

Invasive Cervical Cancer

Summary

In Washington State in 2004, 215 women were diagnosed with invasive cervical cancer ([age-adjusted](#) incidence rate: 7 per 100,000 women). *In situ* or noninvasive cancers, which are not reported in Washington, occur much more frequently and can develop into invasive cervical cancers if not diagnosed and treated early. In 2005, 63 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 HPV types, which are responsible for an estimated 70% of cervical, anal, and genital cancers.

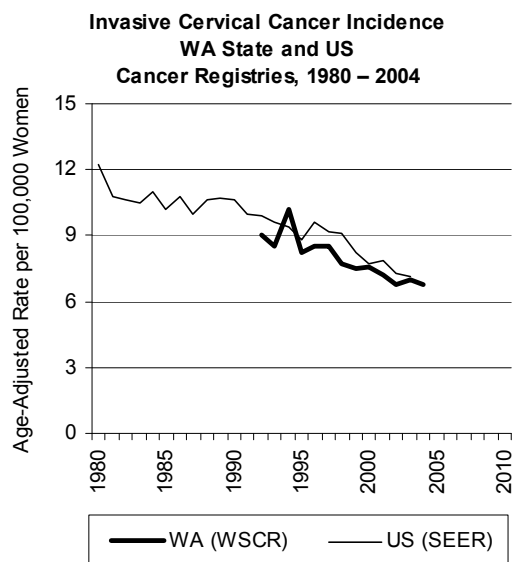
Regular screening to detect precancerous changes to the cervix is the best method of preventing invasive cervical cancer. Women with low levels of education and low incomes are less likely to be screened than other women, and so they are at higher risk of invasive cervical cancer. In Washington in 2004 and 2006 combined, 83% ($\pm 1\%$) of women ages 18 and older with annual household incomes of \$50,000 or more reported having been screened in the past three years compared to 70% ($\pm 1\%$) of women with household incomes of less than \$20,000. Eighty-five percent ($\pm 1\%$) of women ages 25 and older with a college degree reported screening compared with 75% ($\pm 1\%$) who had no formal education after high school. The Washington State Breast and Cervical Health Program, funded by federal, state, and private dollars, offers

Definition: Invasive cancer of the uterine cervix is characterized by the uncontrolled growth of cancer cells developing in the cervix of the uterus. The Washington State Cancer Registry does not collect information on noninvasive (precancerous and *in situ*) cervical cancer. Invasive cervical cancer is coded using ICD-O-3 codes C53.0-C53.9 with behavior code 3 (malignant) and excluding histology 9140, 9590-9989.

cervical cancer screening to uninsured and underinsured women.

Time Trends

The Washington State Cancer Registry (WSCR) reported that 215 women were diagnosed with invasive cervical cancer in 2004, an age-adjusted incidence rate of 7 per 100,000 women. Washington's incidence rates were lower than the national rates for most years. Age-adjusted invasive cervical cancer incidence rates declined in Washington from 1992, the earliest year of available data, to 2004, the most recent year of data. National data from the Surveillance Epidemiology and End Results (SEER) program, available from 1980 to 2003, also showed declining rates of invasive cervical cancer. These declines 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.



Year 2010 Goals

The national *Healthy People 2010* goal is to reduce the cervical cancer death rate to 2 deaths per 100,000 (age-adjusted to the U.S. 2000 population). The 2005 Washington rate of 2 per 100,000 meets this goal.

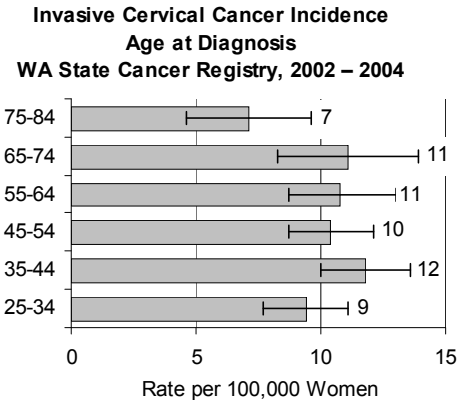
The *Healthy People 2010* screening targets are that 97% (age-adjusted to the 2000 population) of women ages 18 and older (including women without a uterine cervix) report ever receiving a Pap test and 90% report having had a Pap test in the past three years. On the 2006 Washington Behavioral Risk Factor Surveillance System (BRFSS) survey, 94% ($\pm 1\%$) of women ages 18 and older reported ever having a Pap test. This is similar to the 95% ($\pm 1\%$) who reported ever having a Pap test in 2004; i.e., no increase in screening prevalence has occurred since 2004. Hence it is unclear whether Washington will achieve the first screening target. For the second screening target, only 78% ($\pm 1\%$) reported having had a Pap test in the past three years. Since 1995, the age-adjusted percent of women ages 18 and older who reported having had a Pap test in the past three years has been declining. Therefore, it seems unlikely that Washington will meet this *Healthy People 2010* target.

Geographic Variation

In most Washington counties, [fewer than 20](#) women were diagnosed with invasive cervical cancer during 2002–2004 combined. Incidence rates for these counties fluctuate considerably even when combining three years and are not reported here. This information is available at <http://www3.doh.wa.gov/WSCR/>.

Age

Although invasive cervical cancer affects younger women more frequently than most other types of cancer, there are no age-specific differences in its incidence.



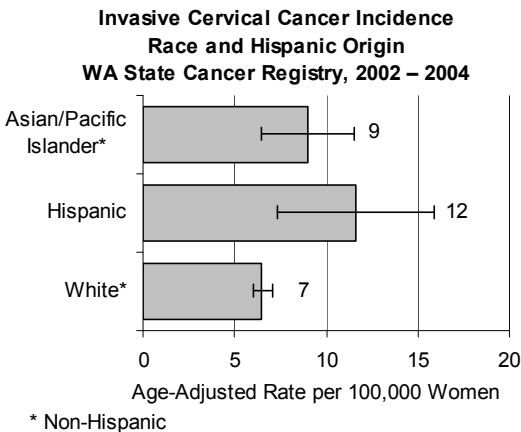
Race and Hispanic Origin

In 2002–2004 combined in Washington, age-adjusted incidence rates for invasive cervical cancer were higher for women of Hispanic origin than for non-Hispanic white women. In that period, fewer than 20 women were diagnosed with invasive cervical cancer in both black and American Indian and Alaska Native groups. Rates for these groups can fluctuate considerably and are not reported below.

Although invasive cervical cancer incidence rates have been decreasing for all women in the United States, rates continue to be consistently higher for women of Hispanic origin. National incidence rates are also higher among blacks and Asians and Pacific Islanders than among whites.¹ During 2002–2004, rates among Asians and Pacific Islanders in Washington were similar to those among whites. In previous years, however, rates among Asians and Pacific Islanders were higher than those among whites. Additional years of data are needed to determine whether the narrowing gap between whites and Asians and Pacific Islanders is due to random variation or represents a change from previous years.

The rates for Asian and Pacific Islander women should be interpreted with caution, because rates vary among subgroups. For example, national invasive cervical cancer incidence rates are higher for women of Vietnamese descent than for those of Japanese descent.² Reliable subgroup data for Asians and Pacific Islanders are not available for Washington.

Some of the differences in incidence rates based on race and ethnic origin probably reflect differences in income and education,³ which influence both cervical cancer screening and timely and appropriate follow-up after an abnormal Pap test.^{4,5}



Income and [Education](#)

The *Health of Washington State 2004 Supplement*⁶ discusses the relationship between invasive cervical cancer, poverty, and education. Consistent with national trends, incidence rates in Washington for 1999–2001 increased as the percent of people living in poverty increased and as the percent with college a education decreased.^{7,8,9} In low-income communities, lack of health insurance, inability to pay, and cultural barriers can impede access to screening for detection and treatment of precancerous conditions.⁴ Differences in rates of screening and treatment do not entirely explain the association of cervical cancer with low education and poverty.³ Researchers continue to seek other explanations.

Other Measures of Impact and Burden

Mortality. In 2005, there were 63 deaths from invasive cervical cancer in Washington; the age-adjusted mortality rate was 2 per 100,000 women. Since 1999, Washington’s mortality rate has been consistently below the national rate. For example, in 2003, the latest year for which national data are available, the rates for Washington and the United States were 2.0 and 2.5 per 100,000, respectively. From 1980 to 2005, invasive cervical cancer age-adjusted mortality rates in Washington 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.¹⁰

Nationally, cervical cancer mortality rates decreased consistently for women 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.¹¹ While cervical cancer death rates have decreased among U.S.-born women, rates are higher among foreign-born women living in the United States.^{7, 12} This is particularly true for immigrants from Asia and Latin America, where cervical cancer incidence rates are high¹² and screening asymptomatic individuals for cancer is not a cultural norm.¹³

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.¹⁴ On the 2004 and 2006 Washington BRFSS combined, as income and education increased, so did the percent of women (including women without a uterine cervix) who reported a Pap test in the past three years. Age-adjusted rates ranged from 70% ($\pm 1\%$) for those in households with annual incomes of less than \$20,000 to 83% ($\pm 1\%$) for those with household incomes of \$50,000 or more. For women ages 25 and older, rates ranged from 75% ($\pm 1\%$) for those with no formal education beyond high school to 85% ($\pm 1\%$) among women with at least four years of college. The relationship of income with Pap testing persisted when accounting for age, race, Hispanic origin, and education; similarly, the relationship of education with Pap testing persisted when accounting for age, race, Hispanic origin, and income. Because poorer women in Washington are both less likely to have Pap tests and less likely to have residential telephones¹⁵ to make them available to the BRFSS survey, disparities by income and education might be even greater than those reported. In the 2004 and 2006 combined BRFSS data, there were no differences among women of different races or Hispanic origin in the proportions reporting Pap tests in the past three years.

Stage at diagnosis. In 2004, 51% of invasive cervical cancer in Washington was diagnosed at the local or non-metastatic stage, 28% had spread regionally, 16% had distant metastasis, and 5% were unstaged. The WSCR does not collect information on *in situ* (noninvasive) cases, but many more women are diagnosed with *in situ* than with invasive cervical cancer. *In situ* cervical cancer can

develop into invasive disease if not diagnosed and treated early.

Based on national data through 2003, 72% of women diagnosed with invasive cervical cancer lived for at least five years. Fifteen percent of women diagnosed when the cancer spread to other parts of the body lived at least five years compared to 92% of women diagnosed with localized disease. As is true for other types of cancer, survival improves with early diagnosis.

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. The major barrier to Pap screening is a lack of access to health care. Other barriers include services that are culturally inappropriate or offered only in English and lack of education about the need for screening. Health care providers do not always recommend screening. Women sometimes feel embarrassed at the prospect of testing or believe the test is painful and unpleasant.¹⁶

Sexual behavior. Invasive cervical cancer is a sexually transmitted disease, spread by certain types of human papillomavirus (HPV). The relationships of disease to risk factors related to sexual behavior are changing as HPV becomes more widespread.³ For example, having multiple sexual partners continues to increase a woman's risk for infection with HPV and consequent cervical cancer. Currently a woman's risk of getting HPV infection increases after three or four partners; the threshold was nine to ten partners 20 years ago when HPV was less common. (Mark Schiffman, personal communication, December 26, 2006) The National Cancer Institute considers having sexual intercourse at a young age and having multiple sexual partners to be risk factors for cervical cancer.¹⁷ Infection with *Chlamydia trachomatis* also increases risk for squamous cell invasive cervical cancer even after accounting for the effect of HPV infection.¹⁸

Contributing factors. Cigarette smoking increases the risk of cervical cancer.¹⁹ Other risk factors include infection with HIV, having seven or more full-term pregnancies, and using oral contraceptives for more than ten years.^{3,17} Some evidence suggests that diets rich in carotenoids from yellow, orange, and red fruits and vegetables and foods rich in vitamin E might

protect against development of cervical cancer, but this association is yet unproven.^{3,17}

Intervention Strategies

In its early stages, cervical cancer can be a silent disease with no symptoms. Periodic screening detects it at its earliest and most treatable stage. Public health efforts to reduce invasive cervical cancer incidence and mortality focus on increasing Pap testing, particularly among low-income women who are less likely to receive screening. The *Guide to Community Preventive Services* reviews evidence for the effectiveness of interventions. The guide found that client reminders and multi-component interventions for women and physicians using media, education, and enhanced access are effective in increasing Pap testing. Other approaches that increase mammography might also be effective for increasing Pap testing. There has not been sufficient research, however, to determine whether these approaches work for Pap testing.²⁰

Screening should begin three years after the onset of sexual activity or at age 21, whichever occurs first. Studies have not established an upper age limit for stopping screening. The U.S. Preventive Services Task Force recommends 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 for benign disease generally do not need routine Pap testing.²¹

Most health organizations in the United States now recommend that once women, ages 30 and older, have two or three normal annual Pap tests, the screening interval can be extended to every two to three years.²¹

Screening women within three years after onset of sexual activity (but no later than age 21) with regular Pap tests reduces invasive squamous cell cervical cancer incidence and mortality but not the rates of cervical adenocarcinomas, which typically occur in a region of the cervix not well assessed by Pap testing. Adenocarcinomas have risen in the past 20 to 30 years.³ More widespread Pap screening in combination with primary HPV DNA testing and HPV vaccination should reduce the rates of adenocarcinomas.²²

The federal Food and Drug Administration has approved HPV testing, only in conjunction with the Pap test, as a primary screening test for cervical cancer in women ages 30 and older. Both the American Cancer Society and the American College

of Obstetrics and Gynecology agreed that it is acceptable to use HPV DNA testing as an adjunct to Pap screening in women ages 30 and older. The U.S. Preventive Services Task Force, however, states that there is currently insufficient evidence to recommend the use of HPV testing as a primary screening test for cervical cancer.²¹

The Washington State Breast and Cervical Health Program, supported by federal, state, and private dollars, works collaboratively with statewide partners to offer uninsured and underinsured women cervical and breast cancer screening, and when needed, diagnostic services. Since July 2001, Medicaid has covered treatment costs for uninsured women diagnosed through the program. Because of funding limitations, the program has screened only about 20% of eligible women in Washington.

Primary prevention focuses on regular screening with Pap tests and reducing cigarette smoking. Recent evidence suggests that among newly sexually active women, consistent condom use by their male partners might reduce the risk of HPV infection.²³ Abstinence from sexual activity will prevent the spread of HPV, and hence, cervical cancer.

Females ages 9–26 will receive the new HPV vaccine as it becomes more available.²⁴ The U.S. Centers for Disease Control and Prevention currently recommends that girls ages 11–12 receive three doses of the vaccine over a six-month period.²⁵ The new vaccine will prevent only 70% of cervical cancers, however, because it does not protect against all the HPV subtypes that cause cervical cancer. Screening with Pap tests will still be necessary. Women currently not getting Pap tests are at highest risk of dying from invasive cervical cancer. These may be the very women who will not receive the vaccine and who would likely benefit from it the most.²⁶

See Related Chapters: [Female Breast Cancer](#), [Access to Primary Health Care Services](#), 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 Statistics Files, Deaths 1980–2005, released December 2006.

Washington State Cancer Incidence: Washington State Department of Health, Washington State Cancer Registry, October 2006.

Washington State Population Counts: U.S. Census provided through Washington State Office of Financial Management (OFM); OFM intercensal and postcensal estimates, Krupski Consulting.

National Incidence Data: SEER*Stat 6.2, Sept 2006 release, NCI, NIH.

National Death Data: SEER*Stat Database: Mortality-All Causes of Death (COD), Public-Use With State, Total U.S. (1969–2003), National Cancer Institute, DCCPS, Surveillance Research Program, Cancer Statistics Branch, released April 2006. Underlying COD mortality data provided by NCHS.

Washington State Behavioral Risk Factor Surveillance System (BRFSS) Data: 2004 and 2006. Data weighted to reflect the county population estimates from the Washington State Office of Financial Management (OFM). Data release for 2003–2005: November 2006; data release for 2006: June 2007.

For More Information

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

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

National Cancer Institute's CancerNet,
<http://cancernet.nci.nih.gov/cancertopics>

U.S. Preventive Services Taskforce (USPSTF),
<http://preventiveservices.ahrq.gov>

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

Endnotes

¹ Howe, H. L., Xiaocheng, W., Ries, L. A. G., Cokkinidies, V., Ahmed, F., Jemal, F., et al. (2006). Annual report to the nation on the status of cancer, 1975–2003, featuring cancer among U.S. Hispanic/Latino populations. *Cancer*, 107, 1711–1742.

² Chen, J. Y., Diamant, A. L., Kagawa-Singer, M., Pourat, N., & Wold, C. (2004). Disaggregating data on Asian and Pacific Islander women to assess cancer screening. *American Journal of Preventive Medicine*, 27, 139–145.

³ Schiffman, M. H., & Hildesheim, A. (2006). Cervical cancer. In D. Schottenfeld & J. F. Fraumeni (Eds.), *Cancer epidemiology and prevention* (pp. 1045–1067). New York, NY: Oxford University Press.

⁴ Benard V. B., Lawson H. W., Ehemann, C. R., Anderson, C., & Helsel, W. (2005). Adherence to guidelines for follow-up of low-grade cytologic abnormalities among medically underserved women. *Obstetrics and Gynecology*, 105, 1323–1328.

⁵ Ward, E., Jemal, A., Cokkinides, V., Singh, G. K., Cardinez, C., Ghafoor, A., et al. (2004). Cancer disparities by race/ethnicity and socioeconomic status. *CA: A Cancer Journal for Clinicians*, 54, 78–93.

⁶ Washington State Department of Health. (2004). *The Health of Washington State 2004 Supplement*. Olympia, WA. Accessed

September 21, 2007 at

<http://www.doh.wa.gov/HWS/HWS2004supp.htm>.

⁷ Singh, G. K., Miller, B. A., Hankey, B. F., & Edwards, B. K. (2004). Persistent area socioeconomic disparities in U.S. incidence of cervical cancer, mortality, stage, and survival, 1975-2000. *Cancer*, *101*, 105-107.

⁸ Cain, J. M., & Howett, M. K. (2000). Preventing cervical cancer. *Science*, *288*, 1753-1754.

⁹ Franco, E. L., Duarte-Franco, E., & Ferenczy, A. (2001). Cervical cancer: epidemiology, prevention and the role of human papillomavirus infection. *Canadian Medical Association Journal*, *164*, 1017-1025.

¹⁰ Surveillance, Epidemiology, and End Results (SEER) Program (www.seer.cancer.gov) SEER*Stat Database: Mortality - All COD, Public-Use With State, Total U.S. for Expanded Races/Hispanics (1990-2003), National Cancer Institute, DCCPS, Surveillance Research Program, Cancer Statistics Branch, released April 2006. Underlying mortality data provided by NCHS (www.cdc.gov/nchs).

¹¹ National Cancer Institute. (2003). *Area socioeconomic variations in U.S. cancer incidence, mortality, stage, treatment, and survival, 1975-1999*. Available from: <http://seer.cancer.gov/>

¹² Seeff, L. C., & McKenna, M. T. (2003). Cervical cancer mortality among foreign-born women living in the United States, 1985-1996. *Cancer Detection and Prevention*, *27*, 203-208.

¹³ Kandula, N. R., Wen, M., Jacobs, E. A., & Lauderdale, D. S. (2006). Low rates of colorectal, cervical, and breast cancer screening in Asian Americans compared with non-Hispanic whites: Cultural influences or access to care. *Cancer*, *107*, 184-192.

¹⁴ Leyden, W. A., Manos, M. M., Geiger, A. M., Weinmann, S., Mouchawar, J., Bischoff, K., et al. (2005). Cervical cancer in women with comprehensive health care access: attributable factors in the screening process. *Journal of the National Cancer Institute*, *97*, 675-683.

¹⁵ U.S. Census Bureau. Census 2000, Summary File 3, HCT27: Tenure by poverty status in 1999 by telephone service available [15]. Universe: Occupied housing units. Generated by using American Factfinder (1/2/2007). Available at <http://www.census.gov/Press-Release/www/2002/sumfile3.html>

¹⁶ Coughlin, S. S., Breslau, E. S., Thompson, T., & Benard, V. B. (2005). Physician recommendation for Papanicolaou testing among U.S. women, 2000. *Cancer Epidemiology Biomarkers & Prevention*, *14*, 1143-1148.

¹⁷ National Cancer Institute (NCI). (2005, July 13). *Cervical cancer (PDQ®) prevention: health professional version*. Retrieved December 18, 2006 from <http://www.cancer.gov/cancertopics/pdq/prevention/cervical/healthprofessional>

¹⁸ Smith, J. S., Bosetti, C., Munoz, N., Herrero, R., Bosch, F. X., & Eluf-Neto, J. (2004). Chlamydia trachomatis and invasive cervical cancer: a pooled analysis of the IARC multicentric case-control study. *International Journal of Cancer*, *111*, 431-439.

¹⁹ Berrington de Gonzalez, A., & Green, J. (2006). Comparison of risk factors for invasive squamous cell carcinoma and adenocarcinoma of the cervix: Collaborative reanalysis of individual data on 8,097 women with squamous cell carcinoma

and 1,374 women with adenocarcinoma from 12 epidemiological studies. *International Journal of Cancer*, *118*, 1481-1495.

²⁰ Centers for Disease Control and Prevention. Guide to Community Preventive Services Website, <http://www.thecommunityguide.org/cancer/screening/ca-screening.pdf>, last updated January 22, 2007 accessed August 3, 2007.

²¹ U.S. Agency for Healthcare Research and Quality. (2006, June). *Guide to Clinical Preventive Services* (AHRQ Publication No. 06-0588). Retrieved (12/15/2006) from <http://www.ahrq.gov/clinic/pocketgd.htm>.

²² Castellsague, X., Diaz, M., de Sanjose, S., Munoz, N., Herrero, R., & Franceschi, S. (2006). Worldwide human papillomavirus etiology of cervical adenocarcinoma and its cofactors: implications for screening and prevention. *Journal of the National Cancer Institute*, *98*, 303-315.

²³ Winer, R. L., Hughes, J. P., Feng, Q., O'Reilly, S., Kiviat, N. B., & Holmes, K. K. (2006). Condom use and the risk of genital human papillomavirus infection in young women. *The New England Journal of Medicine*, *354*, 2645-2654.

²⁴ Koutsky, L. A., Ault, K. A., Wheeler, C. M., Brown, D. R., Barr, E., & Alvarez, F. B. (2002). A controlled study of human papillomavirus type 16 vaccine. *The New England Journal of Medicine*, *347*, 1645-1651.

²⁵ Centers for Disease Control and Prevention. (2007). Quadrivalent human papillomavirus vaccine: Recommendations on immunization: Recommendations of the Advisory Committee on Immunization Practices (ACIP). *Morbidity and Mortality Weekly Report*, *56*(Early Release), 1-23.

²⁶ Cohen, J. (2005). High hopes and dilemmas for a cervical cancer vaccine. *Science*, *308*, 618-621.