

# COPD-related Mortality by Sex and Race Among Adults Aged 25 and Over: United States, 2000–2014

Hanyu Ni, Ph.D., and Jiaquan Xu, M.D.

## Key findings

### Data from the National Vital Statistics System, Mortality

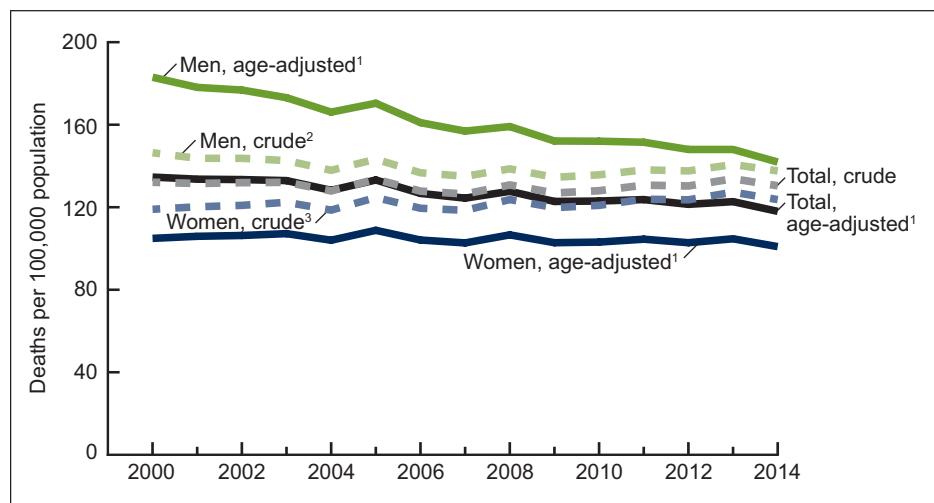
- From 2000 through 2014, the age-adjusted rate for chronic obstructive pulmonary disease (COPD)-related deaths decreased 22.5% for men and 3.8% for women aged 25 and over.
- Between 2000 and 2014, the COPD-related death rate decreased for both men and women aged 65–84 and for men aged 85 and over. The rate increased for both men and women aged 45–64 and for women aged 85 and over.
- The age-adjusted death rate declined for white men but remained stable for white women from 2000 through 2014.
- The age-adjusted death rate declined for black men but increased for black women from 2000 through 2014.
- The major underlying causes of death for COPD-related deaths were COPD, heart disease, and cancer for both men and women.

Chronic obstructive pulmonary disease or COPD (chronic bronchitis and emphysema) is a major component of chronic lower respiratory disease (CLRD). CLRD has been the third leading cause of death since 2008 (1). Based on the underlying cause of death, the COPD death rate declined for men but increased for women from 2000 through 2011 (2,3). The burden of COPD mortality based on the underlying cause of death may be underestimated (4–6). Using data from the multiple causes-of-death files, this report describes COPD-related mortality from 2000 through 2014 by selected race and age groups for men and women aged 25 and over. COPD was identified as those with COPD reported anywhere on the death certificate, either as an underlying or a contributing cause of death.

*Keywords:* death rate • National Vital Statistics System

## The age-adjusted rate for COPD-related deaths declined more rapidly for men than for women from 2000 through 2014.

Figure 1. Crude and age-adjusted rates for COPD-related deaths for adults aged 25 and over, by sex: United States, 2000–2014



<sup>1</sup>Statistically significant decrease in age-adjusted COPD-related death rate from 2000 through 2014 ( $p < 0.05$ ).

<sup>2</sup>Statistically significant decrease in crude COPD-related death rate from 2000 through 2009 ( $p < 0.05$ ).

<sup>3</sup>Statistically significant increase in crude COPD-related death rate from 2000 through 2014 ( $p < 0.05$ ).

NOTES: COPD is chronic obstructive pulmonary disease. COPD-related deaths were identified as those with COPD (ICD-10 code J40–J44) reported anywhere on the death certificate (i.e., as an underlying or a contributing cause of death). Access data table for Figure 1 at: [http://www.cdc.gov/nchs/data/databriefs/db256\\_table.pdf#1](http://www.cdc.gov/nchs/data/databriefs/db256_table.pdf#1).

SOURCE: NCHS, National Vital Statistics System mortality data, 2000–2014.



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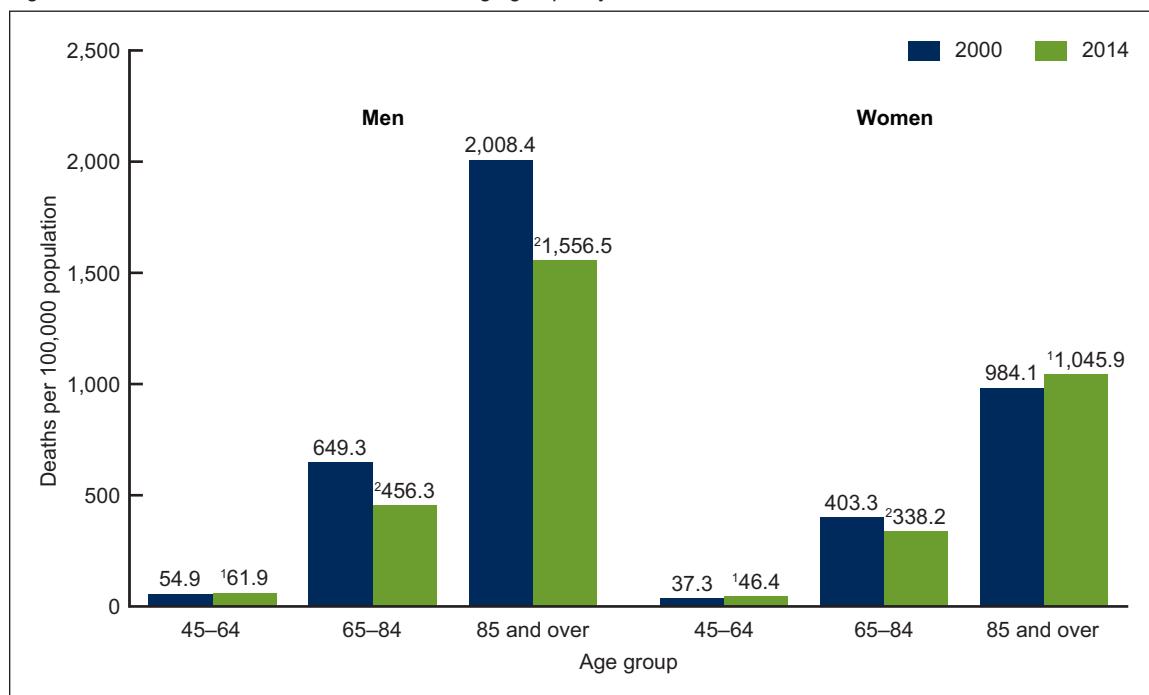


- Overall, the crude rate for COPD-related deaths among adults aged 25 and over remained flat with 132.1 deaths per 100,000 population occurring in 2000 compared with 130.4 in 2014 (Figure 1). The age-adjusted rate declined 12.3%, from 134.6 deaths per 100,000 standard population in 2000 to 118.0 in 2014.
- For men aged 25 and over, the crude death rate declined from 146.4 in 2000 to 134.5 in 2009 but remained stable afterward. The age-adjusted rate declined 22.5%, from 183.0 in 2000 to 141.9 in 2014.
- Among women in the same age group, the crude death rate increased from 119.0 in 2000 to 123.7 in 2014. The age-adjusted rate declined 3.8%, from 104.9 in 2000 to 100.9 in 2014.
- The age-adjusted death rate remained higher for men than for women, although the gender gap narrowed over time.

**The COPD-related death rate increased for men and women aged 45–64 and for women aged 85 and over between 2000 and 2014.**

- Between 2000 and 2014, the COPD-related death rate decreased 29.7% for men aged 65–84 and 22.5% for men aged 85 and over but increased 12.8% for men aged 45–64 (Figure 2).

Figure 2. COPD-related death rates for selected age groups, by sex: United States, 2000 and 2014



<sup>1</sup>Statistically significant increase in COPD-related death rate between 2000 and 2014 ( $p < 0.05$ ).

<sup>2</sup>Statistically significant decrease in COPD-related death rate between 2000 and 2014 ( $p < 0.05$ ).

NOTES: COPD is chronic obstructive pulmonary disease. COPD-related deaths were identified as those with COPD (ICD-10 code J40–J44) reported anywhere on the death certificate (i.e., as an underlying or a contributing cause of death). Access data table for Figure 2 at: [http://www.cdc.gov/nchs/data/databriefs/db256\\_table.pdf#2](http://www.cdc.gov/nchs/data/databriefs/db256_table.pdf#2).

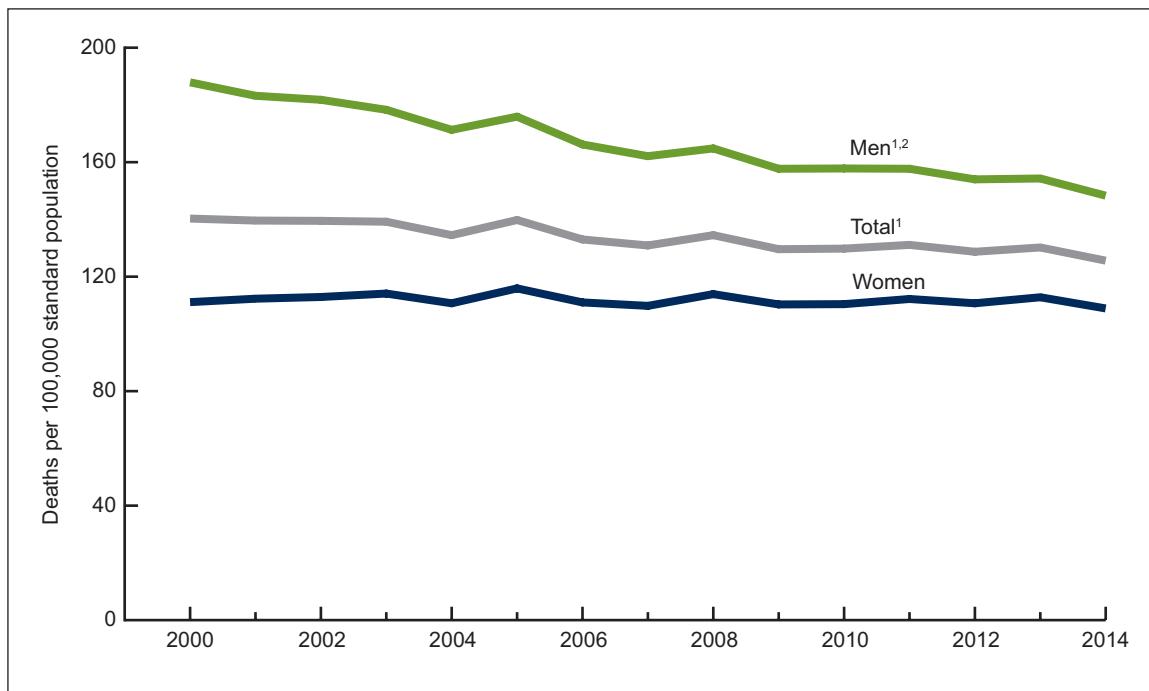
SOURCE: NCHS, National Vital Statistics System mortality data, 2000 and 2014.

- During the same period, the death rate decreased 16.1% for women aged 65–84 but increased 24.4% for women aged 45–64 and 6.3% for women aged 85 and over.
- COPD-related death rates increased with age for both men and women.

**From 2000 through 2014, the age-adjusted rate for COPD-related deaths declined for white men but remained stable for white women.**

- Overall, the age-adjusted COPD-related death rate for white adults aged 25 and over declined 10.5%, from 140.3 deaths per 100,000 standard population in 2000 to 125.6 in 2014 (Figure 3).
- For white men, the age-adjusted death rate declined 21.1%, from 187.9 in 2000 to 148.3 in 2014.
- For white women, the rates remained similar from 2000 through 2014.
- The death rate was higher for white men than for white women throughout the period, but the gender gap decreased over time.

Figure 3. Age-adjusted rate for COPD-related deaths for white adults aged 25 and over, by sex: United States, 2000–2014



<sup>1</sup>Statistically significant decrease in age-adjusted COPD-related death rate from 2000 through 2014 ( $p < 0.05$ ).

<sup>2</sup>Statistically significant difference in age-adjusted COPD-related death rates between white men and women throughout the period ( $p < 0.05$ ).

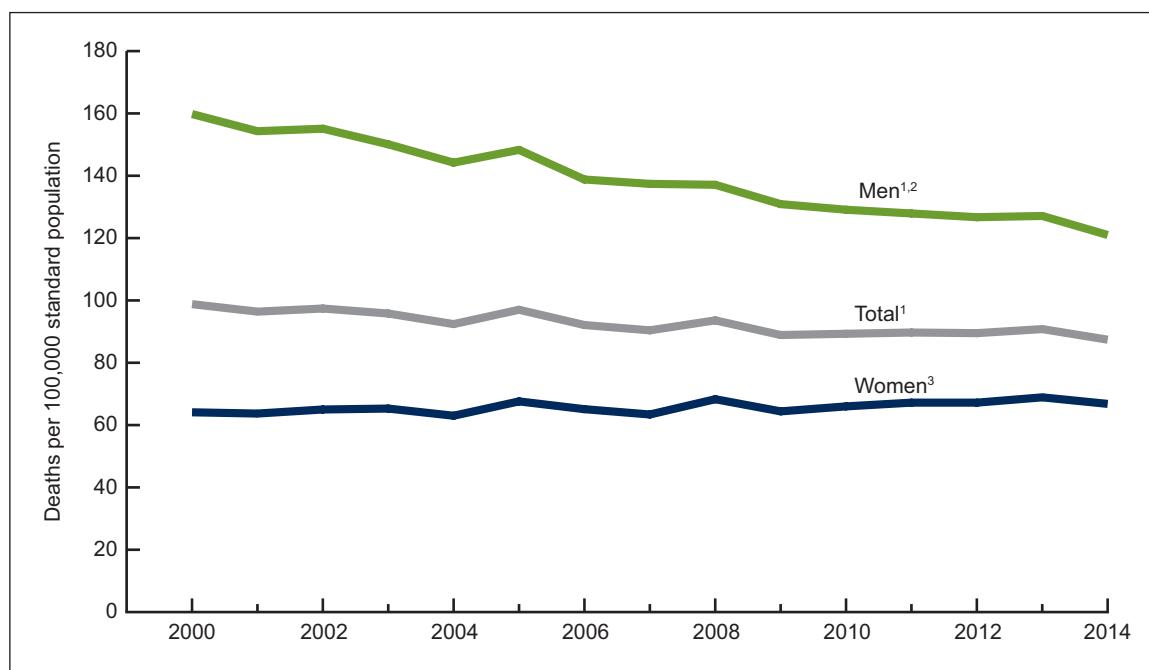
NOTES: COPD is chronic obstructive pulmonary disease. COPD-related deaths were identified as those with COPD (ICD-10 code J40–J44) reported anywhere on the death certificate (i.e., as an underlying or a contributing cause of death). White persons may be of Hispanic or non-Hispanic origin. Access data table for Figure 3 at: [http://www.cdc.gov/nchs/data/databriefs/db256\\_table.pdf#3](http://www.cdc.gov/nchs/data/databriefs/db256_table.pdf#3).

SOURCE: NCHS, National Vital Statistics System mortality data, 2000–2014.

**From 2000 through 2014, the age-adjusted rate for COPD-related deaths declined for black men but increased for black women.**

- Overall, the age-adjusted death rate for black adults aged 25 and over declined 11.5%, from 98.8 deaths per 100,000 standard population in 2000 to 87.4 in 2014 (Figure 4).
- For black men, the age-adjusted death rate declined 24.3%, from 159.8 in 2000 to 121.0 in 2014.
- For black women, the death rate increased 4.2%, from 64.1 in 2000 to 66.8 in 2014.
- The death rate was higher for black men than for black women throughout the period, although the gender gap decreased over time.

Figure 4. Age-adjusted rate for COPD-related deaths for black adults aged 25 and over, by sex: United States, 2000–2014



<sup>1</sup>Statistically significant decrease in age-adjusted COPD-related death rate from 2000 through 2014 ( $p < 0.05$ ).

<sup>2</sup>Statistically significant difference in age-adjusted COPD-related death rates between black men and women from 2000 through 2014 ( $p < 0.05$ ).

<sup>3</sup>Statistically significant increase in age-adjusted COPD-related death rate from 2000 through 2014 ( $p < 0.05$ ).

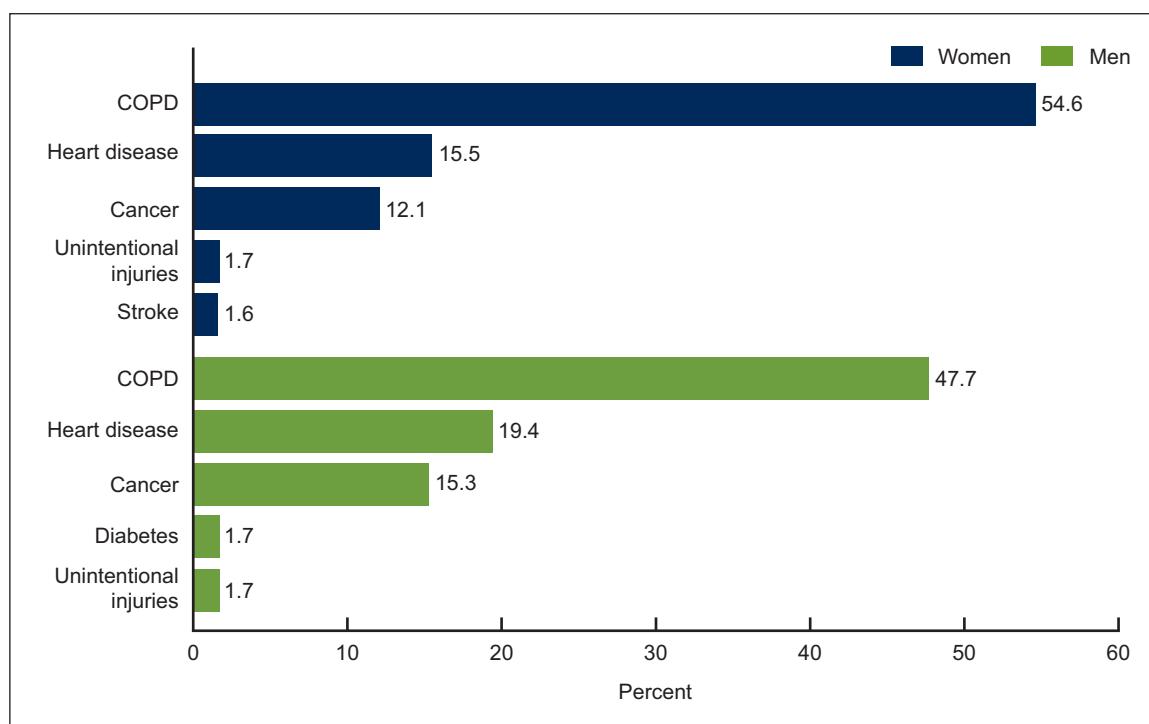
NOTES: COPD is chronic obstructive pulmonary disease. COPD-related deaths were identified as those with COPD (ICD-10 code J40–J44) reported anywhere on the death certificate (i.e., as an underlying or a contributing cause of death). Black persons may be of Hispanic or non-Hispanic origin. Access data table for Figure 4 at: [http://www.cdc.gov/nchs/data/databriefs/db256\\_table.pdf#4](http://www.cdc.gov/nchs/data/databriefs/db256_table.pdf#4).

SOURCE: NCHS, National Vital Statistics System mortality data, 2000–2014.

**Approximately one-half of all COPD-related deaths had COPD as the underlying cause of death for both men and women in 2014.**

- In 2014, COPD was the underlying cause of death for 47.7% of COPD-related deaths for men aged 25 and over (Figure 5). Other major underlying causes of death included heart disease (19.4%), cancer (15.3%), diabetes (1.7%), and unintentional injuries (1.7%).
- For women in the same age group, COPD was the underlying cause of death for 54.6% of COPD-related deaths occurred in 2014. Other major underlying causes of death included heart disease (15.5%), cancer (12.1%), unintentional injuries (1.7%), and stroke (1.6%).

Figure 5. Top five underlying causes of death for COPD-related deaths for adults aged 25 and over, by sex: United States, 2014



NOTES: COPD is chronic obstructive pulmonary disease. COPD-related deaths were identified as those with COPD (ICD-10 code J40–J44) reported anywhere on the death certificate (i.e., as an underlying or a contributing cause of death). Access data table for Figure 5 at: [http://www.cdc.gov/nchs/data/databriefs/db256\\_table.pdf#5](http://www.cdc.gov/nchs/data/databriefs/db256_table.pdf#5).

SOURCE: NCHS, National Vital Statistics System mortality data, 2014.

## Summary

This report describes COPD-related mortality for U.S. adults aged 25 and over using multiple causes of death. The analysis revealed a decline in the age-adjusted COPD-related death rate for both men and women from 2000 through 2014, but a more rapid decline was seen among men. These declines are consistent with declines in the prevalence of current smoking for men and women in the United States (7). The sex-specific trend patterns differed by selected race and age groups. The top three underlying causes of COPD-related deaths were COPD, heart disease, and cancer for both men and women. The death rate continued to be higher for men than for women, although the gender gap decreased further over time (3).

The finding of a declining trend in COPD mortality for men was consistent with findings from previous reports based on the underlying cause of death (2,3). However, the current analysis in the COPD-related death rate revealed a slight decline in the death rate for women, whereas previous studies based on underlying cause of death indicated an increase for both white and black women from 2000 through 2011 (2,3). In this study, the increase in the COPD-related death rate was only observed among black women.

Because COPD is the underlying cause of death for approximately one-half of all COPD-related deaths, the rate based on multiple cause of death is roughly twice as high as the rate based on the underlying cause of death. Using the multiple causes-of-death data, this report goes beyond the underlying cause and provides a more complete picture of mortality associated with COPD.

## Definitions

**Cause-of-death classification:** Medical information, including injury diagnoses and external causes of injury, entered on death certificates filed in the United States, classified and coded in accordance with the *International Statistical Classification of Disease and Related Health Problems, Tenth Revision* (ICD–10) (8).

**Underlying and multiple causes of death:** Underlying cause of death is defined by the World Health Organization as “the disease or injury which initiated the train of events leading directly to death, or the circumstances of the accident or violence which produce the fatal injury” (7). Multiple causes of death include not only the underlying cause but also the immediate cause of death and all other intermediate and contributory conditions reported by the certifying physicians.

**COPD-related death:** All death records with COPD reported on the death certificate (any mention of COPD), either as an underlying or a contributing cause. These deaths were identified in the multiple cause-of-death files as those with ICD–10 code J40–J44 in the record axis fields.

## Data source and methods

This report analyzed the multiple cause-of-death mortality files from the National Vital Statistics System from 2000 through 2014. The direct standardization method was used to calculate age-adjusted death rates, based on the projected year 2000 standard population, using age groups with 10-year intervals. Terms such as “higher than” or “lower than” indicate that the estimates being compared are statistically significant. Trends in death rates were evaluated using the Joinpoint Regression Program (9). The comparisons of rates and percentages are based on the two-tailed *z*-test at the 0.05 level.

## About the authors

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