

## Childhood Cancer

The term “cancer” is used to characterize diseases in which abnormal cells divide without control. A cancerous cell loses its ability to regulate its own growth, control cell division, and communicate with other cells. If left unchecked, cancer cells can invade nearby tissues and can spread through the bloodstream and lymphatic system to other parts of the body (NCI, n.d.). The cellular changes caused by cancer cells are complex and occur over a period of time. This may be accelerated in children. The classification of cancers in children differs from the classification used for adult cancers. The International Classification of Childhood Cancer classifies childhood cancer based on tumor morphology rather than, as for adults, the site of the tumor (Steliarova-Foucher et al., 2005).

As stated by NCI (2014), “The causes of most childhood cancers are not known. Most cancers in children, like those in adults, are thought to develop as a result of mutations in genes that lead to uncontrolled cell growth and eventually cancer.” Environmental exposures have long been suspected of increasing the risk of certain childhood cancers, such as exposure to ionizing radiation. Researchers continue to examine environmental influences on childhood cancer, such as prenatal pesticide exposure, parental exposure to carcinogenic substances, and exposure in childhood to infectious agents, but studies conducted to date have produced mixed outcomes ( NCI, 2014).

This indicator presents incidence rates for childhood cancers from 1973 to 2012 using data collected through the National Cancer Institute’s Surveillance, Epidemiology, and End Results (SEER) Program. The SEER Program collects and publishes cancer incidence and survival data from 9 (SEER 9), 13 (SEER 13), and 18 (SEER 18) population-based cancer registries, including state, central, metropolitan, and Alaska Native registries. This indicator uses data collected through NCI’s SEER 9 Registries, which cover nearly 10 percent of the U.S. population and have the most years of available data (NCI, 2015).

### What the Data Show

In general, overall childhood (ages 0-19 years) cancer incidence for the U.S. has increased slightly between 1973 and 2012 (Exhibit 1), increasing over time from an age-adjusted incidence rate of 13.8 per 100,000 in 1973 to a high of 18.1 per 100,000 in 2011, but then decreasing to 17.7 per 100,000 in 2012. From 1973 to 2012, males generally had higher childhood cancer incidence rates than females. In 2012, females and males age 0-19 years had overall incidence rates of 17.3 and 18.0 cases per 100,000, respectively. Whites consistently had higher rates than blacks from 1973 to 2012. In 2012, whites and blacks had overall incidence rates of 18.4 and 16.1 cases per 100,000, respectively (Exhibit 1).

Exhibit 2 presents the age-adjusted incidence rates for the top 10 cancers among children 0-19 years of age in 2012, and shows incidence rate trends for these 10 cancers between 1973 and 2012. In general, there are no clearly identifiable temporal trends in rates among any of the top 10 cancers over the reported time period. In 2012, leukemia continued to be the most frequently diagnosed cancer in children age 0-19 years (4.2 cases per 100,000) followed by brain and other nervous system cancers (2.9 cases per 100,000). The incidence rates of Hodgkin’s lymphoma, non-Hodgkin’s lymphoma, cancer of the soft tissue including heart, thyroid cancer, neuroblastoma, and bones and joints are all very similar, with rates ranging from 1 to 1.5 cases per 100,000. The remaining top 10 sites include cancer of the kidney and renal pelvis (0.5 cases per 100,000), and

melanoma of the skin and cancer of the eye and orbit, which are tied as the 10<sup>th</sup> top site (0.4 cases per 100,000).

## Limitations

- SEER 9 Registries data cover approximately 10 percent of the U.S. population, though it is designed to be representative of the entire U.S. population. EPA acknowledges that other cancer incidence data sources exist, and is examining and considering these other sources for future ROE updates.
- Incidence data generated from SEER are updated annually. There may be changes in the numerator (e.g., revised counts of newly identified cases) or denominator (e.g., revised population counts) numbers that result in small changes in the overall incidence rates for the same year, depending on when a query is run within the SEER database. For example, the SEER database queried in 2009 generating incidence rates for the year 2000 may provide different incidence rates than the database queried in 2008 for the year 2000.

## Data Sources

Cancer incidence data for this indicator were obtained by querying the National Cancer Institute's SEER Program database through its Cancer Query System (CanQues) (NCI, 2015), available at <http://seer.cancer.gov/canques/incidence.html>.

## References

NCI (National Cancer Institute). 2015. Surveillance, Epidemiology, and End Results (SEER) Program SEER\*Stat Database: Incidence - SEER 9 Regs Research Data, Nov 2014 Sub (1973-2012). National Cancer Institute, DCCPS, Surveillance Research Program, Surveillance Systems Branch, released April 2015, based on the November 2014 submission. Accessed November 18, 2015. <http://seer.cancer.gov/canques/incidence.html>.

NCI. 2014. National Cancer Institute fact sheet: Cancer in children and adolescents. Accessed November 23, 2015. Last reviewed May 12, 2014. <http://www.cancer.gov/types/childhood-cancers/child-adolescent-cancers-fact-sheet>.

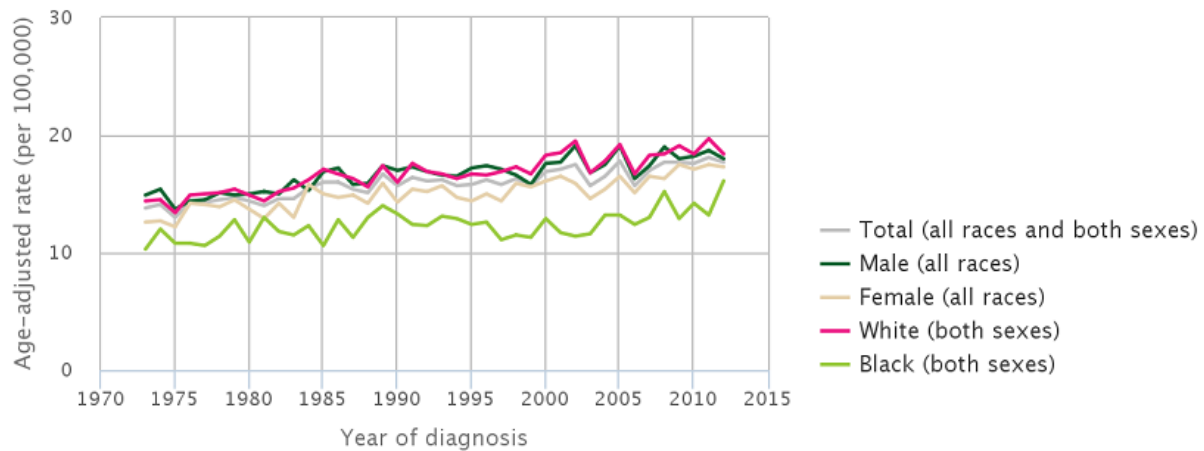
NCI. n.d. NCI dictionary of cancer terms. Accessed November 23, 2015. <http://www.cancer.gov/publications/dictionaries/cancer-terms>.

Steliarova-Foucher, E., C. Stiller, B. Lacour, and P. Kaatsch. 2005. International classification of childhood cancer, third edition. *Cancer* 103(7):1457-1467. <http://seer.cancer.gov/iccc/iccc3.html>.

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**Exhibit 1. Age-adjusted cancer incidence rates in the U.S., 1973–2012: All cancer sites for ages 0–19, by sex and race**

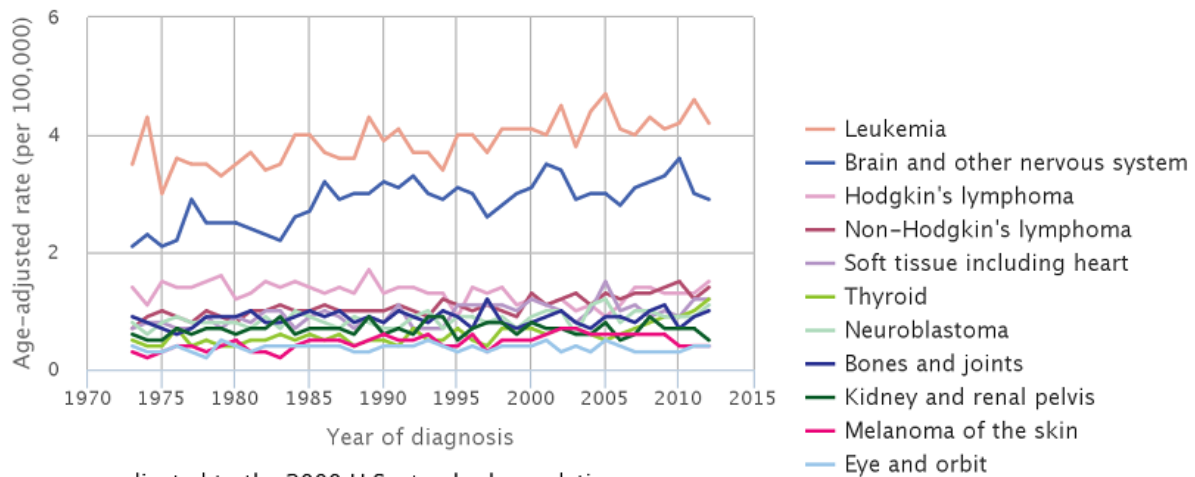


Rates are age-adjusted to the 2000 U.S. standard population.

Information on the statistical significance of the trends in this exhibit is not presented here. For more information about uncertainty, variability, and statistical analysis, view the technical documentation for this indicator.

Data source: NCI, 2015

**Exhibit 2. Age-adjusted cancer incidence rates in the U.S., 1973–2012: Top 10 cancers for ages 0–19**



Rates are age-adjusted to the 2000 U.S. standard population.

Information on the statistical significance of the trends in this exhibit is not presented here. For more information about uncertainty, variability, and statistical analysis, view the technical documentation for this indicator.

Data source: NCI, 2015