



**Trends in COPD (Chronic Bronchitis and Emphysema):
Morbidity and Mortality**

*Please note, this report is designed
for double-sided printing*

**American Lung Association
Epidemiology and Statistics Unit
Research and Health Education Division
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Introduction

Chronic obstructive pulmonary disease (COPD) is a term which refers to a large group of lung diseases characterized by obstruction of air flow that interferes with normal breathing. Emphysema and chronic bronchitis are the most important conditions that compose COPD and they frequently coexist.

The following tables delineate information available from national surveys and statistics on the mortality, prevalence, hospitalization and economic costs attributable to COPD. Please note that the following tables and narrative refer exclusively to data on COPD; data on asthma are not included.

COPD Mortality

Mortality data is based on records of every death among the population, rather than a sample of cases. This means counts and rates are actual representations instead of estimates.

COPD is the third leading cause of death in the U.S. behind cancer and heart disease. Table 1 documents the number of deaths by ethnic origin and sex between 1999 and 2009. In 2009, 133,965 people died of COPD of which more than half (52.3%) were in women. As seen in Figure 1, this is the tenth consecutive year in which the number of deaths due to COPD was higher among women than men. Nearly 80% of COPD deaths are in non-Hispanic whites; Hispanics had the least number of deaths with 3,714.¹

Table 1: COPD - Number of Deaths by Ethnic Origin and Sex, 1999-2009 ^(1,2)

Year	Total			Hispanic			Non-Hispanic								
	Both Sexes		Female	Both Sexes		Female	White			Black			Other		
	Male	Female		Male	Female		Both Sexes	Male	Female	Both Sexes	Male	Female	Both Sexes	Male	Female
1999	119,524	60,795	58,729	2,539	1,428	1,111	108,609	54,384	54,225	6,706	3,978	2,728	1,329	812	517
2000	117,522	58,372	59,510	2,397	1,322	1,075	107,065	52,311	54,754	6,383	3,712	2,671	1,351	840	511
2001	118,744	58,218	60,526	2,558	1,379	1,179	108,036	52,118	55,918	6,412	3,693	2,719	1,415	852	563
2002	120,555	59,133	61,422	2,771	1,511	1,260	109,408	52,767	56,641	6,647	3,794	3,853	1,419	887	532
2003	122,283	59,321	63,062	2,875	1,566	1,309	110,952	52,762	58,190	6,613	3,763	2,850	1,545	967	578
2004	118,171	57,260	60,911	2,826	1,520	1,306	107,293	51,166	56,127	6,330	3,558	2,772	1,503	888	615
2005	127,049	61,120	65,929	3,209	1,733	1,476	114,862	54,272	60,590	7,134	4,003	3,131	1,631	982	649
2006	120,970	57,964	63,006	3,053	1,614	1,439	109,313	51,555	57,758	6,714	3,677	3,037	1,665	992	673
2007	124,477	59,961	64,516	3,292	1,785	1,507	112,329	53,303	59,026	6,937	3,765	3,172	1,744	1,002	742
2008	137,693	65,936	71,757	3,678	1,903	1,775	124,076	58,643	65,433	7,787	4,127	3,660	1,917	1,122	795
2009	133,965	63,899	70,066	3,724	1,895	1,829	120,593	56,737	63,856	7,539	4,060	3,479	1,887	1,069	818

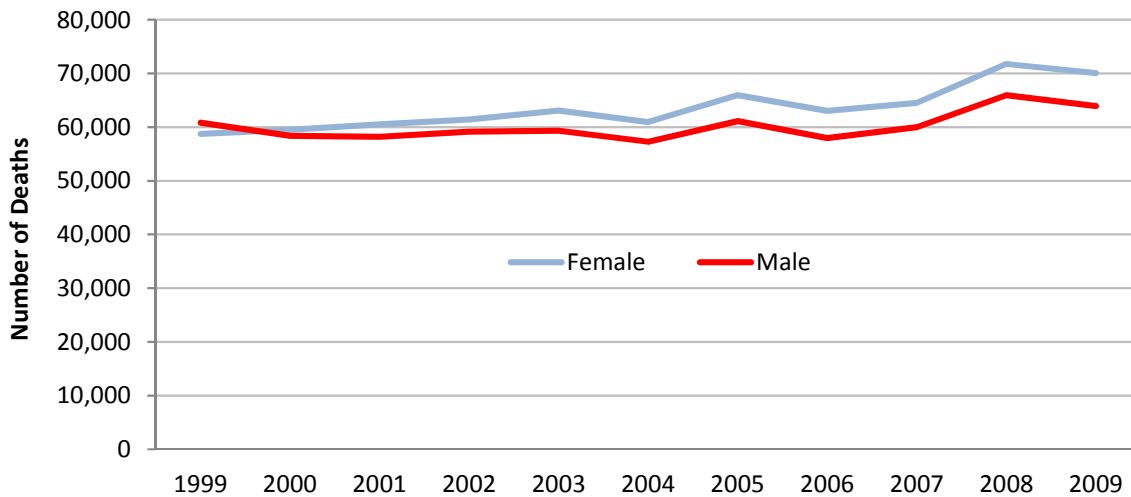
Sources: Centers for Disease Control and Prevention. National Center for Health Statistics. CDC Wonder On-line Database, compiled from Compressed Mortality File 1999-2009 Series 20 No. 20, 2012.

Notes:

(1) This table refers exclusively to data on chronic bronchitis, emphysema and other lower chronic obstructive pulmonary diseases including bronchiectasis. Data on asthma are not included.

(2) Deaths from 1999-2009 are coded by the 10th revision of International Classification of Diseases, codes J40-J44, J47.

Figure 1: COPD – Number of Deaths by Sex, 1999-2009



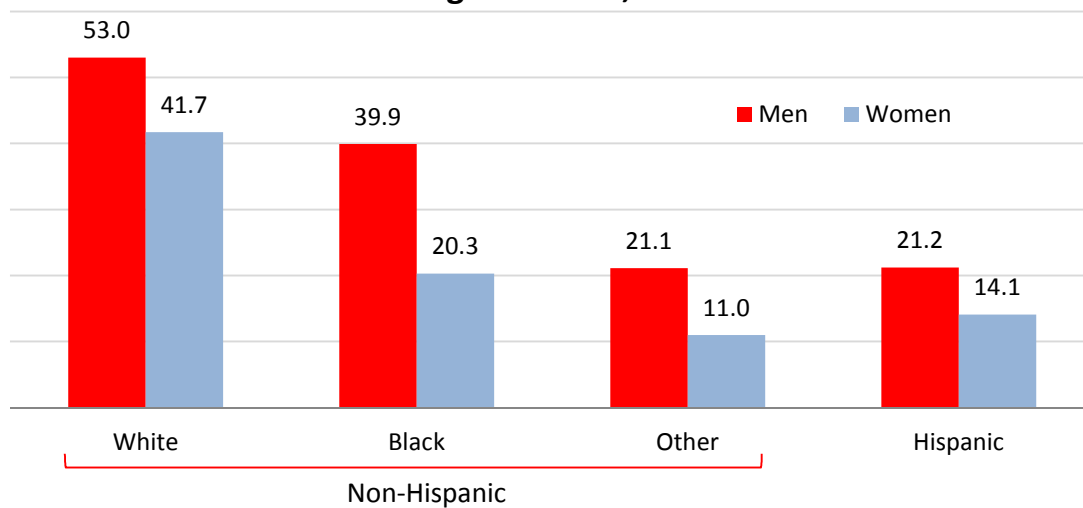
Source: CDC Wonder On-line Database, 1999-2009 data.

Table 2 and Figure 2 displays the age-adjusted death rate per 100,000 population by ethnic origin and sex. Numbers of death or disease (counts) are usually important for healthcare planning or defining the magnitude of disease; however, they do not provide the information necessary to compare disease and health status between groups (such as males versus females). In order to make such comparisons, statisticians develop rates. A rate is a fraction, in which the numerator is the number of people in whom an event occurred during a certain period of time (death), and the denominator is the total number of people in the population at risk for the same period of time. A common type of rate used to express mortality are age-adjusted rates; these rates specifically remove the distorting effect of age on death when comparing populations of different age structures.

COPD has an age-adjusted death rate of 41.2 per 100,000 population; meaning that 41 persons out of 100,000 people died from COPD in 2009. The age-adjusted death rate in non-Hispanic whites (46.0 per 100,000) was 1.7, 2.6 and 3.1 times greater than the rate in non-Hispanic blacks, Hispanics and non-Hispanic others, respectively. Overall, non-Hispanic white males had the highest age-adjusted death rates (53 per 100,000) while non-Hispanic other women had the lowest age-adjusted death rates (11.0 per 100,000 population).²

In 2009, the age-adjusted death rate in men was 1.3 times greater than the rate seen in women despite the fact that there were more deaths due to COPD among women in 2009. This is due to the fact, that unlike counts, rates are scaled to the size of the population and there are more women in the general U.S. population than males. Figure 3 shows this relationship.³

Figure 2: COPD – Age-Adjusted Death Rates by Ethnic Origin and Sex, 2009



Source: CDC Wonder On-line Database, 1999-2009 data.

Table 2: COPD - Age-Adjusted Death Rate per 100,000 Population by Ethnic Origin and Sex, 1999-2009 ^(1,2,3)

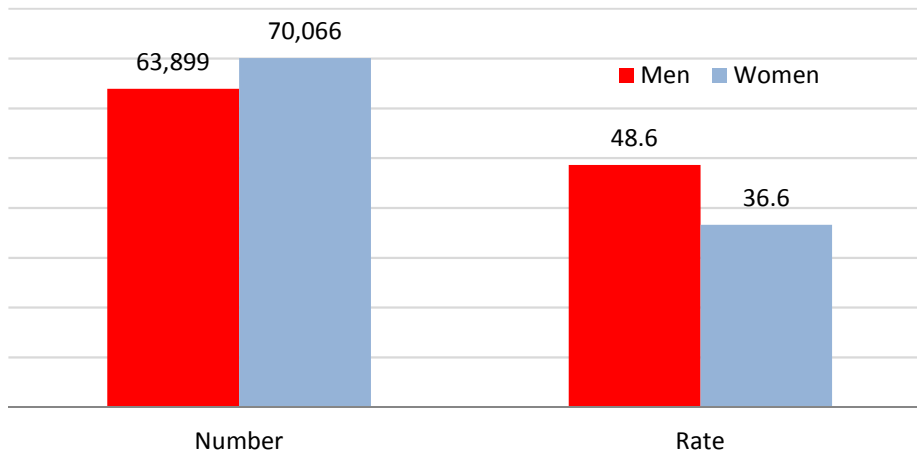
Year	Total			Hispanic			Non-Hispanic								
	Both Sexes	Male	Female	Both Sexes	Male	Female	White			Black			Other		
							Both Sexes	Male	Female	Both Sexes	Male	Female	Both Sexes	Male	Female
1999	44.0	56.8	36.2	18.2	26.1	13.3	47.5	60.3	39.8	30.4	47.7	20.2	19.8	29.1	13.2
2000	42.7	53.6	36.1	16.2	22.3	12.2	46.4	57.1	40.0	28.4	43.5	19.5	19.2	29.0	12.4
2001	42.2	52.8	35.9	19.3	26.6	14.8	45.8	56	39.7	27.7	43.7	18.7	18.3	26.9	12.4
2002	42.0	52.3	35.7	19.3	26.2	14.7	45.7	55.6	39.8	28	43.4	19.4	16.9	25.8	10.7
2003	41.9	51.2	36.2	18.9	26.0	14.4	45.9	54.5	40.5	27.3	42.1	18.9	17.2	26.5	10.9
2004	39.9	48.4	34.5	17.3	22.9	13.5	43.8	52.0	38.8	25.5	38.5	18.1	15.8	23.1	10.9
2005	42.0	50.3	36.6	18.3	24.2	14.3	46.2	54.0	41.2	28.0	42.0	19.8	16.0	23.7	10.8
2006	39.3	46.7	34.6	16.4	21.2	13.1	43.5	50.5	39.1	25.8	37.7	18.9	15.3	22.5	10.5
2007	39.7	47.2	34.8	16.7	22.0	13.0	44.1	51.2	39.4	26.1	37.9	19.2	15.1	21.2	10.9
2008	42.9	50.6	37.9	17.3	21.8	14.2	47.8	55.2	43.0	28.5	40.1	21.6	15.6	22.3	11.0
2009	41.2	48.6	36.6	17.0	21.2	14.1	46.0	53.0	41.7	27.2	39.9	20.3	15.0	21.1	11.0

Sources: Centers for Disease Control and Prevention. National Center for Health Statistics. CDC Wonder On-line Database, compiled from Compressed Mortality File 1999-2009 Series 20 No. 20, 2012.

Notes:

- (1) This table refers exclusively to data on chronic bronchitis, emphysema and other lower chronic obstructive pulmonary diseases including bronchiectasis. Data on asthma are not included.
- (2) Rates for 1999-2009 are age-adjusted to the 2000 U.S. standard population.
- (3) Deaths from 1999-2009 are coded by the 10th revision of International Classification of Diseases, codes J40-J44, J47.

Figure 3: COPD – Deaths and Age-Adjusted Death Rate by Sex, 2009



Source: CDC Wonder On-line Database, 1999-2009 data.

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COPD Prevalence

Prevalence corresponds to the total number (or count) of existing cases of disease in a population or how widespread a disease is in a population. Unfortunately, it is impossible to collect information on COPD prevalence on the entire population and so we must rely on sampling a portion of the entire population to extrapolate disease “estimates”. Prevalence rates represent the proportion of people in a specified population who have a particular disease at a specified point in time.

There are two national surveys that collect data on COPD prevalence – the National Health Interview Survey (NHIS) and the Behavioral Risk Factor Surveillance System (BRFSS).

National Health Interview Survey

The National Health Interview Survey is a multi-purpose health survey conducted by the National Center for Health Statistics (NCHS), Centers for Disease Control and Prevention (CDC). It is the principal source of information on the health of the civilian, non-institutionalized, household population of the United States.

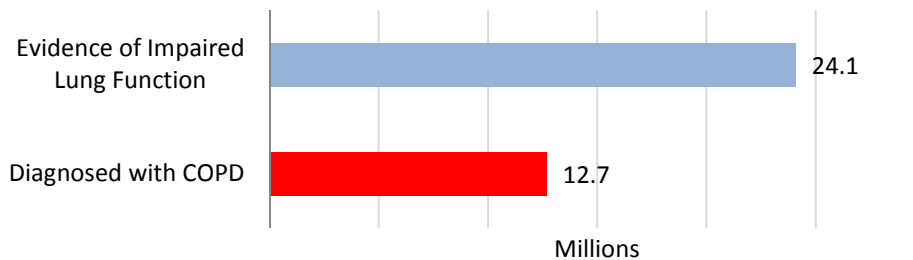
Survey respondents are asked two separate questions:

- Have you been diagnosed with chronic bronchitis in the **past 12 months?** (point prevalence)
- Have you **ever** been diagnosed with emphysema? (period prevalence)

Unfortunately, combining data from these two questions directly for an overall estimate of COPD prevalence would result in an overestimation of disease as many individuals report diagnoses of both diseases.

After accounting for “dual diagnoses”, it is estimated that 12.7 million U.S. adults have been diagnosed with COPD. Unfortunately, research has indicated that COPD is underdiagnosed and that up to 24 million Americans have evidence of impaired lung function (Figure 4).⁴

Figure 4: COPD – Diagnosed Cases and Evidence of Impaired Lung Function



Sources: CDC. COPD Surveillance — US, 1971-2000. MMWR. 2002; 51(SS-6).
CDC. NHIS, 2011.

Chronic Bronchitis

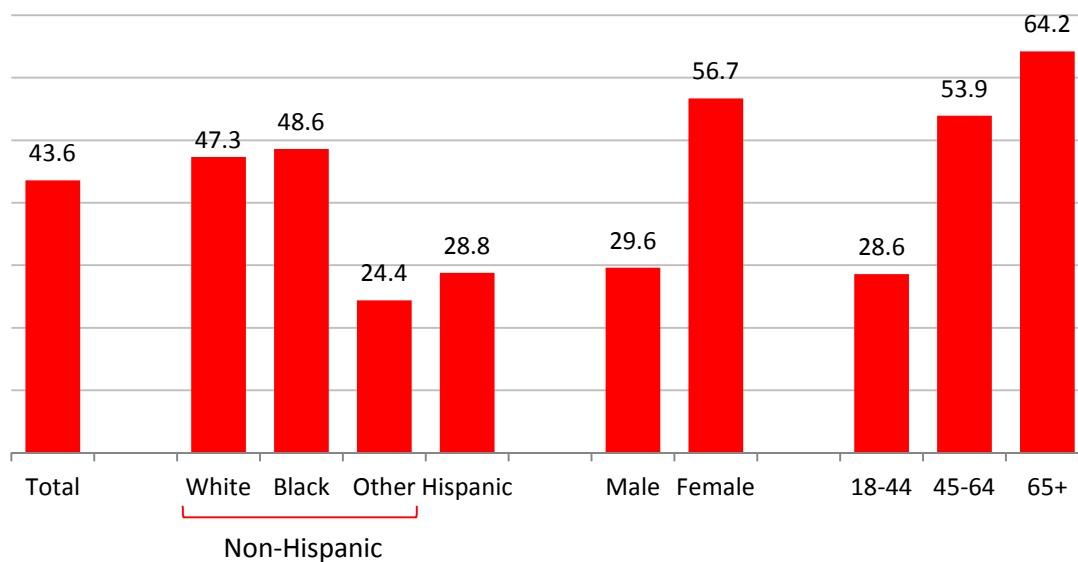
Chronic bronchitis is a chronic inflammation of the bronchi (medium-size airways) in the lungs. It is defined clinically as a persistent cough that produces sputum (phlegm) and mucus, for at least three months per year in two consecutive years.

Table 3 displays prevalence estimates and rates for chronic bronchitis by ethnic origin and sex from 1999 to 2011. In 2011, 7.5 million non-Hispanic whites (47.3 per 1,000), 1.3 million non-Hispanic blacks (48.6 per 1,000 persons), and 943,000 Hispanics (28.8 per 1,000 persons) were diagnosed with chronic bronchitis. Chronic bronchitis prevalence tends to be greater among non-Hispanic whites than non-Hispanic blacks, although this was not the case in 2011. It is much less common among Hispanics and non-Hispanic others.⁵

Women are almost twice as likely to be diagnosed with chronic bronchitis as men. In 2011, 3.3 million men (29.6 per 1,000 persons) were diagnosed with chronic bronchitis compared to 6.8 million women (56.7 per 1,000 persons).⁶

Figure 5 displays prevalence estimates for chronic bronchitis by age. Over ten million Americans reported a physician diagnosis of chronic bronchitis in 2011 with almost 70% of cases occurring in those over 45. Prevalence rates increased with age, such that they were lowest among those 18-44 (28.6 per 1,000 persons) and highest among those 65 years and older (64.2 per 1,000 persons).⁷

Figure 5: Chronic Bronchitis – Prevalence Rates per 1,000, 2011



Source: CDC, NHIS 2011.

Table 3: Chronic Bronchitis - Number of Conditions and Prevalence Rate per 1,000 Population by Ethnic Origin, Sex and Age, 1999-2011 ^(1,2)

	Total ⁽²⁾		Non-Hispanic						Hispanic	
			White		Black		Other			
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate
1999	8,847,646	44.3	7,272,319	48.8	805,128	35.8	238,877	31.2	531,322	25.9
2000	9,354,982	46.4	7,680,117	51.4	922,045	40.4	186,426	22.4	566,394	26.7
2001	11,198,602	54.9	9,066,921	60.5	1,193,632	51.6	258,092	29.0	679,957	31.0
2002	9,113,581	44.3	7,177,946	47.7	1,081,002	46.1	225,054	24.7	629,579	27.7
2003	8,560,342	40.2	6,847,649	44.5	924,572	38.6	184,526	20.6	603,595	23.0
2004	9,047,481	42.0	7,302,106	47.3	899,836	37.1	184,526	18.1	603,595	25.0
2005	8,912,375	40.9	6,953,547	44.8	1,074,702	43.6	218,340	21.9	665,786	24.0
2006	9,463,082	43.0	7,315,058	47.4	1,145,153	44.6	358,802	30.6	644,069	22.5
2007	7,604,098	34.1	6,008,449	38.8	843,346	32.3	249,254	20.1	503,049	16.8
2008	9,832,089	43.7	7,905,680	50.8	1,023,702	38.6	272,056	21.9	630,651	20.6
2009	9,901,580	43.6	7,723,276	49.4	1,073,307	39.8	291,369	23.1	819,628	26.2
2010	9,883,229	43.1	7,635,860	48.5	1,127,051	41.1	242,232	19.2	878,086	27.4
2011	10,070,851	43.6	7,471,900	47.3	1,332,164	48.6	324,065	24.4	942,722	28.8

	Male		Female		18-44		45-64		65+	
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate
1999	2,661,435	27.8	6,186,211	59.4	3,978,344	36.7	2,962,010	50.5	1,907,292	58.7
2000	3,013,616	31.2	6,341,366	60.4	3,876,505	35.7	3,353,176	55.4	2,125,301	65.0
2001	3,718,647	38.0	7,479,955	70.5	4,913,277	45.3	4,073,615	65.1	2,211,710	67.3
2002	2,891,596	29.3	6,221,985	58.1	3,761,235	34.8	3,563,498	55.1	1,788,848	54.1
2003	2,740,594	26.8	5,819,748	52.6	3,253,728	29.4	3,310,933	48.5	1,995,681	58.3
2004	2,756,777	26.6	6,290,704	56.3	3,483,038	31.5	3,412,969	48.6	2,151,474	62.2
2005	2,886,344	27.5	6,026,031	53.4	3,504,174	31.7	3,543,899	49.0	1,864,302	53.2
2006	2,912,124	27.4	6,550,958	57.5	3,182,026	28.8	4,107,558	55.4	2,173,498	60.9
2007	2,558,623	23.7	5,045,475	43.7	2,515,141	22.7	3,225,607	42.4	1,863,350	51.5
2008	3,120,941	28.7	6,711,148	57.6	3,486,419	31.5	4,251,214	54.9	2,094,456	56.3
2009	3,189,161	29.0	6,718,419	57.2	3,092,989	28.0	4,411,101	55.7	2,403,490	63.5
2010	3,399,111	30.6	6,484,118	54.7	3,265,484	29.5	4,246,593	52.9	2,371,152	61.3
2011	3,316,488	29.6	6,754,363	56.7	3,170,362	28.6	4,355,878	53.9	2,544,611	64.2

Source: Centers for Disease Control and Prevention. National Center for Health Statistics. National Health Interview Survey, 1999-2011. Analysis by the American Lung Association Research and Program Services Division using SPSS software.

Notes:

(1) Chronic Bronchitis prevalence was defined as answering "yes" to "Have you been told by a doctor or other health professional that you had chronic bronchitis in the past 12 months?"

(2) Due to rounding, numbers across may not sum up to totals.

Emphysema

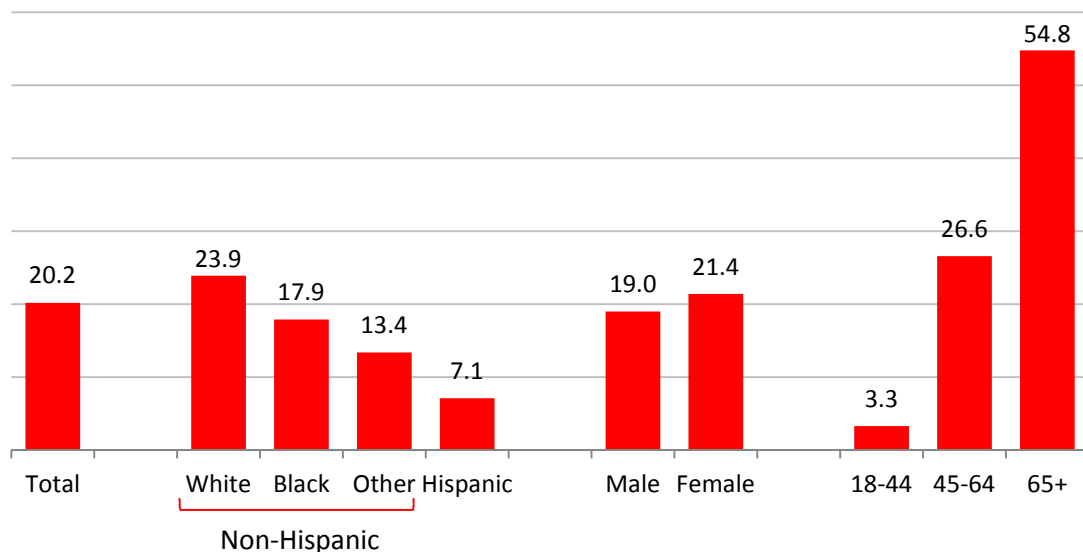
Emphysema is a long-term, progressive obstructive lung disease in which the alveoli (small sacs) that promote oxygen exchange between the air and the bloodstream are destroyed. This causes increased shortness of breath and a loss of elasticity in the alveolar walls that have not been destroyed.

Table 4 displays prevalence estimates and rates for emphysema by age and ethnic origin. In 2011, 4.7 million Americans reported ever being diagnosed with emphysema, a lifetime prevalence rate of 20.2 per 1,000 persons.⁸ Over 90% of emphysema cases were in individuals over the age of 45 years.

Historically, emphysema has been about twice as common among non-Hispanic whites as non-Hispanic blacks; however, 2011 saw a significant increase in emphysema prevalence for the latter that closed the racial gap. In 2011, an estimated 3.8 million non-Hispanic whites had ever been diagnosed with emphysema (23.9 per 1,000 persons), compared to an estimated 489,000 non-Hispanic blacks (17.9 per 1,000 persons); this was the highest rate yet recorded for non-Hispanic blacks by far and may represent an unreliable outlier in the data. Future years of similar rates are needed to confirm the recent trend. The prevalence rate seen in Hispanics and non-Hispanic others is usually somewhat lower than the rate in non-Hispanic blacks and much lower than that in non-Hispanic whites.⁹ Approximately 232,000 Hispanics (7.1 per 1,000 persons) and 178,285 (13.4 per 1,000 persons) have been diagnosed with emphysema in their lifetime.

Figure 6 displays prevalence estimates for emphysema by gender. Women have historically had lower prevalence rates of emphysema than men, however, this trend may be changing much like that seen for deaths. Over the past five years, the prevalence rate among women has increased by more than 63% compared to a decrease of 6% in men. In fact, women actually surpassed men in 2011: 21.4 per 1,000 women had emphysema (2.5 million), compared to 19.0 per 1,000 men (2.1 million).¹⁰

Figure 6: Emphysema – Prevalence Rates per 1,000, 2011



Source: CDC. NHIS 2011.

Table 4: Emphysema - Number of Conditions and Prevalence Rate per 1,000 Population by Ethnic Origin, Sex and Age, 1999-2011 ^(1,2)

	Total ⁽²⁾		Non-Hispanic						Hispanic	
	Number	Rate	White		Black		Other		Number	Rate
			Number	Rate	Number	Rate	Number	Rate		
1999	2,798,963	14.0	2,539,202	17.0	117,378	5.2	52,932	6.9	89,451	4.4
2000	3,124,699	15.5	2,792,954	18.7	208,025	9.1	32,847	4.0	90,873	4.3
2001	2,983,598	14.6	2,632,331	17.6	164,628	7.1	55,941	6.3	130,698	6.0
2002	3,131,410	15.2	2,809,643	18.7	197,404	8.4	45,193	5.0	79,170	3.5
2003	3,114,666	14.6	2,798,537	18.2	193,157	8.1	43,126	4.8	79,846	3.0
2004	3,575,684	16.6	3,086,086	20.0	238,734	9.8	95,553	9.8	155,311	5.8
2005	3,791,006	17.4	3,412,355	22.0	192,838	7.8	54,026	5.4	131,787	4.7
2006	4,068,667	18.5	3,619,091	23.5	190,398	7.4	147,078	12.5	112,100	3.9
2007	3,736,000	16.7	3,131,359	20.2	217,083	8.3	125,740	10.1	261,818	8.8
2008	3,789,224	16.8	3,286,507	21.1	214,072	8.1	97,161	7.8	191,484	6.3
2009	4,895,246	21.5	4,232,303	27.0	357,281	13.3	106,044	8.4	199,618	6.4
2010	4,313,991	19.8	3,644,268	23.2	290,143	10.6	148,228	11.7	231,352	7.2
2011	4,680,381	20.2	3,780,946	23.9	489,434	17.9	178,285	13.4	231,716	7.1

	Male		Female		18-44		45-64		65+	
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate
1999	1,637,536	17.1	1,161,367	11.2	224,033	2.1 *	936,939	16.0	1,637,991	50.4
2000	1,690,500	17.5	1,434,199	13.7	256,030	2.4 *	1,141,600	18.9	1,727,069	52.8
2001	1,678,868	17.2	1,304,730	12.3	200,259	1.8 *	1,099,638	17.6	1,683,701	51.2
2002	1,821,630	18.4	1,309,780	12.2	287,302	2.7 *	1,271,992	19.7	1,572,116	47.6
2003	1,701,065	16.6	1,413,601	12.8	154,649	1.4 *	1,261,139	18.5	1,698,878	49.6
2004	1,871,241	18.1	1,704,443	15.3	309,071	2.8 *	1,393,431	19.9	1,873,182	54.2
2005	2,060,742	19.6	1,730,264	15.3	340,694	3.1	1,429,606	19.8	2,020,706	57.7
2006	2,481,386	23.4	1,587,281	13.9	290,075	2.6	1,764,620	23.8	2,013,972	56.5
2007	2,017,689	18.7	1,718,311	14.9	226,384	2.0	1,765,325	23.2	1,744,291	48.2
2008	1,769,048	16.3	2,020,176	17.3	222,120	2.0	1,572,766	20.3	1,994,338	53.6
2009	2,578,428	23.5	2,316,818	19.7	369,226	3.3	2,064,627	26.1	2,461,393	65.0
2010	2,247,665	20.3	2,066,326	17.4	360,739	3.3	1,703,187	21.2	2,250,065	58.2
2011	2,128,540	19.0	2,551,841	21.4	365,033	3.3	2,146,121	26.6	2,169,227	54.8

Source: Centers for Disease Control and Prevention. National Center for Health Statistics. National Health Interview Survey, 1999-2011. Analysis by the American Lung Association Research and Program Services Division using SPSS software.

Notes:

(1) Emphysema prevalence was defined as answering yes to "Have you EVER been told by a doctor or other health professional that you had emphysema?"

(2) Due to rounding, numbers across may not sum up to totals. considered unreliable.

Behavioral Risk Factor Surveillance System (BRFSS)

The Behavioral Risk Factor Surveillance System (BRFSS) provides COPD prevalence data by state. Like the NHIS, it is a telephone survey of the noninstitutionalized U.S. population aged 18 and over that collects information about modifiable risk factors for chronic diseases and other leading causes of death but at the state level. Data from 2011 marks the first year that questions on COPD prevalence estimates by state are available.

In contrast to the two separate questions about chronic bronchitis and emphysema asked on the NHIS, the BRFSS uses one question to assess COPD prevalence:

- Have you ever been diagnosed with chronic obstructive pulmonary disease, emphysema or chronic bronchitis?

Table 5 shows state-specific COPD prevalence estimates and age adjusted rates overall and by sex. According to the 2011 BRFSS, an estimated 14.7 million adults (6.2%) had been diagnosed with COPD, compared to 12.7 million (5.5%) from the 2011 NHIS.¹¹ This higher estimate was expected based on the different question format including multiple potential diagnosis names (COPD as an acronym and spelled out as well as chronic bronchitis and emphysema) and the universal use of lifetime diagnosis, instead of past year for chronic bronchitis.

Kentucky had the highest age-adjusted rate at 9.7%, followed by Alabama at 9.4%, while Minnesota (4.0%) and Washington (4.1%) were among the lowest. Kentucky was also highest for men (8.4%), while Washington (3.3%) and Washington D.C. (3.5%) were lowest. Among women, Tennessee had the highest age-adjusted rate (11.5%) and Minnesota the lowest (4.3%). The total age-adjusted rates are translated into a heat map by state in **Figure 8**, which shows that rates tend to be higher in the Midwest and Southeast.¹²

Table 5: COPD - Adult Prevalence by Sex and State, 2011 ⁽¹⁾

State	Total		Male		Female	
	Count	Adjusted Percent ⁽²⁾	Count	Adjusted Percent ⁽²⁾	Count	Adjusted Percent ⁽²⁾
Alabama	350,734	9.4	143,667	7.9	207,067	10.8
Alaska	27,461	6.0	16,669	6.9	10,792	5.0
Arizona	255,742	5.3	105,635	4.4	150,107	6.2
Arkansas	175,705	7.5	74,644	6.5	101,061	8.5
California	1,149,520	4.5	475,017	3.8	674,503	5.2
Colorado	174,745	4.7	73,435	3.9	101,310	5.5
Connecticut	166,186	5.8	66,561	4.7	99,625	6.9
Delaware	36,251	4.9	13,791	4.1	22,460	5.8
District of Columbia	22,310	4.8	7,615	3.5	14,695	5.9
Florida	1,165,234	7.4	482,987	6.2	682,247	8.5
Georgia	501,244	7.1	197,392	5.7	303,852	8.4
Hawaii	46,130	4.2	21,129	3.9	25,001	4.5
Idaho	59,558	5.2	26,456	4.5	33,102	5.8
Illinois	584,726	6.0	234,173	4.9	350,553	7.1
Indiana	401,992	8.1	150,006	6.1	251,986	10.1
Iowa	117,540	4.8	51,612	4.2	65,928	5.4
Kansas	140,830	6.4	61,314	5.7	79,516	7.2
Kentucky	325,893	9.7	138,501	8.4	187,392	10.9
Louisiana	232,381	6.7	98,023	5.9	134,358	7.5
Maine	82,242	7.1	34,117	5.8	48,125	8.2
Maryland	261,345	5.9	101,837	4.8	159,508	7.0
Massachusetts	293,661	5.6	116,931	4.6	176,730	6.5
Michigan	601,164	7.6	248,039	6.4	353,125	8.8
Minnesota	164,653	4.0	76,591	3.8	88,062	4.3
Mississippi	181,617	8.2	79,749	7.6	101,868	8.8
Missouri	370,248	7.8	150,058	6.4	220,190	9.2
Montana	45,869	5.6	20,146	4.9	25,723	6.3
Nebraska	67,327	4.8	29,187	4.1	38,140	5.5
Nevada	146,258	7.1	59,955	5.6	86,303	8.8
New Hampshire	65,534	6.1	27,388	5.2	38,146	7.0
New Jersey	344,662	5.0	137,182	4.1	207,480	5.8
New Mexico	94,780	6.0	37,563	4.7	57,217	7.3
New York	884,188	5.7	371,447	5.0	512,741	6.4
North Carolina	497,638	6.7	199,722	5.5	297,916	7.8
North Dakota	24,087	4.6	12,282	4.6	11,805	4.6
Ohio	675,036	7.3	280,955	6.3	394,081	8.3
Oklahoma	241,004	8.2	105,762	7.3	135,242	9.1
Oregon	175,246	5.5	71,818	4.5	103,428	6.6
Pennsylvania	654,746	6.3	262,471	5.1	392,275	7.5
Rhode Island	51,795	6.1	21,797	5.3	29,998	6.8
South Carolina	267,785	7.3	93,117	5.1	174,668	9.3
South Dakota	33,413	5.0	16,287	4.9	17,126	5.2
Tennessee	446,210	8.9	154,769	6.2	291,441	11.5
Texas	1,000,072	5.7	445,284	5.0	554,788	6.4
Utah	77,706	4.3	35,510	3.9	42,196	4.8
Vermont	24,858	4.6	11,818	4.4	13,040	4.7
Virginia	379,407	6.0	146,349	4.7	233,058	7.1
Washington	211,679	4.1	87,962	3.3	123,717	4.8
West Virginia	128,952	8.3	54,616	6.9	74,336	9.6
Wisconsin	234,788	5.2	106,635	4.6	128,153	5.8
Wyoming	25,900	5.9	12,177	5.4	13,723	6.4
United States	14,688,052	6.2	6,048,148	5.2	8,639,904	7.2

Source: Centers for Disease Control and Prevention. National Center for Health Statistics. Behavioral Risk Factor Surveillance System, 2011. Analysis by the American Lung Association Research and Health Education Division using SPSS software.

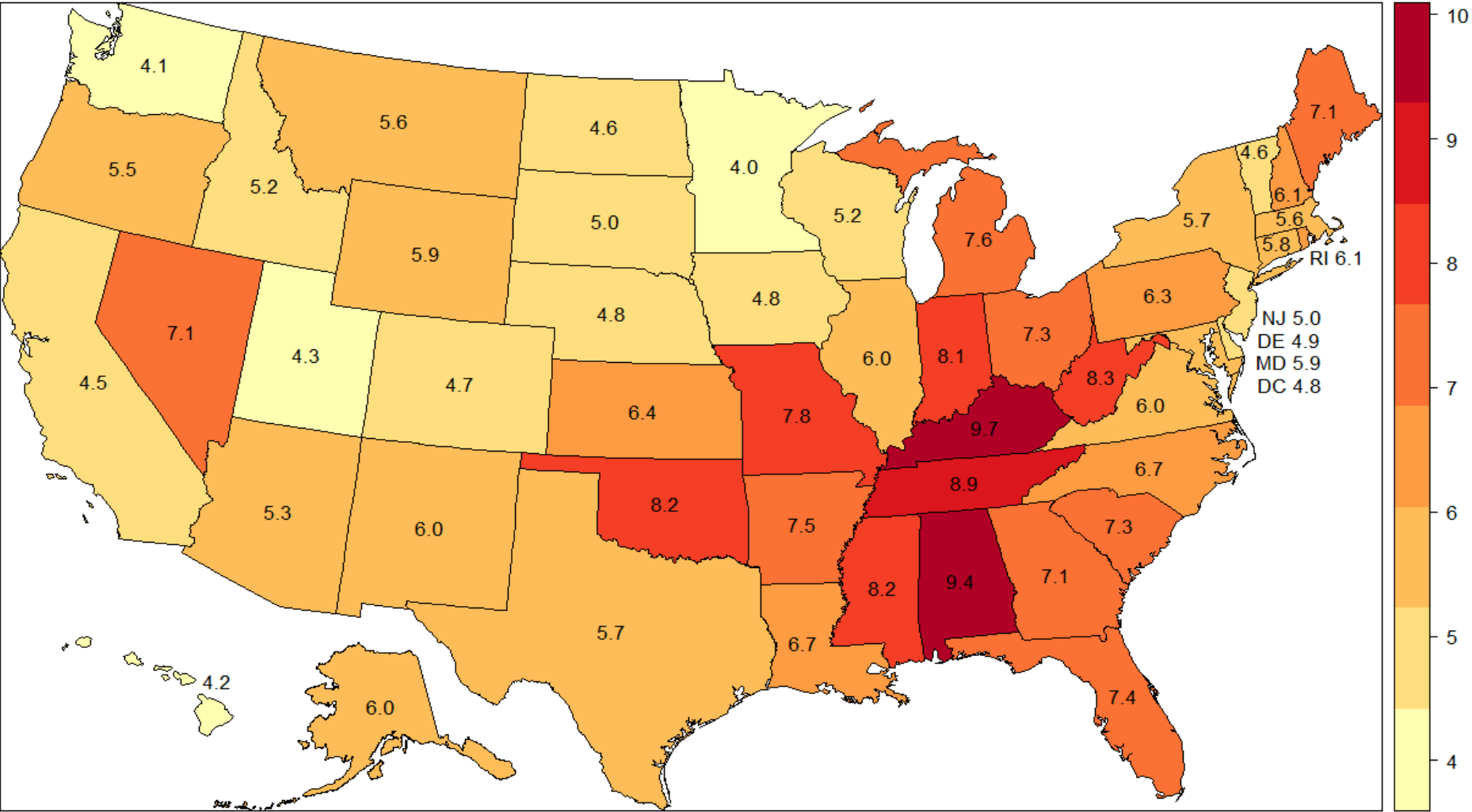
Notes:

(1) Survey participants were asked if they had ever been told they have (COPD) chronic obstructive pulmonary disease, emphysema or chronic bronchitis.

(2) Percentages are age-adjusted to allow for more accurate comparisons between states with different age profiles.

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Figure 8: COPD - Age-Adjusted Prevalence (%) in Adults by State, 2011 ^(1,2)



Source: Centers for Disease Control and Prevention. National Center for Health Statistics. Behavioral Risk Factor Surveillance System, 2011. Analysis by the American Lung Association Research and Health Education Division using SPSS and R software.

Notes:

- (1) COPD prevalence was defined as answering "yes" to "Have you ever been told you have (COPD) chronic obstructive pulmonary disease, emphysema or chronic bronchitis?"
- (2) Percentages are age-adjusted to allow for more accurate comparisons between states with different age profiles.

The BRFSS also included an optional COPD module of 5 questions that were asked of those who answered yes to the COPD prevalence question. Twenty-one states and the District of Columbia included this module in 2011. **Table 6** lists the results for these questions by state:

- Have you ever been given a breathing test to diagnose your COPD, chronic bronchitis, or emphysema?
 - Over three-quarters of patients were given a breathing test to confirm diagnosis of COPD
 - Range: 71.3% in Michigan to 86.9% in Maine.
- Would you say that shortness of breath affects the quality of your life?
 - Close to two-thirds of patients noted a reduction in quality of life due to COPD symptoms.
 - Range: 53.8% in New Jersey to 77.3% in Kentucky.
- Other than a routine visit, have you had to see a doctor in the past 12 months for symptoms related to shortness of breath, bronchitis, or other COPD, or emphysema flare?
 - Less than half of patients visited a doctor for COPD-related symptoms.
 - Range: 37.5% in Nevada to 52.9% in New Jersey.
- Did you have to visit an emergency room or be admitted to the hospital in the past 12 months because of your COPD, chronic bronchitis, or emphysema?
 - Less than a fifth of patients had an ER or hospitalization in the past 12 months due to COPD.
 - Range: 12.5% in Montana to 23.9% in Kentucky.
- How many different medications do you currently take each day to help with your COPD, chronic bronchitis, or emphysema?
 - Between one-third and one-half of patients took at least one medication daily for COPD.
 - Range: 30.6% in District of Columbia to 50.2% in Oregon.

Table 6: Characteristics Among Those Reporting a Diagnosis of COPD by State (%), 2011

	Breathing Test to Diagnose COPD	Shortness of Breath Affects Quality of Life	Seen Doctor in Last 12 Months About COPD or Shortness of Breath	Hospitalised or Visit ER in Last Month Because of COPD	Took At Least One Medication Daily for COPD
Arizona	82.8	70.7	47.7	17.5	43.7
California	73.5	58.3	40.9	15.9	45.8
Connecticut	85.8	55.5	44.3	17.6	36.5
District of Columbia	84.5	77.0	43.9	---	30.6
Illinois	77.3	61.1	41.3	---	46.0
Iowa	80.7	60.6	46.0	---	36.7
Kansas	79.1	73.0	39.8	14.5	43.1
Kentucky	79.7	77.3	50.0	23.9	37.3
Maine	86.9	72.2	51.2	18.4	34.1
Massachusetts	84.7	59.8	40.8	16.1	40.4
Michigan	71.3	60.9	41.6	14.7	49.5
Minnesota	72.4	57.1	40.2	16.4	44.8
Montana	74.4	60.2	39.5	12.5	46.6
Nebraska	75.1	59.4	46.1	15.4	44.5
Nevada	83.9	68.4	37.5	---	47.7
New Jersey	78.6	53.8	52.9	19.2	41.0
North Carolina	81.6	70.9	45.3	17.3	41.9
Ohio	83.6	74.3	42.0	22.8	42.3
Oregon	76.0	67.4	43.8	21.4	50.2
Tennessee	79.5	68.9	38.2	16.8	35.2
Utah	82.5	72.5	---	---	---
West Virginia	81.4	77.1	45.9	22.6	36.3
Total	78.4	64.9	43.2	17.7	43.2

Source: Centers for Disease Control and Prevention. National Center for Health Statistics. Behavioral Risk Factor Surveillance System, 2011. Analysis by the American Lung Association Research and Health Education Division using SPSS software.

Notes:

Results are only for those reached via landline telephone.

--- Results not listed due to small sample size (less than 50 respondents).

Questions were part of an optional module asked only of those reporting ever being diagnosed with COPD and were phrased as follows:

Have you ever been given a breathing test to diagnose your COPD, chronic bronchitis, or emphysema?

Would you say that shortness of breath affects the quality of your life?

Other than a routine visit, have you had to see a doctor in the past 12 months for symptoms related to shortness of breath, bronchitis, or other COPD, or emphysema flare?

Did you have to visit an emergency room or be admitted to the hospital in the past 12 months because of your COPD, chronic bronchitis, or emphysema?

How many different medications do you currently take each day to help with your COPD, chronic bronchitis, or emphysema?

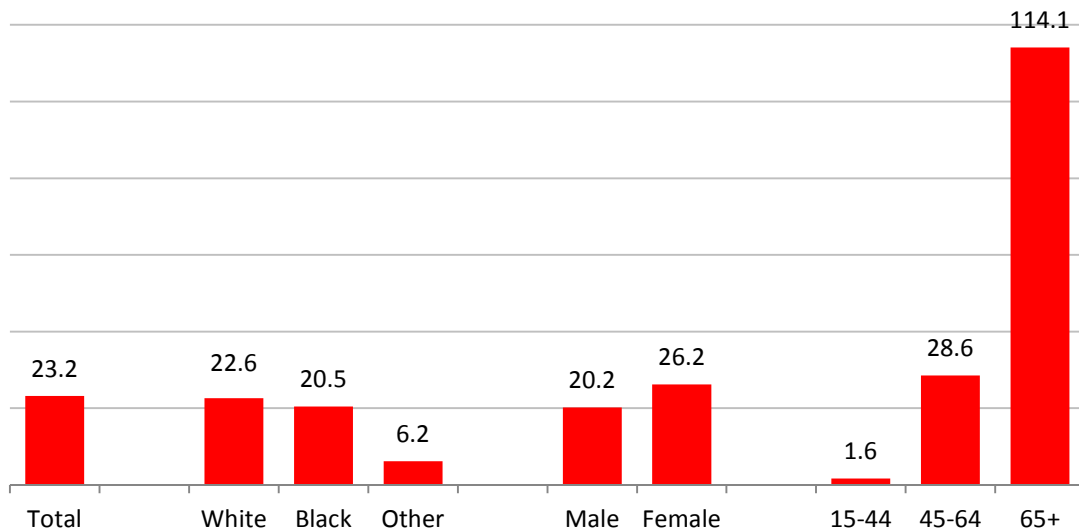
COPD Hospital Discharges (Medical Records)

Table 7 delineates the number and rate of first-listed hospital discharges by race/ethnicity and sex between 1999-2010. The first listed diagnosis is identified as the principal diagnosis on the medical record. An estimated 715,000 discharges were reported in 2010; a discharge rate of 23.2 per 10,000 persons. It should be noted that the number and rate of COPD hospitalizations have remained the same since 1999. The 2010 discharge rate for COPD was higher among whites (22.6 per 10,000 persons) than blacks (20.5 per 10,000 persons). These rates however, should be used with caution due to the large percentage of discharges (9% among COPD discharges, 16% among all discharges in 2010) for which race was not reported.¹³

In 1992 and earlier years (not shown), men had slightly higher discharge rates than women. Since 1993, the rate in women has surpassed the rate for men. In 2010, the discharge rates among men and women were 20.2 and 26.2 per 10,000, respectively.¹⁴

COPD is an important cause of hospitalization in our aged population. Approximately 65% of discharges were in the 65 years and older population in 2010. As seen in **Figure 9**, the discharge rate for the population over age 65 (114.1 per 10,000 persons) was over four times higher than that in the 45-64 age group (28.6 per 10,000 persons).¹⁵

Figure 9: COPD – First-Listed Hospital Discharge Rates per 10,000, 2010



Source: NHDS 2010.

Table 7: COPD - Number of First-Listed Hospital Discharges and Rate per 10,000 Population by Race, Sex and Age, 1999-2010 ⁽¹⁾

	Total ⁽²⁾		White		Black		All Other Races ⁽³⁾		Not Reported ⁽⁴⁾	
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	
1999	713,000	25.9	507,000	22.2	48,000	12.6	7,000	5.5*	133,000	
2000	661,000	23.8	448,000	19.7	49,000	13.9	12,000	6.6	152,000	
2001	663,000	23.4	466,000	20.3	55,000	15.2	10,000	5.3	133,000	
2002	676,000	23.5	471,000	20.3	55,000	15.0	13,000	7.0	137,000	
2003	694,000	24.0	474,000	20.3	51,000	13.8	14,000	7.3	155,000	
2004	638,000	21.8	437,000	18.6	46,000	12.4	14,000	7.1	140,000	
2005	721,000	24.4	511,000	21.6	51,000	13.5	14,000	6.7	145,000	
2006	672,000	22.5	463,000	19.4	57,000	15.0	---	---	142,000	
2007	650,000	21.6	447,000	18.6	53,000	13.8	7,000	3.4*	142,000	
2008	722,000	23.9	503,000	20.8	60,000	15.5	19,000	8.5	140,000	
2009	740,000	24.2	582,000	23.9	62,000	15.8	16,000	7.2	79,000	
2010	715,000	23.2	553,000	22.6	82,000	20.5	15,000	6.2	66,000	

	Male		Female		15-44		45-64		65+	
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate
1999	303,000	22.5	404,000	28.7	28,000	2.3	193,000	32.7	479,000	139.9
2000	300,000	22.1	357,000	25.1	18,000	1.5	188,000	30.8	432,000	125.3
2001	293,520	21.1	369,117	25.5	22,000	1.8	177,000	27.4	458,000	129.8
2002	296,220	21.1	379,658	25.9	31,000	2.5	200,000	30.0	440,000	123.6
2003	315,000	22.2	378,000	25.6	29,000	2.3	199,000	29.0	457,000	127.3
2004	296,000	20.6	342,000	22.9	21,000	1.7	193,000	27.3	415,000	114.2
2005	328,000	22.6	393,000	26.1	22,000	1.8	229,000	31.4	467,000	126.9
2006	318,000	21.7	354,000	23.3	25,000	2.0	207,000	27.7	433,000	116.4
2007	296,866	20.1	353,316	23.1	28,000	2.2	203,000	26.5	417,000	110.1
2008	297,364	20.0	425,075	27.6	22,000	1.8	215,000	27.5	482,000	123.9
2009	318,111	21.1	421,552	27.1	19,000	1.6	239,000	30.1	480,000	121.3
2010	305,731	20.2	409,185	26.2	20,000	1.6	229,000	28.6	463,000	114.1

Source: Centers for Disease Control and Prevention. National Center for Health Statistics. National Hospital Discharge Survey, 1999-2010.

Notes:

(1) This table refers exclusively to data on chronic bronchitis, emphysema and other lower chronic obstructive pulmonary diseases including bronchiectasis. Data on asthma are not included.

(2) Due to rounding, numbers across may not sum up to the total number of hospital discharges.

(3) All races other than Black and White.

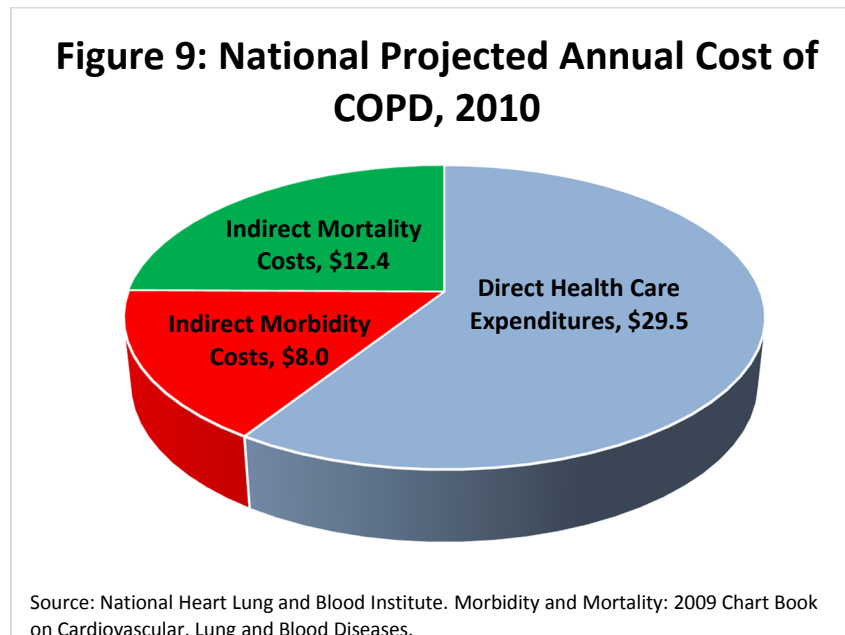
(4) The number of discharges not reporting race increased dramatically over the last two decades. It appears that hospital discharges in Whites might be disproportionately underestimated, particularly in later years. For this reason, comparisons between races should be made with caution.

--- Estimates of less than 5,000 are considered unreliable.

* Estimates of 5,000-10,000 to be used with caution.

Economic Costs

COPD takes a heavy toll on our economy. According to the National Heart Lung and Blood Institute, the national projected annual cost for COPD in 2010 was \$49.9 billion. This includes \$29.5 billion in direct health care expenditures, \$8.0 billion in indirect morbidity costs and \$12.4 billion in indirect mortality costs.¹⁶ Indirect morbidity accounts for lost productivity due to illness, while indirect mortality reflects productivity lost due to early death.



Summary

COPD is a progressive obstructive lung disease that is a major cause of mortality and morbidity in the United States. In fact, COPD recently became the third leading cause of death behind heart disease and cancer.¹⁷ Current estimates suggest that COPD costs the nation almost \$50 billion annually in both direct and indirect health expenditures.

Emphysema and chronic bronchitis are the most important conditions that compose COPD and they can coexist. It is estimated that between 12.7 and 14.7 million adults over the age of 18 have a physician diagnosis of COPD, depending on the survey used.¹⁸ However, as many as 24 million U.S. adults may have some evidence of impaired lung function indicating an under diagnosis of the disease.¹⁹ Prevalence seems to be highest in the Midwest and Southeast states.

Lastly, there is evidence of a gender disparity in COPD with women surpassing men in terms of both mortality and morbidity. The number of women dying from COPD has exceeded the number seen in men since 1999, and the hospital discharge rate for COPD has been higher in women than in men since 1993. Data has indicated that women are twice as likely to be diagnosed with chronic bronchitis as men and starting in 2011, women are now more likely than men to receive a diagnosis of emphysema.

Glossary

Prevalence:	The number of existing cases of a particular condition, disease, or other occurrence (e.g., persons smoking) at a given time.
Period Prevalence:	The proportion of cases that exist within a population at any point during a specified period of time.
Point Prevalence:	The proportion of cases that exist within a population at a single point in time.
Crude Rate:	Cases in a particular population quantity- e.g., per hundred.
Age-Adjusted Rate:	A figure that is statistically corrected to remove the distorting effect of age when comparing populations of different age structures.

Sources

- ¹ Centers for Disease Control and Prevention, National Center for Health Statistics. CDC [Wonder On-line Database](#), compiled from Compressed Mortality File 1999-2009 Series 20 No. 20, 2012.
- ² Centers for Disease Control and Prevention. National Center for Health Statistics. National Vital Statistics Report. Deaths: Final Data for 2009. September 5, 2012. Vol 60 No 3.
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- ⁵ Ibid.
- ⁶ Ibid.
- ⁷ Centers for Disease Control and Prevention. National Center for Health Statistics: National Health Interview Survey Raw Data, 1997-2011. Analysis performed by American Lung Association Research and Health Education using SPSS and SUDAAN software.
- ⁸ Ibid.
- ⁹ Ibid.
- ¹⁰ Ibid.
- ¹¹ Centers for Disease Control and Prevention. National Center for Health Statistics. Behavioral Risk Factor Surveillance Survey, 2011. Analysis performed by the American Lung Association Research and Health Education Division using SPSS software.
- ¹² Ibid.
- ¹³ Ibid.
- ¹⁴ Ibid.
- ¹⁵ Ibid.
- ¹⁶ National Heart Lung and Blood Institute. *Morbidity and Mortality: 2009 Chart Book on Cardiovascular, Lung and Blood Diseases*.
- ¹⁷ Centers for Disease Control and Prevention. National Center for Health Statistics. National Vital Statistics Report. Deaths: Final Data for 2009. September 5, 2012. Vol 60 No 3.
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