HHS Public Access

Author manuscript

Cancer Epidemiol. Author manuscript; available in PMC 2024 June 01.

Published in final edited form as:

Cancer Epidemiol. 2023 June ; 84: 102371. doi:10.1016/j.canep.2023.102371.

Breast, cervical, and colorectal cancer screening test use in the US territories of Guam, Puerto Rico, and the US Virgin Islands

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Abstract

Background: The United States Preventive Services Task Force (USPSTF) recommends breast, cervical, and colorectal cancer screening among eligible adults, but information on screening use in the US territories is limited.

Methods: To estimate the proportion of adults up-to-date with breast, cervical, and colorectal cancer screening based on USPSTF recommendations, we analyzed Behavioral Risk Factor Surveillance System data from 2016, 2018, and 2020 for the 50 US states and DC (US) and US territories of Guam and Puerto Rico and from 2016 for the US Virgin Islands. Age-standardized

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Appendix A. Supplementary material

weighted proportions for up-to-date cancer screening were examined overall and by select characteristics for each jurisdiction.

Results: Overall, 67.2% (95% CI: 60.6–73.3) of women aged 50–74 years in the US Virgin Islands, 74.8% (70.9–78.3) in Guam, 83.4% (81.7–84.9) in Puerto Rico, and 78.3% (77.9–78.6) in the US were up-to-date with breast cancer screening. For cervical cancer screening, 71.1% (67.6–74.3) of women aged 21–65 years in Guam, 81.3% (74.6–86.5) in the US Virgin Islands, 83.0% (81.7–84.3) in Puerto Rico, and 84.5% (84.3–84.8) in the US were up-to-date. For colorectal cancer screening, 45.2% (40.0–50.5) of adults aged 50–75 years in the US Virgin Islands, 47.3% (43.6–51.0) in Guam, 61.2% (59.5–62.8) in Puerto Rico, and 69.0% (68.7–69.3) in the US were up-to-date. Adults without health care coverage reported low test use for all three cancers in all jurisdictions. In most jurisdictions, test use was lower among adults with less than a high school degree and an annual household income of <$25,000.

Conclusion: Cancer screening test use varied between the US territories, highlighting the importance of understanding and addressing territory-specific barriers. Test use was lower among groups without health care coverage and with lower income and education levels, suggesting the need for targeted evidence-based interventions.

Keywords

Cancer screening; breast cancer; cervical cancer; colorectal cancer; US territories

1. Introduction

Little is known about cancer screening prevalence and associated factors in the US territories despite evidence that mortality for most screenable cancers is generally higher in the territories than in the US states. Higher mortality rates for colorectal cancer among men have been reported in the US territories compared to the US states [1]. From 2008 to 2012, the age-standardized mortality rate for colorectal cancer per 100,000 was relatively higher among men in the US Virgin Islands (12.3) and Puerto Rico (11.8) compared to the US states (10.6) [1]. During the same period, the age-standardized mortality rate per 100,000 women for cervical cancer was relatively higher among women in Puerto Rico (1.9) than in the US states (1.7) [1]. In addition, the indigenous persons of Guam, Chamorros, had relatively higher age-standardized mortality rates per 100,000 for breast (32.0 vs. 28.0), colorectal (28.6 vs. 19.7), and cervical (7.5 vs. 2.6) cancers compared to the US states [2].

Screening followed by timely follow-up and treatment has been shown to reduce mortality for breast [3], cervical [4], and colorectal [5, 6] cancers. The United States Preventive Services Task Force (USPSTF) recommends breast [7], cervical [8], and colorectal [9] cancer screening among eligible adults. The limited number of studies on cancer screening prevalence and associated factors in the US territories focused primarily on breast cancer screening and how screening proportions varied [10, 11]. For instance, mammography use among Medicare beneficiaries in the US territories (34%) was approximately half of the use reported in the US (66%) [10].

The US Virgin Islands, Puerto Rico, and Guam are unincorporated, organized territories of the US, and their residents are US citizens. The US Virgin Islands (approximately 87,000 persons) and Puerto Rico (approximately 3,285,000 persons) are in the Caribbean, and Guam (approximately 153,000 persons) is in the Pacific Ocean. The US territories face geographical, economic, and technical challenges in providing cancer screening and follow-up services [12, 13]. Residents of these territories also experience several barriers accessing health care [14, 15]. All these factors combined can influence cancer screening test use. This study examined the proportion of eligible adults who were up-to-date with recommendations for breast, cervical, and colorectal cancer screening test use in the US territories and the 50 US states and the District of Columbia (henceforth referred to as the US).

2. Methods

2.1. Data source

The Behavioral Risk Factor Surveillance System (BRFSS) collects data from only three US territories (Guam, Puerto Rico, and the US Virgin Islands). Data from 2016, 2018, and 2020 were analyzed for the US and the US territories of Guam and Puerto Rico, and from 2016, the only year available, for the US Virgin Islands. BRFSS is an ongoing, random-digit-dialed telephone survey that collects information about health behaviors, chronic conditions, and the use of preventive health services. The survey uses a multistage sampling design to select a representative sample of noninstitutionalized adults aged ≥18 years residing within each US state, the District of Columbia, and three territories. Information about the BRFSS survey design, sampling, instrument, and data collection methods is available elsewhere [16]. In addition, information on the validity and reliability of the survey is provided elsewhere [17]. The median survey response rates from 2016, 2018, and 2020 were 47.1%, 49.9%, and 47.9%, respectively.

2.2. Measures

Up-to-date screening test use was defined based on the USPSTF recommendations for breast, cervical, and colorectal cancer screening in effect for the prior survey year (Table 1). Cancer screening questions for each survey year are provided in Appendix A (supplementary tables 1, 2, and 3).

2.3. Analysis

The weighted proportions of the population up-to-date for cancer screening were estimated overall and by select sociodemographic characteristics (age, race and ethnicity, education level, marital status, and household income), health care coverage, and smoking status. In addition, 95% confidence intervals (CIs) were calculated around the weighted proportions to allow comparison and indicate precision. Estimates of cancer screening test use were determined to be significantly different if the CIs for the estimates did not overlap. All estimates besides age were age-standardized to the 2000 US standard population using the direct method [20]. Non-age-standardized estimates of breast, cervical, and colorectal cancer screening test use for all jurisdictions are provided as supplementary material (supplementary tables 4, 5, and 6). Sampling weights and design parameters were applied

to account for the complex survey design and adjust for nonresponse [21]. Taylor series approximation methods were used to calculate variance estimates [22]. Estimates with a relative standard error (RSE) of greater than 30% were suppressed [23]. All analyses were conducted using SAS (version 9.4; SAS Institute, Inc.) and SUDAAN (version 11.0.3; RTI International).

3. Results

3.1. Breast cancer screening

Overall, 67.2% (95% CI: 60.6–73.3) of women aged 50–74 years in the US Virgin Islands, 74.8% (70.9–78.3) in Guam, and 83.4% (81.7–84.9) in Puerto Rico were up-to-date with mammography (Table 2). In the US, 78.3% (77.9–78.6) of women were up-to-date. The proportion of women up-to-date with mammography did not differ by survey year within each jurisdiction.

Women without health care coverage reported low test use in Guam (41.8% [95% CI: 30.9–53.6]), the US Virgin Islands (45.1% [30.5–60.5]), the US (55.4% [52.7–58.1]), and Puerto Rico (57.8% [44.7–69.9]). In all jurisdictions except Puerto Rico, test use was lower among women whose annual household income was <$25,000 compared to women whose income was ≥$50,000. In Puerto Rico and the US, test receipt was lower among people who smoke relative to people who never smoked or used to smoke.

3.2. Cervical cancer screening

Overall, 71.1% (95% CI: 67.6–74.3) of women aged 21–65 years in Guam, 81.3% (74.6–86.5) in the US Virgin Islands, and 83.0% (81.7–84.3) in Puerto Rico were up-to-date with cervical cancer screening (Table 3). In the US, 84.5% (84.3–84.8) of women were up-to-date. Screening test use was low among women without health care coverage in Guam (47.7% [95% CI: 39.4–56.1]), the US (71.0% [69.8–72.1]), Puerto Rico (72.0% [65.2–77.9]), and the US Virgin Islands (73.9% [60.6–83.9]). Lower test use was also observed in Guam, Puerto Rico, and the US among women who were never married compared to those married or in a relationship, had less than a high school education compared to college graduates, or had an annual household income <$25,000 compared to those with ≥$50,000. In Puerto Rico and the US, lower test receipt was reported among people who smoke compared to people who formerly smoked or never smoked.

3.3. Colorectal cancer screening

Overall, 45.2% (95% CI: 40.0–50.5) of adults aged 50–75 years in the US Virgin Islands, 47.3% (43.6–51.0) in Guam, and 61.2% (59.5–62.8) in Puerto Rico were up-to-date with colorectal cancer screening. In the US, 69.0% (68.7–69.3) of adults were up-to-date. Compared to 2018, the proportion up-to-date with screening test use increased in 2020 for Puerto Rico (55.6% [95% CI: 52.9–58.2] to 71.8% [68.5–74.9]) and Guam (42.9% [37.3–48.7] to 55.9% [49.6–62.1]).

Colorectal cancer screening test use was very low among adults without health care coverage in all jurisdictions at 25.1% (95% CI: 14.6–39.5) in the US Virgin Islands, 25.4%

(17.6–35.0) in Guam, 31.2% (24.3–39.0) in Puerto Rico, and 40.8% (39.2–42.4) in the US. In all jurisdictions, test use was lower among adults with less than a high school education compared to college graduates and among adults with an annual household income of <$25,000 compared to those with ≥$50,000. Compared to people who smoke, test receipt was lower among people who used to smoke or never smoked in Puerto Rico and the US.

Up-to-date colorectal and cervical cancer screening use did not differ when using the USPSTF screening recommendation definition in effect for the prior survey year (used in this analysis) compared to using a consistent USPSTF screening recommendation definition across the survey years, i.e., using the 2008 recommendation for colorectal cancer and the 2012 recommendation for cervical cancer for all survey years (data not shown).

4. Discussion

Results from this study show that cancer screening test use varied across the territories, with higher use reported in Puerto Rico for breast and colorectal cancer screening tests. Compared to the US, colorectal cancer screening use was lower in all territories, breast cancer screening use was lower in the US Virgin Islands and higher in Puerto Rico, and cervical cancer screening use was lower in Guam and similar in Puerto Rico and the US Virgin Islands.

In addition to the unique geographical challenges [13], lower test use in the territories may be due to challenges to screening services [12] and disparities in health care funding and infrastructure [24]. Inadequate and capped federal grant and Medicaid funding in the US territories may have contributed to reduced access [25], fewer benefits [24], and poorer quality of care [26]. Access may have been further hampered by limited health care infrastructure, which has been exacerbated by natural disasters. For example, reductions in cervical cancer screening reported among Medicaid enrollees in Puerto Rico coincided with hurricanes in 2017 and earthquakes in 2020 [27]. Cancer screening and follow-up services in the US territories are also hampered by health care provider shortages caused by the difficulties in provider recruitment and retention [28]. In recent years, an exodus of providers in Puerto Rico has affected health care services [29]. In some territories, timely processing and receipt of screening results are hindered by a lack of certified laboratories and personnel combined with high costs for shipping and testing with off-island laboratories [12]. Obstacles to cancer screening in the US territories also include a lack of resources, low health literacy, transportation challenges, and cultural factors such as the resistance of male partners to having their female spouses examined for cervical cancer in some jurisdictions [13, 30].

Consistent with previous studies [31–33], adults without health care coverage had one of the lowest proportions of cancer screening use across all jurisdictions. Improving coverage could increase access to cancer screenings and improve test receipt. Screening use was also lower among adults with lower income levels, a disparity that has been shown to have persisted for years [31, 32, 34]. To improve access to screening in these groups, the National Breast and Cervical Cancer Early Detection Program (NBCCEDP) provides breast and cervical cancer screening to women who have a low income and are uninsured

or have inadequate insurance. For the 2016 to 2021 program years, NBCCEDP served approximately 1.1 million women with breast and cervical cancer screening and diagnostic services nationally [35]. In the same period, approximately 1,300 women were served in Guam and approximately 800 women were served in Puerto Rico through the NBCCEDP. In addition, federally qualified health centers (FQHCs) provide access to cancer screening services for underserved and low-income populations nationally and in the territories. Approximately 2,000 women in the US Virgin Islands and 1,450 women in Guam were screened for cervical cancer at FQHCs in 2020 [36, 37]. In the same year, approximately 700 adults each in the US Virgin Islands and Guam received colorectal cancer screening at an FQHC [36, 37].

Relative to 2018, reported up-to-date colorectal cancer screening use increased in 2020, especially in Puerto Rico and Guam. The increase in reported colorectal cancer screening use may be at least partially due to changes in the BRFSS questions. In 2020, questions about FIT-DNA and CT colonography were added to the BRFSS survey, and the wording of some questions was revised. The increase in colorectal screening use could also be partially explained by the increased use of home blood stool tests [38]. For instance, the use of fecal occult blood tests increased among Hispanic adults in Puerto Rico from 2019 to 2020 [39]. This increased use of home-based tests could have implications for cervical cancer screening, where home-based HPV self-sampling may be an option for increasing cervical cancer screening compliance. The increase in CRC screening use could also reflect the interventions, such as educational and health promotion programs [40, 41], implemented by the US territories to achieve the National Colorectal Cancer Roundtable screening goal of 80% in every community (previously 80% by 2018) [42]. One such intervention at the policy level was in Puerto Rico, where the Department of Health enacted an administrative order in 2015 to screen for colorectal cancer using the FIT annually [43].

Increasing cancer screening, especially among people who are medically underserved, is a national priority. The Community Preventive Services Task Force (CPSTF) recommends several evidence-based client- and provider-based interventions to improve cancer screening use. [44, 45]. For client-oriented interventions, CPSTF recommends the use of client reminders and one-on-one education. Lack of knowledge about cancer screening has been reported as a barrier in Guam [46], Puerto Rico [47], and US states [48], underscoring the need for one-on-one education and other educational interventions to inform individuals about the purpose, process, and benefits of screening. CPSTF also recommends reducing structural barriers to make screening easier for patients. During the SARS-CoV-2 pandemic, Guam BCCEDP made enrollment in their program easier, resulting in more women screened for breast and cervical cancer [49]. Provider-oriented interventions, such as provider assessment and feedback and provider reminder and recall systems, are recommended by CPSTF to improve cancer screening. Implementing multiple evidence-based interventions could also increase screening use. As guideline-concordant cancer screening use was lower among people who smoke in Puerto Rico and the US in this study and previous studies [50–53], education and counseling efforts could improve screening compliance in this group. Eligible patients who smoke should be encouraged to receive the recommended cancer screenings. Health care providers could also promote tobacco cessation interventions. In an analysis of the National Health Interview Survey, patients who attempted smoking cessation

were more likely to have received a colonoscopy, mammography, and Pap test than patients who had not [53], providing impetus to support cessation treatments as they may improve screening use.

4.2. Limitations

The findings of this analysis are subject to some limitations. First, cancer screening use was self-reported; however, the accuracy of self-reported use has been generally high [54, 55], with some overreporting observed [56]. Second, BRFSS questions did not differentiate between screening and diagnostic tests. However, most tests are done for screening [31, 32]. Third, nonresponse bias could occur if there are systematic differences between respondents and nonrespondents; however, BRFSS has implemented raking as a weighting methodology to adjust for nonresponse [57]. Fourth, the wording of BRFSS survey questions about cancer screening tests has slightly changed over the survey years, which may affect screening test use estimates. A previous change in the BRFSS questionnaire wording for breast cancer screening reduced the estimated prevalence of mammography use, and the magnitude of the effect varied according to race and level of education [57]. Fifth, due to small sample sizes, some territory-specific estimates included wide confidence intervals. Lastly, BRFSS data for the US Virgin Islands was only available for 2016. Despite these limitations, this is one of the first studies to assess breast, cervical, and colorectal cancer screening test use for the US Virgin Islands, Puerto Rico, and Guam. The analyses benefitted from the most recent survey year with cancer screening questions and a large, population-based sample for comparison.

5. Conclusion

In this study, cancer screening test use varied between the territories. These findings highlight the importance of investigating and understanding territory-specific barriers and facilitators to tailor interventions for improving screening use. These findings also demonstrate the importance of population-based surveillance of cancer screening. Continued surveillance is needed to monitor trends, understand disparities, and measure progress against national cancer screening targets. Future work could focus on examining cancer screening test use in other US territories and the US-Affiliated Pacific Islands, which also face significant health disparities and have limited financial and health resources. In this study, test receipt was found to be lower among groups without health care coverage and with lower income and education levels, indicating a possible need for targeted evidence-based efforts. Failure to enhance screening use in these communities may widen disparities. Finally, findings from this study can be used to understand the changes in cancer screening use over time, aiding in measuring progress.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgements:

This project was supported in part by an appointment (SVG) to the Research Participation Program at the Centers for Disease Control and Prevention administered by the Oak Ridge Institute for Science and Education through an

interagency agreement between the United States Department of Energy and the Centers for Disease Control and Prevention.

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

Funding:

M.A. Castaneda-Avila is supported by the National Cancer Institute's Prevention and Control of Cancer: Training for Change in Individuals and Systems (T32 CA172009).

Conflict of Interest:

Authors declare no conflicts of interest related to the content of this work.

Dr. Ortiz-Ortiz reported receiving grants from Abbvie Corp. and Merck Co. outside the submitted work.

Abbreviations:

BRFSS	Behavioral Risk Factor Surveillance System
USPSTF	United States Preventive Services Task Force

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Highlights:

- Cancer screening test use varied between the US territories.
- Breast cancer screening use was higher in Puerto Rico compared to the US states and other US territories.
- Cervical cancer screening use was comparable between the US states, Puerto Rico, and the US Virgin Islands and lower in Guam.
- Colorectal cancer screening use was lower in the US territories compared to the US states.
- Cancer screening test use was lower among adults without health care coverage in all jurisdictions.

Table 1.

Definitions of up-to-date cancer screening based on the United States Preventive Services Task Force recommendations.

Screening	Eligibility	Survey year(s)	Up-to-date definition[1]
Breast cancer	Women aged 50-74 years	2016, 2018, 2020	• Mammography within 2 years [7].
Cervical cancer	Women aged 21-65 years	2016, 2018	• Pap test within 3 years for women aged 21-65 years ***or*** • Combination of Pap test and HPV test within 5 years for women aged 30-65 years [18].
	Women aged 21-65 years	2020	• Pap test within 3 years for women aged 21-65 years ***or*** • Combination of Pap test and HPV test within 5 years for women aged 30-65 years ***or*** • HPV test within 5 years for women aged 30-65 years [8].
Colorectal cancer	Adults aged 50-75 years	2016	• Home blood stool test within 1 year ***or*** • Sigmoidoscopy within 5 years with a home blood stool test within 3 years ***or*** • Colonoscopy within 10 years [19].
	Adults aged 50-75 years	2018, 2020	• Home blood stool test within 1 year ***or*** • Sigmoidoscopy or CT colonography[2] within 5 years ***or*** • Colonoscopy within 10 years ***or*** • FIT-DNA test[2] within 3 years [9].

Abbreviations: CT: computed tomography; DNA: deoxyribonucleic acid; FIT: fecal immunochemical test; HPV, human papillomavirus.

Notes:

1. Behavioral Risk Factor Surveillance System survey questions on cancer screening for each survey year are provided in Appendix A.

2. Behavioral Risk Factor Surveillance System survey questions on CT colonography and FIT-DNA test use were asked only during the 2020 survey year.

Table 2.

Age-specific and age-standardized[a] percentage of women up-to-date[b] with breast cancer screening in the US Virgin Islands, Guam, Puerto Rico, and the 50 US states and the District of Columbia, by select characteristics—Behavioral Risk Factor Surveillance System, 2016-2020.

	US Virgin Islands[c]		Guam		Puerto Rico		US[d]	
	No.	**Weighted % (95% CI)**	**No.**	**Weighted % (95% CI)**	**No.**	**Weighted % (95% CI)**	**No.**	**Weighted % (95% CI)**
Overall	324	67.2 (60.6, 73.3)	968	74.8 (70.9, 78.3)	3,582	83.4 (81.7, 84.9)	271,112	78.3 (77.9, 78.6)
Survey year								
2016	324	67.2 (60.6, 73.3)	274	73.8 (67.0, 79.6)	1,442	83.4 (80.4, 86.1)	105,393	78.2 (77.6, 78.7)
2018	_[c]	_[c]	302	74.9 (67.9, 80.7)	1,099	83.2 (80.3, 85.7)	89,409	78.5 (77.9, 79.1)
2020	_[c]	_[c]	392	75.8 (68.7, 81.8)	1,041	83.5 (80.7, 86.0)	76,310	78.2 (77.4, 78.9)
Age group (years)								
50-59	110	63.4 (53.1, 72.6)	407	71.4 (65.7, 76.5)	1,352	80.7 (78.1, 83.1)	93,983	76.3 (75.7, 76.9)
60-69	159	74.1 (65.5, 81.3)	415	73.4 (64.3, 80.8)	1,555	85.3 (82.9, 87.3)	123,474	79.8 (79.3, 80.2)
70-74	55	72.1 (56.6, 83.7)	146	82.5 (74.5, 88.4)	675	86.1 (82.6, 89.0)	53,655	80.9 (80.2, 81.6)
Race/Ethnicity								
NH White	38	57.7 (39.3, 74.1)	83	82.5 (71.3, 90.0)	25	70.7 (50.1, 85.3)	213,206	77.5 (77.1, 77.8)
NH Black	226	69.5 (61.6, 76.4)	_[h]	_[h]	_[h]	_[h]	24,607	84.0 (82.9, 85.0)
NH Asian	_[h]	_[h]	318	67.8 (60.8, 74.2)	_[h]	_[h]	3,631	77.8 (74.1, 81.1)
NH NHPI	_[h]	_[h]	362	79.0 (73.5, 83.7)	_[h]	_[h]	840	77.4 (67.4, 85.0)
Hispanic	40	73.9 (55.0, 86.8)	74	77.9 (63.2, 87.9)	3,542	83.4 (81.8, 85.0)	15,584	79.9 (78.4, 81.4)
Education level								
Less than high school	40	59.1 (40.9, 75.0)	63	71.0 (58.0, 81.3)	664	80.8 (76.1, 84.8)	14,980	73.0 (71.4, 74.5)
High school graduate or GED	97	70.6 (59.5, 79.6)	310	73.3 (66.4, 79.3)	901	83.3 (80.1, 86.1)	68,392	76.2 (75.5, 76.8)
Some college	70	73.6 (61.1, 83.1)	303	71.0 (63.5, 77.5)	819	85.5 (82.7, 87.9)	78,408	78.0 (77.4, 78.6)
College graduate	112	74.2 (63.1, 82.9)	549	80.6 (75.0, 85.1)	1,195	84.1 (81.6, 86.3)	108,670	82.8 (82.2, 83.3)
Marital status								
Married or in a relationship	137	68.3 (58.5, 76.7)	580	76.8 (71.9, 81.1)	1,843	85.2 (82.9, 87.2)	158,936	80.6 (80.2, 81.1)
Previously married[e]	119	63.0 (52.3, 72.5)	310	73.1 (66.1, 79.2)	1,367	82.2 (79.6, 84.5)	89,931	74.3 (73.6, 74.9)

	US Virgin Islands[c]		Guam		Puerto Rico		US[d]	
	No.	Weighted % (95% CI)	No.	Weighted % (95% CI)	No.	Weighted % (95% CI)	No.	Weighted % (95% CI)
Never married	63	75.9 (61.8, 85.9)	77	54.5 (42.1, 66.4)	358	80.6 (75.4, 85.0)	20,327	75.5 (74.2, 76.7)
Income level [f]								
<$25,000	90	53.8 (42.1, 65.0)	260	66.1 (58.6, 72.9)	2,186	83.2 (81.0, 85.1)	53,793	71.4 (70.6, 72.2)
$25,000-$49,999	87	71.4 (58.6, 81.4)	237	79.4 (72.0, 85.2)	508	86.3 (82.2, 89.6)	53,993	76.1 (75.2, 77.0)
≥50,000	113	80.0 (70.1, 87.2)	382	84.6 (78.4, 89.3)	214	80.8 (73.6, 86.4)	115,667	82.8 (82.2, 83.3)
Health care coverage [g]								
Yes	292	74.1 (67.0, 80.2)	900	78.8 (75.0, 82.3)	3,508	84.2 (82.6, 85.7)	262,579	80.0 (79.6, 80.4)
No	31	45.1 (30.5, 60.5)	66	41.8 (30.9, 53.6)	72	57.8 (44.7, 69.9)	8,003	55.4 (52.7, 58.1)
Smoking status								
Current smoker	_[h]	_[h]	129	74.7 (65.3, 82.3)	185	68.7 (60.4, 75.9)	30,817	65.2 (64.2, 66.2)
Former smoker	32	50.2 (30.2, 70.2)	165	74.4 (64.7, 82.2)	560	84.5 (80.4, 87.9)	77,455	78.8 (78.2, 79.5)
Never smoker	282	69.8 (62.8, 76.0)	671	74.7 (69.9, 79.0)	2,831	84.8 (83.0, 86.4)	161,225	81.3 (80.8, 81.7)

Abbreviation: CI, confidence interval; GED, General Educational Development; NH, non-Hispanic; NHPI, Native Hawaiian and Pacific Islander.

Notes:

[a.] Age-standardized to the 2000 US standard population using the direct method.

[b.] For all survey years, up-to-date screening was defined as receiving mammography within 2 years among women aged 50-74 years.

[c.] Data only available for the 2016 survey year for the US Virgin Islands.

[d.] 50 US states and the District of Columbia.

[e.] Previously married includes divorced, widowed, and separated.

[f.] Annual household income from all sources.

[g.] Health care coverage includes health insurance, prepaid plans such as HMOs, or government plans such as Medicare.

[h.] Estimate not reported as the relative standard error was greater than 30%.

Table 3.

Age-specific and age-standardized[a] percentage of women up-to-date[b] with cervical cancer screening in the US Virgin Islands, Guam, Puerto Rico, and the 50 US states, and the District of Columbia, by select characteristics—Behavioral Risk Factor Surveillance System, 2016-2020.

	US Virgin Islands[c]		Guam		Puerto Rico		US[d]	
	No.	Weighted % (95% CI)	No.	Weighted % (95% CI)	No.	Weighted % (95% CI)	No.	Weighted % (95% CI)
Overall	304	81.3 (74.6, 86.5)	1,417	71.1 (67.6, 74.3)	4,337	83.0 (81.7, 84.3)	259,568	84.5 (84.3, 84.8)
Survey year								
2016	304	81.3 (74.6, 86.5)	436	69.5 (63.6, 74.8)	1,469	82.3 (79.8, 84.6)	86,873	84.7 (84.2, 85.1)
2018	_[c]	_[c]	423	72.1 (66.0, 77.5)	1,396	83.0 (80.7, 85.1)	91,728	85.4 (84.9, 85.8)
2020	_[c]	_[c]	558	71.7 (65.8, 76.9)	1,472	83.8 (81.7, 85.8)	80,967	83.6 (83.0, 84.1)
Age group (years)								
21-29	29	64.6 (45.7, 79.9)	197	65.6 (57.9, 72.5)	705	67.1 (63.4, 70.6)	35,761	71.9 (71.1, 72.7)
30-39	55	95.6 (86.5, 98.7)	340	78.0 (72.0, 83.1)	1,075	89.6 (87.3, 91.6)	57,851	90.0 (89.5, 90.4)
40-49	59	82.2 (61.9, 93.0)	341	68.3 (59.9, 75.7)	1,036	87.2 (84.4, 89.6)	56,415	88.4 (87.8, 88.9)
50-59	89	78.8 (67.7, 86.9)	343	73.9 (67.0, 79.8)	952	85.2 (82.3, 87.7)	66,214	86.0 (85.4, 86.5)
60-65	72	79.2 (67.0, 87.6)	196	64.8 (52.0, 75.8)	569	82.3 (78.1, 85.8)	43,327	82.5 (81.7, 83.3)
Race/Ethnicity								
NH White	31	91.4 (81.1, 96.4)	124	84.6 (75.5, 90.7)	32	95.7 (85.1, 98.9)	181,457	85.7 (85.4, 86.0)
NH Black	201	83.2 (76.8, 88.1)	_[h]	_[h]	_[h]	_[h]	25,069	87.4 (86.6, 88.1)
NH Asian	_[h]	_[h]	446	70.2 (65.1, 74.9)	_[h]	_[h]	6,268	74.4 (72.5, 76.1)
NH NHPI	_[h]	_[h]	543	70.0 (64.4, 75.1)	_[h]	_[h]	1,407	78.0 (73.7, 81.8)
Hispanic	45	75.3 (57.6, 87.2)	87	76.8 (68.0, 83.7)	4,280	83.0 (81.6, 84.3)	29,895	83.6 (82.7, 84.4)
Education level								
Less than high school	36	77.8 (56.4, 90.4)	77	58.3 (47.4, 68.5)	326	75.9 (69.5, 81.4)	14,179	78.1 (76.8, 79.3)
High school graduate or GED	87	73.8 (62.5, 82.7)	411	68.4 (63.1, 73.2)	899	82.4 (79.4, 85.0)	52,797	80.6 (79.9, 81.3)
Some college	68	93.1 (82.9, 97.4)	340	75.8 (70.4, 80.4)	1,205	82.3 (79.9, 84.5)	71,464	84.8 (84.3, 85.3)
College graduate	109	84.3 (75.1, 90.5)	587	81.0 (77.0, 84.5)	1,902	86.3 (84.5, 87.8)	120,623	89.0 (88.6, 89.3)
Marital status								

	US Virgin Islands[c]		Guam		Puerto Rico		US[d]	
	No.	Weighted % (95% CI)	No.	Weighted % (95% CI)	No.	Weighted % (95% CI)	No.	Weighted % (95% CI)
Married or in a relationship	139	90.7 (85.2, 94.3)	916	79.1 (75.2, 82.6)	2,333	87.0 (85.1, 88.6)	159,810	87.7 (87.4, 88.1)
Previously married[e]	73	85.9 (68.6, 94.4)	227	66.2 (55.4, 75.6)	950	83.4 (79.6, 86.7)	50,586	84.2 (83.2, 85.0)
Never married	89	73.9 (59.1, 84.8)	272	56.1 (48.7, 63.3)	1,029	75.1 (71.8, 78.2)	47,658	79.7 (79.0, 80.4)
Income level [f]								
<$25,000	103	81.6 (72.9, 87.9)	370	61.9 (55.3, 68.0)	2,564	81.6 (79.7, 83.3)	51,473	79.1 (78.4, 79.8)
$25,000-$49,999	79	80.1 (69.2, 87.8)	352	74.2 (67.6, 79.9)	719	88.0 (85.2, 90.4)	47,711	83.3 (82.6, 84.0)
≥$50,000	95	87.8 (71.5, 95.3)	583	84.1 (80.0, 87.5)	401	92.4 (88.1, 95.2)	127,946	89.0 (88.6, 89.4)
Health care coverage [g]								
Yes	253	83.8 (75.7, 89.5)	1,261	76.4 (72.8, 79.7)	4,135	83.7 (82.3, 84.9)	238,146	86.5 (86.3, 86.8)
No	51	73.9 (60.6, 83.9)	155	47.7 (39.4, 56.1)	199	72.0 (65.2, 77.9)	20,893	71.0 (69.8, 72.1)
Smoking status								
Current smoker	_[h]	_[h]	217	65.4 (56.2, 73.6)	333	76.1 (69.2, 81.8)	37,374	80.4 (79.7, 81.1)
Former smoker	25	96.1 (85.8, 99.0)	238	85.4 (79.3, 89.9)	485	87.1 (82.8, 90.5)	52,443	87.7 (87.0, 88.3)
Never smoker	270	83.0 (77.5, 87.4)	961	68.8 (64.6, 72.7)	3,514	83.6 (82.2, 84.9)	168,612	84.9 (84.5, 85.3)

Abbreviation: CI, confidence interval; GED, General Educational Development; NH, non-Hispanic; NHPI, Native Hawaiian and Pacific Islander.

Notes:

[a] Age-standardized to the 2000 US standard population using the direct method.

[b] For the 2016 and 2018 survey years, up-to-date screening was defined as receiving a Pap test within 3 years for women aged 21-65 years or a combination of Pap test and human papillomavirus (HPV) test within 5 years for women aged 30-65 years. For the 2020 survey year, the definition was updated to include an HPV test within 5 years for women aged 30-65 years.

[c] Data only available for the 2016 survey year for the US Virgin Islands.

[d] 50 US states and the District of Columbia.

[e] Previously married includes divorced, widowed, and separated.

[f] Annual household income from all sources.

[g] Health care coverage includes health insurance, prepaid plans such as HMOs, or government plans such as Medicare.

[h] Estimate not reported as the relative standard error was greater than 30%.

Table 4.

Age-specific and age-standardized[a] percentage of adults up-to-date[b] with colorectal cancer screening in the US Virgin Islands, Guam, Puerto Rico, and the 50 US states and the District of Columbia, by select characteristics—Behavioral Risk Factor Surveillance System, 2016-2020.

	US Virgin Islands[c]		Guam		Puerto Rico		US[d]	
	No.	Weighted % (95% CI)	No.	Weighted % (95% CI)	No.	Weighted % (95% CI)	No.	Weighted % (95% CI)
Overall	365	45.2 (40.0, 50.5)	1,228	47.3 (43.6, 51.0)	4,546	61.2 (59.5, 62.8)	445,974	69.0 (68.7, 69.3)
Survey year								
2016	365	45.2 (40.0, 50.5)	314	43.8 (37.8, 50.0)	1,693	56.5 (53.9, 59.1)	164,245	67.0 (66.6, 67.4)
2018	_[c]	_[c]	348	42.9 (37.3, 48.7)	1,272	55.6 (52.9, 58.2)	149,601	68.6 (68.1, 69.0)
2020	_[c]	_[c]	566	55.9 (49.6, 62.1)	1,581	71.8 (68.5, 74.9)	132,128	71.4 (70.8, 71.9)
Age group (years)								
50-59	101	38.7 (30.6, 47.5)	451	40.3 (36.1, 44.6)	1,478	51.1 (48.7, 53.5)	134,290	59.3 (58.8, 59.8)
60-69	164	45.4 (38.1, 53.0)	569	53.4 (47.2, 59.6)	1,985	67.1 (64.4, 69.7)	204,005	75.8 (75.3, 76.1)
70-75	100	63.5 (51.1, 74.4)	208	51.4 (40.9, 61.7)	1,083	77.2 (73.8, 80.3)	107,679	82.7 (82.1, 83.2)
Sex								
Male	128	44.3 (35.7, 53.3)	542	50.4 (45.0, 55.8)	1,708	60.4 (57.7, 63.1)	192,142	67.5 (67.1, 68.0)
Female	237	45.9 (39.6, 52.3)	686	44.1 (39.6, 48.8)	2,838	61.8 (59.8, 63.7)	253,580	70.3 (69.9, 70.7)
Race/Ethnicity								
NH White	65	53.7 (40.2, 66.6)	171	65.3 (55.9, 73.7)	29	45.8 (31.0, 61.4)	362,276	71.0 (70.7, 71.3)
NH Black	234	46.6 (39.9, 53.3)	_[h]	_[h]	_[h]	_[h]	33,850	70.5 (69.6, 71.5)
NH Asian	_[h]	_[h]	362	42.8 (37.4, 48.4)	_[h]	_[h]	5,874	63.9 (61.3, 66.5)
NH NHPI	_[h]	_[h]	409	43.9 (37.6, 50.3)	_[h]	_[h]	1,130	63.7 (57.3, 69.7)
Hispanic	40	37.1 (24.1, 52.3)	115	60.2 (49.6, 70.0)	4,501	61.3 (59.6, 62.9)	20,950	59.2 (57.8, 60.5)
Education level								
Less than high school	49	27.8 (18.9, 38.8)	63	37.9 (28.0, 48.9)	825	55.6 (51.7, 59.4)	22,581	56.0 (54.8, 57.1)
High school graduate or GED	100	46.2 (36.8, 55.9)	310	41.0 (35.7, 46.5)	1,132	58.6 (55.3, 61.9)	110,626	65.8 (65.3, 66.3)
Some college	79	62.2 (50.3, 72.7)	303	51.1 (45.1, 57.0)	1,035	63.6 (60.4, 66.7)	124,756	70.9 (70.4, 71.4)
College graduate	130	54.9 (46.8, 62.8)	549	60.3 (54.7, 65.0)	1,549	68.2 (65.7, 70.5)	187,208	75.5 (75.1, 76.0)

	US Virgin Islands[c]		Guam		Puerto Rico		US[d]	
	No.	Weighted % (95% CI)	No.	Weighted % (95% CI)	No.	Weighted % (95% CI)	No.	Weighted % (95% CI)
Marital status								
Married or in a relationship	180	47.0 (39.6, 54.6)	804	52.0 (47.9, 56.2)	2,642	64.0 (62.0, 66.0)	281,956	72.0 (71.6, 72.3)
Previously married[e]	123	42.8 (34.0, 52.1)	318	39.6 (33.4, 46.1)	1,472	59.0 (56.2, 61.8)	128,779	64.3 (63.8, 64.9)
Never married	61	47.4 (34.7, 60.5)	104	51.5 (43.6, 59.3)	416	55.7 (50.2, 61.1)	33,302	61.5 (60.5, 62.5)
Income level [f]								
<$25,000	95	33.6 (25.7, 42.7)	248	32.8 (27.3, 38.9)	2,611	58.3 (56.1, 60.4)	80,485	60.2 (59.5, 60.8)
$25,000-$49,999	103	53.4 (42.5, 63.9)	287	53.1 (45.3, 60.9)	727	66.0 (62.3, 69.6)	88,488	65.4 (64.7, 66.2)
≥$50,000	138	54.8 (46.3, 63.2)	603	62.1 (57.1, 66.8)	393	69.9 (64.7, 74.6)	211,909	74.9 (74.5, 75.2)
Health care coverage [g]								
Yes	337	50.4 (44.4, 56.4)	1,147	50.8 (46.9, 54.6)	4,455	62.6 (60.9, 64.3)	433,164	71.3 (71.0, 71.6)
No	27	25.1 (14.6, 39.5)	80	25.4 (17.6, 35.0)	90	31.2 (24.3, 39.0)	12,099	40.8 (39.2, 42.4)
Smoking status								
Current smoker	_[h]	_[h]	185	37.9 (29.5, 47.2)	309	47.3 (40.6, 54.1)	52,051	58.2 (57.5, 59.0)
Former smoker	59	48.3 (33.6, 63.3)	331	53.4 (46.1, 60.6)	1,068	64.1 (60.7, 67.5)	150,401	71.9 (71.4, 72.5)
Never smoker	285	46.1 (40.2, 52.2)	708	48.5 (43.8, 53.3)	3,158	62.3 (60.4, 64.1)	241,060	70.5 (70.1, 70.9)

Abbreviation: CI, confidence interval; GED, General Educational Development; NH, non-Hispanic; NHPI, Native Hawaiian and Pacific Islander.

Notes:

[a] Age-standardized to the 2000 US standard population using the direct method.

[b] For the 2016 survey year, up-to-date screening was defined as having a home blood stool test within 1 year, colonoscopy within 10 years, or sigmoidoscopy within 5 years with a home blood stool test within 3 years among adults aged 50-75 years. For the 2018 and 2020 survey years, up-to-date screening was defined as having a home blood stool test within 1 year, sigmoidoscopy or computed tomography colonography within 5 years, colonoscopy within 10 years, or fecal immunochemical test-DNA test within 3 years among adults aged 50-75 years.

[c] Data only available for the 2016 survey year for the US Virgin Islands.

[d] 50 US states and the District of Columbia.

[e] Previously married includes divorced, widowed, and separated.

[f] Annual household income from all sources.

[g] Health care coverage includes health insurance, prepaid plans such as HMOs, or government plans such as Medicare.

[h] Estimate not reported as the relative standard error was greater than 30%.