

Cancer Incidence In Virginia 1990-1994

Virginia Cancer Registry



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Section I

Introduction

Virginia Cancer Registry

The Virginia Cancer Registry (VCR) is a computerized system for the collection, analysis and dissemination of information about the occurrence of cancer in the Commonwealth of Virginia. The Virginia Cancer Registry exists to:

- provide data for the planning and evaluation of cancer control activities,
- provide community-based information regarding cancer incidence,
- promote cancer-related research and provide data for research studies,
- provide support and training to hospital registries,
- provide guidance to hospitals seeking American College of Surgeons approval, and
- educate allied health professionals, health managers, and physicians about cancer reporting and data usage.

Although the VCR has collected cancer incidence data from participating hospitals since 1970, the *Code of Virginia* (§32.1-70) has required all Virginia hospitals, clinics, and independent pathology laboratories to report cancers diagnosed since 1990. As a population-based cancer registry, the VCR is dedicated to the fulfillment of its legislative intent--to establish a system to accurately monitor the incidence of cancer in the Commonwealth of Virginia for the purposes of understanding, controlling, and reducing the occurrence of cancer in the state.

This publication is based on cancers diagnosed for Virginia residents between the years of 1990 and 1994 and reported to the Virginia Cancer Registry. Information is provided for total cancer and for the ten most frequently reported sites of invasive cancer diagnosed in Virginia residents. The ten most frequently reported sites of invasive cancer during this period are bladder, female breast, buccal cavity and pharynx, colon and rectum, kidney and renal pelvis, lung and bronchus, skin (melanoma only), prostate, uterus, and Non-Hodgkin's lymphoma. Although cervical cancer is not one of the most frequent sites of invasive cancer, it is included due to the strong interest of the public, researchers, and policymakers. For each major type of invasive cancer, we discuss preventive strategies currently available to reduce the burden of disease. (Note that these data are provisional, as facilities may continue to report additional cases diagnosed in this five-year period.)

Cancer and Prevention

Cancer is a group of diseases characterized by uncontrolled growth and spread of abnormal cells. The various forms of cancer were responsible for 60,192 deaths among Virginia residents from 1990 to 1994, accounting for 24.2% of all deaths in Virginia during that time period (Virginia Center for Health Statistics).

Illness and death due to cancer are increasingly preventable through application of growing knowledge about the causes of cancer, improved screening and early diagnostic techniques, and more effective treatment.

Cancer prevention includes various types of strategies designed to reduce the disease burden. These strategies may be directed at reducing the likelihood that: 1) a healthy individual will develop cancer (primary prevention); or 2) an individual with a developing cancer will become disabled or die as a result (secondary prevention).

Primary prevention rests on the removal of lifestyle, environmental, or other factors that increase the risk of developing cancer. Secondary prevention refers to interventions for the detection of growing neoplasms at an early stage, when they can be treated with the best likelihood of a cure.

Present knowledge suggests that major reductions in population cancer rates and in an individual's likelihood of developing cancer are achievable through primary prevention strategies. For example, the

elimination of tobacco use would reduce the lung cancer death rate by over eighty-five percent and would markedly reduce rates of cancer of the oral cavity and pharynx, esophagus, bladder, kidney, pancreas, and uterine cervix.

A diet low in fat, high in fiber, and including five or more servings per day of fruits and vegetables is likely to reduce the risk of cancer of the colon and rectum, lung, prostate, bladder, esophagus, stomach, and other organs. Regular, moderate exercise has also shown benefits in the prevention of cancer for a number of sites. The overall health benefit of these habits makes them wise choices for cancer prevention.

Screening for early detection has a clear role in reducing the disease burden due to cancer of the female breast and the uterine cervix. The effectiveness of screening for cancer of the colon and rectum is being increasingly recognized. For many other cancers, however, the advisability of routine tests remains controversial and recommendations by various authorities differ.

While individual responsibility plays an important role in cancer prevention, governmental and other societal entities have key roles as well. Public health policies and regulations that minimize exposure to cigarette smoke, control occupational exposure to carcinogens, and assure access to personal health services are important. Health care providers and voluntary organizations provide needed education that helps people make healthy choices. The control of cancer requires collaboration between many different organizations and agencies.

Definitions

Reportable Cancer Cases

The *Regulations for Disease Reporting and Control (1993)* defines cancer as “all carcinomas, sarcomas, melanomas, leukemias, and lymphomas excluding localized basal and squamous cell carcinomas of the skin, except for lesions of the mucous membranes.”

Cancer Site Categories

To facilitate data interpretation and comparison, the VCR uses standard categories to analyze primary site of cancer, i.e., the site of the body in which the cancer originally began. The National Cancer Institute’s Surveillance Epidemiology and End Results (SEER) Program has established these categories. Most cancers are grouped by the primary site. Some cancers, such as lymphomas and leukemias, are grouped by their cell type and not by the anatomical site where they occurred. Please see Appendix 4 for the SEER definition of site categories.

Incidence Rates

A cancer incidence rate reflects the number of new cases diagnosed per 100,000 individuals in a given area over a defined time period. Cancer rates tend to vary substantially by age, with higher rates of most cancers noted in older populations. This report provides both age-specific and age-adjusted incidence rates. Age-specific rates denote the incidence of cancer among persons within specific age categories (typically 0-4 years, 5-9 years, 10-14 years, etc., up to 85+ years). Age-adjusted rates are calculated by mapping age-specific rates onto a standard population to remove the effect of different age structures and to arrive at a single summary measure for comparison. The age-adjusted incidence rates were calculated by the direct method, using the age distribution of the 1970 United States population as the standard. Rates were calculated by sex, race, and region. Except where noted, all incidence rates are expressed per 100,000 persons per year and exclude in situ carcinomas except urinary bladder.

All age-adjusted incidence rates in this report are average annual rates calculated by dividing the total cases during 1990-1994 by the sum of annual population estimates for those years. These estimates were calculated using population data from the US Bureau of the Census and the Virginia Employment Commission (see Appendix 1 for discussion).

Summary Stage

Cancer stage is the categorization of malignant tumors based on how far they have spread from the site of origin at diagnosis. In this publication, stage is categorized according to SEER convention, as follows:

- In situ – A malignant tumor that does not invade or penetrate surrounding tissue.
- Local – An invasive tumor confined to the site of origin.
- Regional – A tumor that has spread by direct extension to immediately adjacent organs or tissues and/or metastasized (spread through the bloodstream) to regional lymph nodes, but appears not to have spread any further.
- Distant – A tumor that has spread by direct extension beyond the immediately adjacent organs or tissues, and/or metastasized to distant lymph nodes or other distant tissues.
- Unknown – Insufficient information available to determine the stage of disease at diagnosis.

Cancers staged as local, regional, or distant are commonly referred to as “invasive.” This report focuses on invasive cancer but does include in situ cancer of the bladder. Complete stage distributions, including in situ cancers, are provided for selected sites in Section III.

Alternatively, stage distribution by American Joint Commission on Cancer (AJCC) stage grouping are provided in Appendix 5 for the major site categories.

Race Grouping

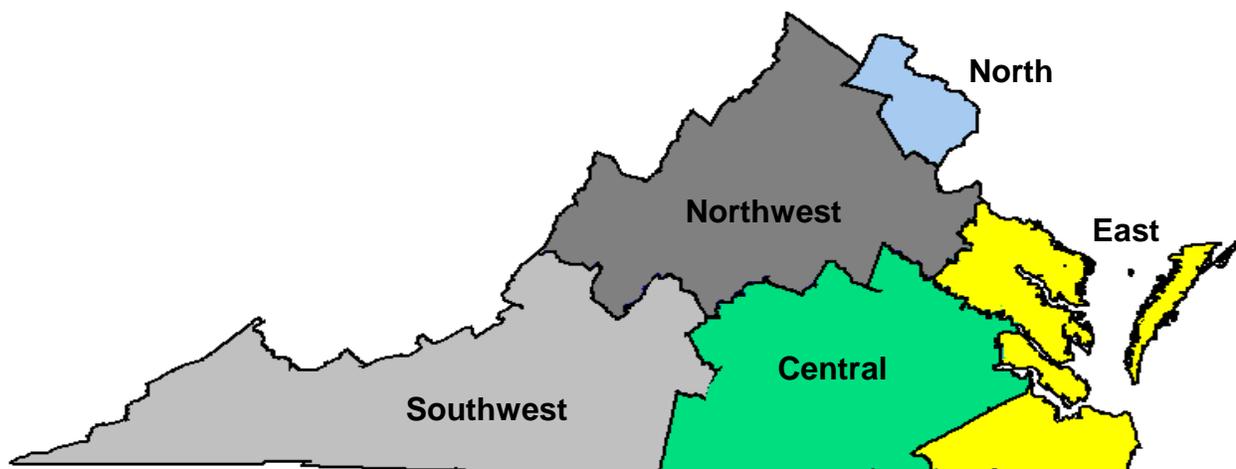
According to the modified 1990 U.S. Census data of February 1992, 78.3% of Virginia’s population was White, 18.9% Black, and 2.8% was of an other race, including Asian/Pacific Islander and Native American. Race-specific counts and rates could only be calculated for White, Black, and other races, since reliable population estimates are not available for the more specific racial populations. Note that persons of Hispanic ethnicity may be included in any race category.

Regions

Virginia is made up of 95 counties and 40 cities, which are grouped into five regions by the Virginia Department of Health. The composition of the Health Regions is both illustrated and listed below:

Northwest Counties: Albemarle, Augusta, Bath, Caroline, Clarke, Culpeper, Fauquier, Fluvanna, Frederick, Greene, Highland, King George, Louisa, Madison, Nelson, Orange, Page, Rappahanock, Rockbridge, Rockingham, Shenandoah, Spotsylvania, Stafford, Warren.
Cities: Buena Vista, Charlottesville, Fredericksburg, Harrisonburg, Lexington, Staunton, Waynesboro, Winchester.

North Counties: Arlington, Fairfax, Loudoun, Prince William.



Cities: Alexandria, Fairfax, Falls Church, Manassas, Manassas Park.

Southwest Counties: Alleghany, Amherst, Appomatox, Bedford, Bland, Botetourt, Buchanan, Campbell, Carroll, Craig, Dickenson, Floyd, Franklin, Giles, Grayson, Henry, Lee, Montgomery, Patrick, Pittsylvania, Pulaski, Roanoke, Russell, Scott, Smyth, Tazewell, Washington, Wise, Wythe.

Cities: Bedford, Bristol, Clifton Forge, Covington, Danville, Galax, Lynchburg, Martinsville, Norton, Radford, Roanoke, Salem.

Central Counties: Amelia, Brunswick, Buckingham, Charles City, Charlotte, Chesterfield, Cumberland, Dinwiddie, Goochland, Greensville, Halifax, Hanover, Henrico, Lunenburg, Mecklenberg, New Kent, Nottoway, Powhatan, Prince Edward, Prince George, Surry, Sussex.

Cities: Colonial Heights, Emporia, Hopewell, Petersburg, Richmond.

East Counties: Accomack, Essex, Gloucester, Isle of Wight, James City, King and Queen, King William, Lancaster, Mathews, Middlesex, Northampton, Northumberland, Richmond, Southampton, Westmoreland, York.

Cities: Chesapeake, Franklin, Hampton, Newport News, Norfolk, Poquoson, Portsmouth, Suffolk, Virginia Beach, Williamsburg.

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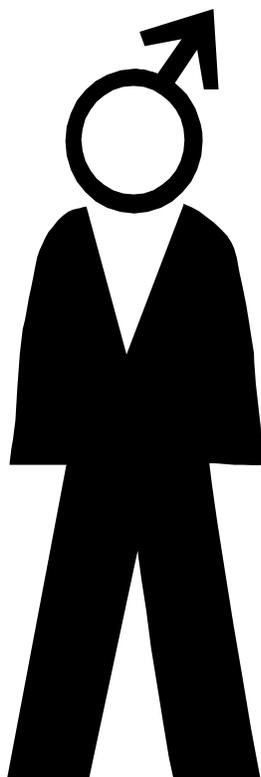
Section II

Incidence of Reportable Cancer in Virginia: An Overview

Distribution of Reported Cancer, Virginia, 1990-1994
 Number of Cases By Site and Year of Diagnosis
 Total Population

SITE	1990	1991	1992	1993	1994	1990-1994	
						Count	%
Lung/Bronchus	3,359	3,584	3,561	3,629	3,587	17,720	15.9
Prostate	2,459	3,375	4,346	3,987	3,425	17,592	15.8
Breast	3,375	3,587	3,536	3,499	3,536	17,533	15.7
Colon/Rectum	2,557	2,603	2,596	2,748	2,613	13,117	11.7
Urinary Bladder	983	947	885	949	940	4,704	4.2
Non-Hodgkin's Lymphoma	732	683	778	766	752	3,711	3.3
Buccal Cavity and Pharynx	608	654	626	631	624	3,143	2.8
Uterus	559	586	592	614	674	3,025	2.7
Melanoma of the Skin	552	583	589	532	635	2,891	2.6
Kidney/Renal Pelvis	469	470	519	476	488	2,422	2.2
Pancreas	433	407	444	453	435	2,172	1.9
Ovary	360	393	386	419	361	1,919	1.7
Leukemia	343	368	357	388	399	1,855	1.7
Cervix	494	294	291	293	273	1,645	1.5
Stomach	328	319	354	316	322	1,639	1.5
Brain/Other Nervous System	288	320	304	315	331	1,558	1.4
Larynx	306	283	270	317	296	1,472	1.3
Esophagus	280	253	301	288	278	1,400	1.3
Multiple Myeloma	207	237	204	245	245	1,138	1.0
Thyroid	180	230	220	227	243	1,100	1.0
Hodgkin's Lymphoma	156	151	166	153	144	770	0.7
Testis	118	146	152	140	141	697	0.6
Liver/Intrahepatic Bile Duct	118	112	146	144	160	680	0.6
Other	1,459	1,558	1,488	1,613	1,658	7,776	7.0
TOTAL	20,723	22,143	23,111	23,142	22,560	111,679	

Note. Data exclude basal and squamous skin cell cancers and in situ carcinomas except urinary bladder. Data include 22 cases with unreported sex.



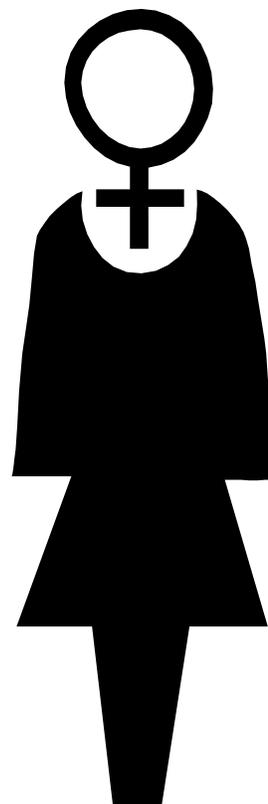
Distribution of Reported Cancer, Virginia, 1990-1994
 Number of Cases By Site and Year of Diagnosis
 Ten Most Commonly Reported Sites--Males

SITE	1990	1991	1992	1993	1994	1990-1994	
						Count	%
Prostate	2,459	3,375	4,346	3,987	3,425	17,592	30.0
Lung/Bronchus	2,158	2,288	2,250	2,269	2,207	11,172	19.1
Colon/Rectum	1,252	1,317	1,319	1,348	1,276	6,512	11.1
Urinary Bladder	735	675	660	661	675	3,406	5.8
Buccal Cavity and Pharynx	424	441	422	401	436	2,124	3.6
Non-Hodgkin's Lymphoma	369	342	420	423	378	1,932	3.3
Melanoma of the Skin	310	299	325	291	362	1,587	2.7
Kidney/Renal Pelvis	290	278	322	302	290	1,482	2.5
Larynx	238	220	209	255	229	1,151	2.0
Pancreas	227	201	223	222	225	1,098	1.9

Note. Data exclude basal and squamous cell skin cancers and in situ carcinomas except urinary bladder.

Distribution of Reported Cancer, Virginia, 1990-1994
 Number of Cases By Site and Year of Diagnosis
 Ten Most Commonly Reported Sites--Females

SITE	1990	1991	1992	1993	1994	1990-1994	
						Count	%
Breast	3,361	3,568	3,506	3,472	3,512	17,419	32.9
Colon/Rectum	1,305	1,286	1,277	1,398	1,336	6,602	12.5
Lung/Bronchus	1,201	1,296	1,311	1,358	1,377	6,543	12.3
Uterus	559	586	592	614	674	3,025	5.7
Ovary	360	393	386	419	361	1,919	3.6
Non-Hodgkin's Lymphoma	363	341	358	343	373	1,778	3.4
Cervix	494	294	291	293	273	1,645	3.1
Melanoma of the Skin	241	284	264	241	273	1,303	2.5
Urinary Bladder	247	272	225	287	263	1,294	2.4
Pancreas	206	206	221	231	210	1,074	2.0



Note. Data exclude basal and squamous cell skin cancers and in situ carcinomas except urinary bladder.

Section III

Descriptive Epidemiology of Invasive Cancer for Selected Sites

All Sites Combined

Incidence Summary

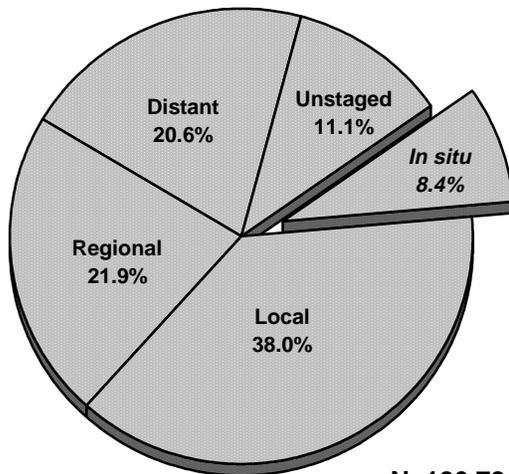
	Total	Male	Female
AAIR*	334.8	414.4	283.7
# of cases	111,688	58,638	53,022

Age-Adjusted Incidence Rates by Race

	Cases	Rate*
White	88,566	324.1
Black	19,886	365.2
Other	1,250	233.0
Unknown	1,986	n/a

*Age-adjusted incidence rates (AAIRs) are per 100,000 population. Data exclude basal and squamous cell skin cancers and in situ carcinomas except urinary bladder.

Stage at Diagnosis



N=120,781

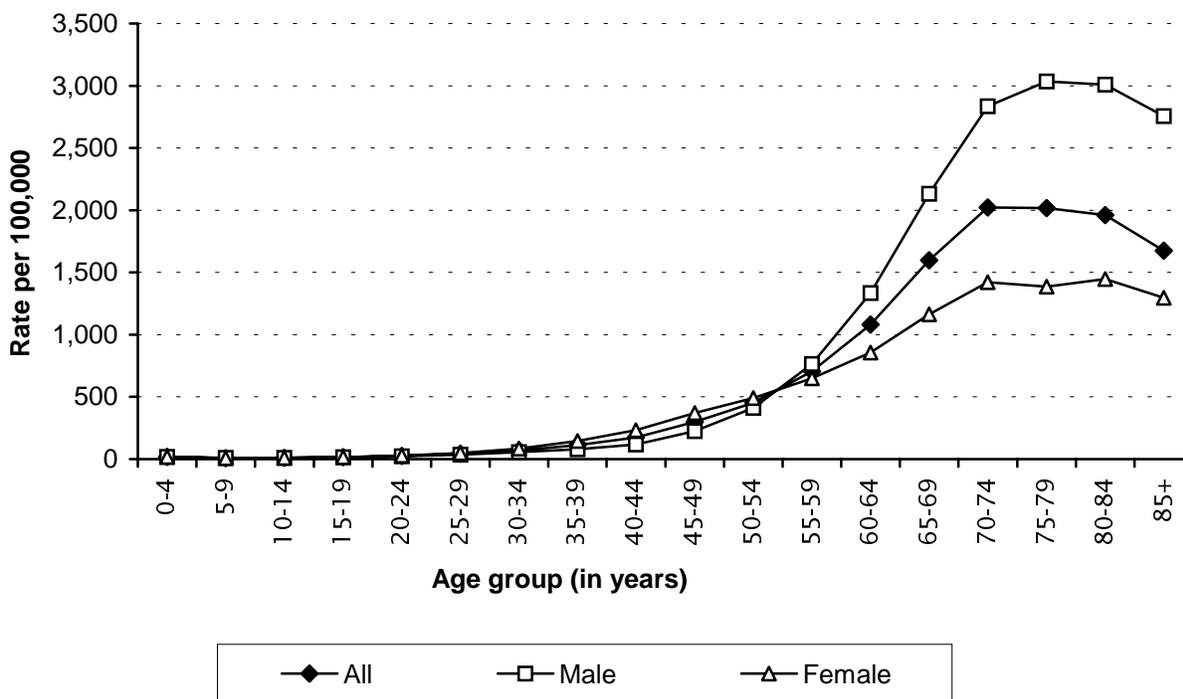
Risk and Associated Factors

Age	Rates increase steadily with age.
Gender	Males have a higher incidence rate than females.
Race and Income	Rates are generally higher for the black population and among lower income groups.
Genetics	Genes play a role in the development of some cancers.
Diet	Increased risk for several cancers is associated with diets low in fresh fruit and vegetable consumption.
Tobacco	Tobacco use is the single most important risk factor for cancer mortality and morbidity.
Occupation	Workplace exposure, primarily to chemicals, asbestos, and radiation, increases risk for some cancers.

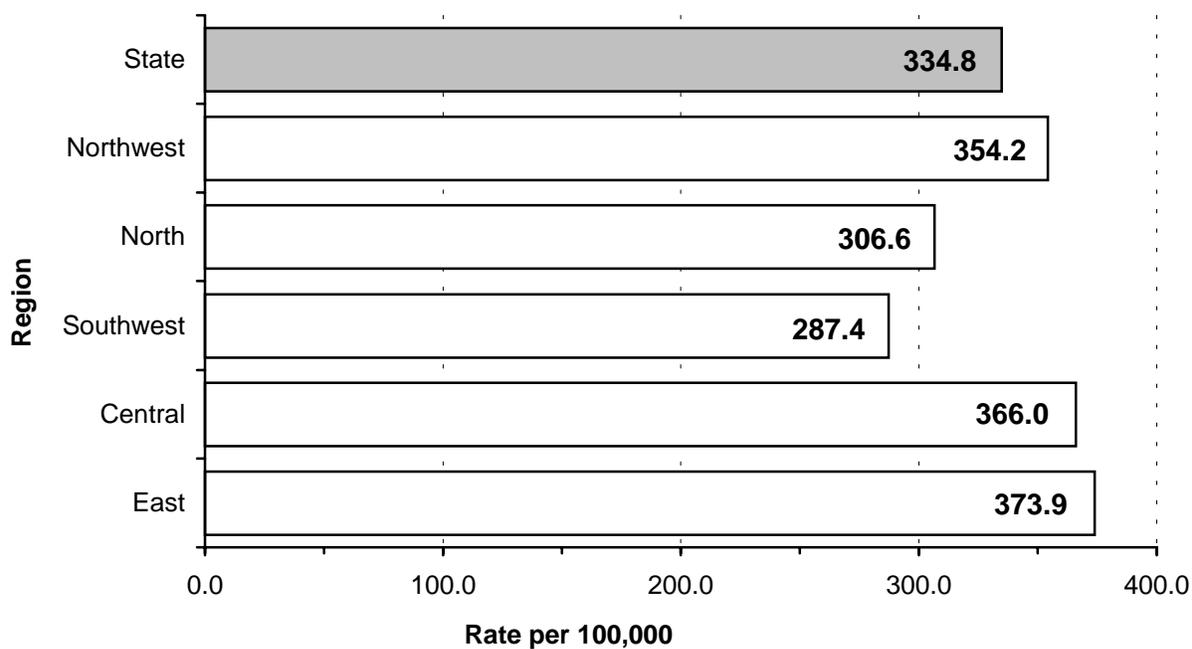
Prevention Strategies

Not all cancers can be prevented, but the best way to minimize risk is to avoid factors known to be related to cancer. To diagnose the disease as early as possible, and thereby increase chances of a favorable outcome, routine medical examinations are recommended.

**All Sites Combined
Age-Specific Rates**



**All Sites Combined
Age-Adjusted Rates by Region**



Note. Data exclude basal and squamous cell skin cancers and in situ carcinomas except urinary bladder.

Bladder Cancer

Incidence Summary

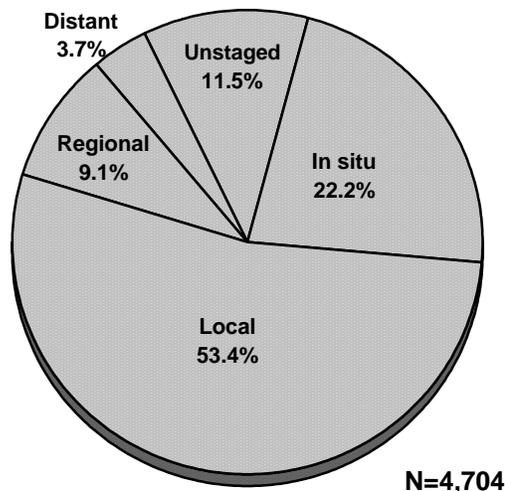
	Total	Male	Female
AAIR*	14.1	24.5	6.6
# of invasive cases	3,658	2,628	1,026
# of in situ cases	1,046	778	268

Age-Adjusted Incidence Rates by Race

	Cases	Rate*
White	4,110	15.0
Black	486	8.9
Other	34	7.9
Unknown	74	n/a

*Age-adjusted incidence rates (AAIRs) are per 100,000 population and include in situ cases.

Stage at Diagnosis



Risk and Associated Factors

Age	Rates increase steadily with age.
Gender	Males have a higher incidence rate than females.
Race	Nationally, incidence rates are slightly higher in the black population.
Tobacco	Cigarette smokers experience twice the risk of non-smokers. Smoking unfiltered cigarettes adds additional risk.
Occupation	Workers in the dyestuffs and rubber industries have been shown to have an increased risk of developing bladder cancer. Occupational exposure to benzidine and 2-naphthylamine has also been associated with increased risk.
Other	Heavy use of analgesics containing phenacetin and Schistosomiasis infection has been linked with increased risk.

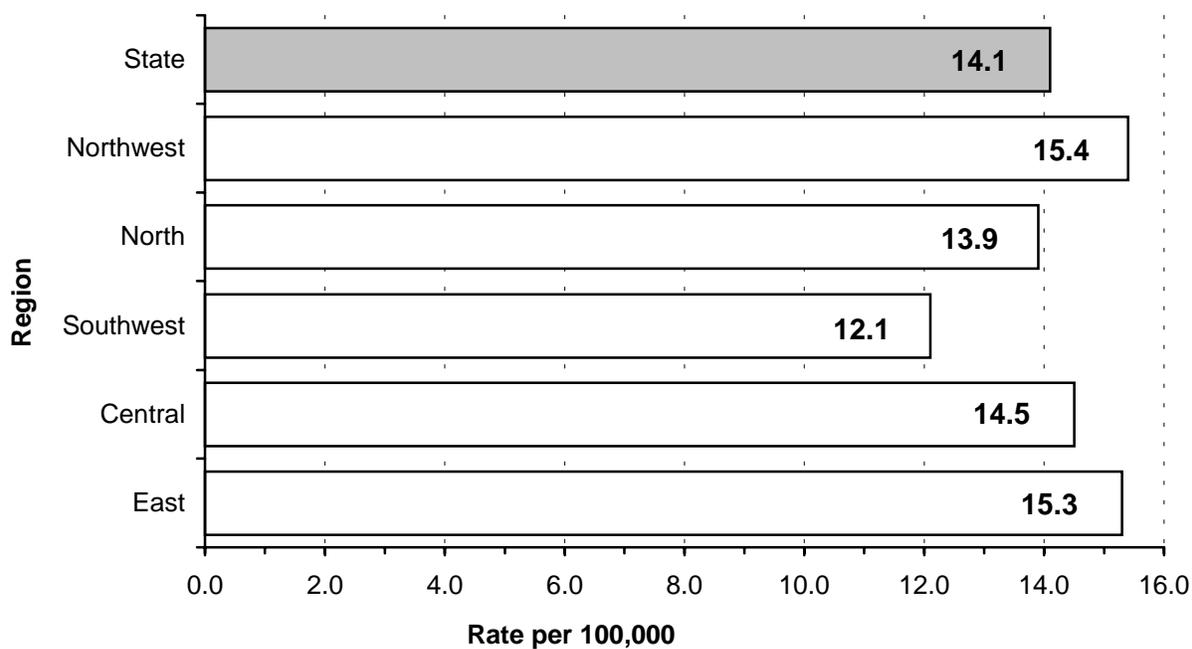
Prevention Strategies

Avoidance of cigarette smoking is the most effective primary prevention available for the general population. Screening of urine for cancer cells has been recommended for industrial workers at increased risk.

**Bladder Cancer
Age-Specific Rates**



**Bladder Cancer
Age-Adjusted Rates by Region**



Female Breast Cancer

Incidence Summary

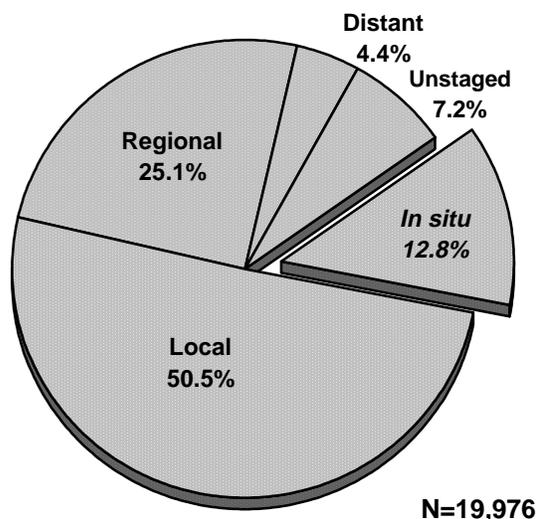
AAIR*	94.2
# of invasive cases	17,419

Age-Adjusted Incidence Rates by Race

	Cases	Rate*
White	14,290	95.5
Black	2,784	88.3
Other	204	49.8
Unknown	141	n/a

*Age-adjusted incidence rates (AAIRs) are per 100,000 population and reflect invasive cancer only.

Stage at Diagnosis



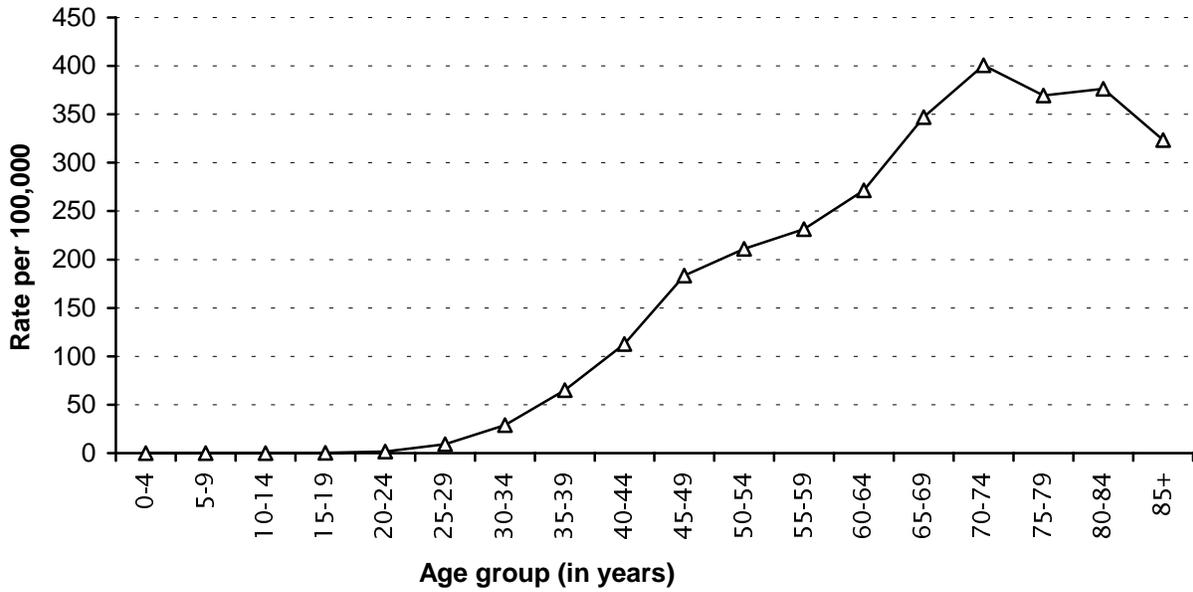
Risk and Associated Factors

Age	Rates increase steadily with age.
Race, Income and Education	Nationwide, rates are higher in white women and women of higher income and education levels.
Genetics	Specific genes associated with breast cancer have been identified and are being studied.
Diet and Exercise	Alcohol consumption and sedentary lifestyle have been identified as possible risk factors. More research is needed.
Hormonal Influences	Early menarche, late menopause, lengthy exposure to postmenopausal estrogens, and late age at first live birth have been associated with higher rates.
Other	Rates are higher for women with history of some forms of benign breast disease, and for women with family history of breast cancer.

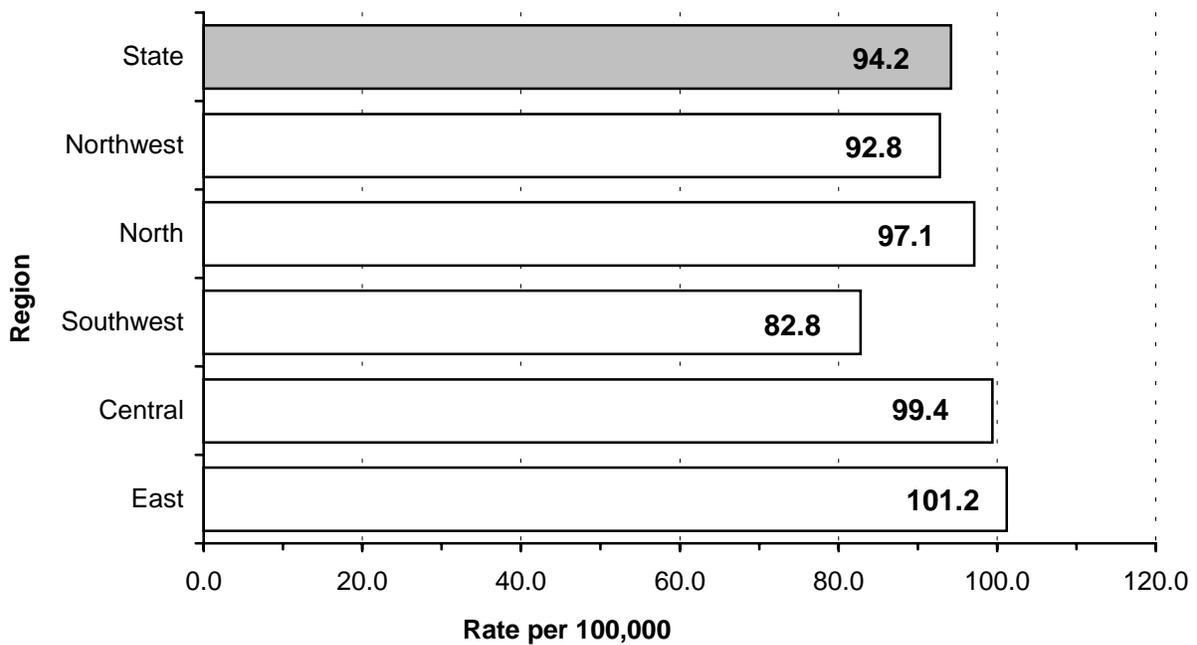
Prevention Strategies

Routine screening evaluations with mammography and clinical breast examinations in women age 50 years and older have been shown to substantially reduce mortality. The effectiveness of screening in younger women is not clearly established; however, monthly breast self-examination is recommended for women 20 years and older. Research in hormonal chemoprevention of breast cancer is currently being conducted.

**Invasive Female Breast Cancer
Age-Specific Rates**



**Invasive Female Breast Cancer
Age-Adjusted Rates by Region**



Cancer of the Buccal Cavity and Pharynx

Incidence Summary

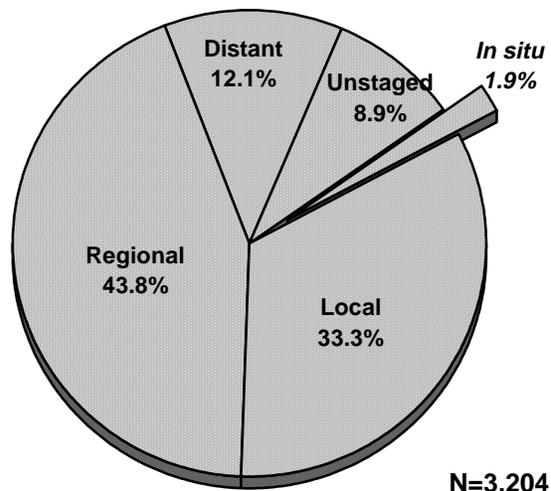
	Total	Male	Female
AAIR*	9.6	14.6	5.5
# of invasive cases	3,143	2,124	1,019

Age-Adjusted Incidence Rates by Race

	Cases	Rate*
White	2,375	8.9
Black	692	13.2
Other	38	5.8
Unknown	38	n/a

*Age-adjusted incidence rates (AAIRs) are per 100,000 population and reflect invasive cancer only.

Stage at Diagnosis



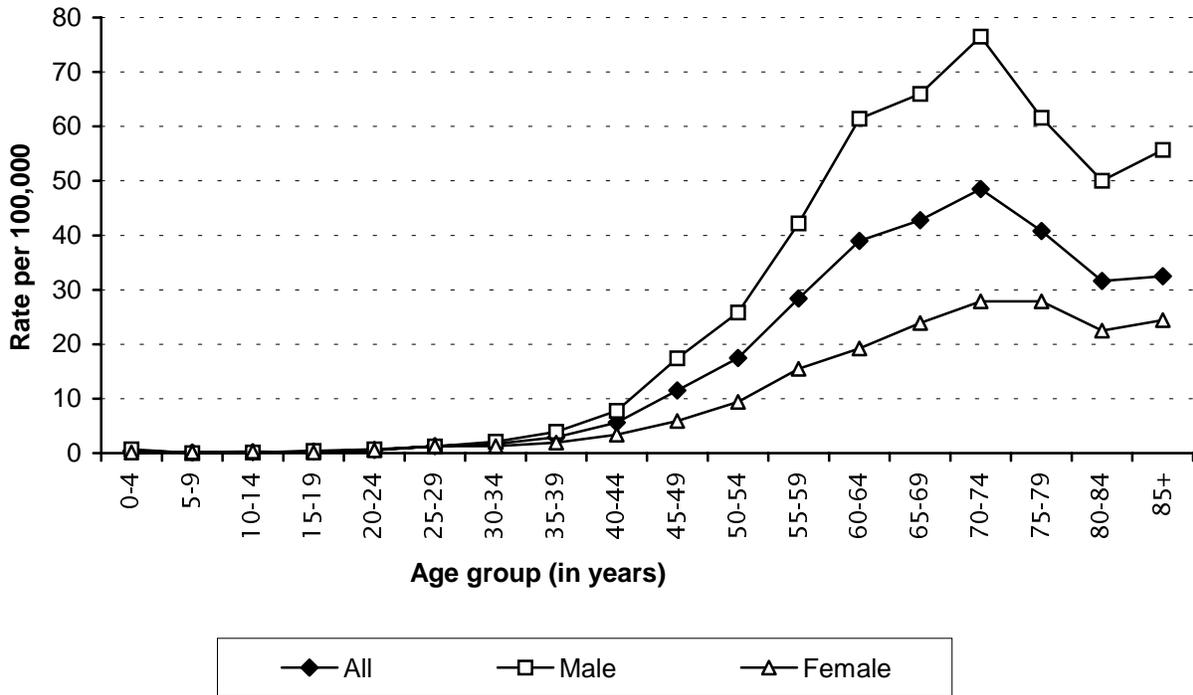
Risk and Associated Factors

Age	Incidence increases with age. Over 90% of cases occur in persons over 45 years of age.
Gender	Males have a higher incidence rate than females.
Race	Nationally and in Virginia, the black population has higher incidence rates than the white population.
Diet	Poor diet, low in fresh fruits and vegetables, increases risk.
Alcohol	Excessive alcohol use is an important risk factor.
Tobacco	Smoking and chewing tobacco are major risk factors.
Occupation	Workers in textile and leather manufacturing are at increased risk.
Other	Combined use of alcohol and tobacco results in higher risk.

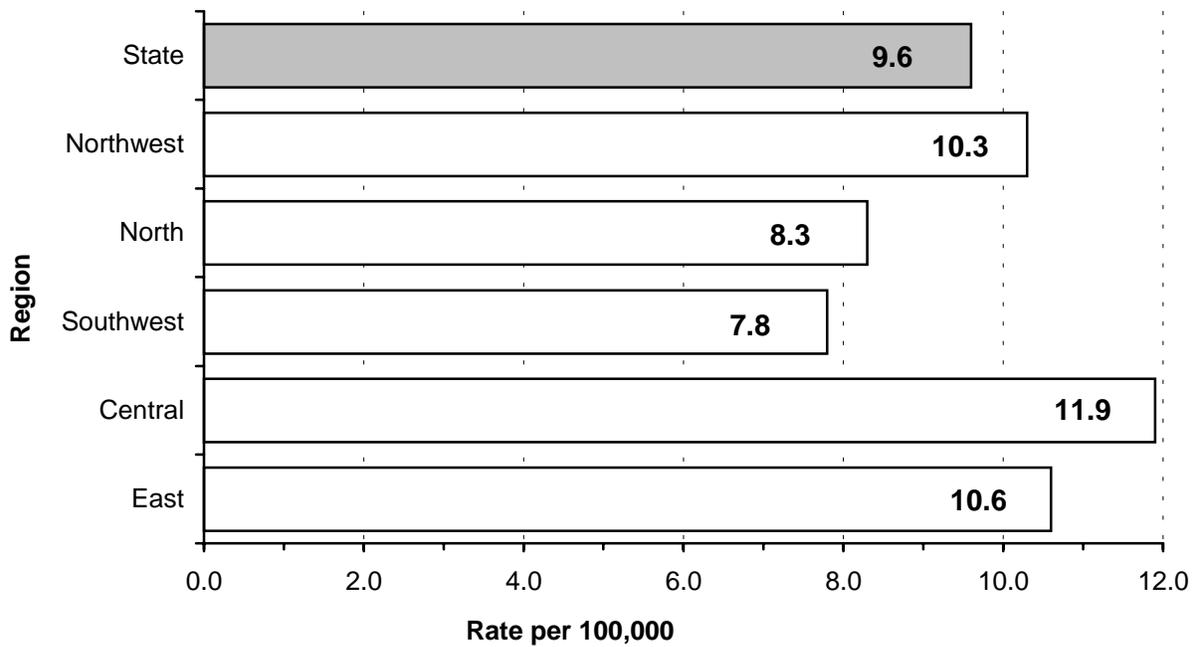
Prevention Strategies

No effective screening modalities have been established, but routine evaluation of the oral cavity during dental and medical check-ups might lead to an earlier diagnosis. The most important preventive measures are the avoidance of tobacco products and the moderation of alcohol use. Also, recent evidence suggests that frequent consumption of fresh fruits and vegetables may lower risk.

**Invasive Cancer of the Buccal Cavity and Pharynx
Age-Specific Rates**



**Invasive Cancer of the Buccal Cavity and Pharynx
Age-Adjusted Rates by Region**



Cancer of the Cervix (invasive)

Incidence Summary

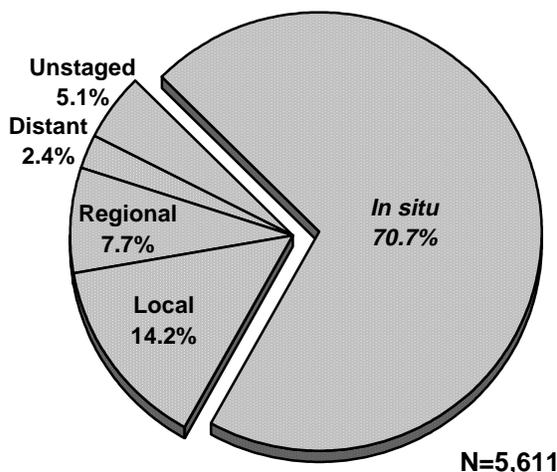
AAIR*	8.5
# of invasive cases	1,645

Age-Adjusted Incidence Rates by Race

	Cases	Rate*
White	1,211	7.8
Black	363	11.1
Other	52	12.3
Unknown	19	n/a

*Age-adjusted incidence rates (AAIRs) are per 100,000 population and reflect invasive cancer only.

Stage at Diagnosis



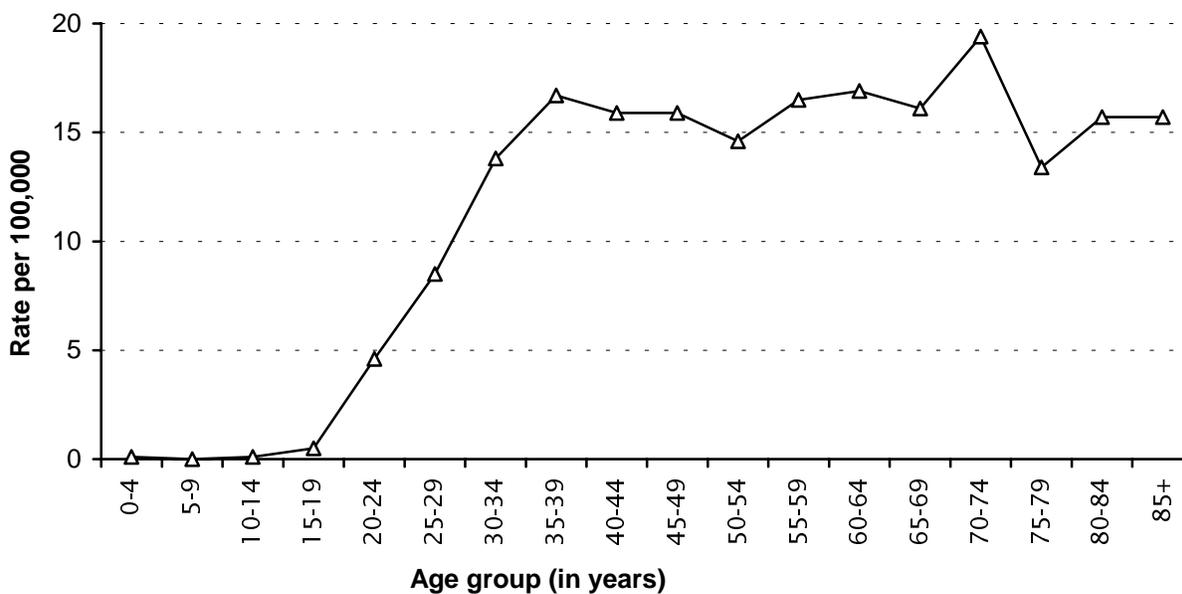
Risk and Associated Factors

Age	Cervical cancer can occur in women of any age. However, the majority of invasive cases are diagnosed in women over age 35.
Race and Income	Nationally, black females, as well as women in lower income groups, have been shown to have higher incidence rates.
Tobacco	Exposure to cigarette smoke is an important risk factor.
Other	Strong risk factors for cervical cancer include: early age at first intercourse (16 years or less), a history of multiple sexual partners, a history of genital Human Papilloma Virus infection or other sexually transmitted disease, and the presence of other genital tract neoplasia.

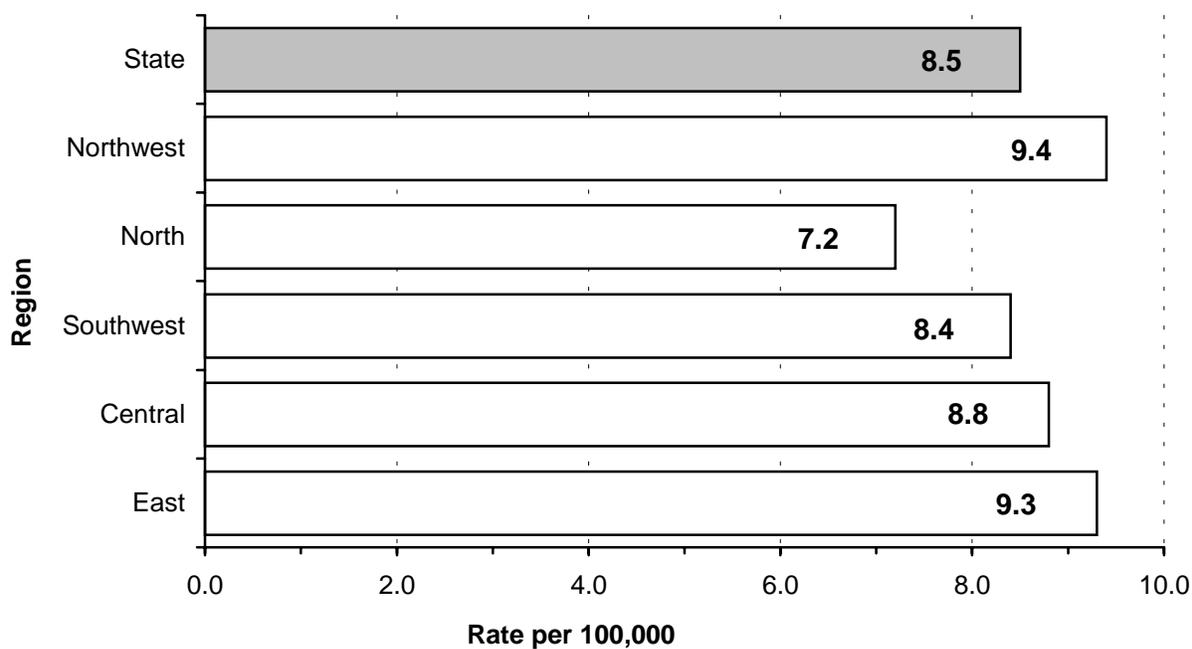
Prevention Strategies

Strong evidence supports the value of routine Pap smears in women who are or have been sexually active. Incidence of invasive cervical cancer has been reduced due to increased use of Pap smear screening. Today, the vast majority of cases in younger women are diagnosed before the invasive stage. Avoidance of sexually transmitted diseases and of cigarette smoke can help prevent cervical cancer, as well.

**Invasive Cervical Cancer
Age-Specific Rates**



**Invasive Cervical Cancer
Age-Adjusted Rates by Region**



Cancer of the Cervix (all stages)

Incidence Summary

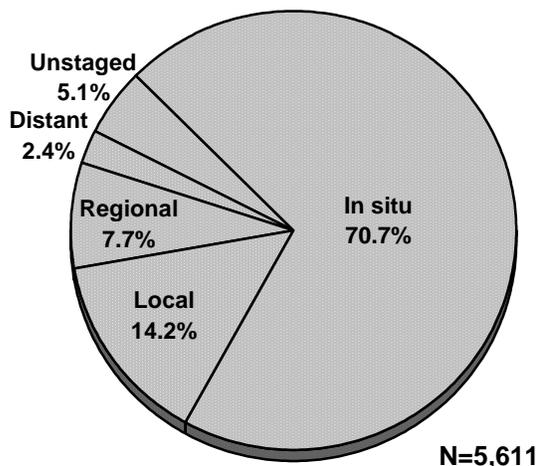
AAIR*	28.6
# of invasive cases	1,645
# of in situ cases	3,966

Age-Adjusted Incidence Rates by Race

	Cases	Rate*
White	4,324	28.2
Black	964	27.0
Other	112	23.2
Unknown	211	n/a

*Age-adjusted incidence rates (AAIRs) are per 100,000 population and include in situ as well as invasive cases.

Stage at Diagnosis



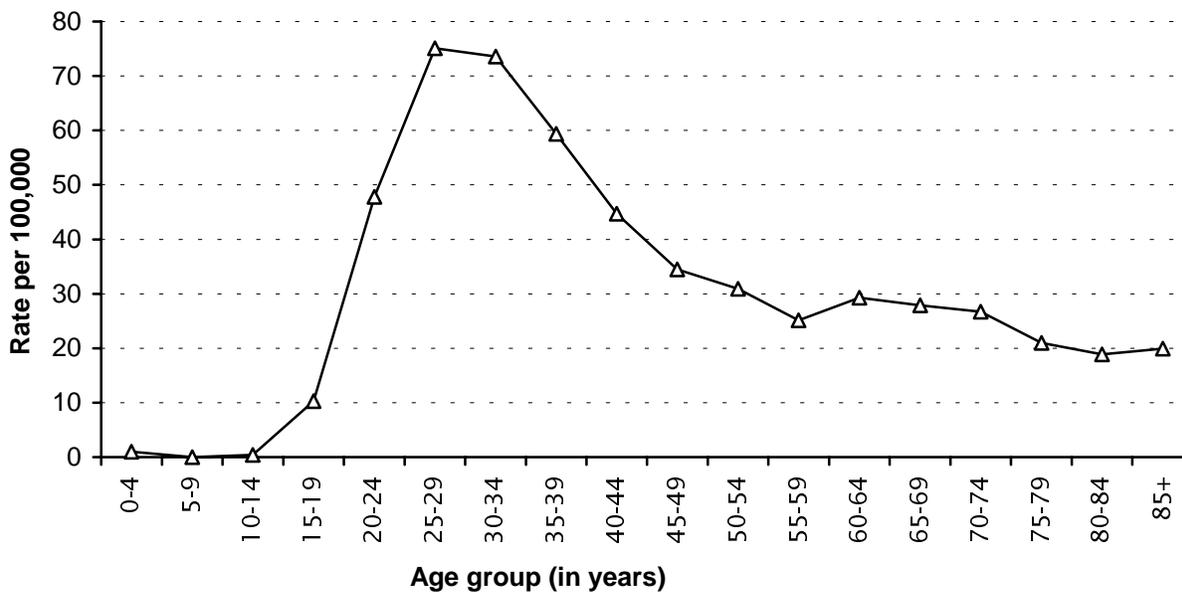
Risk and Associated Factors

Age	Cervical cancer can occur in women of any age. However, the majority of in situ cases are diagnosed in women under the age of 35.
Race and Income	Nationally, black females, as well as women in lower income groups, have been shown to have higher incidence rates.
Tobacco	Exposure to cigarette smoke is an important risk factor.
Other	Strong risk factors for cervical cancer include: early age at first intercourse (16 years or less), a history of multiple sexual partners, a history of genital Human Papilloma Virus infection or other sexually transmitted disease, and the presence of other genital tract neoplasia.

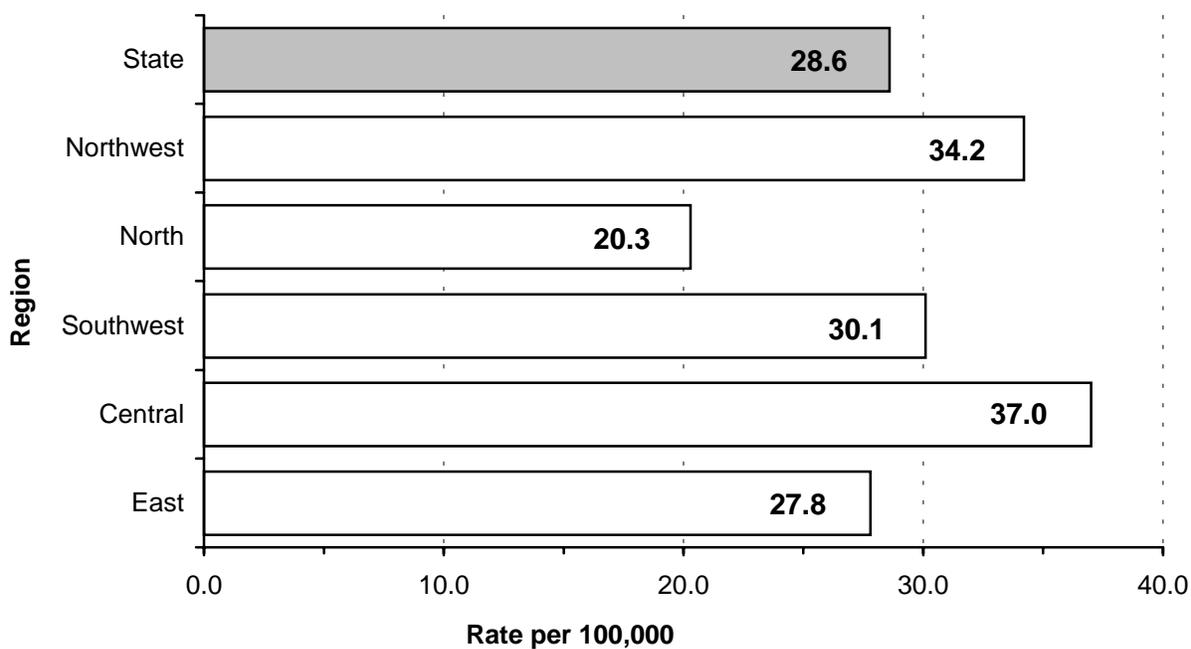
Prevention Strategies

Strong evidence supports the value of routine Pap smears in women who are or have been sexually active. Incidence of invasive cervical cancer has been reduced due to increased use of Pap smear screening. Today, the vast majority of cases in younger women are diagnosed before the invasive stage. Avoidance of sexually transmitted diseases and of cigarette smoke can help prevent cervical cancer, as well.

**Cervical Cancer (all stages)
Age-Specific Rates**



**Cervical Cancer (all stages)
Age-Adjusted Rates by Region**



Cancer of the Colon and Rectum

Incidence Summary

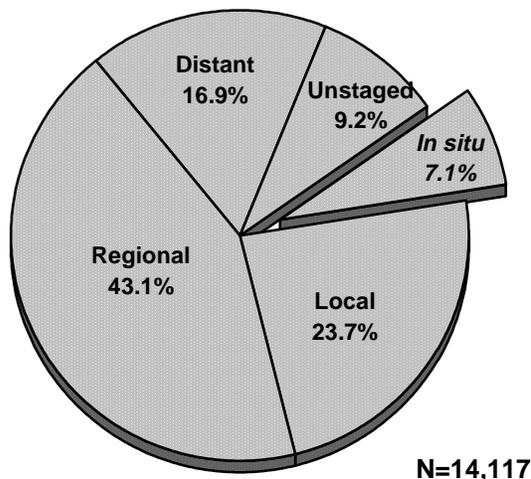
	Total	Male	Female
AAIR*	38.9	46.6	33.5
# of invasive cases	13,117	6,512	6,602

Age-Adjusted Incidence Rates by Race

	Cases	Rate*
White	10,449	37.6
Black	2,423	44.5
Other	138	28.8
Unknown	107	n/a

*Age-adjusted incidence rates (AAIRs) are per 100,000 population and reflect invasive cancer only.

Stage at Diagnosis



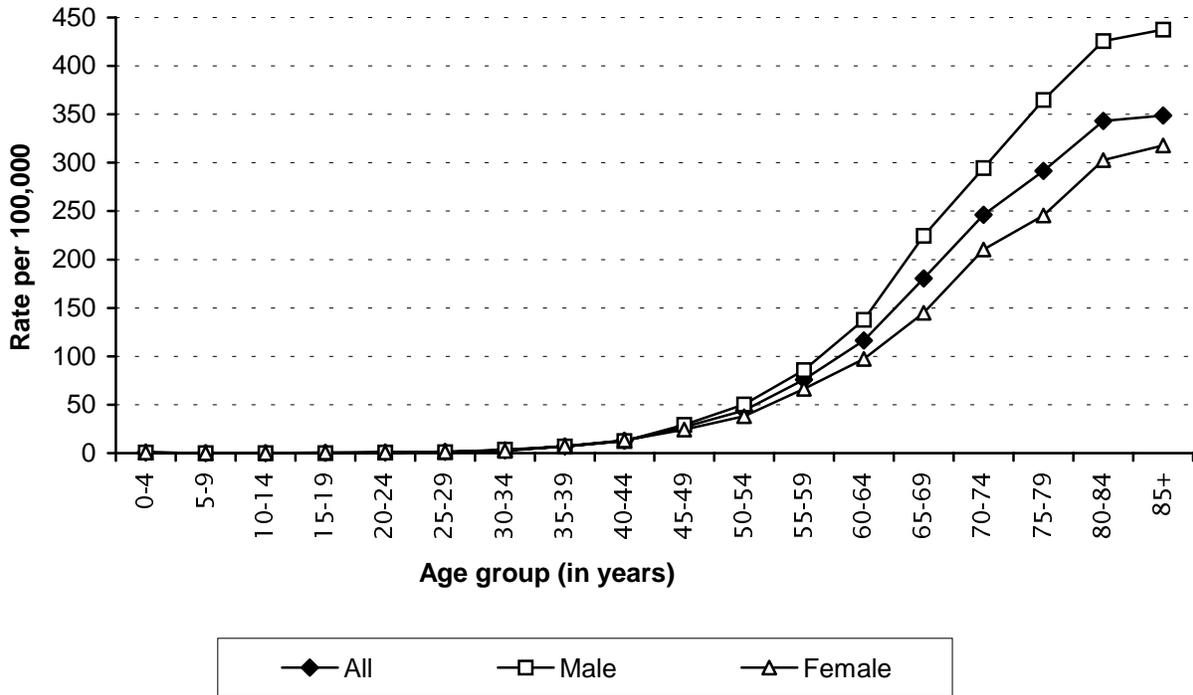
Risk and Associated Factors

- Age** Rates increase with age. Diagnosis is rare before the age of 45.
- Gender** Males have a higher incidence rate than females.
- Genetics** Some research suggests that genetics may contribute to increased risk.
- Diet and Exercise** Research suggests that diets low in fat and high in fiber reduce the risk. Regular, moderate physical activity is associated with lower rates of colorectal cancer.
- Other** A family history of colorectal cancer or polyps increases the risk of this disease.

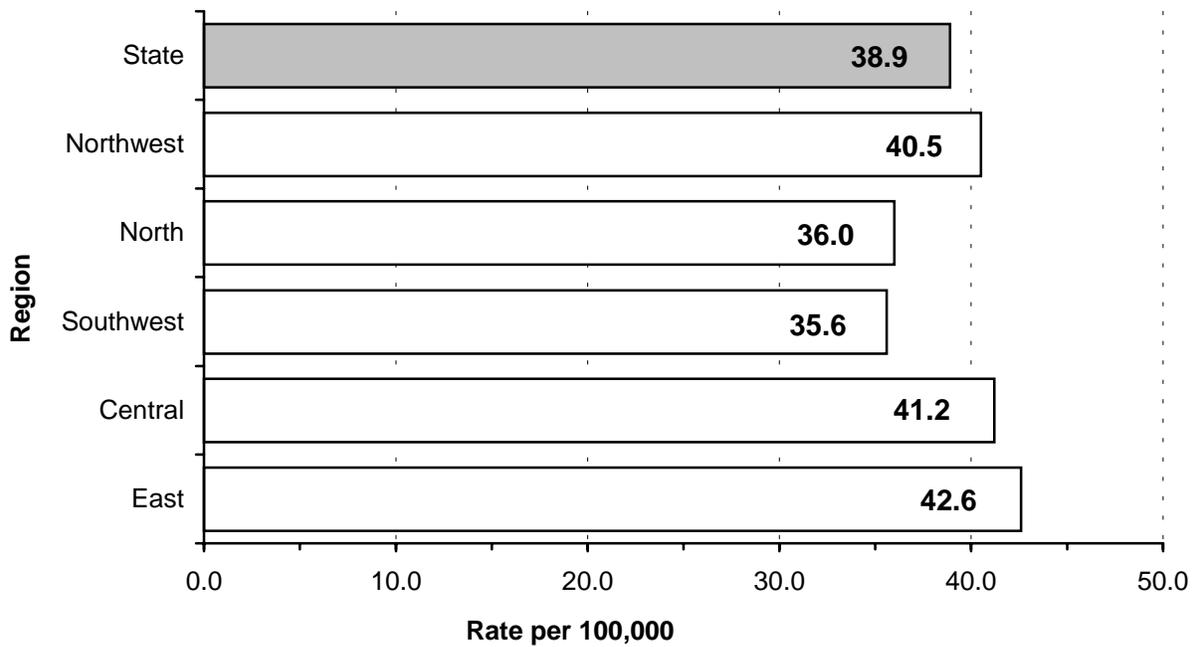
Prevention Strategies

Routine screening is recommended by many authorities for adults over age 40. Screening should include an annual digital rectal exam and fecal occult blood test, as well as periodic sigmoidoscopy (visual examination of the lower bowel) after the age of 50. Decreased intake of fat, increased intake of fiber, and regular exercise may also help prevent colorectal cancer.

**Invasive Cancer of the Colon and Rectum
Age-Specific Rates**



**Invasive Cancer of the Colon and Rectum
Age-Adjusted Rates by Region**



Cancer of the Kidney and Renal Pelvis

Incidence Summary

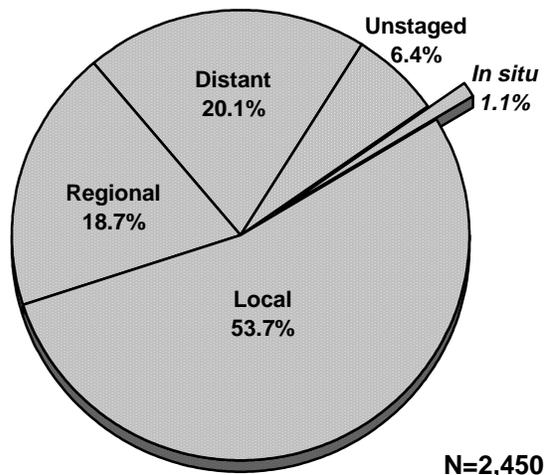
	Total	Male	Female
AAIR*	7.4	10.3	5.2
# of invasive cases	2,422	1,482	940

Age-Adjusted Incidence Rates by Race

	Cases	Rate*
White	1,918	7.2
Black	456	8.4
Other	39	6.9
Unknown	9	n/a

*Age-adjusted incidence rates (AAIRs) are per 100,000 population and reflect invasive cancer only.

Stage at Diagnosis



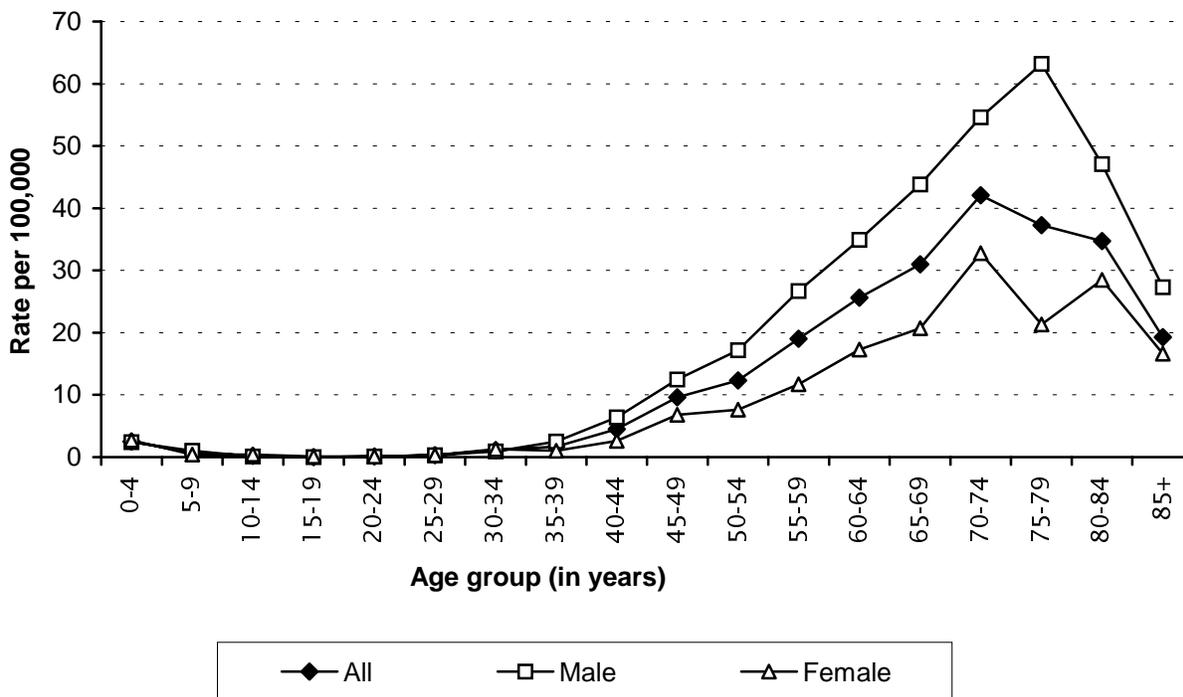
Risk and Associated Factors

Age	Both adults and children are at risk for cancer at this site. Renal cell carcinoma accounts for over 80% of adult kidney cancers. Wilm's tumor predominately affects children under 5 and accounts for the majority of childhood kidney cancers.
Gender	Renal cell carcinoma affects males twice as often as females.
Race	The incidence of Wilm's tumor is higher in the black population.
Genetics	Wilm's tumor often occurs with congenital defects.
Tobacco	Cigarette smoking is strongly associated with adult kidney cancer. Smokers are at twice the risk of developing kidney cancer as non-smokers.
Occupation	Exposure to cadmium, asbestos, and organic solvents is associated with increased risk.
Other	Heavy use of analgesics containing phenacetin has been linked to increased risk.

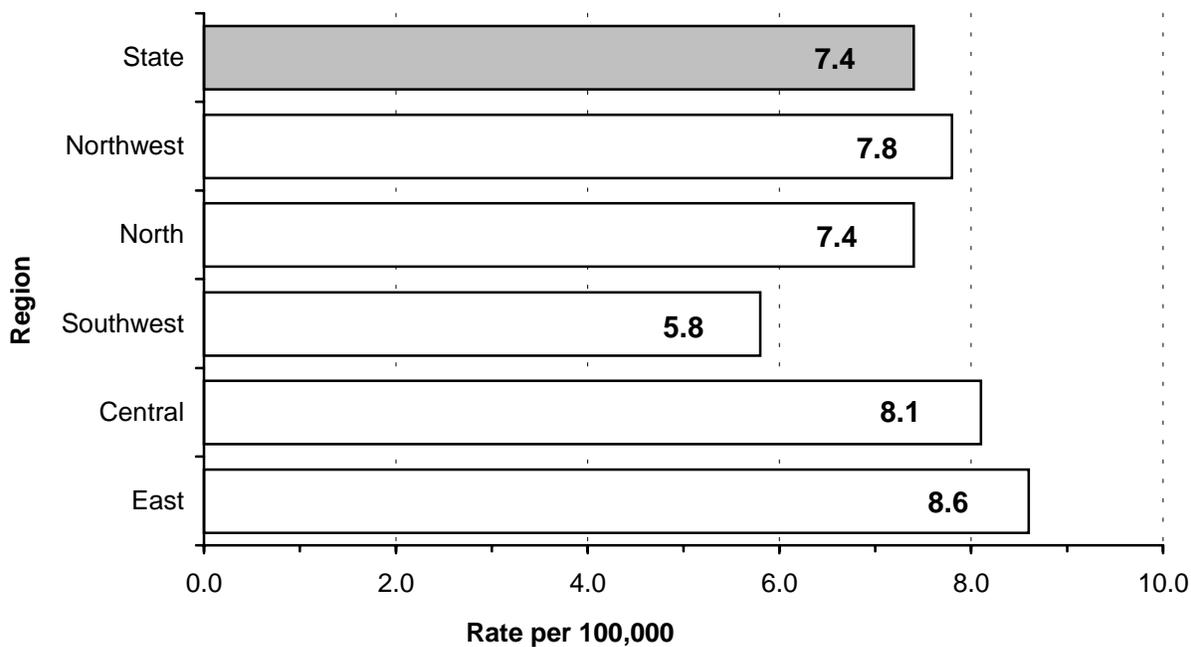
Prevention Strategies

No screening procedures are currently recommended. Avoidance of cigarette smoking and occupational exposures is likely to be beneficial.

**Invasive Cancer of the Kidney and Renal Pelvis
Age-Specific Rates**



**Invasive Cancer of the Kidney and Renal Pelvis
Age-Adjusted Rates by Region**



Lung and Bronchial Cancer

Incidence Summary

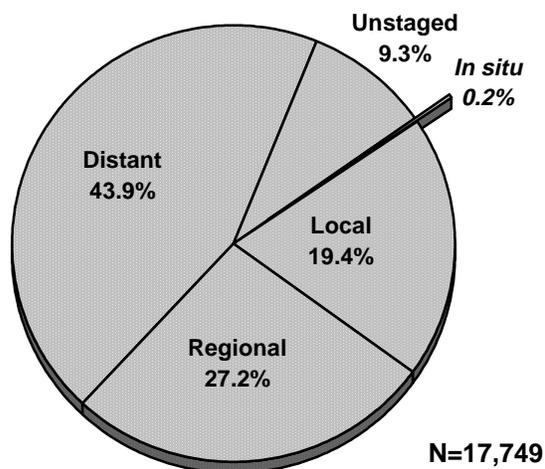
	Total	Male	Female
AAIR*	54.6	79.7	36.0
# of invasive cases	17,720	11,172	6,543

Age-Adjusted Incidence Rates by Race

	Cases	Rate*
White	14,185	53.1
Black	3,315	63.0
Other	140	32.9
Unknown	80	n/a

*Age-adjusted incidence rates (AAIRs) are per 100,000 population and reflect invasive cancer only.

Stage at Diagnosis



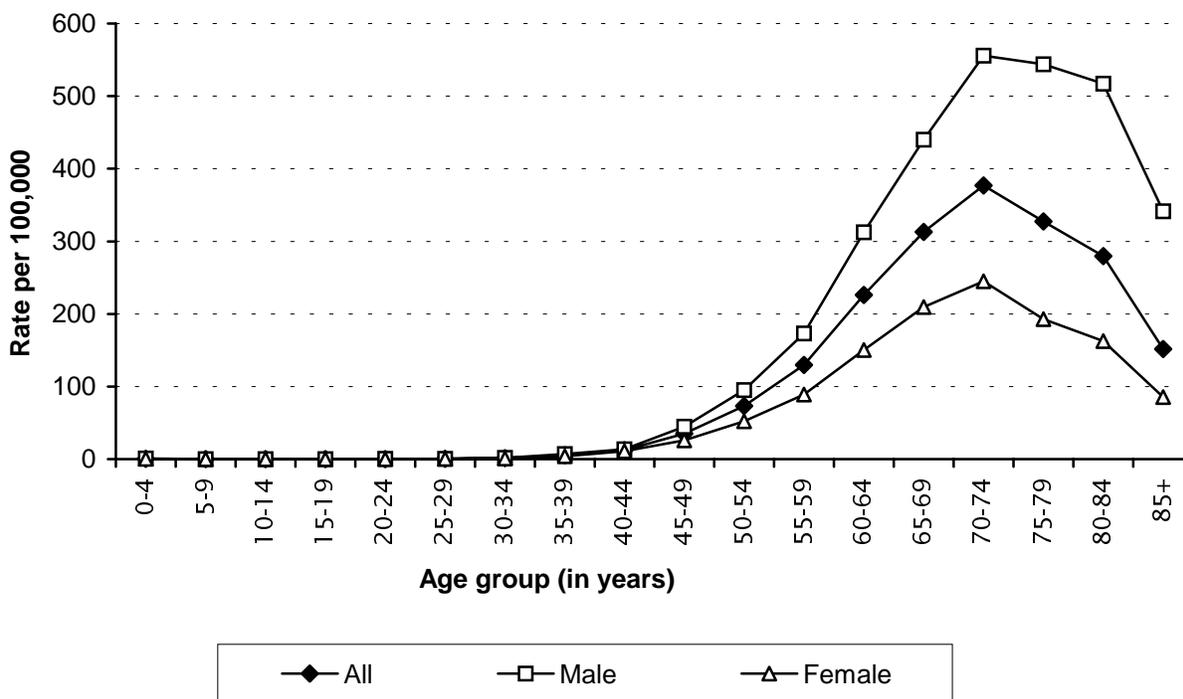
Risk and Associated Factors

Age	Rates increase with age, but decline after the age of 74 years.
Gender	Incidence is currently higher in males than in females; however, the gap is narrowing due to increased smoking rates in women.
Race and Income	Nationwide, blacks have higher incidence rates. Generally, lower income groups have higher rates.
Diet	A diet low in consumption of fruits and vegetables may contribute to increased risk.
Tobacco	Cigarette smoking, including exposure to second-hand smoke, is the most important risk factor.
Occupation	Exposure to asbestos, radon, polycyclic aromatic hydrocarbons, arsenic, and radiation increases the risk of lung cancer.
Other	History of certain lung diseases may contribute to higher risk. Smoking combined with occupational exposure to toxic substances greatly increases the risk of lung cancer.

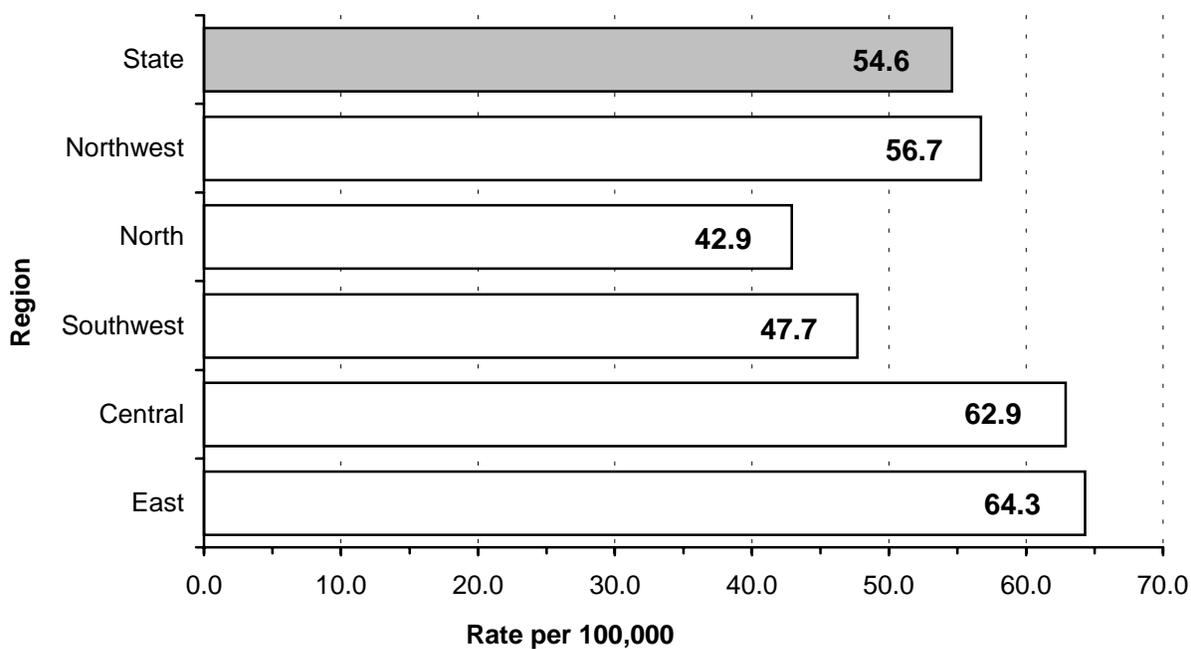
Prevention Strategies

Most authorities recommend against screening asymptomatic individuals due to the failure of studies to provide evidence that screening reduces mortality. Control of occupational exposure is important to lung cancer prevention. A diet high in consumption of fruits and vegetables may help reduce risk. Clearly, the major focus of efforts to prevent and control lung cancer must be on reducing tobacco use.

Invasive Lung and Bronchial Cancer Age-Specific Rates



Invasive Lung and Bronchial Cancer Age-Adjusted Rates by Region



Melanoma of the Skin[†]

Incidence Summary

	Total	Male	Female
AAIR*	8.3	10.3	6.9
# of invasive cases	2,891	1,587	1,303

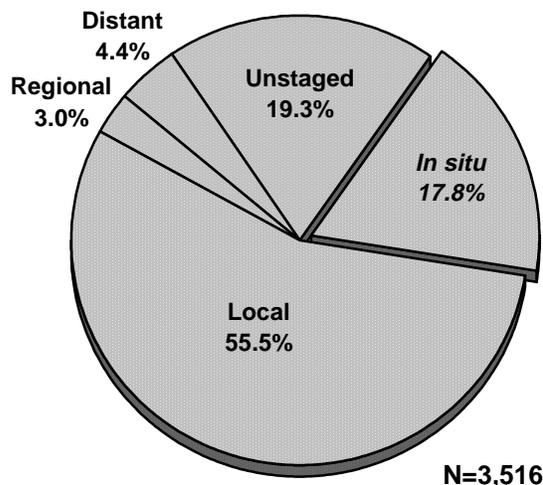
Age-Adjusted Incidence Rates by Race

	Cases	Rate*
White	2,583	9.2
Black	35	0.6
Other	15	2.1
Unknown	258	n/a

*Age-adjusted incidence rates (AAIRs) are per 100,000 population and reflect invasive cancer only.

[†]Data exclude basal and squamous cell carcinoma.

Stage at Diagnosis



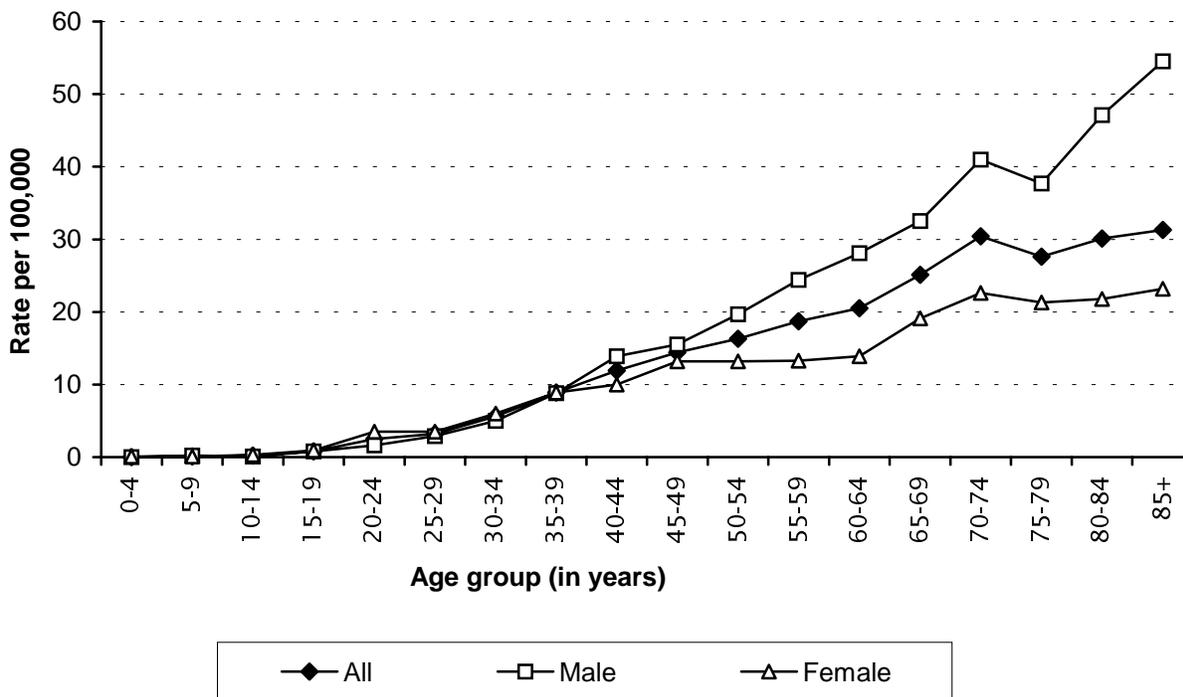
Risk and Associated Factors

Age	Rates generally increase with age.
Gender	Males have a higher incidence rate than females.
Race and Income	The incidence rate is highest in the white population. Higher income groups also have increased incidence.
Occupation	Occupations associated with increased sun exposure have a higher incidence.
Other	Ultraviolet light exposure, especially from blistering sunburns during childhood, is a major risk factor. Individuals with light skin and numerous or atypical moles are at increased risk.

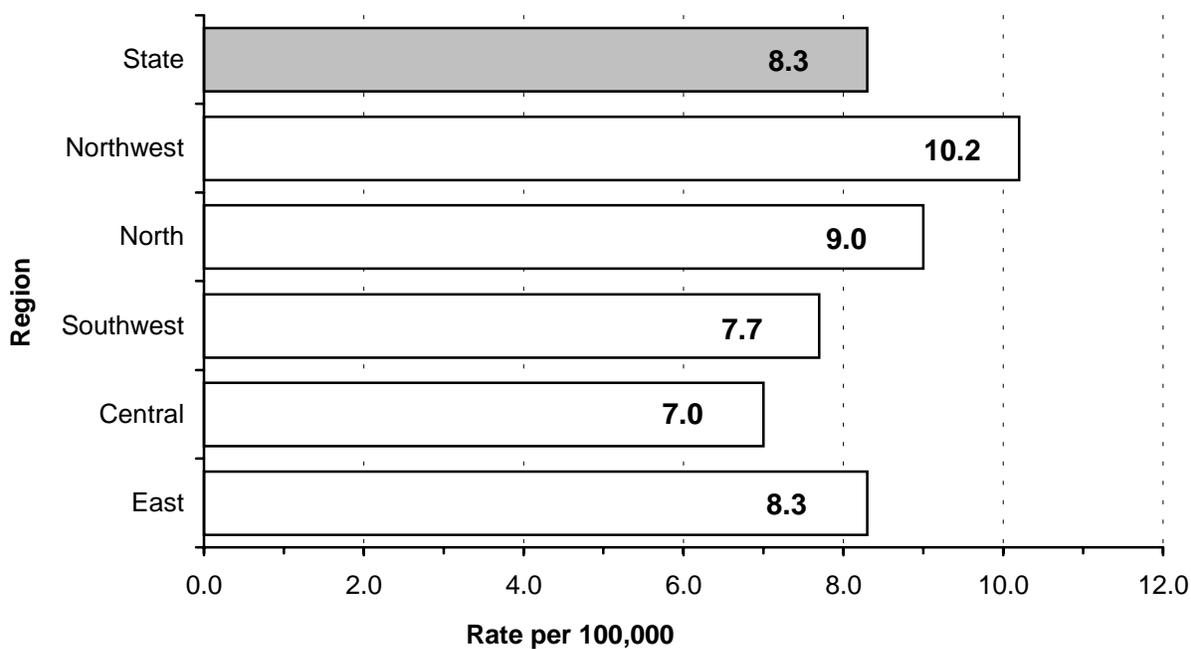
Prevention Strategies

Risk can be reduced by using sunscreen, wearing protective clothing, and avoiding unnecessary sun exposure. Experts agree that new, large (over one-fourth inch), irregular, or changing moles should be evaluated by a physician.

**Invasive Melanoma of the Skin
Age-Specific Rates**



**Invasive Melanoma of the Skin
Age-Adjusted Rates by Region**



Non-Hodgkin's Lymphoma

Incidence Summary

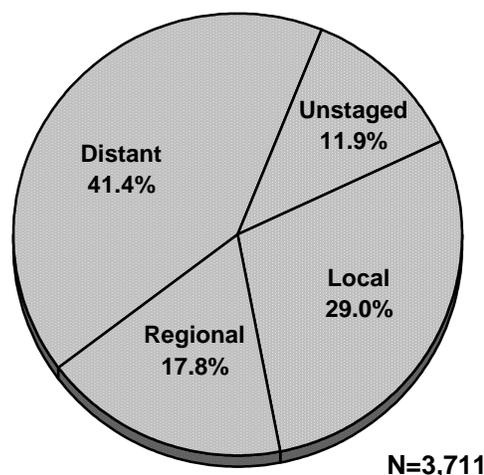
	Total	Male	Female
AAIR*	11.0	12.9	9.4
# of cases	3,711	1,932	1,778

Age-Adjusted Incidence Rates by Race

	Cases	Rate*
White	3,190	11.6
Black	447	7.7
Other	35	6.2
Unknown	39	n/a

*Age-adjusted incidence rates (AAIRs) are per 100,000 population and reflect invasive cancer only.

Stage at Diagnosis



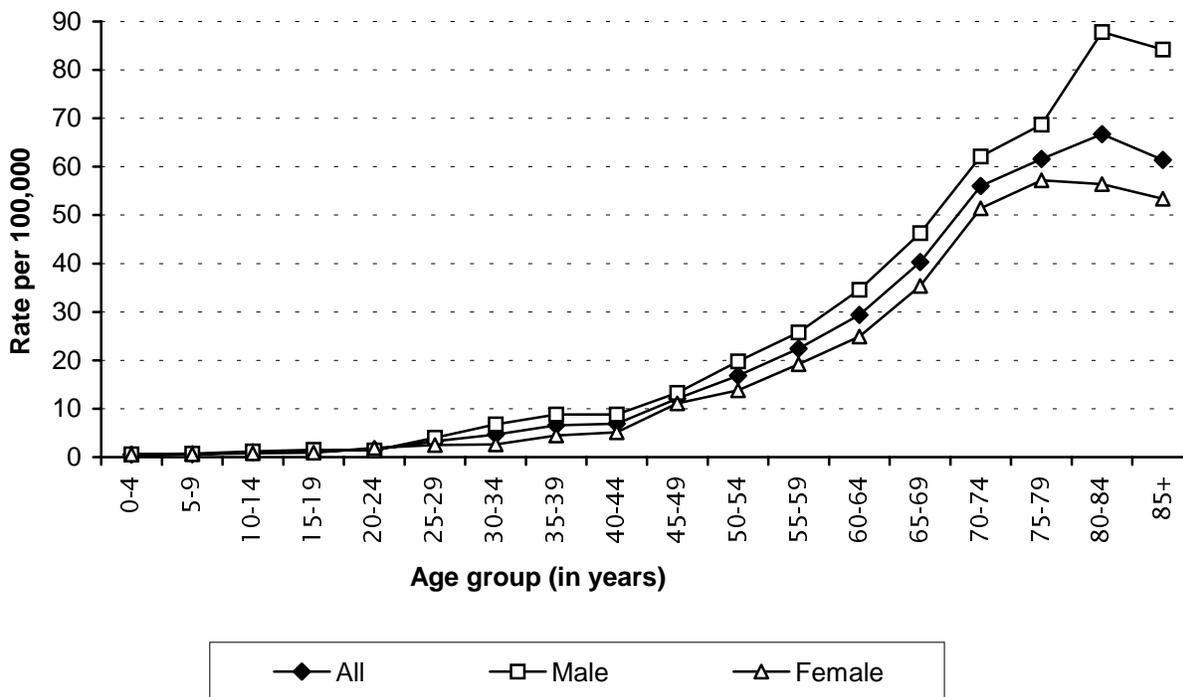
Risk and Associated Factors

Age	Rates increase with age.
Gender	Males have a higher incidence rate than females.
Race and Income	Nationwide, incidence rates are slightly lower in the black population. Rates are higher in upper income groups.
Other	Risk factors are largely unknown but in part involve reduced immune function. Persons with organ transplants are at an increased risk. Human immunodeficiency virus (HIV) and human T-cell leukemia/lymphoma virus-I (HTLV-I) are also associated with increased risk. Exposures to herbicides and high doses of radiation have also been implicated.

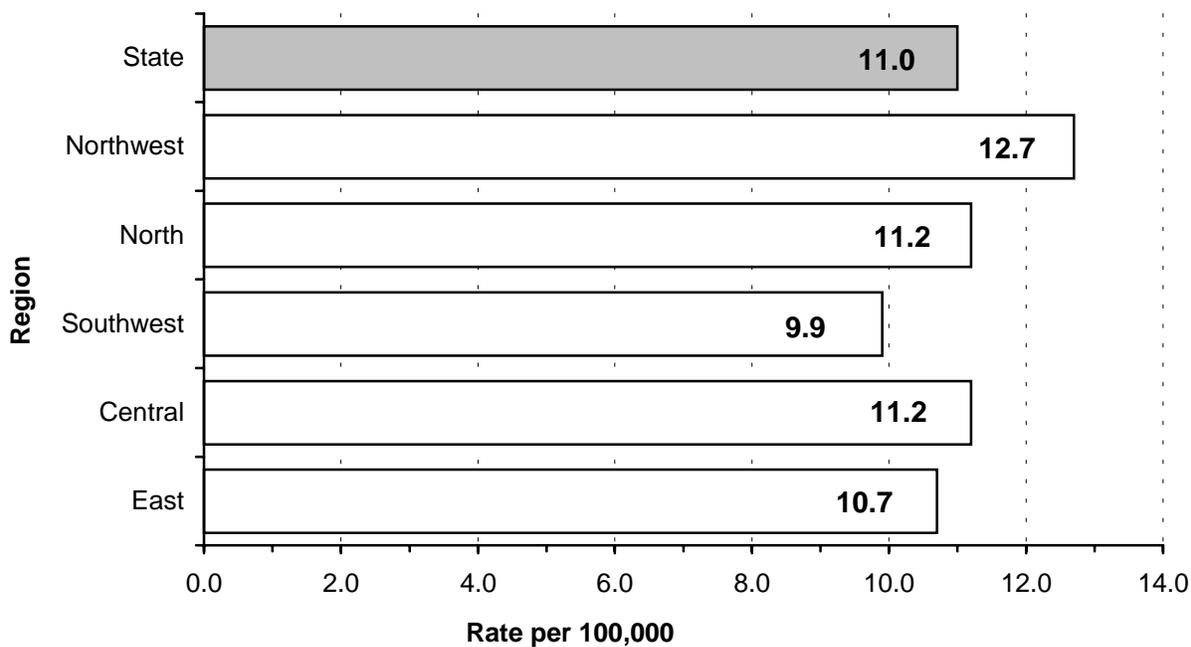
Prevention Strategies

Most authorities do not currently recommend routine screening. Control of certain occupational exposures and reduction of HIV transmission could help prevent some cases.

**Non-Hodgkin's Lymphoma
Age-Specific Rates**



**Non-Hodgkin's Lymphoma
Age-Adjusted Rates by Region**



Prostate Cancer

Incidence Summary

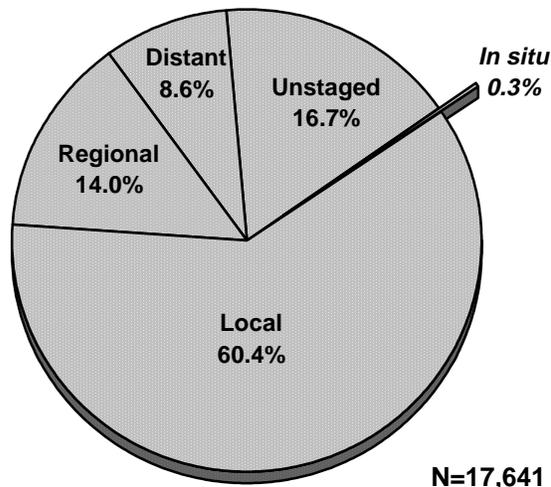
AAIR*	128.2
# of invasive cases	17,592

Age-Adjusted Incidence Rates by Race

	Cases	Rate*
White	12,823	112.6
Black	3,752	172.3
Other	91	59.9
Unknown	926	n/a

*Age-adjusted incidence rates (AAIRs) are per 100,000 population and reflect invasive cancer only.

Stage at Diagnosis



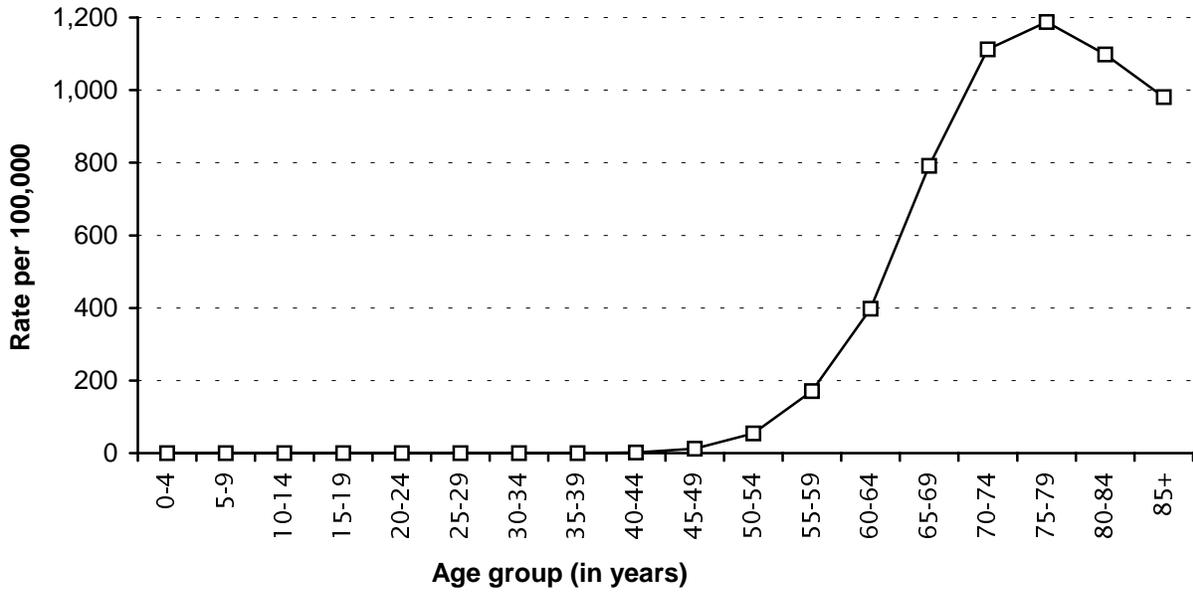
Risk and Associated Factors

Age	Rates increase with age. Eighty percent of all prostate cancer is diagnosed in men over the age of 65.
Race	Worldwide, blacks have the highest incidence rate.
Diet	A diet high in fat may contribute to increased risk.
Occupational	Exposure to cadmium may increase risk.
Other	Other lifestyle and environmental factors may contribute to an increased incidence, but none have been clearly identified.

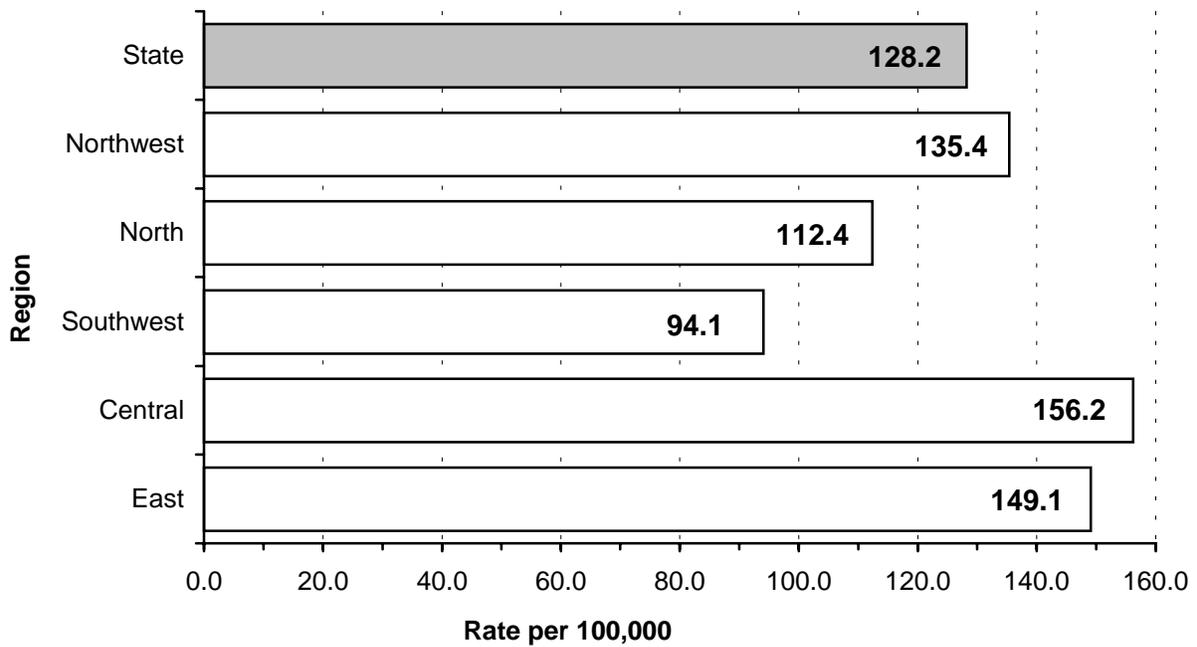
Prevention Strategies

Prostate-specific antigen (PSA) blood test and digital rectal examination are methods for detecting prostate cancer. This cancer tends to grow slowly without causing symptoms for a long period of time. No well-established primary prevention measures currently exist.

**Invasive Prostate Cancer
Age-Specific Rates**



**Invasive Prostate Cancer
Age-Adjusted Rates by Region**



Uterine Cancer

Incidence Summary

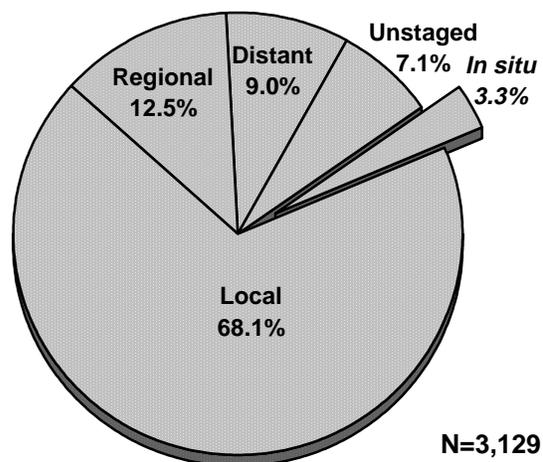
AAIR*	Total
	16.7
# of invasive cases	3,025

Age-Adjusted Incidence Rates by Race

	Cases	Rate*
White	2,521	17.2
Black	435	13.9
Other	30	9.1
Unknown	39	n/a

*Age-adjusted incidence rates (AAIRs) are per 100,000 population and reflect invasive cancer only.

Stage at Diagnosis



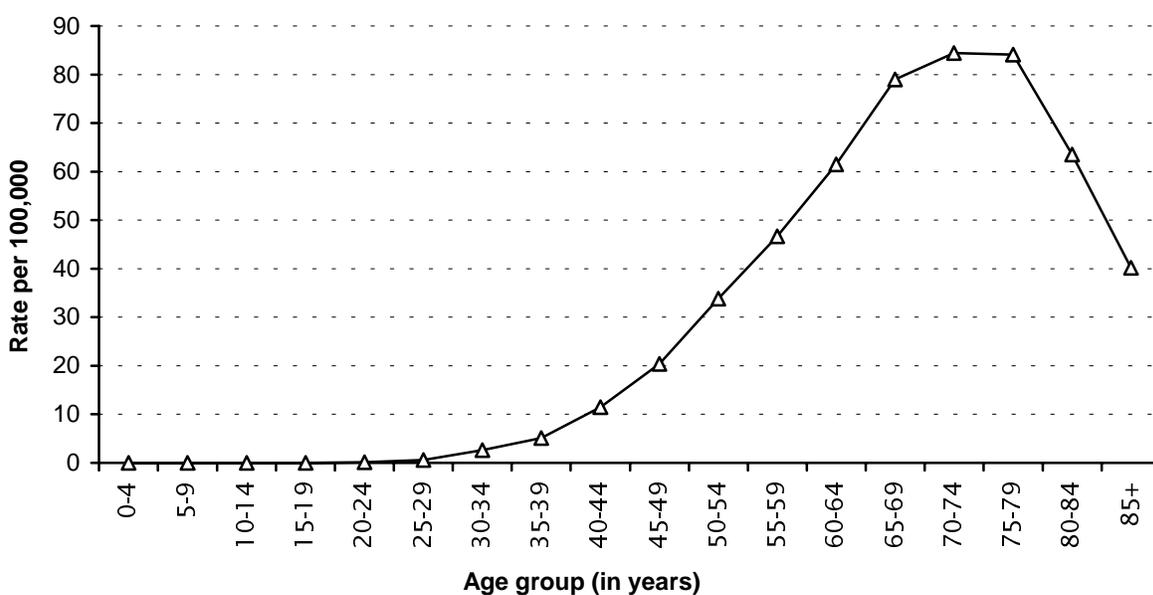
Risk and Associated Factors

Age	Incidence rates are higher in post-menopausal women.
Race and Income	White females have higher rates than black females. Higher income groups have increased incidence rates.
Genetics	Family history of uterine cancer may contribute to increased risk.
Diet	Dietary fat may contribute to increased risk.
Hormonal	Hormonal factors play an important role in determining risk for uterine cancer. Women who have never carried a pregnancy to term are at a relatively high risk, and the risk decreases as the number of pregnancies increases. An increased incidence of uterine cancer has been found in association with prolonged, unopposed estrogen exposure as well as with tamoxifen treatment of breast cancer.

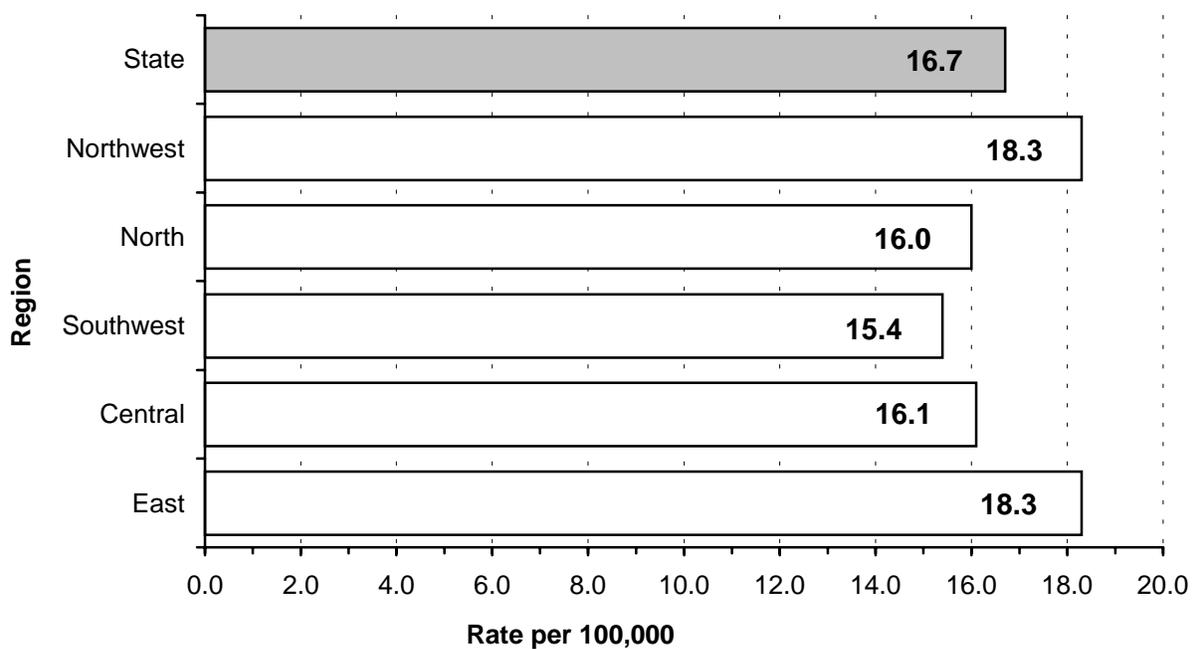
Prevention Strategies

Women 40 and over should have an annual pelvic examination by a health professional. Abnormal uterine bleeding should be investigated by a physician.

Invasive Uterine Cancer Age-Specific Rates



Invasive Uterine Cancer Age-Adjusted Rates by Region



Section IV

Appendices

Appendix 1: Technical Notes

Case Ascertainment

Note that these data reflect a conservative account of cancer in Virginia. Residents sometimes travel out-of-state for diagnosis and treatment. While the Registry now maintains data exchange agreements with central registries in five of the six neighboring states (including the District of Columbia) in order to minimize this loss of reporting, not all states were collecting cancer reports during the early 1990s. Also, not all Virginia hospitals, outpatient facilities, and private pathology laboratories were reporting cases to the Registry during the 1990-1994 period. Further, some patients may have been missed by the routine casefinding methods used in the reporting facilities. These factors combined lead to biases in the cases that are reported. Underreporting of cancer occurs to varying degrees in different areas of the state; for example, counts may be more accurate in urbanized areas simply because case ascertainment is more complete. Similarly, case reporting may be more complete for certain racial groups, cancer sites, or diagnosis stages. Note that age-adjusted rates for the Southwest region especially are consistently low due to underreporting. Overall, the Registry estimates approximately 85% of cases during 1990-1994 are reflected in our data.

Population

Population data used to calculate age-specific and age-adjusted incidence rates were derived from two sources. Estimates for 1990 are the Modified Age-Race-Sex (MARS) population figures from the U.S. Bureau of the Census. Estimates for 1991, 1992, 1993, and 1994 were linearly imputed from the age-race-sex specific figures from the 1990 MARS data and from the 1995 population projections published by the Virginia Employment Commission's State Data Center. Estimates for each of the five years were then summed for a total population-at-risk figure in order to calculate average annual incidence rates.

Prostate Cancer Trends

Section II provides annual counts of prostate cancer reports, which increased from 2,459 in 1990 to 4,346 in 1992 and then dropped to 3,425 in 1994. This mirrors a peak in the recent national incidence of prostate cancer, which has been attributed to the effect of prostate-specific antigen (PSA) screening. PSA screening became widespread during the mid- to late-1980s and resulted in a rapid increase in incidence (84% increase from 1987 to 1992) as existing cancers were discovered and diagnosed before they would otherwise have been detected. After 1992, however, the pool of existing yet undetected prostate cancers diminished, and incidence rates have been dropping since (11% decrease from 1992-1993 per American Cancer Society/National Cancer Institute).

**Appendix 2:
Virginia Population, 1990-1994, By Race, Region, and Sex**

	Male	Female
Race		
White	12,159,463	12,476,060
Black	2,916,750	3,186,979
Other	445,267	480,699
Region		
North	2,123,058	2,184,608
Northwest	3,783,148	3,835,737
Southwest	2,996,948	3,235,777
Central	2,589,004	2,826,717
East	4,029,322	4,060,899
Total	15,521,480	16,143,738

Note. Figures represent total Virginia population over the entire 1990-1994 time period, and are used in the denominator in calculation of age-specific and age-adjusted incidence rates. The average annual Virginia population during 1990-1994 was 6,333,044. See Appendix 1 for source of population estimates.

Appendix 3: US Standard Population, 1970

Age Group (years)	Count
0 to 4	84,416
5 to 9	98,204
10 to 14	102,304
15 to 19	93,845
20 to 24	80,561
25 to 29	66,320
30 to 34	56,249
35 to 39	54,656
40 to 44	58,958
45 to 49	59,622
50 to 54	54,643
54 to 59	49,077
60 to 64	42,403
65 to 69	34,406
70 to 74	26,789
75 to 79	18,871
80 to 84	11,241
85 plus	7,435
TOTAL	1,000,000

Note. The US Standard Population, 1970, is used for the age-adjustment of observed age-specific incidence rates and does not represent an actual population estimate.

Appendix 4: SEER Definition of Site Categories

Primary Site	ICD-O-2 Codes
Buccal Cavity and Pharynx	C00.0 - C14.8
Esophagus	C15.0 - C15.9
Stomach	C16.0 - C16.9
Colon/Rectum	C18.0 - C18.9, C19.9, C20.9, C21.0 - C21.8
Pancreas	C25.0 - C25.9
Larynx	C32.0 - C32.9
Lung/Bronchus	C34.0 - C34.9
Melanoma of the Skin	C44.0 - C44.9 (types 872-879 only)
Breast	C50.0 - C50.9
Cervix	C53.0 - C53.9
Uterus	C54.0 - C54.9, C55.9
Ovary	C56.9
Prostate	C61.9
Testis	C62.0 - C62.9
Urinary Bladder	C67.0 - C67.9
Kidney and Renal Pelvis	C64.9, C65.9
Brain and Other Nervous System	C70.0 - C70.9, C71.0 - C71.9, C72.0 - C72.9, (excluding types 9590-9989)
Thyroid	C73.9
Hodgkin's Lymphoma	Types 9650-9667
Non-Hodgkin's Lymphoma	Types 9590-9595, 9670-9714
Multiple Myeloma	Types 9731-9732
Leukemia	Types 9800-9804, 9820-9827, 9830-9831, 9840- 9842, 9850, 9860-9864, 9866-9868, 9870, 9880, 9890-9894, 9900, 9910, 9930-9941