

## Computation of Death Rates

In this report, total death rates and cause-specific death rates are expressed as resident deaths per 100,000 population. In 1999 and earlier editions of *Leading Causes of Death*, the total death rates were expressed per 1,000 population. To compare the total death rates in this edition to the total death rates published in 1999 and earlier editions, just move the decimal point two places to the left.

Deaths are assigned to cause-of-death categories based on the underlying (or primary) cause of death from the death certificate. Appendix B describes the cause-of-death categories in terms of codes from the tenth revision of the International Classification of Diseases. All rates in Tables 1-20 use total population in the denominator except rates for the sex-specific cancer sites use male or female population in the denominator. Population denominators for these rates were provided by the Office of State Planning. The infant mortality rates in Table 21 are computed as the number of resident deaths under one year of age per 1,000 resident live births.

Deaths in this report are assigned to place of residence. For deaths of people in long-term institutions (mental, penal, old age, orphan, nursing home, rest home, etc.), the institution is considered the usual residence if the decedent lived in the institution at least one year. College students and military personnel are considered residents of the college or military community.

The following definitions apply to the rates of this report:

**Unadjusted Annual Death Rate:** The annual death rates are computed as resident deaths per 100,000 population.

**Unadjusted 5-Year Death Rate:** The average annual death rates are computed as average resident deaths per 100,000 average population. These multi-year rates are computed by summing the deaths for the five years, summing the population for the five years, dividing the former by the latter, and then multiplying the result by 100,000. These rates are shown in the first set of county maps (Figures 1.A, 2.A, etc.).

**Age-Adjusted 5-Year Death Rate:** The average annual age-adjusted rates are computed by the direct method. These rates are also expressed as deaths per 100,000 population and represent the rate that would be expected if the age composition of the state and each county's population were the same as that projected for the nation in the year 2000 (the "standard" population). These rates are shown in the second set of county maps (Figures 1.B, 2.B, etc.).

The user should not compare an adjusted death rate to an unadjusted death rate. Also, adjusted rates for different time periods cannot be directly compared unless they were adjusted by the same standard population. See Appendix E for a more complete discussion of age-adjusted death rates.

The age-adjusted death rates in this 2004 edition of *Leading Causes of Death* were calculated using the projected United States 2000 population as the standard. In 1997 and earlier editions, different standard populations were used. Therefore the age-adjusted rates in the current edition cannot be compared to the age-adjusted rates in these older editions. When using older editions of *Leading Causes of Death*, please read the explanatory notes to understand the technical details of how the age-adjusted rates were calculated. The special, expanded 1998 edition of *Leading Causes of Death* includes five-year age-adjusted death rates, using the projected United States 2000 standard population, over a twenty year period (1979-1998) to allow for comparisons of the adjusted death rates over time. The death data were consistently coded under the ninth revision of the International Classification of Diseases from 1979 through 1998. The data from this 1998 publication are available on the State Center for Health Statistics Web site.

We changed the standard population to the projected United States 2000 population to be consistent with the new practices of the National Center for Health Statistics. This allows direct comparisons of the state and county age-adjusted death rates for North Carolina to the published United States age-adjusted death rates.

In age-adjusting the death rates in this publication, 10 age groups are used to compute age-specific death rates for each geographic area and cause of death. These rates are then applied to the projected 2000 United States standard population by age: 0-4, 5-14, 15-24, 25-34, 35-44, 45-54, 55-64, 65-74, 75-84, and 85+. For details of the age adjustment process, refer to Appendix E.

For the maps, the natural breaks method was used. This method identifies breakpoints by looking for groupings and patterns inherent in the data. These maps show five levels of death rates, where level one is the lowest rate interval and level five the highest.

A word of caution: Rates for sex-specific cancers (e.g., prostate) use male or female population in the denominator and therefore are not comparable to other rates. Therefore, in ranking the causes of cancer death by site one must use the observed number of deaths rather than the rates.

## Interpretation of Death Rates

To assess a county's relative mortality during a multi-year period, both the unadjusted and the adjusted rate can be compared to the corresponding state rates for a particular cause of death. This, of course, should not be done if the county's unadjusted rate has fluctuated widely in recent years. The rate should represent a relatively stable situation. Then, the following alternative interpretations will apply:

Relative Status Of Unadjusted Rate	Adjusted Rate	Interpretation of Unadjusted Rate
Low	Low	Low mortality is not due to age, other mortality conditions are favorable.
Low	High	Low mortality is due to favorable age distribution, other mortality conditions are unfavorable.
High	Low	High mortality is due to unfavorable age distribution, other mortality conditions are favorable.
High	High	High mortality is not due to age, other mortality conditions are unfavorable.

**Caution:** In assessing the relative mortality of a county, be particularly aware of rates based on a small number of deaths (fewer than 20 deaths). Read carefully the next section on "Caution About Use of Rates."

## Caution About Use of Rates

### **Small Number of Events:**

Any death rate with a small number of deaths in the numerator will have substantial random variation over time (a large standard error). A good rule of thumb is that any rate based on fewer than 20 events in the numerator may be subject to serious random error. Therefore, extreme caution should be taken when making comparisons or assessing trends with rates calculated with fewer than 20 events. Many of the death rates in this report have numerators smaller than 20. For a detailed discussion of Problems with Rates Based on Small Numbers, refer to Statistical Primer No. 12 of the State Center for Health Statistics, available on our Web site at <http://www.schs.state.nc.us/SCHS/pdf/primer12.pdf> or by request.

### **Age-Adjusted Death Rates:**

Unadjusted death rates are affected by the demographic composition of populations. Therefore, differences in the age distribution from one geographic area to another or from one point in time to another may hinder comparisons. The standardized adjustment of rates addresses this problem. The age-adjusted rate is a hypothetical rate computed in a way that reflects what the death rate would be in a particular geographic area, if the geographic area had the same age composition of the standard population. The measure, while useful for comparative purposes across time and geographic area, has no descriptive value in itself. The adjusted rate provides opportunities for comparisons across time and geographic area as long as all rates that are to be compared are adjusted to the same standard population. For more information on age-adjusted death rates, see Appendix E.