

Ohio Appalachian Women's Perceptions of the Cost of Cervical Cancer Screening

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BACKGROUND: Despite evidence of the importance of cervical cancer screening, screening rates in the United States remain below national prevention goals. Women in the Appalachia Ohio region have higher cervical cancer incidence and mortality rates along with lower cancer screening rates. This study explored the expectations of Appalachian Ohio women with regard to Papanicolaou (Pap) test cost and perceptions of cost as a barrier to screening. **METHODS:** Face-to-face interviews were conducted with 571 women who were part of a multilevel, observational community-based research program in Appalachia Ohio. Eligible women were identified through 14 participating health clinics and asked questions regarding Pap test cost and perceptions of cost as a barrier to screening. Estimates of medical costs were compared with actual costs reported by clinics. **RESULTS:** When asked about how much a Pap test would cost, 80% of the women reported they did not know. Among women who reportedly believed they knew the cost, 40% overestimated test cost. Women who noted cost as a barrier were twice as likely to not receive a test within screening guidelines as those who did not perceive a cost barrier. Furthermore, uninsured women were more than 8.5 times as likely to note cost as a barrier than women with private insurance. **CONCLUSIONS:** Although underserved women in need of cancer screening commonly report cost as a barrier, the findings of the current study suggest that women may have a very limited and often inaccurate understanding concerning Pap test cost. Providing women with this information may help reduce the impact of this barrier to screening. *Cancer* 2010;116:4727-34. © 2010 American Cancer Society.

KEYWORDS: Papanicolaou test, disparities, perception of cost, access, cost barriers, underserved populations, Appalachia, cancer screening.

Despite efforts to improve screening rates, Papanicolaou (Pap) test rates remain below the national prevention goal that 90% of women aged ≥ 18 years should have received a Pap test within the past 3 years.¹ In general, screening has proved a particularly important tool for reducing the impact of certain cancers, especially for slow-growing, preventable cancers such as cervical cancer.^{2,3} Nevertheless, data from the 2005 National Health Interview Survey indicated that 1 in 5 women (20%) did not receive a Pap test within the past 3 years.⁴ Given estimates that 11,270 new cases of invasive cervical cancer and 4070 deaths would occur in 2009,⁵ the importance of improving screening rates to improve women's survival rates through early detection cannot be underestimated.

In the Appalachia Ohio region of the United States, an area characterized by lower income, higher unemployment rates, and lower levels of education,⁶⁻⁸ recent research has shown both greater cancer incidence and mortality rates, along with a lower prevalence of cancer screening behaviors.⁹ Cervical cancer incidence rates reported in 2006 were found to be 37% higher among women in Appalachia Ohio compared with women from non-Appalachia Ohio, and mortality rates from cervical cancer were 44% higher for women from Appalachia Ohio compared with their non-Appalachia Ohio counterparts.⁹ Rates of receipt of a Pap smear within the past 3 years demonstrated similar differences, with women from Appalachia Ohio having a rate that was 9% lower than women from non-Appalachia Ohio.⁹

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Numerous barriers to a woman's receipt of cervical cancer screening have been identified, including the socio-demographic factors of age, income, and education^{7,10-13}; behavioral factors such as understanding of screening benefits, fear of cancer, and embarrassment^{10,13-15}; and provider factors including physician perceptions¹⁵ and practice characteristics.^{13,16} For women residing in Appalachia Ohio, recent research has suggested that the factors of cost, insurance coverage, and perceptions regarding the test itself (eg, embarrassment, privacy issues) may be particularly salient barriers to cervical cancer screening.¹⁷ In addition, prior research has explored the issues of cost and insurance coverage in relation to other cancer screening practices, including mammograms^{18,19} and colorectal cancer screening tests.²⁰ However, to the best of our knowledge, no studies published to date have investigated the importance of these barriers relative to cervical cancer screening practices in this underserved population. This research was designed to explore expectations about Pap test cost and perceptions of cost as a barrier to cervical cancer screening among an underserved population of women residing in Appalachia Ohio.

MATERIALS AND METHODS

Data Source

The data for this study were obtained from interviews conducted between 2005 and 2006 as part of the Community Awareness Resources Education (CARE) project "Reducing Cervical Cancer in Appalachia" study, a multi-level, observational community-based research program designed to understand why high rates of cervical cancer incidence and mortality are observed in Appalachia Ohio. As part of this study, 22 health clinics were identified in Appalachia Ohio, each of which performed >200 Pap tests per month. Fourteen of those clinics agreed to participate in the study; their patient rolls were randomly sampled to identify women who might be eligible for the study.

The survey instrument was designed to gather information regarding the women's demographics, sources of medical care, knowledge and beliefs concerning cervical cancer and Pap test screening, cost of the Pap test, and health and sexual history. The cross-sectional survey was ultimately completed, in face-to-face interviews, by 571 eligible women whose responses were used in these analyses. A detailed study design and procedures have been summarized previously.²¹ Informed consent procedures and study protocols were reviewed and approved by the

Institutional Review Boards of the Ohio State University, University of Michigan, and Centers for Disease Control and Prevention.

Statistical Analysis

Descriptive statistics were calculated to describe study population demographics and cervical cancer screening history. Additional analyses were conducted to investigate perceptions of Pap test cost as a barrier to care access. We analyzed women's perceptions of Pap test costs and compared perceptions of Pap test medical costs with the actual medical cost of cervical cancer screening for the study population and with women's actual Pap test use. We also compared Pap test cost perceptions with the perceived and actual risk of cervical cancer of the study participants. All comparisons were tested using the Fisher exact test. A mixed effects logistic regression model was used to explore those factors associated with a woman's propensity to state that the cost of a Pap test was an obstacle for her. Explanatory variables in the model included age, insurance, income, education, marital status, and level of worry about cervical cancer. All the variables were either dichotomous or categorical. Random effect intercepts were computed to account for correlations in the data at the level of individual health clinics. Because of the lack of readily available methods for mixed models with dichotomous outcomes, the model fit and discrimination were calculated using the marginal model with clinic as a fixed effect using the Hosmer-Lemeshow goodness-of-fit test and the area under the receiver operating characteristic (ROC) curve.²²

All analyses were performed with SAS statistical software (version 9.1; SAS Institute Inc, Cary, NC), STATA software (version 10.0; StataCorp LP, College Station, TX), and Microsoft Excel 2007 (Microsoft Corporation, Redmond, WA).

Key Variables

Interviewers asked each woman about her health history and demographics, her insurance coverage, and her perception of Pap test costs. Several additional variables were constructed from the survey data. The paragraphs that follow describe how those variables were calculated.

Pap test cost perceptions

Respondents were asked 3 questions. They first were asked "About how much does a Pap smear cost in your community?" Valid responses were comprised of a dollar figure or "I do not know." Next, regardless of their

response to the preceding question, each woman was asked to select a cost category: “Would you expect it to cost: not more than \$10, \$10 to \$25, \$26 to \$50, \$51 to \$75, \$76 to \$100, \$101 to \$150, or more than \$150.” Valid responses included 1 of the categories above, or “I do not know.” Later in the interview, women were asked “Does the cost of a Pap smear make it hard for you to get one?” Valid responses included “Yes,” “No,” or “I do not know.”

Accuracy of cost estimate

For this study, each woman was classified with regard to whether her perception of Pap test cost was accurate. Her response to the cost category question (the second question above) was used to gauge whether her cost perception was in the “appropriate” range. The “appropriate” range was determined by polling participating clinics regarding the cost of a Pap smear. The clinics’ answers ranged from \$28 to \$90. The relatively wide range provides for a conservative estimate. However, to assess accuracy, we compared this range with the Medicare fee schedule for Ohio providers and found that provider reimbursement at the time of the study was \$38.45 for a Pap test (according to the Centers for Medicare and Medicaid services). In the current analyses, we used the conservative range of costs, coding cost perception as “appropriate” if the estimate was between \$26 and \$100, “under” if the cost was <\$26, or “over” if the response was >\$100. Women who responded “I do not know” comprised a fourth category.

Health insurance status

Respondents were asked about current health insurance coverage. Possible responses included: 1) private insurance, either through someone’s job or purchased by the respondent’s family; 2) primarily Medicaid; 3) primarily Medicare; or 4) no insurance. Respondents could select >1 source of health insurance.

Risk of cervical cancer

Respondents were classified as being at high risk if they had ever been diagnosed with human immunodeficiency virus, gonorrhea, genital herpes, syphilis, or venereal warts; or if they were a current smoker; ever had a sexual partner with a sexually transmitted disease; were aged <18 years the first time they had sexual intercourse; or if their number of lifetime sexual partners was >4. Otherwise, they were classified as being at low risk for cervical cancer.

Perceived risk of cervical cancer

Participants were asked “How would you rate your own risk of getting cervical cancer in the next 5 years, compared with other women you know? Would you say your risk is: much lower, somewhat lower, about the same, somewhat higher, or much higher?” The responses were collapsed into 4 categories: lower, about the same, higher, and “I do not know.”

Level of worry

Women were asked “How much do you worry about getting cervical cancer?” Valid responses were “A lot,” “Some,” and “Not at all.”

Pap test within guidelines

If the respondent was at low risk for developing cervical cancer, she was then considered to be within Pap test guidelines if she had received a Pap test any time within the 3 years preceding the interview. If she was at high risk for cervical cancer, then she was considered to be within guidelines if she had received a Pap test within the year leading up to the interview. Otherwise, she was classified as not having received a Pap test within guidelines.

RESULTS

Characteristics of the Study Population

The study population (n = 571) reflects the population of Appalachia Ohio, a group that is predominantly white and includes many low-income residents. Table 1 presents the demographic and Pap test history characteristics of this sample. Across study participants, nearly all (95%) were white, and greater than half (56%) reported an annual household income below 200% of the federal poverty level; approximately one-third (34%) reported an annual household income of <\$20,000. Approximately 56% of the respondents were privately insured whereas 24% reported Medicaid coverage and 15% were uninsured. Less than 5% of women in this sample were covered by Medicare.

Among respondents, nearly one-quarter (24%) reported that they had been without health insurance coverage at some time during the last 12 months. In addition, almost 1 in 5 women (19%) noted that during the last 12 months there was a time during which they needed health care but did not get it because they could not afford it.

The majority (66%) of participants reported that their physician did not encourage them to undergo a Pap

Table 1. Demographic Characteristics and Pap Test History of Study Participants, Shown by Group (n=571)

Characteristic	No. of Respondents
Demographic Characteristics	
Age, y	
18-34	241 (42%)
35-49	190 (33%)
≥50	140 (25%)
Race	
White	540 (95%)
Black or African American	17 (3%)
Other	14 (2%)
Income <200% of federal poverty level	
No	240 (44%)
Yes	303 (56%)
Income	
<\$20,000	185 (34%)
\$20,001-\$35,000	119 (22%)
\$35,001-\$50,000	92 (17%)
>\$50,000	147 (27%)
Insurance	
Private only	315 (56%)
Medicaid	137 (24%)
Medicare	28 (5%)
No insurance	86 (15%)
Education	
High school	46 (8%)
High school graduate/GED	206 (36%)
Some college/college graduate	319 (56%)
Working status	
Full time, part time, or self-employed	378 (66%)
Other (homemaker, student, retired, disabled, or unemployed)	193 (34%)
Marital status	
Not married	222 (39%)
Married or member of a couple	349 (61%)
Pap Test History	
Physician encouraged a Pap test	
No	377 (66%)
Yes	193 (34%)
History of an abnormal Pap test	
No	370 (65%)
Yes	197 (35%)
Pap test within guidelines	
No	182 (32%)
Yes	380 (68%)
At high risk for cervical cancer	
No	117 (21%)
Yes	441 (79%)
Worry about getting cervical cancer	
A lot	38 (7%)
Some	185 (32%)
Not at all	347 (61%)

Pap indicates Papanicolaou; GED, General Equivalency Diploma.

test. Furthermore, although 35% of participants reported an abnormal Pap test result in the past, only 68% of respondents had received a Pap test within guidelines.

Perceptions of Cost as a Barrier and Receipt of a Pap Test Within Guidelines

Nearly 1 in 5 participants (18%) reported that the cost of a Pap test made it difficult for them to get the test. Among women who had not received a Pap test within the past 3 years and who gave a specific reason for not getting screened (n = 34), approximately one-third (29%) reported cost as the reason, and 18% stated that their insurance does not cover the test. Furthermore, women who stated that the cost of a Pap test made it difficult to get were significantly more likely to not receive a Pap test within guidelines (odds ratio [OR], 2.09; 95% confidence interval [95% CI], 1.31-3.33 [P = .002]). Receipt of a Pap test once every 3 years for low-risk women and once per year for high-risk women was considered to be within screening guidelines.

Of participating women who had not received a Pap test within guidelines (n = 183), only 22% reported having heard of any program to help pay for the test. Only 14% had heard of the Breast and Cervical Cancer Control Program (BCCCP), the reduced cost program designed to help women afford screening tests for breast and cervical cancer. Of the total study sample (n = 571), only 7 women (1.2%) reported having received a Pap test that was paid for with BCCCP funding.

Pap Test Cost Expectations

When asked, "About how much does a Pap smear cost in your community?" the great majority of study participants responded "I do not know" (81%) (Table 2). The remaining 106 women provided numerical responses to the question (ie, gave a dollar value). Expectations of Pap test cost for study participants are summarized in Table 2. Among these respondents, the highest dollar figure reported was \$400, and the lowest was \$0. As noted earlier, at the time these interviews were conducted, the actual cost of a Pap test in these communities ranged from \$28 to \$90. Thus, approximately 42% of responding women overestimated the cost of a Pap test by at least \$10, and nearly 1 in 5 overestimated the cost by at least \$60.

In response to the second question regarding cost, women provided estimates in different cost categories (Table 2). When presented with potential cost categories, more women were willing to estimate Pap test cost (ie,

Table 2. Pap Test Cost Expectations**How Much Respondents Expected a Pap Test to Cost, With No Guidance About Cost Categories (n=571)**

Response (n=571)	No. of Respondents
Gave dollar value response	106 (19%)
Responded "I do not know"	465 (81%)
Response Range (n=106) (Dollar Value Provided)	No. of Respondents
\$0-\$99	61 (58%)
\$100-\$150	27 (25%)
>\$150	18 (17%)

How Much Respondents Expected a Pap Test to Cost, by Cost Category Provided (n=571)

Cost Category	No. of Respondents
Not more than \$10	2 (1%)
\$10-\$25	24 (4%)
\$26-\$50	59 (10%)
\$51-\$75	98 (17%)
\$76-\$100	119 (21%)
\$101-\$150	130 (23%)
>\$150	87 (15%)
Do not know	51 (9%)

Pap indicates Papanicolaou.

only 9% of respondents reported "I do not know"), but similar proportions overestimated the test cost (38% overestimated by at least \$10 and 15% overestimated by at least \$60).

Accuracy of Pap Test Cost Perceptions

The accuracy of perceptions regarding Pap test cost was compared between women who were initially willing to provide a numeric cost estimate in dollars (n = 106) and women who were unable to estimate or answered that they did not know (n = 464). The first question was used only to categorize whether the women were willing to provide an unaided cost estimate; the cost estimates that were compared between groups were the categoric responses to the second cost question. The accuracy of Pap test cost estimates was then categorized as "appropriate," "under," "over," and "do not know" (Fig. 1).

Women in both groups were more likely to overestimate than underestimate the cost of a Pap test. Women who provided a numeric cost estimate initially were more likely to appropriately estimate the Pap test cost compared with those who initially did not know the cost of a Pap test. In addition, women who responded "I do not know" to the first question were more likely to overestimate the

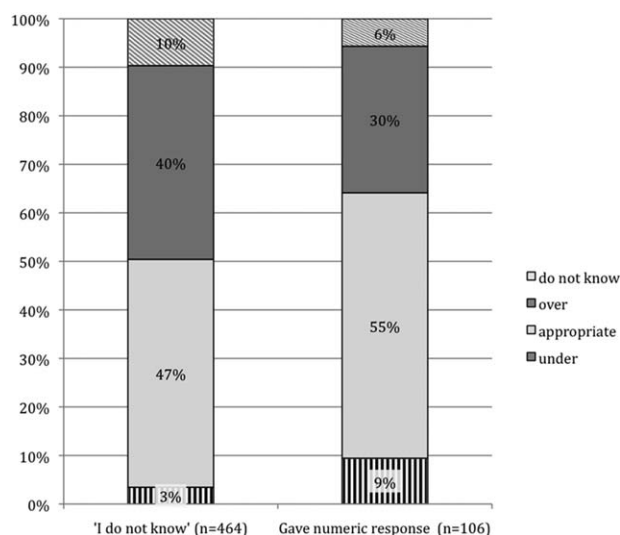
Accuracy of Pap Cost Category Perception by Initial Willingness to Estimate Pap Cost

Figure 1. Distribution of the accuracy of the perceptions of the cost of the Papanicolaou (Pap) test is shown by initial willingness to estimate Pap test cost (n = 570). The chi-square test was performed for overall independence ($P = .001$) and for the "overestimate" category only ($P = .064$). Diagonal striped bars indicate do not know; dark bars, overestimate; light bars, appropriate estimate; horizontal striped bars, underestimate.

cost of a Pap test in the follow-up categoric question than women who provided a numeric response (40% vs 30%; $P = .064$). Women who stated "I do not know" were also less likely to underestimate the cost of a Pap test (3% vs 9%, respectively; $P = .016$).

Perception of Cost as a Barrier to a Pap Test

Insurance status, income, and educational attainment were found to be significantly related to stating that the cost of a Pap test makes it difficult to get one, with insurance status appearing to have the strongest association. Table 3 lists the adjusted ORs and associated 95% CIs for the main effects in the logistic regression model. The odds of a woman with no insurance stating that cost makes it difficult to get a Pap test were 8.66 times those of a woman with private insurance (95% CI, 4.20-17.82). Conversely, for a woman with Medicaid coverage, the odds of stating that cost was an obstacle were 0.35 times those of a woman with private insurance (95% CI, 0.15-0.80).

The odds of a woman whose income was below 200% of the federal poverty level stating that cost was a

Table 3. Associations Between Independent Variables and Stating Cost Makes It Difficult to Obtain a Pap Test (n=571)

	Adjusted OR	95% CI
Insurance coverage		
Private only	1.00	—
Medicaid	0.35 ^a	0.15-0.80
Medicare	0.28	0.05-1.49
No insurance	8.66 ^a	4.20-17.82
Age, y		
≥50	1.00	—
35-49	1.14	0.54-2.39
18-34	0.85	0.39-1.88
Income		
≥200% of federal poverty line	1.00	—
<200% of federal poverty line	2.17 ^b	1.11-4.23
Education		
Some college or college graduate	1.00	—
High school or GED	1.79 ^b	1.01-3.19
Less than high school	2.49	0.95-6.54
Marital status		
Married or member of a couple	1.00	—
Not a member of a couple	1.56	0.88-2.77
Worry about cervical cancer		
Not at all	1.00	—
Some	1.32	0.73-2.37
A lot	0.90	0.31-2.64

Pap indicates Papanicolaou; OR, odds ratio; 95% CI, 95% confidence interval; GED, General Equivalency Diploma.

^a $P \leq .01$.

^b $P \leq .06$.

barrier were 2.17 times higher than those of a woman with an income above 200% of the federal poverty level (95% CI, 1.11-4.23). Furthermore, women with less education had higher odds of stating that the cost of a Pap test makes it difficult to get. Women who completed high school had odds of responding that cost is an obstacle that were 1.79 times higher than women who had been to college (95% CI, 1.01-3.19). Women who failed to complete high school had odds of reporting cost as an obstacle that were 2.49 times those of college-educated women (95% CI, 0.95-6.54).

The Hosmer-Lemeshow goodness-of-fit test indicated that the model fit the data reasonably well; the test failed to reject the null hypothesis of good fit ($P = .7984$). Furthermore, the model was found to have good predictive power; the area under the ROC curve was 85%.

Risk Knowledge and Cost Factors

Overall, 440 women (79%) were found to be at high risk for cervical cancer based on their sexual and medical histories and smoking status. Women at high risk for cervical

Table 4. Perceived Cervical Cancer Risk Versus Risk Calculated From Risk Factors (n=557)

Perception of Own Risk Compared with Other Women You Know	Risk Status Estimated From Health and Sexual History and Smoking Status ^a	
	Low Risk	High Risk
Do not know	5 (4%)	20 (5%)
Lower	44 (38%)	88 (20%)
About the same	61 (52%)	237 (54%)
Higher	7 (6%)	95 (22%)
Total	117	440

^aChi-square test for overall independence: $P = .0001$.

cancer were compared with those at low risk by comparing the percentage in each group who stated that the cost of a Pap smear makes it hard for them to receive it. It is interesting to note that women at high risk were more likely to state that the cost makes it difficult for them to get a Pap test than women at low risk (20% vs 12%; $P = .058$). Yet these women were not always aware of their high-risk status. Among women who were found to be at high risk of developing cervical cancer, 54% reported that they perceived their risk as being the same as that of other women they knew, 22% reported their risk as being higher, and 20% reported their risk as being lower. In contrast, among women who were found to be at low risk of developing cervical cancer, 52% reported that they perceived their risk as being the same as that of other women they knew, 6% reported their risk as being higher, and 38% reported their risk as being lower. Table 4 shows these comparative proportions based on risk.

DISCUSSION

Underserved women in need of an important cancer screening test commonly report cost as a barrier to screening as well as to the receipt of needed medical care. However, the findings of the current study suggest that women in Appalachia Ohio have a very limited and often inaccurate understanding of the cost of cervical cancer screening. Women in the current study either reported no knowledge of Pap test cost or tended to overestimate the cost. Specifically, we found that 4 in 5 women reported having no knowledge of the actual cost of a Pap test. Moreover, approximately 42% of women who believed they had knowledge of the cost of a Pap test overestimated the cost by at least \$10, with nearly 1 in 5 overestimating the cost by >\$60. If less conservative estimates concerning the actual medical cost of a Pap test as

reported by Medicare were used, these overestimates and the percentage of women who overestimated Pap test cost would be even greater.

Although the current study findings are consistent with previous research demonstrating cost as a barrier to preventive screenings,¹⁷⁻²⁰ these results suggest that a lack of knowledge regarding the actual cost of Pap tests may magnify the perception of cost as a barrier. Women who initially report not knowing the cost of a Pap test were more likely to overestimate the cost when pressed for an answer.

Perceptions of cost as a barrier have also been associated with lack of insurance, a lower income level, and lower educational attainment, and the results of the current study are consistent with those reported in the literature. For example, a lack of health insurance is often cited as a major barrier to all types of healthcare services.^{23,24} Not surprisingly, women in the current study who lacked insurance were >8.5 times more likely to report cost as a barrier to receiving a Pap test compared with those with private insurance. This finding is in keeping with previous research that has demonstrated that costs and lack of insurance are barriers to access for preventive screenings among vulnerable populations.^{10,25,26} We found that the perception of cost as a barrier among these vulnerable women from Appalachia Ohio was related to lower use of cervical screening tests. Women in the current study who believed that the cost of a Pap test makes it difficult to receive one were twice as likely not to receive a Pap test within screening guidelines compared with those women who did not view cost as a barrier to receiving the test.

Another important consideration highlighted by the findings of the current study is that of the relation between risk status and cost as a barrier to receiving a Pap test. Although high-risk women were more likely to state that cost makes it difficult for them to receive a Pap test, it was also clear that many of these women were not aware of their actual risk status. Instead, 20% of women who were high risk reported perceiving themselves to be at lower risk than other women they knew. Given the inaccuracies in perceptions regarding both risk status and cost as a barrier, these findings are of great concern.

The current study has limitations associated with both the population studied and the questions asked in the survey. First, this cross-sectional study was limited to the population of Ohio Appalachia, an area characterized by high levels of poverty and lower levels of educational attainment. Although this sample included women from both urban and rural counties and may be generalized

across other similarly underserved areas of the United States, certain demographic features of this population, such as a low proportion of minority residents, may distinguish these results.

Another limitation can be attributed to the study design itself, stemming from the fact that all the women interviewed were linked to a clinic participating in the study. Because this linkage provides evidence that all participating women had had clinic contact and thus access to care within the past 2 years, it is likely that the results of the current study are more favorable than they might have been if the study population also included women not affiliated with health clinics. Thus, given our findings concerning the general lack of knowledge regarding Pap test costs and cost as a barrier to receiving Pap tests, it is likely that the level of knowledge among women who were not affiliated with a medical clinical might have been even lower.

Finally, the current study only considered women's perceptions of the direct medical costs of a Pap test. Other costs associated with the Pap test, such as transportation, child care, and unpaid time off, are also important cost considerations that may affect women's perceptions concerning the overall cost of a Pap test. Therefore, the current study results may underestimate the impact of cost as a barrier to Pap tests.

Conclusions

Given the potential for women's perceptions to influence their motivation to seek cancer screening, addressing this knowledge barrier regarding Pap test cost is likely important. Efforts to increase Pap test use and reduce cervical cancer incidence could focus on this specific population to increase awareness about Pap test costs, improve knowledge regarding cancer risk, increase Pap test receipt, and ultimately reduce the disproportionate burden of disease experienced among underserved women.

CONFLICT OF INTEREST DISCLOSURES

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