

# Colorectal Cancer

**Definition:** Colorectal cancer, or cancer of the colon or rectum, is characterized by uncontrolled growth of neoplastic cells developing in the lower segment of the digestive tract, with the potential to invade and spread to other sites. In the Washington State Cancer Registry, new cases of colorectal cancer are coded to ICD-O-3 codes C18.0–C18.9, C19.9, C20.9, and C26.0. 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. Unless otherwise noted, colorectal cancer incidence in this report includes in situ and invasive diagnoses. Colorectal cancer deaths are coded to ICD-9 codes 153.0–154.1, and 159.0 for 1992–1998 and ICD-10 codes C18–C20 and, C26.0 for 1999–2011.

## Summary

Colorectal cancer is the second most common cancer in Washington State. In 2010, 2,673 Washington residents were diagnosed with this disease (age-adjusted incidence rate: 38 per 100,000). Colorectal cancer is the second leading cause of cancer deaths in Washington. In 2011, 1,024 Washington residents died of this disease (age-adjusted mortality rate: 14 per 100,000).

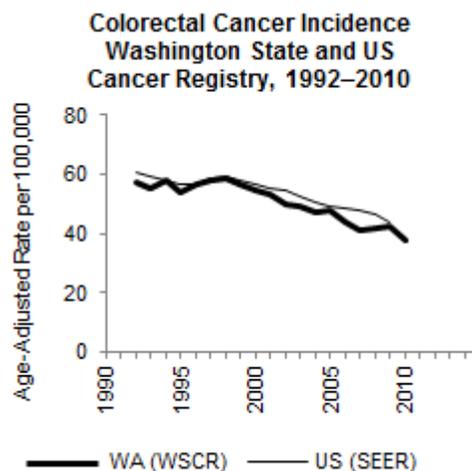
Regular screening beginning at age 50 can prevent colorectal cancer by detecting and removing precancerous growths before they develop into cancer.<sup>1</sup> Regular screening can also detect colorectal cancer early, when it is most treatable. More widespread use of effective screening has contributed to declines in rates of newly diagnosed colorectal cancer and death from colorectal cancer.<sup>2</sup> Despite the availability of effective screening tests, however, Behavioral Risk Factor Surveillance System (BRFSS) data show that 37% ( $\pm 2\%$ ) of Washington residents ages 50–75 years had not been screened or were not up to date with recommended screening guidelines in 2011. Improvements in treatment also contribute to declining death rates.<sup>2</sup>

Evidence-based interventions to increase screening include reminding patients that it is time to be screened and providing small media (e.g. brochures and videos) describing benefits of screening. For healthcare providers evidence-based interventions include reminders that patients need screening, and feedback about their performance in offering and delivering screening services.<sup>3</sup>

## Time Trends

The colorectal cancer [age-adjusted](#) incidence rate in Washington remained level from 1992 to 1998. Since 1998, the incidence rate has declined moderately. According to the Surveillance Epidemiology and End Results (SEER) program, the U.S. incidence rate decreased moderately from 1992 to 1995 and leveled off from 1995 to 1998. Similar to Washington State, the U.S. incidence rate declined moderately from 1998 to 2009.

The decline in incidence is likely due to increased screening, which detects early disease. Early screening allows healthcare providers to detect and remove precancerous lesions or polyps.<sup>1,2</sup>



## 2010 and 2020 Goals

The *Healthy People 2010* target for colorectal cancer was to reduce the age-adjusted mortality rate to 13.9 deaths per 100,000.<sup>4</sup> If the Washington 2010 mortality rate were calculated in a manner comparable to *Healthy People 2010*, it would be 14.1 per 100,000, slightly above this target.

Washington has already met the *Healthy People 2020* target of 14.5 deaths or fewer per 100,000.

*Healthy People 2020* set a new goal to reduce the number of invasive colorectal cancer diagnoses to 38.6 new cases per 100,000 people. Washington State is currently meeting this goal. In 2010, Washington reported 37.7 new cases per 100,000.

The *Healthy People 2010* screening goals were developed in the late 1990s before widespread use of colonoscopy, a medical procedure in which a physician looks for precancerous and cancerous growths along the entire colon and rectum. Given the increase in colonoscopy, the 2010 national goals for fecal occult blood testing or FOBT (that involves looking for traces of blood in stool) and sigmoidoscopy (in which physicians examine the rectum and lower part of the colon) are not good indicators of compliance with screening recommendations.

The current U.S. Preventive Services Task Force (USPSTF) recommendations for colorectal cancer screening are for adults ages 50–75 who are at average risk to screen by annual FOBT, sigmoidoscopy every five years and FOBT every three years, or colonoscopy every 10 years.<sup>5</sup> FOBT testing should be done with high-sensitivity guaiac-based FOBT or a newer type of FOBT, the fecal immunochemical test (FIT). FOBT testing should be done with a take-home test; it should not be done during a digital rectal exam in the healthcare provider’s office.<sup>5</sup>

Following these recommendations, the *Healthy People 2020* target is to increase to 70.5% (age-adjusted) the proportion of adults ages 50–75 who receive colorectal cancer screening. Washington [Behavioral Risk Factor Surveillance System](#) (BRFSS) data from 2011 indicate that 64% ( $\pm 2\%$ , age-adjusted) of Washington residents ages 50–75 met this target.

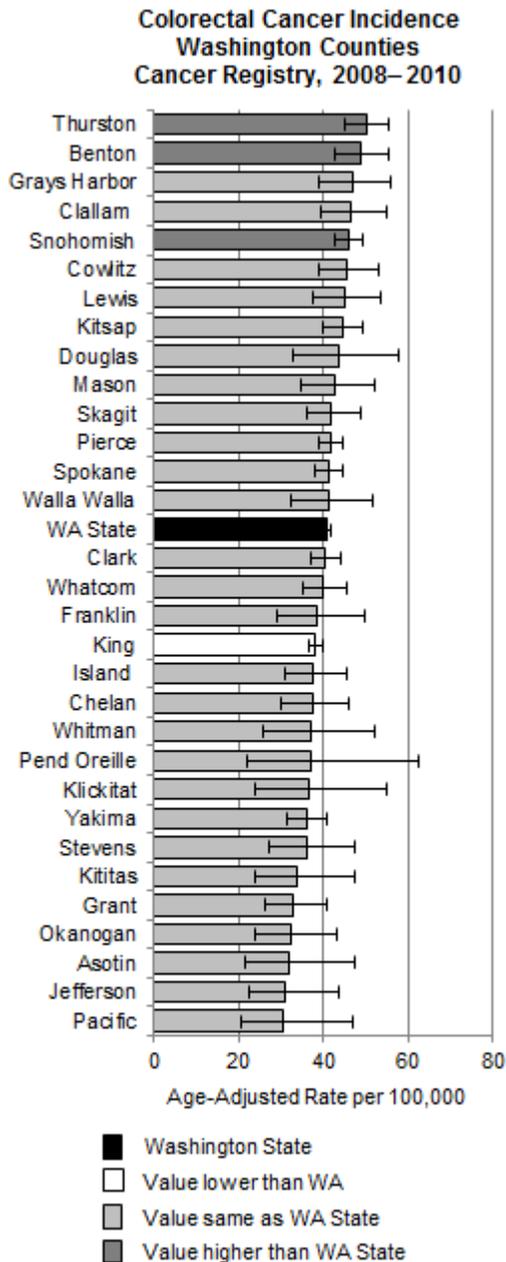
Washington is likely to meet the *Healthy People 2020* goal. Based on older screening definitions and BRFSS methods, the proportion of adults up to date on colorectal cancer screening increased throughout the 2000s, and colorectal cancer screening should be more widely available under the Affordable Care Act.

### Geographic Variation

Incidence rates can be highly variable in counties with few diagnoses. The following chart does not show counties with [fewer than 20](#)

residents diagnosed with colorectal cancer in 2008–2010 combined.

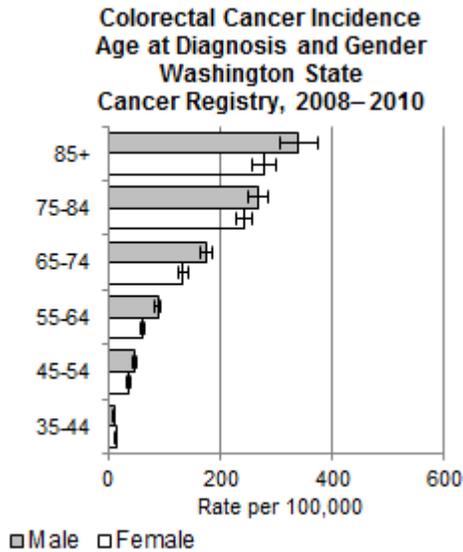
During 2008–2010 combined, Benton, Snohomish and Thurston counties had higher incidence rates than the state; King County had a lower rate.



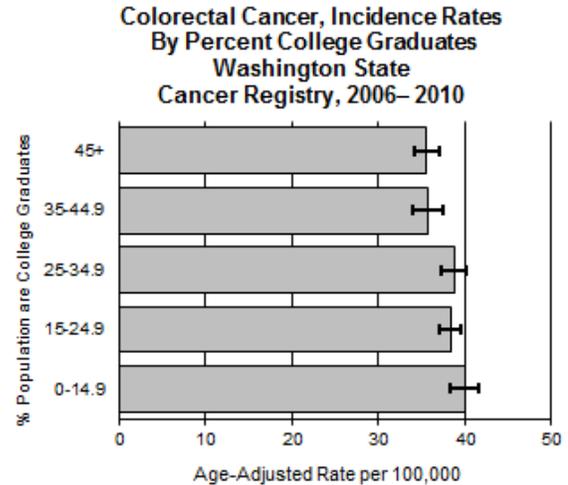
### Age and Gender

Colorectal cancer is rare in people younger than age 40,<sup>6</sup> after which incidence rates increase with age. Although colorectal cancer affects both women and men, incidence rates are consistently higher for

men. The age-specific rates by gender in Washington follow a pattern similar to national rates.

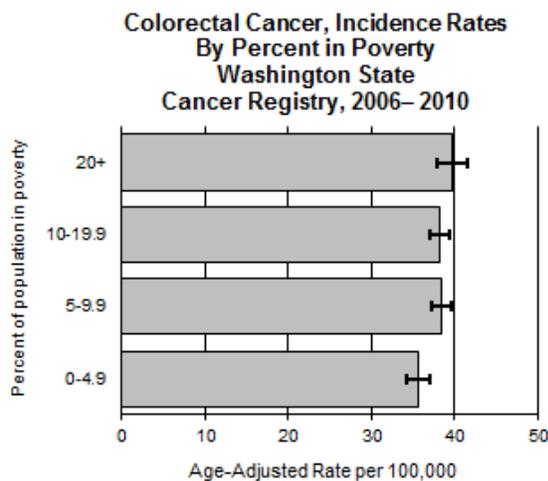


Similarly, for 2006–2010, age-adjusted colorectal cancer incidence rates were higher in census tracts where less than 35% of adults ages 25 and older were college graduates than in census tracts where 35% or more were college graduates.



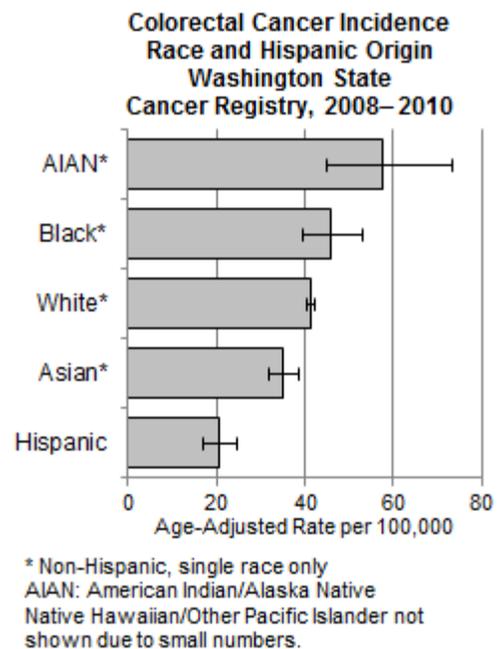
### Economic Factors and Education

There are no direct measures of the relationship between an individual's economic resources and colorectal cancer incidence in Washington. To study the link between poverty and colorectal cancer incidence, we measured poverty as the percent of the population living at or below the federal poverty level in the census tract in which the individual lived at the time of diagnosis. In Washington, for 2006–2010 combined, age-adjusted colorectal cancer incidence rates were higher in census tracts where 5% or more of the population lived in poverty than in census tracts where less than 5% lived in poverty.



### Race and Hispanic Origin

There were too few Native Hawaiian and other Pacific Islander Washington residents diagnosed with colorectal cancer during 2008–2010 to provide a stable estimate of the incidence rate. People of Hispanic origin had the lowest rate of newly diagnosed colorectal cancer. The rate for American Indians and Alaska Natives was higher than that for all groups except blacks.



This pattern is different from that seen nationally where blacks have the highest rate and American Indian and Alaska Natives are among the groups with the lowest rates.<sup>7</sup> These differences might be due to Washington's collaborations with several Indian Health Boards to accurately identify American Indian and Alaska Natives in the Washington State Cancer Registry. These methods have not been used nationally.

## Other Measures of Impact and Burden

**Mortality.** Washington colorectal cancer mortality rates declined moderately from 1980 to 2011. The 2011 Washington age-adjusted mortality rate was 14 per 100,000 people. Similarly, the U.S. colorectal cancer mortality rate declined slightly from 1980 to 1985 and declined moderately from 1985 through 2009. In 2009 (the most recent year available), the U.S. age-adjusted mortality rate was 16 per 100,000 people. The Washington rate for 2009 was 14 per 100,000. The decreasing rates likely reflect a combination of decreasing incidence, advances in treating the disease and more widespread screening leading to earlier detection when treatment is most successful.<sup>2</sup>

During 2008–2010 combined, 38% of colorectal cancers in Washington were diagnosed at an early stage—*in situ* or local stage—before spreading beyond the colon or rectum. This is slightly below the percent of cases diagnosed at an early stage nationally (43%). National data for 2009 showed that over 90% of patients live more than five years after receiving an early diagnosis. When the disease has spread (metastasized) to other parts of the body before diagnosis, about 88% of patients die within five years.

**Screening.** According to 2011 BRFSS data, 63% ( $\pm 2\%$ , not age-adjusted) of Washington residents ages 50–75 years reported either FOBT in the past year, sigmoidoscopy in the past five years and FOBT in the past three years, or colonoscopy in the past 10 years. Colonoscopy is the most commonly reported screening. On the 2011 Washington BRFSS, 58% ( $\pm 2\%$ ) reported colonoscopy in the past 10 years, 11% ( $\pm 1\%$ ) reported FOBT in the past year, and 2% ( $\pm 1\%$ ) reported sigmoidoscopy in the past five years and FOBT in the past three years.

BRFSS data for 2011 also indicate Hispanics were less likely to have received screening compared to non-Hispanic whites and this pattern persisted after controlling for age, education and income. Despite this lower screening rate, people of Hispanic origin have low rates of newly diagnosed colorectal cancer and death from colorectal cancer. Additionally, unlike studies conducted elsewhere,<sup>8,9</sup> Hispanics and non-Hispanic whites in Washington have similar proportions of late stage diagnoses. The reasons for this unique pattern—low screening rates combined with low death rates—are unknown.

On the 2011 Washington BRFSS, residents who reported having health insurance were about two times more likely to meet the USPSTF screening recommendations than those who did not after controlling for age [68% ( $\pm 2\%$ ) compared to 35% ( $\pm 8\%$ )]. Residents who reported having a personal healthcare provider were also about two times more likely to meet screening recommendations than those who did not [69% ( $\pm 2\%$ ) compared to 32% ( $\pm 6\%$ )]. Washington residents with a college degree [69% ( $\pm 3\%$ )] were more likely to meet recommendations than those with some college [62% ( $\pm 3\%$ )] and those with a high school education or less [58% ( $\pm 4\%$ )]. Residents with annual incomes at or below \$25,000 were less likely to meet recommendations [50% ( $\pm 5\%$ )] than residents with incomes between \$25,000–\$49,999 [66% ( $\pm 4\%$ )], \$50,000–\$74,999 [65% ( $\pm 2\%$ )], or above \$75,000 [66% ( $\pm 4\%$ )].

## Risk and Protective Factors

Screening for and removing precancerous polyps reduces a person's risk of getting or dying from colorectal cancer. Other modifiable risk factors for colorectal cancer related to lifestyle include a diet mostly from animal sources, physical inactivity, obesity, smoking and excessive alcohol intake. Although current nutrition recommendations for the prevention of colorectal cancer vary widely, there is consensus that maintaining a normal weight, having regular physical activity, eating fruits and vegetables to support general good nutrition, and reducing or eliminating alcohol consumption are probably important behaviors.<sup>10</sup> Certain medical conditions or a family history of some types of medical conditions, described below, place people at increased risk for colorectal cancer.<sup>2</sup>

**Nutrition.** High intake of red and processed meat is associated with an increased risk of colorectal cancer.<sup>11,12,13</sup> Findings are inconsistent regarding the potential protective effect of eating fruits and vegetables. Although older studies comparing people with and without colorectal cancer tended to

show protective effects,<sup>14</sup> more recent, large studies that follow people over time have not.<sup>15,16,17,18</sup>

Other studies suggest that high intake of dietary fiber protects against colorectal cancer.<sup>19,20,21</sup> In addition, diets low in folic acid, selenium, vitamin D or fish and diets high in animal fats might increase risk for colorectal cancer, but current evidence is limited.<sup>22</sup>

**Obesity.** Obesity is strongly associated with increased risk of colorectal cancer, and the association is stronger for colon cancer than rectal cancer.<sup>23,24,25</sup> This increased risk might be due to lifestyle factors, particularly inactivity and consuming a high-fat diet low in fruits and vegetables. There is evidence that high levels of insulin in obese individuals might promote tumor development.<sup>26</sup> In addition, colorectal cancer patients who are obese have a higher mortality and increased risk of recurrence of cancer than normal weight patients.<sup>27,28,29</sup>

**Physical activity.** Physically active men and women have a decreased risk of developing colorectal cancer.<sup>30,31,32,33</sup> New evidence suggests that physical activity may also reduce mortality among patients with colorectal cancer.<sup>34,35</sup> The American Cancer Society recommends adults get at least 150 minutes of moderate intensity or 75 minutes of vigorous intensity activity each week.<sup>36</sup>

**Smoking and alcohol.** Smokers are at increased risk of colorectal cancer, especially rectal cancer, and heavy smokers are at significantly increased risk.<sup>11,37,38,39</sup> Alcohol consumption is also associated with an elevated risk of colorectal cancer, particularly cancers of the rectum. There is evidence that even moderate drinking might be a significant risk factor for colorectal cancer.<sup>11,30,40,41</sup>

**Drugs.** Evidence is inconsistent regarding whether nonsteroidal anti-inflammatory drugs (NSAIDs), especially aspirin,<sup>42</sup> can reduce the risk of colorectal cancer or prevent the recurrence of colorectal polyps in the average risk population.<sup>43,44</sup> However, a recent study suggests a daily dose of aspirin substantially reduces colorectal cancer incidence among patients with Lynch syndrome, a hereditary condition that greatly increases risk for colorectal cancer.<sup>45</sup> Because aspirin and other drugs can cause serious side effects, people should seek medical advice before taking aspirin or other drugs to prevent colorectal cancer.

**Hereditary conditions.** Hereditary non-polyposis colorectal carcinoma, also known as Lynch syndrome, is a rare inherited condition that increases the risk of colorectal and other cancers. Lynch syndrome is estimated to account for about 3% of all colorectal cancer cases in the United States.<sup>46</sup> A diagnosis of Lynch syndrome impacts treatment for those diagnosed with colorectal cancer and screening recommendations for their close family members. Despite National Cancer Institute recommendations to screen all colorectal cancer patients for the syndrome, screening practices vary.<sup>47</sup> Familial adenomatous polyposis, a rare genetic disorder that causes thousands of polyps to develop in the colon or rectum, also increases the risk of colorectal cancer. This disorder accounts for about 1% of all colorectal cancer cases nationally.<sup>2</sup> People with familial adenomatous polyposis can develop colorectal cancer as early as age 20. Without frequent screening or removal of the colon, most people with the disorder will have developed colorectal cancer by age 40.<sup>48,49</sup> The National Cancer Institute estimates that these and other less common genetic mutations account for 5% to 6% of colorectal cancer cases nationally.<sup>50</sup>

**Family history.** People with a first-degree relative (parent, sibling or child) who had colorectal cancer or adenomatous polyps are at a higher risk for developing the disease.<sup>51</sup> The American Cancer Society recommends that people with a family history of colorectal cancer or polyps begin colorectal cancer screening at age 40, or 10 years before the age of the youngest case in the immediate family, whichever is earlier.<sup>52</sup>

**Other health conditions.** Certain health conditions increase the risk of colorectal cancer. A history of cancer—especially ovarian, endometrial, or a previous colorectal cancer or pre-cancerous polyp—is associated with an increased risk of colorectal cancer.<sup>53</sup> A history of ulcerative colitis or Crohn's disease also increases the risk of colorectal cancer.<sup>53</sup> Having metabolic syndromes significantly increases the risk of colorectal cancer.<sup>23,41,43</sup> Many studies indicate that patients with type 2 diabetes have a higher risk of colorectal cancer.<sup>54,55</sup>

**Screening and stage of diagnosis.** Regular screening can prevent colorectal cancer by detecting and removing precancerous polyps.<sup>1</sup> Regular screening also increases the chances of finding cancer early when it is most easily treated. (See [2010 and 2020 Goals](#) for a description of screening tests and the USPSTF screening recommendations.)

There are pros and cons to each test, but recent modeling evidence suggests screening programs that use any one of the three USPSTF recommended screening regimens will be approximately equal to each other in the resulting number of life-years gained from screening.<sup>5</sup>

The USPSTF recommends that screening begin at age 50 for non-symptomatic individuals not known to be at high risk of disease. People who have chronic inflammatory bowel disease; immediate family members with colorectal cancer or polyps before age 60 or two immediate family members with these conditions at any age; or family history of hereditary conditions related to colorectal cancer may need to start screening before age 50.<sup>2</sup>

**Barriers to screening.** Commonly identified barriers to colorectal cancer screening include low income, low education, being uninsured or underinsured, lack of a usual source of healthcare, few routine doctor's visits, no physician's recommendation, living in a rural area, low awareness or knowledge about screening, and low perceived benefits from screening.<sup>56,57,58</sup>

Even though lack of insurance coverage is a major barrier to colorectal cancer screening,<sup>56,59,60</sup> 2011 BRFSS data indicate only 67% ( $\pm 2\%$ ) of Washington residents with a health plan report screening. Nationally, significant underuse of colorectal cancer screening persists among Medicare beneficiaries, despite the coverage of screening under the Medicare program since 1998.<sup>61,62</sup> Among the insured population, minority status, lower income or economic disadvantage, and lower educational levels have been associated with lower colorectal cancer screening rates.<sup>63,64,65</sup>

## [Intervention Strategies](#)

The Guide to Community Preventive Services recommends several evidence-based interventions to increase screening for colorectal cancer. Recommended interventions include interventions aimed at the screening-eligible population (client-oriented) and interventions for healthcare providers (provider-oriented). Recommended interventions for clients include reminders that it is time for a screening; videos and printed material to inform and motivate people to be screened, and

individual education—in a variety of settings including medical, community, worksite and household—from healthcare professionals and others about the benefits of screening and ways to overcome barriers. The Community Guide also includes interventions that facilitate access to screening services, such as expanded hours of screening, in client-oriented interventions.<sup>3</sup>

For provider-oriented interventions, the Community Guide recommends systems that remind providers that it is time for a patient to be screened or that the patient is overdue for screening. The Community Guide also recommends assessing healthcare providers' performance in offering and delivering screening and sharing this information with providers as an effective strategy to increase colorectal cancer screening.<sup>66</sup>

Intervention programs to increase colorectal cancer screening among minority populations often use a combination of strategies. For example, providing printed education materials in the appropriate language along with in-person contact with health educators fluent in the appropriate language, has been shown to be effective in both clinical and community settings.<sup>67,68,69,70</sup>

Recent research suggests that offering patients a choice of screening tests can increase adherence to screening. In a randomized clinical trial, participants who were offered a choice of colonoscopy or FOBT were almost twice as likely to complete screening as participants who were offered colonoscopy only.<sup>71</sup>

Since 2009 in Washington the Breast, Cervical and Colon Health Program has worked with statewide partners to offer low-income uninsured and underinsured men and women colorectal cancer screening and, when needed, diagnostic services. Eligibility includes Washington residents ages 50 to 64, but residents can qualify if they are younger than 50 with increased risk or 65 and older without Medicare coverage. These services have been supported by federal funding. With the implementation of the Affordable Care Act most people currently served by this program will have access to low- or no-cost health insurance that covers colorectal cancer screening and treatment. Additional information is available at <http://www.doh.wa.gov/BCCHP>.

**See Related Chapters:** [Obesity and Overweight](#), [Nutrition](#), [Physical Activity](#)

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

Washington State cancer incidence: Washington State Department of Health, Washington State Cancer Registry (WSCR), January 2013

Washington State death certificate data: Washington State Department of Health, Vital Registration System Annual Statistical Files, Deaths 1980–2011, released October 2012

National death data: Surveillance Epidemiology and End Results (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 National Incidence Data: SEER\*Stat 8.0.2, April 2012 release, National Cancer Institute, National Institutes of Health

Washington State Behavioral Risk Factor Surveillance System (BRFSS) Data: 1987–2011. Olympia, Washington: Washington State Department of Health, under federal cooperative agreement numbers: U58/CCU002118 (1987–2003), U58/CCU022819 (2004–2008), U58 DP001996 (2009–2010), or U58/SO000047 (2011–2013); data prepared by Washington State Department of Health, Non-Infectious Conditions Epidemiology.

Washington State population counts: 2000 and 2010 U.S. Census and 2001–2009 intercensal and 2011 post-censal estimates, Washington State Office of Financial Management, Forecasting Division (OFM), released January 25, 2013; 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.

**For More Information**

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

National Cancer Institute  
<http://www.nci.nih.gov/>

American Cancer Society  
<http://www.cancer.org>

The Guide to Community Preventive Services  
<http://www.thecommunityguide.org/cancer/>

Colorectal Cancer Control Program  
<http://www.cdc.gov/cancer/crccp/>

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

**Technical Notes**

The availability of mortality and incidence data for the U.S. and Washington varies. Incidence data for the United States (13 SEER regions) are available from 1992–2009. The United States mortality data are available from 1980–2009. Incidence data for Washington are available from 1992–2010. Washington mortality data are available from 1980–2011.

**Acknowledgments**

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**Endnotes**

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