

Invasive Cervical Cancer

Definition: Invasive cancer of the uterine cervix is characterized by the uncontrolled growth of cells in the cervix. The Washington State Cancer Registry does not collect information on noninvasive (*in situ*) cancers and precursor stages to cervical cancer. Invasive cervical cancer is coded using ICD-O-3 codes C53.0-C53.9 with behavior code 3 (malignant). For 1992-2009, histology codes 9140, and 9590-9989 are excluded. Beginning in 2010, histology codes 9990-9992 are also excluded. The additional exclusions do not substantively affect incidence rates. Cervical cancer deaths are coded to ICD-9 codes 180.0-180.9 for 1992-1998 and ICD-10 codes C54 for 1999-2011.

Summary

In Washington State in 2010, 247 women were diagnosed with invasive cervical cancer (age-adjusted incidence rate: 7 per 100,000 women). Precursors to cervical cancer and noninvasive cancers (*in situ*), which are not reported in Washington, occur much more frequently and some can develop into invasive cervical cancers if not diagnosed and treated. In 2011, 76 Washington women died from invasive cervical cancer (age-adjusted death rate: 2 per 100,000 women).

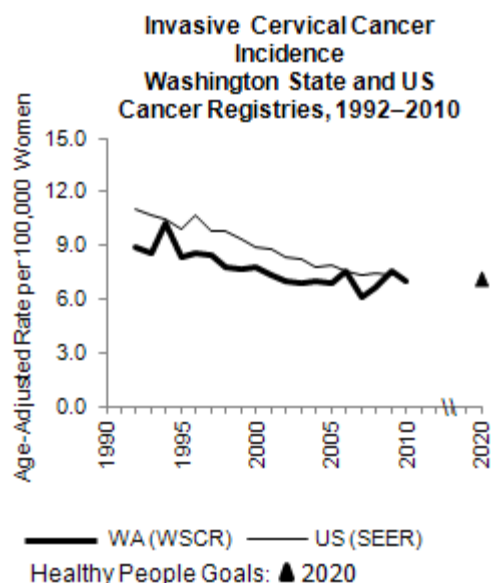
Prolonged infection with certain types of the human papillomavirus (HPV) is the primary risk factor for cervical cancer. The federal Food and Drug Administration in 2006 approved a vaccine for HPV designed to protect against certain HPV types, which are responsible for an estimated 70% of cervical cancers. The vaccine also protects against anal, mouth, throat and other genital cancers caused by HPV.

Thus immunization and regular screening to detect precancerous changes to the cervix are the best methods of preventing cervical cancer.

Time Trends

In 2010, 247 Washington women were diagnosed with invasive cervical cancer, an [age-adjusted](#) incidence rate of 7 per 100,000 women. Age-adjusted invasive cervical cancer incidence rates have been moderately declining since 1992, the earliest year of available data in Washington. National data show a similar pattern from 1992 to 2009. Washington's incidence rates during this time period were lower than the national rates for all years, except 2006 and 2009. These declines in incidence are

due to the widespread use of the cervical-vaginal smear (Papanicolaou or Pap test). The Pap test detects precancerous conditions that can be treated to prevent invasive cervical cancer.



2010 and 2020 Goals

The national *Healthy People 2010* goal was to reduce the cervical cancer death rate to 2 deaths per 100,000 women (age-adjusted to the U.S. 2000 population). Washington met or exceeded this goal for most years from 1999-2010. In 2010 the rate was 1.6 per 100,000.

The *Healthy People 2020* goal for reducing cervical cancer death rates has been increased to 2.2 deaths per 100,000 women. Washington has exceeded this goal at 2 deaths per 100,000 women in 2011.

Healthy People 2020 added a goal for reducing the incidence of invasive cervical cancer in women to an age-adjusted rate of 7.1 new cases per 100,000

women. Washington has already met this goal with our age-adjusted rate of 7.0 new cases per 100,000 women in 2010.

The *Healthy People 2010* screening targets were that 97% (age-adjusted) of women ages 18 and older (including women without a uterine cervix) reported ever receiving a Pap test and 90% reported having had a Pap test in the past three years. On the 2010 Washington Behavioral Risk Factor Surveillance System (BRFSS) survey, 93% ($\pm 1\%$) of women ages 18 and older reported ever having a Pap test and 74% ($\pm 1\%$) reported having had a Pap test within the past three years. Thus, Washington did not meet the *Healthy People 2010* screening targets. Washington BRFSS data show that the age-adjusted percent of women 18 and older who reported ever having a Pap test has been declining since 1995. The percentage who reported having a Pap test in the past three years has been declining since 2002.

Nationally there has also been a downward trend in cervical cancer screening from 2000 to 2010. In 2010, 83% ($\pm 1\%$) of women ages 21–65 reported having had a Pap test in the past three years.¹

The *Healthy People 2020* screening goal is that 93% (age-adjusted) of women ages 21–65 who have not had a hysterectomy have had a Pap test in the past three years. On the 2011 Washington BRFSS, 84% ($\pm 2\%$) of women ages 21–65 who had not had a hysterectomy reported having been screened in the last three years. This goal may need to change, because screening recommendations changed in March 2012. The new recommendations allow the screening interval to be every five years for women ages 30–65 who opt for a combination of Pap and human papilloma virus (HPV) tests.²

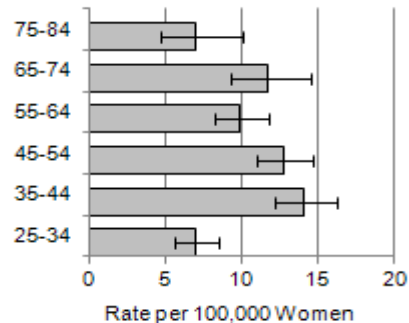
Geographic Variation

In most Washington counties, fewer than 20 women were diagnosed with invasive cervical cancer during 2008–2010 combined. Because incidence rates for these counties fluctuate considerably even when combining three years of data, we do not report county-specific data here. County-specific data are available at <http://www3.doh.wa.gov/WSCR/>.

Age

In Washington the median age at diagnosis was 47 during 2008–2010 combined. This is similar to the national median age of 48 during 2005–2009.³ Washington women ages 25–34 have a lower rate of invasive cervical cancer than women ages 35–74 and a similar rate to those 75–84 years old.

**Invasive Cervical Cancer Incidence by Age at Diagnosis
Washington State
Cancer Registry, 2008–2010**

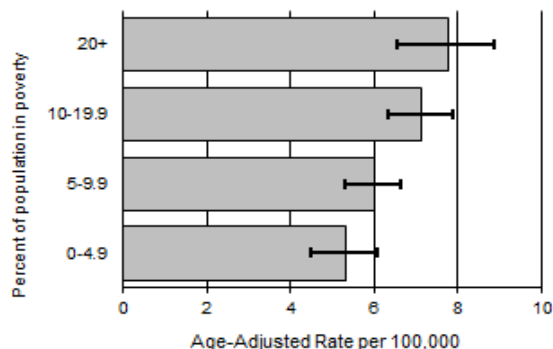


Economic Factors and Education

Women with low levels of education and low incomes are less likely to be screened than other women and thus are at higher risk of invasive cervical cancer.^{4,5,6,7} In low-income communities, lack of health insurance, inability to pay, and cultural barriers can impede access to screening and treatment of precancerous conditions.⁸

We measured community economic resources as the percent of the population who were at or below the federal poverty level in the census tract in which the woman resided when she was diagnosed. (See [Appendix A](#).) During 2006–2010 combined, rates of invasive cervical cancer increased as the proportion of people living in poverty increased.

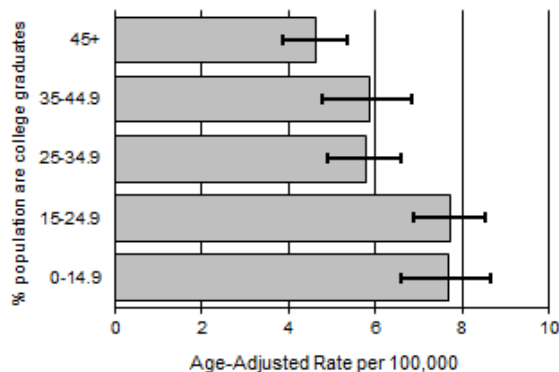
**Invasive Cervical Cancer, Incidence by Percent in Poverty
Washington State
Cancer Registry, 2006–2010**



Incidence rates ranged from 5.3 per 100,000 women in census tracts where less than 5% of the population lived in poverty to 7.8 per 100,000 in census tracts where 20% or more lived in poverty. National cervical cancer incidence data also show a significant relationship between poverty and cervical cancer with women in high-poverty counties having an incidence rate that is at least a third higher than those in low-poverty counties.⁹

We measured education as the percent of the population who graduated from college in the census tract in which the woman resided when she was diagnosed. (See [Appendix A.](#)) During 2006–2010, Washington women living in census tracts where 45% or more of residents completed college had lower incidence rates of invasive cervical cancer than women living in census tracts where less than 25% of residents graduated from college. This is consistent with findings that women with higher levels of education are more likely to have had Pap tests.¹⁰

Invasive Cervical Cancer, Incidence by Percent College Graduates Washington State Cancer Registry, 2006–2010



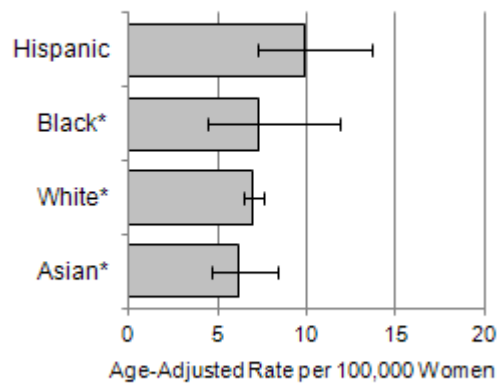
Race and Hispanic Origin

In Washington during 2008–2010 combined, age-adjusted incidence rates for invasive cervical cancer were higher for Hispanic women than for non-Hispanic white women. Rates among non-Hispanic black and non-Hispanic Asian women in Washington were similar to those among non-Hispanic whites. In that same time period, fewer than 20 American Indian and Alaska Native women and fewer than 20 Native Hawaiian and other Pacific Islander women were diagnosed with invasive cervical cancer. Rates for these groups can fluctuate considerably and are not reported below.

Similar to Washington, national rates of invasive cervical cancer are higher among Hispanic women than non-Hispanic white women. Unlike Washington, national rates are also higher for black compared to white women.^{3,11}

Some of the differences in incidence rates based on race and ethnic origin probably reflect differences in income and education,¹² which influence both cervical cancer screening and timely and appropriate follow-up after an abnormal Pap test.^{8,13}

Invasive Cervical Cancer Incidence by Race and Hispanic Origin Washington State Cancer Registry, 2008–2010



*Non-Hispanic, single race only

Other Measures of Impact and Burden

Mortality. In 2011, there were 76 deaths from invasive cervical cancer in Washington; the age-adjusted mortality rate was 2 per 100,000 women. Since 1980, Washington’s mortality rate has been below the national rate. For example, in 2010, the latest year for which national data are available, the rates for Washington and the United States were 1.6 and 2.3 per 100,000, respectively. From 1980 to 2011, invasive cervical cancer age-adjusted mortality rates in Washington moderately declined. National rates showed a similar pattern.

Deaths from cervical cancer are rare, making it difficult to compare mortality rates among sub-populations in Washington. Nationally, the death rate for blacks is nearly twice the national average. Women of Hispanic origin and American Indians and Alaska Natives also have higher-than-average cervical cancer death rates.¹³ Disparities in cervical cancer survival by race, ethnic origin and socioeconomic status may partly be explained by differences in health insurance status, how far the

disease has spread at time of diagnosis and differences in treatment.¹⁴

Nationally, cervical cancer mortality rates decreased consistently for women living in both high- and low-poverty areas from 1975 to 2003. Throughout the 1990s, however, women living in high-poverty U.S. counties had cervical cancer mortality at least 70% greater than women in low-poverty counties. In addition, cervical cancer mortality rose with increasing poverty in all race groups and among women of Hispanic origin.⁹ Since then, the gap in mortality has persisted and even grown between low and more highly educated women and women living in rural compared to urban areas.^{15,16}

While cervical cancer death rates have decreased among U.S.-born women, rates have increased among foreign-born women living in the United States.^{4,17} This is particularly true for immigrants from Latin America and some areas in Asia, where cervical cancer incidence and mortality rates are high and screening asymptomatic individuals for cancer is not widespread.^{17,18}

Screening. Most women diagnosed with invasive cervical cancer either never had a Pap test or did not have one in the three years prior to diagnosis.¹⁹

In Washington in 2011, as income and education levels increased, so did the percentages of women without a hysterectomy who reported a Pap test in the past three years. Ninety-one percent ($\pm 4\%$) of women ages 21–65 with annual household incomes of \$75,000 or more reported having been screened in the past three years compared to 74% ($\pm 6\%$) of women with household incomes of less than \$25,000 (age-adjusted). This relationship between income and being screened with a Pap test persisted after accounting for age, race, Hispanic origin and education. Ninety-one percent ($\pm 3\%$) of women ages 25–65 with a college degree reported screening compared with 79% ($\pm 5\%$) who had no formal education after high school. This relationship between education and screening persisted after accounting for age, race, Hispanic origin and income. Age-adjusted comparisons by race and ethnicity suggested that American Indians and Alaska Natives were less likely to report having a Pap test in the past three years compared to non-Hispanic whites, but this difference disappeared after accounting for education and income as well as age.

National data for 2010 show Asian women as less likely to have had a Pap test in the past three years than white and black women; Hispanic women were less likely to have been screened than non-Hispanic women.¹ Several studies show immigrant women to be less likely than their U.S.-born counterparts to have ever received a Pap test or have had one in the past three years.^{1,20,21,22}

Stage at diagnosis and survival. In 2010, 48% of invasive cervical cancers in Washington were diagnosed before the cancer had spread beyond the cervix (local stage), 33% had spread regionally to other tissues near the cervix, 14% had spread beyond the immediate region to other parts of the body (metastatic stage), and 5% were of unknown stage. National Surveillance Epidemiology and End Results data show a similar pattern for the same year.

Based on national data through 2008, 67% of women diagnosed with invasive cervical cancer lived for at least five years. The earlier the cancer is diagnosed, the better the woman's chances of surviving the disease. National data through 2008 show 15% of women lived at least five years after being diagnosed when the cancer had spread to other parts of the body compared to 91% of women who lived at least five years after localized disease was diagnosed.

Risk and Protective Factors

Lack of screening. Women who do not receive regular Pap tests are at higher risk of invasive cervical cancer than are other women. Lack of health insurance has been identified as one of the strongest predictors of low cervical cancer screening rates.^{23,24,25} Out-of-pocket expenses also influence women's decisions to get a Pap test.¹⁰

Other barriers include services that are culturally inappropriate or offered only in English, and lack of education about the need for screening. Also, healthcare providers do not always appropriately recommend screening.^{26,27,28}

Several psychological and cultural barriers to cervical cancer screening have been identified. These barriers persist even among the insured population.²⁹ Women feel embarrassed at the prospect of testing, believe the test is painful and unpleasant, or feel that being healthy or having no family history are reasons to not get screened.^{29,30} Immigrant and ethnic minority women commonly report fatalistic attitudes about cancer screening, limited knowledge about cervical cancer, fear of a Pap test threatening one's virginity, and belief that a

Pap test is not necessary for symptom-free women as reasons for not getting screened.³¹

HPV infection. Human papillomavirus (HPV) infection is considered the initiating cause for cervical cancer. There are 120 different types of HPV, and at least 17 of them have been related to cervical cancer.^{32,12} HPV types 16 and 18, are found in the majority of cervical cancer patients.^{33,34}

Sexual behavior. HPV infection related to cervical cancer is transmitted mainly through sexual contact. The risk of invasive cervical cancer increases with lifetime number of sexual partners. Those who have had six or more sexual partners are two times more likely to be diagnosed with cervical cancer than those who have had one sexual partner. The risk of invasive cervical cancer also increases with earlier age at first intercourse.³⁵ Infection with other sexually transmitted infections is associated with increased risk of cervical cancer.³⁴

Other contributing factors. Cigarette smoking is an independent risk factor and doubles the risk of cervical cancer.^{34,36,37} Other possible risk factors include having seven or more full-term pregnancies, and using oral contraceptives for more than five to ten years.^{12,34,35,38,39}

Intervention Strategies

Most cervical cancer is prevented by periodic screening and finding and treating its precursor stages. In its early invasive stages, cervical cancer can be a silent disease with no symptoms. Periodic screening can also detect invasive disease at its earliest and most treatable and usually curable stage. The public health effort to reduce invasive cervical cancer incidence and mortality includes promoting prevention and improving screening and appropriate follow-up.

Prevention

Prevention of invasive cervical cancer focuses on increasing HPV vaccination, reducing cigarette smoking and educating about healthy sexual behaviors.

HPV vaccination. The FDA has approved two HPV vaccines to prevent the types of HPV infection that are most often linked to cervical cancer. The U.S. Centers for Disease Control

and Prevention currently recommends that girls and boys ages 11–12 receive three doses of the vaccine over a six-month period and that females ages 13–26 and males ages 13–21 receive the vaccine if they did not have one earlier.⁴⁰ (See [Childhood and Adult Immunizations](#) chapter for strategies to improve immunization rates.) In 2011, 67% (±9%) of girls age 13–17 in Washington had received a first dose of HPV vaccination; however, this drops to 40% (±9%) getting all three doses.⁴¹

The vaccine will prevent only 70% of cervical cancers because it does not protect against all the HPV types that cause cervical cancer. Screening with Pap tests is still necessary. Women currently not getting Pap tests may be the very women who will not receive the vaccine and who would likely benefit from it the most.⁴²

Behavioral prevention strategies. Avoidance of high-risk sexual behaviors that are associated with HPV infection may help decrease the chance of getting cervical cancer. Some examples of prevention strategies include delayed age of first sexual intercourse and condom use.⁴³ Condom use, however, does not provide complete protection against HPV infection because skin contact of areas not covered by a condom can still spread the virus.^{52,44} (See [Sexual Health](#) and [Sexually Transmitted Infections](#) chapters for interventions to reduce risky sexual behavior and reduce the transmission of sexually transmitted infections.)

The Washington Tobacco Quit Line is a useful strategy to help reduce the incidence of smoking among women. (See [Tobacco Use](#) chapter for interventions to reduce smoking.)

Screening

By increasing cervical screening through Pap testing and sometimes HPV testing, more women will be diagnosed with conditions that could develop into invasive cervical cancer if left untreated. The *Guide to Community Preventive Services* recommends client reminders; one-on-one education; and small media like videos, newsletters and brochures as effective ways to increase Pap testing. Provider assessment and feedback and reminder systems also increase screening rates.^{45,46}

Similar strategies to increase the use of Pap tests have been successfully applied in interventions among ethnic minority women, who generally are disproportionately affected by cervical cancer. The most effective strategies among Asian American and African American women were those aimed at enhancing access to cervical cancer screening, such

as providing reduced cost or free Pap tests, transportation or translation service. Employing multiple culturally appropriate elements in the interventions also improved effectiveness.⁴⁷ Lay health worker-led health education has been shown to increase Pap testing among Hispanic and Vietnamese American women, possibly by enhancing psychosocial factors correlated with cervical cancer screening, such as self-efficacy, perceived benefits of screening, perceived susceptibility to cancer and knowledge of cervical cancer.^{48,49,50}

Since 1993 in Washington the Breast, Cervical and Colon Health Program has worked with statewide partners to offer low-income uninsured and underinsured women, who meet the program eligibility criteria, cervical cancer screening and diagnostic services. For cervical services the program is supported by federal and state funding. With the implementation of the Affordable Care Act (ACA) most women currently served by this program will now have access to no- or low-cost health insurance that covers cervical cancer screening and treatment. From July 2001 through December 2013 Medicaid covered treatment costs for women diagnosed with cervical cancer through the program. The program will still continue to screen women not eligible or unable to access options under ACA. For these women, treatment options will likely be limited to charity care.

Screening schedule. The U.S. Preventive Services Task Force recommends beginning screening at age 21. Screening intervals vary depending on age and type of testing, from three years for women ages 21–29 receiving only a Pap test to five years for women ages 30–65 receiving both Pap and HPV tests. They recommend against routinely screening women older than 65 for cervical cancer if they have had adequate recent screening with normal Pap tests and are not otherwise at high risk for cervical cancer. Women who have had a total hysterectomy and no history of cervical precancer or cancer do not need Pap testing.²

HPV testing. Regular Pap tests reduce invasive squamous cell cervical cancer incidence and mortality but not the rates of cervical adenocarcinomas. Adenocarcinoma in situ has risen over the years, but not invasive adenocarcinoma.¹² Both are less common than squamous cancers. HPV vaccination should help reduce the rates of adenocarcinomas and

primary HPV testing also has the potential to help.⁵¹

HPV tests detect several types of HPV infection that are most likely to cause cancer. These tests are approved by the federal Food and Drug Administration (FDA) for (1) use in conjunction with a Pap test for women 30 years of age or older and (2) as a follow-up test for women with slightly abnormal Pap test results.⁵² The U.S. Preventive Services Task Force and the major women's health professional organizations agree that co-testing with both Pap and HPV tests is acceptable for women ages 30–65.

See Related Chapters: [Access to Primary Healthcare Services](#), [Sexual Health](#), and [Sexually Transmitted Infections](#)

Data Sources (For additional detail, see [Appendix B](#).)

Washington State Death Certificate Data: Washington State Department of Health, Vital Registration System Annual Statistical Files, Deaths 1980–2011, released October 2012; data prepared by Washington State Department of Health, Office of Healthy Communities.

Washington State Cancer Incidence: WA: Washington State Department of Health, Washington State Cancer Registry (WSCR), January 2013; data prepared by Washington State Department of Health, Office of Healthy Communities.

Washington State population counts: 2000 and 2010 U.S. Census and 2001–2009 intercensal estimates, Washington State Office of Financial Management, Forecasting Division (OFM), released December, 2011; 1990 U.S. Census and 1991–1999 OFM intercensal estimates, Vista Partnership and Krupski Consulting, released October 2007; 1980 U.S. Census and 1981–1989 OFM intercensal estimates.

National Incidence Data: Surveillance, Epidemiology, and End Results (SEER) Program, SEER*Stat Database: Incidence—SEER 13 Regions Research Data, November 2011 Submission, Vintage 2009 Population (1992-2009) <Katrina/Rita Population Adjustment>, National Cancer Institute, released April 2012; data prepared by Washington State Department of Health, Office of Healthy Communities.

National Cancer Deaths: Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Mortality—All Cause of Death, Vintage 2009 Population (1969-2009) <Katrina/Rita Population Adjustment>, National Cancer Institute, released October 2011. Underlying cause of death data provided by National Center for Health Statistics; data prepared by Washington State Department of Health, Office of Healthy Communities.

United States Behavioral Risk Factor Surveillance System: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention (CDC). Atlanta, Georgia, [2010, 2011]; data prepared by Washington State Department of Health, Epidemiology Office.

Washington State Behavioral Risk Factor Surveillance System (BRFSS) Data: 1987–2011. Olympia, Washington: Washington State Department of Health, under federal cooperative agreement numbers: U58 DP001996 (2009–2010), or U58/SO000047 (2011–2013); data prepared by Washington State Department of Health, Epidemiology Office.

For More Information

Washington State Cancer Registry,
<http://www3.doh.wa.gov/WSCR/>

SEER Program, <http://seer.cancer.gov/>

National Cancer Institute's CancerNet,
<http://www.cancer.gov/>

U.S. Preventive Services Task Force (USPSTF),
<http://www.uspreventiveservicestaskforce.org/>

Washington State Department of Health, Breast, Cervical and Colon Health Program (BCCHP) (888) 438-2247,
<http://www.doh.wa.gov/bcchp>

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Endnotes

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