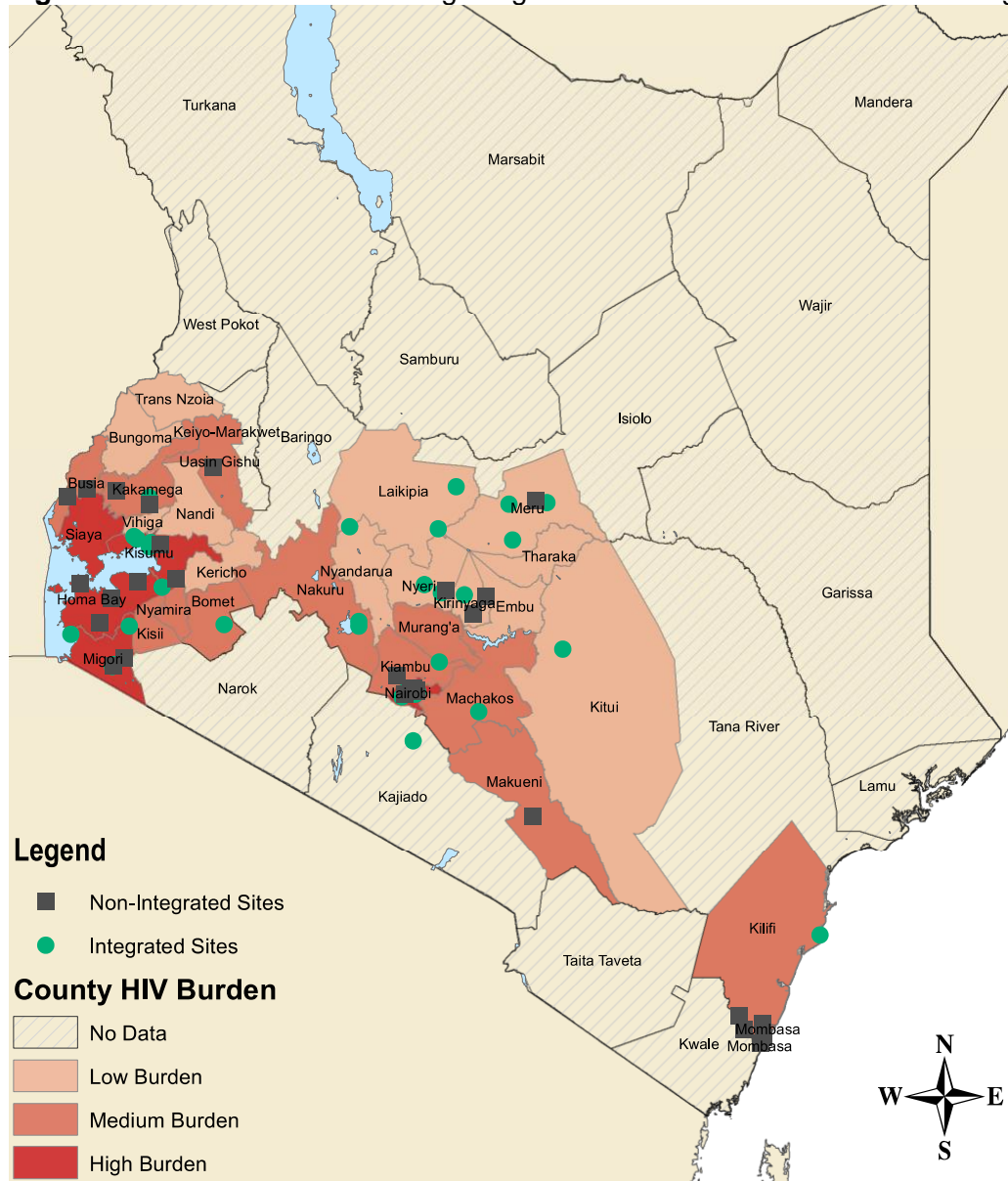
**Table 4** Knowledge of cervical cancer screening among Kenyan women attending HIV Care and Treatment Programs, by screening outcome, 2016

	Answer <sup>1</sup>	Never Screened (n=1336)	Screened (n=1671)	Total (n=3007)
		n [%]	n [%]	n [%]
Screening tests look for changes on your cervix that indicate you are risk for cancer.	<b>TRUE*</b>	470 [35]	1320 [79]	1790 [59]
	FALSE	53 [4]	88 [5]	141 [5]
	DON'T KNOW	813 [61]	263 [16]	1076 [36]
Women should only be screened for cervical cancer when they have cancer symptoms.	TRUE	200 [15]	315 [19]	515 [17]
	<b>FALSE*</b>	546 [41]	1232 [74]	1778 [59]
	DON'T KNOW	590 [44]	124 [7]	714 [24]
If a woman has abnormal vaginal bleeding, discharge, or pain, she should see a medical provider to get screened for cervical cancer.	<b>TRUE*</b>	622 [47]	1302 [78]	1924 [63]
	FALSE	57 [4]	143 [9]	200 [7]
	DON'T KNOW	657 [49]	226 [14]	883 [30]
Cervical cancer can be prevented.	<b>TRUE*</b>	572 [43]	1205 [72]	1777 [59]
	FALSE	89 [7]	141 [8]	230 [8]
	DON'T KNOW	675 [51]	325 [19]	1000 [34]
Screening tests can help prevent cervical cancer.	<b>TRUE*</b>	572 [43]	1225 [73]	1797 [59]
	FALSE	99 [7]	192 [11]	291 [10]
	DON'T KNOW	665 [50]	254 [15]	919 [31]
There is no treatment for cervical cancer.	TRUE	319 [24]	539 [32]	858 [28]
	<b>FALSE*</b>	330 [25]	775 [45]	1085 [36]
	DON'T KNOW	687 [51]	377 [23]	1064 [36]

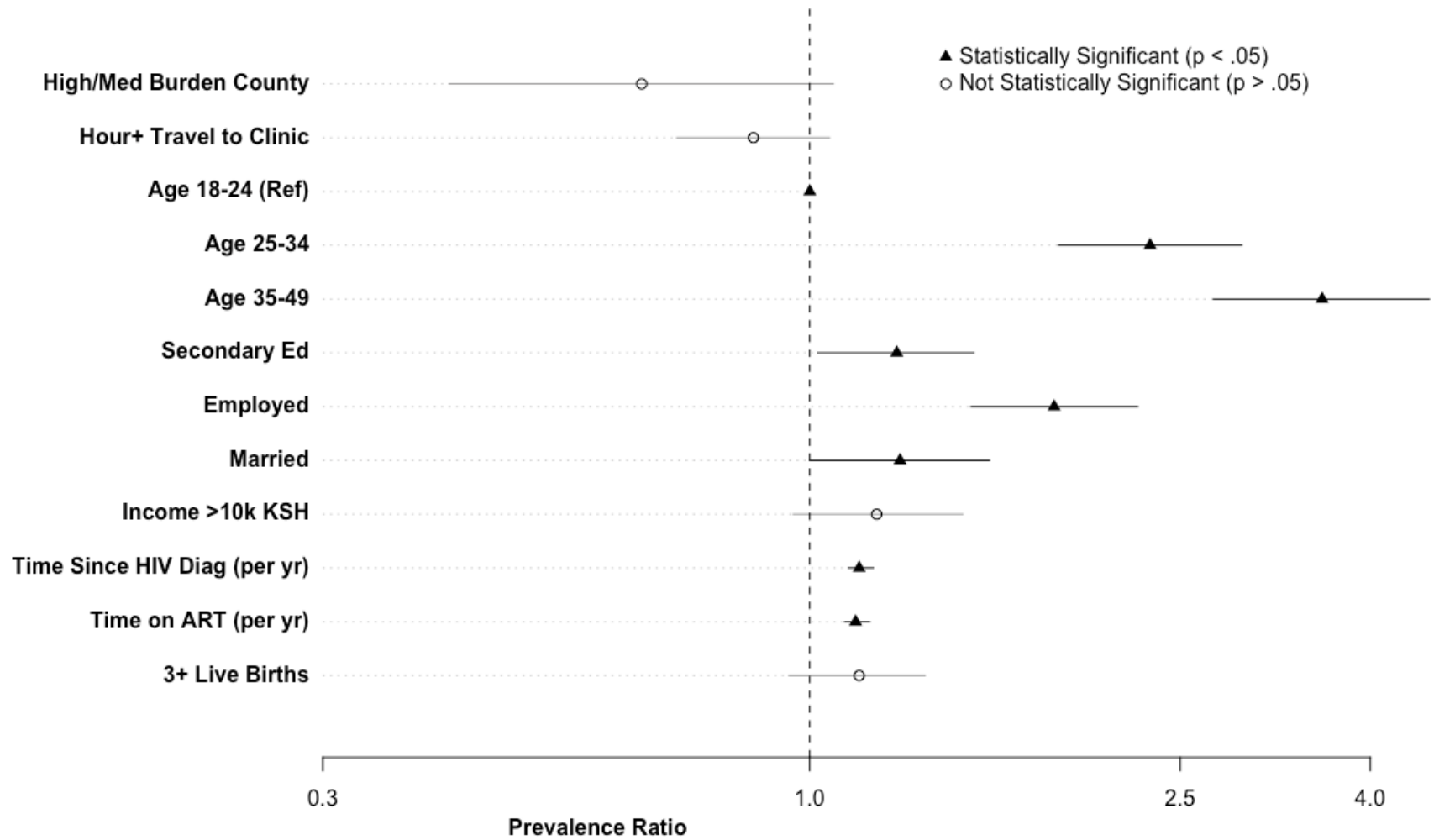
\*Chi-square tests,  $p < .05$ .

<sup>1</sup> Correct answers shaded and bolded.

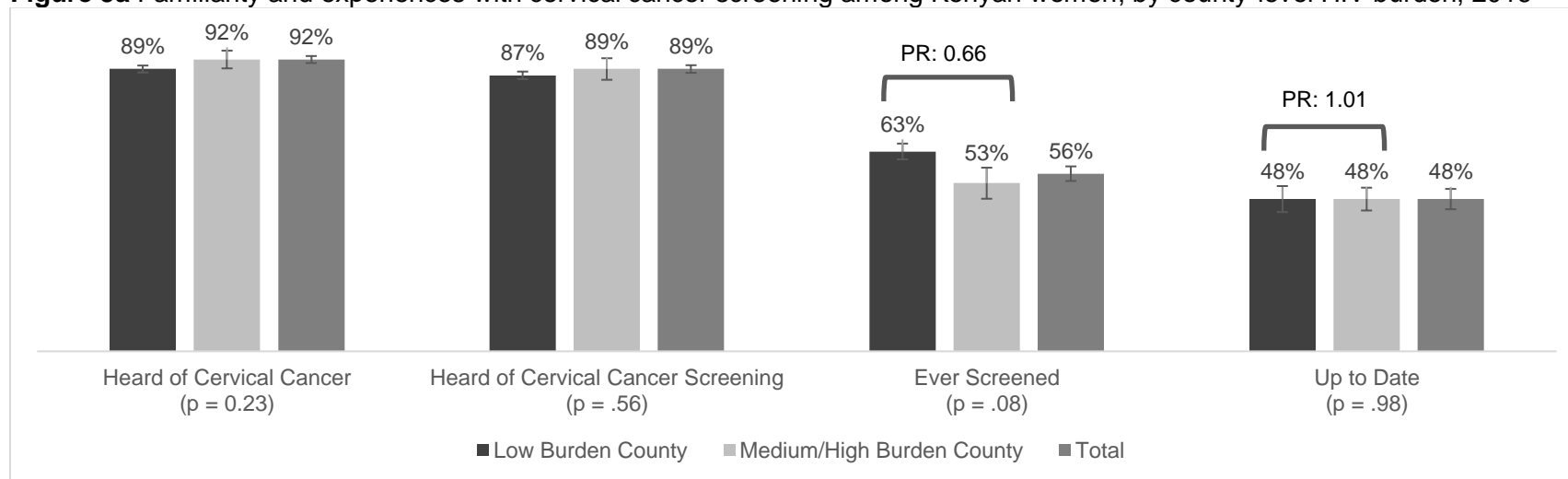
**Figure 1** Cervical cancer screening integration in HIV Care and Treatment Programs: by county-level HIV burden



**Figure 2** Univariate correlates of cervical cancer screening among HIV-infected women in Kenya

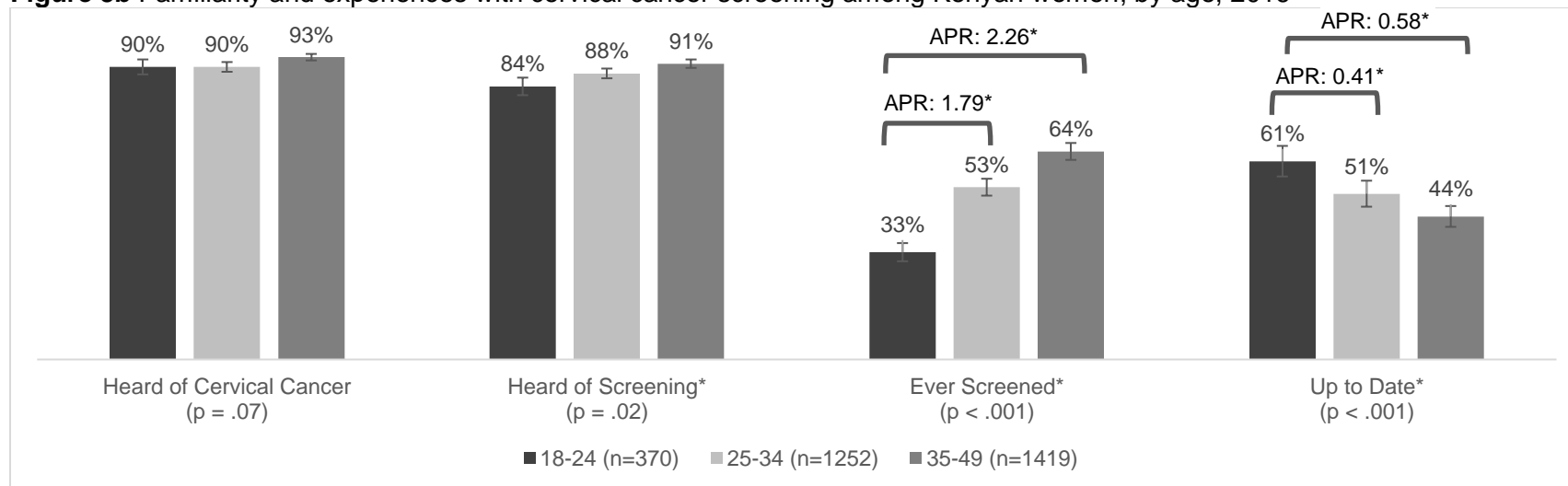


**Figure 3a** Familiarity and experiences with cervical cancer screening among Kenyan women, by county-level HIV burden, 2016



\*Generalized linear models,  $p < .05$

**Figure 3b** Familiarity and experiences with cervical cancer screening among Kenyan women, by age, 2016



\*Generalized linear models,  $p < .05$ .

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