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Eligibility for and reach of the National Breast and Cervical Cancer Early Detection Program, 2018–2021

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Abstract

Purpose: The National Breast and Cervical Cancer Early Detection Program (NBCCEDP) provides access to timely breast and cervical cancer screening and diagnostic services to women who have low incomes and are uninsured or underinsured. Documenting the number of women eligible and the proportion of eligible women who receive NBCCEDP-funded services is important for identifying opportunities to increase screening and diagnostic services among those who would not otherwise have access.

Methods: Using the Census Bureau's Small Area Health Insurance Estimates data, we estimated the number of women who met the NBCCEDP eligibility criteria based on age, income, and insurance status. We used these estimates along with the number of women served by the NBCCEDP to calculate the percent of women served by race/ethnicity and state. We calculated the percent of eligible women who are up to date with screening using the 2019 National Health Interview Survey.

Results: The NBCCEDP served 15.0% of women ages 40–64 eligible for breast cancer services in 2018–2019 and 5.6% of women ages 21–64 eligible for cervical cancer services in 2018–2020. The NBCCEDP served 13.5% of women ages 40–64 eligible for breast cancer services in 2020–2021 and 5.9% of women ages 21–64 eligible for cervical cancer services in 2019–2021. The percent of women ages 40–64 who received breast cancer services declined by 1.5 percentage points between 2018–2019 and 2020–2021. The percent of women ages 21–64 who received cervical cancer services increased by 0.3 percentage points between 2018–2020 and 2019–2021. The percent of eligible women served varied among states. The state interquartile ranges of the percent of women served were 12.3–27.7% for breast cancer services in 2018–2019 and 3.9–14.7% for cervical cancer services in 2018–2020. Among women eligible for the NBCCEDP,

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Ethics approval Emory's Institutional Review Board deemed the study “not human subjects” research.

61.4% are not up to date with breast cancer screening and 40.6% are not up to date with cervical cancer screening.

Conclusion: There is wide variation between states in the share of eligible women served for breast and cervical cancer screening services. We found that both the number and the percentage of eligible women who received NBCCEDP breast cancer services declined during a period that overlapped with the COVID-19 pandemic. A large proportion of eligible women did not receive breast or cervical cancer screening.

Keywords

Breast neoplasms; Early detection of cancer; Mammography; Papanicolaou test; Medically uninsured; National Breast and Cervical Cancer Early Detection Program

Introduction

The National Breast and Cervical Cancer Early Detection Program (NBCCEDP) provides access to timely breast and cervical cancer screening and diagnostic services to women who have low household incomes—at or below 250% of the federal poverty level (FPL)—and are uninsured or underinsured [1]. The program is funded through the Centers for Disease and Control and Prevention (CDC) and administered by the 50 states, District of Columbia, 2 U.S. territories, 5 U.S.-Affiliated Pacific Islands, and 13 American Indian or Alaska Native tribes and organizations. In addition to paying for screening and diagnostic services, the programs collect data, monitor and improve quality, and engage in outreach and evaluation.

NBCCEDP provides breast cancer screening and diagnostic services to women between the ages of 40 and 64 years and cervical cancer screening and diagnostic services to women between the ages of 21 and 64 years. Most women over the age of 64 are covered through Medicare; however, those covered by Medicare Part A only but not enrolled in Medicare Part B may also receive services through the NBCCEDP. Individual NBCCEDP-funded programs have some flexibility to modify age- and income-based eligibility criteria. Some programs set higher minimum ages (generally, 50), while others allow symptomatic or high-risk women younger than 40 to receive screening services. Maximum income thresholds also vary, with some programs setting thresholds lower than 250% of the federal poverty level [2].

The number of women eligible for the programs may vary due to differences in population, income levels, insurance status, and program-level differences in income and age eligibility criteria. The proportion of eligible women who receive screening services through the program may vary based on differences in the availability of screening services, the geographic concentration of eligible women, the cost of screening, the size of the eligible population, the availability of alternative sources of funding for screening services for low-income women (such as public hospitals), program funding, and outreach by the programs.

In this paper, we describe the number of women eligible for the NBCCEDP, the number of women served, and the proportion of women served. Documenting the number of women eligible and the proportion of eligible women who receive NBCCEDP-funded services is

important for identifying opportunities to increase screening for and early diagnosis of breast and cervical cancer. It is also important to continue to evaluate (1) the role of the program since the passage of the Affordable Care Act, which aimed to increase health insurance coverage and access to preventive care [3], and (2) how other events, such as the COVID-19 pandemic, affected the number of women eligible and served for the NBCCEDP.

Methods

We used the U.S. Census Bureau's Small Area Health Insurance Estimates (SAHIE) data [4, 5] for 2019 through 2021 to determine the number of women eligible for the NBCCEDP. The Census Bureau uses the American Community Survey in conjunction with other survey data (e.g., County Business Patterns) and administrative records (e.g., tax returns, Medicaid enrollment) to produce the SAHIE place-based estimates of insurance coverage. SAHIE is not a raw dataset, with individual-level observations. Instead, it contains model-based estimates of the number of uninsured people at the state, sex, and age-, income-, and race/ethnicity-group level.

Methodological details for SAHIE are available in Bauder et al. [4] and Dalzell et al. [6]. We used the SAHIE data to measure the number of women eligible for NBCCEDP breast and cervical cancer screening services in each state and the District of Columbia. The SAHIE data do not report population totals for U.S. territories, and they do not separately report population totals for tribal reservations, though these are included in the state population totals. We applied each state and DC program's income eligibility limit when calculating the number of program-eligible women [2]. We prorated eligibility counts when states' income limits did not align with the lower and upper income ranges for the population counts reported in the SAHIE data. SAHIE also reports the standard error of the number of women eligible. When calculating the number of women eligible for cervical cancer screening services, we adjusted totals to account for the fact that women who have had a hysterectomy do not require screening. Using the 2019 National Health Interview Survey [7], we calculated that approximately 10% (standard error: 1.3%) of women in the 21–64 years age group who met NBCCEDP eligibility criteria have had a hysterectomy.

The number of women served under the NBCCEDP by age group and by race and ethnicity were obtained from reports that the state and DC programs submit to the Centers for Disease Control and Prevention. States (including Washington, DC) submit data on the number of women screened based on contemporaneous United State Preventive Services Task Force breast and cervical cancer screening recommendations [8, 9]. We computed the percent of eligible women who are served based on the counts of women eligible from the SAHIE. Following prior work [10–12], we report outcomes for the periods 2018–2019 and 2020–2021 for NBCCEDP-funded breast cancer services and 2018–2020 and 2019–2021 for NBCCEDP-funded cervical cancer services. Women who received multiple tests during these intervals were counted once. We averaged the counts of the number of eligible women, calculated from the SAHIE, across years.

We report all results by race/ethnicity (non-Hispanic White, non-Hispanic Black, Hispanic) and by state. We assessed the significance of differences in the percent of women screened

overall and by race/ethnicity using Z-tests with an alpha level of 10%, consistent with Census Bureau convention. We also assessed correlations between the number of women eligible and the number of women served.

We used the 2019 NHIS [7] to estimate the proportion of eligible women who received mammograms or, separately, a Pap test or a human papillomavirus (HPV) test outside of the NBCCEDP. The NHIS is an annual survey that collects information about health status and prevention and is designed to be representative of the civilian, non-institutionalized population. We estimated the number of female respondents between the ages of 40 and 64 and 50 and 64 (for breast cancer services) and 21–64 (for cervical cancer services) who were uninsured and lived in households with incomes below 250% of the federal poverty level. (See Sabatino et al. [13] for details about the construction of the sample.) Among women ages of 40 and 64 and 50 and 64 who did not report being previously diagnosed with breast cancer, we measured the proportion who reported that they received a mammogram in the past 2 years.) Among women ages 21–29 who did not report being previously diagnosed with cervical cancer or having a hysterectomy, we measured the share who reported receiving a cervical cancer screening test [either a Pap test or a human papillomavirus (HPV) test] in the past 3 years. Among women ages 30–64 who did not report being previously diagnosed with cervical cancer or having a hysterectomy, we measured the share who reported receiving a cervical cancer screening test in the past 3 years or who had a cervical cancer screening test in the past 5 years and, separately, reported that they had an HPV test at their most recent cervical cancer screening.

We applied sample weights to produce nationally representative estimates. We calculated the proportion of women served outside the NBCCEDP by subtracting the proportion served by the NBCCEDP from the proportion of the eligible population served that we estimated using NHIS. This analysis was deemed not a human subjects study by Emory University's Institutional Review Board. All analyses were performed in Stata version 17 (Stata Corporation, College Station, TX).

Results

Table 1 displays estimates of the number of women eligible for NBCCEDP breast and cervical cancer screening and diagnostic services, the number served, and the percent of eligible women served overall and by race/ethnicity. We present estimates by time period. The NBCCEDP served 15.0% of women ages 40–64 eligible for breast cancer services in 2018–2019. Hispanic women were the most likely to receive NBCCEDP services (21.3%), followed by non-Hispanic Black women (14.6%), and non-Hispanic White women (9.8%). The NBCCEDP served 13.5% of women ages 40–64 eligible for breast cancer services in 2020–2021. The NBCCEDP served 5.6% of women ages 21–64 eligible for cervical cancer services in 2018–2020. Hispanic women were the most likely to receive services (8.2%), with similar percentages of non-Hispanic Black and non-Hispanic White women receiving services (4.0% and 3.8%). The NBCCEDP served 5.9% of women ages 21–64 eligible for cervical cancer services in 2019–2021.

The number of women eligible for NBCCEDP services and the number of women served declined between the two time periods. Specifically, the number of women ages 40–64 eligible for breast cancer services declined by 90,676 (3.3%). The number of women ages 21–64 eligible for cervical cancer services declined by 454,296 (7.6%). The number of women ages 40–64 who received NBCCEDP breast cancer services declined by 53,992 (13.0%). The number of women ages 21–64 who received NBCCEDP cervical cancer services declined by 9231 (2.8%). On net, the percent of eligible women receiving NBCCEDP breast cancer services declined by 1.5 percentage points between 2018–2019 and 2020–2021 (this, and all changes in the percent of women served, are significant at the 10% level). Among racial/ethnic groups, non-Hispanic Black women ages 40–64 experienced an especially large reduction in the percent of women receiving breast cancer services: 3.2 percentage points. There were small increases (0.3 percentage points) in the percent of eligible women receiving cervical cancer services between 2018–2020 and 2019–2021.

The percent of eligible women served varied among states for breast (Figs. 1 and 2) and cervical (Fig. 3) cancer services. (Supplemental Tables S1–S3 report the number of women eligible.) The state level interquartile range for the percent of eligible women ages 40–64 served in 2018–2019 for breast cancer was 12.3–27.7, with 9 states serving over 30% of the eligible population. The percent of eligible women served declined significantly by more than 5 percentage points in 16 states. The interquartile range for women ages 50–64 was 16.0–28.6%, with 14 states experiencing a significant decline of more than 5 percentage points. The range for percent of eligible women ages 21–64 served for cervical cancer in 2018–2020 was 3.9–14.7, and only one state experienced a decline of more than 5 percentage points. Of note, for all three age groups (ages 40–64, 50–64, and 21–64), there is a positive correlation between state-level changes in the number of eligible women and state-level changes in the number of women served, where the change is computed between the two time periods. The percent of women served was generally lower in the Southwestern region of the US and highest in the West and Northeast. For example, the percent of eligible women ages 40–64 screening by the NBCCEDP was 15.4% in the South, 21.5% in the Northeast, 18.6% in the Midwest, 21.0% in the West, and 8% in the Southwest. However, there was substantial variation between states within regions.

Figures 4 and 5 display the percent of eligible women served by the NBCCEDP, the percent of eligible women served by other funding sources (for example, self-pay), as well as the percent not screened. Note that “served” in this case refers to women who received screening services (the vast majority), who received diagnostic mammograms, or who received other diagnostic imaging services or procedures. An estimated 38.6% percent of women ages 40–64 eligible for NBCCEDP breast cancer services were up to date with screening, with 15.0% receiving screening or diagnostic services funded by NBCCEDP in 2019–2020 and 23.6% receiving services funded outside of the program in 2018. An estimated 59.4% percent of women ages 21–64 eligible for NBCCEDP cervical cancer services were up to date with screening, with 5.6% receiving screening or diagnostic services funded by NBCCEDP in 2018–2020 and 53.7% receiving services funded outside of the program in 2018.

Discussion

We found that the number of women eligible for NBCCEDP breast and cervical cancer screening and diagnosis services declined during a period that overlapped with the COVID-19 pandemic. On net, the percent of eligible women ages 40–64 served for breast cancer services declined by 1.5 percentage points. In contrast, the percent of eligible women ages 21–64 served for cervical cancer services increased by 0.3 percentage points. Because receipt of cervical cancer screening services is measured over a 3-year period beginning in 2019, and because screening intervals may be as long as 5 years, this result may not fully reflect the impact of the COVID-19 pandemic. Also, the number of women served by NBCCEDP for breast and cervical cancer services declined in absolute terms by 53,992 (13.0%) and 9231 (2.8%), respectively. Prior research has shown that cancer screening rates declined during the COVID-19 pandemic [14–20]. Nationally, the percent of women ages 50–74 who received a mammogram in the year declined from 61.6% in 2018 to 57.8% in 2020, and the percent of women ages 25–64 who received a Pap testing declined from 58.3 to 51.9% [17].

During the COVID-19 pandemic, uninsurance rates and the NBCCEDP-eligible populations typically declined in states that had expanded Medicaid and typically were unchanged in states that had not [21]. The Families First Coronavirus Response Act [22] provided incentives for states to maintain Medicaid enrollment during the COVID-19 public health emergency. Likely as a result, more Medicaid enrollees were able to maintain continuous coverage throughout the COVID-19 pandemic [23] and Medicaid enrollment increased from March 2020 to March 2023. Note that women enrolled in Medicaid are ineligible for NBCCEDP services. Now that the public health emergency and the Medicaid continuous eligibility declaration have ended, more women with low incomes may lose health insurance coverage [24] and become eligible for the NBCCEDP.

The number of women served by the NBCCEDP also declined during the COVID-19 pandemic [20, 25, 26]. The Centers for Medicare and Medicaid Services had released a national recommendation to delay non-essential medical care on April 7, 2020 [27]. The reductions in the number of women served may reflect declines in eligibility or reluctance among women to risk contracting COVID-19 during medical encounters. Population-wide screening rates declined steeply in April to June of 2020 [13–19] though they rebounded to pre-COVID-19 pandemic levels in the latter half of 2020 and in 2021 [18, 19]. The positive correlation between the change in the number of women eligible and the number of women served at the state level also suggests that some of the decline in the number of women served was a natural consequence of fewer women being uninsured during the COVID-19 pandemic.

We previously documented the reach of the NBCCEDP for breast cancer services in 2015–2017 and cervical cancer services in 2016–2017 [10]. The share of program-eligible women served by the program was 15.0% for breast services in 2016–2017 and 6.8% for cervical services in 2015–2017. The share of the population ages 65 and below that was uninsured increased from 10.4% in 2016 to 12.1% in 2019 [28].

The 2020 SAHIE reflects data collected from part of 2020 and part of 2019. Under ACS data collection conventions, respondents are asked about the prior 12 months. For example, someone answering the ACS questionnaire in February 2020 would be prompted to think about the time period from February 2019 to January 2020. Thus, SAHIE-based estimates of insurance status using the 2020 data partially reflect pre-COVID-19 pandemic trends. For the 2021 SAHIE, however, most of the ACS data capture the COVID-19 pandemic time period. Also, the 2020 ACS collection was affected by the COVID-19 pandemic [29] and experimental weights were needed to produce the 2020 ACS data used for the 2020 SAHIE data [30, 31]. We plan to update estimates of the percent of women served by the NBCCEDP as more years of data become available. Lacking state-specific estimates of the share of women who had a hysterectomy by state, our estimates of the percent of eligible women screened for cervical cancer assume that the share of women who have had a hysterectomy is the same across states (10%).

Pre-COVID-19 pandemic (2018–2019), the NBCCEDP served 15.0% of women ages 40–64 eligible for breast cancer services. Prior analyses reported that the percent of women served was 15.0% in 2016–2017 and 10.6% in 2011–2012 [11, 12]. The comparable figures for cervical cancer services (women ages 21–64) are 5.6% (2018–2020), 6.8% (2015–2017), and 6.5% (2010–2012) [11, 12]. The proportion of eligible women served may vary between state-based programs and over time based on program funding, the availability of alternative sources of free or reduced-cost screening, insurance coverage, changes in the age distribution of the eligible population, and screening guidelines. Differences in the cost of screening and population density also contribute to state-level variation. Still, there may be opportunities for programs to increase the share of eligible women served, especially in those states at the lower tail of the distribution. Following the passage of the Affordable Care Act, it was expected that increased access to health insurance coverage for those previously uninsured would reduce the number of women eligible for the NBCCEDP. Our analysis of NHIS data indicates that a large share of women eligible for NBCCEDP breast and cervical screening services are not up to date with breast and cervical cancer screening (61.4% for breast cancer screening, 40.6% for cervical cancer screening). Despite expansions in health insurance coverage in the years following ACA implementation [32], there is still a sizable uninsured population that remains eligible for the NBCCEDP. Our results suggest that in the absence of the NBCCEDP, even more women would forgo cancer screening services.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Data availability

No datasets were generated or analysed during the current study.

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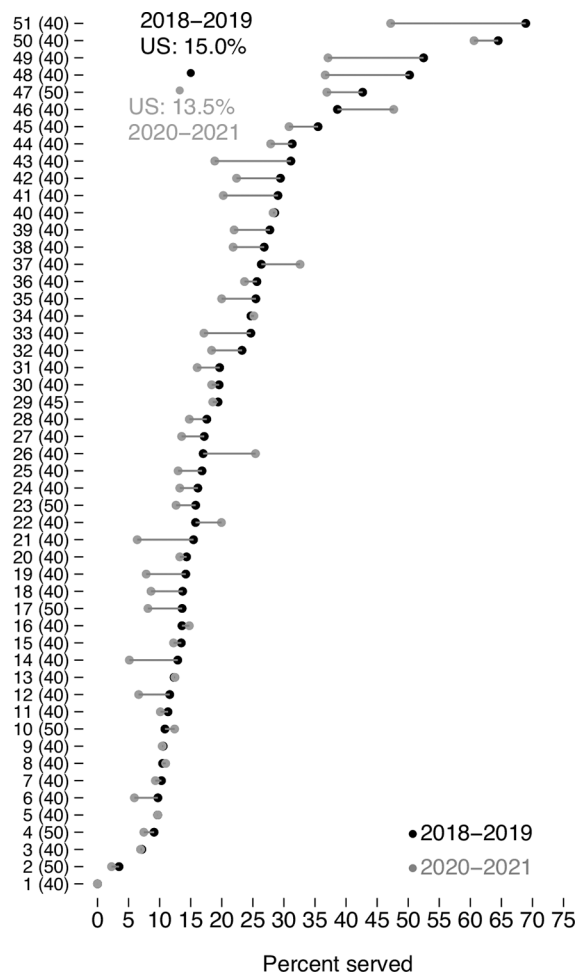


Fig. 1.

Proportion of eligible women served by the National Breast and Cervical Cancer Early Detection Program in 2018–2019 and 2020–2021 for breast cancer services, ages 40–64, by state. The minimum age of eligibility for each state is in parentheses. States are sorted by the percent of eligible women served in 2018–2019. As per CDC policy, state identifiers are masked

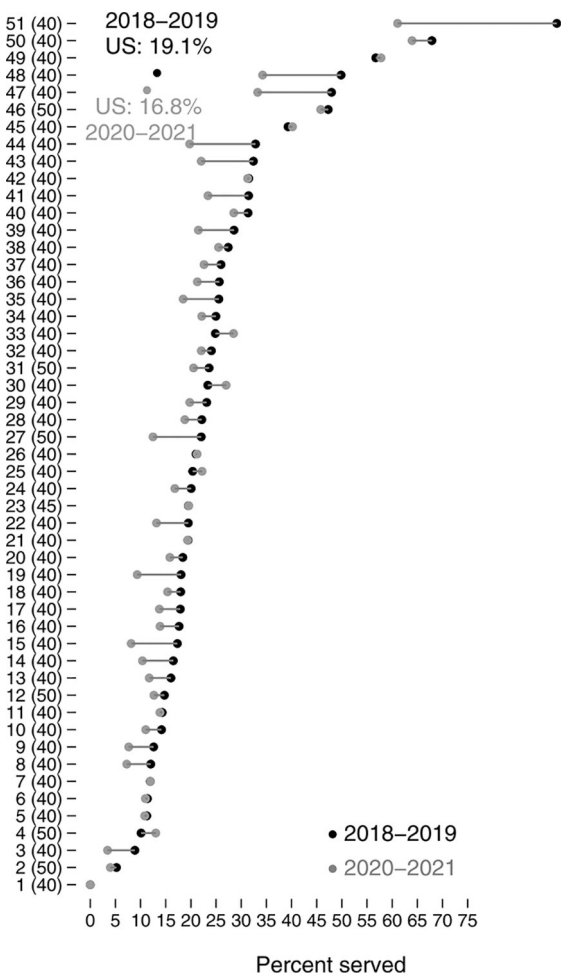


Fig. 2. Proportion of eligible women served by the National Breast and Cervical Cancer Early Detection Program in 2018–2019 and 2020–2021 for breast cancer services, ages 50–64, by state. The minimum age of eligibility for each state is in parentheses. States are sorted by the percent of eligible women served in 2018–2019. As per CDC policy, state identifiers are masked

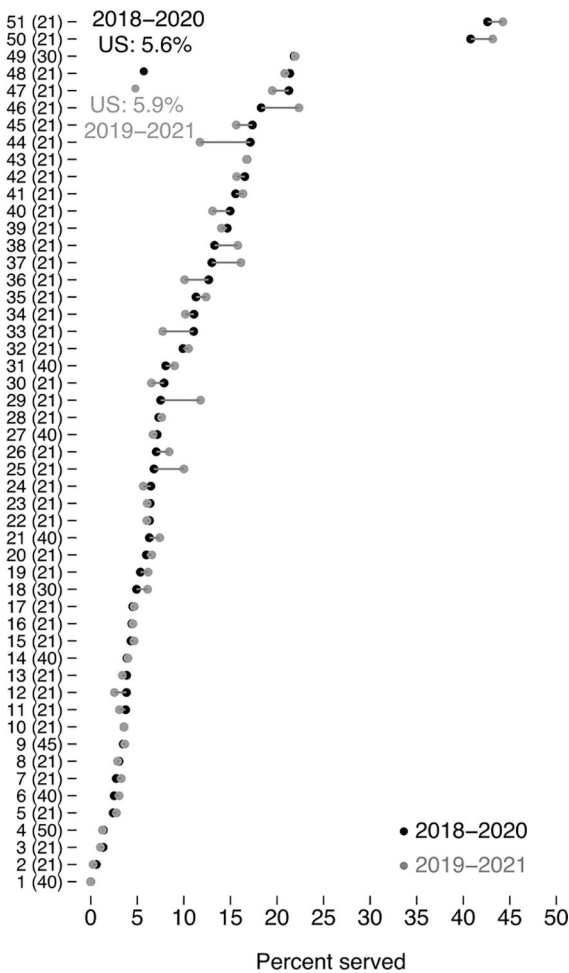


Fig. 3. Proportion of eligible women served by the National Breast and Cervical Cancer Early Detection Program in 2018–2020 and 2019–2021 for cervical cancer services, ages 21–64. The minimum age of eligibility for each state is in parentheses. States are sorted by the percent of eligible women served in 2018–2020. As per CDC policy, state identifiers are masked

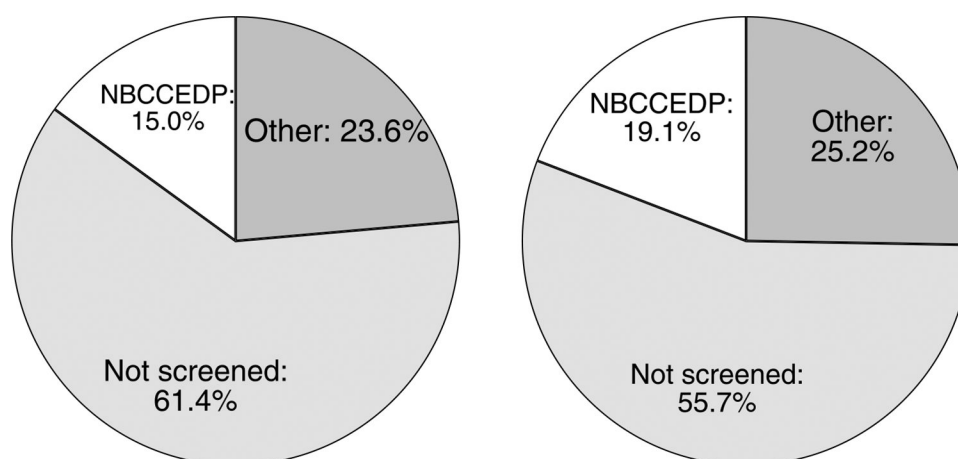


Fig. 4. Source of breast cancer screening services for women eligible for the NBCCEDP in 2018. The graph shows the proportion of women who qualify for the National Breast and Cervical Cancer Early Detection Program (NBCCEDP) based on age, insurance status, and income who received a mammogram in the prior 2 years. Estimates are based on an analysis of the 2019 National Health Interview Survey and the 2019–2020 NBCCEDP program data

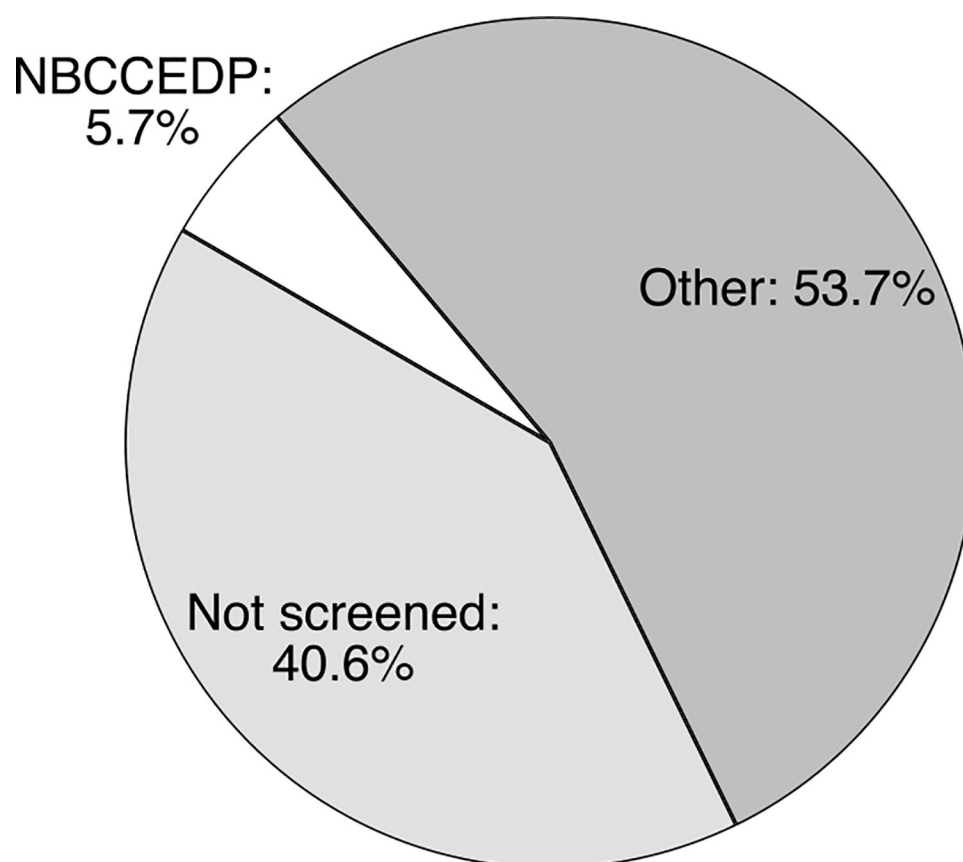


Fig. 5. Source of cervical cancer screening services for women eligible for the NBCCEDP in 2018. The graph shows the proportion of women who qualify for the National Breast and Cervical Cancer Early Detection Program (NBCCEDP) based on age, insurance status, and income who received a Pap test or a human papillomavirus test in the prior 5 years. Estimates are based on an analysis of the 2019 National Health Interview Survey and the 2018–2020 NBCCEDP program data

Table 1
The number of women served, the number of women eligible, and the percent of eligible women served by the National Breast and Cervical Cancer Early Detection Program, by race/ethnicity

	2018–2019		2020–2021		Served	%	Differences		% ^a
	Eligible	Served	Eligible	Served			Eligible N (%)	Served N (%)	
Breast cancer services									
Ages 40–64									
All	2,786,322	416,885	15.0	2,695,646	362,893	13.5	-90,676 (-3.3)	-53,992 (-13.0)	-1.5
Non-Hispanic, White	1,152,528	112,588	9.8	1,062,758	85,492	8.0	-89,770 (-7.8)	-27,096 (-24.1)	-1.7
Non-Hispanic, Black	428,689	62,702	14.6	411,508	47,196	11.5	-17,181 (-4.0)	-15,506 (-24.7)	-3.2
Hispanic	1,017,970	216,468	21.3	1,032,306	211,379	20.5	14,336 (1.4)	-5089 (-2.4)	-0.8
Ages 50–64									
All	1,435,252	274,212	19.1	1,365,267	231,883	17.0	-69,985 (-4.9)	-42,329 (-15.4)	-2.1
Non-Hispanic, White	680,126	81,470	12.0	612,772	60,634	9.9	-67,354 (-9.9)	-20,836 (-25.6)	-2.1
Non-Hispanic, Black	215,614	47,492	22.0	211,394	35,035	16.6	-4220 (-2.0)	-12,457 (-26.2)	-5.5
Hispanic	432,395	126,992	29.4	437,048	122,984	28.1	4653 (1.1)	-4008 (-3.2)	-1.2
Cervical cancer services									
Ages 21–64									
All	5,889,569	334,243	5.68	5,387,668	325,012	6.03	-501,901 (-8.5)	-9231 (-2.8)	0.36
Non-Hispanic, White	2,199,723	87,226	3.97	1,913,342	78,251	4.09	-286381 (-13.0)	-8975 (-10.3)	0.12
Non-Hispanic, Black	909,676	36,715	4.04	817,891	33,415	4.09	-91,785 (-10.1)	-3300 (-9.0)	0.05
Hispanic	2,375,699	192,639	8.11	2,256,412	197,498	8.75	-119,287 (-5.0)	4859 (2.5)	0.64

^a All differences are significant at the 10% level