

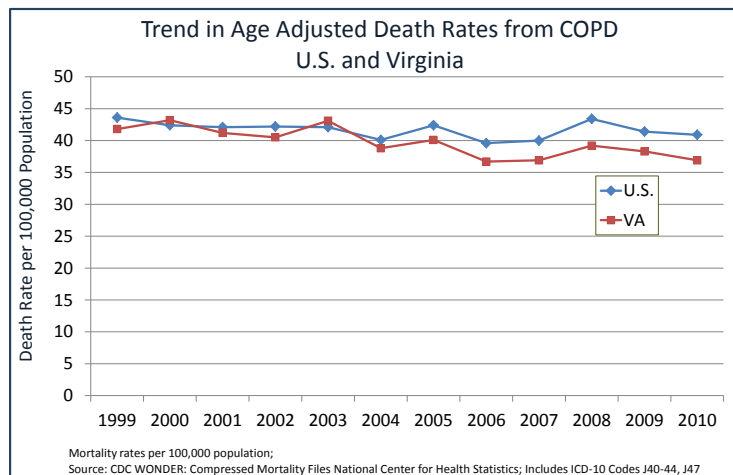
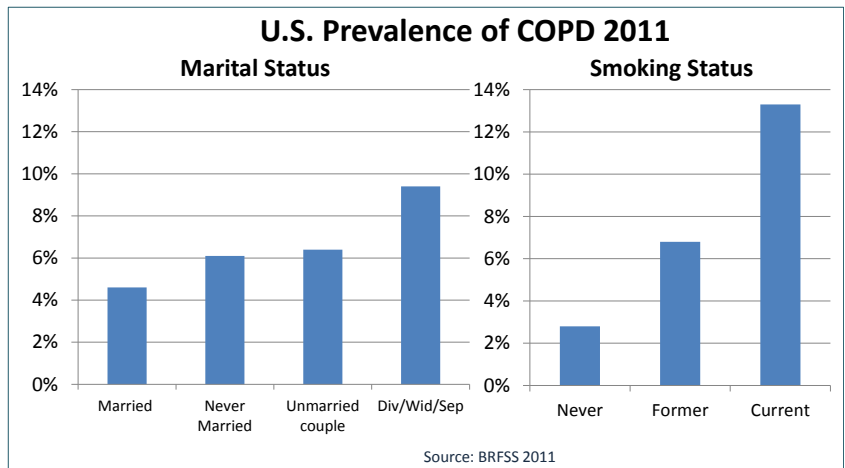
Chronic Obstructive Pulmonary Disease in Virginia

Chronic Obstructive Pulmonary Disease, more commonly known as COPD, is a long term, chronic and progressive disease of the lungs, and is the third leading cause of death and a leading cause of disability in the U.S. and in Virginia. COPD symptoms cannot be reversed and the disease results in reduced ability to carry out activities of daily life, progression to severe lung disease and other disease, particularly heart disease, and shortens lifespan. COPD is almost always caused by smoking and is thus a highly preventable disease.

Key COPD Facts:

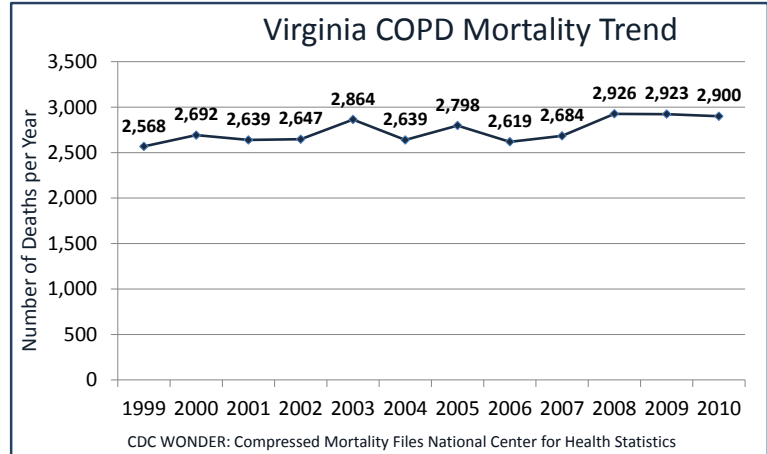
- Prevalence in the U.S. and Virginia:** in 2011, 6.2% of the Virginia population reported that their physician had diagnosed them with COPD, amounting to 379,407 individuals. Across the U.S. and Virginia, COPD is a major cause of disability, affecting millions of people. Many additional people are suffering the effects of COPD who have not been diagnosed with the disease, as it is frequently not recognized in its early stages.
- COPD Growth Rate:** the prevalence of COPD in the U.S. has been stable between 1998 and 2009, and has remained higher for women than men.
- Regional Age-Adjusted Prevalence:** the South Atlantic Census Division, where Virginia is located, has among the higher prevalence rates in the U.S. among adults age 18 and over (5.8%), while the East South Central Division of the U.S. has the highest rates in the U.S. (7.5%); this compares with the Pacific Division (3.9%) which has the lowest prevalence rate in the country.

- Prevalence in the U.S.:** while overall prevalence in the U.S. is 6.3%, many factors relate to a diagnosis of COPD: married individuals have the lowest likelihood, below the national average, while divorced, widowed or separated people have rates higher than the U.S. average; smoking is a key determinant of a COPD diagnosis, with current smokers having rates almost double the national rate and those who never smoked having rates well below the national average. Former smokers show some signs of recovery, with rates equaling the national average.
- U.S. Mortality Trends and Rates:** COPD is the third leading cause of death in the U.S., following heart disease and cancer. While the total U.S. age-adjusted mortality rate per 100,000 declined 11% between 1999 and 2010, the raw number of deaths



increased 12.9% during that same period due to the aging of the population. Mortality rates for men declined during this period but did not change for women, thus narrowing the COPD mortality gap between the genders. In 2007, a total of almost 60,000 men and 65,000 women died of COPD in the U.S. The death rates per 100,000 were 63.5 for men and 46.8 for women.

- **Virginia Mortality Rates and Trends:** age-adjusted mortality declined in Virginia between 1999 and 2010, at a faster rate (11.7%) compared with the U.S. overall (11.0%). The raw number of deaths in Virginia increased slightly, 12.9%, during that same time period, from 2,568 to 2,900, due to the aging of the population (increased population in the age categories most vulnerable to and most likely to suffer from COPD).



- **Years of Potential Life Lost:** in 2011, COPD resulted in 3,077 Years of Potential Life lost in Virginia.
- **U.S. Hospital Utilization Patterns:** there was a decline in inpatient hospitalizations for COPD from 1999 through 2007 for both men and women, who were hospitalized at similar rates during this period.
- **Virginia Hospital Utilization Patterns:** In 2012, there were 18,370 discharges from Virginia hospitals where the primary diagnosis was COPD; the total charges for these cases was \$401,322,454 with an average of \$21,847 per case; Hospitalization patterns differed among the categories of COPD, with emphysema accounting for the highest charges per discharge and chronic bronchitis showing the greatest number of discharges.

2012 Inpatient Hospital Discharges for COPD by Diagnosis Code Group

ICD-9 Category	Discharges	Total Charges	Average Charge per Discharge
Bronchiectasis (494)	234	\$6,824,270	\$29,164
Bronchitis (490)	339	\$5,616,868	\$16,569
Chronic Airway Obstruction (496)	234	\$4,213,226	\$18,005
Chronic Bronchitis (491)	14,053	\$300,250,985	\$21,366
Chronic Obstructive Asthma (493 limited codes)	3,318	\$75,372,809	\$22,716
Emphysema (492)	159	\$8,004,302	\$50,342
Extrinsic Alveolitis (495)	33	\$1,039,993	\$31,515
Total COPD	18,370	\$401,322,454	\$21,847

Source: VHI via Intellimed; ICD-9 Diagnosis codes 490-492, 494-496 and limited codes in 493.

Definitions

Chronic Lower Respiratory Disease: includes both COPD and asthma.

COPD: chronic obstructive pulmonary disease, also known as chronic obstructive airway disease and chronic obstructive lung disease; COPD includes two main diseases, chronic bronchitis and emphysema; COPD is a progressive disease of the lungs which impairs breathing. The main symptoms of COPD are a long lasting

(chronic) cough, mucus production and shortness of breath that worsens with exercise and exertion. COPD is almost always progressive, worsening with time. The underlying cause of COPD is the reduction in elasticity and flexibility of the bronchioles and alveoli of the lung due to their loss of shape and becoming clogged with mucus, caused by inflammation.

Bronchial tubes: airways or the tubes into which air from the windpipe enters the respiratory system.

Bronchioles: tiny smaller tubes which connect the bronchial tubes to the alveoli or air sacs in the lungs; in COPD, the bronchioles lose their shape and become clogged with mucus.

Alveoli: air sacs in the lungs where exchange of oxygen between the air, breathed in by the lungs, and the bloodstream; COPD affects lung function by weakening the alveoli, which then collapse; in addition, excess mucus production negatively affects alveoli by destroying their walls to form larger but fewer alveoli which are less efficient at exchanging oxygen and carbon dioxide with the capillaries.

Capillaries: small blood vessels which run through the walls of the alveoli to absorb oxygen from the air brought in through the bronchial tubes and bronchioles, and to disperse carbon dioxide into the capillaries to remove it from the body as a waste gas.

Emphysema: one of the two main causes of COPD caused by permanent enlargement of the air spaces within the lungs in addition to destruction of the air space walls; in emphysema, the alveoli lose their flexibility, making it difficult to inhale, resulting in shortness of breath and lowered oxygen intake.

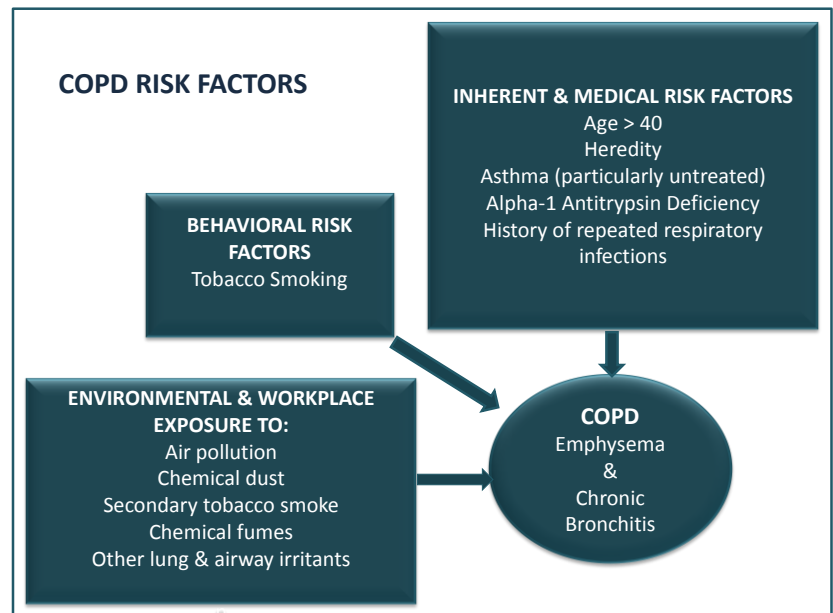
Chronic bronchitis: a chronic, productive cough which persists for three months in each of the two successive years when other causes of a productive chronic cough have been ruled out; in chronic bronchitis, the airways are inflamed and produce mucus, making it difficult to breathe.

COPD Exacerbation: sudden intensification or increase of symptoms, making exertion more difficult; will recur more frequently over time as COPD progresses.

Spirometry: the best test for diagnosing COPD, measures lung function and capacity by evaluating the ability to exhale as much air, as hard and fast as possible; the test involves blowing into a small machine, is not invasive and results are immediate.

Risk Factors

- **Environmental risk factors:** exposure to air pollution, chemical dust and fumes, secondary tobacco smoke and other particulates and gas which are breathed can damage the lungs, resulting in COPD.
- **Behavioral risk factors:** tobacco smoke, whether from cigarettes, cigars or pipe smoking, is the most important cause of COPD.
- **Inherent risk factors:** a number of factors make emphysema and chronic bronchitis, the two main causes of COPD, more likely.



Increasing age is associated with longer exposure to tobacco smoke and other irritants which damage the lungs and cause COPD; in addition, genetic predisposition to lung disease and a history of repeated respiratory system infections (particularly in childhood) and alpha-1 antitrypsin deficiency can predispose individuals to COPD.

Symptoms and Diagnosis of COPD

- **Symptoms:** cough, with or without mucus, fatigue, many respiratory infections, shortness of breath (dyspnea) that worsens with even mild activity, wheezing. Patients may also experience swelling of the legs and feet, weight loss and reduced muscle strength and endurance. Symptoms may appear gradually over time, making it difficult to recognize COPD as a disease rather than aging or other disease.
- **Emergency Symptoms – GO TO AN EMERGENCY ROOM if any of these symptoms occur:** bluish color (face and lips, indicating insufficient oxygen), drowsiness or confusion, extreme difficulty breathing, rapid pulse, severe anxiety due to insufficient air; in addition an attack may be characterized by abnormal, uneven breathing pattern, cessation of breathing, chest pain or tightness in the chest.
- **Diagnosis of COPD:** evaluation of lung function using a stethoscope to hear lung sounds, spirometry to measure lung function and capacity, chest x-ray or CT scan to visualize the lungs and arterial blood gas measurement to determine the amounts of oxygen and carbon dioxide in the blood. These tests are often used in combination since any one test may be negative but COPD may still be present.

Treatment of COPD: there is no cure for COPD, since once the lung tissue is damaged, it cannot recover. However there are many options that allow improvement of health, relief of symptoms and prevention of deterioration of the lungs. These include:

- **Behavioral change:** the key change essential to the treatment of COPD is for the individual to stop smoking; in addition exposure to environmental pollutants (in the workplace or home) must be avoided.
- **Medication:** may include the use of inhalers to open the airways (bronchodilators such as ipratropium, tiotropium or salmeterol), inhaled steroids to reduce lung inflammation and anti-inflammatory medications (montelukast or roflumilast). In addition, patients with COPD should receive flu and pneumonia vaccines each year.
- **Surgery:** lung reduction surgery and lung transplant are appropriate in limited numbers of cases.
- **Severe Cases, Flare-ups, Exacerbations:** treatment may include steroids by mouth or vein (intravenous); bronchodilator through a nebulizer, oxygen therapy and breathing assistance through a mask, BiPAP or endotracheal tube; in addition, antibiotics may be used to avoid or shorten infections.
- **Emergency treatment:** in the case of difficulty breathing or talking, blue or grey lips or fingernails (indicating reduced oxygen intake), reduced mental alertness or rapid heart rate, emergency care should be accessed immediately.

Impact of COPD on Health – Management of COPD: while there is no cure for COPD, proper medical care and self-management can reduce the frequency and seriousness of symptoms, and slow down the progression of the disease. Management includes:

- **Cessation of Tobacco use:** complete cessation of the use of tobacco is essential in order to stop damaging the tissues of the lungs; use of nicotine patches has been found to be an effective method, as well as participation in support groups.
- **Pulmonary rehabilitation:** while COPD cannot be cured, rehabilitation can teach patients to breathe differently to allow continued activity.
- **Strength conditioning:** an exercise program can help patients to build up strength to expand capabilities and fitness.
- **Home environment:** improvements that will improve function include avoidance of very cold air, removal of all sources of smoke from the home (particularly second-hand tobacco smoke), reducing air pollutants from fireplace and other sources.
- **Maintain health:** other aspects of health can be enhanced including improved diet (lean proteins, fruits, vegetables, more calories if needed).
- **Surgical intervention:** in some cases, surgery is needed to remove diseased lung tissue; lung transplant is a treatment of last resort in most severe cases.
- **Stress reduction:** the presence of a progressive, activity-limiting disease such as COPD can be stressful for the patient, family and friends. Support groups are one means of sharing experiences and solutions.
- **Continuing and end of life care:** since COPD is a progressive disease, with significant impact on lifestyle and with a poor prognosis, use of supplemental oxygen or a breathing machine, more frequent hospital admissions and other complications are likely. Consultation with the patient’s physician or other caregivers is likely to be needed.

Complications of COPD

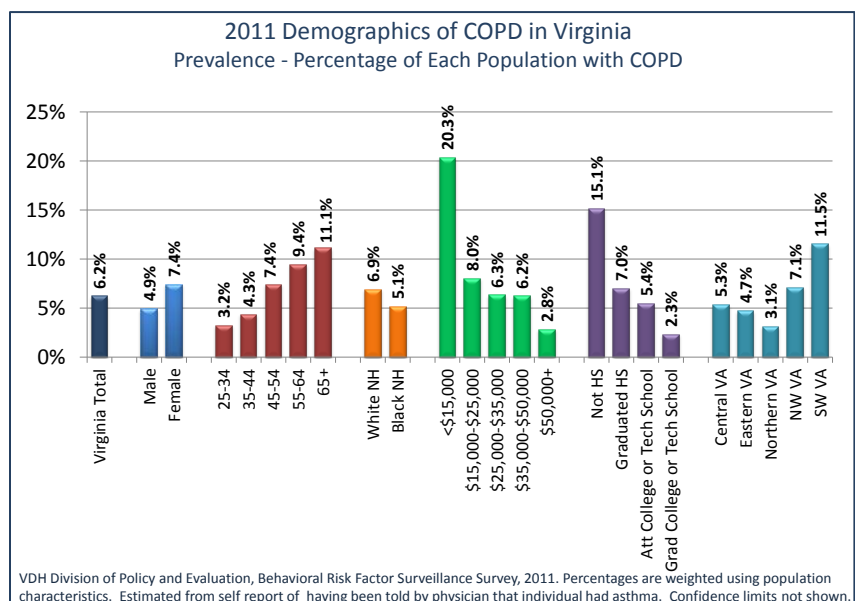
As a disease of the lungs, which are responsible for intake of oxygen which must be distributed throughout the body, COPD increases stress on the entire body, particularly the heart. Complications can develop over time in many organs. In the heart, these may include arrhythmias (irregular heartbeat), cor pulmonale (heart swelling) or right sided heart failure. Lung disease including pneumonia and pneumothorax may develop; and severe weight loss and malnutrition, as well as osteoporosis (thinning of the bones) may also develop.

Socio-Demographics of COPD in Virginia

Gender: women report more frequent diagnosis of COPD compared with men (7.4% versus 4.9%).

Age: COPD prevalence increases with age, with the over 65 population prevalence double the rate of the overall population (6.2%).

Race: Non-Hispanic Whites have higher COPD prevalence compared with Blacks; information on other races is not available.



Income Level: populations with lower income report higher prevalence of COPD, with 15.1% of those who did not graduate from high school having the highest rates, declining as income increases.

Education Level: those who have not graduated from high school have higher prevalence rates than other populations.

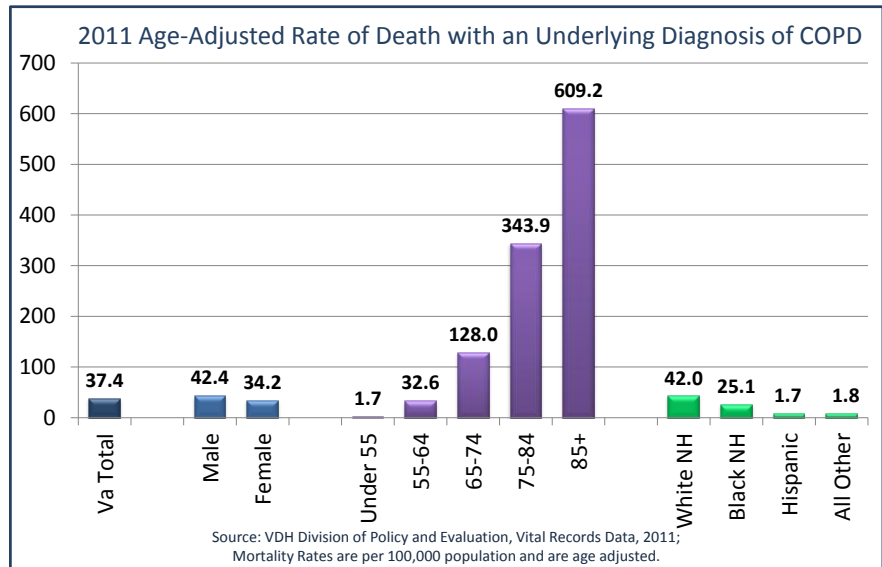
Region: prevalence of COPD in Southwestern Virginia, 11.5%, is double the average for the state as a whole. The lowest rate, 3.1%, is found in Northern Virginia, at half the state rate.

Mortality from COPD in Virginia

Gender: men are more likely to die from COPD, with an age-adjusted rate of 42.2 per 100,000 compared with 34.2 for women.

Age: death rates from COPD increase directly with aging, with almost no COPD in the under 55 population; mortality rates increase exponentially with age, with the 75-84 and 85 and over populations having double and quadruple the rate of the 65-74 age group.

Race: Non-Hispanic Whites have the highest COPD mortality rates, while Hispanic and other populations have rates well below that of the general population.

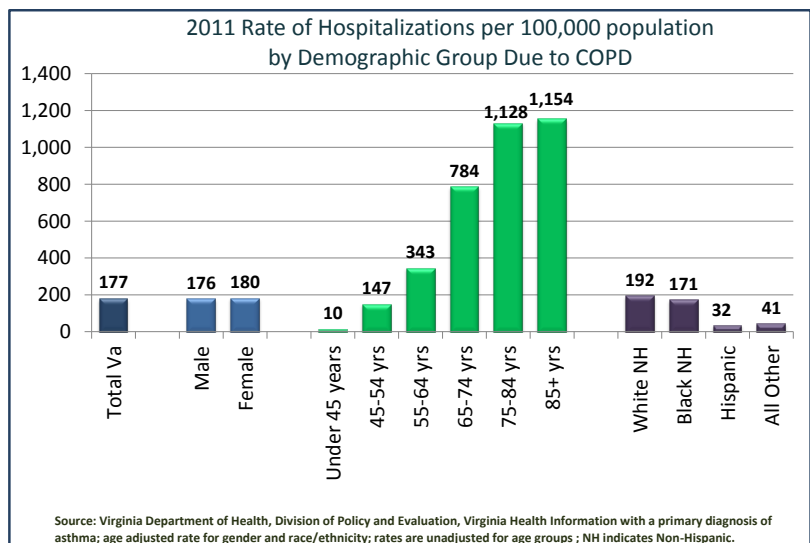


Morbidity – Virginia Hospitalization Rates

Gender: hospitalization rates per 100,000 for COPD are not significantly different for men and women in Virginia.

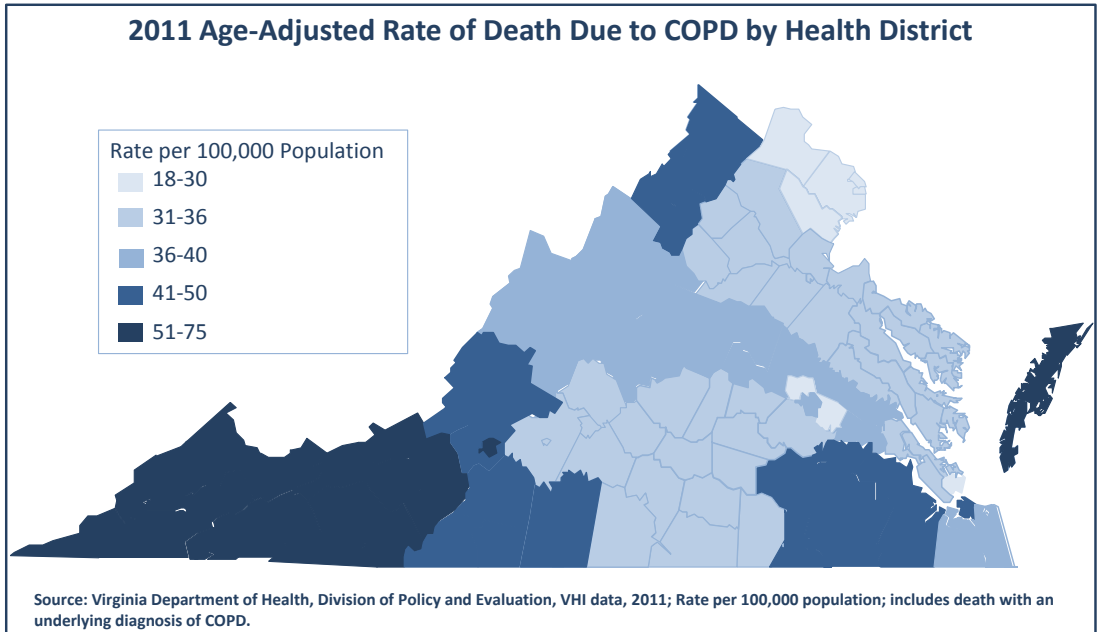
Age: Similar to death rates, hospitalization rates are virtually unknown in the populations under age 45; however, rates increase dramatically with aging, with the 75-84 and 85+ populations having the highest rates.

Race: Hispanic and all other populations have very low hospitalization rates compared with Non-Hispanic Whites, who have the highest rates, and Non-Hispanic Blacks.

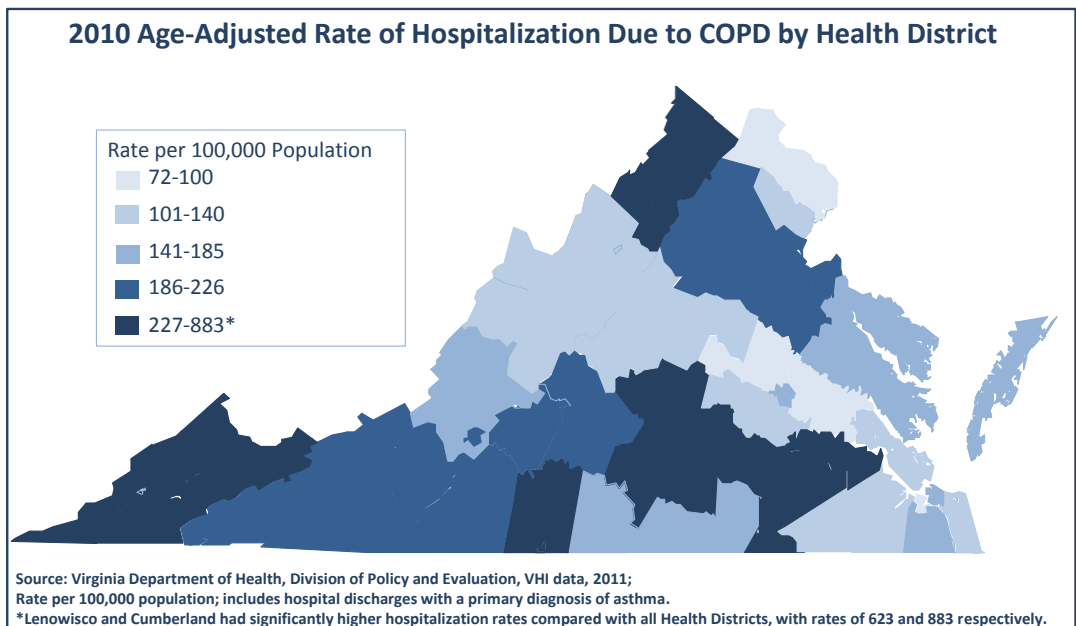


Regionality of COPD in Virginia

Death Rate: Far Southwestern Virginia has the highest mortality rate due to COPD in Virginia, with elevated rates also found on the Eastern Shore and in Northwestern Virginia.



Hospitalization Rate: the age-adjusted hospitalization rate for patients with COPD was extremely high in far Southwestern Virginia, with LENOWISCO and Cumberland Districts having rates up to five fold above the rates seen across the state; other areas with high rates of hospitalizations include the far northwestern counties and central Virginia counties.



References:

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2. CDC WONDER mortality data: www.wonder.cdc.gov.
3. VHI Inpatient Hospital Files via Intellimed, courtesy of VCH Health System.
4. NIH National Lung, Heart and Blood Institute, “What is COPD”, <http://www.nhlbi.nih.gov/health/health-topics/topics/copd/>.