

## Papanicolaou Testing among Women in the Southern United States

Neeraja B. Peterson, M.D., M.Sc.,<sup>1,2</sup> Harvey J. Murff, M.D., M.P.H.,<sup>1,3</sup>  
Yong Cui, M.D., MSPH,<sup>4</sup> Margaret Hargreaves, Ph.D.,<sup>4</sup>  
and Jay H. Fowke, Ph.D., M.P.H.<sup>1,2</sup>

### Abstract

**Background:** Cervical cancer is largely preventable with screening using Papanicolaou (Pap) testing. We examined Pap testing among southern women, mostly of low income and educational status, to determine if rates were similar to those reported nationally and to examine which factors were related to receipt of Pap tests.

**Methods:** Baseline interview data from 19,046 women aged 40–79 enrolled at community health centers into the Southern Community Cohort were analyzed. The percentages of women reporting a recent Pap test (within the past 3 years) were compared according to sociodemographic, healthcare access, and health-related behavior variables. Logistic regression analyses were employed to compute odds ratios (ORs) and corresponding 95% confidence intervals (95% CI).

**Results:** Overall, 88% of the women reported having received a recent Pap test. Screening rates were high among all racial/ethnic groups, but highest for African American women. Not having a Pap test was significantly associated with lower education (OR declining to 0.73, 95% CI 0.64–0.85, among those with less than a high school education), lower income (OR declining to 0.61, 95% CI 0.43–0.87, among those with annual household incomes <\$15,000), and not having health insurance (OR 0.83, 95% CI 0.71–0.97). The most common reason reported by women as to why they had not a Pap test was cost (25%), followed by reporting a doctor had not recommended the test (22%).

**Conclusions:** Pap testing was most frequent among African American women. Subsets, such as women with less education, low income, and no health insurance, however, may not be adequately screened for cervical cancer.

### Introduction

APPROXIMATELY 11,070 NEW CASES of invasive cervical cancer are expected to be diagnosed in 2008, and about 3,870 women are expected to die from this disease. In the United States, the incidence of cervical cancer is higher among African American women than among white women, and the death rate among African American women is more than twice that of white women for this disease.<sup>1</sup> A difference in access to or use of regular screening may contribute to this disparity. Cervical cancer is largely preventable with screening, with precursor lesions often detected and treated prior to cancer onset. Thus, screening and early detection re-

main the cornerstone of cervical cancer prevention and control efforts around the world. The U.S. Preventive Services Task Force (USPSTF), the American College of Obstetricians and Gynecologists (ACOG), and the American Cancer Society (ACS) strongly recommend regular screening for cervical cancer in appropriate women.<sup>2–4</sup> The ACS recommendations for average-risk, asymptomatic women are to begin cervical cancer screening with a Papanicolaou (Pap) test approximately 3 years after a woman becomes sexually active, but no later than age 21 years; that screening should be done every year with conventional Pap tests or every 2 years using liquid-based Pap tests; and that at or after age 30 years, women who have had three normal test results in a row may

<sup>1</sup>Institute for Medicine and Public Health, Department of Medicine, Vanderbilt University Medical Center, Nashville, Tennessee.

<sup>2</sup>Vanderbilt-Ingram Cancer Center, Vanderbilt University, Nashville, Tennessee.

<sup>3</sup>Department of Veterans Affairs, Tennessee Valley Healthcare System, Geriatric Research Education and Clinical Center (GRECC), Nashville, Tennessee.

<sup>4</sup>Meharry Medical College, Nashville, Tennessee.

Grant R01CA092447 from the National Cancer Institute supported this work (PI, William J. Blot).

get screened every 2–3 years with cervical cytology alone, or every 3 years with a human papillomavirus (HPV) DNA test, plus cervical cytology. Women aged  $\geq 70$  years who have had three or more normal Pap tests and no abnormal Pap tests in the last 10 years and women who have had a total hysterectomy may choose to stop cervical cancer screening according to the ACS guidelines.<sup>3</sup>

The number of women in the United States who undergo cervical cancer screening has dramatically increased over the last 25 years, and the death rate from cervical cancer is decreasing.<sup>1</sup> For 2004, the Behavioral Risk Factor Surveillance System (BRFSS) reported that 86% of women  $\geq 18$  years of age had had a Pap test in the last 3 years in the United States.<sup>5</sup> The National Health Interview Survey (NHIS) found that, in 2003, 79% of women aged  $\geq 18$  had a Pap test within the past 3 years.<sup>6</sup> However, the national-level data may not be representative of local, state, or regional screening practices. Surveillance Epidemiology and End Results (SEER) data from 2003 reported that several southern U.S. states had higher cervical cancer incidence rates compared with other parts of the country<sup>7</sup>; this finding may reflect regional differences in screening rates. One study noted significant differences in cervical cancer screening rates by state that could not be explained by socioeconomic indicators, such as poverty, but did not elaborate on which states had the lowest rates.<sup>8</sup> In addition, it is not known if sociodemographic and other factors associated with obtaining a Pap test differ among regions of the country. In this report, we investigate rates of Pap testing and associated predictors in the southeastern United States among a population of racially diverse women participating in the Southern Community Cohort Study (SCCS).

## Materials and Methods

### Sample

The SCCS is a large-scale prospective cohort study designed to help resolve questions about the etiology of cancer, as well as to elucidate causes of the disparities in cancer incidence and mortality across racial and urban/rural groups.<sup>9</sup> The SCCS research protocol received approvals from IRBs at both Vanderbilt University Medical Center and Meharry Medical College. This cross-sectional analysis of Pap testing used baseline data collected from female participants at enrollment.

The study population comprised adults enrolled into the SCCS from March 2002 to June 2006 from 48 community health centers (CHCs) in a 12-state region throughout the southeast. The CHCs provide medical and preventive care mainly to medically underserved and lower-income urban and rural areas. At each CHC, a trained study interviewer approached potential study subjects, informed them about the study, and asked eligible persons to participate. To be eligible, participants had to be between 40 and 79 years of age, be English-speaking, and not have received treatment for cancer within the past year (with the exception of nonmelanoma skin cancer). Eligible participants were interviewed using a computer-assisted personal interview (CAPI). Women  $\geq 40$  years at enrollment into the SCCS were eligible for this analysis ( $n = 31,275$ ). We excluded women who reported a prior diagnosis of cervical cancer ( $n = 168$ ), reported that they had had a hysterectomy ( $n = 10,489$ ), or both ( $n = 239$ ). An additional 1,333 women

were excluded because they did not provide information on Pap testing, leaving a final study population size of 19,046 women.

### Outcome variable

During the baseline interview, women were asked: "Have you ever had a Pap smear?" Participants had the option of responding "don't know" or refusing to answer the question. A standard definition of the term Pap test was provided when necessary. Women responding "yes" were asked a follow-up question to assess the time since their most recent Pap test. We defined our outcome variable of recent Pap test as having a Pap test within the past 3 years, as generally recommended by current guidelines.

### Independent variables

Baseline data collection included questions about sociodemographic characteristics, healthcare access, and health behavior. Sociodemographic variables of interest were age, race, place of birth, rural living, marital status, education, and annual household income. Healthcare access variables of interest included type of health insurance coverage and having made a medical visit in the last year. Health and behavior-related variables of interest included having a personal history of cancer, current height and weight (used to calculate body mass index [BMI]), seatbelt use, receipt of a mammogram in the last 2 years, and smoking status. Categories of the independent variables are shown in Tables 1 and 2.

### Statistical analysis

Data were analyzed with SAS version 9.1 (SAS Institute, Inc., Cary, NC). Percentages of women receiving a recent Pap test by sociodemographic, healthcare access, and health-related behavior variables of interest were calculated. Bivariate analyses of these categorical variables were performed using chi-square tests. A single logistic regression model was used to calculate odds ratios (OR) and 95% confidence intervals (95% CI), summarizing the association between Pap testing and all sociodemographic, healthcare access, and health-related behavior variables of interest.

## Results

Sociodemographic characteristics of women and the proportion reporting a recent Pap test are shown in Table 1. Over 75% of the SCCS women were African American, and most had been born in the United States (99%). Almost half (42%) had lived in a rural community at some time. About a third of women were separated or divorced (33%), 30% were married, and 24% had never been married. Thirty percent of women had not completed high school, and 61% of women reported household incomes of  $< \$15,000$  a year. Overall, 88% of women aged  $\geq 40$  years reported having received a Pap test within the last 3 years. Bivariate analyses showed that recent Pap test use was somewhat lower among women  $\geq 65$  (86% for ages 65–69, 83% for ages 70–74, 76% for ages 75–79), among white women (82%) and women of other race/ethnicity (85%), among women with less than a high school education (85%), and among women with lower household incomes (86% for  $< \$15,000$  annually). Of the

TABLE 1. RATES OF RECENT PAP TESTING BY SOCIODEMOGRAPHIC CHARACTERISTICS FROM SOUTHERN COMMUNITY COHORT STUDY<sup>a</sup>

	n (%)	% reporting Pap test within 3 years
All women	19,046 (100.0)	88.1
Age (years)		
40–44	5,877 (30.9)	89.0
45–49	4,724 (24.8)	88.5
50–54	3,426 (18.0)	87.8
55–59	2,119 (11.1)	88.3
60–64	1,340 (7.0)	88.7
65–69	795 (4.2)	85.7
70–74	490 (2.6)	82.5
75–79	275 (1.4)	75.6
Race		
African American	14,431 (75.8)	90.0
White	4,005 (21.0)	81.6
Other <sup>b</sup>	604 (3.2)	84.9
Birthplace		
United States	18,775 (98.6)	88.1
Outside of United States	269 (1.4)	87.7
Ever lived in rural community		
Yes	8,004 (42.0)	87.1
No	11,032 (58.0)	88.8
Marital status		
Married or partner	5,720 (30.1)	88.6
Separated or divorced	6,286 (33.0)	88.2
Widowed	2,408 (12.7)	86.3
Single, never married	4,623 (24.3)	88.0
Education		
Less than high school	5,786 (30.4)	84.7
High school	7,582 (39.8)	88.8
More than high school	5,674 (29.8)	90.5
Household annual income		
<\$15,000	11,452 (60.8)	86.2
\$15–\$24,999	4,332 (23.0)	89.8
\$25–\$49,999	2,209 (11.7)	91.9
≥\$50,000	834 (4.4)	94.2

<sup>a</sup>Missing values include race ( $n = 6$ ), birthplace ( $n = 2$ ), ever lived in a rural community ( $n = 10$ ), marital status ( $n = 9$ ), education ( $n = 4$ ), household annual income ( $n = 219$ ). Dates of data collection were March 2002–June 2006. Bivariate analyses were performed.

<sup>b</sup>Other includes women who self-identified as Hispanic/Latina ( $n = 102$ ), Asian or Pacific Islander ( $n = 26$ ), American Indian or Alaskan Native ( $n = 71$ ), other race ( $n = 109$ ), or mixed race ( $n = 296$ ).

healthcare access and health-related behaviors shown in Table 2, recent Pap test use was lower among women who had no health insurance (85%), had not had a medical visit in the last year (61%), were underweight (BMI < 18.5 kg/m<sup>2</sup>, 78%), never used seatbelts (80%), had not had a mammogram in the last 2 years (72%), and were currently smoking (85%).

Women who had not had a Pap test in the last 3 years were asked to choose among several reasons why they had not received a Pap test recently (Table 3); 27% of women did not pick any of the reasons provided. Overall, the most common reason specified was cost (25%), followed by reporting a doctor had not recommended the test (22%) and having put off the test or being too busy (17%). Women aged ≥65 were more likely than younger women to report that a doc-

tor had not recommended the test (42% vs. 20%, respectively). Younger women were more likely to report cost as a barrier (28% vs. 3% for women aged ≥65) and that they had put it off or were too busy (18% vs. 9% for women aged ≥65). When stratified by race (results not shown), black women were more likely than white women to report that a doctor had not recommended the test (24% vs. 19%), whereas white women were more likely than black women to report they had put it off (20% vs. 15%), embarrassment (6% vs. 3%), and cost (30% vs. 21%). There were no significant racial differences in the other reasons reported.

In multivariate analyses, the strongest predictor for having had a recent Pap test was having had a mammogram in the last 2 years (OR 11.64, 95% CI 10.28–13.13) (Table 4). Women ≥65 were significantly less likely to have had a re-

TABLE 2. RATES OF RECENT PAP TESTING BY HEALTHCARE ACCESS AND HEALTH BEHAVIORS IN SOUTHERN COMMUNITY COHORT STUDY<sup>a</sup>

	n (%)	% reporting Pap test within 3 years
All participants	19,046 (100.0)	88.1
Insurance <sup>b</sup>		
Private	4,326 (22.8)	92.6
Public	6,416 (33.7)	89.0
Other	200 (1.1)	90.5
None	8,077 (42.5)	84.9
Had medical visit in last year		
Yes	17,730 (93.5)	90.0
No	1,225 (6.5)	61.1
Has personal history of any cancer		
Yes	709 (3.7)	88.0
No	18,320 (96.3)	88.1
Body mass index (BMI), kg/m <sup>2</sup>		
<18.5	272 (1.4)	77.6
18.5–<25	3,639 (19.3)	85.5
25–<30	4,816 (25.6)	88.5
30–<35	4,384 (23.3)	89.6
35–<40	2,834 (15.0)	89.6
≥40	2,899 (15.4)	87.8
Seatbelt use		
All the time	14,829 (77.9)	88.9
Most of the time	2,437 (12.8)	86.3
Some of the time	1,366 (7.2)	84.3
None of the time	399 (2.1)	79.7
Had mammogram in the last 2 years		
Yes	12,457 (65.9)	96.7
No	6,449 (34.1)	71.6
Smoking status		
Current	7,203 (37.9)	85.2
Former	3,655 (19.2)	88.8
Never	8,166 (42.9)	90.3

<sup>a</sup>Missing values include race ( $n = 27$ ), medical visit in last year ( $n = 91$ ), personal history of cancer ( $n = 17$ ), BMI ( $n = 202$ ), seatbelt use ( $n = 15$ ), mammogram in last 2 years ( $n = 140$ ), and smoking status ( $n = 22$ ). Dates of data collection were March 2002–June 2006. Bivariate analyses were performed.

<sup>b</sup>Mutually exclusive insurance categories created from those reporting any private insurance; only publicly funded insurance including Medicaid, Medicare, and VA, Campus; other insurance; or no insurance.

cent Pap test than younger women (OR 0.33, 95% CI 0.28–0.40). White women, as well as women of other racial/ethnic groups, were less likely than African American women to have received recent Pap testing (OR 0.49 for white women; 0.63 for women of other races). Women who had ever lived in a rural community, had not completed high school, had a household income of <\$15,000 a year, and had no health insurance were significantly less likely to have had a recent Pap test. Women who reported wearing seatbelts some, most, or all the time were more likely to have had a recent Pap test than were women who never wore seat belts. Compared with never smokers, former smokers were less likely to have had recent Pap testing, as were current smokers, although this result did not reach statistical significance. Recent Pap testing was not associated with having been born outside the United States, marital status, reporting a personal history of cancer, or BMI.

## Discussion

In our large study of women ≥40 years, who enrolled in the SCCS across 12 southeastern states, we found that 88% had had a Pap test in the last 3 years. Our results are roughly in line with national screening rates as reported by the BRFSS<sup>5</sup> and NHIS<sup>6</sup> and do not indicate that women in this sociodemographic group seeking care at community health centers across the southeast have lower rates of cervical cancer screening. Coughlin et al.,<sup>10</sup> in a subanalysis of BRFSS data from the “Southern Black Belt,” a historical term used to describe an impoverished region of the southern United States, also did not find that cancer screening was underused when compared with the rest of the country.

We found that lower education, lower income, and not having health insurance were associated with not having recent Pap testing in our population, consistent with other

TABLE 3. REASONS WHY WOMEN HAVE NOT HAD PAP TEST IN LAST 3 YEARS: THE SOUTHERN COMMUNITY COHORT STUDY

<i>Reason</i>	<i>All women (n = 1367), %</i>	<i>Aged 40–64 (n = 1202), %</i>	<i>Aged ≥65 (n = 165), %</i>
Doctor has not recommended this test	22.2	19.5	41.8
Forgot to do it	5.6	5.8	4.2
Fear of finding cancer	8.4	8.9	4.9
Put it off or too busy	16.5	17.6	9.1
Embarrassed	4.3	4.5	3.0
Cost	24.5	27.5	3.0
Discomfort or pain may be experienced during this test	7.4	7.8	4.2
None of the above	27.1	26.1	34.6

studies.<sup>5,6,11–14</sup> Older studies have reported lower Pap testing among African American women compared with white women, but recent data from large studies, such as the BRFSS,<sup>5</sup> NHIS,<sup>6</sup> the Medical Expenditure Panel Survey (MEPS),<sup>11</sup> and our own study, indicate that African American women are now as likely or even more likely to receive Pap tests.

Previous research has shown that uninsured individuals are less likely to receive preventive services, including cancer screening, than insured individuals.<sup>15–17</sup> Ross et al.<sup>18</sup> reported that even among higher-income adults, lack of health insurance was associated with decreased use of cancer prevention services. This disparity in cancer screening between uninsured and insured adults persists despite free cancer screening programs for low-income and uninsured women, such as the Center for Disease Control's National Breast and Cervical Cancer Early Detection Program (NBCCEDP). We found that having had a medical visit in the last year was strongly associated with receipt of cervical cancer screening, consistent with other studies.<sup>11,13,14,19,20</sup> It may be that having a usual source of care or a recent clinical encounter is a necessary condition for women to receive cancer screening despite the availability of free screening programs. Receipt of a physician recommendation has consistently been found to be one of the strongest predictors of completion of cervical cancer screening.<sup>21–25</sup> We found that among women who had not had a Pap test in the last 5 years, 20% of women aged 40–64 stated that a doctor had not recommended the test to them.

Having had a recent mammogram and wearing a seatbelt at least some of the time were significantly associated with having a recent Pap test, suggesting that women who adopt one preventive health measure are more likely to adopt others. Previous studies have reported that obese women were less likely to be up to date for cervical cancer screening.<sup>26–28</sup> In our study, however, BMI was not associated with having had a recent Pap test. We did find that women who had lived in a rural area at some time were less likely to undergo recent Pap testing than women who had never lived in a rural area, consistent with one previous study that found that women who lived in rural areas were less likely to receive cervical cancer screening.<sup>29</sup> We did not find that having been born outside the United States was associated with less Pap testing, but few women in our study were foreign born (<

2%). Additionally, we did not measure factors, such as number of years lived in the United States and screening practices in the country of birth, that may be more predictive of screening behavior than simply foreign-born status.

Women ≥65 years were less likely than younger women to have Pap testing. There is uncertainty about the benefit of cervical cancer screening in older women, especially in women who have had normal Pap tests previously.<sup>2,30</sup> The USPSTF<sup>2</sup> and the ACS<sup>30</sup> recommend that average-risk women who have had adequate prior screening can cease cervical cancer screening at ages 65 and 70, respectively. Therefore, it is not unexpected to observe lower rates of Pap testing in women ≥65 years. In addition, differences existed among women <65 and those ≥65 in reported reasons why they had not had recent screening. Women ≥65 were likely to report that a doctor had not recommended the test, possibly because their physician was following guideline recommendations for cessation of screening. In addition, they were significantly less likely to report cost as a barrier, most likely because Pap testing is a covered benefit among Medicare enrollees.

A strength of our study is the investigation of a large group of southern women who are at risk for cervical cancer. However, our study had limitations. Patients who chose to participate in the study may not have been representative of the general patient population, leading to selection bias. We relied on self-reported data and were unable to validate the accuracy of self-reports; as a result, our data may have been subject to some measurement error. We were also unable to examine other potentially important contributors to cancer screening, including provider characteristics and other behavioral and psychosocial factors. Women in our study were aged ≥40, and, therefore, our study findings may not apply to younger women. Correlates of screening, as well as barriers to screening, may differ for younger women. In addition, we examined recent receipt of Pap tests but did not have information on repeat or regular screening.

In 2006, the U.S. Food and Drug Administration (FDA) approved a vaccine against four strains of HPV. Two of the HPV types targeted by the vaccine (HPV-16 and HPV-18) are responsible for about 70% of the cases of cervical cancer worldwide. The Advisory Committee on Immunization Practices (ACIP) has recommended routine vaccination for females beginning at 11–12 years of age and catchup vacci-

TABLE 4. ODDS RATIOS (OR) AND 95% CONFIDENCE INTERVALS (CIs) FOR SOCIODEMOGRAPHIC, HEALTHCARE ACCESS, AND HEALTH BEHAVIOR-RELATED CHARACTERISTICS ASSOCIATED WITH HAVING A PAP TEST IN THE LAST 3 YEARS

	OR	95% CI
Age (years)		
40–64	1.00	—
65–79	0.33	(0.28–0.40)
Race		
African American	1.00	—
White	0.49	(0.44–0.55)
Other <sup>a</sup>	0.63	(0.48–0.82)
Birthplace		
United States	1.00	—
Outside of United States	1.01	0.65–1.56
Ever lived in rural community		
Yes	0.83	0.75–0.93
No	1.00	—
Marital status		
Married or partner	1.00	—
Separated or divorced	1.04	0.91–1.19
Widowed	0.85	0.71–1.02
Single, never married	1.03	0.89–1.20
Education		
Less than high school	0.73	0.64–0.85
High school	0.92	0.81–1.05
More than high school	1.00	—
Household annual income		
<\$15,000	0.61	0.43–0.87
\$15–\$24,999	0.71	0.50–1.01
\$25–\$49,999	0.82	0.57–1.19
≥\$50,000	1.00	—
Insurance <sup>b</sup>		
Private	1.00	—
Public	0.95	0.81–1.14
Other	0.83	0.49–1.43
None	0.83	0.71–0.97
Had medical visit in last year		
Yes	3.76	3.25–4.34
No	1.00	—
Has personal history of any cancer		
Yes	0.67	0.47–0.96
No	1.00	—
Body mass index (BMI), kg/m <sup>2</sup>		
<18.5	0.67	0.47–0.96
18.5–<25	1.00	—
25–<30	1.09	0.94–1.27
≥30	1.00	0.88–1.14
Seatbelt use		
At least some of the time	1.68	1.25–2.24
None of the time	1.00	—
Had mammogram in last 2 years		
Yes	11.64	10.28–13.18
No	1.00	—
Smoking status		
Current	0.90	0.80–1.01
Former	0.82	0.71–0.95
Never	1.00	—

<sup>a</sup>Other includes women who self-identified as Hispanic/Latina ( $n = 102$ ), Asian or Pacific Islander ( $n = 26$ ), American Indian or Alaskan Native ( $n = 71$ ), other race ( $n = 109$ ), or mixed race ( $n = 296$ ).

<sup>b</sup>Mutually exclusive insurance categories created from those reporting any private insurance; only publicly funded insurance including Medicaid, Medicare, and VA, Champus; other insurance; or no insurance.

nation for females aged 13–26 years who have not been vaccinated.<sup>31</sup> It is likely that the incidence of cervical cancer will decrease in the years to come as girls and young women are vaccinated. Despite the advent of this vaccine, however, women should continue to be screened according to guidelines because 30% of HPV types responsible for cervical cancers are not included in the vaccine. Furthermore, the duration of vaccination prevention is unknown, and the vaccine is likely not effective in treating infections acquired prior to vaccination.<sup>31</sup>

In summary, we did not find significant variation in the use of Pap testing among southern U.S. women compared with national testing rates or in associated predictors of cervical cancer screening. Although overall use of Pap tests was high in this population, there were subsets of women who had lower use and who may benefit from targeted interventions to increase Pap testing and perhaps also from vaccination programs. Public health agencies must continue to monitor Pap test use to ensure that all women at risk for cervical cancer are screened.

### Acknowledgments

We thank Ms. Sarah Schweitzer Cohen for providing statistical review assistance during the preparation of the manuscript.

### Disclosure Statement

No competing financial interests exist.

### References

- Jemal A, Siegel R, Ward E, Hao Y, Xu J, Murray T, Thun MJ. Cancer statistics. *CA Cancer J Clin* 2008;58:71–96.
- Screening for cervical cancer: Recommendations and rationale. *Am J Nurs* 2003;103:101.
- Smith RA, Cokkinides V, Eyre HJ. Cancer screening in the United States, 2007: A review of current guidelines, practices, and prospects. *CA Cancer J Clin* 2007;57:90.
- ACOG Practice Bulletin: Clinical management guidelines for obstetrician-gynecologists. Number 45, August 2003. Cervical cytology screening (replaces committee opinion 152, March 1995). *Obstet Gynecol* 2003;102:417.
- Behavioral Risk Factor Surveillance System Prevalence Data. National Center for Chronic Disease Prevention and Health Promotion 2006. Available at [www.cdc.gov/brfss/index.htm](http://www.cdc.gov/brfss/index.htm)
- Cancer trends progress report—2005 update. Bethesda, MD: National Cancer Institute, 2005. Available at [progressreport.cancer.gov](http://progressreport.cancer.gov)
- U.S. Cancer Statistics Working Group. United States cancer statistics: 2003 incidence and mortality. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute, 2003.
- Datta GD, Colditz GA, Kawachi I, Subramanian SV, Palmer JR, Rosenberg L. Individual-, neighborhood-, and state-level socioeconomic predictors of cervical carcinoma screening among U.S. black women: A multilevel analysis. *Cancer* 2006;106:664.
- Signorello LB, Hargreaves MK, Steinwandel MD, et al. Southern Community Cohort Study: Establishing a cohort to investigate health disparities. *J Natl Med Assoc* 2005;97:972.
- Coughlin SS, Thompson TD, Seeff L, Richards T, Stallings F. Breast, cervical, and colorectal carcinoma screening in a demographically defined region of the southern U.S. *Cancer* 2002;95:2211.
- Sambamoorthi U, McAlpine DD. Racial, ethnic, socioeconomic, and access disparities in the use of preventive services among women. *Prev Med* 2003;37:475.
- Coughlin SS, King J, Richards TB, Ekwueme DU. Cervical cancer screening among women in metropolitan areas of the United States by individual-level and area-based measures of socioeconomic status, 2000 to 2002. *Cancer Epidemiol Biomarkers Prev* 2006;15:2154.
- Hewitt M, Devesa SS, Breen N. Cervical cancer screening among U.S. women: Analyses of the 2000 National Health Interview Survey. *Prev Med* 2004;39:270.
- DeVoe JE, Fryer GE, Phillips R, Green L. Receipt of preventive care among adults: Insurance status and usual source of care. *Am J Public Health* 2003;93:786.
- Ayanian JZ, Weissman JS, Schneider EC, Ginsburg JA, Zaslavsky AM. Unmet health needs of uninsured adults in the United States. *JAMA* 2000;284:2061.
- Breen N, Wagener DK, Brown ML, Davis WW, Ballard-Barbash R. Progress in cancer screening over a decade: Results of cancer screening from the 1987, 1992, and 1998 National Health Interview Surveys. *J Natl Cancer Inst* 2001;93:1704.
- DeVoe JE, Fryer GE, Phillips R, Green L. Receipt of preventive care among adults: Insurance status and usual source of care. *Am J Public Health* 2003;93:786.
- Ross JS, Bradley EH, Busch SH. Use of health care services by lower-income and higher-income uninsured adults. *JAMA* 2006;295:2027.
- Rakowski W, Meissner H, Vernon SW, Breen N, Rimer B, Clark MA. Correlates of repeat and recent mammography for women ages 45 to 75 in the 2002 to 2003 Health Information National Trends Survey (HINTS 2003). *Cancer Epidemiol Biomarkers Prev* 2006;15:2093.
- Swan J, Breen N, Coates RJ, Rimer BK, Lee NC. Progress in cancer screening practices in the United States: Results from the 2000 National Health Interview Survey. *Cancer* 2003;97:1528.
- Coughlin SS, Breslau ES, Thompson T, Benard VB. Physician recommendation for Papanicolaou testing among U.S. women, 2000. *Cancer Epidemiol Biomarkers Prev* 2005;14:1143.
- Nguyen TT, McPhee SJ, Nguyen T, Lam T, Mock J. Predictors of cervical Pap smear screening awareness, intention, and receipt among Vietnamese-American women. *Am J Prev Med* 2002;23:207.
- Juon HS, Seung-Lee C, Klassen AC. Predictors of regular Pap smears among Korean-American women. *Prev Med* 2003;37:585.
- Taylor VM, Schwartz SM, Jackson JC, et al. Cervical cancer screening among Cambodian-American women. *Cancer Epidemiol Biomarkers Prev* 1999;8:541.
- Taylor VM, Jackson JC, Tu SP, et al. Cervical cancer screening among Chinese Americans. *Cancer Detect Prev* 2002;26:139.
- Wee CC, Phillips RS, McCarthy EP. BMI and cervical cancer screening among white, African-American, and Hispanic women in the United States. *Obes Res* 2005;13:1275.
- Wee CC, McCarthy EP, Davis RB, Phillips RS. Screening for cervical and breast cancer: is obesity an unrecognized barrier to preventive care? *Ann Intern Med* 2000;132:697.
- Ferrante JM, Chen PH, Jacobs A. Breast and cervical cancer screening in obese minority women. *J Womens Health* 2006;15:531.

29. Coughlin SS, Thompson TD, Hall HI, Logan P, Uhler RJ. Breast and cervical carcinoma screening practices among women in rural and nonrural areas of the United States, 1998–1999. *Cancer* 2002;94:2801.
30. Smith RA, Cokkinides V, Eyre HJ. American Cancer Society guidelines for the early detection of cancer, 2006. *CA Cancer J Clin* 2006;56:11.
31. Markowitz LE, Dunne EF, Saraiya M, et al. Quadrivalent human papillomavirus vaccine: Recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR Recomm Rep* 2007;56:1.

Address reprint requests to:  
*Neeraja B. Peterson, M.D., M.Sc.*  
*Division of General Internal Medicine and*  
*Public Health*  
*Department of Medicine*  
*Vanderbilt University Medical Center*  
*Suite 6108 Medical Center East*  
*Nashville, TN 37232-8300*

*E-mail: neeraja.peterson@vanderbilt.edu*