



HHS Public Access

Author manuscript

Int J Gynecol Cancer. Author manuscript; available in PMC 2015 May 19.

Published in final edited form as:

Int J Gynecol Cancer. 2012 May ; 22(4): 638–644. doi:10.1097/IGC.0b013e318249470a.

Cervical Cancer Awareness and Screening in Botswana

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Abstract

Objective—Cervical cancer remains a leading cause of death in many developing countries due to limited screening by Papanicolaou (Pap) smear. We sought to better understand women's beliefs about cervical cancer and screening in Botswana, a middle income African country with high rates of cervical cancer.

Methods—We interviewed 289 women attending general medicine or human immunodeficiency virus (HIV) clinics, where Pap testing was available, in Gaborone, Botswana in January 2009.

Results—About three-quarters (72%) of respondents reported having ever had a Pap smear. HIV-positive women were more likely to have had a Pap smear than HIV-negative women (80% vs. 64%, OR=1.97, 95% CI: 1.10, 3.55). Screening was also more common among women who were older, had higher incomes, or had heard of cervical cancer. Almost all participants reported a desire to have a Pap smear. Reasons included to determine cervical health (56%), to improve overall health (33%), and to obtain early treatment (34%). About half (54%) of respondents said they did not know what causes cervical cancer, and almost none attributed the disease to HPV infection.

Conclusion—Study findings can inform interventions that seek to increase cervical cancer awareness and uptake of screening as it becomes more widely available.

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Keywords

cervical cancer; Pap smear; screening; Africa; prevention

Introduction

Cervical cancer is the second most common cancer among women worldwide, with about 80% of the cases occurring in less-developed countries.¹ North America and Europe have age-standardized incidence rates of about 6 and 11 cases of cervical cancer per 100,000 woman-years, respectively, while sub-Saharan Africa has one of the highest incidence rates at 32 cases per 100,000 woman-years.² Mortality rates in the US are very low at 2 cases per 100,000 woman-years compared to the high rate in sub-Saharan Africa of 23 cases per 100,000 woman-years.² In sub-Saharan Africa, cervical cancer makes up the largest proportion of years of life lost due to cancer,¹ because of its typically young age at onset, between 35 and 50 years.³

The human immunodeficiency virus (HIV) and acquired immune deficiency syndrome (AIDS) epidemic in sub-Saharan Africa contributes to the high prevalence of HPV infection and cervical cancer as women infected with HIV are at increased risk of acquiring infection with HPV.⁴ HIV-positive women are also six times more likely to develop cervical cancer compared to those not infected with HIV,⁵ and cervical cancer is considered an AIDS defining illness.⁶

While cervical cancer incidence rates have decreased dramatically in developed nations over the past 40 years, incidence rates remain stable in less-developed countries, including those in sub-Saharan Africa. This results from a lack of screening implementation or, where implemented, poor screening coverage and quality.¹ Severely limited health resources make it difficult to transfer successful approaches to cervical cancer prevention and treatment from developed country settings.⁷ As a result, women may frequently go undiagnosed until cervical disease has reached an advanced and untreatable stage. In developing countries, the majority of cases are diagnosed at a late stage of disease,⁸ with as many as 80% of cervical cancer cases diagnosed at stage III or higher.⁹

Cervical cancer screening in Botswana is similarly limited and currently unable to reduce the disease burden. The country lacks the general infrastructure to support widespread screening and subsequent recall of women who have tested positive to receive follow-on treatment. Existing screening resources are concentrated in urban areas, where screening is typically opportunistic, with many screenings performed on women previously screened. Thus, the majority of women presenting with cervical cancer are those who have never been screened.

This study investigated prior receipt of a Papanicolaou (Pap) smear among women seeking health care in Gaborone, Botswana in clinics with access to Pap screening services. The study also examined women's beliefs about causes of cervical cancer and reasons for undergoing a Pap smear. We hypothesized that HIV-positive women would be more likely to have had a Pap smear than HIV-negative women, because they are more involved in

health care services. We also hypothesized that women with higher incomes would be more likely to have had a Pap smear due to greater resources to seek and obtain the health care services that they need.

Methods

Participants and Procedures

In January 2009, interviewers identified potential study participants at two public health clinics in Gaborone, the capital of Botswana. An HIV clinic provided highly subsidized care to individuals living with HIV, and a general medicine clinic provided highly subsidized care to all adult citizens. Both clinics had access to Pap smear services. While 376 adults completed the questionnaire, we report results from 289 female respondents (77% of total participants) who answered questions about cervical cancer.

Local Botswana high school graduates conducted interviews as part of a capacity building collaboration with the Botswana government. Interviewers received training about cervical cancer and appropriate translations for medical terminology from a Motswana obstetrics and gynecology physician. They memorized scripts to achieve consistency during introductions, interviews, and informed consent and received constructive criticism throughout the interview month. The three interviewers rotated among study sites and three experienced research nurses affiliated with the Botswana-UPenn Partnership, provided supervision.

On weekday mornings, patients waited to see a provider in a large general seating area on a first come, first served basis. Interviewers asked people interested in volunteering to join the study to raise their hands and later obtained verbal consent. About half of the adults attending the clinics participated in the study. Participants received no monetary, food, or other incentives for completing the questionnaire. Interviewers offered questionnaires in either Setswana or English, interviewers read the questionnaire for the few individuals that self-identified as unable to read or who preferred this option. The Institutional Review Boards at the University of Pennsylvania, Princess Marina Hospital, and the Botswana Ministry of Health approved this study.

Measures

A native Motswana resident translated the English questionnaire to and from Setswana with the assistance of a Motswana obstetrics and gynecology physician. We resolved discrepancies through discussion. The cultural appropriateness of the content and general reading level was initially tested with three Botswana women, both lay people and medical staff. Based on these interviews, we made final revisions to the questionnaire, which totaled five pages. The questionnaire is available online at <http://www.unc.edu/~ntbrewer/hpv.htm>.

The main outcome measure was self-report of ever having had a Pap smear. The questionnaire provided participants with a brief written explanation on the purpose of a Pap smear and how doctors perform the test. The questionnaire then asked women if they had ever had a Pap smear and if they were willing to get a Pap smear in the next year. The questionnaire asked participants to list the reason why they would or would not be willing to get a Pap smear in the next year, accompanied by three short answer spaces for responses.

Participants were also asked to list up to three things that can cause cervical cancer. Three people independently translated each of the short answer responses from Setswana to English. Any discrepancies were subsequently discussed and resolved to obtain the most accurate translation of the response.

Data Analysis

We used bivariate logistic regression models to examine correlates of women having ever had a Pap smear. We entered statistically significant ($p < 0.05$) covariates in a multivariate logistic regression model using a forward stepwise procedure, as a simultaneous regression model was unstable. Our oversampling of persons with HIV prompted us to explore interactions with HIV status. As interaction terms were not statistically significant at a level greater than chance, we do not discuss the issue further. We analyzed data using SPSS version 19.0 (SPSS Inc., Chicago IL). All statistical tests were two-tailed, using a critical alpha of 0.05.

Results

About three-quarters (71%) of participants were over 30 years of age (Table 1). Women's education levels were distributed about equally between three levels: primary education or less (35%), secondary education (43%), or tertiary and higher (22%). Half of all respondents (53%) had no regular monthly income, and another 30% made less than 2500 pula (~\$360 US) per month, an amount considered low income by Batswana federal government tax bracket.¹⁰ Similar numbers of female respondents were from the general medicine and HIV clinics. Around half of respondents (56%) reported infection with HIV. Nine percent reported a history of genital warts, and 24% reported a history of sexually transmitted infections. Women seen at the HIV clinic were older, less likely to be currently married, less educated, less wealthy and more likely to have had genital warts or sexually transmitted infections than those seen at the general medicine clinic (all $p < .05$).

Cervical cancer

Most (77%) of respondents had heard of cervical cancer prior to the questionnaire and 18% knew someone with cervical cancer. Ten percent of the women ($n=29$) stated they had a personal history of cervical cancer. Of these women, 20 reported being infected with HIV, and 9 stated they were HIV-negative. Just over one-third (37%) of the respondents had heard of HPV prior to the questionnaire.

When asked to list up to three causes of cervical cancer, 54% of the respondents included "I don't know" as a response (Table 2). The most common causes mentioned were unprotected sex or HIV (40%), vaginal or genital infections (38%), inserting foreign matter in the vagina (19%), and multiple sex partners (15%). Only 3 respondents (1%) identified HPV as the cause of cervical cancer. When asked how HIV infection affected the risk of cervical cancer, less than half (47%) of respondents said they believed that HIV infection increases the risk.

Screening

Most women (72%) reported having had a Pap smear in the past. Almost all women (95%) reported that they would be willing to have a Pap smear if given the opportunity. Reasons for desiring a Pap smear included to determine cervical health (56%), to improve overall health (33%), to obtain early treatment (34%), and because of symptoms (10%) (Table 3).

In multivariate analysis that included age, income, HIV diagnosis, and prior knowledge of cervical cancer, women over 30 years of age were more likely to have had a Pap smear than younger women (OR=1.99, 95% CI: 1.07, 3.71) (Table 4). Women earning a regular income were more likely to have had a Pap smear than those without a regular income source (OR=1.90, 95% CI: 1.05, 3.46). HIV-positive women were more likely to have had a Pap smear than HIV-negative women (OR=1.97, 95% CI: 1.10, 3.55). Women who had previously heard of cervical cancer were more likely to have had a Pap smear than those who had not heard of cervical cancer (OR=3.28, 95% CI: 1.73, 6.24). Attending the HIV clinic and having children were associated with having had a Pap smear in bivariate analyses, but not in the multivariate analysis.

Discussion

Nearly all women in our study were willing to receive a Pap smear if the procedure were offered to them. Motivations for testing included assessing personal cervical health, improving overall health, and determining if treatment is necessary. This nearly universal enthusiasm for cervical cancer screening is encouraging and is similar to other countries. A national survey of older adults in the United States found that 87% believed that routine cancer screening is almost always a good idea.¹¹ The enthusiasm for cancer screening in Botswana suggests that there will likely be high uptake of Pap smear as it becomes more widely available.

Cytology registers at the 2 referral labs in the country documented around 10,000 Pap smear slides registered in 2005, compared to around 43,000 slides in 2010 (D. Ramogola-Masire, personal communication). However, many of the women screened had received multiple tests possibly due to inadequate specimen or concomitant infection. As roughly 150,000 Botswana women need screening each year, current prevention services are clearly inadequate. While Pap smears can be expensive, other lower cost screening methods may be more suitable for low resource settings. These include the acetowhite test, visual inspection after application of 3–5% acetic acid and the same procedure with magnification. The VIA technique has a higher sensitivity but lower specificity as compared to Pap smears¹², and all methods of cervical inspection require substantial training of the provider. In addition, testing for human papillomavirus (HPV) infection, the main cause of cervical cancer, is available for cervical cancer screening of women 30 years of age and over, and has been shown to have a notably higher sensitivity, yet lower specificity than Pap smear testing.¹³ Given the relatively high negative predictive value of HPV testing for future risk of high-grade cervical neoplasia, it may also be another option to be considered in less-developed countries. Our study focused on the Pap smear, because it was the procedure available at the study sites.

Self-reported prevalence of history of Pap smear was 72% among Botswana women attending two clinics that were attached to a larger hospital with a dedicated Pap smear clinic. Patients from both clinics could be referred for Pap smear within these clinical settings; therefore, these patients were almost certainly more likely than anywhere else in the country to have had a Pap smear given the limited availability of cervical cancer screening elsewhere in Botswana. Pap smear use was higher among women from the HIV clinic than the general medicine clinic, perhaps due the greater indications for cervical cancer screening of HIV-positive women. Analyses controlled for variables, including income, on which the clinics differed and that were also associated with Pap use.

A recent meta-analysis of accuracy of self-reported cancer screening histories found high sensitivity of Pap smear self-reporting but low specificity, with the most over-reporting among minority and low-income women.¹⁴ Thus, self-reported histories may over-estimate testing prevalence, because women may not know whether a doctor performed a Pap smear, a pelvic exam or some other procedure. While we acknowledge this potential weakness, we also believe the information on beliefs about testing and cervical cancer and correlates of screening are especially valuable.

The prevalence of Pap smear testing is lower in other studies in sub-Saharan Africa. A study in South Africa found that 41% of women in a clinic reported that they had had ever had a Pap smear.¹⁵ This difference may be due to higher availability of Pap smear services and our sample having a high prevalence of HIV-positive women who had more frequent contact with local clinics resulting in higher prevalence of cervical cancer screening.

Women who reported having been previously screened for cervical cancer were more likely to be older, HIV-positive, receiving a regular income, and have heard of cervical cancer. Other studies have found similar correlates. In Tanzania, women pursuing cervical cancer screening were more likely to be non-agriculturally employed and thus have a secure, regular income.¹⁶ Older Mexican women living near the US border were more likely to have had a Pap smear.¹⁷ Understanding the characteristics of women who have had a Pap smear is important to identifying women who are missed in screening programs. Interventions can be targeted toward these women to improve the population's overall health.

Only around half of our respondents linked Pap smears to cervical health or cervical cancer. As we expected women would have low knowledge, the questionnaire provided a brief, general description of the purpose of Pap smear testing and how one is performed, prior to asking about Pap smear history and willingness and reasons to get a Pap smear. We included this educational brief to increase the reliability of responses about having had a Pap smear by standardizing the definition of the test for study participants, though including this information may have also led to overestimates of knowledge. A previous study in Botswana found that of 30 women surveyed, 10 had appropriate understanding of Pap smear testing while 8 were able to only define the test, 8 had merely heard of the test, and 4 had not heard of Pap smears.¹⁸ Similarly low numbers exist in other developing countries with about 30% of women having heard of Pap smears.^{8,19} Of these, 11% to 33% knew the test was used to detect cervical cancer.^{8,19}

Batswana women's awareness of cervical cancer is similar to or higher than levels in other developing countries. In our study, around three quarters of women had heard of cervical cancer. In other studies in developing countries, 12% to 61% of those surveyed had heard of cervical cancer.^{8,15,19} Many Batswana women did not understand the link between HIV or HPV infection and cervical cancer. In our study, less than half of the participants had heard of HPV, and only three women linked it to cervical cancer. However, half of women listed causes of cervical cancer that correctly identified sexual behaviors that increase the risk of HPV infection and thus cervical cancer. Studies in other developing countries found that of women who had heard of cervical cancer, 12% to 32% of women identified HPV as a risk factor.^{8,19}

These low figures show a widespread lack of understanding of cervical health among women in Botswana. Existing education programs are increasing awareness of common health terms but may not be helping women to understand important risk factors and consequences. Improved health education may be needed for women in Botswana to increase motivation to seek Pap smears even when obstacles exist. Focus groups in Malaysia revealed that, while only 3% of women knew that HPV causes cervical cancer, many desired a basic understanding on how HPV causes cervical cancer, the symptoms, and treatment options.²⁰

Our study findings provide a greater understanding of Batswana women's relationship to cervical cancer and screening. As prevention capacity increases, local agencies can use this information to design interventions to increase cervical cancer screening in women not likely to have received Pap smears in the past. They can also develop educational programs that increase not only cervical cancer awareness but also highlight HPV as a risk factor, making the connection between the infection and the disease. This education will become increasingly important in order to encourage acceptance of the HPV vaccine as it is introduced into developing country settings.

Acknowledgments

Disclosure of Funding: This study was supported by a grant from the American Cancer Society (MSRG-06-259-01-CPPB) and was made possible through core services and support from the Penn Center for AIDS Research (CFAR), an NIH-funded program (P30 AI 045008).

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Table 1Characteristics of respondents ($n = 289$)

	HIV Clinic	General Medicine Clinic	Overall
	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)
Age*			
20–30 years	30 (21)	54 (36)	84 (29)
31–84 years	110 (79)	94 (64)	204 (71)
Marital status*			
Never married	99 (71)	92 (62)	191 (66)
Married or living as married	24 (17)	45 (30)	69 (24)
Divorced, widowed, or separated	17 (12)	12 (8)	29 (10)
Have children			
No	19 (14)	26 (17)	45 (16)
Yes	121 (86)	123 (83)	244 (84)
Education*			
Primary education or less	58 (42)	42 (28)	100 (35)
Secondary education	62 (45)	63 (42)	125 (43)
Tertiary education or more	19 (14)	44 (30)	63 (22)
Monthly income*			
No regular income	69 (51)	77 (53)	146 (52)
<\$360 (2500 pula)	49 (36)	36 (25)	85 (30)
\$360 (2500 pula)	18 (13)	33 (23)	51 (18)
Distance from capital (Gaborone)			
0–30 km	89 (65)	93 (64)	182 (64)
>30 km	48 (35)	53 (36)	101 (36)
Had cervical cancer	18 (13)	11 (7)	29 (10)
Had genital warts*	19 (14)	7 (5)	26 (9)
Had sexually transmitted infection*	49 (35)	20 (14)	69 (24)
HIV status*			
Negative	7 (5)	110 (74)	117 (41)
Positive	132 (94)	31 (21)	163 (56)
Never tested/ Not reported	1 (1)	8 (5)	9 (3)

Note. HIV = human immunodeficiency virus

* $p < 0.05$

Table 2Beliefs about causes of cervical cancer ($n=289$)

	<u>%</u>
Don't know	54
Unprotected sex or HIV	40
Vaginal/genital infections	38
Introducing foreign matter into vagina [†]	19
Multiple sex partners	15
Poor general hygiene or diet	8
Gynecologic problems	6
Smoking or alcohol use	4
Heredity	2
HPV	1

Note. Participants could list up to three causes. HIV = human immunodeficiency virus, HPV = human papillomavirus

[†]Traditional herbs, douching, contraceptive, chemicals, and objects placed in the vagina

Table 3Reasons for desiring a Pap smear ($n=289$)

	<u>%</u>
To know if cervix is healthy	56
To get early treatment	34
Improve overall health	33
Had symptoms	10
To know if can have children	8
Other	9

Note. Participants could list up to three reasons. Responses in the “other” category included to be a role model, to receive education, and to check for infection

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Table 4Correlates of Pap smear receipt among Botswana women ($n = 289$)

	No. women ever had a Pap smear/total no. in category (%)	Bivariate OR (95% CI)	Multivariate OR (95% CI)
Overall	208/287 (72)	--	--
Demographic Characteristics			
Age			
20–30 years	50/ 84 (60)	ref.	ref.
31–84 years	158/202 (78)	2.44 (1.41–4.23)*	1.99 (1.07–3.71)*
Ever married			
No	131/190 (69)	ref.	--
Yes	77/ 97 (79)	1.73 (0.97–3.10)	
Have children			
No	26/ 45 (58)	ref.	--
Yes	182/242 (75)	2.22 (1.15–4.29)*	
More than primary education			
No	70/ 98 (71)	ref.	--
Yes	137/188 (73)	1.08 (0.62–1.85)	
Regular income			
No	102/153 (67)	ref.	ref.
Yes	104/132 (79)	1.86 (1.09–3.17)*	1.90 (1.05–3.46)*
Monthly income \$360			
No	62/ 83 (75)	ref.	--
Yes	44/ 51 (86)	2.13 (0.83–5.44)	
Distance from capital (Gaborone)			
0–30 km	133/180 (74)	ref.	--
> 30 km	71/101 (70)	0.84 (0.49–1.44)	
Study Site			
General medicine clinic	98/148 (66)	ref.	--
HIV clinic	110/139 (79)	1.94 (1.14–3.30)*	
Personal Health			
Had cervical cancer			
No	184/255 (72)	ref.	--
Yes	22/ 29 (76)	1.21 (0.50–2.96)	
Had genital warts			
No	186/258 (72)	ref.	--
Yes	20/ 26 (77)	1.29 (0.50–3.34)	
Had sexually transmitted infection			
No	151/216 (70)	ref.	--
Yes	54/ 68 (79)	1.66 (0.86–3.20)	

	No. women ever had a Pap smear/total no. in category (%)	Bivariate OR (95% CI)	Multivariate OR (95% CI)
HIV status			
Negative	74/116 (64)	ref.	ref.
Positive	130/162 (80)	2.31 (1.34–3.96)*	1.97 (1.10–3.55)*
HPV and Cervical Cancer Beliefs			
Heard of HPV			
No	127/178 (71)	ref.	--
Yes	78/105 (74)	1.16 (0.67–2.00)	
Heard of cervical cancer			
No	32/ 59 (54)	ref.	ref.
Yes	172/221 (78)	2.96 (1.62–5.41)*	3.28 (1.73–6.24)*
Knew someone with cervical cancer			
No	166/236 (70)	ref.	--
Yes	41/ 50 (82)	1.92 (0.89–4.16)	
HIV infection's effect on risk of developing cervical cancer			
No effect/lowers risk	31/ 40 (78)	ref.	--
Raises risk	109/136 (80)	1.17 (0.50–2.75)	
Don't know/No answer	68/111 (61)	0.46 (0.20–1.06)	

Note. HPV = human papillomavirus, OR = odds ratio, CI = confidence interval, ref. =referent group, HIV = human immunodeficiency virus.

*
 $p < 0.05$