Cancer in Virginia

Overview and Selected Statistics

August 2014

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Suggested citation:

Virginia Department of Health, *Cancer in Virginia: Overview and Selected Statistics, August 2014*.

I. Introduction

Cancer in Virginia documents the burden of cancer incidence and mortality in Virginia. The report covers the years 2002 – 2011 (for incidence statistics) and 2003 – 2012 (for mortality statistics) for all cancers combined and for cancers of the cervix, colon, female breast, lung, melanoma of the skin, and ovary.

The information includes an overview of incidence by sex, race, and stage at diagnosis, and of mortality by sex and race. Case counts, rates, and percentages appear throughout. A chart displays incidence and mortality trends by year. Accompanying text discusses trends. Each section has two maps; one displays incidence and the other displays mortality. These maps provide visual comparisons by health district. Appendices provide additional information.

The cancers in this report are at the top of the list of common cancers. These cancers were selected because they occur often or are targets of efforts to screen and control or prevent them. **Female breast cancer** and **prostate cancer** are the two most commonly diagnosed cancers in women and men, respectively. **Lung cancer** and **colorectal cancer** are the next most common cancers and affect every segment of the population. **Cervical cancer** is an example of successful prevention and control policies; screening can detect it and timely vaccination can prevent the majority of cases. However, large differences exist between White and African-American rates and between male and female rates. The differences highlight targets for prevention and control activities. **Melanoma** is a cancer that people often can prevent through simple steps to reduce risk. Practicing sun safety and being cautious about other ultra-violet (UV) light sources, such as tanning beds, are behaviors that reduce risk. The **Oral cancer** age-adjusted incidence rate rose over the past ten years. **Ovarian cancer** is more often diagnosed at a later stage than other cancers in this group. The reason is that ovarian cancer may develop without symptoms apparent to the patient until the disease is advanced. No ovarian cancer screening test exists; this fact also increases the likelihood of diagnosis at a later stage.

The Virginia and national cancer incidence and mortality rank by rate (cases per 100,000) is listed in the tables below. The tables rank cancers selected in this report against other top cancer types and ranks gender-specific cancers separately.

	Virginia Incidence (2007-2011)								U.S. Incidence (2007-2011)				
	Male			Female			All		Male		Female		All
Cancer site	**Count**	**Rate**	**Rank**	**Count**	**Rate**	**Rank**	**Count**	**Rate**	**Rate**	**Rank**	**Rate**	**Rank**	**Rate**
All Sites	94,662	508.5		89,193	398		183,855	443.9	529.4		411.3		460.4
Female Breast	-	-	-	28,193	125	1	-	-	-	-	124.6	1	-
Cervix Uteri	-	-	-	1,317	6.3	13	-	-	-	-	7.8	13	-
Ovary	-	-	-	2,658	11.9	8	-	-	-	-	12.3	8	-
Corpus and Uterus, NOS	-	-	-	5,383	23.2	4	-	-	-	-	23.9	4	-
Brain and Other Nervous System	1,396	7.3	14	1,158	5.4	15	2,554	6.3	7.6	15	5.4	15	6.4
Colon and Rectum	8,218	45	3	7,911	35.1	3	16,129	39.5	50.6	3	38.2	3	43.7
Esophagus	1,525	8.1	13	398	1.7	20	1,923	4.6	7.7	13	1.8	19	4.4
Hodgkin Lymphoma	545	2.8	17	484	2.4	19	1,029	2.6	3.1	18	2.4	18	2.9
Kidney and Renal Pelvis	3,813	19.8	7	2,335	10.4	9	6,148	14.6	21.2	7	10.7	10	15.5
Leukemia	2,386	13.4	9	1,825	8.4	11	4,211	10.6	16.7	8	10.2	11	13
Liver and Intrahepatic Bile Duct	1,861	9.4	11	713	3.1	18	2,574	6	12.4	11	4.1	17	7.9
Lung and Bronchus	14,212	79.8	2	11,924	53.2	2	26,136	64.5	72.2	2	51.1	2	60.1
Melanoma of the Skin	4,693	25.5	5	3,370	15.4	6	8,063	19.7	27.7	5	16.7	6	21.3
Myeloma	1,266	7	15	1,092	4.8	16	2,358	5.8	7.7	13	4.9	16	6.1
Non-Hodgkin Lymphoma	3,859	21.2	6	3,264	14.6	7	7,123	17.5	23.9	6	16.3	7	19.7
Oral Cavity and Pharynx	3,231	16.3	8	1,283	5.7	14	4,514	10.6	16.5	9	6.2	14	11
Pancreas	2,388	13.2	10	2,342	10.3	10	4,730	11.7	14	10	10.9	9	12.3
Thyroid	1,131	5.7	15	3,727	17.5	5	4,858	11.7	6.4	16	19.1	5	12.9
Urinary Bladder	5,628	33	4	1,879	8.3	12	7,507	18.8	36.2	4	8.8	12	20.5
Stomach	1,531	8.5	12	924	4.1	17	2,455	6.1	10.3	12	5.3	16	7.5
Testis	891	4.6	16	-	-	-	-	-	5.6	17	-	-	-
Prostate	28,096	143.2	1	-	-	-	-	-	147.8	1	-	-	-

	Virginia Mortality (2008-2012)								U.S. Mortality (2007-2011)				
	Male			Female			All		All	Male		Female	
Cancer Sites	**Deaths**	**Rate**	**Rank**	**Deaths**	**Rate**	**Rank**	**Deaths**	**Rate**	**Rate**	**Rate**	**Rank**	**Rate**	**Rank**
All Sites	36,931	210.4		33,469	144.4		70,400	171.2	173.8	211.6		147.4	
Female Breast	-	-	-	3,863	22.7	2	-	-	-	-	-	22.6	2
Cervix Uteri	-	-	-	415	1.9	15	-	-	-	-		2.3	14
Ovary	-	-	-	1,842	7.9	5	-	-	-	-	-	7.9	5
Corpus and Uterus, NOS	-	-	-	1,024	4.4	8	-	-	-	-		4.3	8
Brain and Other Nervous System	926	4.8	11	747	3.3	9	1,673	3.9	4.3	5.2	11	3.5	9
Colon and Rectum	3,148	17.7	3	2,968	12.7	3	6,116	14.9	15.9	19.1	3	13.5	3
Esophagus	1,428	7.6	8	331	1.4	17	1,759	4.2	4.2	7.5	9	1.6	18
Hodgkin Lymphoma	93	0.5	17	60	0.3	20	153	0.4	0.4	0.5	16	0.3	21
Kidney and Renal Pelvis	1,032	5.7	10	535	2.3	12	1,567	3.8	4	5.8	10	2.6	12
Leukemia	1,544	9.1	5	1,065	4.7	6	2,609	6.5	7	9.4	5	5.3	6
Liver and Intrahepatic Bile Duct	1,618	8.3	6	724	3.1	10	2,342	5.5	5.8	8.5	6	3.4	10
Lung and Bronchus	11,130	62.2	1	8,714	37.8	1	19,844	48.2	48.4	61.6	1	38.5	1
Melanoma of the Skin	777	4.3	13	412	1.8	16	1,189	2.9	2.7	4.1	14	1.7	17
Myeloma	795	4.7	12	707	3	11	1,502	3.7	3.4	4.3	13	2.7	11
Non-Hodgkin Lymphoma	1,347	7.9	7	1,051	4.5	7	2,398	6	6.3	8.1	7	5	7
Oral Cavity and Pharynx	685	3.6	15	279	1.2	18	964	2.3	2.5	3.8	15	1.4	19
Pancreas	2,261	12.5	4	2,193	9.4	4	4,454	10.8	10.9	12.5	4	9.6	4
Stomach	756	4.2	14	518	2.2	13	1,274	3.1	3.5	4.7	12	2.5	13
Thyroid	109	0.6	16	101	0.4	19	210	0.5	0.5	0.5	16	0.5	20
Urinary Bladder	1,140	7.1	9	514	2.2	13	1,654	4.2	4.4	7.7	8	2.2	15
Testis	29	0.1	18	-	-	-	-	-	-	0.2	17	-	-
Prostate	3,399	22.4	2	-	-	-	-	-	-	22.3	2	-	-

VA Rate (Incidence): Virginia Cancer Registry. Based on combined 2007-2011 data. Incidence rates are age-adjusted to the 2000 U.S. standard population.
VA Rate (Mortality): VDH Division of Health Statistics. Based on combined 2008-2012 data. Mortality rates are age-adjusted to the 2000 U.S. standard population.
U.S. Rate (Incidence and Mortality): Howlader N, Noone AM, Krapcho M, Garshell J, Miller D, Altekruse SF, Kosary CL, Yu M, Ruhl J, Tatalovich Z, Mariotto A, Lewis DR, Chen HS, Feuer EJ, Cronin KA (eds). SEER Cancer Statistics Review, 1975-2011, National Cancer Institute. Bethesda, MD, http://seer.cancer.gov/csr/1975_2011/, based on November 2013 SEER data submission, posted to the SEER web site, April 2014.

The information provided in *Cancer in Virginia* is useful and informative in several ways. The text highlights important facts about cancer incidence and mortality among different groups. Tables provide rates and counts of newly diagnosed cases and deaths. Tables also show the percent of cases diagnosed at different cancer "summary stages" (i.e. localized, regional, distant). The summary stage distribution is often different between different population groups. Charts display incidence and mortality rate trends over time. Each chart shows if cancer incidence and mortality are declining, increasing, or holding steady. Two maps, one for incidence and one for mortality, allow readers to compare rates and their differences among Virginia Health Districts. Appendix A is a reference map of Virginia Health Districts, Appendix B lists cities and counties in Virginia Health Districts, and Appendix C defines terms used in the report.

II. Data and Methods

Data Sources

Data were obtained from several sources. Within the Virginia Department of Health, the Virginia Cancer Registry provided incidence data and the Division of Health Statistics provided mortality data. Virginia screening, risk factor, and survivorship data are from the Behavioral Risk Factor Surveillance System (BRFSS), health district information is available at the Virginia BRFSS website: http://www.vdh.virginia.gov/OFHS/brfss). Virginia cancer cost and health care utilization data come from the Virginia Health Information Hospital Discharge Patient-Level Dataset (http://www.vhi.org). Publicly available BRFSS data, compiled by the Centers for Disease Control and Prevention (http://www.cdc.gov/brfss), were used for risk factors and screening comparisons in Virginia and with the United States as a whole.

Statistics

Counts show the number of newly diagnosed (incident) cases and the number of deaths (mortality) for the designated area and period. Incidence and mortality rates are age-adjusted to the 2000 U.S. standard population to allow comparisons across populations. Incidence and mortality trends are presented in charts, which provide year-by-year rates and show long-term trends. In this report, the Cochran-Armitage trend test is used statistically to show if the rate is increasing, decreasing, or staying the same across the 10 year period shown. That statistic tests the null hypothesis that no trend exists over time. Prevalence rate estimates are used to show the percentage of people reporting certain screening and risk factor behaviors. Ninety-five percent confidence intervals (95% CIs) surround the point estimate, which is the rate, and represent the reliability of the point estimate. A 95% confidence interval defines the range of values that include the point estimate 95% of the time.

Sub-populations

Stratified analyses are performed to identify disparities or inequities. Results are stratified by geography (health district), gender, race/ethnicity (African-American vs. White), socioeconomic status (education and income) and health care insurance status. Small numbers limited the ability to look at data by county and by additional racial/ethnic groups. African-American and White race categories have sufficient numbers of cases or deaths to allow for stratification, but other races and ethnicities do not. Total columns labeled “State of Virginia” or “Virginia” include all genders, racial/ethnic categories, and locations including “Other” and “Unknown”, so the sum of gender, racial/ethnic, and location sub-totals may be less than the statewide total. For example, between 2007 and 2011 there were 194 cancer cases identified where the residence location was unknown but was in Virginia and 10 cancer cases where gender was either transgender or unknown. These cases are included in the “State of Virginia” total but not included in the location or gender stratifications.

Mapping

Geographic information systems (ESRI ArcGIS version 10.1) was used to create maps of Virginia with incidence and mortality rates by health district. Appendix A is a reference map displaying Virginia’s 35 health districts by name. Appendix B lists the names of the counties and cities that compose the 35 health districts. The maps use data from the most recent five years available (2007-2011 for incidence and 2008-2012 for mortality).

III. All Sites Cancer

All Sites Cancer Overview

- Cancer was the second leading cause of death (after heart disease) in the United States[1], but first in Virginia in 2011.[2]
- Nationwide, men have about a 43.9 percent chance and women about a 38.3 percent chance of developing cancer during their lifetimes.[1]
- In Virginia, there were 24,047 inpatient hospitalizations in 2012 for cancer at a total cost of over $1.4 billion. The average length of stay was 6.4 days and the average charge per stay was $59,148.[3]

Table 1.1: All Sites Cancer Data by Race and Sex, Incidence (2007-2011) & Mortality (2008-2012)

		State of Virginia	All African-Americans	African-American Men	African-American Women	All Whites	White Men	White Women
Incidence[4]	Count	183,855	33,296	17,708	15,588	142,798	73,116	69,682
	Rate per 100,000	443.9	470.7	589.9	388.9	440.1	494.1	402.6
	95% CI	441.8-445.9	465.5-475.9	580.7-599.2	382.8-395.2	437.8-442.4	490.4-497.8	399.5-405.6
Staging[4]	% Localized	46.0%	44.9%	48.9%	40.4%	46.3%	46.0%	46.6%
	% Regional	20.1%	20.8%	15.9%	26.3%	20.0%	17.5%	22.6%
	% Distant	21.8%	23.4%	24.0%	22.7%	21.7%	22.8%	20.5%
	% Unstaged/Other	9.5%	9.5%	9.5%	9.4%	9.1%	9.6%	8.5%
Mortality[2]	Count	70,400	13,746	7,227	6,519	54,971	28,851	26,120
	Rate per 100,000	171.2	203.7	269.2	163.9	168.2	204.2	143
	95% CI	170.0-172.5	200.3-207.1	263.0-275.5	160.0-167.9	166.8-169.6	201.8-206.5	141.3-167.9

According to Table 1.1:

- From 2007-2011, the incidence rate of cancer was 443.9 cases per 100,000 people in Virginia (U.S. rate: 460.4 cases per 100,000[5]). From 2008-2012, the mortality rate from cancer was 171.2 deaths per 100,000 in Virginia (2007-2011 U.S. rate: 176.4 deaths per 100,000 per year[6]).
- African-American men had the highest rate of cancer incidence while African-American women had the lowest rate.
- The percentage of all sites cancers diagnosed at the localized stage was lower for African-Americans women (40.4%) than for African American men (48.9%).

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[1] American Cancer Society. Cancer Facts & Figures 2013. Atlanta: American Cancer Society; 2013.

[2] VDH Division of Health Statistics. Based on combined 2008-2012 data. Mortality rates are age-adjusted to the 2000 U.S. standard population.

[3] VDH Virginia Health Information Hospital Discharge Patient-Level Dataset.

[4] Virginia Cancer Registry. Based on combined 2007-2011 data. Incidence rates are age-adjusted to the 2000 U.S. standard population; local stage defined using Derived Summary Staging values (http://seer.cancer.gov/tools/ssm/intro.pdf).

[5] Howlader N, Noone AM, Krapcho M, Garshell J, Miller D, Altekruse SF, Kosary CL, Yu M, Ruhl J, Tatalovich Z, Mariotto A, Lewis DR, Chen HS, Feuer EJ, Cronin KA (eds). SEER Cancer Statistics Review, 1975-2011, National Cancer Institute. Bethesda, MD, http://seer.cancer.gov/csr/1975_2011/, based on November 2013 SEER data submission, posted to the SEER web site, April 2014.

6 Howlader N, Noone AM, Krapcho M, Garshell J, Neyman N, Altekruse SF, Kosary CL, Yu M, Ruhl J, Tatalovich Z, Cho H, Mariotto A, Lewis DR, Chen HS, Feuer EJ, Cronin KA (eds). *SEER Cancer Statistics Review, 1975-2010*, National Cancer Institute. Bethesda, MD, http://seer.cancer.gov/csr/1975_2010/, based on November 2012 SEER data submission, posted to the SEER web site, 2013. (accessed 07/02/2014).

Table 1.2: Cancer Data by Health District – All Sites, Incidence (2007-2011) & Mortality (2008-2012)

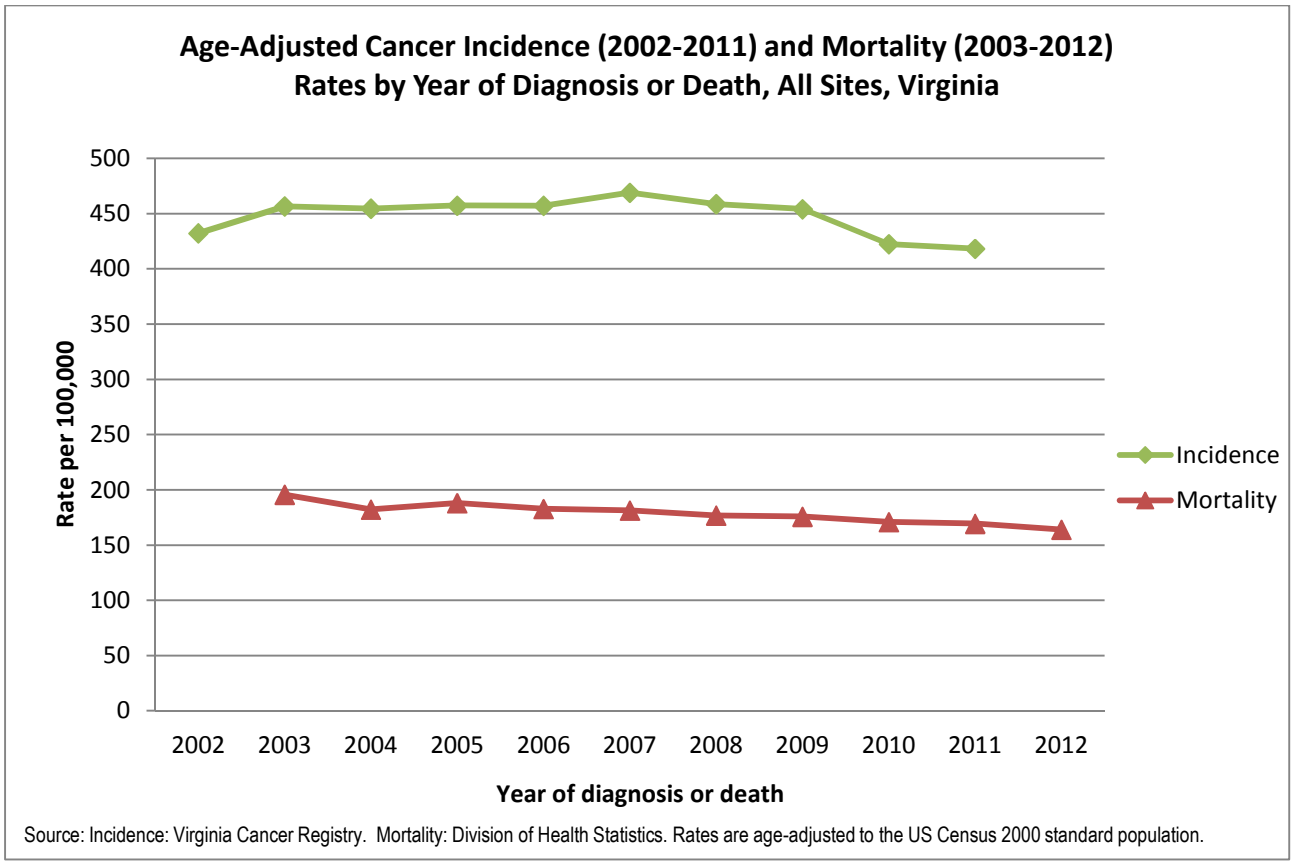
Districts are ranked from favorable (1) to unfavorable (35) for incidence, localized stage, and mortality.

	Incidence[1]				Staging[1]		Mortality[2]			
Health District	**Count**	**Age-Adjusted Rate per 100,000**	**95% CI**	**Rank**	**Percent Localized**	**Rank**	**Count**	**Age-Adjusted Rate per 100,000**	**95% CI**	**Rank**
Alexandria	2,274	365.7	350.1-381.8	1	48.9%	1	807	123.3	114.8-131.8	1
Alleghany	5,065	431.1	419.0-443.4	10	46.3%	15	2,035	167.6	160.3-174.9	7
Arlington	3,471	401.5	387.7-415.8	7	46.6%	14	1,068	126.2	118.6-133.8	2
Central Shenandoah	7,756	459.2	448.9-469.7	19	43.8%	24	12,969	171.0	164.9-177.2	13
Central Virginia	6,930	451.6	440.9-462.6	16	45.1%	21	2,897	183.7	177.0-190.4	16
Chesapeake	5,040	477.6	464.2-491.4	25	47.9%	8	1,889	185.7	177.4-194.1	19
Chesterfield	9,016	504.6	493.9-515.5	33	48.1%	5	2,888	179.2	172.7-185.8	15
Chickahominy	4,117	486.9	471.7-502.5	30	46.7%	13	1,393	170.0	161.1-179.0	11
Crater	4,398	501.2	486.3-516.5	32	42.4%	28	1,805	210.7	201.0-220.4	33
Cumberland Plateau	2,878	387.5	373.1-402.3	3	42.0%	30	1,521	204.8	194.5-215.0	31
Eastern Shore	1,716	520.2	494.9-546.6	35	40.3%	34	736	208.8	193.7-223.9	32
Fairfax	20,754	397.2	391.6-402.9	6	48.6%	3	6,402	131.5	128.3-134.7	3
Hampton	3,627	512.8	496.1-530.0	34	48.2%	4	1,355	192.3	182.1-202.6	27
Henrico	7,436	465.7	455.0-476.6	22	47.7%	10	2,768	169.7	163.4-176.0	10
Lenowisco	2,268	387.6	371.5-404.2	4	38.4%	35	1,250	212.4	200.6-224.1	34
Lord Fairfax	5,681	439.8	428.3-451.6	11	42.0%	30	2,495	190.5	183.0-198.0	21
Loudoun	4,274	387.2	374.7-400.1	2	48.0%	6	1,355	140.3	132.8-147.8	4
Mount Rogers	5,516	416.5	405.3-427.9	9	42.6%	27	2,546	186.0	178.8-193.2	20
New River	3,680	411.5	398.1-425.2	8	46.3%	15	1,524	170.2	161.6-178.7	12
Norfolk	4,850	479.1	465.5-493.0	27	43.4%	25	1,930	192.1	183.5-200.6	26
Peninsula	8,284	461.6	451.6-471.8	20	48.9%	1	3,064	168.2	162.3-174.2	8
Piedmont	2,867	444.6	428.2-461.5	14	43.9%	23	1,253	191.8	181.2-202.4	25
Pittsylvania-Danville	3,380	466.6	450.6-483.0	23	44.6%	22	1,421	190.5	180.6-200.4	21
Portsmouth	2,499	486.5	467.3-506.2	29	41.4%	32	1,171	224.6	211.7-237.4	35
Prince William	6,488	396.0	385.5-406.7	5	47.2%	11	2,247	154.3	147.9-160.6	5
Rappahannock	6,807	480.6	468.8-492.6	28	46.3%	15	2,451	184.2	176.9-191.5	17
Rappahannock -Rapidan	4,255	441.8	428.4-455.6	12	45.6%	19	1,681	176.8	168.3-185.2	14
Richmond	4,802	490.8	476.8-505.2	31	42.3%	29	2,031	190.6	182.3-198.9	23
Roanoke	2,686	479.0	460.7-497.9	26	42.7%	26	1,192	199.3	188.0-210.6	29
Southside	2,799	458.1	440.8-476.0	18	41.4%	32	1,214	193.3	182.4-204.1	28
Thomas Jefferson	6,086	471.2	459.2-483.4	24	48.0%	6	2,209	168.4	161.4-175.4	9
Three Rivers	4,792	463.2	449.7-477.0	21	45.5%	20	2,037	190.6	182.3-198.8	23
Virginia Beach	9,075	442.7	433.5-452.1	13	47.9%	8	3,342	166.7	161.0-172.3	6
West Piedmont	4,377	444.6	431.2-458.4	14	46.9%	12	1,859	185.4	176.9-193.8	18
Western Tidewater	3,717	456.7	441.9-472.0	17	45.8%	18	1,594	200.0	190.2-209.9	30
Virginia	**183,855**	**443.9**	**441.8-445.9**		**46.0%**		**70,400**	**171.2**	**170.0-172.5**	

[1] Virginia Cancer Registry. Based on combined 2007-2011 data. Incidence rates are age-adjusted to the 2000 U.S. standard population; local stage defined using Derived Summary Staging values (http://seer.cancer.gov/tools/ssm/intro.pdf).

[2] VDH Division of Health Statistics. Based on combined 2008-2012 data. Mortality rates are age-adjusted to the 2000 U.S. standard population.

Chart 1.1: All Sites Cancer Incidence and Mortality Rates, by Year, 2002-2012



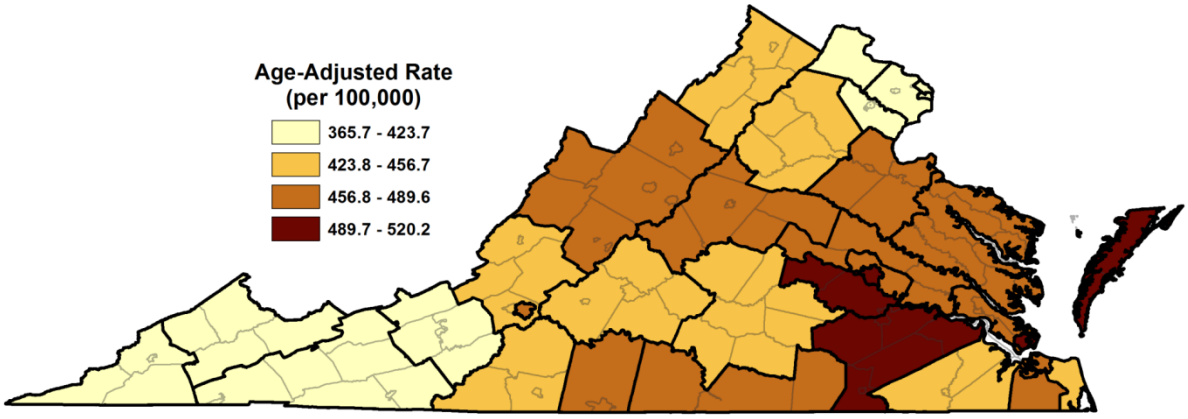
Cancer incidence varied between 432.3 cases per 100,000 people (in 2002) to a high of 469.0 per 100,000 (in 2007), with a subsequent decline to 418.3 per 100,000 in 2011.[1] However, overall cancer incidence in the state is expected to rise because Virginia's population is aging. Cancer rates increase as people age. Cancer screening also contributes to increased rates. Scientifically accepted screening methods are available for breast and cervical cancer among women, prostate cancer among men, and colorectal cancer among both sexes. Screening can increase cancer incidence rates because cancers that are discovered through screening may not otherwise be detected. According to a Cochran-Armitage trend analysis, there was no significant incidence rate trend over the 10 year period. Also, the 2010 incidence rate was low due to a change in data collection systems. This change affected all central cancer registries in the U.S.

Cancer as a primary or a contributing cause of death declined marginally in Virginia during the 2003 – 2012 period. The highest mortality rate was 195.7 deaths per 100,000 people in 2003 and the lowest was 164.1 per 100,000 people in 2012. The average annual decline was close to 3 cancer deaths per 100,000 people.[2] According to a Cochran-Armitage trend analysis, there was no significant mortality rate trend over the 10 year period.

[1] Virginia Cancer Registry. Based on combined 2002-2011 data. Incidence rates are age-adjusted to the 2000 U.S. standard population.

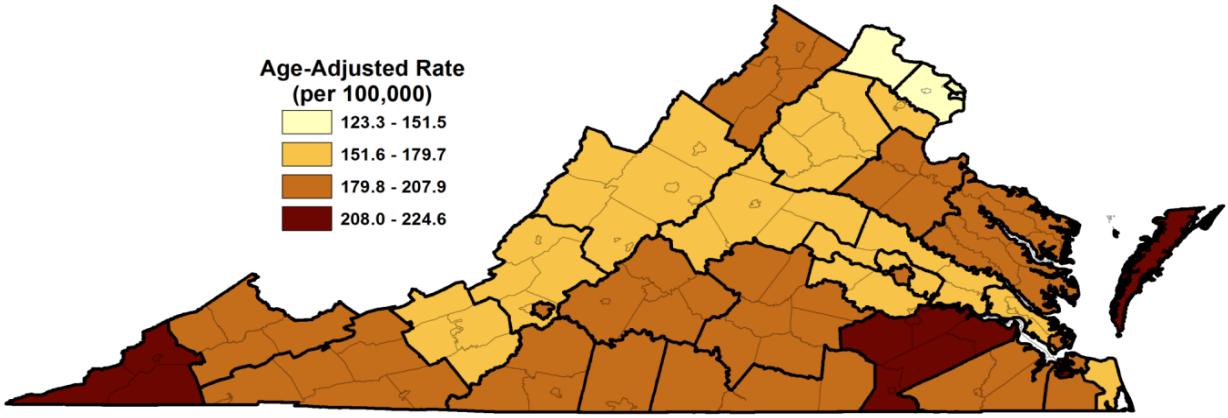
[2] VDH Division of Health Statistics. Based on combined 2003-2012 data. Mortality rates are age-adjusted to the 2000 U.S. standard population.

Map 1.1: All Sites Cancer Incidence Rates by Health District, 2007-2011[1]



Eastern Shore (520.2 cases per 100,000), Hampton (512.8), and Chesterfield (504.6) had the highest all sites cancer incidence rates among the 35 health districts. Alexandria (365.7), Loudoun (387.2), and Cumberland Plateau (387.5) had the lowest incidence rates.

Map 1.2: All Sites Cancer Mortality Rate by Health District, 2008-2012[2]



Portsmouth (224.6 deaths per 100,000), Lenowisco (212.4), and Crater (210.7) had the highest mortality rates from all sites cancer among the 35 health districts. Alexandria (123.3), Arlington (126.2), and Fairfax (131.5) had the lowest mortality rates among the 35 health districts.

[1] Virginia Cancer Registry. Based on combined 2007-2011 data. Incidence rates are age-adjusted to the 2000 U.S. standard population.

[2] VDH Division of Health Statistics. Based on combined 2008-2012 data. Mortality rates are age-adjusted to the 2000 U.S. standard population.

IV. Breast Cancer (Female)

Breast Cancer (Female) Overview

- Breast cancer is the most frequently diagnosed cancer in women. Breast cancer ranks second as a cause of cancer death in women (after lung cancer) in the United States. One in eight women will be diagnosed with breast cancer during their lifetime. [1]

- Breast cancer has a five-year relative survival rate of 89.2 percent if diagnosed in its earliest (localized) stage, when it is most curable.[2] In Virginia, 62.4 percent of breast cancers were diagnosed at the localized stage.[3]

- In Virginia, there were 1,723 inpatient hospitalizations in 2012 for female breast cancer at a total cost of over $72 million. The average length of stay was 2.3 days and the average charge per stay was $42,359.[4]

- According to the 2012 Behavioral Risk Factor Surveillance System (BRFSS) survey data, 78.0 percent of Virginia women 40 years and older reported having had a mammogram in the previous two years (U.S. average, 75.0%).[5]

- Mammography screening rates were lower among women who were less educated (65.6% for less than high school versus 83.3% for college graduate), lower income (67.9% for $15,000 or less versus 82.7% for $50,000 and above), and uninsured (55.0% for uninsured versus 80.7% for insured).[5]

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[1] American Cancer Society. Cancer Facts & Figures 2014. Atlanta: American Cancer Society; 2014. http://www.cancer.org/acs/groups/content/@research/documents/webcontent/acspc-042151.pdf

[2] Howlader N, Noone AM, Krapcho M, Garshell J, Miller D, Altekruse SF, Kosary CL, Yu M, Ruhl J, Tatalovich Z,Mariotto A, Lewis DR, Chen HS, Feuer EJ, Cronin KA (eds). SEER Cancer Statistics Review, 1975-2011, National Cancer Institute. Bethesda, MD, http://seer.cancer.gov/csr/1975_2011/, based on November 2013 SEER data submission, posted to the SEER web site, April 2014.

[3] Virginia Cancer Registry. Based on combined 2007-2011 data. Incidence rates are age-adjusted to the 2000 U.S. standard population; Local Stage cancers reported using the Derived Summary Staging System.

[4] VDH Virginia Health Information Hospital Discharge Patient-Level Dataset, 2012.

[5] Centers for Disease Control and Prevention (CDC). Behavioral Risk Factor Surveillance System Survey Data. Atlanta, Georgia: US Department of Health and Human Services, Centers for Disease Control and Prevention, 2012.

Table 2.1: Breast Cancer (Female) Data by Race and Sex, Incidence (2007-2011) & Mortality (2008-2012)

		State of Virginia	African-American Women	White Women
Incidence[1]	Count	28,193	5,282	21,756
	Rate per 100,000	125.0*	128.9	125.5
	95% CI	123.5-126.5	125.4-132.5	123.9-127.3
Staging[1]	% Localized	62.4%	55.0%	64.3%
	% Regional	28.9%	33.9%	27.6%
	% Distant	5.1%	7.0%	4.7%
	% Unstaged/Other	3.4%	3.9%	3.1%
Mortality[2]	Count	5,275	1,297	3,863
	Rate per 100,000	22.7	31.5	21.3
	95% CI	22.1-23.3	29.8-33.2	20.6-22.0

According to Table 2.1:

- During the period 2007-2011, the breast cancer incidence rate was 125.0 cases per 100,000 women in Virginia (U.S. rate: 122.4 cases per 100,000 women).[3]

- During the period 2008-2012, the mortality rate from breast cancer was 22.7 deaths per 100,000 women in Virginia (2007-2011; U.S. rate: 22.6 deaths per 100,000 women).[4]

- The rate of breast cancer incidence did not differ substantially between African-American and White women. However, African-American women in Virginia had a mortality rate that was 39 percent higher than that of White women.

- A higher percentage of White women (64.3%) had their breast cancer diagnosed at the localized stage in comparison to African-American women (55%).

[1] Virginia Cancer Registry. Based on combined 2007-2011 data. Incidence rates are age-adjusted to the 2000 U.S. standard population; local stage defined using Derived Summary Staging values (http://seer.cancer.gov/tools/ssm/intro.pdf).

[2] VDH Division of Health Statistics. Based on combined 2008-2012 data. Mortality rates are age-adjusted to the 2000 U.S. standard population.

[3] Howlader N, Noone AM, Krapcho M, Garshell J, Miller D, Altekruse SF, Kosary CL, Yu M, Ruhl J, Tatalovich Z, Mariotto A, Lewis DR, Chen HS, Feuer EJ, Cronin KA (eds). SEER Cancer Statistics Review, 1975-2011, National Cancer Institute. Bethesda, MD, http://seer.cancer.gov/csr/1975_2011/, based on November 2013 SEER data submission, posted to the SEER web site, April 2014.

[4] Howlader N, Noone AM, Krapcho M, Garshell J, Neyman N, Altekruse SF, Kosary CL, Yu M, Ruhl J, Tatalovich Z, Cho H, Mariotto A, Lewis DR, Chen HS, Feuer EJ, Cronin KA (eds). *SEER Cancer Statistics Review, 1975-2010*, National Cancer Institute. Bethesda, MD, http://seer.cancer.gov/csr/1975_2010/, based on November 2012 SEER data submission, posted to the SEER web site, 2013. (accessed 07/02/2014).

*The rate for Virginia State was lower than the two subgroups was due to a higher rate of 71.1 for other race group.

Table 2.2: Cancer Data by Health District – Breast (Female), Incidence (2007-2011) & Mortality (2008-2012)

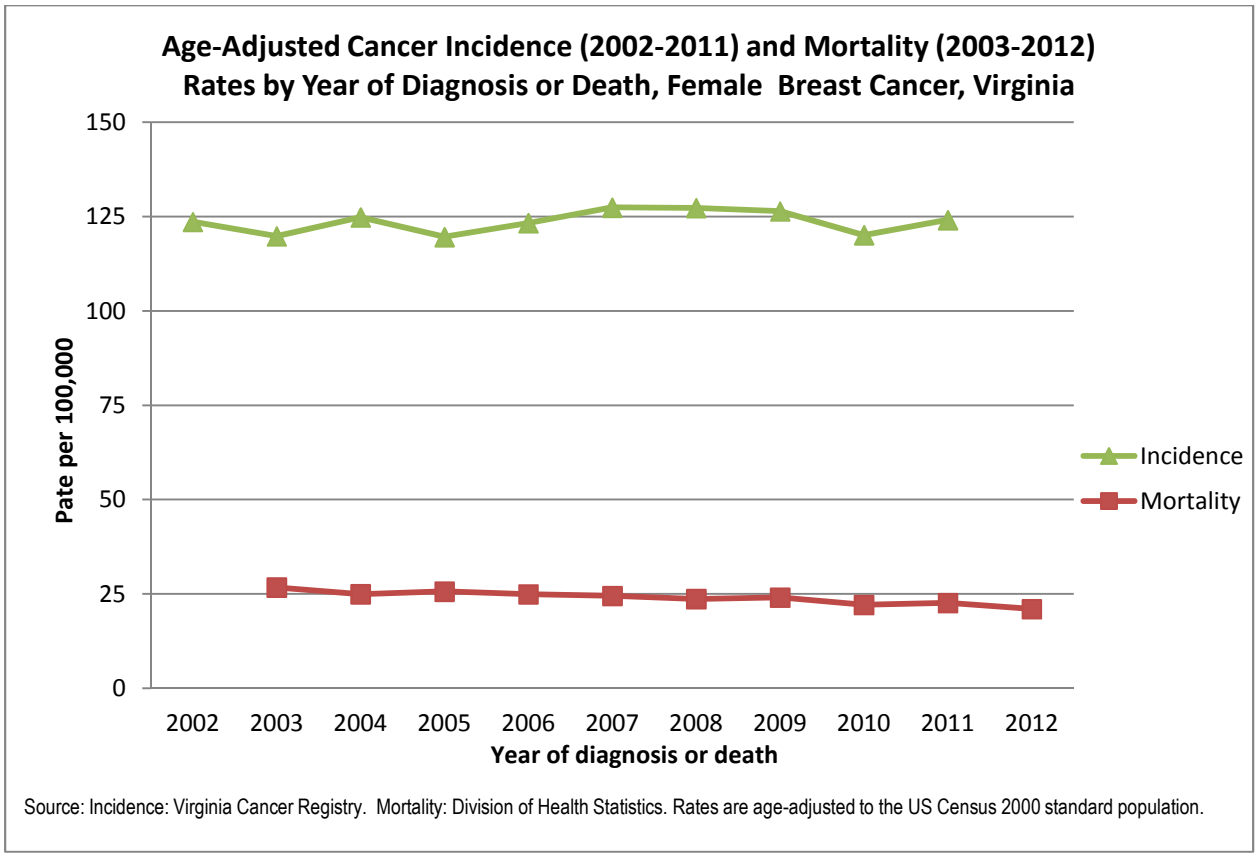
Districts are ranked from favorable (1) to unfavorable (35) for incidence, localized stage, and mortality.

	Incidence[1]				Staging[1]		Mortality[2]			
Health District	Count	Age-Adjusted Rate per 100,000	95% CI	Rank	Percent Localized	Rank	Count	Age-Adjusted Rate per 100,000	95% CI	Rank
Alexandria	442	124.9	113.2-137.6	18	60.0%	23	91	23.5	18.7-28.3	20
Alleghany	791	125.9	117.0-135.3	20	67.5%	3	132	19.9	16.5-23.3	6
Arlington	661	141.1	130.2-152.6	35	65.3%	5	96	19.6	15.7-23.5	5
Central Shenandoah	1,054	121.0	113.6-128.8	11	64.7%	7	175	18.4	15.7-21.1	1
Central Virginia	983	121.2	113.6-129.3	13	64.1%	9	190	21.4	18.3-24.4	11
Chesapeake	846	139.7	130.3-149.6	34	62.5%	16	152	24.5	20.6-28.3	23
Chesterfield	1,372	135.2	128.0-142.8	28	63.0%	14	212	22.0	19.0-24.9	12
Chickahominy	634	137.4	126.7-148.8	31	63.9%	10	101	22.5	18.1-26.9	13
Crater	555	122.0	111.9-132.9	15	57.1%	33	124	26.7	22.0-31.5	30
Cumberland Plateau	306	76.4	67.8-85.8	1	57.7%	29	108	26.4	21.4-31.4	26
Eastern Shore	196	112.8	96.8-131.0	6	59.1%	26	50	26.5	19.2-33.8	29
Fairfax	3,716	125.7	121.6-130.0	19	63.7%	11	571	20.0	18.3-21.6	7
Hampton	507	129.1	117.9-141.0	24	65.7%	4	99	24.3	19.5-29.1	22
Henrico	1,242	136.7	129.1-144.6	30	63.6%	12	254	26.7	23.4-30.0	30
Lenowisco	311	103.7	92.2-116.4	3	62.9%	15	78	25.9	20.1-31.6	25
Lord Fairfax	886	131.3	122.7-140.5	27	61.0%	19	187	26.4	22.7-30.2	26
Loudoun	791	120.6	111.8-129.9	10	62.3%	17	117	19.2	15.7-22.6	4
Mount Rogers	699	100.0	92.5-108.1	2	61.9%	18	177	23.4	20.0-26.9	18
New River	514	108.0	98.7-118.0	4	57.2%	32	105	21.0	17.0-25.0	10
Norfolk	770	138.1	128.4-148.4	32	60.5%	21	136	23.8	19.8-27.8	21
Peninsula	1,351	138.6	131.2-146.3	33	65.1%	6	236	23.4	20.4-26.4	18
Piedmont	385	121.1	108.8-134.4	12	58.2%	27	109	31.1	25.3-37.0	35
Pittsylvania-Danville	456	118.2	107.2-130.0	7	63.2%	13	85	20.6	16.2-24.9	8
Portsmouth	389	135.2	121.9-149.7	28	57.0%	34	93	30.6	24.4-36.8	33
Prince William	1,081	111.5	104.6-118.8	5	60.4%	22	205	22.7	19.6-25.8	15
Rappahannock	952	119.0	111.4-127.0	9	58.2%	27	176	22.6	19.2-25.9	14
Rappahannock -Rapidan	598	118.3	108.9-128.4	8	56.6%	35	106	20.7	16.7-24.6	9
Richmond	688	128.5	118.8-138.7	21	57.7%	29	163	26.4	22.4-30.5	26
Roanoke	384	124.1	111.6-137.6	17	57.3%	31	82	25.0	19.6-30.4	24
Southside	400	130.3	117.2-144.6	26	60.0%	23	91	28.6	22.7-34.5	32
Thomas Jefferson	879	128.6	120.1-137.6	23	68.4%	1	133	18.4	15.3-21.5	1
Three Rivers	651	121.7	112.1-131.9	14	64.6%	8	104	18.6	15.0-22.1	3
Virginia Beach	1,492	128.5	122.0-135.2	21	59.4%	25	272	23.3	20.5-26.1	17
West Piedmont	649	129.1	119.0-140.0	24	67.9%	2	123	22.7	18.7-26.7	15
Western Tidewater	545	123.9	113.6-134.9	16	61.0%	19	141	30.9	25.8-36.0	34
Virginia	**28,193**	**125.0**	**123.5-126.5**		**62.3%**		**5,275**	**22.7**	**22.1-23.3**	

[1] Virginia Cancer Registry. Based on combined 2007-2011 data. Incidence rates are age-adjusted to the 2000 U.S. standard population; local stage defined using Derived Summary Staging values (http://seer.cancer.gov/tools/ssm/intro.pdf).

[2] VDH Division of Health Statistics. Based on combined 2008-2012 data. Mortality rates are age-adjusted to the 2000 U.S. standard population.

Chart 2.1: Breast Cancer (Female) Incidence and Mortality Rates, by Year, 2002-2012



The incidence of female breast cancer in Virginia varied between 2002 and 2011. The rate in 2002 was 123.6 cases per 100,000 females. From 2005 through 2007, the rate increased from 119.6 to 127.4.* The incidence rate continues to fluctuate.[1] Womens' increased awareness of the importance of screening may impact incidence. According to a Cochran-Armitage trend analysis, there was no significant incidence rate trend over the 10 year period.

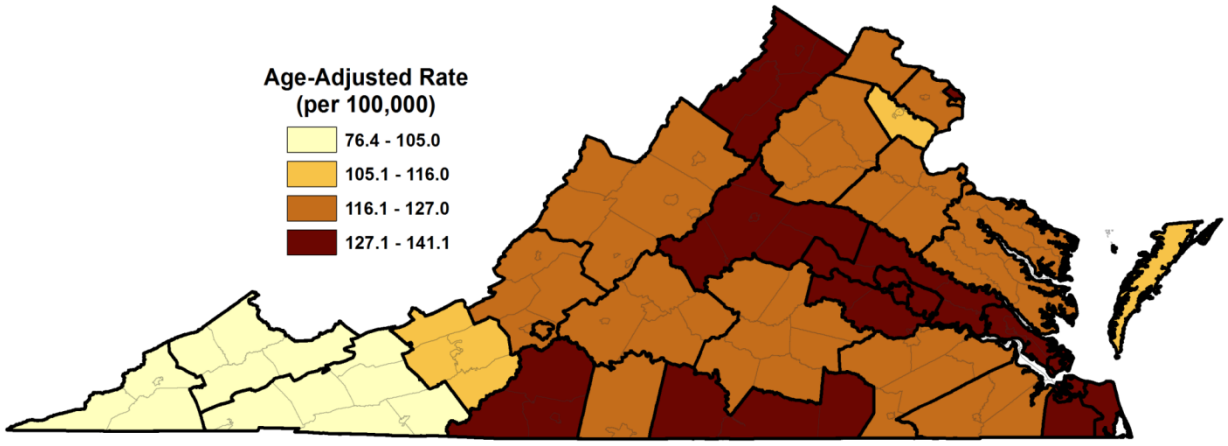
Female mortality from breast cancer declined rather steadily between 2003 and 2012. In 2003, the mortality rate was 26.8 deaths due to breast cancer per 100,000 women. By 2012, the rate had fallen to 21.2 per 100,000 women.[1] The mortality rate for this cancer declined more than 20 percent during the period.[2] Experts identify two important factors influencing the decline. First is widespread use of screening, which can help find tumors at earlier stages when treatment success is better. Second is advances in therapies. According to a Cochran-Armitage trend analysis, the female breast cancer mortality rate significantly decreased over the 10 year period.

[1] Virginia Cancer Registry. Based on combined 2002-2011 data. Incidence rates are age-adjusted to the 2000 U.S. standard population.

[2] VDH Division of Health Statistics. Based on combined 2003-2012 data. Mortality rates are age-adjusted to the 2000 U.S. standard population.

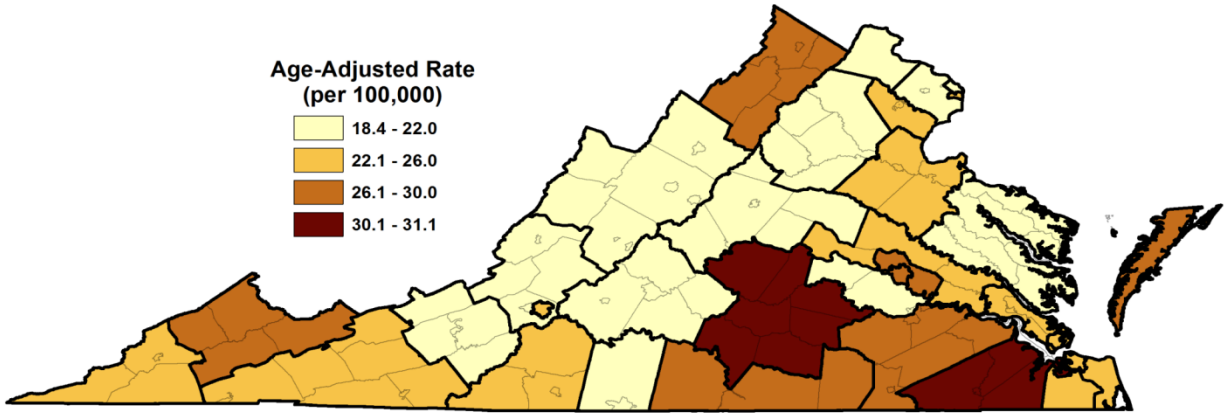
*Incidence data for 2010 may be incomplete because reporting lags resulted from adopting an enhanced coding system that slowed timely reporting.

Map 2.1: Breast Cancer (Female) Incidence Rates by Health District, 2007-2011[1]



Arlington (141.1 cases per 100,000 women), Chesapeake (139.7), and Peninsula (138.6) had the highest breast cancer incidence rates among the 35 health districts. Cumberland Plateau (76.4), Mount Rogers (100.0), and Lenowisco (103.7) had the lowest incidence rates.

Map 2.2: Breast Cancer (Female) Mortality Rates by Health District, 2008-2012[2]



Piedmont (31.1 deaths per 100,000 women), Western Tidewater (30.9), and Portsmouth (30.6) had the highest mortality rates from breast cancer among the 35 health districts. Thomas Jefferson (18.4), Central Shenandoah (18.4), and Three Rivers (18.6) had the lowest mortality rates from breast cancer among the 35 health districts.

[1] Virginia Cancer Registry. Based on combined 2007-2011 data. Incidence rates are age-adjusted to the 2000 U.S. standard population.

[2] VDH Division of Health Statistics. Based on combined 2008-2012 data. Mortality rates are age-adjusted to the 2000 U.S. standard population.

V. Cervical Cancer

Cervical Cancer Overview

- Cervical cancer is not among the top ten cancers diagnosed among women in the United States. However, one in 151 women will be diagnosed with cervical cancer during her lifetime.[1] Cervical cancer incidence and mortality have fallen substantially over the last several decades due to Papanicolaou test (Pap test) screening.[2] Cervical cancer is also notable because most cases can be prevented through vaccination.

- Cervical cancer has a five-year relative survival rate of 91.0 percent if diagnosed in its earliest (localized) stage, when it is most curable.[1] In Virginia, 46.8 percent of cervical cancer was diagnosed at the localized stage.[3]

- In Virginia, there were 174 inpatient hospitalizations in 2012 for cervical cancer, at a total cost of over $7,720,000. The average length of stay was 4.5 days and the average charge per stay was $44,371.[5]

- According to 2012 BRFSS survey data, 81.5 percent of Virginia women aged 18 years and older reported having had a Pap test in the previous three years (U.S. average, 77.9%).[4]

- Pap test screening rates were lower among women who were less educated (64.3% for less than high school versus 91.2% for college graduate), lower income (63.2% for $15,000 or less versus 89.2% for $50,000 and above), and uninsured (70.3% for uninsured versus 83.8% for insured).[4]

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[1] http://www.cancer.org/acs/groups/content/@research/documents/webcontent/acspc-042151.pdf

[2] American Cancer Society. *Cancer Facts & Figures 2014*. Atlanta: American Cancer Society; 2014. http://www.cancer.org/acs/groups/content/@research/documents/webcontent/acspc-042151.pdf .

[3] Virginia Cancer Registry. Based on combined 2007-2011 data. Incidence rates are age-adjusted to the 2000 U.S. standard population; Local Stage cancers reported using the Derived Summary Staging System.

[4] Centers for Disease Control and Prevention (CDC). Behavioral Risk Factor Surveillance System Survey Data. Atlanta, Georgia: US Department of Health and Human Services, Centers for Disease Control and Prevention, 2012.

[5] VDH Virginia Health Information Hospital Discharge Patient-Level Dataset, 2012.

Table 3.1: Cervical Cancer Data by Race and Sex, Incidence (2007-2011) & Mortality (2008-2012)

		State of Virginia	African-American Women	White Women
Incidence[1]	Count	1,317	313	888
	Rate per 100,000	6.3	7.6	5.8
	95% CI	5.9-6.6	6.8-8.5	5.4-6.2
Staging[1]	% Localized	46.9%	39.6%	49.7%
	% Regional	34.3%	39.3%	33.2%
	% Distant	10.5%	14.1%	9.7%
	% Unstaged/Other	7.9%	7.0%	6.9%
Mortality[2]	Count	415	115	279
	Rate per 100,000	1.9	2.9	1.7
	95% CI	1.7-2.1	2.3-3.4	1.5-1.9

According to table 3.1:

- During the period 2007-2011, the incidence rate of cervical cancer was 6.3 cases per 100,000 women in Virginia[1] (U.S. rate: 7.8 cases per 100,000 women).[3]
- During the period 2008-2012, the mortality rate from cervical cancer was 1.9 deaths per 100,000 women in Virginia[2] (2007-2011 U.S. rate: 2.4 deaths per 100,000 women per year).[4]
- Cervical cancer incidence rates were 7.6 per 100,000 for African-American women and 5.8 per 100,000 for White women. African-American women had a higher mortality rate (2.9 per 100,000 women) compared to White women (1.7 per 100,000 women).
- White women (49.7%) were more likely to have their cervical cancer diagnosed at the localized stage than African-American women (39.6%).

[1] Virginia Cancer Registry. Based on combined 2007-2011 data. Incidence rates are age-adjusted to the 2000 U.S. standard population.

[2] VDH Division of Health Statistics. Based on combined 2008-2012 data. Mortality rates are age-adjusted to the 2000 U.S. standard population.

[3] Howlader N, Noone AM, Krapcho M, Garshell J, Miller D, Altekruse SF, Kosary CL, Yu M, Ruhl J, Tatalovich Z,Mariotto A, Lewis DR, Chen HS, Feuer EJ, Cronin KA (eds). SEER Cancer Statistics Review, 1975-2011, National Cancer Institute. Bethesda, MD, http://seer.cancer.gov/csr/1975_2011/, based on November 2013 SEER data submission, posted to the SEER web site, April 2014.

[4] Howlader N, Noone AM, Krapcho M, Garshell J, Neyman N, Altekruse SF, Kosary CL, Yu M, Ruhl J, Tatalovich Z, Cho H, Mariotto A, Lewis DR, Chen HS, Feuer EJ, Cronin KA (eds). *SEER Cancer Statistics Review, 1975-2010*, National Cancer Institute. Bethesda, MD, http://seer.cancer.gov/csr/1975_2010/, based on November 2012 SEER data submission, posted to the SEER web site, 2013. (accessed 07/02/2014).

Table 3.2: Cancer Data by Health District – Cervical, Incidence (2007-2011) & Mortality (2008-2012)

Districts are ranked from favorable (1) to unfavorable (35) for incidence, localized stage, and mortality.

	Incidence[1]				Staging[1]		Mortality[2]			
Health District	Count	Age-Adjusted Rate per 100,000	95% CI	Rank	Percent Localized	Rank	Count	Age-Adjusted Rate per 100,000[3]	95% CI	Rank
Alexandria	20	5.6	3.3-9.0	9	35.0%	30	-	DSU	-	-
Alleghany	25	4.8	3.0-7.3	4	64.0%	1	-	DSU	-	-
Arlington	23	4.4	2.7-6.7	1	47.8%	15	-	DSU	-	-
Central Shenandoah	49	6.9	5.0-9.2	23	61.2%	4	-	DSU	-	-
Central Virginia	39	6.0	4.2-8.2	14	41.0%	22	-	DSU	-	-
Chesapeake	33	5.8	4.0-8.2	12	33.3%	32	-	DSU	-	-
Chesterfield	50	5.4	4.0-7.2	7	48.0%	14	-	DSU	-	-
Chickahominy	22	5.6	3.4-8.7	9	54.5%	7	-	DSU	-	-
Crater	28	7.4	4.9-10.8	26	46.4%	19	-	DSU	-	-
Cumberland Plateau	22	6.8	4.1-10.5	21	31.8%	33	-	DSU	-	-
Eastern Shore	16	13.8	7.5-23.1	35	37.5%	27	-	DSU	-	-
Fairfax	170	5.9	5.0-6.9	13	50.6%	10	41	1.4	1.0-1.9	1
Hampton	20	5.1	3.1-7.9	6	40.0%	23	-	DSU	-	-
Henrico	55	6.4	4.8-8.4	18	54.5%	7	-	DSU	-	-
Lenowisco	17	7.2	4.1-11.6	25	29.4%	34	-	DSU	-	-
Lord Fairfax	39	6.4	4.5-8.8	18	59.0%	6	-	DSU	-	-
Loudoun	32	4.5	3.0-6.4	2	46.9%	17	-	DSU	-	-
Mount Rogers	40	7.0	4.9-9.7	24	40.0%	23	-	DSU	-	-
New River	25	6.3	4.0-9.4	17	64.0%	1	-	DSU	-	-
Norfolk	57	10.6	8.0-13.8	34	35.1%	29	-	DSU	-	-
Peninsula	68	8.1	6.3-10.3	31	47.1%	16	-	DSU	-	-
Piedmont	20	6.8	4.0-10.8	21	50.0%	11	-	DSU	-	-
Pittsylvania-Danville	18	5.5	3.2-9.0	8	44.4%	21	-	DSU	-	-
Portsmouth	25	9.7	6.2-14.5	33	40.0%	23	-	DSU	-	-
Prince William	52	4.7	3.5-6.2	3	36.5%	28	-	DSU	-	-
Rappahannock	62	7.6	5.8-9.8	29	46.8%	18	-	DSU	-	-
Rappahannock -Rapidan	26	5.6	3.6-8.3	9	46.2%	20	-	DSU	-	-
Richmond	37	6.7	4.7-9.4	20	54.1%	9	-	DSU	-	-
Roanoke	18	7.5	4.4-11.8	27	50.0%	11	-	DSU	-	-
Southside	21	8.2	4.9-13.0	32	19.0%	35	-	DSU	-	-
Thomas Jefferson	36	6.1	4.3-8.5	16	63.9%	3	-	DSU	-	-
Three Rivers	20	5.0	2.9-8.0	5	60.0%	5	-	DSU	-	-
Virginia Beach	69	6.0	4.7-7.6	14	49.3%	13	27	2.2	1.4-3.1	2
West Piedmont	32	7.8	5.2-11.2	30	34.4%	31	-	DSU	-	-
Western Tidewater	31	7.5	5.0-10.7	27	38.7%	26	-	DSU	-	-
Virginia	**1,317**	**6.3**	**5.9-6.6**		**46.8%**		**415**	**1.9**	**1.7-2.1**	

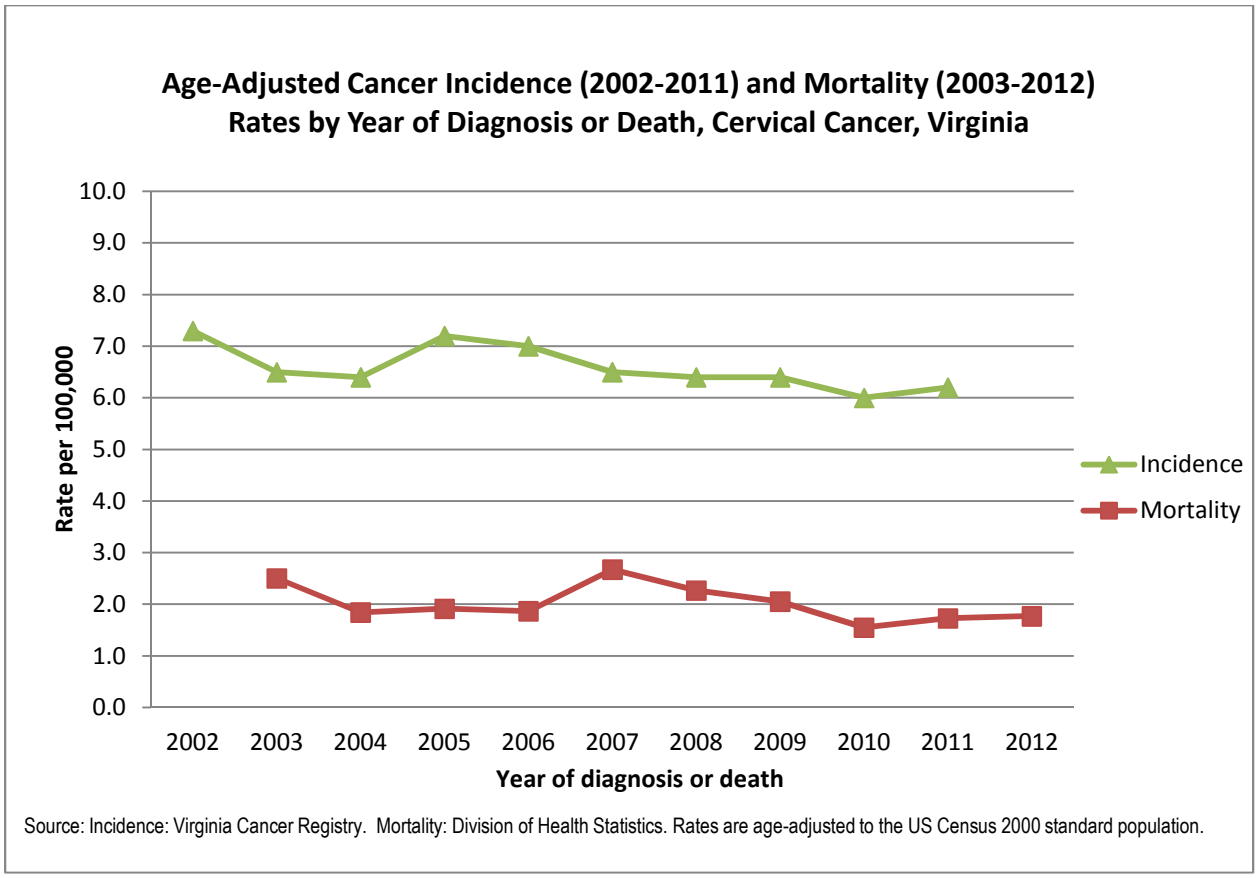
DSU/- : Data statistically unreliable; the number of cases (25 or less) is too small to calculate a reliable rate.

[1] Virginia Cancer Registry. Based on combined 2007-2011 data. Incidence rates are age-adjusted to the 2000 U.S. standard population; local stage defined using Derived Summary Staging values (http://seer.cancer.gov/tools/ssm/intro.pdf).

[2] VDH Division of Health Statistics. Based on combined 2008-2012 data. Mortality rates are age-adjusted to the 2000 U.S. standard population.

[3] DSU: Data statistically unreliable; the number of cases (25 or less) is too small to calculate a reliable rate.

Chart 3.1: Cervical Cancer Incidence and Mortality Rates, by Year, 2002-2012



Virginia cervical cancer incidence (2002 – 2011) declined. The incidence rate in 2002 was 7.3 cases per 100,000 females. This fell to 6.2 cases in 2011. This decline in incidence is 14.4 percent percent.[1] In 2002, mortality due to cervical cancer in Virginia was 2.5 deaths per 100,000 females. This rate declined to 1.8 in 2004, but rose to 2.7 in 2007. Thereafter, the rate declined steadily to 1.8 in 2012.[2] According to a Cochran-Armitage trend analysis, the cervical cancer incidence rate significantly decreased over the 10 year period.

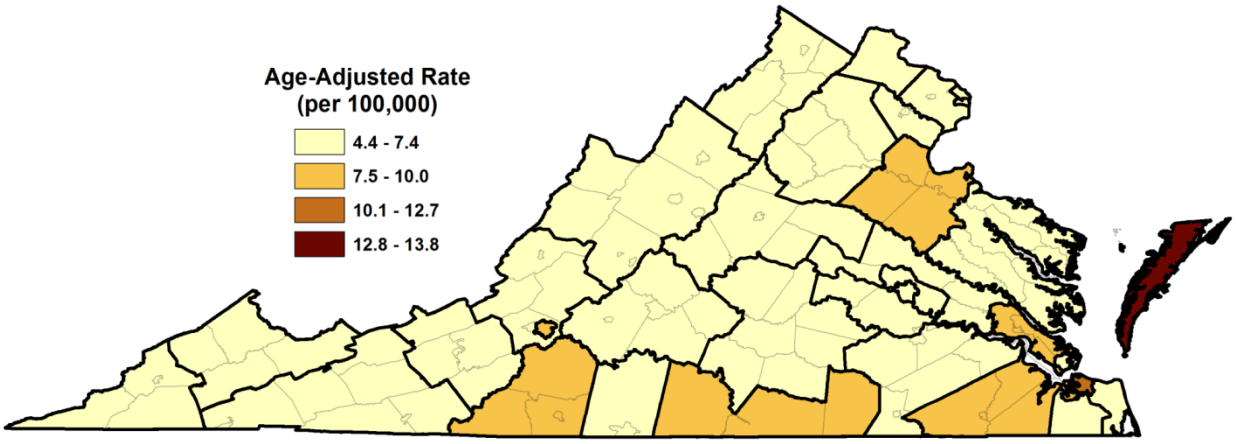
Declines in cervical cancer incidence and mortality rates partially can be attributed to increased screening using the Pap test, which can detect developing stages of the disease. The HPV (human pappilloma virus) test effectively shows the presence of this cancer-causing virus which, according to the CDC (Centers for Disease Control and Prevention), causes most cervical cancer cases.[3] According to a Cochran-Armitage trend analysis, there was no significant mortality rate trend over the 10 year period.

[1] Virginia Cancer Registry. Based on combined 2002-2011 data. Incidence rates are age-adjusted to the 2000 U.S. standard population.

[2] VDH Division of Health Statistics. Based on combined 2003-2012 data. Mortality rates are age-adjusted to the 2000 U.S. standard population.

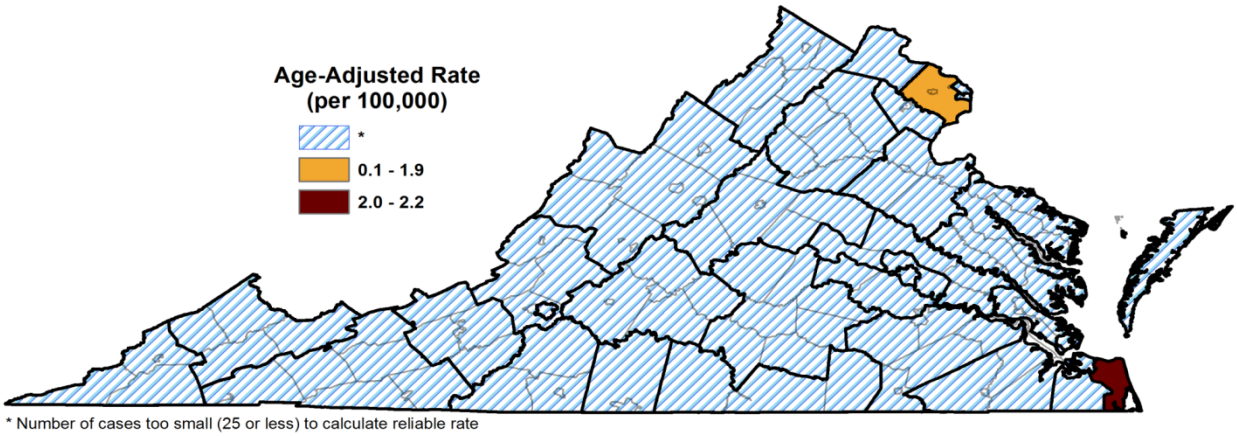
[3] Centers for Disease Control and Prevention HPV Fact Sheet. http://www.cdc.gov/std/HPV/STDFact-HPV.htm (accessed 06/27/2014).

Map 3.1: Cervical Cancer Incidence Rates by Health District, 2007-2011[1]



Eastern Shore (13.8 cases per 100,000 women), Norfolk (10.6), and Portsmouth (9.7) had the highest incidence rates of cervical cancer among the 35 health districts. Arlington (4.4), Loudoun (4.5), and Prince William (4.7) had the lowest incidence rates of cervical cancer.

Map 3.2: Cervical Cancer Mortality Rates by Health District, 2008-2012[2]



Virginia Beach (2.2 deaths per 100,000), and Fairfax (1.4) were the only health districts to have more than 25 deaths due to cervical cancer.

[1] Virginia Cancer Registry. Based on combined 2007-2011 data. Incidence rates are age-adjusted to the 2000 U.S. standard population.

[2] VDH Division of Health Statistics. Based on combined 2008-2012 data. Mortality rates are age-adjusted to the 2000 U.S. standard population.

VI. Colorectal Cancer

Colorectal Cancer Overview

- Colorectal cancer is the fourth most commonly diagnosed cancer (excluding non-melanoma skin cancer) and the second leading cause of cancer death among men and women in the United States. One in twenty men and one in twenty women will be diagnosed with colorectal cancer during their lifetimes.[1] National colorectal cancer incidence and mortality rates have fallen over the past two decades.[2]

- Colorectal cancer has a five-year relative survival rate of 90.0 percent if diagnosed in its earliest (localized) stage, when it is most curable.[2] In Virginia, 39.7 percent of colorectal cancers diagnosed were at the localized stage.[3]

- In Virginia, there were 2,925 inpatient hospitalizations in 2012 for colorectal cancer, at a total cost of over $182 million. The average length of stay was 7.6 days and the average charge per stay was $62,515.[4]

- According to the 2012 BRFSS survey data, 69.0 percent of Virginia adults aged 50 years and older reported ever having had an endoscopy (e.g. colonoscopy, sigmoidoscopy). Colorectal screening prevalence was 68.0 percent among African-Americans and 64.7 percent among Whites.[5]

- Colorectal screening rates were lower among adults who were less educated (58.9% for less than high school versus 74.8% for college graduates) and who did not have insurance (38.3% for uninsured versus 73.0% for insured).[5]

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[1] Howlader N, Noone AM, Krapcho M, Garshell J, Miller D, Altekruse SF, Kosary CL, Yu M, Ruhl J, Tatalovich Z,Mariotto A, Lewis DR, Chen HS, Feuer EJ, Cronin KA (eds). http://seer.cancer.gov/statfacts/html/lungb.html. (accessed 09/22/2014)

[2] American Cancer Society. Cancer Facts & Figures 2013. Atlanta: American Cancer Society; 2013.

[3] Virginia Cancer Registry. Based on combined 2007-2011 data. Incidence rates are age-adjusted to the 2000 U.S. standard population; local stage defined using Derived Summary Staging values (http://seer.cancer.gov/tools/ssm/intro.pdf).

[4] VDH Virginia Health Information Hospital Discharge Patient-Level Dataset, 2012.

[5] Centers for Disease Control and Prevention (CDC). *Behavioral Risk Factor Surveillance System Survey data*. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2012.

Table 4.1: Colorectal Cancer Data by Race and Sex, Incidence (2007-2011) & Mortality (2008-2012)

		State of Virginia	All African-Americans	African-American Men	African-American Women	All Whites	White Men	White Women
Incidence[1]	Count	16,129	3,231	1,604	1,627	12,247	6,280	5,967
	Rate per 100,000	39.5	47	55.6	41.2	38.1	43.1	33.8
	95% CI	38.9-40.1	45.4-48.7	52.7-58.6	39.2-43.2	37.4-38.7	42.0-44.2	33.0-34.7
Staging[1]	% Localized	39.7%	37.8%	36.8%	38.7%	40.2%	40.7%	39.7%
	% Regional	32.8%	30.9%	30.2%	31.7%	33.2%	33.4%	33.0%
	% Distant	19.3%	21.2%	22.7%	19.7%	19.1%	19.1%	19.1%
	% Unstaged/ Other	7.8%	9.8%	10.2%	9.5%	7.1%	6.5%	7.8%
Mortality[2]	Count	6,116	1,399	732	667	4,557	2,331	2,226
	Rate per 100,000	14.9	20.8	26.7	17	14	16.4	12
	95% CI	14.5-15.3	19.7-21.9	24.8-28.7	15.7-18.3	13.6-14.4	15.7-18.3	11.5-12.5

According to Table 4.1:

- During the period 2007-2011, the colorectal cancer incidence rate was 39.5 cases per 100,000 in Virginia (U.S. rate: 43.7 cases per 100,000).[3]
- During the period 2008-2012, the mortality rate from colorectal cancer was 14.9 deaths per 100,000 in Virginia (2007-2011 U.S. rate: 16.4 deaths per 100,000).[4]
- The highest rate of colorectal cancer incidence in Virginia during 2007-2011 was among African-American men (55.6 per 100,000).
- Mortality rates in Virginia were higher in men compared to women and in African-Americans compared to Whites. The mortality rate among African-American men, 26.7 deaths per 100,000, was the highest of all groups.
- The percentage of colorectal cancer cases diagnosed at the localized stage was similar for Whites (40.2%) and African-Americans (37.8%).

[1] Virginia Cancer Registry. Based on combined 2007-2011 data. Incidence rates are age-adjusted to the 2000 U.S. standard population.

[2] VDH Division of Health Statistics. Based on combined 2008-2012 data. Mortality rates are age-adjusted to the 2000 U.S. standard population.

[3] Howlader N, Noone AM, Krapcho M, Garshell J, Miller D, Altekruse SF, Kosary CL, Yu M, Ruhl J, Tatalovich Z,Mariotto A, Lewis DR, Chen HS, Feuer EJ, Cronin KA (eds). SEER Cancer Statistics Review, 1975-2011, National Cancer Institute. Bethesda, MD, http://seer.cancer.gov/csr/1975_2011/, based on November 2013 SEER data submission, posted to the SEER web site, April 2014.

[4] Howlader N, Noone AM, Krapcho M, Garshell J, Neyman N, Altekruse SF, Kosary CL, Yu M, Ruhl J, Tatalovich Z, Cho H, Mariotto A, Lewis DR, Chen HS, Feuer EJ, Cronin KA (eds). *SEER Cancer Statistics Review, 1975-2010*, National Cancer Institute. Bethesda, MD, http://seer.cancer.gov/csr/1975_2010/, based on November 2012 SEER data submission, posted to the SEER web site, 2013. (accessed 07/02/2014).

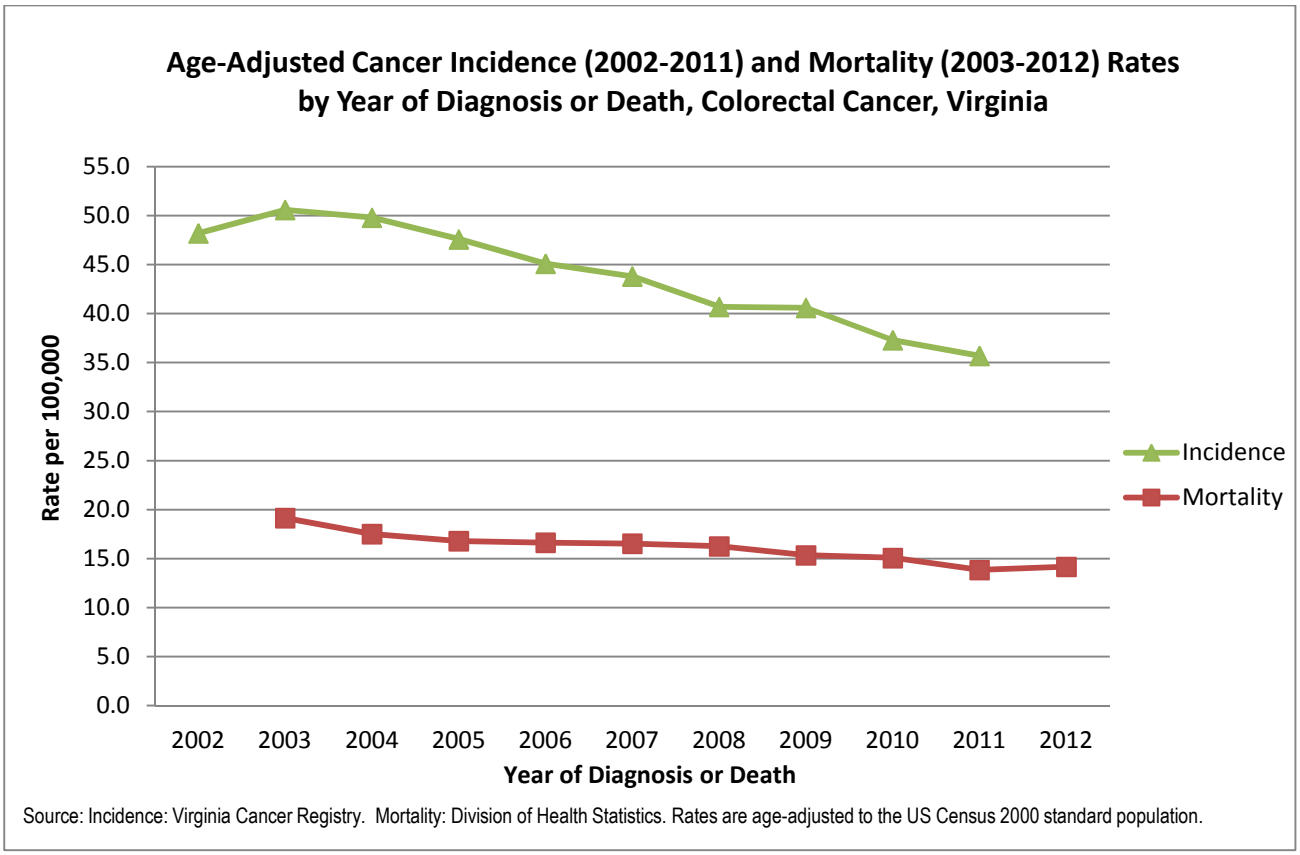
Table 4.2: Cancer Data by Health District – Colorectal, Incidence (2007-2011) & Mortality (2008-2012)
Districts are ranked from favorable (1) to unfavorable (35) for incidence, localized stage, and mortality.

	Incidence[1]				Staging[1]		Mortality[2]			
Health District	**Count**	**Age-Adjusted Rate per 100,000**	**95% CI**	**Rank***	**Percent Localized**	**Rank***	**Count**	**Age-Adjusted Rate per 100,000**	**95% CI**	**Rank***
Alexandria	193	31.4	26.9-36.3	1	38.9%	18	67	10.2	7.7-12.6	1
Alleghany	459	38.6	35.1-42.4	11	35.1%	33	178	14.8	12.6-17.0	13
Arlington	279	32.6	28.7-36.8	2	35.8%	30	87	10.3	8.1-12.4	2
Central Shenandoah	694	41.0	38.0-44.3	22	39.3%	14	295	17.1	15.1-19.0	24
Central Virginia	706	45.8	42.5-49.4	29	38.1%	23	260	16.7	14.6-18.7	22
Chesapeake	406	39.8	35.9-43.9	16	37.2%	27	171	17.1	14.5-19.7	24
Chesterfield	724	42.1	39.0-45.3	24	37.4%	26	252	15.9	13.9-17.9	19
Chickahominy	377	45.8	41.2-50.9	29	36.3%	29	116	14.5	11.9-17.2	10
Crater	371	42.7	38.4-47.4	25	36.7%	28	160	18.9	15.9-21.8	32
Cumberland Plateau	292	39.7	35.2-44.7	15	35.3%	31	138	18.5	15.4-21.6	30
Eastern Shore	139	40.9	34.3-48.7	21	34.5%	34	51	14.0	10.1-17.8	7
Fairfax	1,689	33.4	31.8-35.1	3	43.5%	4	550	11.3	10.4-12.3	3
Hampton	271	39.5	34.8-44.5	13	43.9%	3	109	15.8	12.8-18.7	18
Henrico	615	38.8	35.8-42.1	12	40.2%	12	257	15.6	13.7-17.5	17
Lenowisco	217	38.2	33.2-43.7	9	39.2%	15	104	17.9	14.5-21.4	27
Lord Fairfax	491	38.0	34.7-41.5	8	37.9%	25	189	14.7	12.6-16.8	12
Loudoun	352	34.3	30.5-38.4	4	38.9%	18	138	14.2	11.8-16.5	8
Mount Rogers	532	39.8	36.5-43.5	16	35.3%	31	223	16.3	14.2-18.4	21
New River	339	38.3	34.3-42.7	10	38.1%	23	136	15.3	12.8-17.9	16
Norfolk	461	46.5	42.3-51.0	32	38.4%	22	151	15.0	12.6-17.4	14
Peninsula	646	36.1	33.3-39.0	5	42.0%	9	216	11.9	10.3-13.5	4
Piedmont	300	46.8	41.6-52.5	33	43.0%	7	112	17.1	14.0-20.3	24
Pittsylvania-Danville	383	52.3	47.1-58.0	35	38.6%	20	149	19.8	16.6-23.0	33
Portsmouth	238	46.4	40.6-52.7	31	32.8%	35	105	20.5	16.5-24.4	35
Prince William	559	36.6	33.3-40.0	6	43.3%	6	207	13.5	11.6-15.3	6
Rappahannock	542	39.6	36.2-43.2	14	40.6%	10	196	15.2	13.1-17.3	15
Rappahannock -Rapidan	387	40.7	36.6-45.0	19	45.0%	1	152	16.0	13.5-18.6	20
Richmond	431	44.0	39.9-48.5	26	39.2%	15	198	18.3	15.8-20.9	29
Roanoke	278	49.8	44.0-56.2	34	43.5%	4	113	18.6	15.2-22.1	31
Southside	250	41.8	36.6-47.5	23	40.0%	13	88	14.3	11.3-17.3	9
Thomas Jefferson	527	40.8	37.4-44.5	20	44.4%	2	190	14.6	12.5-16.6	11
Three Rivers	413	39.8	35.9-44.0	16	38.5%	21	187	18.1	15.5-20.7	28
Virginia Beach	753	37.6	34.9-40.4	7	40.6%	10	249	12.5	11.0-14.1	5
West Piedmont	448	44.9	40.7-49.4	27	42.6%	8	165	16.8	14.3-19.4	23
Western Tidewater	357	45.1	40.4-50.1	28	39.2%	15	157	20.0	16.9-23.1	34
Virginia	**16,129**	**39.5**	**38.9-40.1**		**39.7%**		**6,116**	**14.9**	**14.5-15.3**	

***Because rates and percentages are rounded to one decimal place, different ranks may be assigned to the same apparent rate or percentage value. Underlying values expressed at two or more decimals places differ.

[1] Virginia Cancer Registry. Based on combined 2007-2011 data. Incidence rates are age-adjusted to the 2000 U.S. standard population; Local Stage cancers reported using the Derived Summary Staging System.
[2] VDH Division of Health Statistics. Based on combined 2008-2012 data. Mortality rates are age-adjusted to the 2000 U.S. standard population.

Chart 4.1: Colorectal Cancer Incidence and Mortality Rates, by Year, 2002-2012



In 2002, the colorectal cancer incidence rate was 48.2 cases per 100,000 Virginians. By 2011, colorectal cancer incidence fell to 35.7 cases per 100,000; this is a decline of approximately 26 percent. The number of cases fell from 3,333 in 2002 to 3,057 in 2011.[1] Declining colorectal cancer incidence in Virginia parallels the national decline. According to The American Cancer Society, "…the acceleration in the decline in the past decade has largely been attributed to the detection and removal of precancerous polyps as a result of colorectal cancer screening."[2] According to a Cochran-Armitage trend analysis, the colorectal cancer incidence rate significantly decreased over the 10 year period.

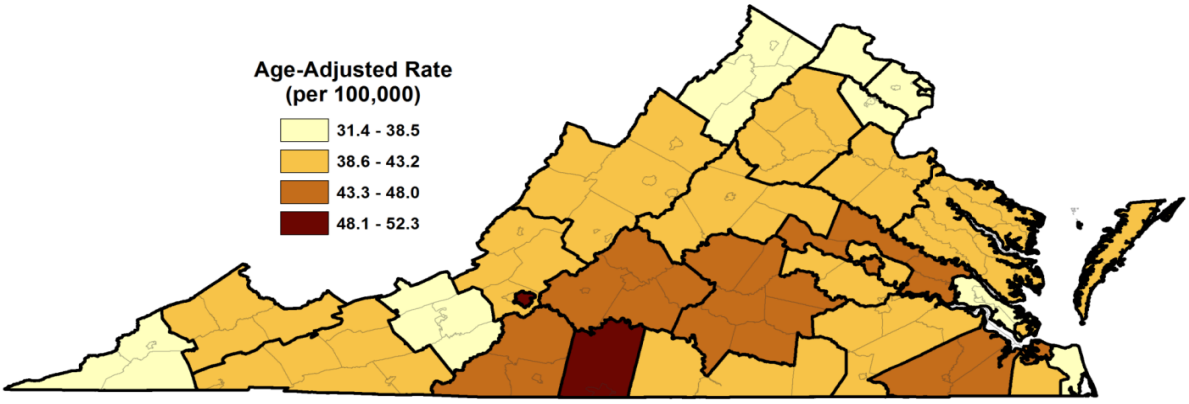
Mortality related to colorectal cancer steadily fell in Virginia. In 2003, a total of 1,330 deaths were associated with this cancer; the number had dropped to 1,223 deaths in 2012. This difference, 107 deaths, is a decline of more than 8 percent. Expressed as a mortality rate, the 2003 rate of 19.2 deaths per 100,000 people fell to 14.2 deaths per 100,000 people in 2012.[3] According to a Cochran-Armitage trend analysis, the colorectal cancer mortality rate significantly decreased over the 10 year period.

[1] Virginia Cancer Registry. Based on combined 2002-2011 data. Incidence rates are age-adjusted to the 2000 U.S. standard population.

[2] American Cancer Society, New Report: Screening Would Prevent Deaths from Colon Cancer, Article date: March 1, 2011 http://www.cancer.org/cancer/news/screening-would-preven-deaths-from-colon-cancer (accessed 07/01/2014).

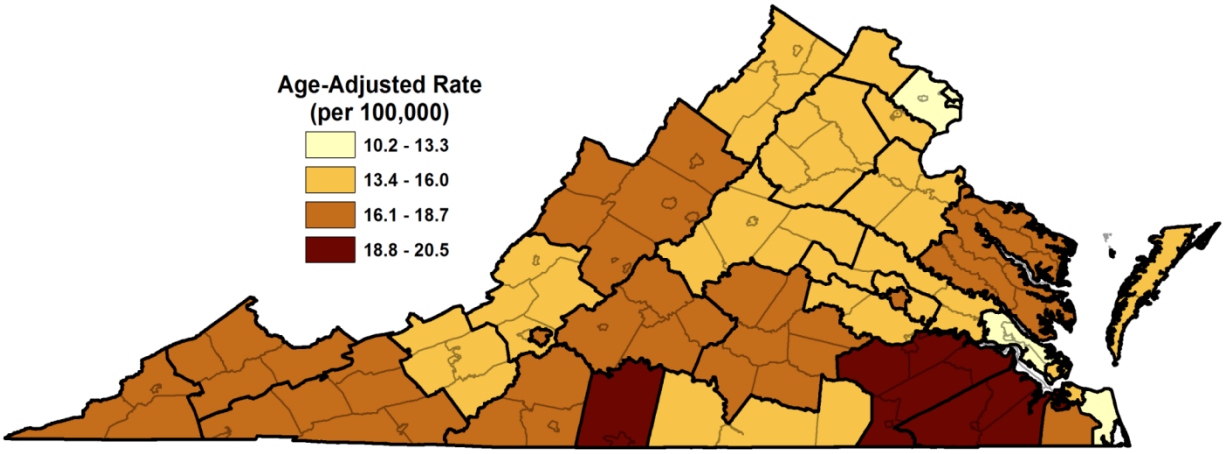
[3] VDH Division of Health Statistics. Based on combined 2003-2012 data. Mortality rates are age-adjusted to the 2000 U.S. standard population.

Map 4.1: Colorectal Cancer Incidence Rates by Health District, 2007-2011[1]



Pittsylvania-Danville (52.3 cases per 100,000), Roanoke City (49.8), and Piedmont (46.8) had the highest incidence rates of colorectal cancer among the 35 health districts. Alexandria (31.4), Arlington (32.6), and Fairfax (33.4) had the lowest colorectal cancer incidence rates.

Map 4.2: Colorectal Cancer Mortality Rates by Health District, 2008-2012[2]



Portsmouth (20.5), Western Tidewater (20.0), and Pittsylvania/Danville (19.8) had the highest mortality rates from colorectal cancer among the 35 health districts. Alexandria (10.2), Arlington (10.3), and Fairfax (11.3) had the lowest colorectal cancer mortality rates.

[1] Virginia Cancer Registry. Based on combined 2007-2011 data. Incidence rates are age-adjusted to the 2000 U.S. standard population.

[2] VDH Division of Health Statistics. Based on combined 2008-2012 data. Mortality rates are age-adjusted to the 2000 U.S. standard population.

VII. Lung Cancer

Lung Cancer Overview

- Lung cancer is the third most commonly diagnosed cancer (excluding non-melanoma skin cancer) and the leading cause of cancer death among both men and women in the United States. One in thirteen men and one in sixteen women will be diagnosed with lung cancer during their lifetimes.[1] However, incidence and mortality rates among men have fallen over the last two decades.[1]

- Nationally, lung cancer has a five-year relative survival rate of 54.0 percent if diagnosed in its earliest (localized) stage.[2] In Virginia, only 19.1 percent of lung cancers were diagnosed at the localized stage between 2007 and 2011.[3]

- In Virginia, there were 3,041 inpatient hospitalizations in 2012 for lung cancer, at a total cost of about $167 million. The average length of stay was 6.5 days and the average charge per stay was $55,122.[4]

- According to 2012 BRFSS survey data, 19.0 percent of adults in Virginia were current smokers (U.S. average, 17.0%).[5] Smoking is a significant contributor to developing lung cancer.

- Prevalence of current smoking was higher among those who were less educated (31.5% for less than high school versus 8.0% for college graduates) lower income (32.2% among those earning $15,000 or less versus 13.3% for $50,000 and above), and uninsured (36.5% for uninsured versus 15.9% for insured).[5]

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[1] SEER Stat Fact Sheets: Lung and Bronchus Cancer. http://seer.cancer.gov/statfacts/html/lungb.html (accessed 07/01/2014).

[2] American Cancer Society. Cancer Facts & Figures 2014. Atlanta: American Cancer Society; 2014

[3] Virginia Cancer Registry. Based on combined 2007-2011 data. Incidence rates are age-adjusted to the 2000 U.S. standard population; Percent of Local Stage cancers reported using the Derived Summary Staging System.

[4] VDH Virginia Health Information Hospital Discharge Patient-Level Dataset, 2012.

[5] Centers for Disease Control and Prevention (CDC). *Behavioral Risk Factor Surveillance System Survey data*. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2012.

Table 5.1: Lung Cancer Data by Race and Sex, Incidence (2007-2011) & Mortality (2008-2012)

		State of Virginia	All African-Americans	African-American Men	African-American Women	All Whites	White Men	White Women
Incidence[1]	Count	26,136	4,522	2,595	1,927	21,018	11,303	9,715
	Rate per 100,000	64.5*	67.6	94.3	49.7	65.3	78.7	55.2
	95% CI	63.7-65.3	65.6-69.6	90.5-98.3	47.5-52.0	64.4-66.2	77.2-80.2	54.1-56.3
Staging[1]	% Localized	19.1%	16.3%	15.0%	18.1%	19.8%	17.6%	22.3%
	% Regional	22.9%	23.6%	22.0%	25.7%	22.8%	23.0%	22.6%
	% Distant	47.4%	49.4%	52.9%	44.8%	46.8%	48.8%	44.4%
	% Unstaged/Other	9.4%	9.7%	9.2%	10.4%	9.3%	9.4%	9.2%
Mortality[2]	Count	19,844	3,451	2,060	1,391	16,006	8,856	7,150
	Rate per 100,000	48.2**	51.4	75.7	35.4	48.8	61.3	39.3
	95% CI	47.5-48.8	49.7-53.1	72.5-79.0	33.6-37.3	48.0-49.5	60.0-62.6	38.4-40.2

*The incidence rate for "other race", not shown, was 30.9. ** The mortality rates for "other race", not shown, was 15.0

According to Table 5.1:

- During the period 2007-2011, the incidence rate of lung cancer in Virginia was 64.5 cases per 100,000 [1] (U.S. rate: 60.1 cases per 100,000).[3]
- During the period 2008-2012, the mortality rate from lung cancer was 48.2 deaths per 100,000 people in Virginia[2] (2007-2011 U.S. rate: 49.5 deaths per 100,000 per year).[4]
- Incidence rates were higher in men than among women in Virginia. Incidence among African-American men was especially high, at 94.3 cases per 100,000.
- Mortality rates were also higher in men compared to women in Virginia. African-American men had the highest mortality rate, 75.7 deaths per 100,000.
- The percentage of lung cancer cases diagnosed at the localized stage among Whites (19.8%) and African-Americans (16.3%) is less than half that of all cancer sites combined (46.0%). Early-stage diagnosis yields better outcomes.

[1] Virginia Cancer Registry. Based on combined 2007-2011 data. Incidence rates are age-adjusted to the 2000 U.S. standard population.

[2] VDH Division of Health Statistics. Based on combined 2008-2012 data. Mortality rates are age-adjusted to the 2000 U.S. standard population.

[3] Howlader N, Noone AM, Krapcho M, Garshell J, Miller D, Altekruse SF, Kosary CL, Yu M, Ruhl J, Tatalovich Z, Mariotto A, Lewis DR, Chen HS, Feuer EJ, Cronin KA (eds). SEER Cancer Statistics Review, 1975-2011, National Cancer Institute. Bethesda, MD, http://seer.cancer.gov/csr/1975_2011/, based on November 2013 SEER data submission, posted to the SEER web site, April 2014.

[4] Howlader N, Noone AM, Krapcho M, Garshell J, Neyman N, Altekruse SF, Kosary CL, Yu M, Ruhl J, Tatalovich Z, Cho H, Mariotto A, Lewis DR, Chen HS, Feuer EJ, Cronin KA (eds). *SEER Cancer Statistics Review, 1975-2010*, National Cancer Institute. Bethesda, MD, http://seer.cancer.gov/csr/1975_2010/, http://seer.cancer.gov/archive/csr/1975_2010/results_merged/sect_15_lung_bronchus.pdf (accessed 07/01/2014).

Table 5.2: Cancer Data by Health District – Lung, Incidence (2007-2011) & Mortality (2008-2012)

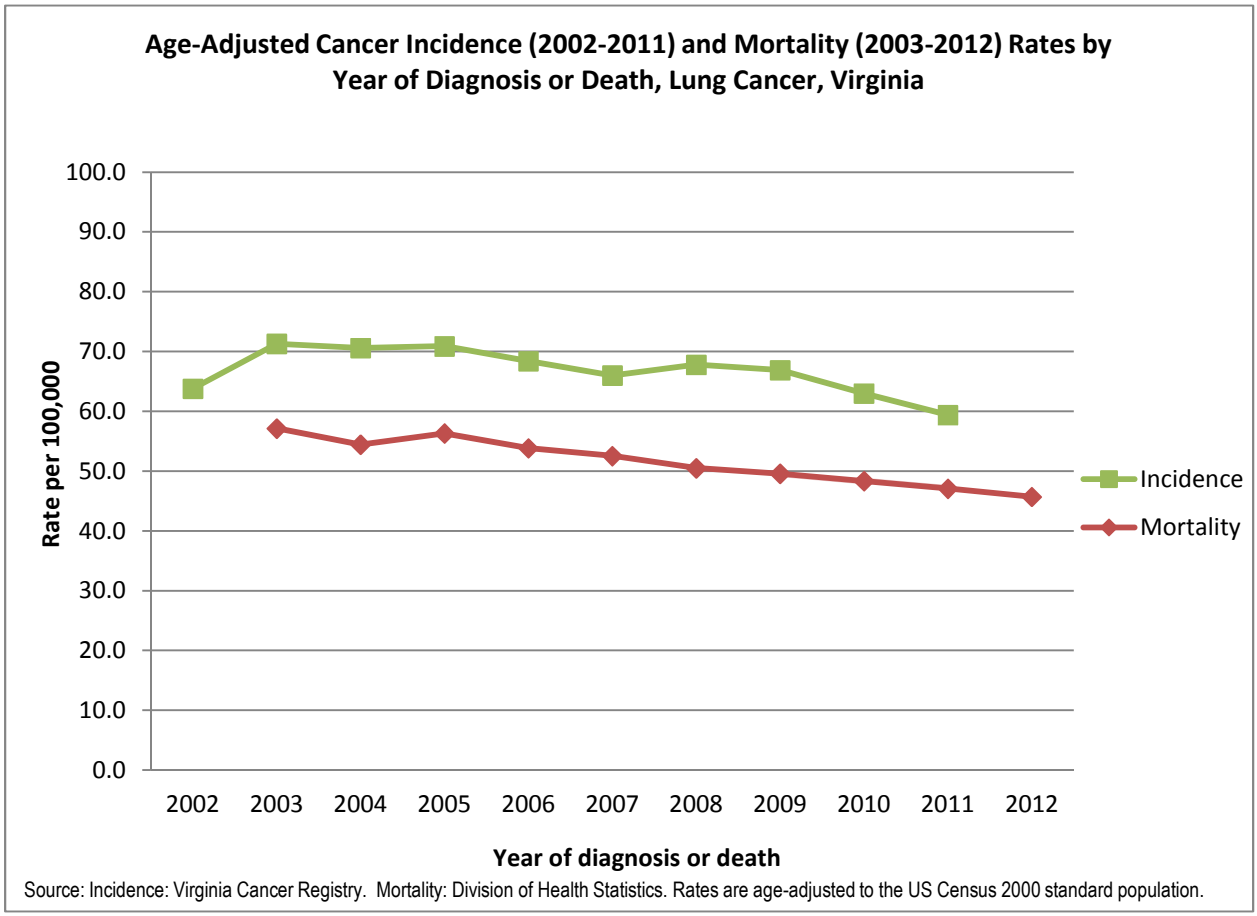
Districts are ranked from favorable (1) to unfavorable (35) for incidence, localized stage, and mortality.

	Incidence[1]				Staging[1]		Mortality[2]			
Health District	**Count**	**Age-Adjusted Rate per 100,000**	**95% CI**	**Rank**	**Percent Localized**	**Rank**	**Count**	**Age-Adjusted Rate per 100,000**	**95% CI**	**Rank**
Alexandria	212	38.2	33.0-44.0	1	23.6%	2	163	24.5	20.7-28.2	1
Alleghany	789	65.2	60.7-70.0	13	17.5%	25	602	49.1	45.2-53.1	11
Arlington	322	40.9	36.4-45.7	2	16.1%	31	205	24.7	21.3-28.1	2
Central Shenandoah	1,138	65.5	61.7-69.5	14	21.3%	7	806	45.9	42.7-49.1	7
Central Virginia	1,136	72.6	68.4-77.0	22	18.2%	19	845	53.3	49.7-56.9	18
Chesapeake	756	77.2	71.6-83.0	28	21.8%	6	533	52.9	48.4-57.4	16
Chesterfield	1,200	71.5	67.4-75.8	21	19.6%	11	834	51.7	48.2-55.2	15
Chickahominy	585	70.7	65.0-76.9	18	18.3%	17	436	53.0	48.0-58.0	17
Crater	746	84.9	78.9-91.4	33	16.4%	29	529	61.3	56.1-66.5	29
Cumberland Plateau	577	75.1	69.0-81.6	24	17.9%	22	517	67.9	62.1-73.8	33
Eastern Shore	330	94.6	84.5-105.8	35	12.1%	35	257	72.9	64.0-81.9	34
Fairfax	2,045	43.6	41.6-45.6	3	20.3%	9	1,336	28.1	26.6-29.7	3
Hampton	525	75.8	69.4-82.7	25	18.7%	15	415	58.0	52.4-63.6	27
Henrico	978	62.3	58.4-66.4	9	18.8%	14	772	47.7	44.4-51.1	10
Lenowisco	506	83.4	76.2-91.2	32	17.8%	23	439	73.1	66.2-79.9	35
Lord Fairfax	925	71.0	66.4-75.8	19	19.2%	13	772	58.3	54.2-62.4	28
Loudoun	419	45.8	41.2-50.7	4	22.4%	4	323	35.2	31.4-39.1	4
Mount Rogers	1,005	73.0	68.5-77.8	23	19.5%	12	873	62.5	58.3-66.6	30
New River	548	60.4	55.4-65.8	7	16.6%	28	467	51.6	46.9-56.3	14
Norfolk	753	76.5	71.1-82.3	26	18.7%	15	530	53.4	48.8-57.9	19
Peninsula	1,057	59.2	55.6-62.9	6	21.2%	8	803	43.9	40.8-46.9	6
Piedmont	424	64.5	58.4-71.0	12	12.7%	34	357	54.0	48.4-59.6	21
Pittsylvania-Danville	572	76.6	70.4-83.3	27	18.0%	21	430	57.4	51.9-62.8	25
Portsmouth	426	82.9	75.1-91.3	31	14.3%	33	329	62.9	56.1-69.7	31
Prince William	770	55.3	51.1-59.7	5	18.3%	17	604	42.7	39.3-46.1	5
Rappahannock	1,031	78.6	73.7-83.7	29	24.2%	1	720	54.7	50.7-58.7	22
Rappahannock -Rapidan	586	60.4	55.5-65.6	7	19.8%	10	479	49.6	45.2-54.1	12
Richmond	763	79.2	73.6-85.2	30	16.3%	30	602	57.1	52.5-61.6	24
Roanoke	492	86.7	79.0-94.8	34	17.3%	26	380	64.0	57.5-70.4	32
Southside	441	69.1	62.7-76.0	17	15.0%	32	353	55.4	49.6-61.1	23
Thomas Jefferson	857	66.6	62.2-71.3	15	22.1%	5	613	46.1	42.4-49.7	8
Three Rivers	769	71.4	66.4-76.8	20	17.6%	24	634	57.7	53.2-62.2	26
Virginia Beach	1,254	63.9	60.4-67.6	11	22.7%	3	936	47.1	44.1-50.1	9
West Piedmont	644	62.8	58.0-68.0	10	18.2%	20	547	53.5	49.0-58.0	20
Western Tidewater	532	66.7	61.1-72.8	16	17.1%	27	403	50.0	45.1-54.9	13
Virginia	**26,136**	**64.5**	**63.7-65.3**		**19.1%**		**19,844**	**48.2**	**47.5-48.8**	

[1] Virginia Cancer Registry. Based on combined 2002-2011 data. Incidence rates are age-adjusted to the 2000 U.S. standard population; local stage defined using Derived Summary Staging values (http://seer.cancer.gov/tools/ssm/intro.pdf).

[2] VDH Division of Health Statistics. Based on combined 2003-2012 data. Mortality rates are age-adjusted to the 2000 U.S. standard population.

Chart 5.1: Lung Cancer Incidence and Mortality Rates, by Year, 2002-2012



Lung cancer incidence in Virginia was 63.8 cases per 100,000 people in 2002. Incidence thereafter rose to a peak of 71.3 per 100,000 in 2003 before declining to 59.4 cases per 100,000 in 2011.[1] The decline in lung cancer incidence in Virginia is similar to the nationwide decline. CDC relates the national decline to falling numbers of people who smoke.[2] However, according to a Cochran-Armitage trend analysis, the Virginia lung cancer incidence rate trend did not change significantly over the 10 year period.

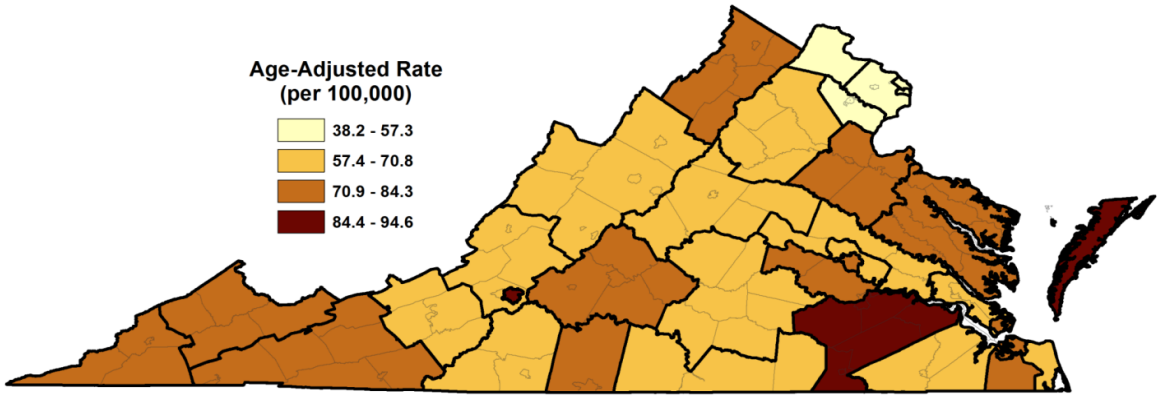
Lung cancer mortality rates display a pattern similar to the incidence rate pattern. From 57.2 deaths per 100,000 in 2003, lung cancer mortality declined to 45.7 per 100,000 in 2012.[3] According to Cochran-Armitage trend analysis, the lung cancer mortality rate significantly decreased over the 10 year period.

[1] Virginia Cancer Registry. Based on combined 2002-2011 data. Incidence rates are age-adjusted to the 2000 U.S. standard population.

[2] State-Specific Trends in Lung Cancer Incidence and Smoking, United States, 1999—2008. Morbidity and Mortality Weekly Report (MMWR), 09/16/2011, 60(36); 1243-1247.

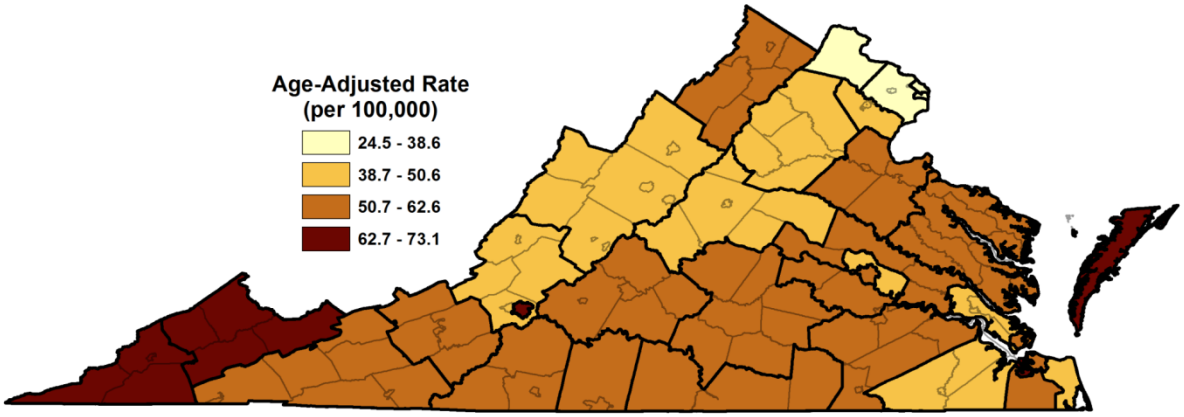
[3] VDH Division of Health Statistics. Based on combined 2003-2012 data. Mortality rates are age-adjusted to the 2000 U.S. standard population.

Map 5.1: Lung Cancer Incidence Rates by Health District, 2007-2011[1]



Eastern Shore (94.6 cases per 100,000); Roanoke (86.7), and Crater (84.9) had the highest incidence rates of lung cancer among the 35 health districts. Alexandria (38.2), Arlington (40.9), and Fairfax (43.6) had the lowest incidence rates of lung cancer.

Map 5.2: Lung Cancer Mortality Rates by Health District, 2008-2012[2]



Lenowisco (73.1 deaths per 100,000), Eastern Shore (72.9), and Cumberland Plateau (67.9) had the highest mortality rates from lung cancer among the 35 health districts. Alexandria (24.5), Arlington (24.7), and Fairfax (28.1) had the lowest lung cancer mortality rates.

[1] Virginia Cancer Registry. Based on combined 2007-2011 data. Incidence rates are age-adjusted to the 2000 U.S. standard population.

[2] VDH Division of Health Statistics. Based on combined 2008-2012 data. Mortality rates are age-adjusted to the 2000 U.S. standard population.

VIII. Melanoma

Melanoma Cancer Overview

- Melanoma is the most serious form of skin cancer. It is among the top five cancers diagnosed among men in the United States but is relatively rare as a cause of death. One in 34 men and one in 53 women will be diagnosed with melanoma of the skin during his or her lifetime.[1]

- Melanoma has a five-year relative survival rate of 98.1 percent if diagnosed at its earliest (localized) stage, when it is most curable.[2] In Virginia, 73.2 percent of melanomas diagnoses were localized stage diagnoses.[3]

- In Virginia, there were 47 inpatient hospitalizations in 2012 for melanoma, at a total cost of over $1.4 million. The average length of stay was 3.2 days and the average charge per stay was $29,200.[4]

- According to 2007 BRFSS survey data, about a third (32.0%) of Virginia adults reported having had sunburn in the previous 12 months.[5] Exposure to ultra-violet light from the sun is an important risk factor for developing melanoma.

- White adults, especially men, were most likely to report having sunburn in the previous 12 months.[5]

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[1] Howlader N, Noone AM, Krapcho M, Garshell J, Miller D, Altekruse SF, Kosary CL, Yu M, Ruhl J, Tatalovich Z, Mariotto A, Lewis DR, Chen HS, Feuer EJ, Cronin KA (eds). SEER Cancer Statistics Review, 1975-2011, National Cancer Institute. Bethesda, MD, http://seer.cancer.gov/csr/1975_2011/, based on November 2013 SEER data submission, posted to the SEER web site, April 2014.

[2] American Cancer Society. Cancer Facts & Figures 2013. Atlanta: American Cancer Society; 2013.

[3] Virginia Cancer Registry. Based on combined 2007-2011 data. Percent of Local Stage cancers reported using the Derived Summary Staging System.

[4] VDH Virginia Health Information Hospital Discharge Patient-Level Dataset, 2012.

[5] Centers for Disease Control and Prevention (CDC). *Behavioral Risk Factor Surveillance System Survey data*. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2012.

Table 6.1: Melanoma Cancer Data by Race and Sex, Incidence (2007-2011) & Mortality (2008-2012)

		State of Virginia	All African-Americans	African-American Men	African-American Women	All Whites	White Men	White Women
Incidence[1]	Count	8,063	75	26	49	7,374	4,343	3,031
	Rate per 100,000	19.7	1.1	0.9	1.3	23.2	29.7	18.4
	95% CI	19.2-20.1	0.9-1.4	0.6-1.4	0.9-1.7	22.6-23.7	28.8-30.6	17.7-19.0
Staging[1]	% Localized	73.2%	40.0%	38.5%	40.8%	75.3%	73.5%	78.0%
	% Regional	8.8%	14.7%	23.1%	10.2%	9.4%	10.5%	7.9%
	% Distant	4.1%	25.3%	19.2%	28.6%	4.1%	4.9%	3.0%
	% Unstaged/Other	13.7%	17.3%	15.4%	18.4%	11.0%	11.0%	11.0%
Mortality[2]	Count	1,189	DSU	DSU	DSU	DSU	DSU	DSU
	Rate per 100,000	2.9	DSU	DSU	DSU	DSU	DSU	DSU
	95% CI	2.7-3.1	DSU	DSU	DSU	DSU	DSU	DSU

According to Table 6.1:

- During the period 2007-2011, the melanoma incidence rate was 19.7 cases per 100,000 in Virginia[1] (U.S. rate: 21.3 cases per 100,000).[3]

- During the period 2008-2012, the mortality rate from melanoma cancer was 2.9 deaths per 100,000 in Virginia[2] (2007-2011 U.S. rate: 2.7 deaths per 100,000 per year).[4]

- White men (29.7 per 100,000) had the highest rate of melanoma incidence in Virginia and African-American men (0.9) had the lowest incidence rate.

- Virginia melanoma incidence rates were 21.1 times higher among Whites compared to African-Americans, and were higher among White males than among White females.

- The percentage of melanoma cases diagnosed at the localized stage was higher for Whites (75.3%) than for African-Americans (40.0%) in Virginia.

[1] Virginia Cancer Registry. Based on combined 2007-2011 data. Incidence rates are age-adjusted to the 2000 U.S. standard population; Local Stage cancers reported using the Derived Summary Staging System.

[2] VDH Division of Health Statistics. Based on combined 2008-2012 data. Mortality rates are age-adjusted to the 2000 U.S. standard population.

[3] Howlader N, Noone AM, Krapcho M, Garshell J, Miller D, Altekruse SF, Kosary CL, Yu M, Ruhl J, Tatalovich Z, Mariotto A, Lewis DR, Chen HS, Feuer EJ, Cronin KA (eds). SEER Cancer Statistics Review, 1975-2011, National Cancer Institute. Bethesda, MD, http://seer.cancer.gov/csr/1975_2011/, based on November 2013 SEER data submission, posted to the SEER web site, April 2014.

[4] Howlader N, Noone AM, Krapcho M, Garshell J, Neyman N, Altekruse SF, Kosary CL, Yu M, Ruhl J, Tatalovich Z, Cho H, Mariotto A, Lewis DR, Chen HS, Feuer EJ, Cronin KA (eds). *SEER Cancer Statistics Review, 1975-2010*, National Cancer Institute. Bethesda, MD, http://seer.cancer.gov/csr/1975_2010/, based on November 2012 SEER data submission, posted to the SEER web site, 2013. (accessed 07/02/2014).

Table 6.2: Cancer Data by Health District – Melanoma, Incidence (2007-2011) & Mortality (2008-2012)

Districts are ranked from favorable (1) to unfavorable (35) for incidence, localized stage, and mortality.

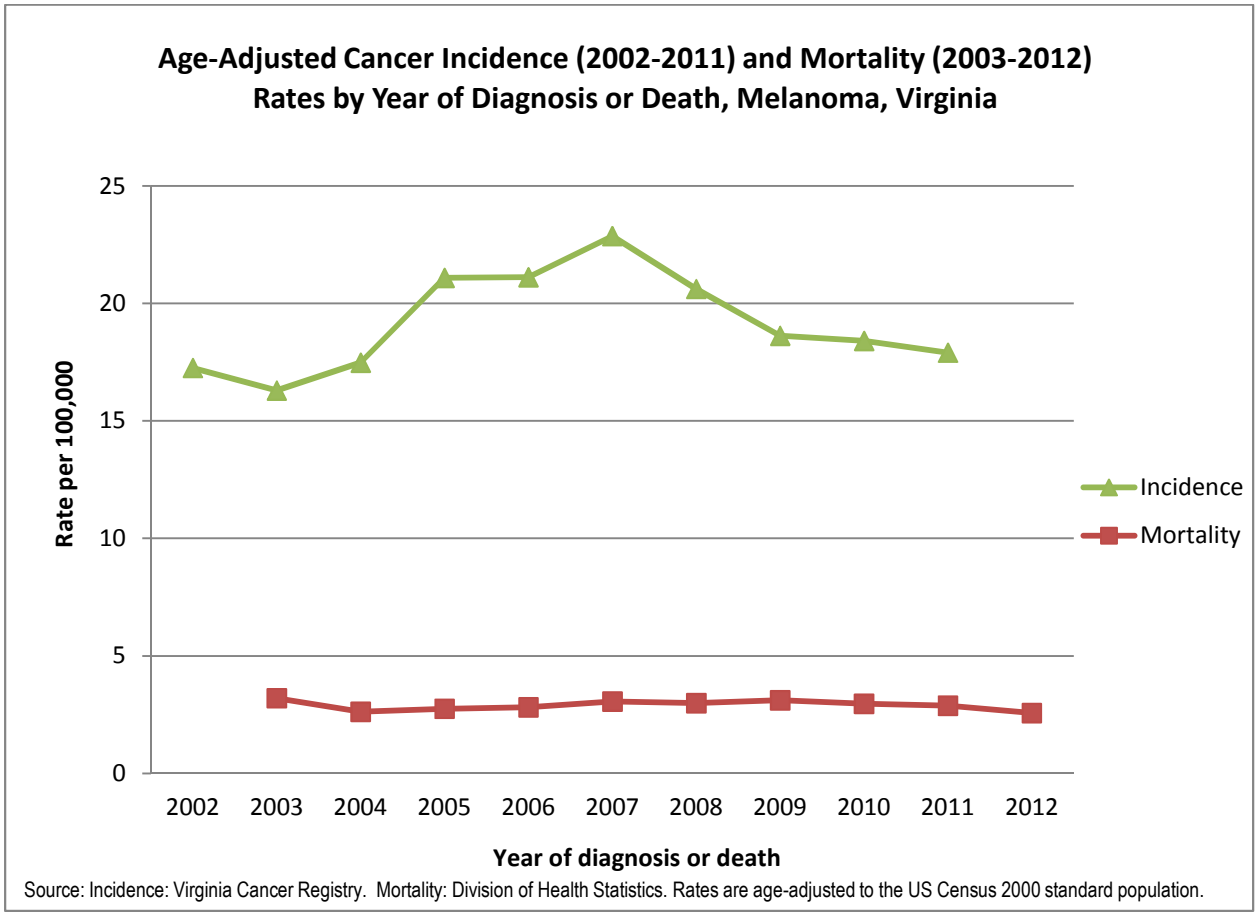
	Incidence[1]				Staging[1]		Mortality[2]			
Health District	Count	Age-Adjusted Rate per 100,000	95% CI	Rank	Percent Localized	Rank	Count	Age-Adjusted Rate per 100,000	95% CI	Rank
Alexandria	99	15.3	12.3-18.8	9	64.6%	29	18	DSU	-	-
Alleghany	247	23.3	20.4-26.6	25	80.6%	10	33	2.9	1.9-3.9	6
Arlington	154	16.7	14.0-19.7	13	55.2%	35	15	DSU	-	-
Central Shenandoah	390	23.9	21.5-26.4	26	68.2%	27	61	3.6	2.7-4.5	14
Central Virginia	306	20.5	18.2-22.9	22	81.4%	8	46	3.1	2.2-4.0	9
Chesapeake	216	19.8	17.1-22.7	21	66.2%	28	27	2.6	1.6-3.6	4
Chesterfield	440	25.0	22.7-27.5	30	80.2%	11	64	3.7	2.8-4.7	16
Chickahominy	185	22.9	19.6-26.6	24	78.4%	13	23	DSU	-	-
Crater	121	14.2	11.8-17.0	5	70.2%	25	21	DSU	-	-
Cumberland Plateau	121	18.2	15.0-21.9	17	81.8%	7	23	DSU	-	-
Eastern Shore	85	27.8	21.9-34.9	33	82.4%	5	DSU	DSU	-	-
Fairfax	802	15.1	14.0-16.2	8	58.2%	34	131	2.7	2.2-3.1	5
Hampton	122	17.4	14.4-20.8	15	82.8%	2	10	DSU	-	-
Henrico	376	24.1	21.6-26.6	28	82.4%	5	46	2.9	2.1-3.7	6
Lenowisco	57	10.1	7.6-13.2	1	73.7%	22	16	DSU	-	-
Lord Fairfax	247	19.5	17.2-22.2	20	59.1%	32	55	4.2	3.1-5.3	19
Loudoun	180	16.4	13.9-19.2	11	59.4%	31	24	DSU	-	-
Mount Rogers	265	21.5	18.9-24.4	23	79.2%	12	45	3.5	2.5-4.5	12
New River	216	24.7	21.4-28.3	29	72.7%	24	39	4.1	2.8-5.4	18
Norfolk	171	16.6	14.1-19.3	12	69.6%	26	29	2.9	1.9-4.0	6
Peninsula	482	27.3	24.9-29.9	32	82.8%	2	62	3.4	2.6-4.3	11
Piedmont	98	15.6	12.6-19.1	10	82.7%	4	15	DSU	-	-
Pittsylvania-Danville	92	14.5	11.6-18.0	7	72.8%	23	17	DSU	-	-
Portsmouth	59	11.7	8.9-15.1	2	62.7%	30	15	DSU	-	-
Prince William	225	12.5	10.8-14.4	3	58.7%	33	39	2.4	1.6-3.1	1
Rappahannock	245	17.0	14.9-19.4	14	73.9%	21	33	2.4	1.6-3.2	1
Rappahannock -Rapidan	181	19.2	16.4-22.3	18	74.0%	20	35	3.7	2.4-4.9	16
Richmond	137	14.4	12.0-17.1	6	75.9%	16	17	DSU	-	-
Roanoke	101	18.1	14.7-22.1	16	75.2%	19	20	DSU	-	-
Southside	70	12.9	10.0-16.5	4	75.7%	17	12	DSU	-	-
Thomas Jefferson	350	27.9	25.0-31.1	34	80.9%	9	44	3.6	2.5-4.6	14
Three Rivers	253	25.9	22.7-29.5	31	77.9%	14	34	3.2	2.1-4.3	10
Virginia Beach	578	28.1	25.8-30.5	35	75.3%	18	71	3.5	2.7-4.3	12
West Piedmont	180	19.2	16.4-22.4	18	77.2%	15	26	2.5	1.6-3.5	3
Western Tidewater	191	23.9	20.5-27.6	26	83.8%	1	18	DSU	-	-
Virginia	**8,063**	**19.7**	**19.2-20.1**		**73.2%**		**1,189**	**2.9**	**2.7-3.1**	

DSU/- : Data statistically unreliable; the number of cases (25 or less) is too small to calculate a reliable rate.

[1] Virginia Cancer Registry. Based on combined 2007-2011 data. Incidence rates are age-adjusted to the 2000 U.S. standard population; Local Stage cancers reported using the Derived Summary Staging System.

[2] VDH Division of Health Statistics. Based on combined 2008-2012 data. Mortality rates are age-adjusted to the 2000 U.S. standard population.

Chart 6.1: Melanoma Cancer Incidence and Mortality Rates, by Year, 2002-2012



Melanoma incidence in Virginia increased from 17.3 cases per 100,000 people in 2002 to 17.9 per 100,000 in 2011. From 2005 through 2008, the incidence rate was above 20.0 cases per 100,000.[1] The American Cancer Society analyzed increasing melanoma incidence in the U.S. and concluded: "Rates continue to increase with age and are highest among those in their 80s, but melanoma is not uncommon even among those younger than 30. In fact, it is one of the more common cancers in young adults (especially young women)."[2] However, according to a Cochran-Armitage trend analysis, there was no significant incidence rate trend over the 10 year period.

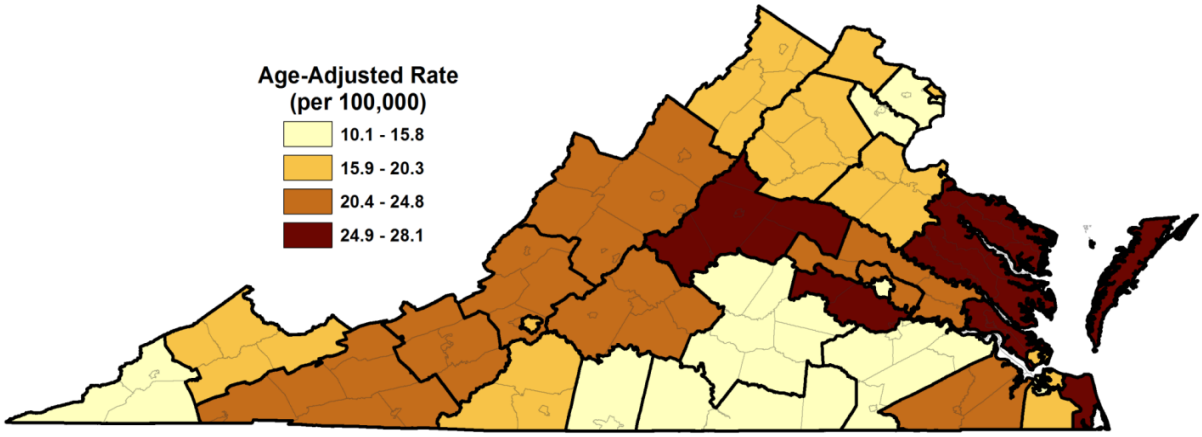
Mortality due to melanoma fell from 3.2 cases per 100,000 Virginians in 2003 to 2.6 cases/100,000 in 2013; the mortality rate decreased approximately 19.8 percent in 10 years. The number of deaths fell from 230 in 2003 to 222 in 2012.[3] According to a Cochran-Armitage trend analysis, there was no significant mortality rate trend over the 10 year period.

[1] Virginia Cancer Registry. Based on combined 2002-2011 data. Incidence rates are age-adjusted to the 2000 U.S. standard population; local stage defined using Derived Summary Staging values (http://seer.cancer.gov/tools/ssm/intro.pdf).

[2] What are the key statistics about melanoma skin cancer? http://www.cancer.org/cancer/skincancer-melanoma/detailedguide/melanoma-skin-cancer-key-statistics (accessed 10/16/13).

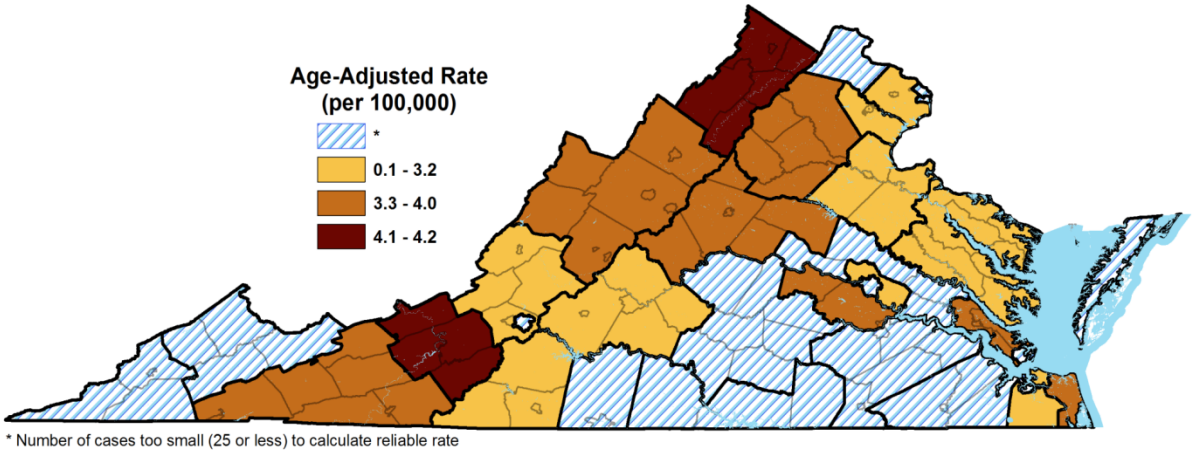
[3] VDH Division of Health Statistics. Based on combined 2003-2012 data. Mortality rates are age-adjusted to the 2000 U.S. standard population.

Map 6.1: Melanoma Cancer Incidence Rates by Health District, 2007-2011[1]



Virginia Beach (28.1 cases per 100,000); Thomas Jefferson (27.9), and Eastern Shore (27.8) had the highest incidence rates of melanoma among the 35 health districts. Lenowisco (10.1), Portsmouth (11.7), and Prince William (12.5) had the lowest incidence rates.[1]

Map 6.2: Melanoma Cancer Mortality Rates by Health District, 2008-2012[2]



Lord Fairfax (4.2 deaths per 100,000), New River (4.1), and Chesterfield (3.7) had the highest mortality rates of melanoma cancer among the 35 health districts.[2] Henrico (2.9), Alleghany (2.9), and Norfolk (2.9) had the lowest melanoma cancer mortality rates.

[1] Virginia Cancer Registry. Based on combined 2007-2011 data. Incidence rates are age-adjusted to the 2000 U.S. standard population.

[2] VDH Division of Health Statistics. Based on combined 2008-2012 data. Mortality rates are age-adjusted to the 2000 U.S. standard population.

IX. Oral Cavity Cancer

Oral Cavity Cancer Overview

- Oral cancer is among the top ten most commonly diagnosed cancers among men, but not among women, in the United States. It is relatively rare as a cause of death. In the U.S., mortality rates in both men and women have fallen over the last three decades. However, incidence is increasing for oral cancers that are associated with human papillomavirus (HPV) infection.[1]

- Oral cancer has a five-year relative survival rate of 62.0 percent if diagnosed in its earliest (localized) stage, when it is most curable.[2] In Virginia, 30.1 percent of oral cancers diagnosed were at the localized stage.[3]

- In Virginia, there were 359 inpatient hospitalizations in 2012 for oral cancer, at a total cost of over $24 million. The average length of stay was 6.8 days and the average charge per stay was $67,918.[4]

- According to the 2012 BRFSS survey data, 19.0 percent of adults aged 18 years and older reported being current smokers. Smoking is a major risk factor for oral cancer.[5]

- Also from the 2012 BRFSS data, prevalence of current smokers was higher among those who were less educated (31.5% for less than high school versus 8.0% for college graduates) lower income (32.2% for $15,000 or less versus 13.3% for $50,000 and above), and uninsured (36.5% for uninsured versus 15.9% for insured).[5]

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[1] American Cancer Society. Cancer Facts & Figures 2013. Atlanta: American Cancer Society; 2013.

[2] Howlader N, Noone AM, Krapcho M, Garshell J, Miller D, Altekruse SF, Kosary CL, Yu M, Ruhl J, Tatalovich Z, Mariotto A, Lewis DR, Chen HS, Feuer EJ, Cronin KA (eds). SEER Cancer Statistics Review, 1975-2011, National Cancer Institute. Bethesda, MD, http://seer.cancer.gov/csr/1975_2011/, based on November 2013 SEER data submission, posted to the SEER web site, April 2014.

[3] Virginia Cancer Registry. Based on combined 2007-2011 data. Percent of Local Stage cancers reported using the Derived Summary Staging System.

[4] VDH Virginia Health Information Hospital Discharge Patient-Level Dataset, 2012.

[5] Centers for Disease Control and Prevention (CDC). *Behavioral Risk Factor Surveillance System Survey data*. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2012.

Table 7.1: Oral cavity Cancer Data by Race and Sex, Incidence (2007-2011) & Mortality (2008-2012)

		State of Virginia	All African-Americans	African-American Men	African-American Women	All Whites	White Men	White Women
Incidence[1]	Count	4,514	697	510	187	3,675	2,624	1,051
	Rate per 100,000	10.6	9.1	15.1	4.5	11.1	16.8	6.0
	95% CI	10.3-10.9	8.5-9.9	13.7-16.5	3.9-5.2	10.7-11.4	16.1-17.5	5.6-6.4
Staging[1]	% Localized	30.1%	21.1%	20.2%	23.5%	31.9%	26.9%	44.2%
	% Regional	46.4%	47.1%	48.2%	43.9%	46.6%	50.8%	36.3%
	% Distant	16.1%	24.5%	24.9%	23.5%	14.4%	15.4%	12.1%
	% Unstaged/Other	7.2%	7.0%	6.7%	8.0%	6.8%	6.6%	7.2%
Mortality[2]	Count	964	DSU*	DSU	DSU	DSU	DSU	DSU
	Rate per 100,000	2.3	DSU	DSU	DSU	DSU	DSU	DSU
	95% CI	2.1-2.4	DSU	DSU	DSU	DSU	DSU	DSU

*DSU: Data statistically unreliable; the number of cases (25 or less) is too small to calculate a reliable rate.

According to Table 7.1:

- During the period 2007-2011, the incidence rate of oral cancer was 10.6 cases per 100,000 in Virginia[1] (U.S. rate: 11.0 cases per 100,000).[3]
- During the period 2008-2012, the Virginia mortality rate from oral cancer was 2.3 deaths per 100,000 [2] (2007-2011 U.S. rate: 2.5 deaths per 100,000 per year).[4]
- Incidence rates were higher among men than among women in Virginia. The incidence rate was higher for White men (16.8 cases per 100,000) compared to White women (6.0) and for African-American men (15.1) compared to African-American women (4.5).
- The percentage of oral cancers diagnosed at the localized stage was lower for African-Americans (21.1%) than for Whites (31.9%).

[1] Virginia Cancer Registry. Based on combined 2007-2011 data. Incidence rates are age-adjusted to the 2000 U.S. standard population; Local Stage cancers reported using the Derived Summary Staging System.

[2] VDH Division of Health Statistics. Based on combined 2008-2012 data. Mortality rates are age-adjusted to the 2000 U.S. standard population.

[3] Howlader N, Noone AM, Krapcho M, Garshell J, Miller D, Altekruse SF, Kosary CL, Yu M, Ruhl J, Tatalovich Z, Mariotto A, Lewis DR, Chen HS, Feuer EJ, Cronin KA (eds). SEER Cancer Statistics Review, 1975-2011, National Cancer Institute. Bethesda, MD, http://seer.cancer.gov/csr/1975_2011/, based on November 2013 SEER data submission, posted to the SEER web site, April 2014.

[4] Howlader N, Noone AM, Krapcho M, Garshell J, Neyman N, Altekruse SF, Kosary CL, Yu M, Ruhl J, Tatalovich Z, Cho H, Mariotto A, Lewis DR, Chen HS, Feuer EJ, Cronin KA (eds). *SEER Cancer Statistics Review, 1975-2010*, National Cancer Institute. Bethesda, MD, http://seer.cancer.gov/csr/1975_2010/, based on November 2012 SEER data submission, posted to the SEER web site, 2013. (accessed 07/02/2014).

Table 7.2: Cancer Data by Health District – Oral, Incidence (2007-2011) & Mortality (2008-2012)

Districts are ranked from favorable (1) to unfavorable (35) for incidence, localized stage, and mortality.

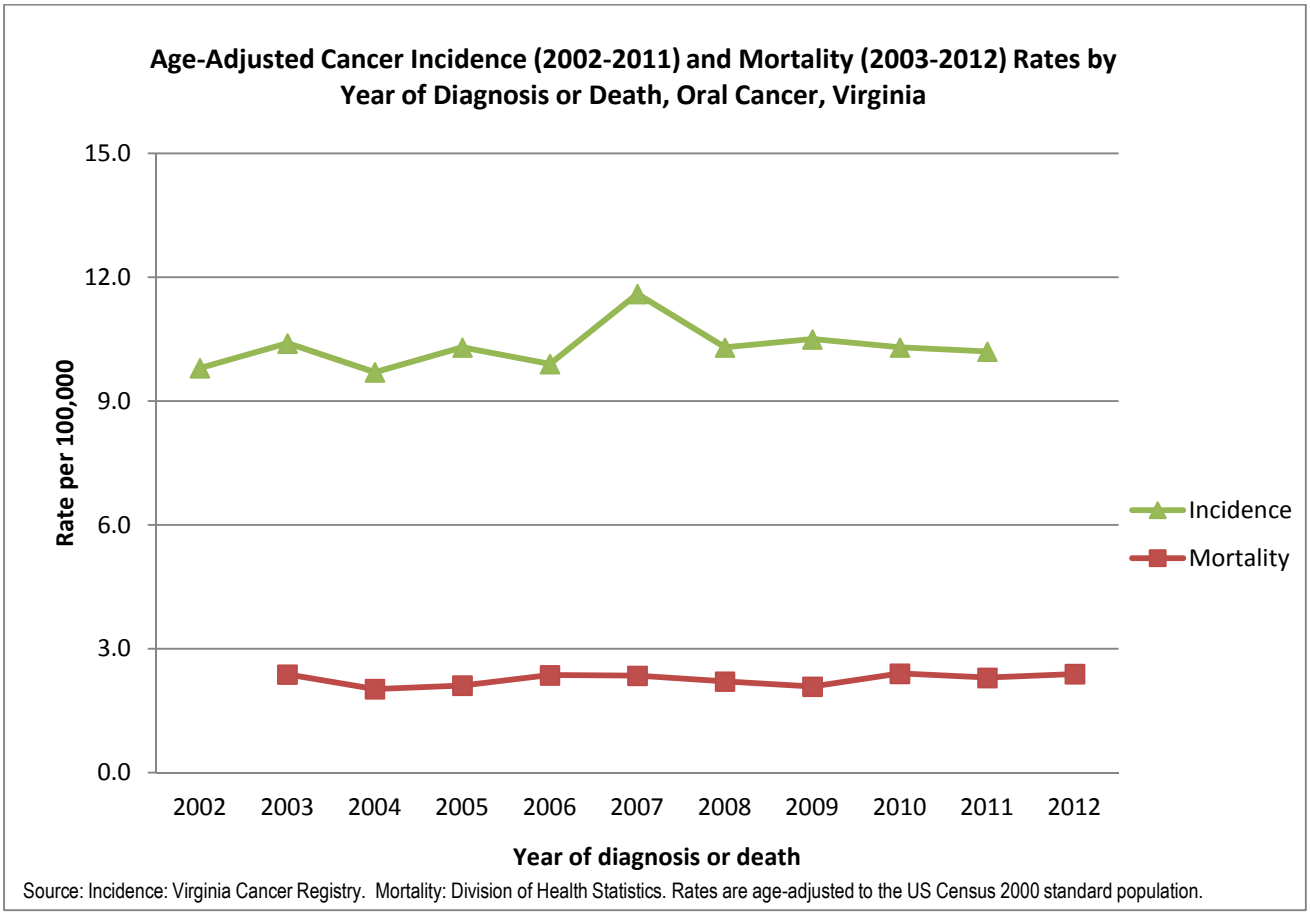
	Incidence[1]				Staging[1]		Mortality[2]			
Health District	**Count**	**Age-Adjusted Rate per 100,000**	**95% CI**	**Rank**	**Percent Localized**	**Rank**	**Count**	**Age-Adjusted Rate per 100,000**	**95% CI**	**Rank**
Alexandria	61	9.5	7.2-12.3	6	31.1%	16	14	DSU	-	-
Alleghany	130	11.2	9.3-13.3	19	30.8%	18	32	2.5	1.7-3.4	9
Arlington	73	7.8	6.0-9.9	3	35.6%	4	17	DSU	-	-
Central Shenandoah	172	10.3	8.8-12.0	10	39.0%	1	29	1.7	1.1-2.3	2
Central Virginia	174	11.4	9.7-13.3	22	35.6%	4	50	3.2	2.3-4.1	14
Chesapeake	110	10.0	8.2-12.1	8	22.7%	33	20	DSU	-	-
Chesterfield	203	10.8	9.3-12.5	17	26.1%	29	30	1.9	1.2-2.6	4
Chickahominy	95	10.7	8.6-13.2	15	33.7%	8	13	DSU	-	-
Crater	110	12.3	10.1-14.9	27	29.1%	22	42	4.6	3.2-6.0	18
Cumberland Plateau	57	7.6	5.7-9.9	1	33.3%	10	24	DSU	-	-
Eastern Shore	41	13.2	9.3-18.2	32	24.4%	31	14	DSU	-	-
Fairfax	455	8.4	7.6-9.2	4	28.8%	23	65	1.3	1.0-1.6	1
Hampton	94	13.0	10.5-16.0	30	27.7%	25	22	DSU	-	-
Henrico	172	10.7	9.1-12.4	15	31.4%	15	34	2.0	1.3-2.7	6
Lenowisco	61	10.3	7.9-13.4	10	32.8%	13	19	DSU	-	-
Lord Fairfax	168	12.7	10.8-14.8	28	26.2%	28	38	2.8	1.9-3.7	12
Loudoun	95	7.6	6.0-9.4	1	30.5%	19	17	DSU	-	-
Mount Rogers	177	13.7	11.8-16.0	34	32.8%	13	46	3.5	2.5-4.5	17
New River	100	11.3	9.1-13.7	21	28.0%	24	20	DSU	-	-
Norfolk	134	13.0	10.8-15.4	30	13.4%	35	35	3.4	2.2-4.5	16
Peninsula	197	10.6	9.2-12.2	13	36.0%	3	41	2.2	1.6-2.9	7
Piedmont	72	11.2	8.7-14.2	19	26.4%	27	17	DSU	-	-
Pittsylvania-Danville	76	10.6	8.3-13.4	13	34.2%	7	14	DSU	-	-
Portsmouth	70	13.4	10.4-16.9	33	14.3%	34	14	DSU	-	-
Prince William	165	9.4	7.9-11.1	5	33.3%	10	33	2.3	1.5-3.1	8
Rappahannock	159	10.4	8.8-12.2	12	33.3%	10	32	2.6	1.7-3.5	10
Rappahannock -Rapidan	102	10.1	8.2-12.3	9	26.5%	26	19	DSU	-	-
Richmond	119	12.0	9.9-14.5	24	25.2%	30	29	2.8	1.8-3.8	12
Roanoke	69	12.0	9.3-15.2	24	30.4%	20	25	DSU	-	-
Southside	82	13.7	10.8-17.2	34	36.6%	2	14	DSU	-	-
Thomas Jefferson	152	11.5	9.7-13.5	23	33.6%	9	26	1.9	1.2-2.6	4
Three Rivers	133	12.7	10.6-15.2	28	34.6%	6	30	2.7	1.7-3.7	11
Virginia Beach	229	10.9	9.5-12.5	18	31.0%	17	40	1.8	1.3-2.4	3
West Piedmont	116	12.1	10.0-14.6	26	29.3%	21	21	DSU	-	-
Western Tidewater	81	9.8	7.8-12.3	7	23.5%	32	28	3.3	2.1-4.6	15
Virginia	**4,514**	**10.6**	**10.3-10.9**		**30.1%**		**964**	**2.3**	**2.1-2.4**	

DSU/- : Data statistically unreliable; the number of cases (25 or less) is too small to calculate a reliable rate.

[1] Virginia Cancer Registry. Based on combined 2007-2011 data. Incidence rates are age-adjusted to the 2000 U.S. standard population; local stage defined using Derived Summary Staging values (http://seer.cancer.gov/tools/ssm/intro.pdf).

[2] VDH Division of Health Statistics. Based on combined 2008-2012 data. Mortality rates are age-adjusted to the 2000 U.S. standard population.

Chart 7.1: Oral Cancer Incidence and Mortality Rates, by Year, 2002-2012



The age-adjusted oral cancer incidence rate rose from 9.8 cases per 100,000 in 2002 to 11.6 cases per 100,000 in 2007 then declined to 10.2 In 2011. The number of cases reported from 2002 to 2011 was 8,301, of which 71 percent were male and 29 percent were female.[1] According to the National Cancer Institute, "Tobacco use causes most oral cancers. Smoking cigarettes, cigars, or pipes, or using smokeless tobacco (such as snuff and chewing tobacco) causes oral cancer."[2] Much of the difference in oral cancer incidence between men and women can be attributed to different patterns of tobacco use. According to a Cochran-Armitage trend analysis, the oral cancer incidence rate increased significantly over the 10 year period.

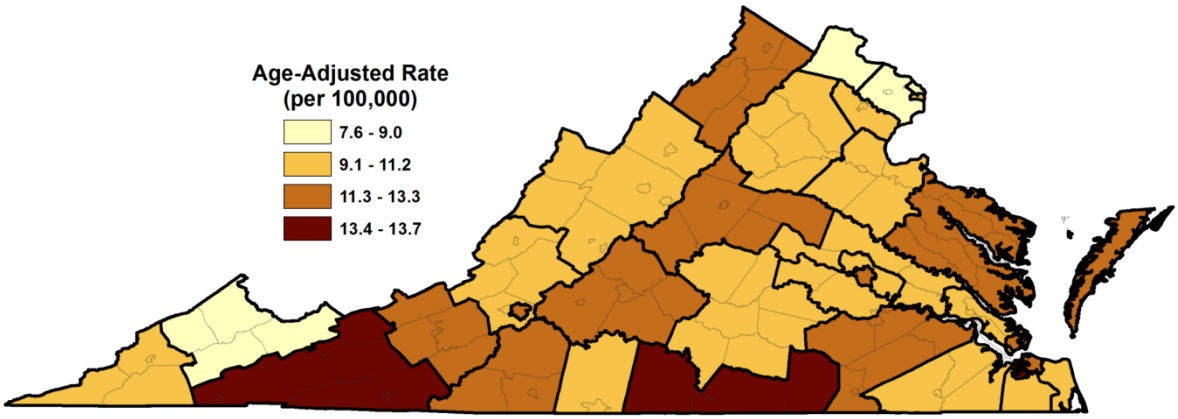
Oral cancer mortality rates have changed very little. The highest rates recorded in Virginia, 2.4 deaths per 100,000 people, occurred in 2010 and the lowest rate, 2.0 per 100,000, occurred in 2004. The average rate for the entire ten years is 2.3 per 100,000 people.[3] According to a Cochran-Armitage trend analysis, there was no significant mortality rate trend over the 10 year period.

[1] Virginia Cancer Registry. Based on combined 2002-2011 data. Incidence rates are age-adjusted to the 2000 U.S. standard population.

[2] National Cancer Institute, What You Need To Know About Oral Cancer, http://www.cancer.gov/cancertopics/wyntk/oral/page4 (accessed 10/17/13).

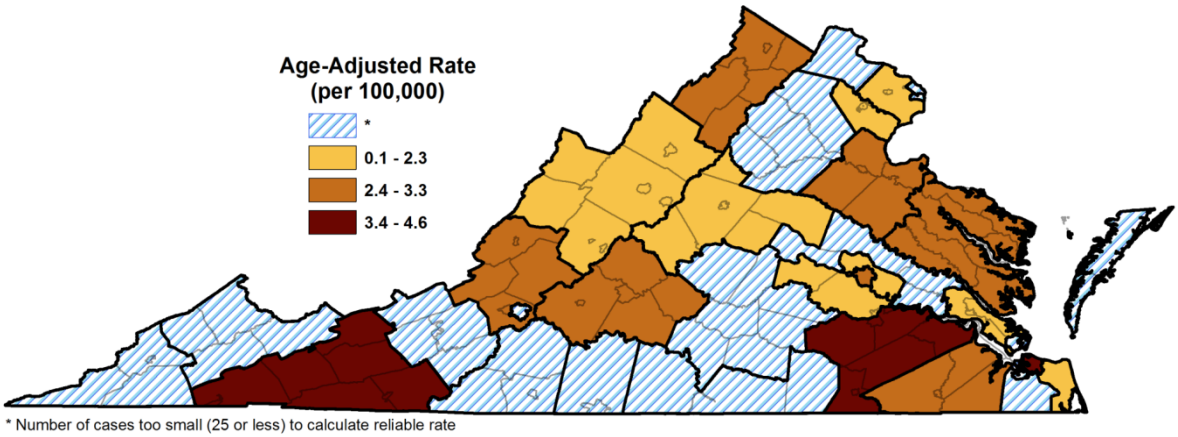
[3] VDH Division of Health Statistics. Based on combined 2003-2012 data. Mortality rates are age-adjusted to the 2000 U.S. standard population.

Map 7.1: Oral Cancer Incidence Rates by Health District, 2007-2011[1]



Mount Rogers (13.7 cases per 100,000), Southside (13.7), and Portsmouth (13.4) had the highest oral cancer incidence rates among the 35 health districts. Loudoun (7.6), Cumberland Plateau (7.6), and Arlington (7.8) had the lowest incidence rates of oral cancer.

Map 7.2: Oral Cavity Cancer Mortality Rates by Health District, 2008-2012[2]



Crater (4.6 deaths per 100,000), Mount Rogers (3.5), and Norfolk (3.4) had the highest mortality rates for oral cancer among the 35 health districts. Fairfax (1.3), Central Shenandoah (1.7), and Virginia Beach (1.8) had the lowest oral cancer mortality rates.

[1] Virginia Cancer Registry. Based on combined 2007-2011 data. Incidence rates are age-adjusted to the 2000 U.S. standard population.

[2] VDH Division of Health Statistics. Based on combined 2008-2012 data. Mortality rates are age-adjusted to the 2000 U.S. standard population.

X. Ovarian cancer

Ovarian Cancer Overview

- Ovarian cancer is not among the top ten most commonly diagnosed cancers. However it is the fifth leading cause of cancer death among women in the United States.[1]

- Ovarian cancer has a five-year relative survival rate of 92.0 percent if diagnosed at its earliest (localized) stage, when it is most curable.[2] In Virginia, only 14.5 percent of ovarian cancers were diagnosed at the localized stage.[3]

- In Virginia, there were 543 inpatient hospitalizations in 2012 for ovarian cancer, at a total cost of over $33 million. The average length of stay was 6.7 days and the average charge per stay was $62,141.[4]

[1] American Cancer Society. Cancer Facts & Figures 2013. Atlanta: American Cancer Society; 2013.

[2] Howlader N, Noone AM, Krapcho M, Garshell J, Miller D, Altekruse SF, Kosary CL, Yu M, Ruhl J, Tatalovich Z, Mariotto A, Lewis DR, Chen HS, Feuer EJ, Cronin KA (eds). SEER Cancer Statistics Review, 1975-2011, National Cancer Institute. Bethesda, MD, http://seer.cancer.gov/csr/1975_2011/, based on November 2013 SEER data submission, posted to the SEER web site, April 2014.

[3] Virginia Cancer Registry. Based on combined 2007-2011 data. Incidence rates are age-adjusted to the 2000 U.S. standard population; local stage defined using Derived Summary Staging values (http://seer.cancer.gov/tools/ssm/intro.pdf).

[4] VDH Virginia Health Information Hospital Discharge Patient-Level Dataset, 2012.

Table 8.1: Ovarian Cancer Data by Race and Sex, Incidence (2007-2011) & Mortality (2008-2012)

		State of Virginia	African-American Women	White Women
Incidence[1]	Count	2,658	365	2,166
	Rate per 100,000	11.9	9.2	12.5
	95% CI	11.4-12.3	8.3-10.3	12.0-13.1
Staging[1]	% Localized	14.5%*	13.4%	14.2%
	% Regional	18.8%	18.1%	18.7%
	% Distant	57.0%	55.9%	57.7%
	% Unstaged/Other	9.0%	12.3%	8.5%
Mortality[2]	Count	1,842	272	1,522
	Rate per 100,000	7.9	6.9	8.3
	95% CI	7.6 -8.3	6.1-7.7	7.9-8.7

*Percentage of localized stage from other/unknown race group (not shown) was 22.0%.

According to Table 8.1:

- During the period 2007-2011, the ovarian cancer incidence rate was 11.9 cases per 100,000 women in Virginia[1] (U.S. rate: 12.3 cases per 100,000 women).[3]
- Between 2008 and 2012, the mortality rate from ovarian cancer was 7.9 deaths per 100,000 women[2] (2007-2011 U.S. rate: 8.1 deaths per 100,000 women).[4]

1 Virginia Cancer Registry. Based on combined 2007-2011 data. Incidence rates are age-adjusted to the 2000 U.S. standard population; localized stage defined using Derived Summary Staging values (http://seer.cancer.gov/tools/ssm/intro.pdf).

2 VDH Division of Health Statistics. Based on combined 2008-2012 data. Mortality rates are age-adjusted to the 2000 U.S. standard population.

3 Howlader N, Noone AM, Krapcho M, Garshell J, Miller D, Altekruse SF, Kosary CL, Yu M, Ruhl J, Tatalovich Z, Mariotto A, Lewis DR, Chen HS, Feuer EJ, Cronin KA (eds). SEER Cancer Statistics Review, 1975-2011, National Cancer Institute. Bethesda, MD, http://seer.cancer.gov/csr/1975_2011/, based on November 2013 SEER data submission, posted to the SEER web site, April 2014.

4 Howlader N, Noone AM, Krapcho M, Garshell J, Neyman N, Altekruse SF, Kosary CL, Yu M, Ruhl J, Tatalovich Z, Cho H, Mariotto A, Lewis DR, Chen HS, Feuer EJ, Cronin KA (eds). SEER Cancer Statistics Review, 1975-2010, National Cancer Institute. Bethesda, MD, http://seer.cancer.gov/csr/1975_2010/, based on November 2012 SEER data submission, posted to the SEER web site, 2013. (accessed 07/02/2014).

Table 8.2: Cancer Data by Health District – Ovarian, Incidence (2007-2011) & Mortality (2008-2012)

Districts are ranked from favorable (1) to unfavorable (35) for incidence, localized stage, and mortality.

	Incidence[1]				Staging[1]		Mortality[2]			
Health District	**Count**	**Age-Adjusted Rate per 100,000**	**95% CI**	**Rank***	**Percent Localized**	**Rank***	**Count**	**Age-Adjusted Rate per 100,000**	**95% CI**	**Rank***
Alexandria	37	10.2	7.1-14.3	8	21.6%	4	24	DSU	-	-
Alleghany	72	11.5	8.9-14.6	15	18.1%	8	57	8.4	6.2-10.6	18
Arlington	60	12.2	9.2-15.9	23	21.7%	3	47	9.6	6.8-12.3	25
Central Shenandoah	126	13.7	11.4-16.4	30	11.1%	28	97	9.8	7.9-11.8	26
Central Virginia	108	13.3	10.9-16.2	27	12.0%	27	69	8.1	6.2-10.0	14
Chesapeake	65	11.5	8.9-14.8	15	16.9%	11	58	9.9	7.4-12.5	27
Chesterfield	91	9.3	7.5-11.5	3	14.3%	18	79	8.8	6.8-10.7	22
Chickahominy	49	10.7	7.8-14.3	12	8.2%	31	39	8.4	5.8-11.1	18
Crater	47	10.2	7.4-13.7	8	10.6%	29	37	8.1	5.5-10.8	14
Cumberland Plateau	50	13.7	10.1-18.3	30	20.0%	6	27	7.0	4.3-9.6	4
Eastern Shore	22	15.1	9.0-23.9	33	13.6%	21	18	DSU	-	-
Fairfax	382	13.2	11.9-14.6	25	14.4%	17	217	7.7	6.7-8.8	12
Hampton	52	13.3	9.9-17.5	27	13.5%	23	31	7.6	4.9-10.3	10
Henrico	101	11.5	9.3-14.0	15	15.8%	14	94	9.9	7.9-11.9	27
Lenowisco	26	8.5	5.5-12.8	1	15.4%	15	21	DSU	-	-
Lord Fairfax	103	15.1	12.3-18.4	33	18.4%	7	56	7.5	5.6-9.5	9
Loudoun	81	13.2	10.3-16.6	25	24.7%	1	39	7.4	5.0-9.7	7
Mount Rogers	72	10.4	8.1-13.2	11	16.7%	12	53	7.0	5.1-8.8	4
New River	45	9.3	6.7-12.6	3	17.8%	9	35	7.1	4.8-9.5	6
Norfolk	59	9.9	7.5-12.9	6	13.6%	21	39	6.7	4.6-8.7	3
Peninsula	100	10.1	8.2-12.4	7	6.0%	34	78	7.6	5.9-9.3	10
Piedmont	34	10.7	7.3-15.2	12	14.7%	16	24	DSU	-	-
Pittsylvania-Danville	52	13.5	9.9-18.0	29	13.5%	23	34	8.1	5.4-10.9	14
Portsmouth	34	12.1	8.3-17.0	22	17.6%	10	25	DSU	-	-
Prince William	98	10.2	8.2-12.6	8	22.4%	2	54	6.1	4.4-7.7	2
Rappahannock	94	11.8	9.5-14.6	19	13.8%	20	63	8.5	6.4-10.6	20
Rappahannock -Rapidan	59	11.1	8.4-14.4	14	8.5%	30	52	9.9	7.2-12.6	27
Richmond	55	9.6	7.1-12.6	5	16.4%	13	35	5.8	3.9-7.8	1
Roanoke	51	16.4	12.1-21.9	35	21.6%	4	25	DSU	-	-
Southside	29	8.7	5.7-13.0	2	3.4%	35	30	8.6	5.5-11.7	21
Thomas Jefferson	99	14.2	11.5-17.3	32	12.1%	26	68	9.4	7.2-11.6	23
Three Rivers	64	12.5	9.5-16.4	24	6.3%	33	53	9.4	6.9-12.0	23
Virginia Beach	132	11.9	10.0-14.2	20	12.9%	25	84	7.4	5.8-9.0	7
West Piedmont	58	12.0	9.0-15.7	21	6.9%	32	45	8.1	5.7-10.5	14
Western Tidewater	50	11.7	8.7-15.6	18	14.0%	19	35	7.7	5.1-10.2	12
Virginia	**2,658**	**11.9**	**11.4-12.3**		**14.5%**		**1,842**	**7.9**	**7.6-8.3**	

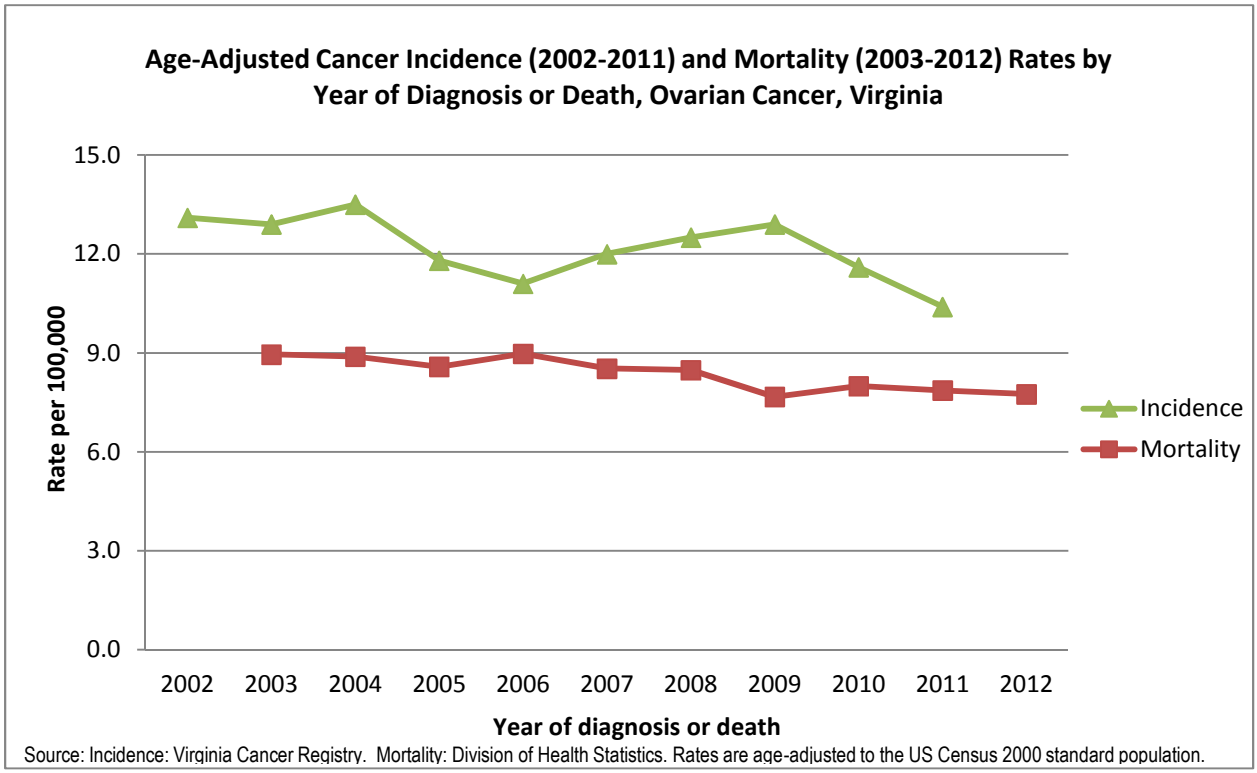
***Because rates and percentages are rounded to one decimal place, different ranks may be assigned to the same apparent rate or percentage value.**

DSU/- : Data statistically unreliable; the number of cases (25 or less) is too small to calculate a reliable rate.

[1] Virginia Cancer Registry. Based on combined 2007-2011 data. Incidence rates are age-adjusted to the 2000 U.S. standard population; local stage defined using Derived Summary Staging values (http://seer.cancer.gov/tools/ssm/intro.pdf).

[2] VDH Division of Health Statistics. Based on combined 2008-2012 data. Mortality rates are age-adjusted to the 2000 U.S. standard population.

Chart 8.1: Ovarian Cancer Incidence and Mortality Rates, by Year, 2002-2012



Ovarian cancer incidence in Virginia between 2002 and 2011 varied from year to year. The rate reached a peak of 13.5 per 100,000 women in 2004, rising from 13.1 cases per 100,000 women in 2002. Incidence subsequently declined to 10.4 in 2011.[1] The Virginia data are similar to the US data in this respect.[2] According to a Cochran-Armitage trend analysis, there was no significant incidence rate trend over the 10 year period.

Compared to its incidence rate, the mortality rate of ovarian cancer is relatively high.[3] In 2003 and 2006, the Virginia mortality rate for ovarian cancer was 9.0 women per 100,000 patients. These two years had the highest mortality rates during the 2003 – 2012 period.[3] In 2012, the mortality rate had declined to 7.8 deaths per 100,000. Although women who develop ovarian cancer comprise about three percent of all female cancer cases, it is the fifth leading cause of cancer mortality among women. The National Cancer Institute states: "Ovarian cancer has the highest mortality of all cancers of the female reproductive system. This reflects, in part, a lack of early symptoms and of effective ovarian cancer screening tests. Thus, ovarian cancer is often diagnosed at an advanced stage, after the cancer has spread beyond the ovary."[4] According to a Cochran-Armitage trend analysis, the ovarian cancer mortality rate decreased significantly over the 10 year period.

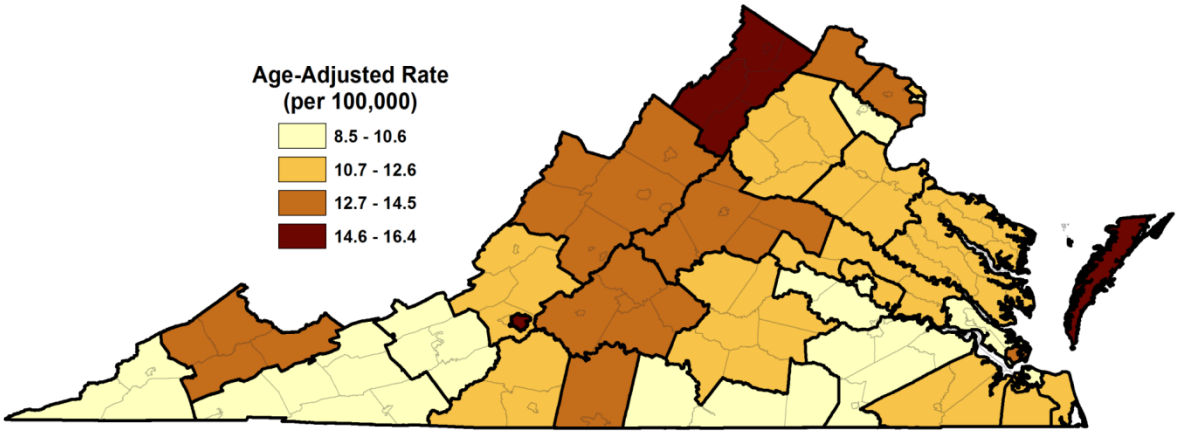
[1] Virginia Cancer Registry. Based on combined 2002-2011 data. Incidence rates are age-adjusted to the 2000 U.S. standard population.

[2] Copeland G, Lake A, Firth R, Wohler B, Wu XC, Stroup A, Russell C, Zakaria D, Miladinovic Z, Schymura M, Hofferkamp J, Kohler B (eds). *Cancer in North America: 2007-2011. Volume One: Combined Cancer Incidence for the United States, Canada and North America.* Springfield, IL: North American Association of Central Cancer Registries, Inc., 2013: http://www.naaccr.org/LinkClick.aspx?fileticket=g-02rL1IRDU%3d%tabid-93$mid=43.

[3] VDH Division of Health Statistics. Based on combined 2003-2012 data. Mortality rates are age-adjusted to the 2000 U.S. standard population.

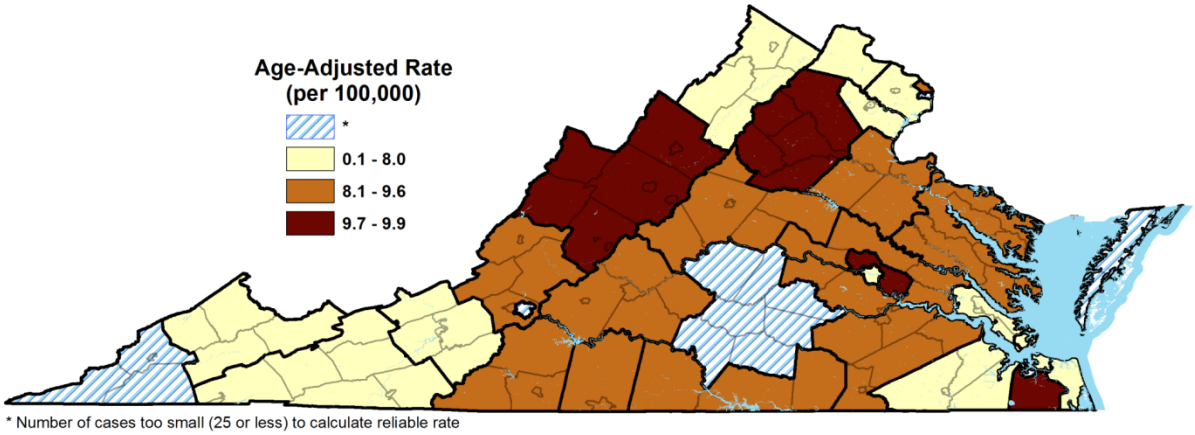
[4] National Cancer Institute, A Snapshot of Ovarian Cancer, http://www.cancer.gov/researchandfundking/snapshots/ovarian.

Map 8.1: Ovarian Cancer Incidence Rates by Health District, 2007-2011[1]



Roanoke (16.4 cases per 100,000 women), Eastern Shore (15.1), Lord Fairfax (15.1), and Thomas Jefferson (14.2) had the highest incidence rates of ovarian cancer among the 35 health districts. Lenowisco (8.5), Southside (8.7), New River (9.3), and Chesterfield (9.3) had the lowest ovarian cancer incidence rates.

Map 8.2: Ovarian Cancer Mortality Rates by Health District, 2008-2012[2]



Rappahannock/Rapidan (9.9 deaths per 100,000 women), Chesapeake (9.9), and Henrico (9.8) had the highest ovarian cancer mortality rates among the 35 health districts. Richmond (5.8), Prince William (6.1), and Norfolk (6.7) had the lowest rates.

[1] Virginia Cancer Registry. Based on combined 2007-2011 data. Incidence rates are age-adjusted to the 2000 U.S. standard population.

[2] VDH Division of Health Statistics. Based on combined 2008-2012 data. Mortality rates are age-adjusted to the 2000 U.S. standard population.

XI. Prostate Cancer

Prostate Cancer Overview

- Among men in the United States, prostate cancer is the most commonly diagnosed cancer (excluding non-melanoma skin cancer) and the second leading cause of cancer death.[1] One in seven men will be diagnosed with prostate cancer during his lifetime.[2]

- Prostate cancer has a five-year relative survival rate of 98.6 percent if diagnosed at its earliest (localized) stage.[2] In Virginia, 79.7 percent of prostate cancers diagnosed were at the localized stage.[3]

- In Virginia, there were 1,425 inpatient hospitalizations in 2012 for prostate cancer, at a total cost of over $67.7 million. The average length of stay was 2.1 days and the average charge per stay was $47,508.[4]

- According to the 2012 BRFSS survey data, 46.5 percent of Virginia men 50 years and older reported having had a Prostate-Specific Antigen (PSA) screening test in the previous two years (U.S. average, 45.2%).[5]

- Also from the 2012 BRFSS survey data, 18.2 percent of men over age 40 with an annual income of $15,000 or less had a PSA screening in 2012, the lowest percentage among all income groups. The next lowest group, those with income of $15,000 to $24,000, had a 39% screening rate.[5]

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[1] American Cancer Society. Cancer Facts & Figures 2014. Atlanta: American Cancer Society; 2014.

[2] Howlader N, Noone AM, Krapcho M, Garshell J, Miller D, Altekruse SF, Kosary CL, Yu M, Ruhl J, Tatalovich Z, Mariotto A, Lewis DR, Chen HS, Feuer EJ, Cronin KA (eds). SEER Cancer Statistics Review, 1975-2011, National Cancer Institute. Bethesda, MD, http://seer.cancer.gov/csr/1975_2011/, based on November 2013 SEER data submission, posted to the SEER web site, April 2014.

[3] Virginia Cancer Registry. Based on combined 2007-2011 data. Incidence rates are age-adjusted to the 2000 U.S. standard population; local stage defined using Derived Summary Staging values (http://seer.cancer.gov/tools/ssm/intro.pdf).

[4] VDH Virginia Health Information Hospital Discharge Patient-Level Dataset, 2012.

[5] Centers for Disease Control and Prevention (CDC). *Behavioral Risk Factor Surveillance System Survey data*. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2012.

Table 9.1: Prostate Cancer Data by Race and Sex, Incidence (2007-2011) & Mortality (2008-2012)

		State of Virginia	African-American Men	White Men
Incidence[1]	Count	28,096	7,003	19,845
	Rate per 100,000	143.2	224.8	126.7
	95% CI	141.5-144.9	219.3-230.4	124.9-128.5
Staging[1]	% Localized	79.7%*	81.5%	80.3%
	% Regional	8.7%	7.3%	8.3%
	% Distant	3.2%	4.6%	3.5%
	% Unstaged/Other	7.5%	6.5%	8.3%
Mortality[2]	Count	3,399	1,006	2,344
	Rate per 100,000	22.4	46.2	18.9
	95% CI	21.6-23.1	43.3-49.0	18.1-19.7

*Percentage of local stage for other/unknown race group (not shown) was 60.3%.

According to Table 9.1:

- During the period 2007-2011, prostate cancer incidence was 143.2 cases per 100,000 men in Virginia[1] (U.S. rate: 147.8 cases per 100,000 men).[3]

- Between 2008 and 2012, prostate cancer mortality was 22.4 deaths per 100,000 in Virginia[2] (2007-2011 U.S. rate: 23.0 deaths per 100,000).[4]

- The African-American incidence rate was about 1.8 times greater than it was among White men; for every 100 incident cases among White men, African-American men experienced about 180 cases.[1]

- Mortality rates were about 2.4 times greater in African-American men compared to White men in Virginia.[2]

- The percentage of prostate cancer cases diagnosed at the localized stage was similar for both Whites (80.3%) and African-Americans (81.5%) in Virginia.[1]

[1] Virginia Cancer Registry. Based on combined 2007-2011 data. Incidence rates are age-adjusted to the 2000 U.S. standard population; Local Stage cancers reported using the Derived Summary Staging System.

[2] VDH Division of Health Statistics. Based on combined 2008-2012 data. Mortality rates are age-adjusted to the 2000 U.S. standard population.

[3] Howlader N, Noone AM, Krapcho M, Garshell J, Miller D, Altekruse SF, Kosary CL, Yu M, Ruhl J, Tatalovich Z, Mariotto A, Lewis DR, Chen HS, Feuer EJ, Cronin KA (eds). SEER Cancer Statistics Review, 1975-2011, National Cancer Institute. Bethesda, MD, http://seer.cancer.gov/csr/1975_2011/, based on November 2013 SEER data submission, posted to the SEER web site, April 2014.

[4] Howlader N, Noone AM, Krapcho M, Garshell J, Neyman N, Altekruse SF, Kosary CL, Yu M, Ruhl J, Tatalovich Z, Cho H, Mariotto A, Lewis DR, Chen HS, Feuer EJ, Cronin KA (eds). *SEER Cancer Statistics Review, 1975-2010*, National Cancer Institute. Bethesda, MD, http://seer.cancer.gov/csr/1975_2010/, based on November 2012 SEER data submission, posted to the SEER web site, 2013. (accessed 07/02/2014).

Table 9.2: Cancer Data by Health District – Prostate, Incidence (2007-2011) & Mortality (2008-2012)

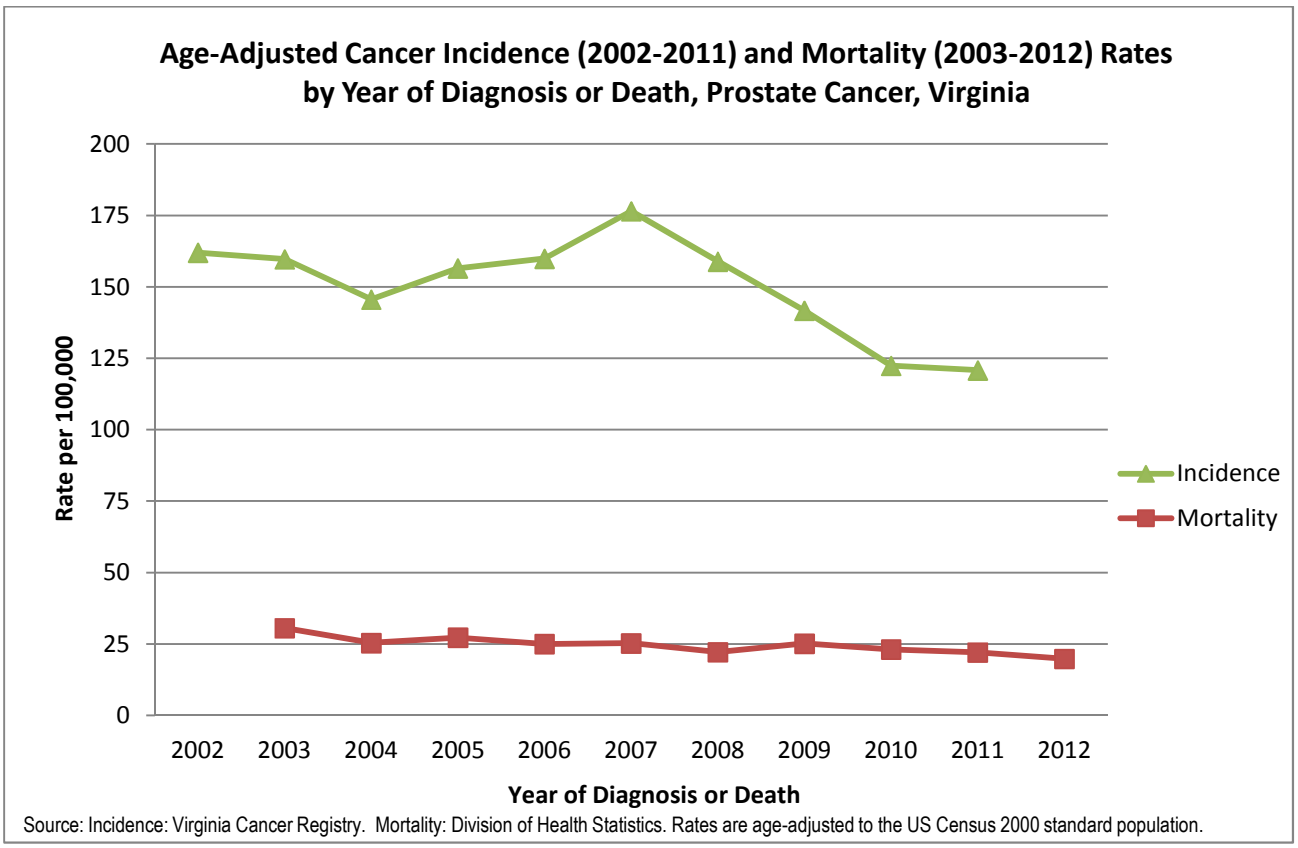
Districts are ranked from favorable (1) to unfavorable (35) for incidence, localized stage, and mortality.

	Incidence[1]				Staging[1]		Mortality[2]			
Health District	**Count**	**Age-Adjusted Rate per 100,000**	**95% CI**	**Rank**	**Percent Localized**	**Rank**	**Count**	**Age-Adjusted Rate per 100,000**	**95% CI**	**Rank**
Alexandria	341	125.4	111.6-140.4	8	79.5%	18	52	22.7	16.5-28.9	19
Alleghany	688	122.2	113.1-132.0	7	83.1%	8	95	20.7	16.5-24.8	11
Arlington	508	130.6	118.9-143.2	11	74.4%	33	50	16.6	12.0-21.2	1
Central Shenandoah	1,163	143.7	135.5-152.3	19	79.1%	19	127	18.4	15.2-21.6	4
Central Virginia	978	132.7	124.4-141.4	13	85.5%	4	156	25.9	21.9-30.0	26
Chesapeake	779	155.4	144.1-167.3	26	85.1%	6	97	27.8	22.3-33.3	29
Chesterfield	1,664	192.4	182.7-202.4	33	80.0%	17	121	22.1	18.2-26.1	18
Chickahominy	723	167.9	155.4-181.3	30	76.2%	30	65	20.2	15.3-25.1	9
Crater	819	196.7	183.0-211.2	34	77.7%	23	108	34.1	27.7-40.6	33
Cumberland Plateau	342	95.1	85.0-106.3	2	86.0%	3	48	17.8	12.8-22.9	3
Eastern Shore	267	161.5	142.5-182.7	28	76.4%	28	41	26.7	18.6-34.9	28
Fairfax	3,247	128.9	124.2-133.7	9	77.6%	24	298	16.9	15.0-18.8	2
Hampton	694	214.0	198.0-231.1	35	86.5%	1	79	31.0	24.2-37.8	31
Henrico	1,321	190.0	179.6-200.8	32	76.0%	31	111	18.7	15.2-22.2	5
Lenowisco	236	84.1	73.4-95.9	1	76.3%	29	45	20.5	14.5-26.5	10
Lord Fairfax	703	108.3	100.3-116.8	4	70.3%	35	110	21.4	17.4-25.4	14
Loudoun	625	121.5	111.2-132.5	5	73.8%	34	65	21.3	16.1-26.5	13
Mount Rogers	674	105.5	97.5-114.0	3	81.9%	13	102	19.2	15.5-23.0	6
New River	528	122.0	111.6-133.2	6	85.2%	5	64	19.9	15.0-24.7	8
Norfolk	650	146.1	134.8-158.1	21	79.1%	19	93	24.7	19.6-29.7	23
Peninsula	1,281	154.0	145.5-162.9	24	83.8%	7	166	23.7	20.1-27.3	22
Piedmont	533	165.9	151.9-181.0	29	77.1%	26	74	29.2	22.5-35.8	30
Pittsylvania-Danville	536	157.1	143.8-171.3	27	82.8%	9	64	22.0	16.6-27.4	17
Portsmouth	335	149.2	133.4-166.4	23	82.7%	10	74	37.4	28.9-46.0	35
Prince William	1,040	137.4	128.0-147.3	15	77.4%	25	101	22.8	18.3-27.2	20
Rappahannock	956	142.7	133.2-152.6	17	78.8%	21	103	21.4	17.3-25.6	14
Rappahannock -Rapidan	665	137.7	127.1-148.9	16	77.1%	26	71	19.7	15.1-24.3	7
Richmond	806	189.4	176.2-203.4	31	75.9%	32	103	25.8	20.8-30.7	25
Roanoke	333	136.2	121.6-152.1	14	80.8%	15	62	26.6	20.0-33.2	27
Southside	465	154.8	140.8-170.0	25	77.8%	22	89	36.7	29.0-44.3	34
Thomas Jefferson	906	143.5	134.2-153.4	18	81.0%	14	114	21.4	17.5-25.3	14
Three Rivers	784	147.7	137.4-158.7	22	80.4%	16	114	25.6	20.9-30.3	24
Virginia Beach	1,239	131.0	123.5-138.7	12	82.4%	11	148	20.7	17.3-24.0	11
West Piedmont	636	129.4	119.3-140.2	10	86.3%	2	93	23.2	18.5-28.0	21
Western Tidewater	590	145.3	133.4-158.0	20	82.2%	12	96	32.9	26.3-39.5	32
Virginia	**28,096**	**143.2**	**141.5-144.9**		**79.7%**		**3,399**	**22.4**	**21.6-23.1**	

[1] Virginia Cancer Registry. Based on combined 2007-2011 data. Incidence rates are age-adjusted to the 2000 U.S. standard population; local stage defined using Derived Summary Staging values (http://seer.cancer.gov/tools/ssm/intro.pdf).

[2] VDH Division of Health Statistics. Based on combined 2008-2012 data. Mortality rates are age-adjusted to the 2000 U.S. standard population.

Chart 9.1: Prostate Cancer Incidence and Mortality Rates, by Year, 2002-2012



Prostate cancer incidence declined from 162.0 cases per 100,000 in 2002 to 145.6 in 2004, then rose to a peak of 176.5 in 2007 before falling to 120.8 in 2011[1]. According to a Cochran-Armitage trend analysis, the Virginia prostate cancer incidence rate significantly decreased over the 10 year period.

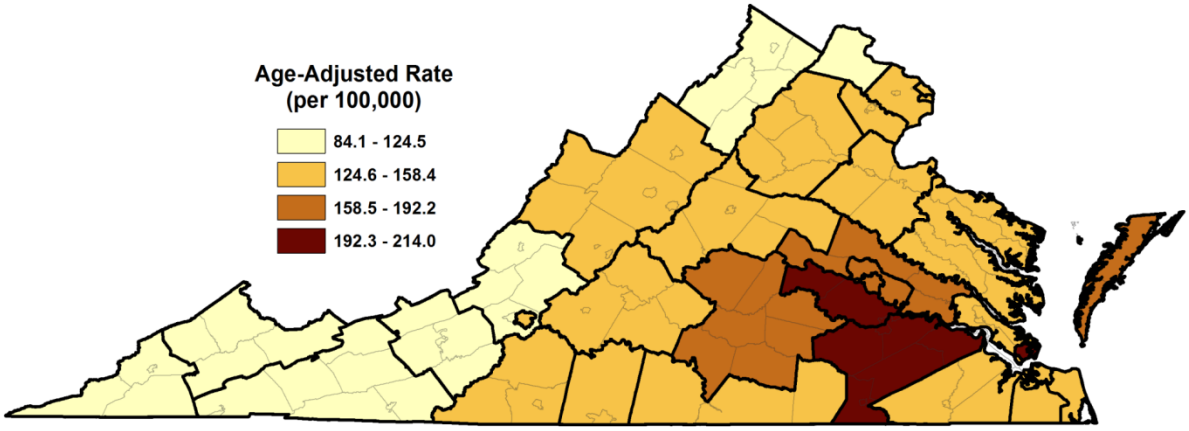
The mortality rate for prostate cancer in Virginia decreased overall between 2003 and 2012, from 30.6 deaths per 100,000 men to 19.8 deaths per 100,000. The steady decline in prostate cancer mortality in Virginia reflects a national trend.[2] According to the National Cancer Institute, "mortality rates for prostate cancer also have declined since the mid-1990s."[3] A Cochran-Armitage trend analysis shows that the prostate cancer mortality rate has significantly decreased over the 10 year period.

[1] Virginia Cancer Registry. Based on combined 2007-2011 data. Incidence rates are age-adjusted to the 2000 U.S. standard population.

[2] VDH Division of Health Statistics. Based on combined 2008-2012 data. Mortality rates are age-adjusted to the 2000 U.S. standard population.

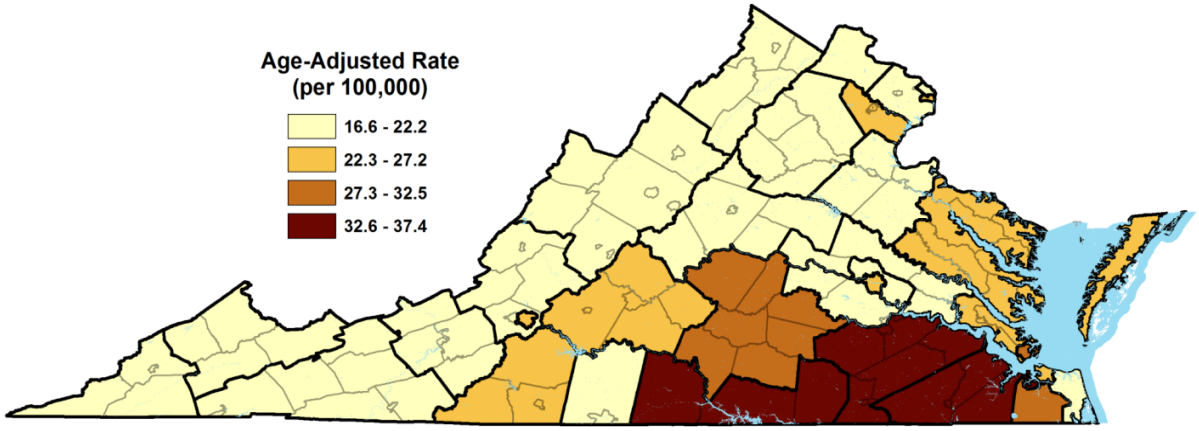
[3] National Cancer Institute, A Snapshot of Prostate Cancer, http://www.cancer.gov/researchandfunding/snapshots/prostate.

Map 9.1: Prostate Cancer Incidence Rate by Health District, 2007-2011[1]



Hampton (214.0 cases per 100,000 men), Crater (196.7), and Chesterfield (192.4) had the highest prostate cancer incidence rates among the 35 health districts. Lenowisco (84.1), Cumberland Plateau (95.1), and Mount Rogers (105.5) had the lowest incidence rates.

Map 9.2: Prostate Cancer Mortality Rate by Health District, 2008-2012[2]



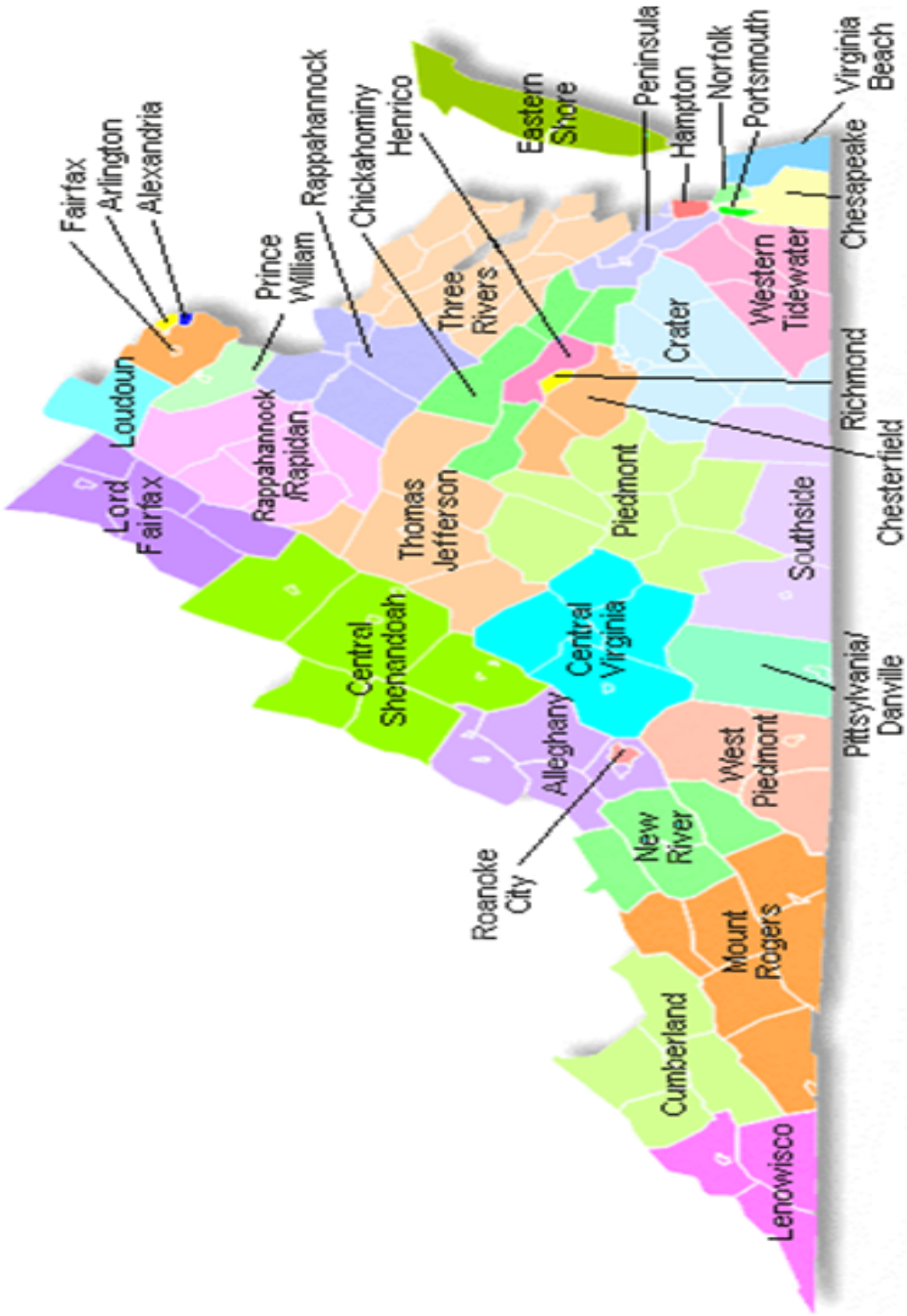
Portsmouth (37.4 deaths per 100,000 men), Southside (36.7), and Crater (34.1) had the highest prostate cancer mortality rates among the 35 health districts. Arlington (16.6), Fairfax (16.9), and Cumberland Plateau (17.8) had the lowest mortality rates.

[1] Virginia Cancer Registry. Based on combined 2007-2011 data. Incidence rates are age-adjusted to the 2000 U.S. standard population.

[2] VDH Division of Health Statistics. Based on combined 2008-2012 data. Mortality rates are age-adjusted to the 2000 U.S. standard population.

XII. Appendices

Appendix A: Local Health District Map



Appendix B: Localities in Local Health Districts

Alexandria
Alexandria City

Alleghany
Alleghany County
Botetourt County
Covington City
Craig County
Roanoke County
Salem City

Arlington
Arlington County

Central Shenandoah
Augusta County
Bath County
Buena Vista City
Harrisonburg City
Highland County
Lexington City
Rockbridge County
Rockingham County
Staunton City
Waynesboro City

Central Virginia
Amherst County
Appomattox County
Bedford City
Bedford County
Campbell County
Lynchburg City

Chesapeake
Chesapeake City

Chesterfield
Chesterfield County
Colonial Heights City
Powhatan County

Chickahominy
Charles City County
Goochland County
Hanover County
New Kent County

Crater
Dinwiddie County
Emporia City
Greensville County
Hopewell City
Petersburg City
Prince George County
Surry County
Sussex County

Cumberland Plateau
Buchanan County
Dickenson County
Russell County
Tazewell County

Eastern Shore
Accomack County
Northampton County

Fairfax
Fairfax City
Fairfax County
Falls Church City

Hampton
Hampton City

Henrico
Henrico County

Lenowisco
Lee County
Norton City
Scott County
Wise County

Lord Fairfax
Clarke County
Frederick County
Page County
Shenandoah County
Warren County
Winchester City

Loudoun
Loudoun County

Mount Rogers
Bland County
Bristol City
Carroll County
Galax City
Grayson County
Smyth County
Washington County
Wythe County

New River
Floyd County
Giles County
Montgomery County
Pulaski County
Radford City

Norfolk City
Norfolk City

Peninsula
James City County
Newport News City
Poquoson City
Williamsburg City
York County

Piedmont
Amelia County
Buckingham County
Charlotte County
Cumberland County
Lunenburg County
Nottoway County
Prince Edward County

Pittsylvania/Danville
Danville City
Pittsylvania County

Portsmouth
Portsmouth City

Prince William
Manassas City
Manassas Park City
Prince William County

Rappahannock
Caroline County
Fredericksburg City
King George County
Spotsylvania County
Stafford County

Rappahannock/ Rapidan
Culpeper County
Fauquier County
Madison County
Orange County
Rappahannock County

Richmond City
Richmond City

Roanoke City
Roanoke City

Southside
Brunswick County
Halifax County
Mecklenburg County

Thomas Jefferson
Albemarle County
Charlottesville City
Fluvanna County
Greene County
Louisa County
Nelson County

Three Rivers
Essex County
Gloucester County
King William County
King and Queen County
Lancaster County
Mathews County
Middlesex County
Northumberland County
Richmond County
Westmoreland County

Virginia Beach
Virginia Beach City

West Piedmont
Franklin County
Henry County
Martinsville City
Patrick County

Western Tidewater
Franklin City
Isle of Wight County
Southampton County
Suffolk City

Appendix C: Glossary

Age-adjusted rate: A rate that allows comparing communities with different age structures. Because cancer occurs more often among older people, localities that have higher percentages of older people differ from areas with higher percentages of younger people. Calculating an age-adjusted rate eliminates the effect of age, thus allowing direct comparisons between communities and other groups.

Case: A countable instance of a cancer tumor. If a person develops two cancers that are not from the same source, the case count is two. An example is: 10 people in a community have cancer. One person develops 2 different cancers and 9 people develop a single cancer. The number of cancer cases is 2 + 9 = 11, and the case count is 11.

Cochran Armitage Trend: The Cochran Armitage Trend test is a statistical test. It is used to examine data for trends in binomial proportions (confidence intervals for a proportion in a statistical population) across the levels of a single variable.

Confidence interval: Two numbers, one low and one high, form an interval. A confidence interval is the range that brackets a point estimate of a number in a population. Ninety-five percent confidence intervals (95% CIs) quantify random variability in data. A confidence interval is an estimate of the certainty that a measured number, such as an incidence or mortality rate, actually falls within the interval. The interval defines the range that includes the statistic itself 95% of the time.

Count: The number of cancer cases or deaths that happen. In this report, counts are presented by demographic category (sex, race), disease category (all cancers, lung cancer), geographic category (Virginia, health district), and time interval (2001 – 2010, 2006 – 2010). An example is 28,516 cases of prostate cancer among men in Virginia between 2006 and 2010. Cancer counts in this report are counts of cancers, not counts of patients. A person who develops more than one cancer contributes more than one case to the cancer case count.

Health district: The Virginia Department of Health defines state health districts. A health district may be one county or city (Loudoun, Norfolk) or incorporate multiple counties or cities (Lenowisco, Piedmont). Appendix B lists Virginia health districts and their constituent counties and cities.

Incidence: The number of times an event happens, usually expressed as a rate observed during a period of time. To calculate incidence, divide the number of new cases counted during a time period by the number of people in the population during that time period. Incidence counts refer only to new cases. An example is: 50 people in a population of 100,000 were cancer patients at the end of a year. Among these patients, 5 people were newly diagnosed in that year; 45 people were diagnosed and counted at some other time. The incidence rate is 5 new cases per 100,000. Incidence is not the same as prevalence (see Prevalence).

Mortality: The number of deaths in a defined population during a period of time. Like incidence, mortality may be expressed as a count or a rate. Calculate mortality rates using the method to calculate incidence rates (see Incidence).

Prevalence: The number or percentage of a population that has a condition at a given time. Prevalence begins with existing cases, adds new cases, and subtracts cases that are no longer present.

An example is: 50 people out of a population of 100,000 had cancer at the beginning of an interval such as a year; 5 people developed cancer; and 10 people who had cancer moved out or died. Prevalence at the beginning is 50, which then increased by 5 and decreased by 10 during the interval. Prevalence is 50 + 5 - 10 = 45 cases in the population of 100,000. Prevalence is not the same as incidence (see Incidence).

Rate: A number expressing how often something happens during a certain period. In this report, rates are the number of cancer incident cases and deaths during defined intervals. Rates are expressed for 100,000 people. An example is: During one year, 82 new cancer cases were diagnosed. The population is 33,000 people. For that year, the rate is (82 / 33,000) X 100,000 = 0.002485 X 100,000 = 248.5. The incidence rate is 248.5 cases per 100,000 people. (This is a crude rate, not an age-adjusted rate.)

Stage, staging: A medical term describing the extent to which a cancer has developed. A local stage cancer is less extensive than a regional stage cancer, and a regional stage cancer is less extensive than a late stage cancer. Patients can more easily manage cancer when it is diagnosed at an earlier stage. Doctors and cancer registrars use staging to describe differences between cancers.

Trend: A long-term movement or change in a rate, usually upwards or downwards. An example is: A cancer rate is 100 per 100,000 people in the first year, 110 per 100,000 in the second year, and 120 per 100,000 in the third year. This is an upward trend. In this report the Cochran-Armitage test is used to test the null hypothesis that no trend exists over the stated interval.

These programs and offices in the Virginia Department of Health collaborated to produce this report: The Comprehensive Cancer Control Program, the Virginia Cancer Registry, the Epidemiology unit of the Division of Policy and Evaluation in the Office of Family Health Services, and the Office of Health Statistics