Low Income, Race, and the Use of Mammography

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Objective. To describe national trends in mammography use by race and income and to test whether higher use of mammography among low-income African American women than low-income white women can be explained by health insurance coverage, usual place of health care, or place of residence.

Data Sources/Study Setting. Data from five years of the National Health Interview Survey spanning the period 1987–1994.

Study Design. Trends in the percentage of women 50–64 years of age with a mammogram within the past two years were analyzed by race and income. Data for 1993–1994 were pooled, and with logistic regression analysis, variation in use of recent mammography for low-income women was investigated. Independent variables are age, race, family income, education, health insurance coverage, place of usual source of health care, metropolitan residence, and geographic region.

Data Collection/Extraction Methods. The National Health Interview Survey is a cross-sectional national survey conducted by the National Center for Health Statistics. Data are collected through household interviews. [Editor's note: in keeping with HSR policy, the term black is used to conform to its use in the surveys studied. In other references to race, the term African American is used.]

Principal Findings. Among women 50–64 years of age use of recent mammograms increased rapidly between 1987 and 1991 for all groups of women, and between 1991 and 1994 the increases slowed. However, increases between 1991 and 1994 have been more rapid among low-income black women than among low-income white women. In 1993–1994, low-income black women were about one-third more likely than low-income white women to report mammography within the past two years. This difference could not be explained by health insurance coverage, usual source of health care, metropolitan status, or region of residence.

Conclusions. These results, which provide some evidence of success for screening programs targeted to the poor, raise the question of why low-income black women appear to be to more likely than low-income white women to have benefited from recent efforts to promote mammography. Continued evaluation of mammography programs focused on women who are underserved as well as the monitoring of trends and variations in service use by race and income are needed.

Key Words. Mammography, trends, race

The breast is the leading site of new cancers among women and the second-leading site of cancer deaths among women. Breast cancer is an important health issue for both white women and African American women. Breast cancer incidence was about 14 percent higher for white women than for black women in 1995. However, black women have lower survival rates from the disease (71 versus 87 percent five-year relative survival) and breast cancer mortality was one-third higher for black women than for white women in 1995. In addition, breast cancer mortality has been slowly declining for white women since 1989, but has been stable for black women (National Center for Health Statistics 1998).

Regular mammography screening every 1–2 years has been shown in clinical trials to reduce breast cancer mortality among women 50–74 years of age through early detection and treatment (Fletcher et al. 1993). Substantial efforts have been directed toward increasing the proportion of women who receive breast cancer screening, and as a result use of mammography has risen sharply since 1987. In 1994, 61 percent of women age 50 and over reported that they had had a mammogram within the past two years, up from 27 percent in 1987 (National Center for Heath Statistics 1998).

Previous studies have shown that the use of mammography is positively associated with income, education, having health insurance coverage, having a usual source of care, and urban residence (Anderson and May 1995; Katz and Hofer 1994; Rakowski, Rimer, and Bryant 1990). Women age 75 and over are less likely than middle-aged women to have mammography. Previous studies have differed concerning whether African American women are less likely than white women to use mammography (Breen and Kessler 1994; Burns et al. 1996).

A number of different types of interventions have been used to promote mammography. These include media campaigns, interventions directed at individuals and health care providers; interventions that improve access to mammography such as mobile vans; policy-level changes such as reimbursement of mammography by Medicare; and the encouragement of mammography use through social networks. Research shows that using multiple interventions is more effective than any single approach (Rimer 1997).

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This study has three objectives: (1) to describe how national trends in use of recent mammography differ by race and income; (2) investigate factors that may explain differences in the use of recent mammography between white women and black women surveyed during 1993–1994; and (3) test the hypothesis that the higher use of recent mammography by low-income black women than low-income white women in 1993–1994 is explained by differences in insurance coverage, place of care, and place of residence.

DATA AND METHODS

This study is based on data from the National Health Interview Survey (NHIS), a continuing nationwide sample of households that is conducted by the National Center for Health Statistics. The sample each week is representative of the target population, and the weekly samples are additive across time, enabling estimates for smaller population subgroups to be obtained by pooling data across time (Massey et al. 1989). Data are collected through household interviews in about 45,000 households each year. Data for the five years 1987, 1990, 1991, 1993, and 1994 were used in the analysis. The dependent variable was defined as whether or not a woman reported having a mammogram within the past two years.

Trends for the period 1987–1994 were analyzed by race and family income. To analyze variation in mammography use for the most recent data years, 1993 and 1994, additional variables were included in analyses (education, health insurance coverage, place of usual source of care, and metropolitan status and geographic region of residence). Since this analysis focuses on relatively small subgroups of the population, data for 1993 and 1994 were pooled to reduce sampling error. The percentage of women with recent mammography was similar in 1993 and 1994.

This analysis focuses on women 50–64 years of age. Women age 65 and over have been excluded from this analysis due to important differences in health insurance coverage between middle-aged and older women. Women aged 50–64 are generally insured through employer-sponsored private coverage or Medicaid while almost all older women have Medicare coverage and almost none are uninsured. The analysis was restricted to non-Hispanic black women and non-Hispanic white women, the two race/ethnicity groups with the highest breast cancer death rates. Throughout this article the term white refers to non-Hispanic white and black refers to non-Hispanic black. Analyses were conducted separately for two income groups: women with family income below twice the poverty level (low income) and those with

income at least twice the poverty level (higher income). In 1994, twice the federal poverty level corresponded to a family income of less than $19,000 for a family size 2 and less than $30,000 for a family of size 3. Women who reported that their income was under $20,000 or at least $20,000 but did not report more detailed income information (about 8 percent) were assigned to the low- and higher-income groups, respectively. After eliminating records for women with missing data on mammography (about 3 percent) and income (about 3 percent) the sample sizes for non-Hispanic white and non-Hispanic black women 50–64 years of age are as follows: 1,954 in 1987; 3,599 in 1990; 3,834 in 1991; 1,817 in 1993; and 1,734 in 1994.

The computer software package, SUDAAN, was used to calculate all estimates, taking into account the complex survey design of the NHIS. Logistic regression models were used to estimate the odds of having a recent mammogram for black women compared to white women, adjusting for other variables.

RESULTS

Among middle-aged women 50–64 years of age mammography increased rapidly between 1987 and 1991 for both low-income and higher-income women. Between 1991 and 1994, increases slowed for both groups of women. In 1987, higher-income women were about 75 percent more likely to report a recent mammography while in 1994 use of recent mammography was about 50 percent greater for higher-income than low-income women (74 and 48 percent) (Table 1).

Table 1: Percentage of Women 50–64 Years of Age with a Mammogram Within the Past Two Years and Standard Errors (United States, 1987–1994)

	1987	*1990*	*1991*	*1993*	*1994*
Low income					
All races	20.6 (1.7)	37.8 (1.7)	45.7 (1.8)	47.6 (2.4)	48.4 (2.4)
White	21.1 (2.2)	38.9 (1.9)	46.2 (2.1)	46.8 (2.7)	43.8 (3.0)
Black	22.2 (3.6)	38.3 (3.5)	43.6 (3.3)	56.8 (4.8)	60.2 (5.0)
Higher income					
All races	36.7 (1.5)	63.4 (1.0)	66.8 (1.1)	72.1 (1.2)	73.6 (1.4)
White	38.4 (1.7)	64.2 (1.1)	67.1 (1.2)	72.4 (1.3)	74.1 (1.5)
Black	31.4 (5.8)	60.2 (3.5)	64.5 (3.7)	73.4 (5.9)	70.3 (4.9)

Among women ages 50–64 years, about one-fifth of white women and half of black women had a family income that was below twice the poverty level in 1994. Among low-income women, use of recent mammography approximately doubled for both white women and black women between 1987 and 1991. However, between 1991 and 1994 the percent with recent mammography remained about the same for low-income white women while the percentage rose by more than a third for low-income black women (Table 1). In 1987, among low-income women the percent reporting recent mammography was similar for white women and black women (21–22 percent), but in 1994 the percent with recent mammography was about a third higher for black women than white women (60 and 44 percent).

Among women with income at least twice the poverty level, use of recent mammography for both black and white women increased rapidly between 1987 and 1991 and then increased more slowly through 1994. There were no statistically significant differences in the percent reporting recent mammography between higher-income black women and higher-income white women throughout the period 1987–1994.

The remaining results are based on pooled data for 1993 and 1994 with sample sizes of 307 low-income black women, 801 low-income white women, 222 higher-income black women, and 2,221 higher-income white women. In 1993–1994, overall, a percentage of black women similar to that of white women reported recent use of mammography, despite the strong relationship between income and mammography and the higher percentage of black women than white women with low income. This occurred because low-income black women were more likely to report a recent mammogram than low-income white women. Among low-income middle-aged women the average annual percent reporting recent mammography was almost 30 percent higher for black than for white women (58 and 45 percent). Among higher-income women the percent reporting mammography was similar for black women and white women (73 and 72 percent).

The remainder of the results focus on low-income women 50–64 years of age and investigate whether differences in specific characteristics of low-income black women and low-income white women can account for the higher use of mammography by black women in 1993–1994. Among low-income women, black women were more likely than white women to have less than 12 years of education (Table 2). No statistically significant difference was found in the percentage uninsured, but black women were twice as likely to have Medicaid coverage (33 and 15 percent) and white women were more likely to have private health care coverage. There was no difference in the

percentage of women without a usual source of care (13 percent), but black women were four times as likely as white women to report a public clinic or hospital outpatient clinic as their usual source of care (20 and 5 percent). Black women were almost three times as likely as white women to reside in the central city of a metropolitan area (58 and 21 percent). Black women were also more likely to live in the South than white women (54 and 40 percent). In 1993–1994, the percentage of low-income black women with recent mammography was generally higher than that of low-income white women regardless of other characteristics, although many of the differences were not statistically significant due to large standard errors of the estimates for black women (Table 2).

Results of logistic regression analysis for low-income middle-aged women, show that the odds ratio for recent mammography for low-income black women compared to low-income white women was 1.69 without adjusting for other variables and was essentially unchanged at 1.66 after adjusting for current health insurance coverage, place of usual source of care, central city residence, education, geographic region, and age (Table 3). Thus, there was no evidence that these variables account for the higher use of mammography reported by low-income black women than low-income white women. Odds ratios for low-income women who have private health insurance or public health insurance were greater than 2 compared with women who have no insurance. Odds ratios for low-income women with either a doctor's office or clinic as a usual source of care were greater than 3 compared with women who have no usual source of care. Finally low-income women who reside in a central city have an odds ratio of 1.5 compared with those who reside elsewhere.

DISCUSSION

Several factors may have contributed to the increases in mammography use among low-income black women, especially between 1991 and 1994. The National Breast and Cervical Cancer Early Detection Program is by far the largest single effort to increase screening among low-income women (Henson, Wyatt, and Lee 1996). In fiscal year 1995 CDC entered its fifth year of this program and provided funding to 35 states and 9 tribes for comprehensive screening programs for low-income uninsured and underinsured women. The program targets minority women, underserved women, and older women. As of 1994, it provided 220,592 mammograms, and 16 percent of these were

Table 2: Characteristics of Low-Income Women 50–64 Years of Age and Percent Reporting a Mammogram Within the Past Two Years, According to Race (United States, 1993–1994)

	Percent Distribution (std. error)		*Percent with Mammogram (std. error)*	
	White	*Black*	*White*	*Black*
Education				
Less than 12 years	39.5 (2.0)	55.9 (3.4)	38.5 (3.0)	61.5 (4.8)
12 years	43.8 (1.9)	32.0 (3.0)	49.2 (2.8)	49.1 (5.6)
More than 12 years	16.6 (1.4)	12.1 (2.5)	52.1 (4.6)	68.6 (6.8)
Health insurance coverage				
Private	60.7 (2.1)	36.3 (3.5)	52.6 (2.7)	65.6 (5.2)
Public	14.5 (1.4)	33.2 (3.3)	45.1 (4.4)	67.4 (5.5)
None	24.8 (1.9)	30.5 (3.5)	28.2 (3.5)	39.3 (7.4)
Usual source of care				
None	12.5 (1.4)	14.0 (2.6)	18.9 (4.3)	37.7 (10.7)
Public or hospital clinic	4.9 (0.9)	20.0 (2.7)	46.4 (8.7)	69.6 (7.0)
Doctor's office/Other	82.6 (1.6)	66.0 (3.3)	49.1 (2.1)	59.3 (4.2)
Place of residence				
Metro, central city	20.8 (1.8)	58.3 (4.7)	51.8 (4.2)	61.5 (4.0)
Metro, outside central city	41.9 (2.2)	21.3 (3.7)	43.6 (3.2)	58.8 (8.7)
Nonmetro	37.3 (2.3)	20.4 (4.5)	43.8 (3.1)	49.2 (6.4)
Region				
Northeast	19.3 (1.4)	14.9 (2.8)	44.0 (4.7)	56.1 (8.1)
Midwest	26.1 (1.8)	19.9 (3.6)	43.8 (3.7)	57.3 (4.9)
South	40.1 (2.1)	53.9 (4.5)	42.4 (3.2)	62.1 (4.9)
West	14.5 (1.5)	11.3 (3.1)	58.2 (4.5)	45.8 (11.8)

for black women. In addition, state and community-based clinic efforts may be more prevalent in counties where low-income black women reside. In 1994, an estimated 58 percent of poor black women resided in a county with a mammography program compared with 43 percent of poor white women (Blanchfield and Dorosh 1998). Several grassroots programs, such as the Witness project and Save our Sisters, encourage African American women to be screened (Erwin, Spatz, and Turturro 1992; Eng 1993). Finally, many intervention studies have targeted low-income and African American women or have promoted low-cost mammography (Fink 1989).

A limitation of this analysis is that the information on the time lapse since the last mammogram is self-reported and subject to possibly inaccurate recall by respondents. Estimated screening levels may be too high if women recalled events that occurred more than two years ago. However, there is

Table 3: Adjusted Odds Ratios for Reporting a Mammogram Within the Past Two Years Among Women 50–64 Years of Age with low income (United States, 1993–1994)

	Odds Ratio	*(95% CI)*
Race		
Black	1.66	(1.15, 2.40)
White	1.00	
Health insurance		
Private	2.61	(1.75, 3.90)
Public	2.05	(1.37, 3.09)
Uninsured	1.00	
Usual source of care		
Public or hospital clinic	3.59	(1.89, 6.84)
Doctor's office/Other	3.03	(1.85, 4.98)
None	1.00	
Central city residence	1.53	(1.06, 2.22)
Other place	1.00	

Note: The model also includes age, education, and region. Odds ratios for these variables were not significantly different from 1.

no reason to believe that low-income black women are more subject to recall biases than low-income white women. A record check study based on women enrolled in an HMO in Detroit showed that there was no difference by race in the percentage of women whose reports of mammography within the past year were confirmed by medical records (Makuc and Weiserbs 1995). An additional limitation is that data on insurance and usual source of care are as of the time of the survey and may differ from the respondent's insurance and usual source of care at the time of the most recent mammogram. We included broad indicators and characteristics of a woman's access to the health care system in this analysis: whether or not a woman had a usual source of care, the type of place of the usual source of care (doctor's office or clinic), whether or not a woman had health insurance coverage, and the type of coverage (private or public). In the National Health Interview Survey no data were available on the location where the mammogram was received or on the source of payment for the mammogram. Information on these variables could provide more insight into the differences in mammography use between low-income African American women and low-income white women. It is also important to keep in mind that having a mammogram within the past two years does not necessarily mean that screening will continue on a regular basis.

In summary, despite increases in screening since 1987, low-income women remain less likely than higher-income women to report mammography within the last two years. In 1993–1994, low-income black women were more likely than low-income white women to report mammography within the past two years. Having insurance coverage, having a usual source of care, and central city residence were all positively associated with the use of mammography among low-income middle-aged women; but these variables did not explain the higher screening levels reported by low-income black women than low-income white women. Some additional variables, not available for this analysis, that may have affected the odds of recent mammography use for low-income black women compared with white women include whether a woman received a recommendation for a mammogram from her health care provider, whether the woman had access to mammography with no out-of-pocket payments, and whether breast cancer awareness and screening programs were available in the woman's neighborhood of residence.

Despite increases in screening levels, breast cancer mortality did not decline for black women during the period 1987 through 1996 and breast cancer mortality remained higher for black women than for white women in 1996 (National Center for Health Statistics 1998). This may be due in part to the fact that decreases in breast cancer death rates lag behind increases in screening and so mortality benefits have not yet been realized. In addition, screening does not necessarily ensure the follow-up and treatment that are also needed to reduce mortality.

Although the literature on programs to promote mammography over the past decade suggests that programs have tended to increase the use of mammography (Breen, Kessler, and Brown 1996; Vernon, Laville, and Jackson 1990; Fink 1989), this literature has several limitations. Most demonstration programs collect data on health care encounters rather than on individuals. Few studies provide readers with a careful description of the context in which the project occurred, including socioeconomic and cultural indicators for the target population and program participants, indicators of availability and access to health services and health professionals, and whether screening and cancer control programs already are established in the targeted community. To better evaluate the quality and effectiveness of these programs, more data are needed on the background of patients, the services delivered to patients, procedures that occurred following a screening, and whether cancer was diagnosed.

The results of this study indicate that the multiple efforts that have occurred to increase mammography among low-income African American

women appear to have had a positive impact on screening levels. However, efforts to increase mammography among low-income white women appear to have been less successful as of 1994. Continued monitoring of population-based trends and variation in mammography use by race and income are needed for middle-aged as well as older women. Future research is also needed on differences by race and income on where mammography is received, the source of payment for mammography, whether mammography screening is received at regular intervals, and whether appropriate follow-up and treatment of identified cases occurs.

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