

Short Communication

Breast and Cervical Cancer Screening: Associations with Personal, Spouse's, and Combined Smoking Status¹

Melissa A. Clark,² William Rakowski, and Beverly Ehrich

Department of Community Health [M. A. C., W. R.] and Center for Gerontology and Health Care Research [M. A. C., W. R., B. E.], Brown University, Providence, Rhode Island 02912

Abstract

The objective of this study was to examine the association of women's cancer screenings with both personal and spouses' smoking status, as well as with the broader context of household smoking, in a United States national-level sample of women aged 42–75 years. Data were from the 1994 National Health Interview Survey Health Promotion Supplement. The sample included 1586 women who reported they were married and living with a spouse in a two-person household. Three measures of smoking status were used: personal smoking status, smoking status of spouse, and household smoking status (self and spouse smoked, spouse only smoked, self only smoked, and both nonsmokers). Using logistic regression modeling, associations were examined between the smoking status measures and three cancer screening indicators: mammogram ≤ 2 years, clinical breast exam ≤ 2 years, and Pap test ≤ 3 years. The both nonsmokers group consistently had the highest screening rates for all three exams. The spouse only smoking group was 10–12% less likely to obtain all three cancer screening tests compared to the both nonsmokers group. The self and spouse group was less likely to report a recent mammogram and clinical breast exam. The self only group did not differ significantly from the both nonsmokers group on any of the cancer screening measures. Results suggest that smoking status of a spouse may be an important correlate of women's cancer screenings.

Introduction

Descriptive and intervention studies indicate that female smokers are at least 10% less likely to obtain breast and cervical cancer screenings than nonsmokers (1–5). Less is known about the association between cancer screenings and the smoking habits of other individuals in women's social environments.

However, smoking status of a spouse has been shown to be negatively associated with women's health-related behaviors (6–10).

With a few exceptions (*e.g.*, Refs. 9–10), most investigations of the association of spousal smoking with women's individual lifestyle behaviors included only nonsmoking women and focused on the confounding effect of dietary behaviors on the health consequences of smoking. No studies that we are aware of have addressed the importance of household smoking specifically in regard to women's cancer screenings.

Materials and Methods

Sample

Data were from the public release tape of the 1994 National Health Interview Survey Supplement on Health Promotion for the Year 2000 Health Objectives (11). The NHIS³ is an annual household interview of randomly selected persons ≥ 18 years that uses a multistage sampling design to represent the civilian noninstitutionalized population in the United States. The Supplement was an additional set of questions asked of half the sample. The analysis sample for this report included women aged 42–75 years because these women were age-eligible for mammography, CBE, and Pap testing.

Although the 1994 NHIS contained information about respondents' smoking status, it did not include questions specifically about spouses' smoking status. Rather, a general question was asked about the number of people who smoked in the home. This did not allow identifying smokers in households with greater than or equal to three people. To specify spouses' smoking status, we restricted the sample to women who were married and living with a spouse in two-person households. For analyses of cervical cancer screening, we further restricted the sample to women who reported not having had a hysterectomy (12).

Dependent Variables

Breast Cancer Screening. We defined both recency of screening by mammography and by CBE as: ≤ 2 years *versus* > 2 years/never/did not recall. At the time of the 1994 NHIS, every other year for breast screening was a commonly accepted minimum standard (13, 14); therefore, women in the > 2 years/never/did not recall group were considered overdue.

Cervical Cancer Screening. We defined recency of Pap test screening as: ≤ 3 years *versus* > 3 years/never/did not recall. Every 3 years is the minimum acceptable standard (13); therefore, women in the > 3 years/never/did not recall group were considered overdue.

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² To whom requests for reprints should be addressed, at Center for Gerontology & Health Care Research, Brown University, Box G-H, Providence, RI 02912.

³ The abbreviations used are: NHIS, National Health Interview Survey; CBE, clinical breast exam; SMSA, Standard Metropolitan Statistical Area; CI, confidence interval; OR, odds ratio.

Table 1 Breast cancer screening in past 2 years by smoking status: 1994 National Health Interview Survey

Smoking status	N	Mammography			CBE		
		% screened	Unadjusted OR (95% CI)	Adjusted ^a OR (95% CI)	% screened	Unadjusted OR (95% CI)	Adjusted ^a OR (95% CI)
Personal smoking status							
Smoker	279	60.4	0.62 (0.48–0.80)	0.67 (0.51–0.89)	73.2	0.71 (0.53–0.94)	0.78 (0.57–1.06)
Nonsmoker	1298	71.1	Reference	Reference	79.4	Reference	Reference
Smoking status of spouse							
Smoker	308	57.8	0.53 (0.41–0.69)	0.57 (0.43–0.75)	69.4	0.56 (0.42–0.73)	0.59 (0.44–0.79)
Nonsmoker	1240	72.0	Reference	Reference	80.3	Reference	Reference
Household smoking status							
Self and spouse	143	53.6	0.43 (0.31–0.60)	0.48 (0.34–0.68)	67.4	0.50 (0.34–0.73)	0.56 (0.37–0.84)
Spouse only	165	61.5	0.60 (0.42–0.85)	0.61 (0.42–0.89)	71.1	0.59 (0.41–0.86)	0.60 (0.40–0.88)
Self only	114	65.3	0.71 (0.46–1.08)	0.75 (0.48–1.17)	77.6	0.84 (0.53–1.33)	0.89 (0.55–1.45)
Both nonsmokers	1126	72.7	Reference	Reference	80.6	Reference	Reference

^a Other correlates in the model: age, education, income, race/ethnicity, region of country, SMSA size, and functional limitations.

Independent Variables

Smoking Status. Three measures of smoking status were used. Personal smoking status was based on self-report and was coded as present smoker *versus* nonsmoker (former smoker or never smoked). Smoking status of spouse was coded as smoker *versus* nonsmoker. Household smoking status was defined by cross-tabulating personal smoking status and smoking status of spouse: present smokers with a spouse who smoked (self and spouse), present smokers with a nonsmoking spouse (self only), nonsmokers with a spouse who smoked (spouse only), and nonsmokers with a nonsmoking spouse (both nonsmokers).

Demographic and Health Status Characteristics. Demographic and health status characteristics were included in the analyses to control for potential confounding. The characteristics that we included have been associated with smoking and/or cancer screenings in other studies. Demographic variables were: age (42–49, 50–64, 65–75); education (≤ 11 years, 12 years, ≥ 13 years); race/ethnicity (white non-Hispanic, all other); region of the country (Northeast, Midwest, South, West), size of SMSA ($< 250,000$; 250,000–999,999; ≥ 1 million); and family income ($< \$15,000$; \$15,000–29,999; $\geq \$30,000$; unknown). Functional status (no limitation, limited in activity) was included as a measure of health status.

Analysis Plan

We used SUDAAN 7.0 software (Research Triangle Institute, Research Triangle Park, NC) to account for the sample weights and complex survey design of the NHIS. We fit single variable (unadjusted) and multiple (adjusted) logistic regression models to examine the association between the three smoking status measures and each of the three screening indicators. All sample sizes are based on unweighted data. All percentages, ORs, and CIs reflect weighted data.

Results

Sample Characteristics. A total of 1586 women (37% of women aged 42–75 years in the 1994 NHIS) indicated that they were married and living with a spouse in a two-person household. The percentages in each of the four household smoking status groups were: self and spouse, 8.9%; self only, 7.5%; spouse only, 10.5%; and both nonsmokers, 73.1%.

The smoking status groups did not differ by income, race/ethnicity, region of the country, size of SMSA, or functional status. Relative to women in households with at least one

smoker, women in the both nonsmokers group were more likely to be aged 65–74 years and to have > 13 years of education.

Breast Cancer Screening. Table 1 presents the results for breast cancer screening within the past 2 years. For personal smoking status, women who smoked were significantly less likely to have had a recent mammogram relative to nonsmoking women in both the unadjusted and adjusted models. Personal smoking status was associated with recency of CBE only in the unadjusted models.

Spouse's smoking status was also associated with both recency of mammography and CBE in the unadjusted and adjusted models. Women with spouses who smoked were less likely to have had breast screenings than women with nonsmoking spouses.

The four-group indicator of household smoking status was significant in the unadjusted and adjusted models. The self and spouse group and the spouse only group were both less likely to have had a recent mammogram and a CBE, compared to the both nonsmokers group. However, the self only group did not differ from the both nonsmokers group.

Cervical Cancer Screening. Table 2 presents results for Pap testing within the past 3 years. Personal smoking status was not associated with recency of Pap testing. Spouse's smoking status was significant in the unadjusted model, and the 95% CI in the adjusted model only slightly exceeded 1.00.

The four-group indicator of household smoking status was not as strongly associated with cervical screening as it was with breast screenings. Similar to breast screening, the spouse only group was less likely to have had a recent Pap test compared to the both nonsmokers group in the unadjusted and adjusted models. However, the self and spouse group and the self only group did not differ from the both nonsmokers group.

Discussion

This study examined the association of women's cancer screenings with both personal and spouses' smoking status, as well as with the broader context of household smoking. The number of women whose cancer screenings may be influenced by smoking is larger than the population statistics that report only the respondent's personal smoking status. In 1994, 18% of women who were aged 42–75 years and living with a spouse in a two-person household presently smoked. However, another 10% of women were nonsmokers who lived with a spouse who smoked.

Table 2 Cervical cancer screening in past 3 years by smoking status: 1994 National Health Interview Survey

Smoking status	N	% screened	Unadjusted OR (95% CI)	Adjusted ^a OR (95% CI)
Personal smoking status				
Smoker	159	77.6	0.91 (0.58–1.42)	0.97 (0.60–1.55)
Nonsmoker	791	79.3	Reference	Reference
Smoking status of spouse				
Smoker	186	73.0	0.67 (0.45–0.98)	0.67 (0.45–1.01)
Nonsmoker	746	80.3	Reference	Reference
Household smoking status				
Self and spouse	81	78.3	0.85 (0.46–1.58)	0.91 (0.48–1.76)
Spouse only	105	69.0	0.53 (0.33–0.83)	0.51 (0.31–0.83)
Self only	64	73.8	0.67 (0.37–1.20)	0.67 (0.36–1.25)
Both nonsmokers	682	80.9	Reference	Reference

^a Other correlates in the model: age, education, income, race/ethnicity, region of country, SMSA size, and functional limitations.

Nonsmoking women living with a nonsmoker consistently had the highest screening rates for all three exams. However, compared to women in totally nonsmoking households, nonsmokers living with a spouse who smoked were 10–12% less likely to obtain cancer screenings, a consistent outcome across the three dependent variables. This is consistent with studies that have found household influences on individual health behaviors (15–19), and it supports other research that has found that nonsmoking women living with smokers have more unfavorable lifestyle behaviors (6–10).

Among female smokers, those living with a spouse who smokes may be most at risk for not receiving routine cancer screenings. Using only the indicator of personal smoking status, female smokers reported lower rates of mammography but did not differ from nonsmokers in receipt of CBE or Pap testing. However, when female smokers were divided into those with and without a spouse who smoked, those with a spouse who smoked were 19% less likely to report a recent mammogram and 13% less likely to report a recent CBE compared to women in totally nonsmoking households. On the other hand, female smokers with a nonsmoking spouse did not differ significantly from women in totally nonsmoking households on any of the screening measures.

We cannot demonstrate a causal link between smoking and receipt of cancer screenings. Women who smoke and who have less favorable health practices overall may be more likely to have a spouse who also smokes. Our results show that 56% of female smokers lived with a spouse who smoked. Selection bias could, therefore, account for lower screening in the self and spouse group. However, this does not explain results for the spouse only group.

The 1994 NHIS supplement did not include any variables that might help to explain why women who live with smokers have lower screening rates. Other studies suggest possible mechanisms to explore in future research linking smoking status to behavioral outcomes. First, some studies suggest that males who smoke have lifestyles that are adopted by their spouses (7, 8). Therefore, less healthy influences and priorities from male partners may guide some women, even if they themselves do not smoke. Second, women may be faced with caretaker issues as a result of a spouse having a smoking-related condition. The physical and emotional burden of caring for an impaired spouse may adversely affect the preventive health behaviors of the caregiver (20). Finally, spouses who smoke may share bad advice and therefore undermine attempts to engage in health-promotive behaviors (21).

Future research should include other features not available in the 1994 NHIS. First, there was no information to determine whether the spouse was a same-sex or opposite-sex partner. Although the large majority of women who report being married have a male partner, an undefined minority have a same-sex partner, and there are some indications that lesbians have less favorable health behaviors (22). The implications for this study are important if lesbians are more likely to be smokers or to live with smokers and also to have lower cancer screening rates.

Because of the lack of identification of the specific smokers in the household, we could not address the contribution of a spouse's smoking to women's cancer screenings compared to the smoking behaviors of other household members, such as children or other relatives. Future studies should move beyond examining only the impact of a woman's spouse to investigate the influence of other members of her social network.

Women living in two-person households have higher rates of cancer screenings than women in households with more than two people (23). Additional persons in the household create the potential for competing priorities for monetary resources, time demands, and caregiving responsibilities. It also presents the possibility of more people in the household who smoke. Therefore, the percentages of women in this study with recent cancer screenings may be higher than would be observed among women living in households with ≥ 3 persons.

Relationships between smoking status and cervical cancer screening were not as strong as those for breast cancer screening. This may be attributable to the smaller sample sizes for the analyses involving Pap testing. Almost 40% ($n = 626$) of the eligible sample were excluded because of a self-reported hysterectomy. As a result, two of the household smoking groups had unweighted samples < 100 , making the estimates for these groups less reliable.

We could not conduct some potentially important subgroup analyses because of limitations of the NHIS. Women without health insurance could not be identified because of the lack of appropriate questions. Also, variables such as race/ethnicity had to be reported as dichotomous responses because of small sample sizes for some categories. Cancer screenings may be lower for some of these subgroups; therefore, the association between household smoking and cancer screening may be especially important for them.

Other studies have found that former smokers have more favorable screening behaviors than never smokers (1, 5). We classified personal smoking status into three categories (present smoker, former smoker, and never smoker), cross-tabulated spousal smoking status with this three-category variable, and replicated all of the analyses (analyses not shown). For the analyses involving mammography and CBE, screening percentages for former smokers were within $\pm 5\%$ of never smokers. For the analyses involving Pap testing, the sample sizes for former and never smokers with a spouse who smoked were both too small to compute reliable estimates. Our analyses should be replicated with sufficient sample sizes to compare screening behaviors among former and never smokers, with and without a spouse who smokes.

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