

# Declines in Cancer Death Rates Among Children and Adolescents in the United States, 1999–2014

Sally C. Curtin, M.A., Arialdi M. Miniño, M.P.H., and Robert N. Anderson, Ph.D.

## Key findings

### Data from the National Vital Statistics System

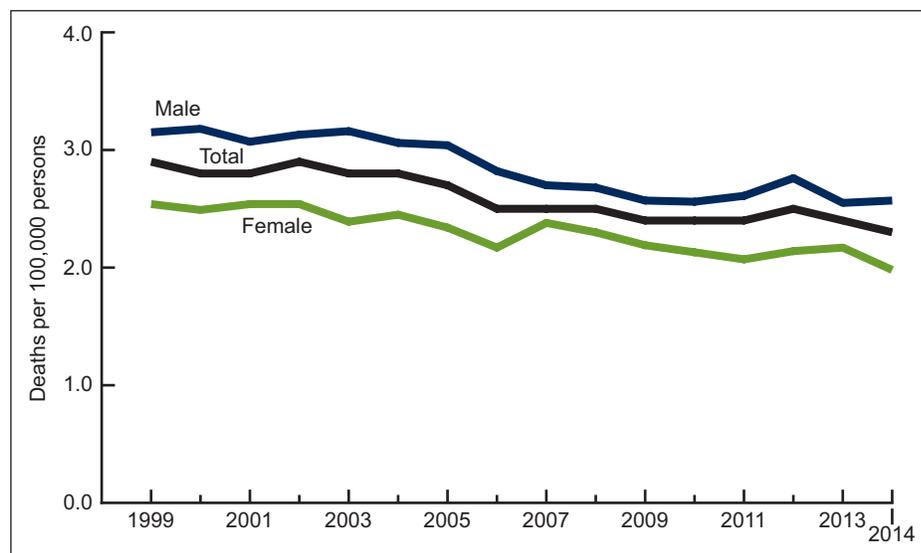
- During 1999–2014, the cancer death rate for children and adolescents aged 1–19 years in the United States declined 20%, from 2.85 to 2.28 per 100,000 population.
- The cancer death rate for males aged 1–19 years in 2014 was 30% higher than for females.
- Declines in cancer death rates during 1999–2014 were experienced among both white and black persons aged 1–19 years and for all 5-year age groups.
- During 1999–2014, brain cancer replaced leukemia as the most common cancer causing death among children and adolescents aged 1–19 years, accounting for 3 out of 10 cancer deaths in 2014.

Since the mid-1970s, cancer death rates among children and adolescents in the United States showed marked declines despite a slow increase in incidence for some of the major types (1–3). These trends have previously been shown through 2012. This data brief extends previous research by showing trends in cancer death rates through 2014 among children and adolescents aged 1–19 years in the United States. Cancer death rates for 1999–2014 are presented and trends are compared for both females and males, by 5-year age group, and for white and black children and adolescents. Percent distributions of cancer deaths among children and adolescents aged 1–19 years are shown by anatomical site for 1999 and 2014.

*Keywords: malignant neoplasm • death certificate • underlying cause of death • National Vital Statistics System*

## From 1999 through 2014, cancer death rates declined for both males and females aged 1–19 years.

Figure 1. Cancer death rates for children and adolescents aged 1–19 years, by sex: United States, 1999–2014



NOTES: Decline in rates from 1999 through 2014 was statistically significant for all groups ( $p < 0.05$ ). Access data table for Figure 1 at: [http://www.cdc.gov/nchs/data/databriefs/db257\\_table.pdf#1](http://www.cdc.gov/nchs/data/databriefs/db257_table.pdf#1).

SOURCE: NCHS, National Vital Statistics System, Mortality, ICD-10 underlying cause-of-death codes malignant neoplasms (C00–C97).

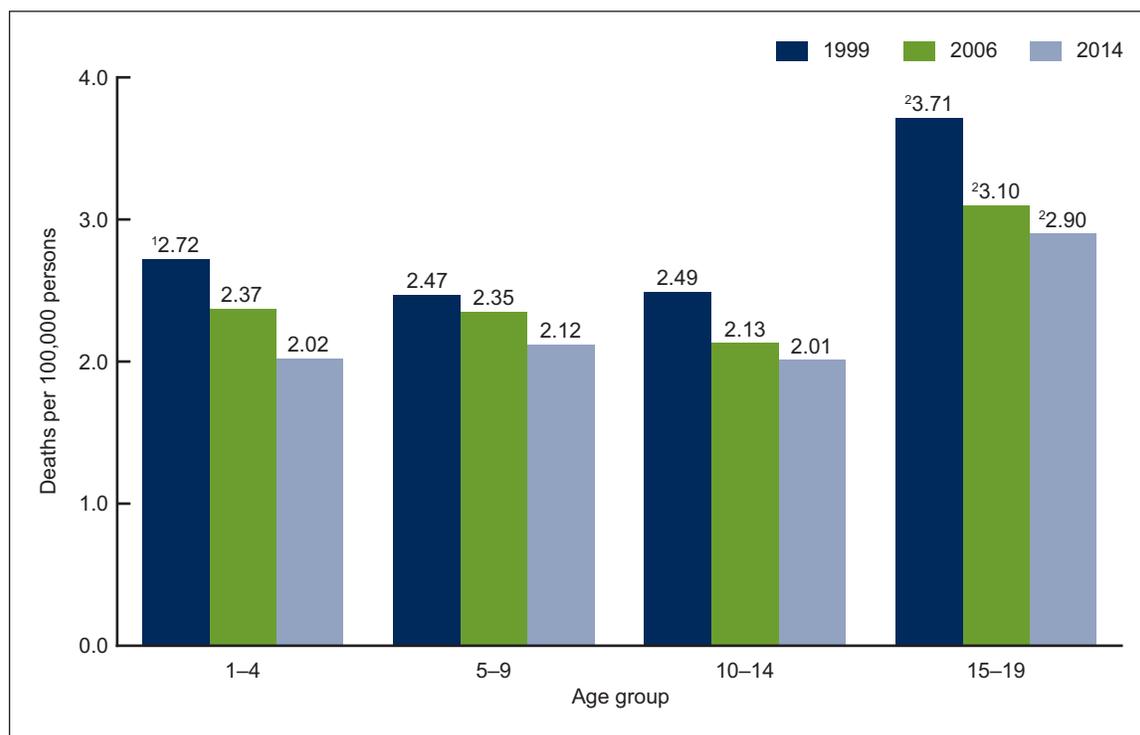


- The cancer death rate for children and adolescents aged 1–19 years was 20% lower in 2014 (2.28 per 100,000) than in 1999 (2.85) ([Figure 1](#)).
- Cancer death rates declined for both females and males during the 1999–2014 period.
- The cancer death rate for females in 2014 (1.98) was 22% lower than the 1999 rate (2.54), while the rate for males in 2014 (2.57) was 18% lower than the 1999 rate (3.15).
- Cancer death rates in 1999–2014 for male children and adolescents aged 1–19 years were continually higher than for their female counterparts. During this period, the male-to-female rate ratios ranged from 1.1 to 1.3, and the rate ratio was 1.3 in 2014.

## Cancer death rates declined between 1999 and 2014 for all age groups from 1–19 years.

- All 5-year age groups (1–4, 5–9, 10–14, and 15–19) experienced declines in cancer death rates during the 1999–2014 period, with percentage declines ranging from 14% for children aged 5–9 years to 26% for children aged 1–4 years (Figure 2).
- For 1999, 2006, and 2014, adolescents aged 15–19 had the highest cancer death rates of all age groups of children and adolescents, although the rate dropped 22% between 1999 (3.71 per 100,000) and 2014 (2.90). The majority of this decline was during the first half of the period (1999–2006).
- In 1999, the cancer death rate for children aged 1–4 years (2.72) was 10% higher than for those aged 5–9 years (2.47). In 2006 and 2014, the cancer death rates for children aged 1–4, 5–9, and 10–14 years were not statistically different.

Figure 2. Cancer death rates for children and adolescents aged 1–19 years, by age group: United States, 1999, 2006, and 2014



<sup>1</sup>Significantly higher than the rate for those aged 5–9 in 1999 ( $p < 0.05$ ).

<sup>2</sup>Significantly higher than the rates for all other age groups ( $p < 0.05$ ).

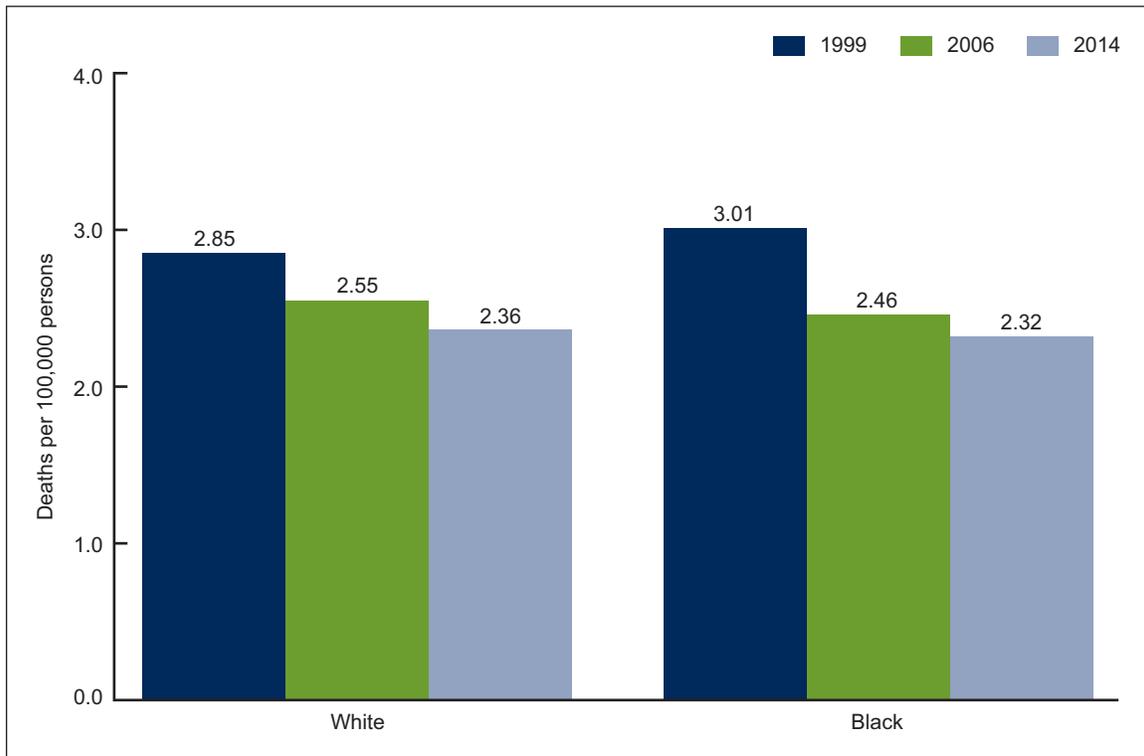
NOTES: Decline in rates from 1999 through 2014 was statistically significant for all groups ( $p < 0.05$ ). Access data table for Figure 2 at: [http://www.cdc.gov/nchs/data/databriefs/db257\\_table.pdf#2](http://www.cdc.gov/nchs/data/databriefs/db257_table.pdf#2).

SOURCE: NCHS, National Vital Statistics System, Mortality, ICD–10 underlying cause-of-death codes malignant neoplasms (C00–C97).

### Cancer death rates declined for both white and black children and adolescents aged 1–19 years.

- Cancer death rates declined from 1999 through 2014 for both white and black persons aged 1–19 years (Figure 3).
- The cancer death rate for white children and adolescents aged 1–19 years was 17% lower in 2014 (2.36) than in 1999 (2.85); the decline was 23% for black children and adolescents, from 3.01 to 2.32.
- No statistically significant differences were observed in cancer death rates between white and black children and adolescents aged 1–19 years.

Figure 3. Cancer death rates for children and adolescents aged 1–19 years, by race: United States, 1999, 2006, and 2014



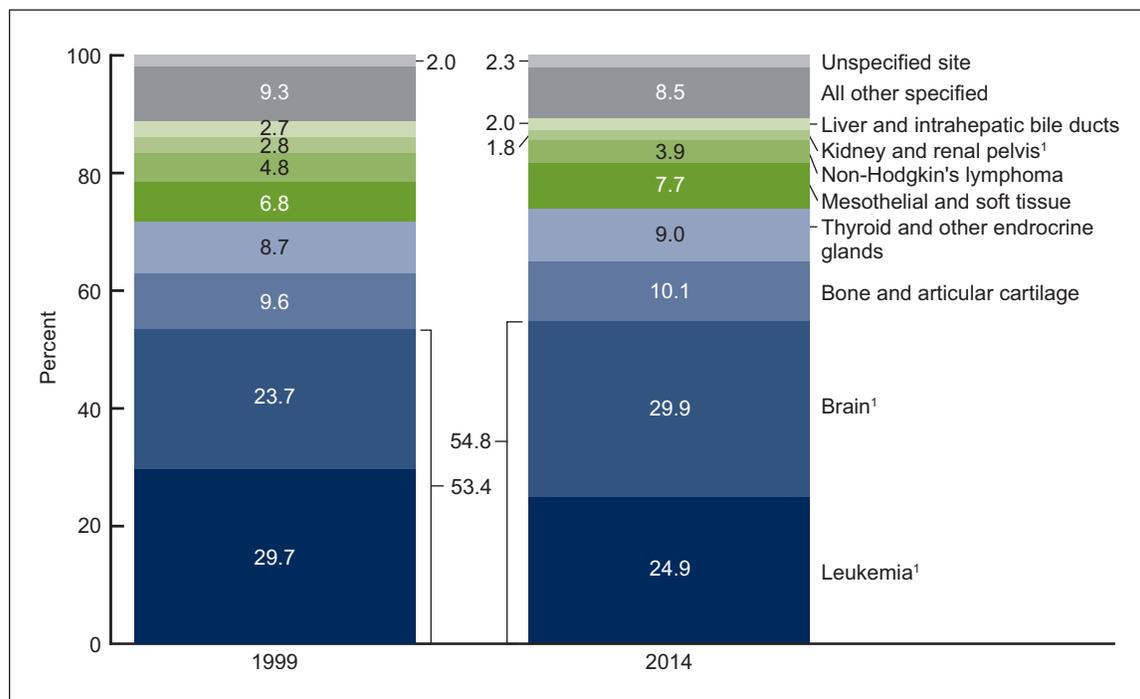
NOTES: Decline in rates from 1999 through 2014 was statistically significant for both groups ( $p < 0.05$ ). Access data table for Figure 3 at: [http://www.cdc.gov/nchs/data/databriefs/db257\\_table.pdf#3](http://www.cdc.gov/nchs/data/databriefs/db257_table.pdf#3).

SOURCE: NCHS, National Vital Statistics System, Mortality, ICD–10 underlying cause-of-death codes malignant neoplasms (C00–C97).

**During the 1999–2014 period, brain cancer replaced leukemia as the most common cancer causing death in children and adolescents aged 1–19 years.**

- In both 1999 and 2014, more than one-half of all cancer deaths among children and adolescents aged 1–19 years were attributable to either leukemia or brain cancer (Figure 4). These two sites combined accounted for 53.4% of all cancer deaths to persons aged 1–19 years in 1999 and 54.8% in 2014.
- Three out of 10 cancer deaths among children and adolescents aged 1–19 years in 1999 were due to leukemia (29.7%), the most common site, whereas about one in four were due to brain cancer (23.7%). By 2014, these percentages reversed and brain cancer was the most common site, accounting for 29.9% of total cancer deaths.
- Other common sites of cancer causing deaths among children and adolescents aged 1–19 years were: bone and articular cartilage (10.1% in 2014), thyroid and other endocrine glands (9.0%), and mesothelial and soft tissue (7.7%). These cancers, along with brain cancer and leukemia, accounted for more than 8 out of 10 (81.6%) cancer deaths among children and adolescents in 2014.
- Although accounting for a small percentage of all cancer deaths among children and adolescents aged 1–19 years, deaths due to cancer of the kidney and renal pelvis declined from 2.8% in 1999 to 1.8% in 2014.

Figure 4. Percent distribution of cancer deaths for children and adolescents aged 1–19 years, by anatomical site: United States, 1999 and 2014



<sup>1</sup>Difference in percentages for 1999 and 2014 was statistically significant ( $p < 0.05$ ).  
 NOTE: Access data table for Figure 4 at: [http://www.cdc.gov/nchs/data/databriefs/db257\\_table.pdf#4](http://www.cdc.gov/nchs/data/databriefs/db257_table.pdf#4).  
 SOURCE: NCHS, National Vital Statistics System, ICD-10 underlying cause-of-death codes: Leukemia (C91–C95), brain cancer (C71), bone and articular cartilage (C40–C41), thyroid and other endocrine glands (C73–C75), mesothelial and soft tissue (C45–C49), non-Hodgkin's lymphoma (C82–C85), kidney and renal pelvis (C64–C65), liver and intrahepatic bile ducts (C22), all other specified sites not shown separately (C00–C97), and unspecified site (C80).

## Summary

Cancer mortality among children and adolescents aged 1–19 years continued to decline during 1999–2014, building upon progress of the previous 3 decades (1–3). Major therapeutic advances in treating some forms of cancer, particularly leukemia, may have resulted in increased survivorship (1). The overall cancer death rate declined by one-fifth during 1999–2014, with all 5-year age groups experiencing declines ranging from 14% to 26%. Parity in cancer death rates was observed between white and black persons aged 1–19 years, with both groups experiencing declines during the period. More than one-half of all cancer deaths among children and adolescents aged 1–19 years in 1999 and 2014 were attributable to either leukemia or brain cancer. However, a shift occurred during the period, with brain cancer replacing leukemia as the leading type of cancer causing death among children and adolescents aged 1–19 years. Cancer death rates continued to be higher for males aged 1–19 years compared with their female counterparts.

## Data source and methods

Mortality and population data are from the National Center for Health Statistics' 1999–2014 multiple cause-of-death mortality files (4). Cancer deaths are those with *International Classification of Diseases, Tenth Revision* underlying cause-of-death codes C00–C97 (5). Cancer deaths by specific anatomical site are classified as: Leukemia (C91–C95), brain cancer (C71), bone and articular cartilage (C40–C41), thyroid and other endocrine glands (C73–C75), mesothelial and soft tissue (C45–C49), non-Hodgkin's lymphoma (C82–C85), kidney and renal pelvis (C64–C65), liver and bile ducts (C22), all other specified sites not shown separately (C00–C97), and unspecified site (C80).

Trends were evaluated using the Joinpoint Regression Program (6). Differences in percentages in Figure 4 were tested using the  $z$  test statistic at  $p < 0.05$ . Death rates are per 100,000 population and are based on April 1 bridged-race census counts for 2000 and 2010 and July 1 bridged-race estimates for 1999, 2001–1999, and 2011–2014 from the vintage 2014 postcensal series. Male to female differences in cancer rates were based on rate ratios calculated as the male rate divided by the female rate.

## About the authors

Sally C. Curtin, Arialdi M. Miniño, and Robert N. Anderson are with the National Center for Health Statistics, Division of Vital Statistics.

## References

1. Siegel RL, Miller KD, Jemal A. Cancer statistics, 2016. *CA Cancer J Clin* 66(1):7–30. 2016.
2. Ries LAG, Smith MA, Gurney JG, Linet M, Tamra T, Young JL, Bunin GR (eds). *Cancer incidence and survival among children and adolescents: United States SEER program 1975–1995*. NIH Pub. No. 99–4649. Bethesda, MD: National Cancer Institute, SEER Program. 1999.
3. Ryerson AB, Ehemann CR, Altekruse SF, Ward JW, Jemal A, Sherman RL, et al. Annual report to the nation on the status of cancer, 1975–2012, featuring the increasing incidence of liver cancer. *Cancer* 122(9):1312–37. 2016.
4. National Center for Health Statistics. About underlying cause of death, 1999–2014. CDC WONDER online database. 2016. Available from: <http://wonder.cdc.gov/ucd-icd10.html>.
5. WHO. *International statistical classification of diseases and related health problems, tenth revision (ICD–10)*. 2008 ed. Geneva, Switzerland. 2009.
6. National Cancer Institute. *Joinpoint Regression Program (Version 3.4.3)* [computer software]. 2010.

**U.S. DEPARTMENT OF  
HEALTH & HUMAN SERVICES**

Centers for Disease Control and Prevention  
National Center for Health Statistics  
3311 Toledo Road, Room 5419  
Hyattsville, MD 20782–2064

FIRST CLASS MAIL  
POSTAGE & FEES PAID  
CDC/NCHS  
PERMIT NO. G-284

OFFICIAL BUSINESS  
PENALTY FOR PRIVATE USE, \$300

For more NCHS Data Briefs, visit:  
<http://www.cdc.gov/nchs/products/databriefs.htm>.



**NCHS Data Brief ■ No. 257 ■ September 2016**

**Suggested citation**

Curtin SC, Miniño AM, Anderson RN.  
Declines in cancer death rates among  
children and adolescents in the United  
States, 1999–2014. NCHS data brief, no  
257. Hyattsville, MD: National Center for  
Health Statistics. 2016.

**Copyright information**

All material appearing in this report is in  
the public domain and may be reproduced  
or copied without permission; citation as to  
source, however, is appreciated.

**National Center for Health  
Statistics**

Charles J. Rothwell, M.S., M.B.A., *Director*  
Jennifer H. Madans, Ph.D., *Associate  
Director for Science*

**Division of Vital Statistics**

Delton Atkinson, M.P.H., M.P.H., P.M.P.,  
*Director*  
Hanyu Ni, Ph.D., M.P.H., *Associate Director  
for Science*

---

For e-mail updates on NCHS publication  
releases, subscribe online at:  
<http://www.cdc.gov/nchs/govdelivery.htm>.

For questions or general information  
about NCHS:  
Tel: 1–800–CDC–INFO (1–800–232–4636)  
TTY: 1–888–232–6348  
Internet: <http://www.cdc.gov/nchs>  
Online request form: <http://www.cdc.gov/info>

**ISSN 1941–4927 Print ed.**  
**ISSN 1941–4935 Online ed.**  
DHHS Publication No. 2016–1209  
CS269196