Introduction to Mortality Statistics

The mortality section of the Minnesota County Health Tables provides data on deaths to residents of Minnesota, including number of deaths, crude death rates, age-adjusted death rates, age-specific death rates, the 15 leading causes of death and premature death rate by top 10 leading causes of death. All data are presented for the most current year available with the exception of the premature deaths; due to small numbers of deaths, a 5-year grouping is provided for premature deaths. This introduction provides an overview of mortality (death) statistics, how death rates are calculated and how to use these statistics.

Crude Death Rate

A crude death rate is a good measure of the overall magnitude of mortality in a population. The crude rate is useful information for some purposes, such as planning for the delivery of health care services. One should be cautious when comparing a crude death rate over time or to another county or Community Health Board (CHB). Be aware that differences in the crude rate may be due to older populations.

A crude death rate is simply the number of deaths divided by the total population, often multiplied by some constant so that the result is not a fraction (for death rates 100,000 is the most commonly used multiplier).

\[
\text{Crude Death Rate} = \frac{\text{Number of Deaths}}{\text{Estimated Population}} \times \text{Multiplier}
\]

Mortality Table 1 includes crude death rates for the state of Minnesota, its counties and community health boards (multi-county regions).

Age-specific death rates

An age-specific death rate is useful for examining the influence an age group has on the overall crude death rate. Mortality Table 3 shows age-specific death rates for the state of Minnesota, its counties and CHBs, using eight common age groupings. Note that the death rate for ages 0-4 is substantially higher than the death rates for the other younger age groups (primarily due to high death rates during infancy); only at ages 45-54 does the death rate begins to exceed that for ages 0-4. It can be immediately seen that the death rates are many times higher in the oldest age groups. Therefore, a county or CHB with an older population will automatically have a higher overall death rate than an area with a younger population.

An age-specific death rate is calculated as the number of deaths to an age group divided by the population for that age group, often multiplied by some constant so that the result is not a fraction (for death rates - 100,000 is the most commonly used multiplier).

\[
\text{Age Specific Death Rate} = \frac{\text{Number of Deaths in Age Group}}{\text{Estimated Population in Age Group}} \times \text{Multiplier}
\]
Premature Death Rate (PDR)

Almost 4 out of every 10 deaths to Minnesota residents occur to people under 75 years of age. Thus, it is also important to investigate deaths to younger Minnesotans, called “premature deaths”. By examining premature deaths to younger persons, it may be possible to identify counties or CHBs where deaths from certain causes may be more prevalent among younger residents.

The premature death rate for those under age 75 is calculated as the number of deaths to residents under age 75 per 100,000 persons age-adjusted to the 2000 U.S. standard population. For more information on PDRs, go to: Pennsylvania Department of Health, Tools of the Trade, Premature Mortality Rates

http://www.portal.state.pa.us/portal/server.pt?open=514&objID=556449&mode=2

Mortality Tables 1 and 5 of the Minnesota County Health Tables include the number of premature deaths to those under age 75, as well as premature death rates (age-adjusted). Mortality Table 5 provides PDRs for the top 10 leading causes of death in Minnesota for the most recent 5 year time period, and ranks these causes. This table demonstrates the influence that chronic conditions among those 75 and older have on the overall rankings of causes of death. For the 2007-2011 time period, the top 5 leading causes of death in Minnesota were cancer, heart disease, stroke, chronic lower respiratory disease and unintentional injury (Figure 1).

However, for those under 75 years of age, unintentional injury was the third leading cause of death and suicide was the fifth. Mortality Table 5 can be used to compare the rankings between overall deaths and premature deaths and to better understand the major causes of death to the younger population.

<table>
<thead>
<tr>
<th>Rank</th>
<th>All Deaths</th>
<th>Under 75 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cancer</td>
<td>Cancer</td>
</tr>
<tr>
<td>2</td>
<td>Heart Disease</td>
<td>Heart Disease</td>
</tr>
<tr>
<td>3</td>
<td>Stroke</td>
<td>Unintentional Injury</td>
</tr>
<tr>
<td>4</td>
<td>Chronic Lower Respiratory Disease</td>
<td>Chronic Lower Respiratory Disease</td>
</tr>
<tr>
<td>5</td>
<td>Unintentional Injury</td>
<td>Suicide</td>
</tr>
</tbody>
</table>

*based on age-adjusted death rates (Mortality Table 5)

Age-adjusted Death Rates

Age adjusting rates is a way to make fairer comparisons between counties/CHBs with different age distributions. For example, a county having a higher percentage of elderly people may have a higher crude death rate than a county with a younger population merely because the elderly are more likely to die. Age-adjusted death rates are used to eliminate this age bias in the makeup of the populations being compared, thereby providing a much more reliable rate for comparison purposes.

The age-adjusted rates provided in Mortality Tables 1 and 5 are calculated using the “direct method” of age adjustment. For more information on age adjusting death rates, go to: Centers for Disease Control and Prevention, Healthy People 2000 Statistical Notes, Direct Standardization (Age-Adjusted Death Rates)

http://www.cdc.gov/nchs/data/statnt/statnt06rv.pdf
A Comparison of Two Counties

This next section will compare the various death rates of two counties to demonstrate the differences in the four types of rates and how they may be used. The two counties, Aitkin and Carver, were chosen because their age distributions are dramatically different, with Aitkin having a higher percentage of elderly residents and Carver having a much higher percentage of youth (Figure 2).

![Figure 2: Population Pyramids for Aitkin and Carver Counties, Minnesota 2011](image)

Figure 2: Population Pyramids for Aitkin and Carver Counties, Minnesota 2011

Death Rates for Aitkin and Carver Counties

<table>
<thead>
<tr>
<th>County</th>
<th>Crude</th>
<th>Age-Adjusted</th>
<th>55-64 years*</th>
<th>75+ years*</th>
<th>Premature (under 75 years)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aitkin</td>
<td>1,424.2</td>
<td>799.4</td>
<td>751.9</td>
<td>7,734.5</td>
<td>354.4</td>
</tr>
<tr>
<td>Carver</td>
<td>452.3</td>
<td>612.8</td>
<td>458.1</td>
<td>7,099.8</td>
<td>196.2</td>
</tr>
</tbody>
</table>

Source: MDH, Center for Health Statistics

*Per 100,000 of the specific age group

Aitkin County’s **crude death rate** is three times higher than Carver County’s rate.

This means that a greater proportion of Aitkin County’s residents are dying than Carver County residents. The major reason for the high crude death rate for Aitkin is that Aitkin has an older population. Counties like Aitkin with higher percentages of older residents will almost always have much higher crude death rates for all deaths as well as for deaths due to major chronic conditions, compared to counties with younger populations. Conversely, counties with younger populations will tend to have higher crude rates for deaths due to unintentional injuries, especially motor vehicle crashes.

Aitkin County’s **age-adjusted death rate** is 799.4 compared to 612.8 per 100,000 for Carver County.

Once the death rates are adjusted for the variation in ages, the difference in the rates is not so extreme. But the fact that a difference remains after age adjusting also tells us that the higher rate of
death for Aitkin County is not simply due to age. There may be other factors in play, including lifestyle choices, environmental conditions and access to health care.

Aitkin’s **age-specific death rates** for 55-64 year olds and 75+ year olds are higher than Carver’s death rates for these age groups. For both counties, the 75+ age group rates are 10 to 15 times higher than the rates for the 55-64 age group.

Age-specific death rates are used to understand the influence that each age group has on the overall crude death rate. As with the age-adjusted rate, this tells us that the differences in crude death rates between Aitkin and Carver may not solely be attributed to age.

The Aitkin County **premature death rate (PDR)** is almost twice the premature death rate of Carver County.

PDRs are used to examine deaths to the younger population. Again, the PDR difference reaffirms that the difference in crude death rate between Aitkin and Carver are not solely due to age. A next step in this analysis is to look at the premature death rates by cause (Figure 4). PDRs by cause provide insight into the health of your county or CHB’s younger population and the influence non-chronic conditions have on this population.

Figure 4 compares the premature death rates to the overall death rates for certain causes for Aitkin and also shows the Carver County rates.

**Figure 4: Comparison of Selected Premature Deaths Rates (PDR) to Overall Death Rates**

<table>
<thead>
<tr>
<th>Cause</th>
<th>Aitkin County</th>
<th>Carver County</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PDR*</td>
<td>Overall Death Rate</td>
</tr>
<tr>
<td>Cancer</td>
<td>98.8</td>
<td>150.9</td>
</tr>
<tr>
<td>Heart Disease</td>
<td>52.8</td>
<td>138.0</td>
</tr>
<tr>
<td>Unintentional Injury</td>
<td>44.0</td>
<td>41.3</td>
</tr>
<tr>
<td>CLRD</td>
<td>17.9</td>
<td>27.4</td>
</tr>
<tr>
<td>Stroke</td>
<td>16.8</td>
<td>27.6</td>
</tr>
</tbody>
</table>

Source: MDH, Center for Health Statistics, Minnesota County Health Tables 2012, Mortality Table 5

*Per 100,000 under age 75 age-adjusted to the 2000 US standard population

**Figure 4 analysis:**

- For the two counties, all the overall death rates are higher than the PDR except for Aitkin County’s unintentional injury rate.

- Aitkin County’s PDRs for heart disease, unintentional injury and CLRD are two times higher and stroke is three times higher than Carver County’s PDRs.

- For overall death rates, Aitkin County’s rates are either equal to or lower than Carver County’s rates with the exception of unintentional injury. UI rate for Aitkin is twice the rate of Carver.

- For PDRs, Aitkin County’s rates are 1.3 to 2.9 times higher than Carver County’s PDRs.
These data warrant further investigation of premature deaths especially unintentional injury deaths in Aitkin County. Aitkin County may want to know what types of unintentional injury deaths are most common in their county (see MCHT injury section) and the incidence and hospitalization rates of chronic conditions (see MCHT morbidity section). They may also want to assess the risk behaviors (see MCHT morbidity section or local surveys) and social determinants of health (see MCHT demographic section) that affect death rates.

Summary

The death rates in the mortality section of the county health tables can be useful in your assessment of your community’s health. Crude rates can give you a general sense of the magnitude of mortality in your county or CHB; age-adjusted rates allow you to compare your county or CHB to others; age-specific rates provide an understanding of the influence that different age groups have on mortality; and premature death rates provide a picture of deaths among the younger population. Additional death data are available at the Minnesota Department of Health and the Centers for Disease Control and Prevention, including:

Minnesota Vital Statistics Interactive Queries Website
A query system that includes deaths by county, age, cause, gender and race/ethnicity
https://pqc.health.state.mn.us/mhsq/index.jsp

Minnesota Vital Statistics State, County, and Community Health Board Trend Reports
Reports include the 5-year rates for the cancer heart disease, stroke, and unintentional injury
http://www.health.state.mn.us/divs/chs/trends/index.html

Minnesota Injury Data Access System (MIDAS)
A query system of injury and violence data for Minnesotans by county, injury type, gender, outcome (fatal/non-fatal)
http://www.health.state.mn.us/injury/midas/ub92/

CDC Wonder
WONDER online databases utilize a rich ad-hoc query system for the analysis of public health data
http://wonder.cdc.gov/