Reported Drop in Mammography

Is This Cause for Concern?

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BACKGROUND. Timely screening with mammography can prevent a substantial number of deaths from breast cancer. The objective of this brief was to ascertain whether recent use of mammography has dropped nationally.

METHODS. The authors assessed the trend in mammography rates from 1987 through 2005. Then, they used the 2000 and 2005 National Health Interview Survey (NHIS) estimates to characterize trends and current patterns in mammography use.

RESULTS. After robust, rapid increases in reported use of mammography by women in the U.S. since 1987, estimates from the 2005 NHIS showed a decline compared with 2000 (from 70% to 66%). Although it was small, this decline may be cause for concern, because it signals a change in direction.

CONCLUSIONS. This report establishes for the nation what already has been observed in some local data. The results confirmed that the use of mammography may be falling. This change needs to be monitored carefully and also may call for intervention. ***Cancer* 2007;109:2405–9.** *Published 2007 by the American Cancer Society**

KEYWORDS: breast cancer incidence, mammography, cancer screening, National Health Interview Survey.

Between 1987 and 2000, the percentage of women in the U.S. aged ≥40 years who reported that they had a mammogram in the previous 2 years increased dramatically, from 39.1% to 70.1%,[1] and already exceeded the Healthy People 2010 target of 70%.[2] After rapid increases until 2000, rates stabilized between 2000 and 2003.[3] The increase in the use of mammography over time has made early detection of breast cancer more common and has helped reduce mortality from this disease.[4] Despite the great success of mammography in detecting breast cancer early, recent articles in the popular press suggest a decline in the rates of mammography use among women in Michigan,[5] Iowa,[6] and Florida.[7] In addition, Feldstein et al.[8] reported that screening mammography declined between 1999 and 2002 from 67% to 62.5% among patients in a nonprofit group-model health maintenance organization (HMO) in the Pacific Northwest. Even more disturbing, 33 states have reported a decline in mammography claims for Medicare beneficiaries. Finally, a recent report that used data from the Behavioral Risk Factor Surveillance System (BRFSS) indicated that there was a statistically significant decline in mammography rates in women aged ≥40 years from 76.4% in 2000 to 74.6% in 2005[9]; however, not all states administered the mammography questions.

The objective of this brief was to ascertain whether the recent use of mammography has dropped nationally. We defined *recent* as

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self-reported receipt in the previous 2 years among women aged ≥40 years. This definition reflects prevailing recommendations.[10] We computed mammograms for any purpose, because women who obtain a mammogram for diagnostic purposes would not be expected to obtain another for screening purposes. Only 1 mammogram was counted for any women, including those who reported >1 mammogram during the period defined as recent. First, we assess the trend in rates from 1987 through 2005; then, we compare estimates from 2000 and 2005 to characterize trends and current patterns in mammography use.

We used the National Health Interview Survey (NHIS) to examine trends and patterns in the recent use of mammography, because it is the primary source of health information on the civilian, noninstitutionalized population in the U.S., and it was designed specifically to produce national estimates.[11] An annual survey that is administered in person by Census Bureau interviewers, the NHIS uses a complex, stratified, multistage sample to provide data representative of the U.S. population.[12] Approximately 35,000 adults are interviewed, and response rates for the questions fielded in the cancer module are in the range of 80%.[13,14]

Adult female respondents aged ≥40 years were asked a series of questions to determine the timing of their most recent mammogram. They were first asked, "Have you ever had a mammogram?" Women who responded affirmatively were then asked, "When did you have your last mammogram?" In 2005, the skip pattern was modified to specify the month for women who did not provide it initially. We took advantage of this additional information when computing rates in 2005 and differences between years. We examined adherence to recommendations for mammography, ie, receipt within the past 2 years, using the 1987, 1992, 1998, 2000, 2003, and 2005 NHIS.

First, we examined NHIS data from 1987 to 2005 to ascertain whether recent use of mammography was lower in 2005 than in previous years. Then, we examined the 2000 and 2005 data for trends and patterns for all women and for several subpopulations. Confidence intervals were calculated using SUDAAN software (release 9) to account for the complex survey design.[15] We used SUDAAN Proc Descript to perform Student *t* tests to determine whether differences between estimated percentages in 2000 and 2005 were significant, because *t* tests are more accurate than comparisons of confidence intervals.[16] Data in Table 1 are standardized to the 2000 U.S. standard population by 5-year age groups, except for the age group variable (groups aged 40–49 years, 50–64 years, and ≥65 years). Data in Figure 1 are not age standardized, because the figure shows separate age groups.

Figure 1 shows that an upward trend in recent use of mammography was observed from 1987 to 2000 for all women (Fig. 1, black line) and for women ages 40 to 49 years (Fig. 1, red line), 50 to 64 years (Fig. 1, green line), and ≥65 years (Fig. 1, blue line). Rates from 2000 to 2003 were essentially the same. Data from 2005 suggest a decline, one that was especially marked for women aged 50 to 64 years. Vertical lines in Figure 1 indicate the confidence intervals for each point estimate.

Estimated mammography rates were nearly 4% lower in 2005 compared with the rates in 2000, and the difference was significant, as shown in Table 1. Rates were lower in 2005 than in 2000 for nearly all of the different groups of women examined. The largest significant declines were among women who traditionally have used mammography at high rates, including women ages 50 to 64 years and women with higher incomes. These 2005 estimates signify the first time that nationally representative data have shown a significant decline in the use of mammography in the U.S., and they are distributed throughout the groups for which screening is recommended. Significant declines were observed among non-Hispanic white women, women aged ≥50, women with higher educational attainment, women who reported a usual source of care, and women ages 40 to 64 years who had private non-HMO heath insurance coverage or public insurance coverage. We also computed mammography rates for 2005 data using the method employed for the 2000 data as much as possible; this method showed a smaller but still statistically significant drop (from 70.1% to 68.3%). Future monitoring will be critical to establish whether the use of mammography will continue to decline.

We should note that screening rates may be lower than reported by the NHIS, because studies have indicated that self-report may overestimate screening relative to what is determined by reviewing the medical records. Nevertheless, because there is no reason to believe that the direction or degree of overestimation has changed over time, the measurement of trends should not be affected. Our findings confirm for the entire U.S. a recent report using BRFSS data that showed a statistically significant decline in mammography rates among women aged ≥40 years.[9] NHIS data are representative of the entire U.S., and the survey is administered in person, so that it includes individuals without a telephone; BRFSS is a telephone survey, and questions concerning mammography use were not administered to women in all states.

TABLE 1
Comparison of Mammography Rates Among Women Aged ≥40 Years by Characteristics: The 2000 and 2005 National Health Interview Surveys

	2000 NHIS			2005 NHIS			
Characteristic	**No.**	**%**	**95% CI**	**No.**	**%**	**95% CI**	**Difference**
Total			N = 10,212			N = 10,076	
%	10,212	70.1	69–71.2	10,076	66.4	65.2–67.5	−3.8*
Age, y†			N = 10,212			N = 10,076	
40–49	3308	64.2	62.2–66.2	3087	63.5	61.4–65.5	−0.7
50–64	3349	78.6	76.8–80.3	3727	71.8	70.2–73.4	−6.8*
≥65	3555	68	66.1–69.8	3262	63.8	61.7–66	−4.1*
Education			N = 10,142			N = 10,004	
Less than high school	2352	57.2	54.4–59.9	1932	53.8	50.8–56.7	−3.4
High school graduate	3318	68.5	66.6–70.3	3085	63.6	61.5–65.6	−4.9*
Some college or AA degree	2536	72.6	70.7–74.5	2697	69.1	67.2–71	−3.5*
College graduate (BA/BS)	1936	80	77.9–82	2290	76.3	74.5–78.1	−3.7*
Family income as percentage of the poverty level, $			N = 10,212			N = 10,076	
<200	2833	55.8	53.4–58.2	2676	52.1	49.7–54.5	−3.7*
200–299	1230	66.4	63–69.6	1299	65.4	62.3–68.3	−1
300–399	907	71.7	68.6–74.7	1051	68.7	65.4–71.7	−3.1
400–499	748	77.1	73.3–80.6	697	72.5	68.7–76	−4.6
≥500	1853	82.8	80.6–84.8	1927	76.5	74–78.8	−6.3*
Unknown	2641	69.7	67.6–71.8	2426	64.6	62.1–67.1	−5.1*
Have a usual source of care			N = 10,211			N = 10,075	
No	793	34.6	30.8–38.7	764	34.1	30–38.4	−0.6
Yes	9418	73	71.9–74.1	9311	68.9	67.8–70.1	−4.1*
Health insurance, age <65 y			N = 6633			N = 6800	
Private, HMO	1978	77.5	75.2–79.6	1544	75.1	72.7–77.4	−2.4
Private, non-HMO	2918	76.5	74.7–78.2	3283	73.6	71.8–75.2	−3*
Public only	732	65.2	60.9–69.2	919	57.9	53.6–62	−7.3*
Uninsured	1005	41.4	37.7–45.2	1054	38	34.6–41.6	−3.3
Health insurance, age ≥65 y			N = 3544			N = 3260	
Medicare HMO	574	71.1	66.5–75.4	373	69.2	63.1–74.7	−1.9
Private	2007	71	68.8–73.1	1775	67.4	64.9–69.8	−3.5*
Medicaid, military, other government	374	57.9	52.9–62.8	407	56.7	51–62.2	−1.2
Medicare fee-for-service	539	56.1	51.4–60.7	672	57.1	52.3–61.7	1
Uninsured or Medicare Part A only	50	39.3	26.2–54.2	33	44.6	29.3–61.1	5.3
Chronic disability			N = 10,123			N = 10,039	
Yes	2501	65.8	63.4–68.1	2488	60.6	57.8–63.2	−5.2*
No	7622	71.6	70.3–72.8	7551	68.1	66.7–69.4	−3.5*
Race/ethnicity			N = 10,195			N = 10,057	
Hispanic	1258	60.7	57.5–63.8	1265	58.9	55.1–62.6	−1.7
Non-Hispanic white	7253	72	70.7–73.2	7113	68	66.6–69.3	−4*
Non-Hispanic black	1450	67.8	64.7–70.8	1384	64.5	61.3–67.5	−3.3
Non-Hispanic AIAN	58	52.1	40.9–63	49	67.2	57.1–75.8	15.1
Non-Hispanic Asian	176	58.1	50–65.7	246	54	46.9–61	−4
Race			N = 9921			N = 10,050	
White	8197	71.2	70–72.4	8325	67	65.7–68.3	−4.2*
Black	1472	67.6	64.5–70.6	1407	64.1	60.9–67.2	−3.5
AIAN	72	52.3	41.7–62.8	69	66.3	58.1–73.5	14
Asian	180	58.7	50.5–66.5	249	54.1	47–61	−4.7
Immigration status			N = 10,102			N = 10,049	
In U.S. <10 y	180	39.3	30.4–48.9	153	47	37.3–56.9	7.7
In U.S. ≥10 y	1040	64.7	61.2–68	1169	63.5	60.2–66.6	−1.2
Born in U.S.	8882	71.3	70.1–72.5	8727	67	65.8–68.3	−4.3*
Saw/talked to general physician in past 12 mo			N = 10,204			N = 10,067	
Yes	7813	75.5	74.3–76.7	7820	71.5	70.2–72.8	−4*
No	2391	52.6	50.1–55	2247	47.8	45.4–50.3	−4.8*
Saw/talked to Ob/Gyn in past 12 mo			N = 10,204			N = 10,070	
Yes	3639	87.5	86.2–88.7	3495	85.6	84–87	−1.9
No	6565	59.6	58.1–61	6575	54.6	53–56.1	−5*

NHIS indicates National Health Interview Survey; 95% CI, 95% confidence interval; AA, some college or associate degree; BA, Bachelor of Arts; BS, Bachelor of Science; HMO, health maintenance organization; AIAN, American Indian/Alaska Native; Ob/Gyn, obstetrician/gynecologist.

* The difference between the 2000 and 2005 estimates was statistically significant based on a *t* test.

† Except for the age-group variable (ages 40–49 years, 50–64 years, and ≥65 years), estimates were standardized to the 2000 U.S. Standard Population by 5-year age groups.

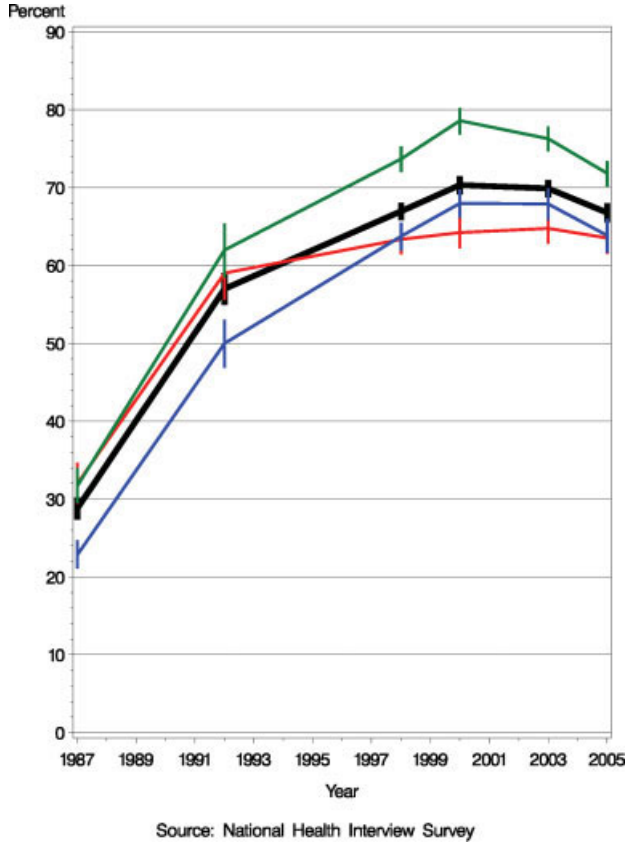

FIGURE 1. Recent (within 2 years) mammography use among women by age. Black line indicates women aged ≥40 years; blue line, women aged ≥65 years; green line, women aged 50 years to 64 years; red line, women aged 40 years to 49 years.

The looming questions are whether the decline in mammography will continue and how it will affect mortality rates from breast cancer. In addition to those questions is the challenge of explaining the decline: The drop in rates may be caused by numerous factors, including an increase in the number of women who do not have health insurance, higher copayments for office visits, less certainty regarding the desirability of screening because of perceived inconsistent findings on the effectiveness of mammograms in preventing deaths from breast cancer, reduced perceived risk because of reports of decreasing mortality from breast cancer, and a lack of emphasis on mammography in health promotion campaigns. In a recent Institute of Medicine report, it was speculated that a decline in mammography may have been caused by decreased mammography capacity because of low reimbursement by insurers, rising malpractice litigation against radiologists who read mammograms, and fewer radiologists choosing to specialize in breast imaging.[17]

Changes in screening rates have an immediate impact on the reported incidence of breast cancer and, ultimately, mortality. When a screening test is introduced, patients will be diagnosed earlier, leading to a rise in incidence relative to prescreening levels. This is because patients who would have had their disease detected clinically in the future will be brought forward into the year in which their disease was detected by screening.[18] Conversely, when screening rates drop, women who are diagnosed with breast cancer who had stopped screening will be detected later than if they had continued screening, and this will result in a short-term drop in incidence. Just as an increase in incidence associated with screening is a positive indication of dissemination and will lead to an eventual reduction in mortality for the population, a decrease in incidence associated with a decline in screening may presage a future increase in mortality from breast cancer. The *Annual Report to the Nation on the Status of Cancer* published in the journal *Cancer*[19] indicates a much-anticipated leveling off and possible decline in the incidence rate for breast cancer in 2003. This decline occurred over approximately the same period as the decline in the use of mammography. Consequently, we are concerned that some of the observed decline in incidence may be caused in part by the leveling off and reduction in mammography rates. If future NHIS data continue to show a decline in mammography use, then, as a nation, we need to be prepared to address it.

Since we observed the drop in mammography rates, our group has been working to develop a conceptual framework for evaluating the factors that influence mammography use and may have caused the drop in mammography rates that we observed. The extent to which the decline in incidence rates for breast cancer is associated with this drop also needs to be investigated. Although these findings are preliminary, together, they call for continued monitoring of trends in incidence, screening, and their underlying factors. It is not too early to consider what types of interventions would be needed should these downward trends continue.

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