Published in final edited form as:

Prev Med. 2015 December ; 81: 427–432. doi:10.1016/j.ypmed.2015.10.005.

Cervical cancer screening among women 70 years of age in the United States – a referral problem or patient choice

Fangjian Guo, MD, PhD¹, Jacqueline M. Hirth, PhD, MPH¹, and Abbey B. Berenson, MD, PhD¹

¹ Department of Obstetrics & Gynecology, and Center for Interdisciplinary Research in Women's Health, The University of Texas Medical Branch, Galveston, TX

Abstract

Objective—Clinical guidelines recommend that women with a history of adequate screening and not otherwise at high risk may discontinue cervical cancer screening after 65 years of age.

However, screening remains common among US women over 65 years old. This study was conducted to examine whether overutilization was attributable to provider's recommendation or patient choice.

Method—This cross-sectional study used data from 1752 female participants (70+ years) from the 2013 National Health Interview Survey (NHIS). We quantitatively assessed the proportions of provider-recommended and patient self-initiated Pap smears.

Results—Among female respondents, 40.8% had a Pap smear within the past 3 years, 19.4% had a Pap smear in the last year, and 39.7% reported receiving a recommendation for a Pap smear from their provider in the past year. Among women who received a recommendation to obtain a Pap smear, 39.8% did so within the past 12 months compared to 5.9% of women who did not receive a recommendation (adjusted odds ratio 10.5, 95% confidence interval 7.39–15.0). About 70% of women who visited an obstetrician/gynecologist and reported receiving a recommendation to have a Pap smear did so in the past year, while 32.3% of women who visited an obstetrician/gynecologist but did not receive a recommendation obtained one.

Conclusion—Pap smears were common among women 70 years of age. Health care providers may need additional education on current guidelines regarding indications for Pap smears in this age group to help reduce screening of patients who may not benefit.

Correspondence to: Abbey B. Berenson, MD, PhD; Professor, Department of Obstetrics & Gynecology, Director, Center for Interdisciplinary Research in Women's Health, The University of Texas Medical Branch, 301 University Blvd., Galveston, TX 77058-0587, Phone: (409) 772-2417, Fax: (409) 747-5129, abberens@utmb.edu.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Financial Disclosures: The authors have no conflict of interest to disclose.

Disclaimer: The findings and conclusions in this paper are those of the authors and do not necessarily represent the views of CDC/NCHS.

Keywords

Cancer Screening; Cervical Cancer; Pap smear; Overutilization of Health Services

Introduction

Cytology is recommended (Smith et al., 2015; U.S. Preventive Services Task Force, 2014) and well-utilized (Sabatino et al., 2015; Weinmann et al., 2015) in the United States (US) for the prevention of cervical cancer. However, performing Papanicolaou (Pap) smears in women 65 years of age has limited benefit, and can result in potential harm from false positive results and subsequent invasive procedures (Mandelblatt et al., 2002; Sawaya et al., 2000a; Sawaya et al., 2000b; Van Wijngaarden and Duncan, 1993). Since 2003, the US Preventive Services Task Force (USPSTF) has recommended that women with a history of adequate screening and not otherwise at high risk may discontinue cervical cancer screening after 65 years of age (U.S. Preventive Services Task Force, 2003). The American Cancer Society (ACS) also suggested in 2002 that cervical cancer screening could be discontinued at age 70 (Smith et al., 2002), and current ACS guidelines recommend that screening stops at age 65 for women with adequate negative prior screening and no history of cervical intraepithelial neoplasia (CIN) 2 or higher (Saslow et al., 2012; Smith et al., 2015). However, screening continues to be common among US women over 65 years of age, even among those with less than a 5-year life expectancy due to poor health (Royce et al., 2014).

To design effective strategies which reduce the overutilization of cervical cancer screening in the US, it is important to examine whether overutilization stems more from health care providers' recommendations or patients' requests for services. There are few studies that have quantitatively assessed the proportion of provider-recommended and patient self-initiated Pap smears among US women. This study used nationally-representative data from the National Health Interview survey (NHIS) 2013 to provide an overall picture of Pap smear use among US women 70 years of age and to examine whether provider recommendation or patient choice is more important for screening overutilization.

Methods

This cross-sectional study used data from the 2013 NHIS. NHIS data is collected from a representative cross-sectional non-institutionalized sample to assess the health status and behaviors of US adults. Health information was collected through an annual, in-person household survey, and used a complex, stratified, multistage sample design to provide nationally representative data. Detailed information about the methodology can be found elsewhere (National Center for Health Statistics, 2014). Verbal consent for survey participation was provided by each subject. For this study, women 70 years of age were included, as we assessed screening use in the past 3 years and cervical cancer screening is recommended to stop at age 65 (Smith et al., 2015; U.S. Preventive Services Task Force, 2014). We excluded women with a prior hysterectomy (n=1,324), a history of cervical cancer (n=7), those who had a Pap smear for a problem (n=25), and those missing

information on their most recent Pap smears (n=117). After these exclusions, we included 1,752 women 70 years of age in our analyses (**Figure 1**).

We included the following sociodemographic information in our analyses: age in years, race (non-Hispanic white, non-Hispanic black, Hispanics, and others), immigration status (born in US, in US <10 years, and in US 10+ years), region of residence (northeast, Midwest, south, and west), marital status (married/living with partner, widowed/divorced/separated, and single), education level (< high school, high school, and > high school), and family income to poverty threshold ratio (<1, 1-3, and >3). Family income to poverty threshold ratio is a ratio of the family's income to the appropriate federal poverty threshold. Health insurance coverage (public, private, and none) and whether the participant reported a usual place of health care (yes, and no) were used to determine access to health care. Those who listed the emergency room as their usual place where they received health care were considered to have no usual source of care. We also included whether women had visited an obstetrician/gynecologist (OB/GYN) in the past year. Smoking status was classed into current smoker, past smoker, and never smoker.

Female participants were asked whether they ever had a Pap smear; those who responded yes were asked additional questions about the timing of their most recent Pap smear. This information was recoded using the NHIS 2000 method by combining information available on month/year, days/weeks/months/years of the exam, the original time interval grouping, and the interview date (National Center for Health Statistics, 2002). In addition, the survey asked women whether they had received recommendations for Pap smears from their doctors with in the past year. If a woman did not receive a d o c t o r's r e c o m m e n d a t i o n f o r P a p s m e a r b u t obtained one in the past year, that woman was classified as having initiated screening herself.

Statistical Analysis

We examined the weighted prevalence of reported Pap smears within the past 3 years, within the past 2 years, and in the past year to get an overall picture of screening among women 70 years of age. To investigate the role of providers and patients in the initiation of cervical cancer screening, we also assessed the proportion of women who stated they received recommendations for cervical cancer screening from their doctors in the past 12 months, the prevalence of Pap smears among women who reported a provider recommendation, and the prevalence of reported provider recommendations among women who had a Pap smear. All analyses of NHIS data were weighted to account for differential probabilities of selection and the complex sample design following NHIS analytic guidelines (National Center for Health Statistics, 2014). Sample weights of final annual person weights were incorporated in all analyses to account for non-response and post stratification adjustment (age-sex-race/ethnicity adjustment to 2010 Census population Control totals). Standard errors were calculated using Taylor series linearization. Multivariate logistic regression models were used to assess differences in screening use, recommendation received, and Pap smear prevalence by recommendation status. Variables that were controlled for included age, race/ethnicity, education level, and income level. Statistical

analyses were conducted using SAS software version 9.4(SAS Institute; Carey, NC). A 2-sided p value <0.05 was considered statistically significant.

Results

Among the 1752 US women 70 years of age in our sample, 35.1% were 70-74 years old, 29.4% were 75-80 years old, and 35.5% were >80 years of age (**Table 1**). Only 0.7% of these women had been in the US < 10 years, 4.1% were single, 0.7% did not have any health insurance coverage, 3.1% did not have a usual place of care, 16% visited an OB/GYN in the past year, and 5.8% were current smokers.

Among the women in this sample, 40.8% reported having had a Pap smear within the past 3 years, 32.5% reported a Pap smear within the past 2 years, and 19.4% reported a Pap smear in the past 12 months (**Table 1**). Pap smear use decreased with age ($p<0.001$ for trend), with 59.2% of 70-74 year old women and 23% of those >80 years of age reporting having had a Pap smear in the past 3 years. Pap smear use in the past year did not differ across racial/ethnic groups. Women who visited an OB/GYN in the past year reported higher Pap test use than those who did not (56.1% vs 12.3%, $p<0.001$).

In the past year, 39.7% of women stated that they received recommendations for Pap smears from their doctors (**Table 2**). The proportion of women who got a Pap smear recommendation decreased with age ($p<0.001$ for trend). Black women were less likely while married women were more likely to report receiving a screening recommendation. Women covered by public health insurance reported a similar prevalence of provider recommendations for Pap smears as those who were privately insured (39.6% vs 39.9%). Among women who stated that they received a Pap smear in the past year, 81.5% reported receiving recommendations to have a Pap smear from their doctor. The proportion of doctor-recommended Pap smears among Pap smears performed in the past year did not differ across age groups.

Among women who received a doctor's recommendations to obtain a Pap smear in the past 12 months, 39.8% stated that they did so in the past 12 months (**Table 3**), compared to only 5.9% who had a Pap smear among those who did not receive a recommendation (adjusted odds ratio 10.5, 95% confidence interval 7.39-15.0, $p<0.001$). Among those women who received a doctor's recommendations for a Pap smear in the past year, those who visited an OB/GYN in the past 12 months were more likely to undergo this test than those who visited other types of providers (69.6% vs 29.3%, $p<0.001$). Among women who did not receive a doctor's recommendation for Pap smears, 32.3% of those who visited an OB/GYN had cervical screening in the past year, which was significantly higher than those who did not visit an OB/GYN (3.1%, $p<0.001$). Among women who did not receive a doctor's recommendation for Pap smears, past smokers had much higher Pap test use than current smokers or never smokers (9.4% vs 4.3%, $p=0.01$); women aged 70-74 years were more likely to have a Pap smear than women >80 years of age.

Discussion

This study demonstrated that a large number of US women 70 years of age were still receiving Pap smears as recently as 2013. Our results were particularly striking for women >80 years of age, as 23% of women in this age group reported receiving a Pap smear in the past 3 years, and 28% reported receiving a doctor's recommendation for a Pap smear in the past year. Overall, over 40% of women reported receiving a Pap smear in the past 3 years, which translates to >6.3 million Pap smears every 3 years among this group according to the standard 2010 US Census population (U.S. Census Bureau, 2010). At approximately \$30 per test (Centers for Medicare & Medicaid Services, 2015), at least \$189 million could be saved in direct medical costs by following USPSTF guidelines.

Overall, we found that age was associated with cervical cancer screening with a decreasing prevalence as age increased. This is in agreement with prior studies which demonstrated that screening is performed less often in women with shorter life expectancies (Kagay et al., 2006; Kiefe et al., 1998; Royce et al., 2014; Walter and Schonberg, 2014). We also found that younger women were more likely to initiate screening themselves than older women and that women 70 years of age who were past, but not current, smokers were more likely to seek out screening on their own. Since these women were not current smokers, it is possible that they requested this test because they were concerned about their health (Buczowski et al., 2014), but had limited understanding of its risk-benefit ratio. This suggests that patient education needs to target this population to prevent overutilization of health care resources.

Cervical cancer screening behavior is also influenced by health providers' attitudes toward use of this test (O'Connor et al., 2014). If the provider feels that the test will benefit their patients, the likelihood of performing the test increases. Our analysis of the role of providers and patients in the initiation of cervical screening demonstrated that >80% of the screening in this population appears to be due to provider recommendation. In particular, obstetricians/gynecologists played a central role in the overutilization of cervical cancer screening among older women. Close to two thirds of women who visited an OB/GYN received Pap smear recommendations. Among these women, over two thirds obtained a Pap smear, whereas about one third of women who visited an OB/GYN but did not receive a recommendation for a Pap smear initiated screening. In contrast, women who did not visit an OB/GYN were less likely to have a Pap test. These findings are consistent with a national survey conducted in 2011-2012 among OB/GYNs in the US in which over half reported that they continued to screen patients 70 years of age for cervical cancer (Perkins et al., 2013). Gaps in physician-patient communication, lack of access to new information/guidelines, and overlooking the harms of screening may prompt physicians to continue cervical cancer screening in older women (Harris and Sheridan, 2013; Perkins et al., 2013). We also noted that women who visited OB/GYNs were more likely to request this test themselves, even when their doctors did not initially recommend the test. To reduce overutilization of cervical cancer screening in this age group, up-to-date information on guidelines for testing in this age group needs to be better disseminated to providers. The Centers for Disease Control and Prevention (CDC) has generated a useful table that summarizes the recommendations of different organizations regarding when to stop screening and when to screen after age 65

years (Centers for Disease Control and Prevention, 2015). This could help providers discuss current guidelines with their patients so they can make an informed choice.

Strengths of this study include use of data from a large, nationally representative sample with high response rates and the availability of information on sociodemographic characteristics and health care access. This study also has several limitations. First, information on Pap smear use, access to care, and receiving recommendations for Pap smears was self-reported and subject to recall bias. Pap smear use may be overestimated as we did not have medical records to confirm patient reports (Bowman et al., 1997; Caplan et al., 2003; Gordon et al., 1993; Johnson et al., 1995; Montañó and Phillips, 1995; Suarez et al., 1995; Vernon et al., 2004). Moreover, women may have misinterpreted receiving a pelvic examination as undergoing a Pap smear. Pelvic exams are indicated for this population (U.S. Preventive Services Task Force, 2014), but some women do not understand the difference between a pelvic exam and a Pap smear (Howard et al., 2015). Additionally, NHIS did not collect sufficient information to determine whether a woman had an adequate screening history, or whether she had a history of CIN 2 or higher. It is important to note that although we attempted to exclude women who had a Pap smear due to a prior problem, we did not have medical records to confirm that none of the remaining women had a prior abnormal Pap smear. As Pap smears are indicated in women with a history of abnormal cervical cancer screening tests and cancer precursors, even if they are >65 years of age, this could have affected our results (Massad et al., 2013).

In conclusion, cervical cancer screening remains common among US women 70 years of age, which appears to be mostly due to provider recommendations. Further studies are needed to investigate the underlying reasons of the providers' behaviors. Additional provider education is needed regarding current guidelines as well as potential harms and benefits of this test among this age group so they can discuss these with their patients.

Acknowledgement

Part of the results were presented as an oral presentation at the APHA (American Public Health Association) Annual Meeting 2015, October 31 – November 4, 2015, Chicago, Illinois.

Financial Support: Dr. Guo is currently a postdoctoral fellow supported by an institutional training grant (National Research Service Award T32HD055163, Berenson, Principal Investigator) from the Eunice Kennedy Shriver National Institute of Child Health & Human Development of the National Institutes of Health. Dr. Hirth, is supported by a research career development award (Building Interdisciplinary Research Careers in Women's Health Program -BIRCWH K12HD052023, Berenson, Principal Investigator) from the Office of Research on Women's Health (ORWH), the Office of the Director (OD), the National Institute of Allergy and Infectious Diseases (NIAID), the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD) at the National Institutes of Health. The content is solely the responsibility of the authors and does not necessarily represent the official views of the NICHD or the NIH.

Role of the Sponsors: All data from National Health Interview Survey (NHIS) used in this study were collected by the National Center for Health Statistics (NCHS) for Disease Control and Prevention (CDC).

Abbreviation

ACS	American Cancer Society
CDC	Centers for Disease Control and Prevention

CIN	Cervical Intraepithelial Neoplasia
NHIS	National Health Interview survey
OB/GYN	Obstetrician/Gynecologist
Pap	Papanicolaou
USPSTF	US Preventive Services Task Force

References

- Bowman JA, Sanson-Fisher R, Redman S. The accuracy of self-reported Pap smear utilisation. *Soc Sci Med*. 1997; 44:969–76. [PubMed: 9089918]
- Buczowski K, Marcinowicz L, Czachowski S, Piszczek E. Motivations toward smoking cessation, reasons for relapse, and modes of quitting: results from a qualitative study among former and current smokers. *Patient Prefer Adherence*. 2014; 8:1353–63. <http://dx.doi.org/10.2147/PPA.S67767>. [PubMed: 25336926]
- Caplan LS, McQueen DV, Qualters JR, Leff M, Garrett C, Calonge N. Validity of women's self-reports of cancer screening test utilization in a managed care population. *Cancer Epidemiol Biomarkers Prev*. 2003; 12:1182–7. [PubMed: 14652278]
- Centers for Disease Control and Prevention. Cervical Cancer Screening Guidelines for Average-Risk Women. 2015. <http://www.cdc.gov/cancer/cervical/pdf/guidelines.pdf>
- Centers for Medicare & Medicaid Services. Clinical Diagnostic Laboratory Fee Schedule. Centers for Medicare & Medicaid Services; Baltimore: 2015. 2015. [http://www.cms.gov/apps/ama/license.asp?file=/ClinicalLabFeeSched/Dow nloads/15CLAB.zip](http://www.cms.gov/apps/ama/license.asp?file=/ClinicalLabFeeSched/Dow%20nloads/15CLAB.zip)
- Gordon NP, Hiatt RA, Lampert DI. Concordance of self-reported data and medical record audit for six cancer screening procedures. *J Natl Cancer Inst*. 1993; 85:566–70. [PubMed: 8455203]
- Harris R, Sheridan S. The times they (may) be a-changin': too much screening is a health problem. *Am J Prev Med*. 2013; 45:248–9. <http://dx.doi.org/10.1016/j.amepre.2013.05.002>. [PubMed: 23867035]
- Howard DL, Hostetter SS, Hunter J, Johnson N, Cooper S, Malnar G. Women's Understanding of the Term 'Pap Smear'. *Matern Child Health J*. 2015; 19:1455–63. <http://dx.doi.org/10.1007/s10995-015-1679-0>. [PubMed: 25630404]
- Johnson CS, Archer J, Campos-Outcalt D. Accuracy of Pap smear and mammogram self-reports in a southwestern Native American tribe. *Am J Prev Med*. 1995; 11:360–3. [PubMed: 8775656]
- Kagay CR, Quale C, Smith-Bindman R. Screening mammography in the American elderly. *Am J Prev Med*. 2006; 31:142–9. [PubMed: 16829331]
- Kiefe CI, Funkhouser E, Fouad MN, May DS. Chronic disease as a barrier to breast and cervical cancer screening. *J Gen Intern Med*. 1998; 13:357–65. [PubMed: 9669564]
- Mandelblatt JS, Lawrence WF, Womack SM, Jacobson D, Yi B, Hwang YT, Gold K, Barter J, Shah K. Benefits and costs of using HPV testing to screen for cervical cancer. *JAMA*. 2002; 287:2372–81. [PubMed: 11988058]
- Massad LS, Einstein MH, Huh WK, et al. 2012 updated consensus guidelines for the management of abnormal cervical cancer screening tests and cancer precursors. *Obstet Gynecol*. 2013; 121:829–46. <http://dx.doi.org/10.1097/AOG.0b013e3182883a34>. [PubMed: 23635684]
- Montaño DE, Phillips WR. Cancer screening by primary care physicians: a comparison of rates obtained from physician self-report, patient survey, and chart audit. *Am J Public Health*. 1995; 85:795–800. [PubMed: 7762712]
- National Center for Health Statistics. Survey Description, National Health Interview Survey, 2013. Hyattsville, Maryland: 2014. Survey Description, National Health Interview Survey, 2000. Hyattsville, Maryland. 2002. National Center for Health Statistics.
- O'Connor M, Murphy J, Martin C, O'Leary J, Sharp L, Irish Cervical Screening Consortium (CERVIVA). Motivators for women to attend cervical screening: the influential role of GPs. *Fam Pract*. 2014; 31:475–82. <http://dx.doi.org/10.1093/fampra/cmu029>. [PubMed: 24927724]

- Perkins RB, Anderson BL, Gorin SS, Schulkin JA. Challenges in cervical cancer prevention: a survey of U.S. obstetrician-gynecologists. *Am J Prev Med.* 2013; 45:175–81. <http://dx.doi.org/10.1016/j.amepre.2013.03.019>. [PubMed: 23867024]
- Royce TJ, Hendrix LH, Stokes WA, Allen IM, Chen RC. Cancer screening rates in individuals with different life expectancies. *JAMA Intern Med.* 2014; 174:1558–65. <http://dx.doi.org/10.1001/jamainternmed.2014.3895>. [PubMed: 25133746]
- Sabatino SA, White MC, Thompson TD, Klabunde CN. Cancer screening test use - United States, 2013. *MMWR Morb Mortal Wkly Rep.* 2015; 64:464–8. [PubMed: 25950253]
- Saslow D, Solomon D, Lawson HW, et al. American Cancer Society, American Society for Colposcopy and Cervical Pathology, and American Society for Clinical Pathology screening guidelines for the prevention and early detection of cervical cancer. *CA Cancer J Clin.* 2012; 62:147–72. <http://dx.doi.org/10.3322/caac.21139>. [PubMed: 22422631]
- Sawaya GF, Grady D, Kerlikowske K, et al. The positive predictive value of cervical smears in previously screened postmenopausal women: the Heart and Estrogen/progestin Replacement Study (HERS). *Ann Intern Med.* 2000a; 133:942–50. [PubMed: 11119395]
- Sawaya GF, Kerlikowske K, Lee NC, Gildengorin G, Washington AE. Frequency of cervical smear abnormalities within 3 years of normal cytology. *Obstet Gynecol.* 2000b; 96:219–23. [PubMed: 10908766]
- Smith RA, Cokkinides V, von Eschenbach AC, et al. American Cancer Society guidelines for the early detection of cancer. *CA Cancer J Clin.* 2002; 52:8–22. [PubMed: 11814067]
- Smith RA, Manassaram-Baptiste D, Brooks D, et al. Cancer screening in the United States, 2015: a review of current American cancer society guidelines and current issues in cancer screening. *CA Cancer J Clin.* 2015; 65:30–54. <http://dx.doi.org/10.3322/caac.21261>. [PubMed: 25581023]
- Suarez L, Goldman DA, Weiss NS. Validity of Pap smear and mammogram self-reports in a low-income Hispanic population. *Am J Prev Med.* 1995; 11:94–8. [PubMed: 7632456]
- U.S. Census Bureau. Age and Sex Composition in the United States. 2010. Available at: <https://www.census.gov/population/age/data/2010comp.html>
- U.S. Preventive Services Task Force. The Guide to Clinical Preventive Services. 2014. Available at: <http://www.ahrq.gov/professionals/clinicians-providers/guidelines-recommendations/guide/cpsguide.pdf>. Accessed August 11, 2014
- U.S. Preventive Services Task Force. Screening for cervical cancer: recommendations and rationale. *Am Fam Physician.* 2003; 67:1759–66. [PubMed: 12725455]
- Van Wijngaarden WJ, Duncan ID. Rationale for stopping cervical screening in women over 50. *BMJ.* 1993; 306:967–71. [PubMed: 8490472]
- Vernon SW, Briss PA, Tiro JA, Warnecke RB. Some methodologic lessons learned from cancer screening research. *Cancer.* 2004; 101:1131–45. [PubMed: 15316907]
- Walter LC, Schonberg MA. Screening mammography in older women: a review. *JAMA.* 2014; 311:1336–47. <http://dx.doi.org/10.1001/jama.2014.2834>. [PubMed: 24691609]
- Weinmann S, Williams AE, Kamineni A, et al. Cancer. 2015; 121:2976–83. <http://dx.doi.org/10.1002/cncr.29445>. [PubMed: 25989253]

Figure 1.

Flowchart of the numbers of participants included in the analyses of cervical cancer screening among women 70 years of age in NHIS 2013.

NHIS: National Health Interview Survey.

Table 1

Pap smear prevalence among women 70 years of age in the United States.

	n(%) ^a	Pap Smear %(95% CI)		
		Within 3 Years	Within 2 Years	Within 1 Year
Total	1752 (100)	40.8 (37.7-43.9)	32.5 (29.6-35.5)	19.4 (16.9-21.8)
Age Group				
70-74	589 (35.1)	59.2 (54.4-64.0)	49.3 (44.2-54.4)	27.8 (23.0-32.5)
75-80	511 (29.4)	39.8 (34.0-45.6)	29.9 (24.6-35.1)	19.8 (15.4-24.1)
>80	652 (35.5)	23.4 (19.1-27.7)	18.2 (14.3-22.1)	10.8 (7.7-13.8)
Race/Ethnicity				
NH-White	1205 (76.5)	40.3 (36.7-43.9)	32.0 (28.6-35.4)	19.1 (16.3-21.9)
NH-Black	225 (8.9)	36.9 (28.6-45.3)	33.3 (25.0-41.6)	19.7 (13.2-26.1)
Hispanic	185 (8.2)	43.0 (34.3-51.7)	32.4 (24.1-40.7)	20.3 (13.3-27.3)
Other	137 (6.4)	48.9 (38.5-59.3)	37.8 (26.8-48.8)	21.2 (13.4-28.9)
Immigration Status				
Born in US	1466 (83.8)	40.4 (37.0-43.8)	32.1 (28.9-35.3)	19.2 (16.5-21.8)
In US 10+ years	269 (15.3)	44.1 (36.4-51.9)	35.9 (28.4-43.3)	20.5 (14.1-26.9)
In US < 10 years	12 (0.7)	23.8 (2.0-45.7)	23.8 (2.0-45.7)	23.8 (2.0-45.7)
Missing	5 (0.3)			
Region of Residence				
Northeast	364 (22.3)	43.4 (38.0-48.8)	35.1 (29.8-40.4)	21.1 (16.3-26.0)
Midwest	407 (24.4)	38.6 (31.9-45.3)	30.6 (24.7-36.6)	17.1 (12.5-21.7)
South	592 (33.6)	39.8 (34.3-45.4)	31.7 (25.9-37.4)	19.4 (14.6-24.2)
West	389 (19.6)	42.2 (35.4-49.0)	33.4 (27.2-39.7)	20.1 (15.0-25.2)
Marital Status				
Married/Living with Partner	451 (37.0)	54.1 (48.7-59.5)	43.3 (38.0-48.7)	25.2 (20.7-29.8)
Widowed/Divorced/Separated	1214 (58.8)	33.6 (30.2-36.9)	26.8 (23.6-29.9)	16.2 (13.5-18.9)
Single	85 (4.1)	23.9 (13.3-34.5)	17.6 (8.9-26.4)	11.5 (4.3-18.7)
Missing	2 (0.1)			
Education Level				
< High School	440 (22.3)	30.9 (25.5-36.3)	25.0 (19.9-30.0)	13.6 (9.5-17.8)
High School	601 (35.4)	39.1 (33.7-44.5)	30.3 (25.1-35.6)	18.4 (14.2-22.7)
> High School	695 (41.5)	48.2 (43.5-53.0)	39.0 (34.1-43.9)	23.5 (19.4-27.6)
Missing	16 (0.8)			
Family Income to Poverty Threshold Ratio				
<1	314 (13.9)	31.5 (24.2-38.8)	24.0 (17.0-31.1)	13.7 (8.0-19.4)
1-2	872 (48.6)	35.5 (31.2-39.9)	27.7 (23.6-31.7)	17.5 (13.8-21.2)
>3	566 (37.5)	51.0 (45.9-56.1)	41.9 (36.7-47.2)	23.9 (19.5-28.2)
Health Insurance Coverage				
None	15 (0.7)	26.7 (10.5-42.9)	25.4 (9.7-41.0)	7.3 (0.0-17.7)
Private	820 (46.7)	44.9 (40.5-49.3)	36.2 (32.0-40.3)	21.3 (17.8-24.9)
Public	915 (52.4)	37.2 (33.0-41.4)	29.2 (25.3-33.2)	17.8 (14.5-21.2)

	n(%) ^a	Pap Smear %(95% CI)		
		Within 3 Years	Within 2 Years	Within 1 Year
Missing	2 (0.2)			
Having a Usual Source of Care				
No	53 (3.1)	17.1 (5.5-28.7)	12.7 (2.6-22.9)	5.0 (0.0-10.0)
Yes	1699 (96.9)	41.5 (38.4-44.7)	33.2 (30.1-36.2)	19.8 (17.3-22.4)
Missing				
Visiting an OB/GYN in the past year				
No	1494 (84.0)	33.3 (30.0-36.5)	24.2 (21.3-27.1)	12.3 (10.1-14.5)
Yes	257 (16.0)	80.2 (74.4-86.0)	76.1 (70.0-82.1)	56.1 (49.2-62.9)
Missing	1 (0.1)			
Tobacco Smoking				
Current Smoker	109 (5.8)	38.8 (26.6-51.1)	34.6 (22.6-46.7)	17.0 (8.2-25.8)
Past Smoker	499 (30.4)	42.5 (36.7-48.3)	32.4 (27.0-37.9)	18.2 (14.4-22.0)
Never Smoker	1142 (63.7)	40.2 (36.5-44.0)	32.4 (28.7-36.2)	20.2 (16.9-23.5)
Missing	2 (0.1)			

Data were from participants in the 2013 National Health Interview Survey (NHIS).

CI: Confidence interval.

^a %: sample weights were used to calculate weighted percentage.

Table 2

Prevalence of doctor's recommendation for Pap smear in the past year among women 70 years of age.

	Prevalence of Recommendation % (95% CI)	
	All	Pap testing Last Year^a
Total	39.7 (36.6-42.9)	81.5 (76.5-86.6)
Age Group		
70-74	52.5 (47.1-57.9)	81.6 (74.6-88.6)
75-80	38.5 (33.0-44.1)	80.6 (71.6-89.7)
>80	28.0 (23.4-32.7)	82.8 (72.6-92.9)
Race/Ethnicity		
NH-White	40.1 (36.4-43.9)	82.6 (76.7-88.6)
NH-Black	28.2 (21.5-34.9)	69.0 (50.3-87.7)
Hispanic	42.3 (32.8-51.9)	78.4 (62.5-94.2)
Other	47.2 (36.7-57.8)	89.1 (77.3-100.0)
Immigration Status		
Born in US	39.3 (35.8-42.7)	81.4 (76.2-86.5)
In US 10+ years	42.8 (34.1-51.6)	81.5 (67.0-95.9)
In US < 10 years	28.6 (5.0-52.2)	100.0 (100.0-100.0)
Region of Residence		
Northeast	44.1 (37.9-50.4)	82.9 (71.0-94.8)
Midwest	36.9 (30.6-43.2)	89.0 (81.4-96.7)
South	37.0 (31.1-42.8)	74.2 (64.2-84.1)
West	42.9 (36.2-49.5)	84.0 (75.5-92.5)
Marital Status		
Married/Living with Partner	48.6 (42.6-54.5)	81.1 (72.6-89.5)
Widowed/Divorced/Separated	34.4 (30.8-38.1)	82.6 (76.3-88.9)
Single	34.4 (19.8-49.0)	68.7 (39.6-97.7)
Education Level		
< High School	35.0 (29.0-41.0)	84.3 (74.7-94.0)
High School	38.2 (32.9-43.6)	84.0 (75.8-92.3)
> High School	44.1 (39.2-49.0)	78.9 (71.3-86.5)
Family Income to Poverty Threshold Ratio		
<1	36.3 (29.0-43.7)	89.3 (79.2-99.4)
1-2	37.8 (33.6-42.0)	83.8 (76.8-90.8)
>3	43.4 (37.9-48.9)	77.8 (69.1-86.4)
Health Insurance Coverage		
None	28.8 (1.7-55.9)	100.0 (100.0-100.0)
Private	39.9 (35.3-44.4)	79.0 (71.0-87.0)
Public	39.6 (35.0-44.2)	84.1 (78.4-89.8)
Having a Usual Source of Care		
No	20.0 (6.8-33.2)	76.4 (35.3-100.0)
Yes	40.3 (37.1-43.6)	81.6 (76.4-86.7)

Prevalence of Recommendation % (95% CI)		
	All	Pap testing Last Year^a
Visiting an OB/GYN in the past year		
No	35.1 (31.7-38.5)	83.5 (77.0-90.1)
Yes	63.7 (56.2-71.2)	79.1 (71.3-86.9)
Tobacco Smoking		
Current Smoker	41.8 (30.1-53.5)	90.1 (76.3-100.0)
Past Smoker	37.0 (31.2-42.8)	67.5 (57.2-77.8)
Never Smoker	40.9 (36.9-44.8)	86.9 (81.0-92.9)

Data were from participants in the 2013 National Health Interview Survey (NHIS).

CI: Confidence interval.

^aPercentage of women who received doctors' recommendations to obtain a Pap smears among those who had Pap smear in the past year.

Table 3

Pap smear prevalence in the past year among women 70 years of age according to whether they received a doctor's recommendation for a Pap smear.

	Pap Smear % (95% CI)		OR (95% CI) ^a
	Recommended	Not Recommended	
Total	39.8 (35.0-44.5)	5.9 (4.2-7.7)	10.5 (7.39-15.0)
Age Group			
70-74	43.0 (35.9-50.1)	10.7 (6.4-15.1)	6.32 (3.76-10.6)
75-80	41.5 (32.7-50.3)	6.2 (3.1-9.4)	11.8 (6.49-21.5)
>80	31.8 (22.5-41.1)	2.6 (1.0-4.2)	19.0 (8.46-42.5)
Race/Ethnicity			
NH-White	39.4 (34.0-44.7)	5.5 (3.6-7.5)	9.86 (6.34-15.4)
NH-Black	47.3 (32.7-61.9)	8.3 (2.1-14.6)	11.7 (4.36-31.3)
Hispanic	37.6 (24.9-50.4)	7.6 (1.6-13.6)	6.82 (2.48-18.7)
Other	40.0 (24.0-55.9)	4.4 (0.0-9.3)	17.2 (3.43-86.6)
Immigration Status			
Born in US	39.7 (34.6-44.8)	5.9 (4.2-7.6)	9.87 (6.79-14.4)
In US 10+ years	39.1 (26.2-51.9)	6.7 (1.1-12.2)	8.65 (2.76-27.1)
In US < 10 years	83.4 (52.7-100.0)	0	
Region of Residence			
Northeast	39.8 (29.6-49.9)	6.5 (1.9-11.0)	8.14 (3.23-20.5)
Midwest	41.2 (32.2-50.1)	3.0 (0.9-5.0)	26.1 (10.5-65.0)
South	38.9 (29.7-48.0)	7.9 (4.6-11.2)	7.07 (4.01-12.5)
West	39.6 (30.7-48.5)	5.7 (2.1-9.3)	11.7 (5.83-23.5)
Marital Status			
Married/Living with Partner	42.3 (34.9-49.7)	9.3 (5.0-13.7)	7.41 (4.07-13.5)
Widowed/Divorced/Separated	38.7 (32.6-44.8)	4.3 (2.7-5.9)	13.2 (8.19-21.3)
Single	23.0 (6.9-39.0)	5.5 (0.0-11.8)	7.24 (0.59-89.1)
Education Level			
< High School	32.8 (23.1-42.6)	3.3 (1.1-5.5)	13.5 (5.97-30.7)
High School	40.4 (32.0-48.7)	4.7 (2.1-7.4)	12.3 (6.13-24.7)
> High School	42.2 (34.9-49.5)	8.9 (5.5-12.3)	7.52 (4.55-12.4)
Family Income to Poverty Threshold Ratio			
<1	32.9 (20.0-45.7)	2.2 (0.3-4.2)	20.8 (6.58-65.7)
1-2	38.8 (30.8-46.9)	4.6 (2.5-6.6)	13.1 (7.06-24.3)
>3	42.9 (34.9-50.9)	9.4 (5.4-13.4)	6.85 (3.87-12.1)
Health Insurance Coverage			
None	25.3 (0.0-64.6)	0	
Private	42.2 (35.4-49.0)	7.4 (4.5-10.4)	9.23 (5.36-15.9)
Public	38.0 (31.1-44.8)	4.7 (3.0-6.4)	11.4 (7.07-18.4)
Having a Usual Source of Care			
No	19.0 (0.0-40.9)	1.5 (0.0-4.4)	

	Pap Smear % (95% CI)		OR (95% CI) ^a
	Recommended	Not Recommended	
Yes	40.1 (35.3-44.8)	6.1 (4.3-7.9)	9.57 (6.60-13.9)
Visiting an OB/GYN in the past year			
No	29.3 (24.2-34.4)	3.1 (1.8-4.5)	12.5 (7.35-21.3)
Yes	69.6 (61.4-77.8)	32.3 (21.5-43.1)	5.06 (2.63-9.73)
Tobacco Smoking			
Current Smoker	36.6 (19.0-54.2)	2.9 (0.0-7.1)	5.06 (2.63-9.73)
Past Smoker	33.4 (25.5-41.3)	9.4 (6.0-12.9)	3.98 (2.28-6.97)
Never Smoker	42.8 (36.4-49.2)	4.4 (2.3-6.6)	16.5 (9.25-29.4)

Data were from participants in the 2013 National Health Interview Survey (NHIS).

Blank cells had values inestimable.

CI: Confidence interval.

^a OR: adjusted odds ratio, adjusted for age, race/ethnicity, education level, and income level when appropriate.