Cervical Cancer Geographic Disparities in Screening Age New Jersey Women

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BACKGROUND

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Invasive cervical cancer is the third most common of the five gynecologic cancers in the United States (U.S.), behind uterine and ovarian cancers, and is preventable through screening and vaccination. Cervical cancer mortality rates as well as invasive incidence rates have gone down by more than 50% over the last 40 years due to increased screening.[1] In recent years, however, rates have plateaued.[1]

The mean age-adjusted invasive cervical cancer incidence rate was 7.4 cases per 100,000 women per year, and the mean age-adjusted mortality rate was 2.3 deaths per 100,000 women per year from 2010-2014 in the U.S.[2] The New Jersey rates for the same time period were very similar, 7.6 cases per 100,000 women per year and 2.2 deaths per 100,000 women per year, respectively. The five-year relative survival rate for invasive cervical cancer in the U.S. is 69% for White women and 57% for Black women.[1] Invasive cervical cancer is most frequently diagnosed in women aged 35-44 years.[2]

Racial, ethnic, and socioeconomic disparities exist in cervical cancer incidence in the U.S. and New Jersey. Black women and Hispanic women have the highest incidence rates compared to other racial/ethnic groups.[2] Research by Roche et al. identified three geographic areas of New Jersey with significantly elevated invasive cervical cancer incidence rates.[3] The three areas, mostly concentrated around Newark, Trenton, and Camden, have higher proportions of minorities and those with low socioeconomic status.[3] Invasive cervical cancer cases in some or all of these areas were significantly more likely to be Black, Hispanic, unmarried, and uninsured or Medicaid-insured than cases in the rest of New Jersey.[3]

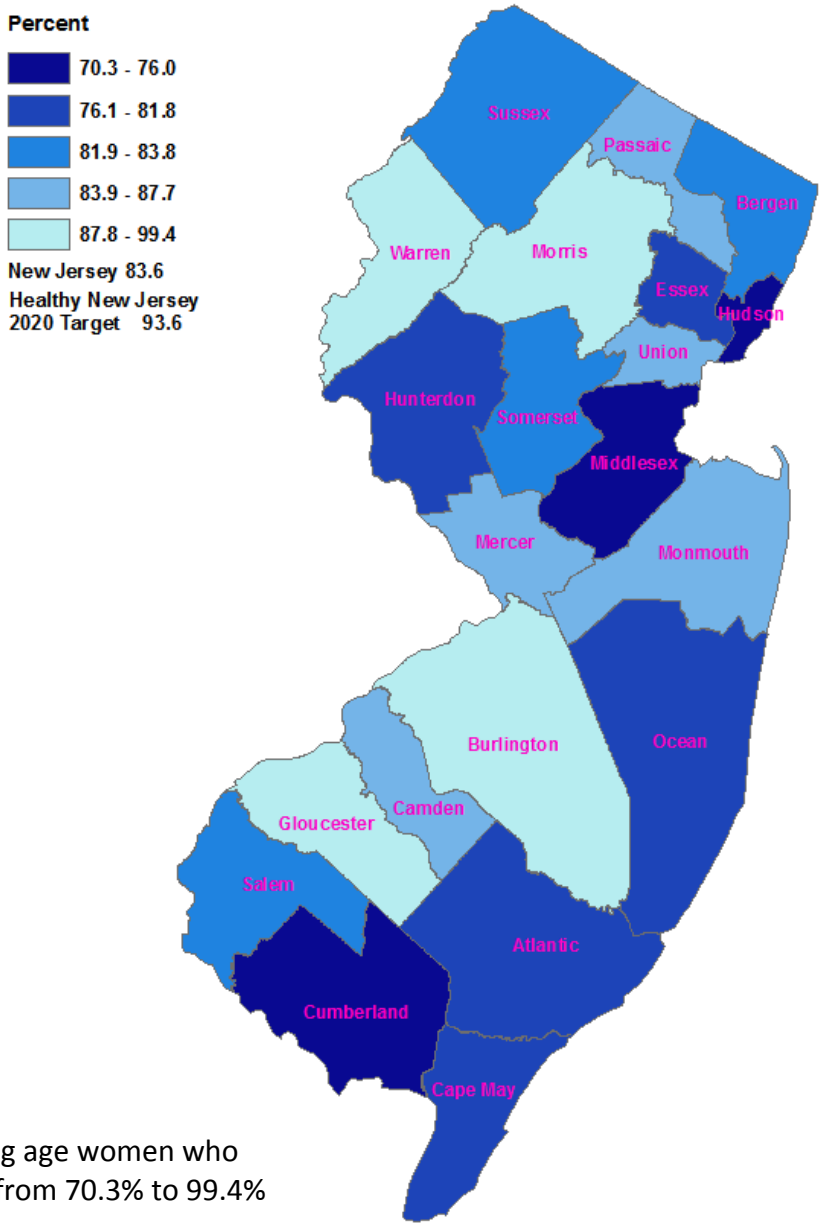
The Papanicolaou (Pap) screening test can detect and remove precancerous lesions in the cervix and detect early stage non-invasive cervical cancer, for which treatment is most successful.[1] Most cervical cancers are caused by infection with certain types of the human papillomavirus (HPV). HPV vaccines protect against the most common forms of HPV that cause cervical cancer, however, HPV vaccination rates are low in the U.S.[1] In 2014, the estimated ≥3-dose HPV vaccination coverage among adolescent girls in the U.S. overall was 39.7%, while in New Jersey in 2014, the ≥3-dose coverage was estimated to be 34.5%.[4]

The American Cancer Society (ACS) recommends cervical cancer screening for women aged 21-65 years.[1] For women aged 21-29 years, a Pap test should be performed every 3 years.[1] Starting at age 30 years, both an HPV test and a Pap test (co-testing) can be performed every 5 years, or a Pap test alone can be done every 3 years.[1] The ACS recommends that women over age 65 years who have had negative screenings over the past ten years and those who have had a total hysterectomy should stop screening.[1]

This report characterizes invasive cervical cancer screening and diagnosis by New Jersey county using data from the New Jersey State Cancer Registry (NJSCR) and the New Jersey Behavioral Risk Factor Survey.

Cervical Cancer Screening in New Jersey Screening Age Women by County

State/County	Percent
New Jersey	83.6
Atlantic	80.4
Bergen	83.8
Burlington	95.8
Camden	85.4
Cape May	81.7
Cumberland	70.3
Essex	81.8
Gloucester	91.6
Hudson	76.0
Hunterdon	80.2
Mercer	87.4
Middlesex	76.0
Monmouth	87.6
Morris	92.7
Ocean	80.4
Passaic	87.7
Salem	83.2
Somerset	83.4
Sussex	83.5
Union	85.7
Warren	99.4

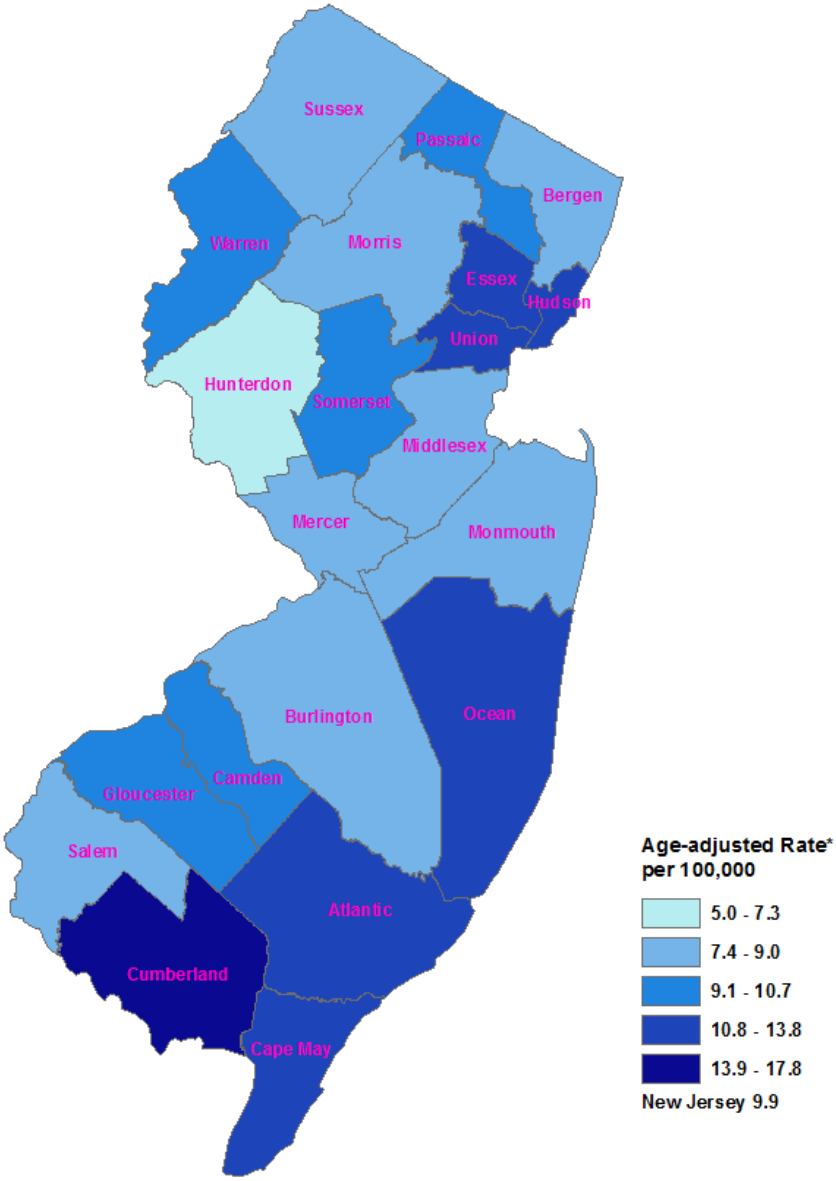


- The percentage of New Jersey screening age women who reported having had a Pap test ranged from 70.3% to 99.4% with a mean of 83.6%.
- Women in Atlantic, Cape May, Cumberland, Essex, Hudson, Hunterdon, Middlesex, and Ocean counties had the lowest percentages of Pap screenings (70.3% - 81.8%), which were below the mean for all New Jersey women. Six of these counties (all except Hunterdon and Middlesex counties) with lower screening rates also had higher rates of newly diagnosed cervical cancer (10.8 - 17.8 per 100,000 women).
- Women in Burlington, Gloucester, Morris, and Warren counties reported the highest percentages of Pap screenings (87.8% - 99.4%).
- Only two counties, Burlington and Warren, met the Healthy New Jersey (HNJ) 2020 target with 95.8% and 99.4 % of women reported having had a Pap test, respectively.[5]

Screening data are from 2011-2014 New Jersey Behavioral Risk Factor Survey presented as percentages of women aged 21-65 who reported having had a Pap test in the past 3 years.

Newly Diagnosed Cervical Cancer in New Jersey Screening Age Women

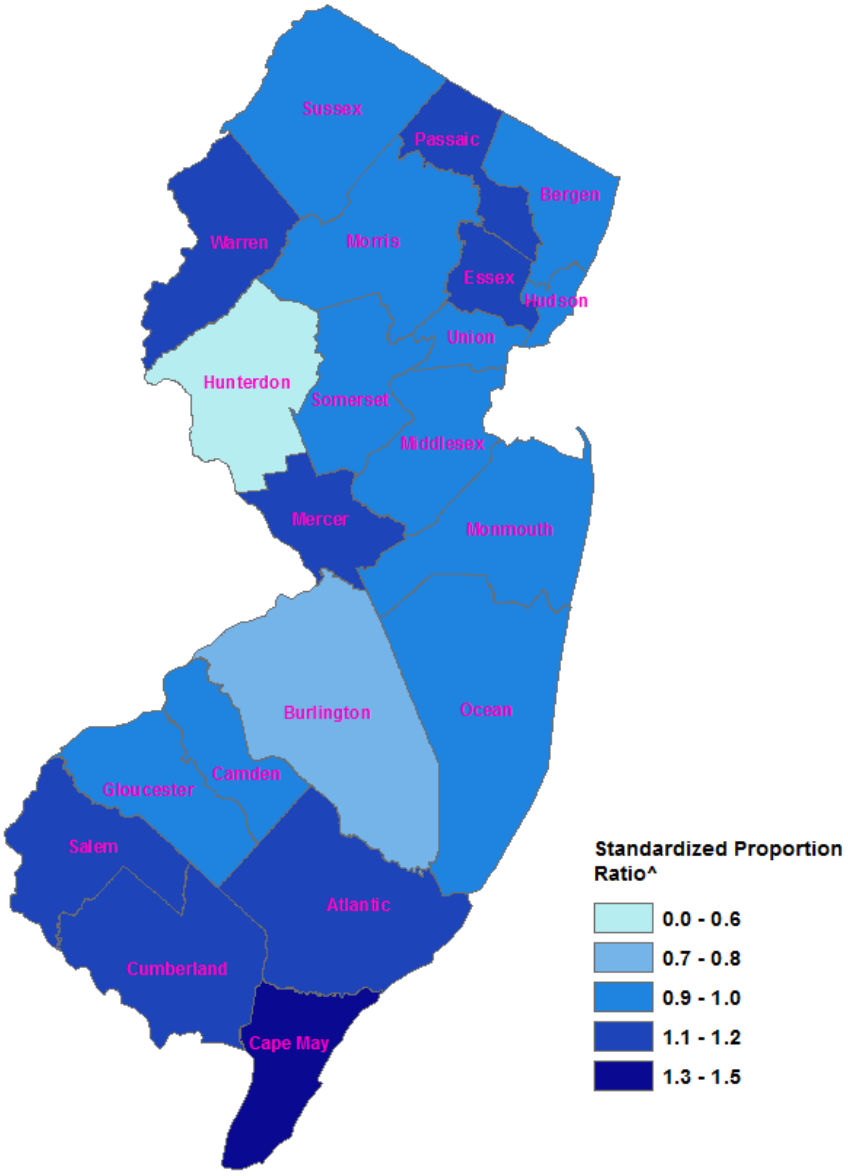
State/County	Age-adjusted Rate*	Count
New Jersey	9.9	1,121
Atlantic	13.8	49
Bergen	9.0	105
Burlington	8.4	45
Camden	10.5	69
Cape May	11.5	10
Cumberland	17.8	31
Essex	12.3	127
Gloucester	9.5	34
Hudson	11.5	96
Hunterdon	5.0	10
Mercer	8.2	38
Middlesex	7.4	78
Monmouth	8.3	73
Morris	7.7	49
Ocean	12.7	83
Passaic	10.5	65
Salem	8.8	6
Somerset	9.5	40
Sussex	7.6	17
Union	11.3	81
Warren	10.7	15



- Women had rates of newly diagnosed cervical cancer ranging from 5.0 to 17.8 per 100,000.
- Hunterdon county had the lowest rate of new cervical cancer (5.0 per 100,000).
- Cumberland county had the highest rate of new cervical cancer (17.8 per 100,000).
- Essex, Hudson, and Union counties had higher rates of newly diagnosed cervical cancer than other counties in northern New Jersey.
- Atlantic, Cape May, Cumberland, and Ocean counties had higher rates of new cervical cancer compared to other counties in southern New Jersey.

*Rates are per 100,000 and age-adjusted to the 2000 U.S. population standard.
Incidence data are from the New Jersey State Cancer Registry and include invasive cervical cancer cases from 2011-2014 in women aged 20-64 years.

Late Stage Cervical Cancer Diagnosis Among New Jersey Screening Age Women



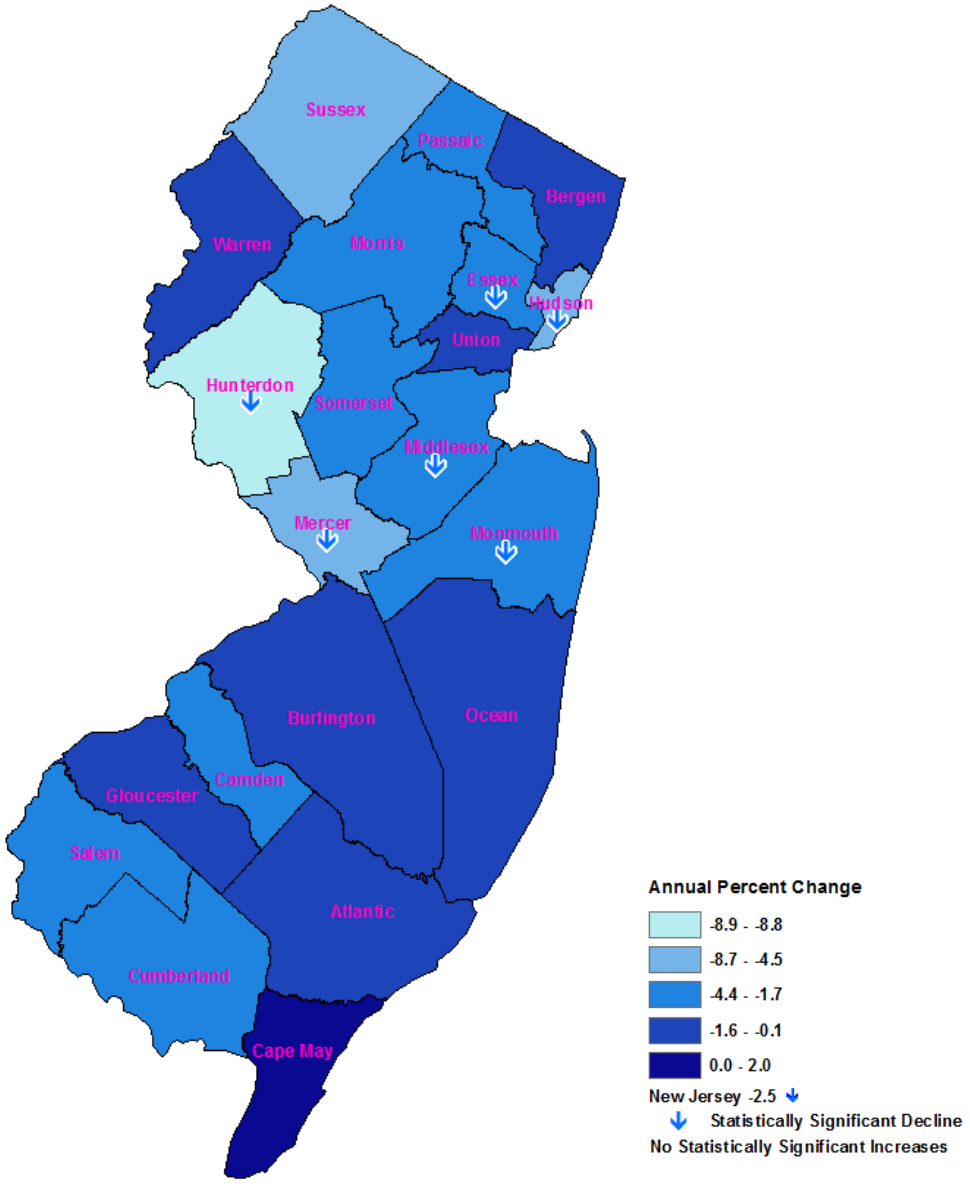
County	SPR
Atlantic	1.1
Bergen	0.9
Burlington	0.7
Camden	1.0
Cape May	1.5
Cumberland	1.1
Essex	1.1
Gloucester	1.0
Hudson	1.0
Hunterdon	0.6
Mercer	1.2
Middlesex	1.0
Monmouth	0.9
Morris	1.0
Ocean	1.0
Passaic	1.2
Salem	1.1
Somerset	0.9
Sussex	0.9
Union	1.0
Warren	1.1

- Counties with a Standardized Proportion Ratio (SPR) less than 1.0 had a lower proportion of invasive cervical cancer cases diagnosed in the later stages compared to the statewide proportion.
- Cape May county had the highest proportion of cervical cancer cases that were diagnosed in the later stages (SPR = 1.5 or 50% higher than the state overall), followed by Atlantic, Cumberland, Essex, Mercer, Passaic, Salem, and Warren counties.
- Hunterdon county had the lowest proportion of cervical cancer cases diagnosed in later stages (SPR = 0.6 or 40% lower than the statewide proportion).

^Standardized proportion ratio of late stage cervical cancer cases in each county compared to New Jersey. SPRs can be interpreted as the percentage above or below the reference population's SPR of 1 or 100%. A SPR of 1.5 represents 50% higher than the New Jersey SPR, while a 0.6 SPR represents 40% lower than the New Jersey SPR.
Late stage includes regional and distant stages. The total number of cases includes local, regional, and distant stages.
Incidence data are from the New Jersey State Cancer Registry and include invasive cervical cancer cases from 2011-2014 in women aged 20-64 years.

Changes Over 15 Years of Newly Diagnosed Cervical Cancer in New Jersey Screening Age Women

State/County	APC^
New Jersey	-2.5↓
Atlantic	-0.7
Bergen	-0.1
Burlington	-0.7
Camden	-2.0
Cape May	2.0
Cumberland	-1.7
Essex	-3.3↓
Gloucester	-0.6
Hudson	-4.9↓
Hunterdon	-8.9↓
Mercer	-5.6↓
Middlesex	-3.4↓
Monmouth	-3.2↓
Morris	-2.7
Ocean	-0.4
Passaic	-2.6
Salem	-2.6
Somerset	-2.8
Sussex	-4.5
Union	-1.1
Warren	-0.9



- Over time, rates of newly diagnosed cervical cancer deceased significantly in women.
- Among counties that showed a statistically significant decline in rates of new cervical cancer, Hunterdon county had the most pronounced (APC = -8.9).
- Rates of newly diagnosed cervical cancer declined significantly in Essex, Hudson, Hunterdon, Mercer, Middlesex, and Monmouth counties.

^ APC: Annual Percent Change
↓ Statistically significant decline
Incidence data are from the New Jersey State Cancer Registry and include invasive cervical cancer cases from 2000-2014 in women aged 20-64 years.

DISCUSSION

Cervical Cancer Geographic Disparities in Screening Age New Jersey Women

Cervical cancer screening and invasive cervical cancer incidence rates varied across New Jersey counties. In 2014, 83.6% of New Jersey women aged 21-65 years reported having had a Pap test in the past 3 years.[6] Analysis of county-level data showed that northeastern and southern New Jersey counties had lower screening and higher invasive cervical cancer rates. From 2011-2014, Atlantic, Cape May, Cumberland, and Essex counties showed higher standardized proportion ratios of late stage cervical cancer cases among screening age women and lower cervical cancer screening, indicating opportunities for education and implementation of cancer control programs. Efforts are needed statewide to increase the percentage of New Jersey women aged 21-65 receiving Pap tests to meet the HNJ 2020 target of 93.6%.

From 2000-2014, invasive cervical cancer incidence in screening age women (aged 20-64 years) declined significantly ($p<0.05$) in New Jersey and in six of the 21 counties. However, more efforts are necessary to realize a decrease in the invasive cervical cancer incidence for women of all ages from the 8.1 per 100,000 in 2010 to the HNJ 2020 target of 7.2 per 100,000. Because HPV infection causes the majority of cervical cancers, efforts to increase HPV vaccination coverage could further progress toward this goal. Although HPV vaccination coverage has been increasing in New Jersey, over half of adolescent girls had not received ≥3 HPV vaccine-doses in 2015.[4] In the U.S., HPV vaccine coverage is low in White adolescents and adolescents living above the federal poverty line.[4] Targeting these groups may be most effective in increasing HPV vaccination rates. HPV testing can also help identify those at greater risk of cervical cancer so they can receive the appropriate screening tests. The New Jersey Cancer Education and Early Detection (NJCEED) program has helped many women without healthcare gain access to screenings like HPV testing, however, one study found in a group of uninsured or underinsured NJCEED users, about 70% had still never received an HPV test.[7] The study also found that NJCEED users in southern New Jersey counties typically reported lower rates of HPV test utilization than NJCEED users in northern New Jersey counties despite having higher incidence of invasive cervical cancer.[7] This disparity highlights the work that still needs to be done to further decrease cervical cancer incidence. This report is the first step in illustrating geographic disparities in cervical cancer screening and invasive cervical cancer incidence. Future efforts should include analysis of HPV vaccine uptake, follow-up rates after a positive HPV or abnormal Pap screening, and racial/ethnic disparities in cervical cancer incidence.

In conclusion, education and outreach about cervical cancer screening and timely follow-up is recommended because cervical cancer is preventable. These efforts will raise awareness of the importance of regular screening and follow-up, and to address barriers to screening. Timely follow-up after screening is very important as early stage cervical cancer is more successfully treated than cervical cancer diagnosed at later stages. Women should speak with their health-care provider about cervical cancer screening. Guidelines for cervical cancer screening can be found on the American Cancer Society website https://www.cancer.org/healthy/find-cancer-early/cancer-screening-guidelines/american-cancer-society-guidelines-for-the-early-detection-of-cancer.html. The New Jersey Cancer Education and Early Detection Program provides screening services for uninsured and underinsured; for information, visit http://www.nj.gov/health/ces/public/resources/njceed.shtml. The Office of Cancer Control and Prevention coordinates comprehensive cancer control efforts in New Jersey. To find cancer resources in your community, visit http://www.nj.gov/health/ces/public/resources/occp.shtml.

Data Sources

New Jersey incidence data for this report were derived from the NJSCR December 2016 file. This report includes malignant cervical cancer cases from 2000-2014 in women aged 20-64 years. The NJSCR does not collect cervical cancer *in situ* diagnosed after 1994. Cervical cancer is defined by the topography codes for cervix uteri (C530-C539) and histology codes excluding (9050-9055, 9140, 9590-9992) as detailed in the International Classification of Diseases for Oncology (ICD-O) third edition.

Screening data were obtained from the New Jersey Behavioral Risk Factor Survey, New Jersey Department of Health, Center for Health Statistics, New Jersey State Health Assessment Data. Data were accessed at http://nj.gov/health/shad_on_03/31/2017. The estimated percentages have been produced by weighting the sample so that the results better represent the New Jersey population and to adjust for the probability of selection.

Software

Data analyses were conducted using SEER*Stat version 8.3.4 and ESRI ArcMap version 10.4.1.

Methods

In this report, rates are per 100,000 and age-adjusted to the 2000 U.S. population standard. The annual percent change is significant at $p<0.05$. Standardized proportion ratios represent the proportion of late stage (regional and distant) cervical cancer cases in each county compared to New Jersey. The total number of cases includes local, regional, and distant stages.

The NJSCR Data Guidelines containing comprehensive data analysis methods, race and ethnicity classification, population and mortality data sources, and additional information related to NJSCR data can be found at https://nj.gov/health/ces/reports.shtml.

Data were collected by the New Jersey State Cancer Registry under contract HHSN 261201300021I and control No. N01PC-2013-00021 from the Surveillance, Epidemiology, and End Results Program of the National Cancer Institute, and under cooperative agreement 5U58DP003931-02 from the National Program of Cancer Registries, Centers for Disease Control and Prevention, in addition to funding from the State of New Jersey, and the Rutgers Cancer Institute.

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