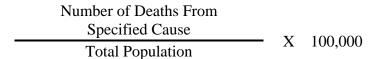# CAUSE-SPECIFIC DEATH RATE

1. Definition:

CAUSE-SPECIFIC DEATH RATE is the number of deaths from a specified cause per 100,000 person-years at risk. The numerator is typically restricted to resident deaths in a specific geographic area (country, state, county, etc.). Cause-specific death rates may be adjusted for the age and sex composition, or other characteristics of the population. When that is done, for instance, in the case of age adjustment, it is called an age-adjusted rate.

2. Calculation:

$$\frac{\text{Number of Deaths From Specified Cause}}{\text{Total Population}} \quad X \quad 100{,}000$$

3. Examples:

137 homicide deaths (ICD-10 X85-Y09, Y87.1, *U01-*U02) in New Mexico during calendar year 2006. 2,010,787 - estimated 2006 mid-year population. 6.8 homicide deaths per 100,000 population (person-years at risk) during calendar year 2006 in New Mexico.

$$137 / 2{,}010{,}787 * 100{,}000 = 6.8$$

6,309 colon cancer deaths (ICD-10: C18) in Illinois during calendar years 2003, 2004, 2005. 38,128,753 - sum of estimated 2003, 2004, 2005 mid-year populations. 16.5 colon cancer deaths per 100,000 population (person-years at risk) during calendar years 2003, 2004, 2005 in Illinois.

119.5 average annual Alzheimer's disease deaths (ICD-10: G30) in Salt Lake County, Utah during calendar years 2006 & 2007. 1,007,639 – average annual estimated 2006, 2007 mid-year Salt Lake County population. 11.9 Alzheimer's disease deaths per 100,000 population (person-years at risk) in Salt Lake County, Utah during calendar years 2006 & 2007.

4. Technical Notes:

- In order to provide a consistent ranking standard the NCHS (National Center for Health Statistics, part of the CDC) prepared a list of 113 selected causes of death. For more information about the NCHS rankings, see [Cause of Death Ranking](#) on the NCHS website.

- The term in the denominator is labeled "total population," but is technically known as the "person-years at risk." Denominators for certain diseases (such as breast cancer or prostate cancer) are calculated for a single sex, not the whole population. If the numerator uses the sum of the number of deaths across multiple years, the denominator should use the sum of the population over the same years. Alternatively, one could use the average annual deaths in the numerator and either the average annual population to represent person-years at risk, or the population in a single year in the middle of the time period.

- In order to determine reliability and the chance variation of a death or mortality rate (especially those based on smaller numbers of events) as well as to determine significant changes over time or significant differences when comparing rates (e.g. a county rate to

the state rate), it is highly recommended that a standard error or [confidence interval](#) (usually at 95%) be calculated and shown for the rates.

- The Division of Vital Statistics (DVS) at NCHS follows standards for use of the terms "death rate" and "mortality rate" in naming and reporting common vital statistics rates for deaths. The NAPHSIS standard measures shown here follow the DVS standards, primarily to maintain consistency with DVS for naming conventions. Please note that states/registration areas and other federal government organizations within and outside NCHS/CDC may not follow the DVS standards when naming and reporting death/mortality rates.

  - According to DVS standards, the following naming conventions are used for the common vital statistics rates for deaths:

Mortality Rates	Death Rates
Infant Mortality Rate	Crude Death Rate
Neonatal Mortality Rate	Age-Specific Death Rate
Postneonatal Mortality rate	Cause-Specific Death Rate
Perinatal Mortality Rate	Age-Adjusted Death Rate
Fetal Mortality Rate	
Maternal Mortality Rate	

- A crude, cause-specific death rate has four components:
  1. A specified measurement period.
  2. The numerator, the number of deaths from a specified cause that occurred in a specified geographic area during a given period of time, and
  3. The denominator, the total number of people in the population at risk in the same geographic area for the same period of time ("person-years at risk"). The population estimate used is typically the mid-year (July 1) population count estimate for the same year(s) included in the numerator.
  4. A constant. The result of the fraction is usually multiplied by some factor of 10 (such as 100,000), so that the rate may be expressed as a whole number.