International Journal of Occupational and Environmental Health

ISSN: 1077-3525 (Print) 2049-3967 (Online) Journal homepage: http://www.tandfonline.com/loi/yjoh20

Breast Cancer Screening among Employed American Women

Terri J. Ballard, Carol A. Burnett, W. Karl Sieber & William E. Halperin

To cite this article: Terri J. Ballard, Carol A. Burnett, W. Karl Sieber & William E. Halperin (1995) Breast Cancer Screening among Employed American Women, International Journal of Occupational and Environmental Health, 1:3, 225-231, DOI: 10.1179/oeh.1995.1.3.225

To link to this article: https://doi.org/10.1179/oeh.1995.1.3.225

Breast Cancer Screening among Employed American Women

TERRI J. BALLARD, DRPH, CAROL A. BURNETT, MS, W. KARL SIEBER, PHD, WILLIAM E. HALPERIN, MD

From the 1990 National Health Interview Survey Health Promotion and Disease Prevention supplement, the authors estimated the 1990 baseline prevalence of breast cancer screening among employed U.S. women aged 50–70 years. Proportions of women screened for breast cancer were calculated by occupational category and demographic characteristics, and were compared with the *Healthy People 2000* objective that 60% of women aged 50 and older have had mammography and a clinical breast examination within the preceding two years. The objective was exceeded for white-collar workers (61.8%) and workers with some college (64.1%), but was not met by any blue-collar/service workers (40.8%); or any workers with only a high school diploma (54.7%) or less than a high school diploma (38.5%). Identification of occupational categories and demographic subgroups among working women will be helpful to those planning breast cancer screening programs, in both the public and the private sectors. *Key words:* breast screening; mammography; occupation; ethnic minorities; worksite health promotion; cancer control.

INT J OCCUP ENVIRON HEALTH 1995; 1:225–231

Regular breast cancer screening with mammography alone or in combination with clinical breast examination (CBE) has been shown to reduce mortality from breast cancer in women aged 50–69 years by approximately one-third.[1,2] The U.S. Public Health Service recommends in its *Healthy People 2000: National Health Promotion and Disease Prevention Objectives* that by the year 2000, the proportion of women aged 50 and older who have had a clinical breast examination and mammography within the preceding one to two years should be at least 60%.[3] In the United States, costs for breast cancer screening, including mammography, are met mostly through out-of-pocket payments or private insurance except for women in the Medicare program and or in special community-based programs for low-income women, in contrast to several European countries, where breast cancer screening programs are part of health-care entitlements.[4] In the past decade, many public and private-sector breast cancer screening programs have been implemented in the United States,[5–11] several of which have targeted employed women. Because many women work outside of the home, providing opportunities for breast cancer screening and education at the worksite has the potential to greatly increase the number of women being screened. Worksite programs may offer education about the risks of breast cancer and the benefits of screening, and may also provide CBE and mammography referrals as part of periodic health examinations[7,12] or through on-site mammography programs via mobile vans.[5] In order to best target underutilizers of breast cancer screening among employed women, it is important to know the distribution of screening among women in different occupations and within demographic subgroups of employed women. No study to date has analyzed screening utilization specifically among employed women, either in the United Sates or in countries where population-based mammography screening is an entitlement.

The objectives of the present study were 1) to estimate the 1990 baseline prevalence of breast cancer screening for employed women; 2) to compare this baseline with the *Healthy People 2000* objective of screening within the preceding two years by 60% of women 50 years of age or older; and 3) to identify occupations and demographic subgroups where employed women underutilize services for breast cancer prevention.

Received from the Surveillance Branch, Division of Surveillance, Hazard Evaluations and Field Studies, National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention, Public Health Service, US Department of Health and Human Services, Cincinnati Ohio. At the time of this investigation, Dr. Ballard was an officer in the Epidemic Intelligence Service, Centers for Disease Control and Prevention.

Presented in part at the Tenth International Symposium on Epidemiology in Occupational Health, Como, Italy, September 20–23, 1994, and at the 27th Annual Meeting of the Society for Epidemiologic Research, Miami, Florida, June 15–18, 1994.

Address correspondence and reprint requests to the Carol Burnett, National Institute for Occupational Safety and Health, Surveillance Branch, 4676 Columbia Parkway Mailstop R-21, Cincinnati, OH 45226, U.S.A.

TABLE 1 Breast cancer screening in women aged 50–70 years, by employment status, NHIS, 1990*

Employment Status	Sample Size	National Population Estimates†	Percentage Ever Having Mammography (SE)	Percentage Having Had Mammography and Breast Exam in Past 2 Years (SE)
Employed	2,368	9,572,325	63.5 (1.2)	54.8 (1.1)
Not employed	2,930	11,716,592	56.4 (1.3)	46.1 (1.3)
TOTAL	5,298	21,288,915	59.6 (0.9)	50.0 (0.9)

**Source:* National Center for Health Statistics, 1991.
†National estimate from weighted sampling frame, NHIS.

METHOD

We used data from the 1990 National Health Interview Survey (NHIS) to examine reported utilization of mammography and CBEs. The NHIS is an annual nationwide survey of the non-institutionalized civilian population of the United States conducted by the National Center for Health Statistics. The 1990 survey included a Health Promotion and Disease Prevention (HPDP) supplement with questions about cancer screening, the responses to which supplied the data for this analysis. The response rate for the 1990 NHIS-HPDP was 86.3%.[13] The population selected for the current analysis included 5,298 women between the ages of 50 and 70 years, of whom 2,368 (45%) were employed at the time of the interview.

We explored breast cancer screening practices by employment status, occupational category, and demographic characteristics. Breast cancer screening was measured as 1) ever having had mammography, and 2) having had mammography and CBE within the two years preceding the interview. Women who had had breast-related complaints at the time of the most recent mammography were excluded from the analysis. Employment status was defined as employed or not at the time of the interview. For employed women, occupational category was defined as 1) occupation at the time of the survey and 2) white-collar or blue-collar/service occupation, using 1980 census occupational codes.[14] We measured the frequency of screening among all women by employment status, and among employed women by occupational category, annual family income ($25,000 and over, <$25,000), marital status (currently married, widowed/separated/divorced, never married), educational attainment (>12 years, 12 years, <12 years), race/ethnicity (white non-Hispanic, black non-Hispanic, Hispanic, other), age (50–59 years, 60–70 years), metropolitan statistical area (MSA) of residence (central city, non-central city, rural) and region of residence (Northeast, Midwest, South, West). Odds ratios (ORs) and 95% confidence intervals (CIs) were used to compare white-collar workers with blue-collar/service workers for screening activities while adjusting for the demographic variables described above. Respondents who had not had mammography within the three years preceding the interview were asked to choose their primary reasons for not doing so. We explored these reasons among employed women by occupational status.

The proportions of employed women screened within the two years before the interview were compared with the *Healthy People 2000* objective that 60% of women aged 50 or older will have had mammography and CBE within the previous two years. It is necessary to clarify that the *Healthy People 2000* goals were established using the 1987 NHIS Cancer Control Supplement[15] as a baseline for reported utilization of mammography and CBE *for any reason,* not exclusively for screening purposes. Most subsequent analyses of NHIS breast cancer screening activities, including the present study, have focused on the prevalence of screening mammography that excluded women whose most recent mammographies have been done because of breast problems.[16,17] The effect of excluding subjects who had mammography for medical reasons is to underestimate the total number of women having had these procedures. Despite the fact that the *Healthy People 2000* objective was not set exclusively for screening activities, we chose still to use 60% utilization as our comparison point for employed women.

In order to account for the multistage probability sampling design of the National Health Interview Survey, the SUDAAN (Survey Data Analysis) software[18] was used to calculate weighted proportions and their standard errors, and for multivariable modeling to estimate ORs and 95% CIs comparing groups for breast cancer screening. The use of weighted data enabled us to calculate national estimates for frequencies and proportions.[19]

RESULTS

From the 1990 National Health Interview Survey, it was estimated that 45% of women aged 50–70 years were employed. The employed women were younger than the non-employed women (68% of employed women vs 32% of non-employed women were less than 60 years old), and more likely to have family incomes of $25,000 or more (63% vs 41%), to have some college education (35% vs 23%), and to be widowed, divorced, or separated (32% vs 28%), but the racial compositions of the two groups were similar. Table 1 shows that the employed women were more likely than the non-employed women ever to have had mammography (63.5% vs

56.4%) and to have been screened within the preceding two years (54.8% vs 46.1%).

The frequencies of screening and factors associated with screening utilization among the employed women are shown in Table 2. Proportions and standard errors are listed by occupational category and demographic characteristics for ever having had mammography and for having been recently screened. Utilization was greatest for women employed in white-collar jobs, for women with family incomes of $25,000 or more, for those currently married, those with some college education, white women, those aged 50–59 years, those residing in non–central-city areas, and those residing in the West. The same factors were associated with both ever having had mammography and having been screened with mammography and CBE within the preceding two years.

Table 2 also shows the ORs and 95% CIs for screening within the previous two years among employed women from a multiple-logistic-regression model that included occupational and demographic variables. Age, MSA, and region were non-contributory and were dropped in the final model. Women employed in white-collar work were more likely to have been screened than those in blue-collar work [adjusted OR = 1.86 (1.40–2.47)]. Other demographic characteristics that predicted screening were annual family income of $25,000 or more and married status. Although the percentage of screened employed women was much higher among college-educated women compared with those without high school diploma (64.1% vs 38.5%), higher education became less important when occupational category, income, marital status, and race were controlled for in the model [adjusted OR = 1.35

TABLE 2 Breast cancer screening in employed women age 50–70 years, by occupational* and demographic characteristics

		Mammography (Ever Had)	Mammography and Clinical Breast Examination in Past 2 Years	
	Population Estimates	% (SE)	% (SE)	Adjusted Odds Ratio† (95% CI)
Occupational category				
White-collar	6,312,477	70.3 (1.3)	61.8 (1.3)	1.86 (1.40–2.47)
Blue-collar/service	3,107,048	50.0 (2.2)	40.8 (2.4)	Referent
Annual family income‡				
$25,000 plus	4,940,886	71.9 (1.6)	62.7 (1.6)	1.81 (1.40–2.33)
<$25,000	2,914,145	51.7 (2.1)	41.8 (1.9)	Referent
Marital status				
Married	6,087,016	66.6 (1.6)	59.0 (1.6)	1.95 (1.18–3.22)
Widow/divorced	3,063,313	58.7 (1.9)	47.7 (1.7)	1.73 (1.03–2.92)
Never married	421,994	53.1 (4.7)	45.1 (5.0)	Referent
Education				
Beyond HS	3,349,515	72.7 (1.7)	64.1 (1.7)	1.35 (0.92–2.00)
HS diploma	4,327,421	63.0 (1.7)	54.7 (1.7)	1.09 (0.80–1.50)
< HS diploma	1,850,803	48.1 (2.9)	38.5 (2.8)	Referent
Race/ethnicity				
White (non-Hispanic)	7,750,751	65.3 (1.3)	56.5 (1.2)	0.99 (0.71–1.38)
Hispanic	557,570	61.1 (4.2)	50.3 (4.9)	1.19 (0.70–2.01)
Black (non-Hispanic)	1,054,705	52.6 (3.1)	45.0 (3.3)	Referent
Other	209,297	57.6 (7.9)	50.9 (8.3)	§
Age				
50–59 years	6,487,710	64.6 (1.5)	55.1 (1.4)	§
60–70 years	3,084,613	61.0 (1.8)	54.0 (1.8)	
Metropolitan statistical area				
Central city	2,848,101	63.2 (2.1)	54.3 (2.2)	§
Non-central	4,559,106	66.8 (1.6)	58.5 (1.7)	
Rural	2,165,116	56.9 (3.0)	47.6 (3.0)	
Region				
Northeast	2,209,877	63.4 (2.1)	56.5 (1.7)	§
Midwest	2,273,117	61.6 (2.4)	52.3 (2.1)	
South	3,231,673	59.7 (2.2)	51.0 (2.5)	
West	1,857,656	72.4 (2.7)	62.3 (2.3)	

Source: National Center for Health Statistics, 1991.
†Adjusted for all other variables in the model.
‡18% of the respondents had missing income data.
§Not included in the final logistic regression model.

(0.92–2.00)]. Similarly, while white women were more likely than black women to have been recently screened (56.5% vs 45.0%), this difference disappeared when controlling for occupational category, income, education, and marital status (adjusted OR = 0.99). A similar model was used with the full population of surveyed women aged 50–70 years, i.e., not restricted to employed women. In the place of occupational status (white-collar, blue-collar), we used employment status (employed:yes,no). The crude OR for having been screened within the previous two years by employment status was 1.4 (1.2–1.6). However, when controlling for income, education, marital status, race, and age, the adjusted OR was 1.1 (0.96–1.3) (data not shown).

The prevalence of screening (mammography and CBE within previous two years) was estimated for whites, for blacks, and for all workers (including Hispanic and other races) holding jobs in 20 occupations (both white-collar and blue-collar/service) in which at least an estimated 50,000 women aged 50–70 were employed (Table 3). Among all white-collar workers, at least 65% of managers, finance officers, secretaries, and registered nurses had been screened. Screening prevalences were similar for white and black white-collar workers (62.0 and 57.8%); only white women exceeded the *Healthy People 2000* objective of 60%. In contrast, the prevalence of screening among blue-collar workers was far below the 60% objective for both whites (41.8%) and blacks (37.1%). No more than 35% of all waitresses, textile machine operators, domestic workers, licensed practical nurses (LPNs), and food service workers had been screened within two years. While screening rates within occupation were generally similar in whites and blacks, there were some noticeable differences, although they were not statistically significant. Sixty-three percent of white teachers had been screened, compared with 44% of black teachers. Similarly, white assemblers, cooks, and domestic workers were considerably better screened than their black counterparts. LPNs were very low utilizers as a group, but within that occupation, blacks were much more likely to be screened (29.9%) than whites (9.0%). Inadequate numbers of black workers limited the ability to make comparisons by race for some of the listed occupations, and may have contributed to the lack of statistical significance for the few categories where large differences were seen. The proportion of employed black women was greater in blue-collar and service jobs than in white-collar jobs. For example, blacks comprised 59% of LPNs, 58% of domestic workers, 26% of health service workers, but only 10% of teachers and 3% of secretaries.

Reasons for not having had mammography in the three years preceding the interview were analyzed for the employed women (Table 4). For both white-collar

TABLE 3 Breast cancer screening in the two years preceding the interview in employed women aged 50–70 years, by selected occupation and race*

	Total†		*White*		*Black*	
Occupation	Population Estimate	Percent Screened (SE)	Population Estimate	Percent Screened	Population Estimate	Percent Screened
White-collar	6,312,477	61.8 (1.3)	5,574,315	62.0	406,163	57.8
Manager/administrator	884,153	68.5 (3.7)	781,703	68.8	58,440	55.9‡
Finance officer	228,391	67.5 (8.5)	217,111	70.5	11,280	. . .§
Secretary	784,486	66.7 (3.2)	710,233	68.0	21,558	69.9
Registered nurse	275,348	65.2 (6.8)	226,553	65.0	29,250	71.1
Motor vehicle operator	77,471	64.3 (11.0)	61,865	60.1	11,588	. . .
Teacher	553,555	60.7 (4.7)	485,968	63.3	54,664	43.7
Clerk	670,284	60.1 (4.6)	610,962	57.9	27,763	71.1
Sales supervisor	206,976	57.6 (7.2)	195,781	60.3	4,458	. . .
Real estate sales	130,873	51.9 (10.7)	118,929	47.1	7,530	. . .
Blue-collar/service	3,107,048	40.8 (2.4)	2,054,921	41.8	637,286	37.1
Agriculture worker	156,780	48.2 (8.4)	155,590	48.6	1,190	. . .
Health service worker	323,840	44.7 (6.0)	190,766	44.5	83,771	47.5
Assembler	139,946	41.9 (10.3)	79,608	41.8	30,363	14.0
Personal service worker	262,715	40.7 (7.6)	185,035	40.7	44,465	42.0
Cleaning service	286,443	39.3 (6.4)	154,002	36.7	82,464	46.4
Cook	203,757	38.8 (7.9)	143,059	44.1	39,821	30.2
Waitress	130,528	33.9 (10.1)	107,454	32.9	3,337	. . .
Textile machine operator	168,803	31.9 (8.9)	95,592	30.1	18,822	. . .
Domestic worker	317,378	30.2 (6.7)	115,248	40.4	182,591	21.2
Licensed practical nurse	64,500	21.3 (9.4)	26,549	9.0	37,951	29.9
Food service worker	83,491	14.3 (7.9)	54,212	16.4	18,323	16.4

*Source: National Center for Health Statistics, 1991.
†Total includes all races; race-specific rates listed for whites and blacks only.
‡p value <0.05 for white–black comparisons within occupation.
§. . . = sample size inadequate for estimation.

TABLE 4 Reasons for not having had mammography within three years preceding interview, employed women, aged 50–70 years*

Reason	Total % (SE)	White-collar % (SE)	Blue-collar/Service % (SE)
Thought not necessary	36.4 (1.7)	33.2 (2.0)	40.3 (2.9)
MD did not recommend	26.0 (1.8)	24.8 (2.2)	27.5 (2.6)
Procrastination	12.1 (1.3)	16.3 (2.0)	6.8 (1.3)
Cost	8.5 (1.0)	6.9 (1.3)	10.5 (1.6)
Fear	2.3 (0.6)	2.5 (1.0)	2.0 (0.7)
Other	14.8 (1.5)	16.2 (1.9)	12.9 (2.1)

Source: National Center for Health Statistics, 1991.

and blue-collar/service workers, the two most common reasons were: 1) the woman did not think it necessary or she had no problem, and 2) a physician had not recommended mammography. Procrastination was a more important reason for white-collar workers than for blue-collar/service workers. Overall, cost was not a major reason for not having had mammography among women of either occupational category, but was cited more often by blue-collar/service workers than by white-collar workers (10.5% vs 6.9%).

We explored the possibility that the effects of occupational category on screening varied by level of income or education (effect modification), but did not find any statistical evidence of this, nor of collinearity among these variables.

DISCUSSION

This study demonstrated that while employed women were better screened than non-employed women per se, the difference disappeared when socioeconomic indicators such as income, education, and marital status were considered. However, among the employed women, differences in screening between white-collar and blue-collar/services workers remained after controlling for socioeconomic factors. Regardless of occupational category, employed women with low incomes, less than high school education, and non-married status remained underscreened for breast cancer. This is consistent with the results of other studies that have explored factors associated with breast cancer screening among women regardless of employment status.[9,16,20–22] Race/ethnicity was not a determinant of breast cancer screening among employed women in the present study when considering income, and to a lesser extent, education. The same phenomenon was found in a study that analyzed data from the 1987 and 1990 NHISs, showing that the gap in mammography utilization by race/ethnicity narrowed in 1990, leaving income and education to explain the differences in screening behaviors.[17] However, despite the equalizing effect of income on racial differences in statistical models, in the real world there are disproportionate concentrations of minorities and poorly educated workers in low-paying and insecure jobs.[23] Black/white differences in breast cancer survival rates may be due in large part to differences in stages of cancer at diagnosis, implying that earlier diagnosis through improved access and use of screening in black women could be an extremely important factor in lessening the gap.[24] Thus, targeting black women at the workplace, especially in blue-collar and service industries, may contribute to lowering breast cancer mortality in this population. The present study suggests that within the same occupation, there may be differences in screening by race. Among higher-income jobs, black teachers were considerably less likely to be screened than white teachers, an interesting finding in light of a recent mortality study of breast cancer by occupation,[25] which showed that teachers had a higher proportionate mortality for breast cancer than did women in other white-collar occupations, and that the rate was considerably higher for black compared with white teachers.

Several limitations to the present study may have influenced our findings. Income data were not available for 18% of the study subjects. In order to determine whether this biased the occupational analysis, a dummy income variable that assigned a value to those with missing income data was entered into a logistic regression model along with occupation and all other demographic variables. The resulting estimate of effect for occupational category was essentially unchanged, suggesting that there was no bias due to excluding subjects with missing income data from the analysis. Similarly, missing income data were not related to mammography use in an economic analysis of screening by Urban.[26] A second limitation in the present study was self-reporting of breast cancer screening in the National Health Interview Survey, which was not validated by medical records. However, studies have shown that women's self-reports of mammography are generally valid and may be used reliably to monitor utilization.[27] A third limitation was the absence of information about health insurance coverage for mammography among the subjects of the 1990 NHIS-HPDP supplement. Not having health insurance at all or not having a plan that covers screening mammography may influence screening behaviors among disadvantaged groups, and may also influence a physician's recommendations for ordering one. A recent economic analysis of screening, however, provided no evidence that the effect of improved insurance coverage would greatly increase the use of mammography, particularly among low-income women.[26] Utilization of screening services varies even in countries where screening is an entitlement. In Great Britain, where breast can-

cer screening has been available to all women aged 50–64 years since 1987, women in inner cities who are older, of the lower social classes, or of ethnic minorities have been identified as underutilizers of such services.[28] Lack of information about health insurance does not affect the results of this study, whose purpose was to measure screening proportions within occupations in order to better target employed women for prevention programs.

In summary, employed women in blue-collar and service jobs of any race/ethnicity group, black employed women regardless of occupational category, and women with less than a high school diploma were far from reaching the *Healthy People 2000* goal for breast cancer screening. In order to reduce health disparities among Americans and to achieve access to preventive services for all with respect to breast cancer screening, targeted programs are necessary to provide better educational and screening opportunities for women aged 50 years and older. Worksite breast cancer screening programs have the potential to reach minorities and lower-income women, who are less likely than other women to engage in preventive health care.[29,30] Part of the blue-collar/service–white-collar difference found in this study may have been due to limited access to health care or health insurance, but also may have resulted from the unavailability of worksite health promotion programs that educate women about the need for screening and provide on-site mammography. Worksites with mostly blue-collar workers have fewer health-promotion activities than do those with white-collar majorities; among worksites that offer mammography, only 16.6% have majorities of blue-collar workers.[12] The most recent National Survey of Worksite Health Promotion Activities found that overall, only 7.5% of worksites that had 50 or more employees offered mammography, but that the percentage increased dramatically for worksites with over 750 employees (42.1%).[31] For those women whose workplaces have breast cancer screening programs, participation may be self-selected by perception of risk[32] or by occupational category and education.[33] Nationwide, participation in worksite health-promotion activities appears to be greater among employees who are younger, healthier, and more concerned with fitness and health matters than non-participants.[34,35] Through education about the need for screening and access to low-cost mammography, worksite breast cancer detection programs may greatly increase screening by lower-income and minority employed women, who are found predominately in blue-collar and service jobs.

This paper presents 1990 levels of breast cancer screening activities among employed women and identifies occupations and demographic subgroups within occupations where such preventive services were underutilized. These data can be used to evaluate progress towards the *Healthy People 2000* breast cancer screening objective, and will provide information to those planning screening programs, in both the public and the private sectors. Many challenges remain to reach working women, especially those in blue-collar or service jobs whose worksites do not offer screening or who are not eligible for benefits that include screening. In addition, creative solutions are needed to increase screening opportunities for employees in isolated workplaces, those who do not work during normal working hours, and those whose jobs do not allow them to take off time during the work day to be screened. Although this study focused on employed American women, the demonstrated differentials in screening among employed women may be useful to other countries that are in the process of implementing national screening programs.

References

1. Fletcher SW, Black W, Harris R, Rimer BK, Shapiro S. Report of the International Workshop on Screening for Breast Cancer. J Natl Cancer Inst. 1993;85:1644–56.
2. National Cancer Institute. NCI Replaces guidelines with statement of evidence. J Natl Cancer Inst. 1994:86:14–5.
3. United States Public Health Service. Healthy People 2000: national health promotion and disease prevention objectives. Washington, DC: US Department of Health and Human Services, Public Health Service, 1991; DHHS publication no. PHS 91-50212:428–9.
4. Shapiro S. Periodic breast cancer screening in seven foreign countries. Cancer. 1992;69(suppl):1919–24.
5. Kessler HB, Rimer BK, Devine PJ, Gatenby RA, Engstrom PF. Corporate-sponsored breast cancer screening at the work site: results of a statewide program. Radiology. 1991;179:107–10.
6. Laville EA, Vernon SW, Jackson GL, Hughes JI. Comparison of participants and nonparticipants in a work site cancer awareness and screening program. J Occup Med. 1989;31:221–32.
7. Goodspeed RB, DeLucia AG, Parravano J, Goldfield N. Compliance with mammography recommendations at the work site. J Occup Med. 1988;30:40–2.
8. Culver J, Alexander EJ. Implementing the American Cancer Society Breast Cancer Awareness Program in the workplace. Am Assoc Occup Health Nurses J. 1989;37:166–70.
9. National Cancer Institute Breast Cancer Screening Consortium. Screening mammography: a missed clinical opportunity? Results of the NCI Breast Cancer Screening Consortium and National Health Interview Survey studies. JAMA. 1990;264:54–8.
10. Centers for Disease Control and Prevention. Update: National Breast and Cervical Cancer Early Detection Program, July 1991–July 1992. MMWR. 1992:41:739–43.
11. Lane DS, Polednak AP, Burg MA. Breast cancer screening practices among users of county-funded health centers vs women in the entire community. Am J Public Health. 1992;82:199–203.
12. Fielding JE, Piserchia PV. Frequency of worksite health promotion activities. Am J Public Health. 1989;79:16–20.
13. National Center for Health Statistics. Public Use Data Tape Documentation, Part I, National Health Interview Survey, 1990 (machine readable data file and documentation). National Center for Health Statistics, Hyattsville, Maryland, 1991.
14. Bureau of the Census. 1980 Census of Population Alphabetical Index of Industries and Occupations. Washington, DC: U.S. Department of Commerce, 1982: publication no. PHC80-R3.
15. Schoenborn CA, Marano M. Current estimates from the National Health Interview Survey: United States, 1987. Vital Health Stat (10). DHHS publication PHS 88-1594, 1988.
16. Calle EE, Flanders D, Thun MJ, Martin LM. Demographic predictors of mammography and Pap smear screening in US women. Am J Public Health. 1993;83:53–60.

17. Breen N, Kessler L. Changes in the use of screening mammography: evidence from the 1987 and 1990 National Health Surveys. Am J Public Health, 1994;84:62–7.
18. Shah BV, Barnwell BG, Hunt PN, LaVange LM. SUDAAN User's Manual, Release 5.50. Research Triangle Institute, Research Triangle Park, North Carolina 27709, 1991.
19. National Center for Health Statistics. Design and Estimation for the National Health Interview Survey, 1985–1994. Series 2, No. 110. DHHS Publication No. (PHS) 89-1384, 1989.
20. Centers for Disease Control and Prevention. Use of mammography—United States, 1990. MMWR. 1990:39:621,627–30.
21. Zapka JG, Stoddard AM, Costanza ME, Greene HL. Breast cancer screening by mammography: utilization and associated factors. Am J Public Health. 1989;79:1499–502.
22. Henrich JB, Kornguth PJ, Berg AT, Schwartz GE. Psychosocial factors and mammography use. J Women's Health. 1992;1;123–8.
23. Waitzman NJ, Smith KR. The effects of occupational class transitions on hypertension: racial disparities among working-age men. Am J Public Health. 1994;84:945–50.
24. Eley JW, Hill HA, Chen VW, et al. Racial differences in survival from breast cancer. JAMA. 1994;272:947–54.
25. Rubin CH, Burnett CA, Halperin WE, Seligman PJ. Occupation as a risk identifier for breast cancer. Am J Public Health. 1993;83: 1311–5.
26. Urban N, Anderson GL, Peacock S. Mammography screening: how important is cost as a barrier to use? Am J Public Health. 1994;84:50–5.
27. King ES, Rimer BK, Trock B, Balshem A, Engstrom P. How valid are mammography self-reports. Am J Public Health. 1990;80: 1386–8.
28. Botha JL, Manku-Scott TK, Moledina F, Williams A. Indirect discrimination and breast screening. Ethnicity and Disease. 1993;3: 189–95.
29. Roetzheim RG, Van Durme DJ, Brownlee HJ, Herold AH, Woodard LJ, Blair C. Barriers to screening among participants of a media-promoted breast cancer screening project. Cancer Detect Prev. 1993;17:367–77.
30. Glasgow RE, McCaul KD, Fisher KJ. Participation in worksite health promotion: a critique of the literature and recommendations for future practice. Health Educ Q. 1993;20:391–408.
31. United States Department of Health and Human Services, Public Health Service. 1992 National Survey of Worksite Health Promotion Activities Final Report. U.S. Government Printing Office, no. PB93-500023, 1993.
32. Glanz K, Resch N, Lerman C, Blake A, Gorchov PM, Rimer BK. Factors associated with adherence to breast cancer screening among working women. J Occup Med. 1992;34:1071–8.
33. Rutledge DN, Hartmann WH, Kinman PO, Winfield AC. Exploration of factors affecting mammography behaviors. Prev Med. 1988;17:412–22.
34. Conrad P. Who comes to work-site wellness programs? A preliminary review. J Occup Med. 1987;29:317–20.
35. Fielding JE. Health promotion and disease prevention at the worksite. Annu Rev Public Health. 1984;5:237–65.