

Vermont Facts

- ❖ **Incidence:** Lung cancer is the second most commonly diagnosed cancer in Vermont; approximately 260 lung cancer cases are diagnosed among men and 231 lung cancer cases are diagnosed among women in Vermont.
- ❖ **Mortality:** Lung cancer is the leading cause of cancer death. Each year, approximately 185 men and 161 women die from lung cancer in Vermont.
- ❖ **Trends:** Incidence and mortality for lung cancer has declined among Vermont males from 1998-2007. Incidence rates of lung cancer have increased, but mortality has not changed among women in Vermont during 1998-2007.
- ❖ **Vermont vs. U.S.:** Lung cancer incidence rates among Vermont men and women are higher than the U.S., and lung cancer mortality rates among Vermont men are lower than the U.S. There is no statistical difference between Vermont women and the U.S for mortality.
- ❖ **Age:** The incidence of lung cancer increases with age. More than 80 percent of lung cancer cases are diagnosed in individuals aged 60 and older.
- ❖ **Stage:** In Vermont, 17 percent of lung cancers are diagnosed at the localized stage (the cancer is limited to the organ of origin), and 76 percent are diagnosed at the regional or distant stages (the cancer has extended beyond the local organ or has metastasized).
- ❖ **Prevention:** Nearly 90 percent of lung cancer cases are due to smoking.
- ❖ **Survival:** Nationally, 53 percent of individuals whose lung cancer is diagnosed at a localized stage survive their cancer for at least five years. Only 4 percent of those diagnosed with distant stage survive for at least five years.

Table of Contents:

<i>Vermont Facts</i>	1
<i>Background</i>	2
Lung Cancer	2
<i>Incidence</i>	3
<i>Mortality</i>	3
<i>Trends</i>	4
<i>U.S. Comparisons</i>	6
<i>Age</i>	7
<i>Stage at Diagnosis</i>	9
<i>Risk Factors</i>	10
<i>Prevention</i>	12
<i>Diagnosis</i>	12
<i>Survival & Treatment</i>	14
<i>Intervention, Policy, & Recommendations</i>	15
Vermont Efforts	15
National Efforts	16
<i>Data Sources</i>	17
<i>Technical Notes & Definitions</i>	18

Background

In Vermont, cancer is the leading cause of death, with approximately 1,200 people dying from cancer each year. For the past 40 years, the three leading causes of death in Vermont have been heart disease, cancer, and stroke. In contrast to the dramatic declines in the death rates for heart disease and stroke, the death rate for cancer rose steadily over the past few decades before decreasing in recent years. Roughly one out of every two men and one out of every three women will develop cancer in their lifetime.

Any disease in which abnormal cells develop, divide, grow, and have the potential to spread throughout the body can be called cancer. If the spread of these cancer cells is not controlled, death may result. Cancer cells from a malignant tumor can invade nearby tissues either by direct growth into adjacent tissue or by migration through the bloodstream and lymphatic system to other parts of the body. This process is called metastasis. Cancer that started as lung cancer and spread to the brain is still lung cancer.

Lung Cancer

Lung cancer is a disease of uncontrolled cell growth in tissues of the lung. Among Vermonters, lung cancer is the second most common form of cancer and the leading cause of cancer death.

Lung cancers are thought to develop over many years. They may start as areas of pre-cancerous changes in the lung. The first changes happen in the cells themselves, but cells do not form a mass or tumor. They cannot be seen on an x-ray and they do not cause symptoms. Over time, these pre-cancerous changes may progress into a cancer which can continue to grow and form a tumor large enough to be seen on imaging tests such as x-rays. At some point, cells from the cancer may break away from the original tumor and spread (metastasize) to other parts of the body. Lung cancer frequently spreads in this way before it is detected.

The main types of lung cancer are *non-small cell lung cancer (NSCLC)* and *small cell lung cancer (SCLC)*. This difference is important since the aggressiveness of the disease and treatment options depend upon which type of cancer is diagnosed and the information for one type will not apply to the other type. Approximately 85 to 90 percent of lung cancers are non-small cell lung cancer (NSCLC).

The non-small cell lung cancers are grouped together because of similar prognosis and management. Non-small cell lung cancers (NSCLC) are sometimes treated with surgery, while small cell lung cancer (SCLC) may respond better to chemotherapy and radiation. Small cell lung carcinomas are less common and typically arise in the larger airways (primary and secondary bronchi), growing rapidly and becoming fairly large. Initially they may be more responsive to chemotherapy, they typically have a worse prognosis, and are often metastatic at diagnosis.

Incidence

Defined as the number of *new* cases occurring in a population during a defined time interval, incidence rates are a useful measure of the risk of disease.

Table 1. The most commonly diagnosed cancers in males and females – Vermont, average number of cases per year, 2003-2007.

Male Cancer Site	Cases (per year)	Percent (per year)	Female Cancer Site	Cases (per year)	Percent (per year)
Prostate	502	29%	Breast	489	29%
Lung and Bronchus	260	15%	Lung and Bronchus	231	14%
Colon and Rectum	152	9%	Colon and Rectum	167	10%
Bladder	134	8%	Uterus	122	7%
Melanoma (Skin)	109	6%	Melanoma (Skin)	98	6%
All Sites	1,759	100%	All Sites	1,709	100%

New cases per year exclude basal cell and squamous cell skin cancers and in situ (malignant but non-invasive) carcinomas except urinary bladder.

- ❖ An average 1,759 cancers in men and 1,709 women are diagnosed each year in Vermont. Of those, an average of 260 men and 231 women are diagnosed with lung cancer each year.
- ❖ Lung cancer is the second most commonly diagnosed cancer in males and females and accounts for roughly 15 percent of all cancers diagnosed in Vermont men and 14 percent diagnosed among Vermont women.

Mortality

The mortality rate is a measure of the number of deaths in a population during a specific period of time.

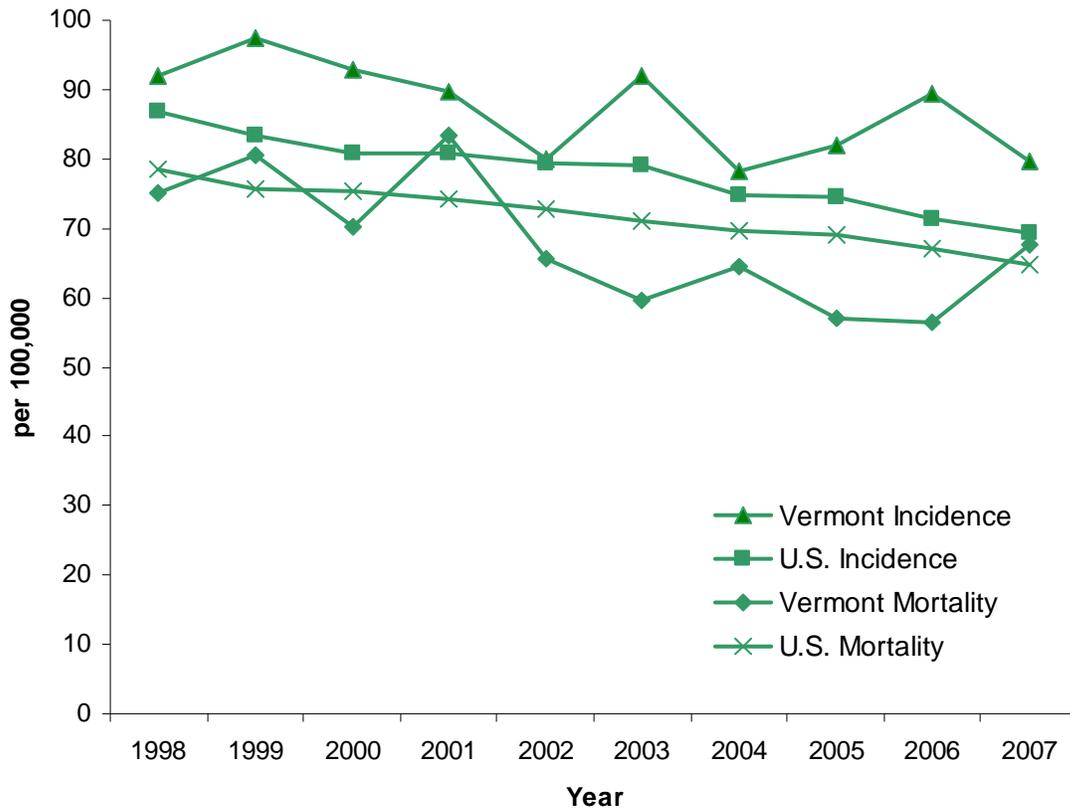
Table 2. The most common causes of cancer deaths in males and females – Vermont, average number of deaths per year, 2003-2007.

Male Cancer Site	Deaths (per year)	Percent (per year)	Female Cancer Site	Deaths (per year)	Percent (per year)
Lung and Bronchus	185	30%	Lung and Bronchus	161	27%
Prostate	65	10%	Breast	92	15%
Colon and Rectum	59	9%	Colon and Rectum	62	10%
Pancreas	33	5%	Pancreas	34	6%
Leukemia	29	5%	Ovary	30	5%
All Sites	627	100%	All Sites	607	100%

- ❖ An average of 627 men and 607 women die each year from cancer in Vermont. Of these, an average of 185 men and 161 women die from lung cancer.
- ❖ Lung cancer is the leading cause of cancer death among Vermonters and accounts for roughly 30 percent of all cancer deaths in men and 27 percent of deaths among women.

Trends

Figure 1. Incidence and mortality rates of male lung cancer – Vermont and United States¹, 1998-2007.

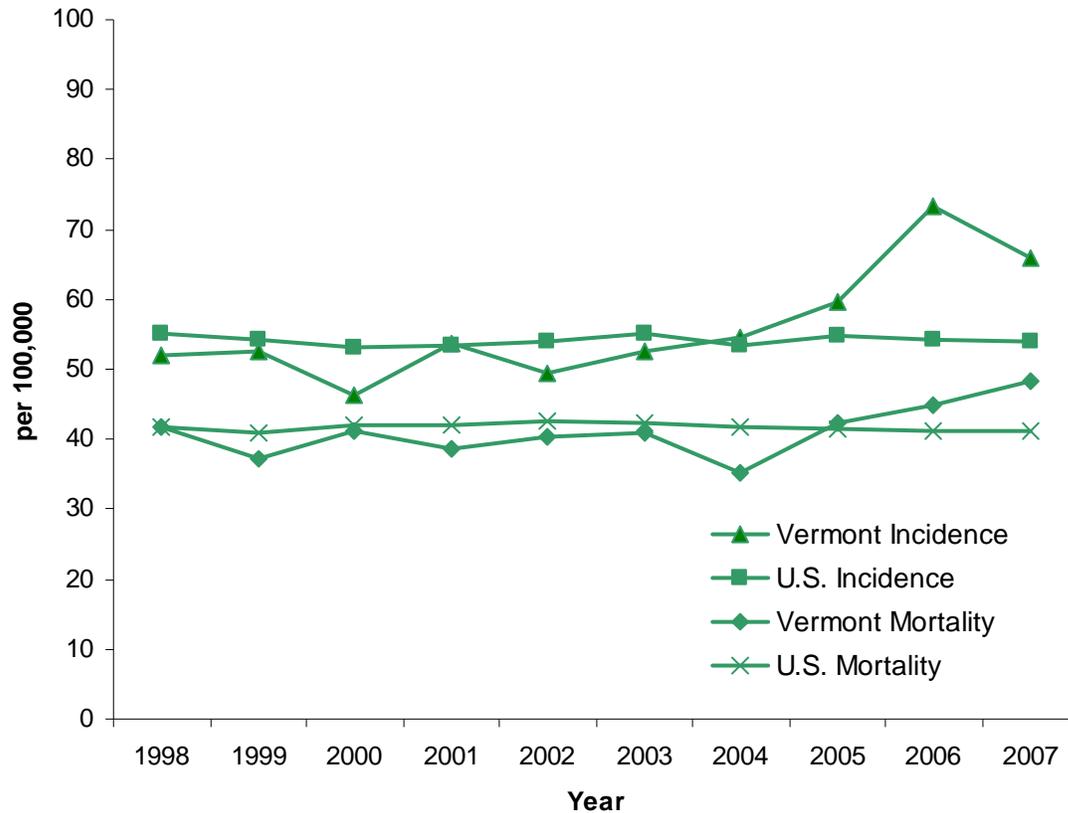


	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Vermont Incidence	92.0	97.5	92.8	89.8	79.9	92.0	78.1	81.9	89.5	79.6
U.S. Incidence	86.7	83.4	80.8	80.8	79.5	79.0	74.7	74.5	71.3	69.2
Vermont Mortality	75.1	80.4	70.2	83.5	65.7	59.7	64.5	57.0	56.5	67.5
U.S. Mortality	78.5	75.7	75.4	74.2	72.8	71.2	69.7	69.1	67.1	64.8

- ❖ From 1998 to 2007, the decline in the incidence of male lung cancer was statistically significant for Vermont and the U.S.
- ❖ From 1998 to 2007, the decline in the mortality of male lung cancer were statistically significant for the U.S. and Vermont.

¹ The U.S. rates represented in this publication are for whites. See Technical Notes section for more information.

Figure 2. Incidence and mortality rates of female lung cancer – Vermont and United States, 1998-2007.



	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Vermont Incidence	52.0	52.5	46.2	53.8	49.4	52.5	54.5	59.6	73.4	65.9
U.S. Incidence	55.1	54.4	53.2	53.5	54.0	55.2	53.4	54.9	54.4	54.1
Vermont Mortality	41.8	37.2	41.1	38.7	40.4	40.8	35.2	42.4	44.8	48.3
U.S. Mortality	41.7	40.9	42.1	42.0	42.6	42.2	41.9	41.6	41.2	41.1

- ❖ From 1998 to 2007, the increase in the incidence of female lung cancer was statistically significant for the Vermont; the U.S. trend was not statistically significant.
- ❖ From 1998 to 2007, there were no statistically significant changes in mortality of female lung cancer for the U.S or Vermont.

U.S. Comparisons

Table 3. Incidence and mortality rates of lung cancer – Vermont and United States, per 100,000, 2003-2007.

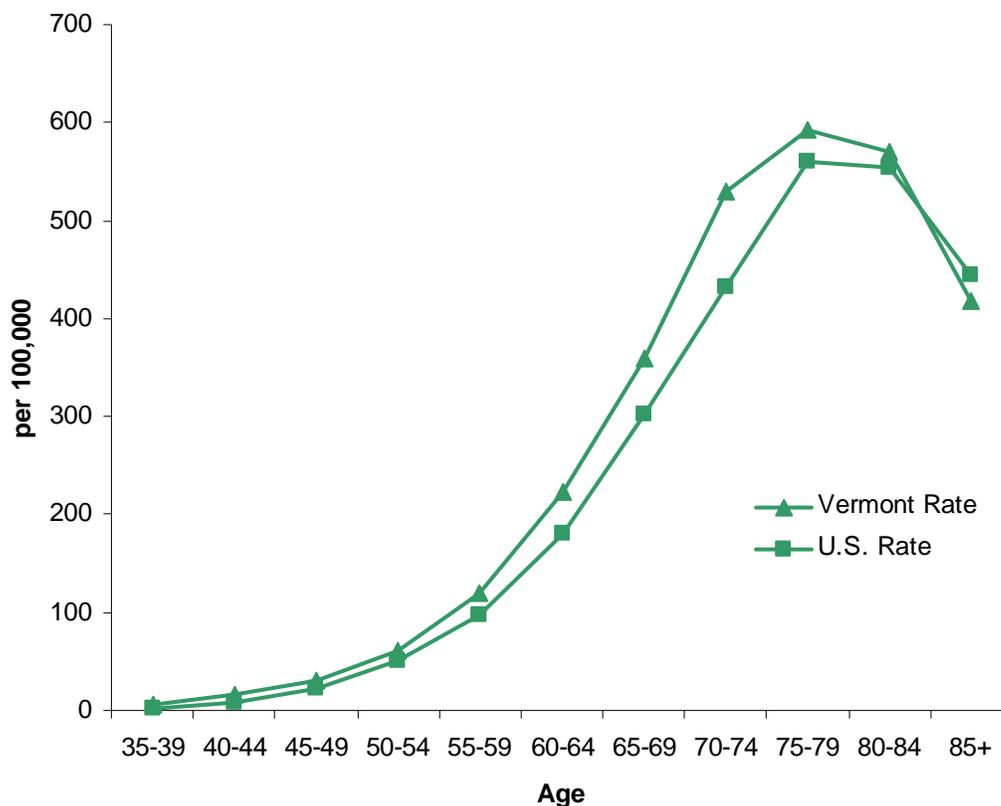
	Incidence	Mortality
Vermont males	84.2	61.1
U.S. males	73.6	68.3
Vermont females	61.2	42.3
U.S. females	54.3	41.6

- ❖ The lung cancer incidence rate among Vermont males is higher than the U.S. The mortality rate among Vermont males is lower than the U.S.
- ❖ The lung cancer incidence rate among Vermont females is higher than the U.S. The mortality rate among Vermont females is not different from the U.S.

Age

The incidence of lung cancer, as with many cancers, increases with age and is most often diagnosed among men and women over the age of 65.

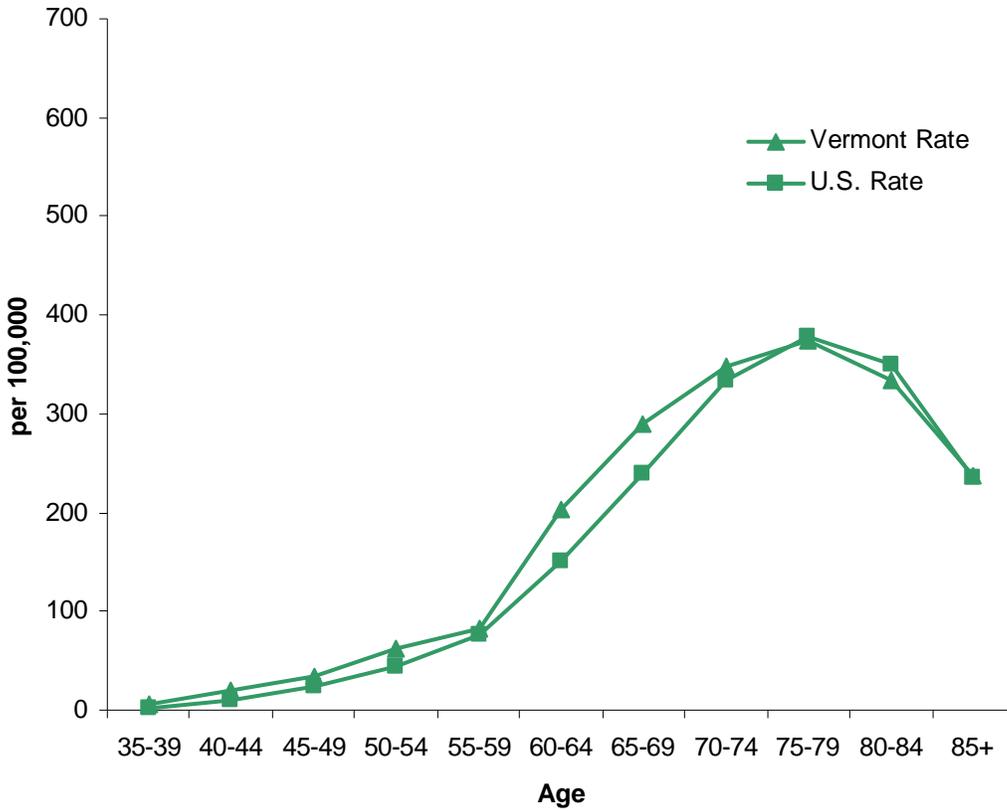
Figure 3. Incidence rates of male lung cancer, by age – Vermont and United States, 2003-2007.



Age Group	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85+
Vermont Rate	6.8	15.5	30.8	61.8	120.3	222.3	359.1	528.7	592.0	569.9	417.2
U.S. Rate	2.8	9.1	21.9	50.6	97.1	181.5	302.6	432.9	559.3	554.4	444.6

- ❖ Vermont males age 60-74 have a higher age-specific incidence rates of lung cancer compared to U.S. males.

Figure 4. Incidence rates of female lung cancer, by age – Vermont and United States, 2003-2007.



Age Group	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85+
Vermont Rate	5.6	20.2	33.2	61.8	82.4	202.3	289.0	348.8	375.0	334.6	236.6
U.S. Rate	2.8	10.0	25.1	43.5	77.2	151.8	240.1	334.0	377.9	350.7	235.1

❖ Vermont females age 40-44, 50-54, and 60-64 have higher age-specific incidence rates of lung cancer compared to U.S. females.

Stage at Diagnosis

Stage describes the extent to which the cancerous cells have spread from the original site to another part of the body; it helps determine prognosis and treatment options. Stage can be grouped into the following categories: in situ, localized, regional, distant, and unknown (unstaged). The earlier a cancer is diagnosed, the better a person's prognosis is likely to be. Cancers occurring in parts of the body that can be easily seen or felt (skin, breast) are easier to detect at an early stage (localized) compared to cancers of internal organs, which require imaging procedures and/or laboratory tests to detect.

Figure 5. Cancer by stage at diagnosis, Vermont, 2003-2007.

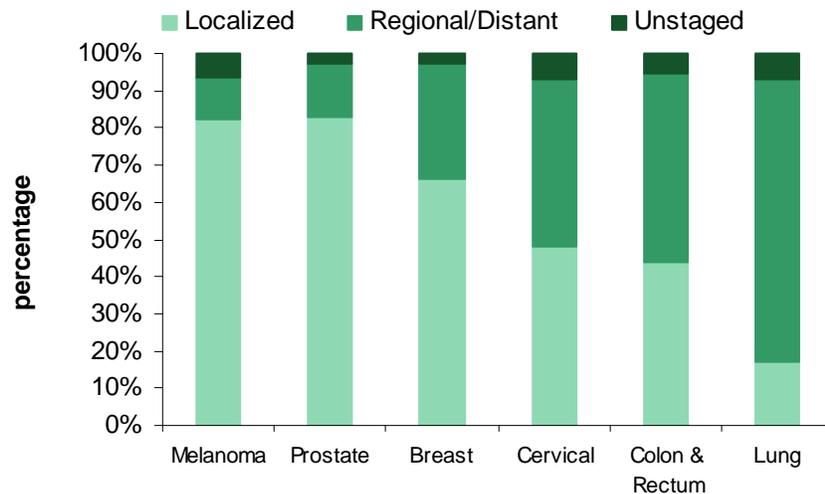
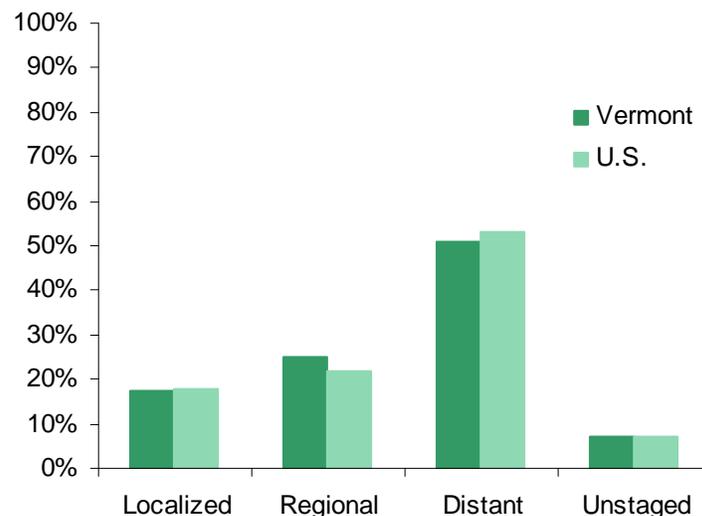


Figure 6. Invasive lung cancer by stage at diagnosis – male and female, Vermont and the United States, 2003-2007.



- ❖ Among Vermonters, approximately 17 percent of lung cancers are diagnosed at the early stage (localized), 25 percent are diagnosed at a regional stage, and 51 percent are diagnosed at a distant stage. In the U.S., 18 percent of lung cancers are diagnosed at the early stage, 22 percent are diagnosed at a regional stage, and 53 percent are diagnosed at a distant stage.
- ❖ More Vermonters are diagnosed at a regional stage compared to the U.S.

Risk Factors

A risk factor is a condition, an activity or an exposure that increases a person's chance of developing cancer. Cancer develops gradually as a result of a complex mix of factors related to lifestyle choices, environment and genetics. Each type of cancer is caused by a different set of factors, some well established, some uncertain, and some unknown. The exact causes of lung cancer are unknown; however, individuals with certain risk factors may be more likely than others to develop lung cancer. Risk factors for lung cancer include:

- ❖ **Tobacco:** Tobacco smoke is the leading risk factor for lung cancer. The use of tobacco products are an established risk factor for not only lung cancer but also cancers of the mouth, larynx, bladder, kidney, cervix, esophagus, and pancreas.
 - Nearly 90 percent of lung cancer cases are due to smoking².

Before manufactured cigarettes were widely available, lung cancer was much less common than other types of cancer. Approximately 87 percent of lung cancer deaths are thought to result from smoking. The risk for lung cancer among smokers is many times higher than among non-smokers. Harmful substances in smoke from cigarettes, pipes, or cigars damage lung cells and can cause lung cancer. The longer an individual smokes, and the more packs a day smoked, the greater the risk.

There is little difference in risk depending upon the product that is used. Cigar smoking and pipe smoking are almost as likely to cause lung cancer as cigarette smoking. Smoking low tar or "light" cigarettes has the same cancer risk as regular cigarettes. Mentholated cigarettes may increase risk since menthol allows smokers to inhale more deeply.

If an individual stops smoking before a cancer develops, damaged lung tissue gradually starts to repair itself. No matter what your age or how long you've smoked, quitting may help you live longer. People who stop smoking before age 50 cut their risk of dying in the next 15 years in half compared with those who continue to smoke. For *Vermont Quit Smoking Help* visit:
http://healthvermont.gov/prevent/tobacco/quit_smoking.aspx.

- ❖ **Second hand or environmental tobacco smoke:** If you don't smoke, breathing in the smoke of others can increase your risk of developing lung cancer. A non-smoker who lives with a smoker has about a 20 percent to 30 percent greater risk of developing lung cancer than someone who is not exposed to second hand smoke. Workers who are exposed to tobacco smoke in the workplace are also more likely to get lung cancer than those who work in smoke-free workplace. Secondhand smoke is thought to cause more than 3,000 deaths from lung cancer each year in the U.S. Secondhand smoke is especially harmful for children, contributing to a number of health problems and conditions. For more information visit:
http://healthvermont.gov/prevent/tobacco/second_hand.aspx.
- ❖ **Radon:** Radon is a naturally occurring radioactive gas that has no color, odor or taste. It is the result of decay over billions of years of uranium, which is a radioactive element found naturally in the earth's crust. In some regions of the U.S. radon can be present in homes built on soil with naturally occurring uranium. Unless it is specifically tested for, there is no way of knowing if radon is present in a home. Radon damages lung cells, and people exposed to radon are at increased risk of lung cancer. The lung cancer risk from radon is lower than that from tobacco smoke; however, the risk of lung cancer from radon is greater among smokers. For more information about radon visit: <http://healthvermont.gov/enviro/rad/Radon.aspx>.

² State of Lung Disease in Diverse Communities 2010, American Lung Association, http://www.lungusa.org/assets/documents/publications/lung-disease-data/solddc_2010.pdf.

- ❖ **Asbestos:** Studies have found that people who work with asbestos (in some mines, mills, textile plants, places where insulation is used, shipyards, etc.) are several times more likely to die of lung cancer than people who work in other industries. In workers exposed to asbestos who also smoke, the lung cancer risk is much greater than even adding the risks from these exposures separately. Additionally, both smokers and non-smokers exposed to asbestos also have a greater risk of developing *mesothelioma*, a type of cancer that starts in the pleura (the lining surrounding the lungs). For more information about asbestos visit: <http://healthvermont.gov/enviro/asbestos/index.aspx>.
- ❖ **Other substances:** People who have certain jobs, such as those who work in the construction and chemical industries, have an increased risk of lung cancer. Exposures to radioactive ores such as uranium, diesel exhaust, inhaled chemicals or minerals such as arsenic, beryllium, cadmium, silica, vinyl chloride, nickel compounds, chromium compounds, coal products, mustard gas, and chloromethyl ethers can cause lung cancer. The risk of lung cancer from these substances is even greater for smokers.
- ❖ **Air pollution:** Air pollution, particulate matter primarily from vehicles, industry, and power plants, may slightly increase the risk of lung cancer and cardiovascular disease among individuals exposed over a long period of time. The risk from air pollution is higher for smokers.
- ❖ **Family history of lung cancer:** Individuals with a father, mother, brother, or sister who had lung cancer may be at slightly increased risk of the disease, even if they don't smoke. Research has found that genetics may contribute to risk for some families with a strong history of lung cancer. Certain DNA changes may increase the risk of developing lung cancer.
- ❖ **Personal history of lung cancer:** Individuals who have had lung cancer are at increased risk of developing a second lung tumor.
- ❖ **Age:** most people are older than 65 years of age when diagnosed with lung cancer.

Researchers continue to study other possible risk factors. For example, having certain lung diseases (such as tuberculosis or bronchitis) for many years may increase the risk of lung cancer. However, it is not yet clear whether having certain lung diseases is a risk factor for lung cancer. There are some reasons to think that marijuana smoking might increase lung cancer risk. Researchers agree that marijuana contains known carcinogens, or chemicals that can cause cancer. However, results of epidemiologic studies of marijuana and cancer risk have been inconclusive.

Never-Smokers

Many cancers have risk factors that can be traced to lifestyle, including obesity and poor diet, but in many ways, lung cancer carries a stigma that no other cancer does. Although most lung cancers are a result of smoking, approximately 10 percent of men and 20 percent of women in this country who developed lung cancer have never smoked. Roughly 15,000 lung cancers are diagnosed nationally among individuals that have never smoked. Lung cancer in never-smokers ranks with brain, liver, ovarian, and uterine cancers. Second-hand smoke is absolutely a factor in many lung cancer diagnosis; however, even when secondhand smoke is considered, there is a large number of lung cancer patients whose disease can't be easily traced to tobacco. Research suggests that never-smokers' lung cancer may be a distinct disease and never-smokers who get lung cancer get a different type than smokers do. While diagnosis and treatment is similar, whether individuals smoked or not, never-smokers may respond slightly better to certain treatments than smokers.

Lung cancer in never-smokers is almost entirely non-small cell lung cancers, and small cell lung cancers are rare among never-smokers. Studies seem to indicate that lung cancer among those who have never smoked have characteristics that are different from those who smoke. Lung cancers among never-smokers are more often adenocarcinomas and less often squamous cell carcinomas compared to smokers. The K-ras gene is often mutated in tumors from smokers, but it is very uncommon for this mutation to be present among never-smokers. The epidermal growth factor receptor (EGFR) gene is more often mutated in tumors from never-smokers, and not in smokers.

Prevention

Although there is no certain way to prevent cancer, there are ways to reduce a person's risk. Risk factors such as age and family history cannot be controlled; however it may be possible to reduce risk for lung cancer by making some changes. The following actions can reduce a person's risk of developing lung cancer.

- Don't smoke, stop smoking, and avoid second hand and environmental smoke. If someone is a current or recent smoker, quitting reduces the risk of lung cancer, even if they have smoked for years.
- Test your home for radon. Exposure to radon can be reduced or eliminated by having your home tested and treated, if needed.
- Follow workplace guidelines and safety standards if you work with substances that are known to increase the risk for developing lung cancer.
- Eat a diet that emphasizes fruits and vegetables, drink alcohol in moderation, and exercise. Studies show that a diet rich in fruit, and possibly vegetables, may help lower the risk of lung cancer, while heavy alcohol drinking may increase the risk of lung cancer. Additionally, studies show that people who are physically active may have a lower risk of lung cancer than those who are not, even after taking cigarette smoking into account.
- Attempts to reduce the risk of lung cancer in current or former smokers by giving them high doses of vitamins or vitamin-like drugs have not been successful so far. Some studies have determined that beta-carotene, a nutrient related to Vitamin A, may increase the likelihood of developing lung cancer.

Diagnosis

Many cancers can be treated quickly and effectively if they are detected early. Screening is a way of checking for diseases when there are no symptoms. People of certain ages and genders are recommended to undergo screening tests, such as mammograms for breast cancer, Pap tests for cervical cancer, and colonoscopies for colorectal cancer.

There is no screening test for lung cancer.

Symptoms of lung cancer may not be apparent until the disease is already in an advanced stage, and lung cancer may be mistaken for other problems, such as an infection or the long-term effects from smoking, further delaying a diagnosis.

Early lung cancer often does not cause symptoms. As the cancer progresses, symptoms may include: a cough that gets worse or does not go away; breathing trouble, such as shortness of breath; constant chest pain; coughing up blood; a hoarse voice; frequent lung infections, such as pneumonia; feeling very tired all the time; or weight loss with no known cause. These symptoms are often **not** due to cancer and can be caused by other health problems.

As a result of tests for other medical conditions, some lung cancers may be diagnosed early. A lung tumor may be observed by imaging tests that are done for other reasons in patients with heart disease, pneumonia, or other lung conditions.

Symptoms of metastatic disease (the cancer has spread) may include: bone pain, neurologic changes (such as headache, weakness or numbness of a limb, dizziness, or recent onset of a seizure), jaundice (yellowing of the skin and eyes), lumps near the surface of the body, due to cancer spreading to the skin or to lymph nodes in the neck or above the collarbone.

The availability of an effective screening test for lung cancer could save many lives. Medical experts disagree on whether people with no signs or symptoms of lung cancer should undergo screening for the disease. Even

if there is an increased risk of lung cancer, such as for a smoker, it is unclear whether a chest X-ray or CT scan can be beneficial. Some studies indicate that screening can find cancer earlier, when it may be treated more successfully, whereas other studies find that these tests often reveal more benign conditions that result in invasive testing and unnecessary risks and have not been proven to detect cancers at an earlier stage or to reduce mortality. Currently there are no recommendations for these tests for screening the general public or even for people at increased risk.

The U.S. Preventive Services Task Force (USPSTF) concludes that the evidence is insufficient to recommend for or against screening asymptomatic persons for lung cancer with either low dose computerized tomography (LDCT), chest x-ray (CXR), sputum cytology, or a combination of these tests³.

Studies are ongoing to determine what types of tests may be helpful and who would benefit from lung cancer screening. The *National Lung Screening Trial (NLST)*⁴ is a research study sponsored by the **National Cancer Institute** for men and women at risk for lung cancer. Launched in 2002, the NLST is comparing two imaging techniques for detecting lung cancer to determine whether one test is better than the other in helping to reduce deaths from this disease. Results from this study are anticipated in 2010 or 2011.

Lung cancer may be seen on imaging such chest x-ray or computed tomography scan (CT Scan). A diagnosis is confirmed with a biopsy. Based on the appearance of lung cancer cells under the microscope, lung cancers are divided into two primary types. This distinction is important, since treatment varies depending upon which type of cancer is diagnosed. The two general types of lung cancer include:

Small cell lung cancer (SCLC), occurring almost exclusively in heavy smokers, is less common and may respond better to chemotherapy and radiation. **Non-small cell lung cancer (NSCLC)** is a term that includes several types of lung cancers that behave in a similar way. Non-small cell lung cancers include squamous cell carcinoma, adenocarcinoma, and large cell carcinoma and are sometimes treated with surgery.

³ For more information visit: <http://www.uspreventiveservicestaskforce.org/uspstf/uspplung.htm>.

⁴ For more information visit: <http://www.cancer.gov/nlst>.

Survival and Treatment

Survival rate refers to the percentage of people who are alive for a given period of time after diagnosis and is an indication of the prognosis of the disease. The prognosis and treatment of lung cancer is largely determined by the stage of the disease, which considers the size of the tumor, involvement of nearby organs, lymph node status, and whether metastatic disease is present. Survival rates for individuals diagnosed with lung cancer are lower than some of the other common cancer types, such as breast, colon, and prostate. Nationally, 53 percent of individuals whose lung cancer is diagnosed at a localized stage survive their cancer for at least five years. Only 4 percent of those diagnosed with distant stage lung cancer survive for at least five years.

Treatment and prognosis depend upon the histological type of cancer, the stage, and one's overall health. Possible treatments or combinations of treatments include **surgery**, **chemotherapy** (method that uses drugs to destroy cancer cells), **radiotherapy** (ionizing radiation to kill cancer cells), or **targeted drug therapy** (drugs to block the growth and spread of cancer cells).

The choice of treatment depends mainly on the type of lung cancer and its stage. Localized small cell lung cancer may be treated with radiation therapy and chemotherapy. A very small lung tumor could require surgery and chemotherapy while a more advanced stage small cell lung cancer may be treated with chemotherapy only. Non-small cell lung cancer may be treated with surgery, chemotherapy, radiation therapy, or a combination of treatments. The treatment choices are different for each stage. Some people with advanced cancer may receive targeted therapy.

Lung cancer **surgery** can involve removing a portion of the lung or the entire lung. An operation to remove the lung cancer and a small portion of healthy tissue is called a **wedge resection**. Removing a larger area of the lung is called **segmental resection**. Surgery to remove one of the five lobes is a **lobectomy** and removal of an entire lung is a **pneumonectomy**.

Radiation therapy uses ionizing radiation to kill cancer cells. Normal cells are able to repair radiation damage, while cancer cells are not. Radiation therapy can be directed at the lung cancer from outside the body, called *external beam radiation*, or it can be put inside needles, seeds or catheters and placed internally near the cancer, called *brachytherapy*.

Chemotherapy uses drugs to kill cancer cells. One or more chemotherapy drugs may be administered intravenously or taken orally. A combination of drugs usually is given in a series of treatments over a period of weeks or months, with breaks in between so that the body can recover.

Targeted therapies are newer cancer treatments that work by targeting specific abnormalities in cancer cells. For example, drugs that prevent tumors from creating new blood supplies and inhibit tumor growth or a drug that blocks chemicals that signal the cancer cells to grow and divide.

Lung cancer remains difficult to control with current treatments, and a health care provider may encourage a patient to consider participation in a clinical trial. **Clinical trials** are generally designed to compare potentially better therapy with therapy that is currently accepted as standard and can be an important option for many individuals when considering treatment. Most of the progress made in identifying curative therapies for cancers has been achieved through clinical trials.

Information about ongoing clinical trials is available from the National Cancer Institute at: <http://www.cancer.gov/clinicaltrials/search>.

Palliative care may be offered when treatments no longer offer a cure and a decision is made to avoid harsh treatments and choose supportive care instead. Palliative care is any form of medical care or treatment that concentrates on reducing the severity of disease symptoms, rather than halting or delaying progression of the disease itself or providing a cure. The goal is to prevent and relieve suffering and to improve quality of life for people facing serious, complex illness.

Intervention, Policy, and Recommendations

Vermont Efforts

The **Vermont State Cancer Plan**⁵, published by the Vermont Department of Health and **Vermonters Taking Action Against Cancer (VTAAC)**⁶, provides a strategic roadmap to reduce the burden of all cancers by 2015. The Plan identifies strategic priorities in the following areas: preventing future cancers, detecting new cancers early, increasing access to optimal treatment and follow up, improving the quality of life for cancer survivors, and improving pain management and end-of-life care.

The burden of lung cancer in Vermont can be reduced by achieving the following objectives, as identified in the 2010-2015 Vermont State Cancer Plan:

Prevent future cancers by reducing exposure to known risk factors.

- Reduce tobacco use among all Vermonters. For more information about the Vermont Department of Health/Vermont Tobacco Control Plan: <http://healthvermont.gov/prevent/tobacco>.
- Increase the percentage of households tested for radon gas.
- Increase the percentage of households that test high for radon gas that are mitigated. For more information about Vermont Department of Health Radon Program: <http://healthvermont.gov/enviro/rad/Radon.aspx>.

Increase access to high quality cancer treatment and follow-up care.

- Increase the percentage of cases managed by health care providers in multi-disciplinary settings.
- Increase the number of individuals with cancer who participate in clinical trials.

Reduce pain, discomfort, and distress among Vermont cancer patients and survivors.

- Increase the number of Vermont hospitals that offer a uniform set of palliative care and pain management services.
- Increase the number of Vermont health care providers (MD, RN, PA, etc.) receiving continuing medical education in palliative care, pain management and/or hospice care.
- Increase the percentage of cancer survivors who report always or usually receiving emotional/psychological support when needed.

Increase the integration of complementary and alternative medicine (CAM) and oncology.

- Increase percentage of adults who report discussing CAM use with their primary care providers.

Reduce financial barriers to optimal cancer care.

- Increase the percentage of Vermonters with health insurance.

Promote optimal health among cancer survivors.

- Increase use of treatment summaries and survivorship plans.
- Increase the percentage of cancer survivors who have a medical home (primary care provider).
- Increase the percentage of cancer survivors with good or excellent health.
- Increase the five-year survival rate for people with cancer.

⁵ Vermont State Cancer Plan, 2010-2015: http://healthvermont.gov/pubs/cancerpubs/state_cancer_plan.aspx.

⁶ A network of groups and individuals that speaks with one voice about reducing cancer risk, detecting cancers earlier, creating better access to quality cancer treatment, and improving the quality of life for cancer survivors. Visit <http://vtaac.org/> or call (802) 872-6303.

Increase use of hospice care for people with cancer.

- Increase the percentage of individuals who receive hospice care within one month of death.
- Increase education and training of health care providers on end-of-life care.

Improve planning for end-of-life care for all Vermonters.

- Increase the number of individuals enrolled in the Advanced Directives Registry.

Vermonters Taking Action Against Cancer (VTAAC) is a statewide collaborative partnership of over 200 organizations, healthcare providers and individuals working together to reduce the burden of cancer among all Vermonters. VTAAC workgroups and affiliate organizations develop and implement specific strategies and activities to achieve the objectives of the Vermont State Cancer Plan. Activities and progress towards these objectives are routinely assessed and reported annually. For more information about VTAAC, the Vermont State Cancer Plan or current activities and progress, visit: <http://healthvermont.gov/cancer> and <http://vtaac.org>.

The Vermont Cancer Survivor Network (VCSN) was founded in 2005 and is implementing the survivorship objectives in the Vermont State Cancer Plan. The Network is hosting celebratory events, providing educational activities for cancer survivors, their families and caregivers, and creating a peer-to-peer support network called Kindred Connections. For more information about VCSN, visit: <http://vcsn.net>.

The **Vermont Quit Network** offers smokers a wide range of proven and effective quit smoking tools, so smokers can choose what works best for them. One-on-one phone coaching; in-person group coaching, at hospital, business and community settings; online support; and *Your Quit. Your Way.* tools are some of the no cost support resources available to Vermonters. Vermonters may also be eligible to receive free nicotine replacement such as gum, lozenges, or patches, which have been shown to increase the chances of success. Between July 1, 2008 and June 30, 2009 the Vermont Quit Network had 6,953 total users.

Vermont has set a goal to reduce the youth smoking rate to 15 percent and the adult rate to 11 percent. In 2009, approximately 16 percent of youth (grades 8-12) and 17 percent of adults reported currently smoking. The number of youth who smoke has significantly decreased from 32 percent in 1999, while adult smoking prevalence has significantly decreased from 22 percent in 2000. Data from the 2009 Behavioral Risk Factor Surveillance System indicate some differences among Vermont smokers:

- Age:** 31 percent of Vermonters age 18 to 24 are reported smokers compared to 6 percent of Vermonters age 65 and older.
- Gender:** 19 percent of males compared to 15 percent of females.
- Income:** 25 percent of Vermonters making less than 250% of the Federal Poverty Level are current smokers compared to 11 percent of Vermonters making over 250% of the Federal Poverty Level.
- Education:** 27 percent of Vermonters with less than a high school education are current smokers compared to 7 percent of Vermonters who have completed college or higher.

Vermont has set a goal to increase the number of quit attempts among smokers to 65 percent. In 2008, 62 percent of adult smokers (defined as current smokers and recent quitters) had attempted to quit smoking in the last year (Vermont Adult Tobacco Survey, 2008).

National Efforts

The **Centers for Disease Control and Prevention (CDC)**, through its **Office on Smoking and Health (OSH)**, is the lead federal agency for comprehensive tobacco prevention and control. OSH is a division within the National Center for Chronic Disease Prevention and Health Promotion, which is located within CDC's Coordinating Center for Health Promotion. Originally established in 1965 as the National Clearinghouse for Smoking and Health, OSH is dedicated to reducing the death and disease caused by tobacco use and exposure to secondhand smoke. For more information about the organization, goals, partnerships, programs and contact information visit: <http://www.cdc.gov/tobacco/osh/index.htm>.

Data Sources

Vermont Cancer Registry: The Vermont Cancer Registry is a central bank of information on all cancer cases diagnosed among Vermont residents as well as out of state residents who are diagnosed or treated in Vermont. The registry enables the state to collect information on new cases (incidence) of cancer since January 1, 1994. The information maintained by the registry allows the Health Department to study cancer trends and improve cancer education and prevention efforts. Vermont Department of Health Cancer Registry, 1998-2007. The Vermont Cancer Registry can be contacted at 802-865-7749 (http://healthvermont.gov/research/cancer_registry/registry.aspx).

Vermont Vital Statistics: In Vermont, all deaths are registered using an Electronic Death Registration System which is maintained by the Vermont Department of Health (VDH), Vital Statistics. Death certificates are available from towns with appropriate jurisdiction or the VDH Vital Records Office. Vital Statistics Bulletins are posted at: <http://healthvermont.gov/research/index.aspx#vital>.

Behavioral Risk Factor Surveillance System: Since 1990, Vermont and 49 other states and three territories track risk behaviors using a telephone survey of adults called the Behavioral Risk Factor Survey. Suggested Citation: 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, 2009.

Youth Risk Factor Survey: Since 1993, the Department of Health's Division of Alcohol and Drug Abuse Programs, and the Department of Education's Coordinated School Health Programs have sponsored the Vermont Youth Risk Behavior Survey (YRBS). Administered biennially, the YRBS measures the prevalence of behaviors that contribute to the leading causes of death, disease, and injury among youth. <http://healthvermont.gov/research/yrbs.aspx>.

Vermont Adult Tobacco Survey: Since 2001, the Vermont Adult Tobacco Survey (VTATS) has been a telephone survey used to help evaluate the effectiveness of the Vermont Tobacco Control Program's efforts to reduce smoking and increase awareness and knowledge of smoking related issues among Vermont adults. <http://healthvermont.gov/pubs/documents/2008ATSReportFinal.pdf>.

Surveillance, Epidemiology, and End Results: The National Cancer Institute funds a network of Surveillance, Epidemiology and End Results (SEER) registries. The SEER Program currently collects and publishes cancer incidence and survival data from 14 population-based cancer registries and three supplemental registries covering approximately 26 percent of the U.S. population. These rates are used to estimate the U.S. cancer incidence rates. U.S. incidence is based on the SEER 9 Registries white rates. Suggested Citation: Ries LAG, Eisner MP, Kosary CL, Hankey BF, Miller BA, Clegg L, Mariotto A, Feuer EJ, Edwards BK (eds). SEER Cancer Statistics Review, 1975-2007, National Cancer Institute. Bethesda, MD, 2010 (http://www.seer.cancer.gov/csr/1975_2007).

U.S. Vital Statistics: The U.S. Public Use Database Vital Statistical System maintains the U.S. mortality rates. Rates represented in this report are for the U.S. white population. Suggested Citation: Surveillance, Epidemiology, and End Results (SEER) Program (www.seer.cancer.gov) SEER*Stat Database: Mortality - All COD, Public-Use With State, Total U.S. (1969-2007), National Cancer Institute, DCCPS, Surveillance Research Program, Cancer Statistics Branch, released April 2010. Underlying mortality data provided by NCHS (www.cdc.gov/nchs).

Technical Notes and Definitions

Age Adjustment: All rates in this document are age-adjusted to the 2000 U.S. standard population. This allows the comparison of rates among populations having different age distributions by standardizing the age-specific rates in each population to one standard population.

Incidence: Incidence refers to the number or rate of newly diagnosed cases of cancer. The incidence rate is calculated as the number of new lung cancer cases diagnosed in the state during one year divided by the number of residents in the state during the same year. The incidence data presented in this report were coded using the International Classification of Disease for Oncology (ICD-O) coding system. Lung cancer cases were defined as invasive neoplasms with ICD-O-3 histology code C34.0-C34.9 with the exception of histology 9590-9989 (or equivalent for older data).

Mortality: Mortality refers to the number or rate of deaths from cancer. The mortality data presented here were coded using the International Classification of Diseases (ICD). Cause of death was coded according to ICD-10. Cause of death before 1999 was coded according to ICD-9. Comparability ratios were applied to pre-1999 mortality rates to allow for continuity in trends across the ICD revisions.

Race: U.S. incidence and mortality rates for whites, rather than those for all races, are used for comparison because racial minority groups were estimated to make up 3.9 percent of the total Vermont population, compared with the total U.S. non-white population of 34 percent in 2007. Nationwide, whites have a higher risk compared to people of other races for female breast, melanoma, and bladder cancer incidence. Whites have a lower risk compared to other races for prostate, colorectal, and cervical cancer. The much smaller populations of Vermont residents

of other races may have very different risks of these cancers. Combining data over many years will be required to determine cancer rates.

Federal Poverty Level (FPL): The set minimum amount of income that a family needs for food, clothing, transportation, shelter and other necessities. In the United States, this level is determined by the Department of Health and Human Services. FPL varies according to family size. The number is adjusted for inflation and reported annually in the form of poverty guidelines. Public assistance programs, such as Medicaid in the U.S., define eligibility income limits as some percentage of FPL.

Statistical Significance: A statistically significant difference indicates that there is statistical evidence that there is a difference that is unlikely to have occurred by chance alone.

Small Numbers: Rates are not presented in this report if they are based on fewer than 6 cases.

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