

Cervical Cancer Screening among Women in Metropolitan Areas of the United States by Individual-Level and Area-Based Measures of Socioeconomic Status, 2000 to 2002

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Abstract

Background: Few studies have examined cancer screening among women residing in metropolitan areas in relation to both individual-level and area-based measures of socioeconomic status (SES). To learn more, we examined self-reported rates of Papanicolaou (Pap) testing among women living in metropolitan areas in relation to individual-level measures of SES (household income and education), and area-based measures of SES (percentage of residents living in poverty, percentage with low education, and percentage working class).

Methods: Data were obtained from women who were interviewed by telephone during 2000 and 2002 as part of the Behavioral Risk Factor Surveillance System (BRFSS). Self-reported county of residence was used to classify respondents as residents of metropolitan statistical areas. Only BRFSS respondents who resided in 35 metropolitan statistical areas with a population of ≥ 1.5 million in 2000 were included in this analysis. Analyses were limited to women ages ≥ 18 years with no history of hysterectomy ($n = 49,231$). Area-based measures of SES were obtained

by using county-level information from the 2000 U.S. Census.

Results: Only 75.4% [95% confidence interval (95% CI), 73.8-77.1%] of 3,947 women ages ≥ 18 years who had a reported household income of $< \$15,000$ per year had received a Pap test in the previous 3 years, compared with 92.2% (95% CI, 91.2-93.1%) of 18,698 women with a household income of $\geq \$50,000$. Overall, 77.5% (95% CI, 75.7-79.3%) of women without a high school education had received a Pap test compared with 91.7% (91.0-92.3%) of college graduates. In multivariate analysis, we also found education level to be positively associated with Pap testing rates, especially among women residing in areas where a relatively low percentage of residents had a low education level ($P < 0.0001$).

Conclusions: Individual-level measures of SES may be modified by county-level measures of SES. Analyses of cancer screening rates by measures of income, educational attainment, and other factors may help health officials to better direct their finite resources to areas of greatest need. (Cancer Epidemiol Biomarkers Prev 2006;15(11):2154-9)

Introduction

Studies carried out in selected geographic localities in the United States have suggested that low-income women living in metropolitan areas may be less likely to be screened for cancer than more affluent women living in those areas (1-3). Most of these studies have examined breast cancer screening; however, relatively few studies have examined cervical cancer screening among low-income women living in metropolitan areas of the United States. In addition, few studies have examined cancer screening among metropolitan women in relation to both individual-level and area-based measures of socioeconomic status (SES; ref. 4).

Possible reasons why cancer screening may be less frequent among low income women residing in metropolitan areas, compared with more affluent women in metropolitan areas, include inadequate health insurance coverage, lack of a regular health care provider, and lower education (5, 6). Studies have

shown that persons with less education and lower health literacy are less likely to undergo routine cancer screening, and more likely to be uninsured or of low income (7-9). Women who live in economically deprived areas of the United States and Great Britain have been reported to have an increased mortality and other poor health outcomes (10-16).

This article describes rates of Papanicolaou (Pap) testing among women living in metropolitan areas of the United States in relation to individual-level measures of SES (i.e., household income and education), and in relation to area-based measures of SES (i.e., percentage living in poverty, percentage with low education, and percentage working class). Of particular interest is whether any differences in screening by individual-level measures of SES were modified by area-based or ecologic measures of SES. The area-based measures of SES were not intended to be proxies for individual-level variables but were rather intended to measure contextual effects at the county level.

Materials and Methods

The data used in the study were obtained from 251,269 women who were interviewed by telephone during 2000 and 2002 as part of the Behavioral Risk Factor Surveillance System (BRFSS; ref. 17). The BRFSS used a random-digit dialing technique and multistage cluster sampling in each participating state to sample noninstitutionalized adults living in a residence that had a telephone. Trained interviewers had administered the computer-assisted interviews.

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Note: The findings and conclusions in this article are those of the authors and do not necessarily represent the views of the Centers for Disease Control and Prevention.

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Data from the 2-year study period (i.e., 2000 and 2002) were pooled to increase the sample size available for this analysis. BRFSS data from 2000 and 2002 were used to provide the best match between individual-level information and ecologic data from the 2000 U.S. Census.

Self-reported county of residence was used to classify respondents as residents of metropolitan statistical areas using Office of Management and Budget definitions (18). All counties within the metropolitan areas were included regardless of state boundaries. To reduce the heterogeneity of the metropolitan areas and help ensure there were sufficient numbers of respondents in each, only BRFSS respondents who resided in metropolitan statistical areas with a population of at least 1.5 million in 2000 were included in this analysis. These account for ~27.2% of female BRFSS respondents during this time period. The 35 metropolitan statistical areas included in this analysis are shown in Fig. 1. The 35 metropolitan statistical areas included ranged in population size from 1,500,741 to 18,323,002 persons. All eligible women were included regardless of their self-identified race and Hispanic ethnicity. Analyses were limited to women ages ≥ 18 years who had not had a hysterectomy ($n = 49,231$).

Weights were used to adjust for differences in probability of selection, nonresponse, and noncoverage. The estimated median response rate for 2000 and 2002 were 48.9% and 58.3%, respectively (19). [The numerator denotes the number of completed responses and the denominator is an estimate of the number of households in the sample.]

The study interviews included questions about general health status, both demographic and socioeconomic characteristics, and use of cancer screening tests. Each female respondent was asked whether she had ever had a Pap test; participants who responded positively were then asked when they had received their last Pap test. The women were also asked whether they had undergone a hysterectomy. County-based measures of SES (i.e., percentage of residents living in poverty, percentage with low education, and percentage working class) were obtained by using information from the 2000 U.S. Census. These area-based measures were categorized using cutpoints used by Krieger et al. (20). Percentage of residents living below the poverty level, an area-based indicator recommended by Krieger et al. (20), was based on the 2000 federal definition of poverty.

In the analysis, cutpoints for household income reported by BRFSS respondents included household incomes of $< \$15,000$ per year, a level just above that identified by 2000 federal poverty level guidelines as 100% of poverty ($\$13,410$) for a family of three with one member age < 18 years. Rates of Pap test use in the past 3 years were calculated for the 2-year study period of 2000 and 2002. We examined bivariate associations between screening and both demographic and health factors. Using SUDAAN software to account for the weighting, levels of statistical significance were obtained using Pearson's χ^2 tests and 95% confidence intervals (95% CI) estimated (21). We conducted a multivariate analysis of individual-level and area-based measures of screening test use using logistic regression techniques. Interaction terms were introduced into logistic models to test for interactions, i.e., to examine whether individual-level measures of SES were modified by area-based measures of SES.

Results

Characteristics of the BRFSS respondents included in the analysis for Pap testing are shown in Table 1. About 21.9% of the women had never been married and 11.0% had less than a high school education. Approximately 9.7% of the women ages ≥ 18 years with no history of hysterectomy ($n = 3,994$) had a household income of $< \$15,000$ per year. About 25.0% had an income of $\$15,000$ to $\$34,999$ per year.

We conducted cross-tabulations of individual-level and area-based measures of SES as part of exploratory analyses (results not shown). In these exploratory analyses, 10.6% of respondents with a household income of $< \$15,000$ per year lived in a county where at least 20% of residents lived in poverty compared with 8.0% of respondents with a household income of $\$15,000$ to $< \$34,999$ per year, and 5.3% of those with a household income of $\geq \$35,000$. Also, in exploratory analysis, 41.9% of respondents with less than a high school education lived in a county where at least 25% of residents were with low education compared with 24.4% of respondents who were high school graduates or had a General Educational Degree, and 20.2% of those with at least some college or technical school.

Rates of recent Pap testing in the past 3 years are shown in Table 2 by individual-level variables and area-based measures



Figure 1. Map of 35 metropolitan statistical areas included in the analysis.

Table 1. Descriptive characteristics of women who were residents of selected metropolitan statistical areas ages ≥ 18 years and with no history of hysterectomy, 2000 and 2002 BRFSS (N = 49,231)

	Percent (95% CI)	n
Year		
2000	50.1 (49.4-50.7)	21,493
2002	49.9 (49.3-50.6)	27,738
Age (y)		
18-39	49.7 (49.0-50.5)	22,280
40-49	20.9 (20.3-21.4)	11,083
50-64	16.8 (16.2-17.3)	9,133
65-74	7.6 (7.2-8.0)	3,665
75+	5.1 (4.8-5.4)	3,070
Race		
White	75.1 (74.4-75.8)	38,663
Black	13.7 (13.2-14.2)	6,355
Asian or Pacific Islander	5.1 (4.7-5.5)	1,488
American Indian or Alaska native	1.0 (0.8-1.1)	379
Other	5.1 (4.8-5.5)	1,925
Hispanic		
Yes	17.0 (16.4-17.7)	4,419
No	83.0 (82.3-83.6)	44,617
Household size		
One	14.0 (13.6-14.3)	12,033
Two	28.0 (27.4-28.6)	13,966
Three	19.3 (18.8-19.9)	8,846
Four or more	38.7 (38.0-39.5)	14,311
Marital status		
Currently married or living as unmarried couple	57.1 (56.4-57.8)	25,166
Divorced or separated	13.5 (13.1-14.0)	8,429
Widowed	7.5 (7.1-7.8)	4,651
Never married	21.9 (21.3-22.6)	10,851
Education		
<High school graduate	11.0 (10.4-11.5)	3,803
High school graduate/GED	26.1 (25.5-26.8)	12,638
Some college/technical school	28.7 (28.1-29.4)	13,507
College graduate	34.2 (33.5-34.8)	19,219
Household income		
<\$15,000	9.7 (9.3-10.3)	3,994
\$15,000-34,999	25.0 (24.3-25.6)	12,383
\$35,000-49,999	14.5 (14.0-15.0)	7,420
\geq \$50,000	37.4 (36.7-38.1)	18,741
Unknown	13.4 (13.0-13.9)	6,693
Saw physician in last year		
Yes	76.8 (76.0-77.7)	18,733
No	23.2 (22.3-24.1)	4,751
Health insurance		
Yes	86.1 (85.5-86.7)	44,151
No	13.9 (13.3-14.5)	4,995

NOTE: Estimates were obtained using SUDAAN software to account for the weighting. Physician visit in last year is in the core BRFSS questionnaire in 2000; in 2002, it is in the Health Care Coverage and Utilization Module (only asked in 10 states).

of SES. Only 72.4% of Asian or Pacific Islander women had received a Pap test in the past 3 years compared with 87.1% of White women and 88.8% of Black women. Women who were widowed or had never married and those with less than a high school education had relatively low cervical cancer screening rates compared with those who were married or college graduates. Only 75.4% (95% CI, 73.8-77.1%) of 3,947 women who were ages ≥ 18 years and had a household income of $<$ \$15,000 reported having received a Pap test in the past 3 years, compared with 84.0% (95% CI, 82.7-85.4%) of 12,287 women who had a household income of \$15,000 to 34,999 and 92.2% of 18,698 women with a household income of at least \$50,000 (95% CI, 91.2-93.1%). With respect to associations with area-based measures of SES, percentage with low education was inversely associated with Pap testing.

After adjustment for year of survey, age, race, ethnicity, marital status, health insurance, and household size, women

with an income of $<$ \$15,000 per year were less likely to receive cervical cancer screening than more affluent women, as shown in Table 3, which presents multivariate-adjusted percentages. Women with less than a high school education were less likely to have received a Pap test in the past 3 years, and this was especially true of women residing in areas with a lower percentage of residents with low education ($P < 0.0001$). The percentage of area residents with low education modified the effect of individual educational attainment on Pap testing ($P < 0.0001$). The interaction between the percentage of those living in poverty and household income was statistically nonsignificant ($P > 0.05$). Among women who were high school graduates, no important association was seen between Pap testing and percentage of residents with low education (Table 3).

Multivariate results from two logistic models are summarized in Table 4, which shows multivariate adjusted odds ratios rather than multivariate adjusted percentages. Model 1 only includes variables from BRFSS (year, age, race, Hispanic ethnicity, marital status, education, household income, household size, and health insurance), but model 2 includes both BRFSS variables and census variables (percentage of residents living in poverty and percentage with low education). The adjusted odds ratios for categories of household income, educational attainment, and other individual-level BRFSS variables from models 1 and 2 were almost identical.

Discussion

Previous studies conducted throughout the United States have shown that women with lower SES are less likely to undergo cancer screening (3, 4). The results of this study confirm that women with a household income of $<$ \$15,000 per year in larger metropolitan areas of the United States are less likely to receive cervical cancer screening than more affluent women in those metropolitan areas. An important finding in the current study is that contextual effects may also be important. Low education women residing in metropolitan areas with a lower percentage of low-education residents are less likely to undergo cancer screening, compared with low-education women in other metropolitan areas. This may be because of socioeconomic factors (e.g., they may spend more of their financial resources on housing or commuting) or because of a lack of culturally appropriate and accessible preventive health care services in the areas in which the women live (22). The relatively low screening rates among Asian or Pacific Islander women may be due to a lack of access to culturally appropriate and sensitive preventive health care or to a lack of awareness about the importance of routine cervical cancer screening. There may also be a need for health education materials and preventive health services suitable for persons with lower health literacy. Studies have shown that persons with lower health literacy are less likely to undergo routine cancer screening (7-9). The current results agree with those of prior research involving data from the National Health Interview Study in which women in counties with a lower percentage of residents with high school diplomas were found to have lower cervical cancer screening rates (23).

Area-based measures of SES may be related to cervical cancer screening rates through several mechanisms. The areas in which persons live may be related to screening utilization through their effects on income, education, employment, access to health care, and other factors. Factors related to health care access include cost, proximity, acceptability of the services, and the presence of public transportation or public clinics (24). County or community-level resources may affect a person's ability to access preventive health care services. The ability of this study to identify specific pathways influencing

Table 2. Percentage of women residing in selected metropolitan statistical areas who had a self-reported Pap test in the past 3 years according to variables from 2000 and 2002 BRFSS, and 2000 U.S. Census

	Percentage (95% CI)	n
BRFSS variables		
All	86.4 (85.6-87.2)	48,860
Year		
2000	85.9 (84.8-87.1)	21,364
2002	86.9 (86.0-87.9)	27,496
Age (y)*		
18-39	87.1 (85.8-88.3)	22,196
40-49	90.2 (88.8-91.5)	11,048
50-64	88.4 (87.3-89.5)	9,082
65-74	80.0 (77.6-82.4)	3,597
75+	67.3 (64.0-70.6)	2,937
Race*		
White	87.1 (86.3-87.9)	38,381
Black	88.8 (87.4-90.2)	6,302
Asian or Pacific Islander	72.4 (69.8-74.9)	1,478
American Indian or Alaska native	85.7 (80.1-91.2)	377
Other	84.1 (81.6-86.7)	1,910
Hispanic [†]		
Yes	84.1 (82.5-85.6)	4,395
No	86.9 (86.1-87.7)	44,275
Household size** ‡		
One	81.2 (80.1-82.2)	11,846
Two	88.0 (87.1-88.9)	13,868
Three	89.1 (88.0-90.2)	8,816
Four or more	85.9 (84.8-87.0)	14,262
Marital status*		
Currently married or living as unmarried couple	90.8 (90.0-91.6)	25,054
Divorced or separated	87.7 (86.4-89.1)	8,387
Widowed	74.2 (72.0-76.5)	4,509
Never married	78.3 (75.6-81.0)	10,778
Education** ‡		
<High school graduate	77.5 (75.7-79.3)	3,738
High school graduate/GED	82.4 (81.3-83.5)	12,533
Some college/technical school	87.2 (86.1-88.4)	13,413
College graduate	91.7 (91.0-92.3)	19,118
Income** ‡		
<\$15,000	75.4 (73.8-77.1)	3,947
\$15,000-34,999	84.0 (82.7-85.4)	12,287

screening utilization was limited by the variables included in the analytic data set and by the smallest geographic area of residence available for analysis (county). Future refinements could include analyses that include additional variables related to utilization of cancer screening services, and that examine neighborhood characteristics in greater detail such as at the census tract level or block group level.

Table 3. Multivariate adjusted percentage of women residing in selected metropolitan statistical areas who had a self-reported Pap test in the past 3 years according to both individual-level measures of SES variables (from 2000 and 2002 BRFSS) and area-based measures of SES (from 2000 U.S. Census; N = 48,156)

Household income (from BRFSS)	Percentage of residents living in poverty (from Census)		
	7<5%	75% to <20%	7≥20%
<\$15,000	78.7 (74.7-82.7)	78.4 (82.3-86.9)	83.7 (78.8-88.5)
\$15,000 to \$34,999	85.7 (84.0-87.4)	86.7 (85.4-88.0)	88.3 (85.2-91.3)
≥\$35,000	88.0 (86.7-89.4)	87.3 (86.0-88.7)	90.7 (88.0-93.4)
Education (from BRFSS)	Percentage of residents with low education (from Census)		
	<14.9%	15% to <24.9%	≥25%
<High school graduate	78.0 (73.3-82.7)	84.1 (81.3-86.9)	82.2 (78.7-85.7)
High school graduate/GED	84.0 (82.1-85.9)	84.0 (82.4-85.5)	82.7 (80.0-85.5)
Some college/technical school or college graduate	89.8 (88.7-90.9)	88.8 (87.8-89.8)	87.1 (85.3-88.9)

NOTE: Estimates were obtained using SUDAAN software to account for the weighting. Census 2000 variables are linked at the county level to the 2000 and 2002 BRFSS data set. Based on logistic regression analysis, including the following variables: year (2000 versus 2002), age, race, ethnicity, marital status, household size, health insurance, household income, educational attainment, percentage of residents living in poverty, and percentage of residents with low education. Abbreviation: GED, General Educational Degree.

Table 2. Percentage of women residing in selected metropolitan statistical areas who had a self-reported Pap test in the past 3 years according to variables from 2000 and 2002 BRFSS, and 2000 U.S. Census (Cont'd)

	Percentage (95% CI)	n
\$35,000-49,999	87.5 (86.3-88.7)	7,400
≥\$50,000	92.2 (91.2-93.1)	18,698
Unknown	81.6 (79.4-83.8)	6,528
Saw a physician in the past year*		
Yes	90.9 (89.8-92.0)	18,620
No	71.5 (69.4-73.5)	4,730
Health insurance*		
Yes	88.4 (87.7-89.0)	43,811
No	75.0 (72.5-77.5)	4,968
Census variables		
Percentage of residents working class* [§]		
0-49.9% working class	90.2 (88.9-91.4)	4,633
50-65.9% working class	87.0 (85.8-88.2)	20,226
66-74% working class	85.6 (84.9-86.4)	20,188
75%+ working class	86.6 (85.6-87.7)	3,813
Percentage living in poverty (%) [*]		
0-4.9	88.6 (86.6-90.7)	5,438
5-9.9	86.5 (85.6-87.3)	34,189
10-19.9	85.1 (83.3-87.0)	8,367
20+	90.3 (87.0-93.5)	866
Percentage with low education (%) ^{*‡}		
0-14.9	87.9 (86.9-88.9)	20,507
15-24.9	86.6 (85.8-87.5)	20,318
25+	84.0 (82.5-85.6)	8,035

NOTE: Estimates were obtained using SUDAAN software to account for the weighting. Census 2000 variables are linked at the county level to the 2000 and 2002 BRFSS data set. Only women residing in a county that is part of a metropolitan statistical area with a total Census 2000 population of at least 1,500,000 are included in the sample. Physician visit in last year is in the core BRFSS questionnaire in 2000; in 2002, it is in the Health Care Coverage and Utilization Module (only asked in 10 states).

* $P < 0.001$ from χ^2 test.

[†] $P < 0.01$ from χ^2 test.

[‡] $P < 0.0001$ from Wald χ^2 test for trend.

[§] $P < 0.01$ from Wald χ^2 test for trend.

^{||} $P < 0.001$ from Wald χ^2 test for trend.

With respect to other limitations of this study, response bias is a possibility because the telephone survey excluded women living in households without telephones, and, among women with household telephones; numerous potential respondents did not participate. Self-reported information about cancer screening practices may also differ from information obtained from records of health-care providers. Validation studies have

Table 4. Multivariate results for having a self-reported Pap test in the past 3 years among women residing in selected metropolitan statistical areas, based on data from 2000 and 2002 BRFSS and 2000 U.S. Census (N = 48,095)

Characteristic	Model 1, odds ratio (95% CI)	Model 2, odds ratio (95% CI)
Year		
2000	1.02 (0.86-1.22)	1.02 (0.85-1.22)
2002	1.00	1.00
Age (y)		
18-39	1.00	1.00*
40-49	0.84 (0.72-0.97)	0.84 (0.72-0.97)
50-64	0.64 (0.54-0.76)	0.64 (0.54-0.76)
65-74	0.34 (0.27-0.42)	0.34 (0.27-0.42)
75+	0.18 (0.14-0.22)	0.18 (0.14-0.22)
Race		
White	1.00*	1.00*
Black	1.66 (1.34-2.05)	1.63 (1.32-2.02)
Asian or Pacific Islander	0.31 (0.25-0.40)	0.31 (0.25-0.40)
American Indian or Alaska native	2.07 (1.57-2.74)	2.03 (1.53-2.69)
Other	1.16 (0.96-1.40)	1.16 (0.96-1.40)
Hispanic		
Yes	1.00	1.00
No	1.13 (0.95-1.35)	1.15 (0.96-1.38)
Household size		
One	1.00*	1.00*
Two	0.94 (0.82-1.08)	0.94 (0.82-1.08)
Three	0.94 (0.79-1.10)	0.94 (0.79-1.11)
Four or more	0.67 (0.56-0.79)	0.67 (0.57-0.80)
Marital status		
Currently married or living as unmarried couple	1.00*	1.00*
Divorced or separated	0.72 (0.61-0.85)	0.72 (0.61-0.85)
Widowed	0.69 (0.56-0.84)	0.69 (0.56-0.84)
Never married	0.29 (0.25-0.34)	0.29 (0.25-0.34)
Education		
<High school graduate	1.00*	1.00*
High school graduate/GED	1.12 (0.93-1.33)	1.11 (0.93-1.33)
Some college/technical school	1.51 (1.25-1.83)	1.51 (1.24-1.83)
College graduate	2.15 (1.75-2.64)	2.15 (1.75-2.63)
Income		
<\$15,000	1.11 (0.96-1.28)	1.11 (0.95-1.28)
\$15,000-34,999	1.06 (0.88-1.28)	1.06 (0.88-1.27)
\$35,000-49,999	0.82 (0.68-0.99)	0.82 (0.68-0.99)
≥\$50,000	1.34 (1.13-1.60)	1.35 (1.14-1.60)
Unknown	1.00*	1.00*
Health insurance		
Yes	2.37 (2.05-2.73)	2.36 (2.05-2.73)
No	1.00*	1.00*
Percentage living in poverty (%)		
0-4.9	—	0.91 (0.69-1.21)
5-9.9	—	0.78 (0.62-0.99)
10-19.9	—	0.88 (0.72-1.07)
20+	—	1.00
Percentage with low education (%)		
0-14.9	—	1.14 (0.94-1.38)
15-24.9	—	1.16 (1.00-1.34)
25+	—	1.00

NOTE: Estimates were obtained using SUDAAN software to account for the weighting. Census 2000 variables are linked at the county level to the 2000 and 2002 BRFSS data set. Only women residing in a county that is part of a metropolitan statistical area with a total Census 2000 population of at least 1,500,000 are included in the sample. Model 1 results are based on data from BRFSS. Model 2 results are based on data from both BRFSS and U.S. Census.

*P < 0.001 from Wald χ^2 test.

suggested that patients tend to overreport their use of screening and underreport the time lapse since their last screening (25, 26). A further issue is that the results of this study may not be generalizable to all metropolitan areas of the United States. In addition, BRFSS weights are primarily designed to provide accurate estimates at the state level. However, the metropolitan statistical areas selected for this

study had large populations (at least 1.5 million population) and large numbers of individual BRFSS respondents. The number of BRFSS respondents per metropolitan statistical area ranged from 161 (Sacramento-Arden-Arcade-Roseville, CA) to 5,860 (New York-Northern New Jersey-Long Island).

Despite the effectiveness of routine cervical cancer screening in reducing mortality from cervical cancer, results from this study indicate that screening tests are still underused by some women with lower incomes and less education residing in urban areas. Studies are needed to examine the extent to which cancer screening is being provided to priority populations (e.g., women who have rarely or never been screened for cervical cancer) at the community level. Addressing this question may require development of improved methods for obtaining small area (subcounty) estimates of the locations of priority populations, and evaluations of the locations of high priority populations compared with the locations of where screening tests are currently being provided. Women not eligible for Medicaid who do not have employer-sponsored health care can receive breast and cervical cancer screening through Centers for Disease Control National Breast and Cervical Cancer Early Detection Program,¹ which funds all 50 state health agencies, the District of Columbia, 13 tribal organizations, and four territories. Analyses of cancer screening by measures of educational attainment and other socioeconomic factors may help direct resources to areas of greatest need so that resources can be most effective and beneficial. Studies are needed to identify factors influencing the use of Pap tests by low income women in these areas so that barriers to routine cancer screening can be overcome to minimize cervical cancer morbidity and mortality.

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