## 2B.

## LEADING CAUSES OF DEATH

Beginning with the 2000 data year in Arizona (1999 nationally) two major changes have occurred that affect the computation of mortality rates, tabulation of leading causes of death and analyses of mortality data over time. First, a new revision of the International Classification of Diseases (ICD), used to classify causes of death, was implemented. The Tenth Revision (ICD-10) has replaced the Ninth Revision (ICD-9), which was in effect since 1979. Second, a new population standard for the age adjustment of mortality rates has replaced the standard based on the 1940 population and used since 1943. The new set of age-adjustment weights uses the year 2000 estimated U.S. population as a standard.

Both changes have profound effects on the comparability of mortality data and continuity in statistical trends. Age-adjusted rates can only be compared to other age-adjusted rates that use the same population standard. In this report, ALL age-adjusted mortality rates (including those for 1980, 1990, and 1997-2007) are based on the (new) 2000 standard, and they CANNOT BE compared to rates using the 1940 standard population. This is because the age structures of the 1940 and year 2000 populations differ. From 1940 to 2000 the U.S. population "aged" considerably. The age-adjusted rates based on the year 2000 standard are different because the year 2000 population standard, which has an older age structure, gives more weight than the 1940 standard to death rates at older ages where mortality is higher. More than 1,800 age-adjusted mortality rates in this report were recomputed for the new population standard so that mortality rates can be compared over time. Beginning with the 2008 edition of this report we have added the recomputed age-adjusted mortality rates for 1991-1999 for the fifteen leading causes of death in Table 2B-3.

Breaks in comparability of mortality statistics effective with deaths occurring in 2000 also result from the implementation of ICD-10. ICD-10 is far more detailed than ICD-9, with about 8,000 categories compared with about 5,000 categories. Some of the coding rules and rules for selecting the underlying cause of death have been changed. Moreover, cause-of-death titles have been changed and the cause-of-death categories regrouped.

The new population standard and the revision of the ICD are not the only factors affecting the comparability of cause of death and the continuity of statistical trends in mortality. The mortality data for Arizona residents for 1999-2008 are not quite as complete as they used to be. There seems to be a problem with the out-of-State deaths of the residents of Arizona: their records (copies of death certificates from other states) are not always sent to the Office of Vital Records of the Arizona Department of Health Services:

| Data year | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Reported out-of-State deaths of AZ residents | 1,569 | 792 | 844 | 1,009 | 678 | 640 | 714 | 553 | 493 | 518 | 727 |

Since mortality rates express the likelihood (or risk) of death in a specified population (i.e., all Arizona residents) regardless of the place of occurrence, missing data about the number of events in the numerator (i.e., resident deaths occurring out-of-State) continue to contribute to misrepresentation of mortality risks for Arizonans.

In particular, mortality rates for 1999-2008 were understated because the numerators used to calculate them were too small.

Another disturbing peculiarity of the mortality data collection in 2000 – 2007, are records where cause of death is missing (i.e. the ICD-10 code for the underlying cause of death). The majority of those records are, again, for Arizonans who died outside Arizona. Unfortunately, missing cause of death accounted for 970 records in 2001, almost as many as diabetes (1,040 deaths), and the eight leading cause of death in 2001.

| Data year | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Missing cause of death | 12 | 11 | 197 | 970 | 704 | 532 | 118 | 37 | 0 | 36 | 140 |

As a result, the cause-of-death-specific numbers and rates for 2000-2008 also have been understated.

Last but not least, before data for 2000, mortality medical information was based on manual coding of an underlying death for each certificate in accordance with WHO rules, and done locally by the Office of Vital Records. Effective with the 2000 data year, cause-of-death data presented in this publication were coded, using computerized procedures of SuperMICAR (Mortality Medical Indexing and Retrieval) and ACME (Automated Classification of Medical Entities) systems.

The conversion to computerized coding contributed to at least some of the breaks in comparability over time of cause-of-death statistics for *drug-induced deaths*, *intentional self-harm (suicide)*, *firearm-suicide*, and *accidental discharge of firearms*:

| Data year | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|---|---|---|
| Drug-induced deaths | 543 | 331 | 577 | 645 | 646 | 745 | 799 | 903 | 940 | 523 |
| Suicide | 773 | 737 | 600 | 855 | 807 | 854 | 915 | 948 | 986 | 876 |
| Suicide by firearms | 495 | 486 | 358 | 544 | 476 | 498 | 507 | 554 | 541 | 529 |
| Accidental discharge of firearms | 7 | 11 | 114 | 26 | 13 | 13 | 15 | 9 | 13 | 9 |

Unprecedented decline in 2001 in the number of suicides and the equally unprecedented increase in the number of firearm deaths classified as accidental are obviously associated. Approximately 100 firearm fatalities, that would have been classified as suicides had the manual coding system been in place, were classified as accidents in 2001 because the "manner of death" was not indicated and the automated coding system defaulted to accidental injury.

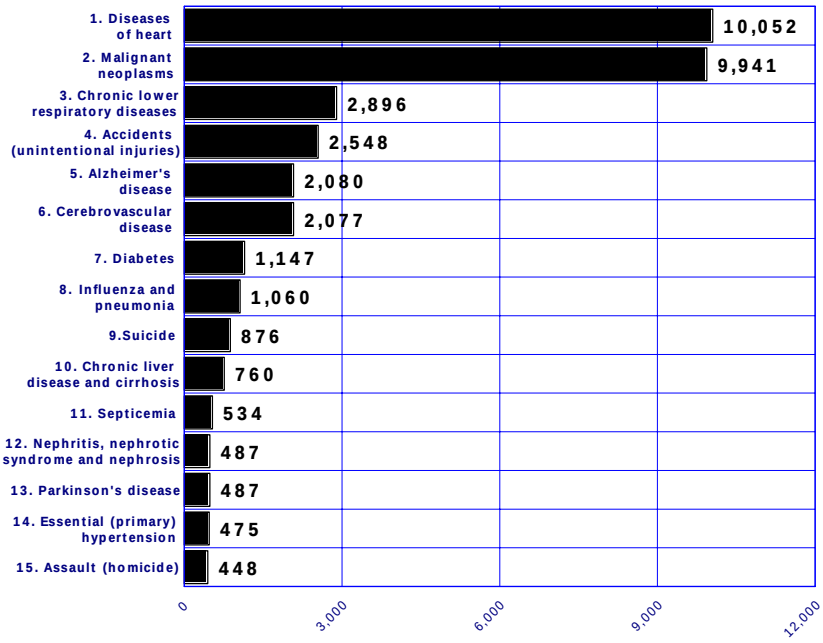
Coding of "non-alcoholic" conditions as "alcoholic" is another (discovered in June 2007) and now corrected problem with SuperMICAR.

Beginning in 2000 the mode of transport has been unknown for the majority of the motor vehicle fatalities. It is another unintended result of the implementation of automated coding of the underlying causes of death. In 2008, among the 874 motor vehicle-related deaths, the mode of transport was unknown for 517. Fortunately, the ICD-10 categories V98 and V88 exclude collisions involving motorcycle riders, pedal cyclists, and pedestrians. However, we have lost the ability to properly identify other types of victims of motor vehicle accidents, such as drivers, non-driving passengers of motor vehicles, persons on outside of vehicle, or persons injured while boarding or alighting. Unfortunately, it is not possible to design an effective prevention strategy without taking into consideration characteristics of victims of motor vehicle accidents. Air bags and seat belts are known to decrease the number of serious injuries and fatalities among the occupants of motor vehicles, but they do nothing for persons outside of vehicles. Similarly, wearing a helmet may work well for a motorcycle rider but it's unlikely to help a pedestrian.

Some experience is usually necessary before the data is collected and coded as accurately and completely as possible in changed circumstances. Data in future years will indicate if this assumption is reasonable.

**Figure 2B-1A**
**Leading Causes of Death among Arizona Residents in 2008**

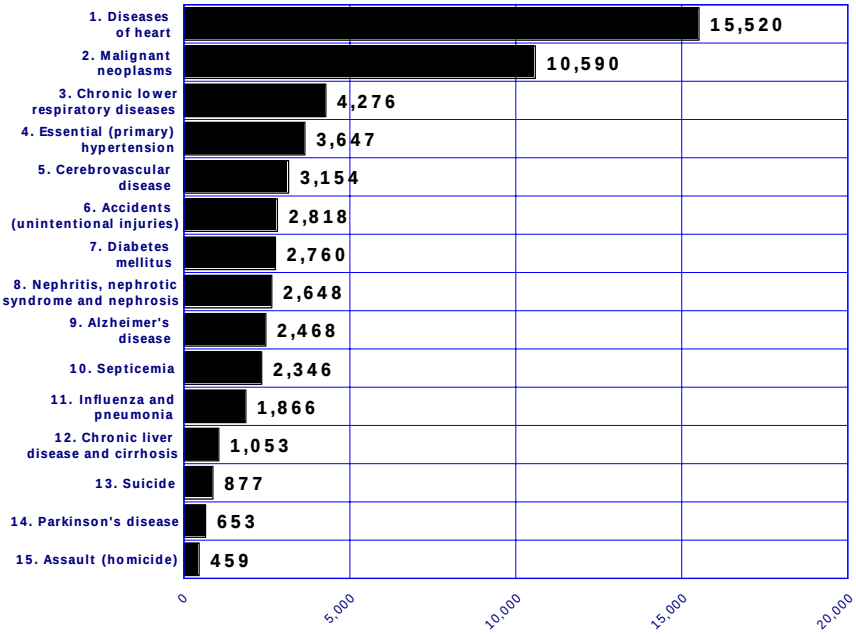
**BASED ON THE NUMBER OF DEATHS DUE TO THE UNDERLYING CAUSE:**




The leading underlying cause of death to Arizona residents in 2008 continued to be *heart disease*, which accounted for 10,052 or 22.3 percent of all deaths (**Figure 2B-1A**, **Table 2B-1**, **Table 5E-14**). *Cancer* remained the second most frequent cause of death to residents of the state, being responsible for 22.0 percent of all deaths in 2008. Deaths due to *chronic lower respiratory diseases (*a title change from ICD-9 title *chronic obstructive pulmonary disease*) ranked third in 2008, with 2,896 resident deaths reported. The fourth leading cause of death, *accidents (unintentional injuries)* accounted for 2,548 or 5.6 percent of total deaths. Deaths due to *Alzheimer's disease* ranked fifth in 2008, with 2,080 resident deaths reported. Together, these five causes accounted for 61.0 percent of total deaths in 2008. The fifteen leading causes accounted for 79.5 percent of all deaths among Arizona residents.

**Figure 2B-1B**
**Leading Causes of Death among Arizona Residents in 2008**

**BASED ON THE NUMBER OF DEATHS DUE TO ANY MENTION OF A CAUSE:**




For the purpose of mortality statistics, every death is attributed to one underlying condition or underlying cause of death. The underlying cause is defined as the disease or injury that initiated the chain of events leading directly to death. It is selected from up to 20 causes and conditions entered by the physician on the death certificate. The totality of all these conditions is known as multiple cause of death.

In addition to 10,052 deaths that had diseases of the heart assigned as the underlying cause, another 5,468 deaths had diseases of the heart assigned as the other than underlying cause. The sum of these two counts (15,520, **Figure 2B-1B**) is the total number of deaths that had any mention of diseases of the heart on the 2008 death certificates. The ranking based on any mention of the 15 diagnostic categories is different from ranking of the leading causes of death based on the underlying cause. In particular, essential (primary) hypertension ranked 14$^{th}$ as the underlying cause but ranked 4$^{th}$ when any mention of it is counted.

It is important to note that Figure 2B-2, 2B-3, 2B-4, and 2B-5 are based on the age-adjusted mortality rates and not on the number of deaths.

In 2008, diseases of the heart were the leading cause of death for three of the five race/ethnic groups in Arizona: American Indians, Blacks or African Americans, and Hispanics or Latinos (**Figure 2B-2, Table 2B-4**). Cancer was the number one cause among Asians or Pacific Islanders and White non-Hispanics. Unintentional injury was the third leading cause of death only for American Indians. For Asians and Hispanics, stroke was the 3rd leading cause of death in 2008. Diabetes was among the top five causes of death among American Indians and Hispanics, but not among Asians, Blacks or White non-Hispanics (**Table 2B-4**).

Alzheimer's disease was the third leading cause of death for Black or African Americans, and the fifth leading cause of death only among Asians and White non-Hispanics. Chronic liver disease and cirrhosis was the fifth leading cause of death specific to American Indians. Chronic lower respiratory diseases were the third leading cause of death specific to White non-Hispanics.

**Figure 2B-2**
**Age-adjusted* Mortality Rates for the Five Leading Causes of Death for Both Genders by Race/Ethnicity, Arizona, 2008**

| Rank | Asian or Pacific Islander | American Indian or Alaska Native | Black or African American | Hispanic or Latino | White non-Hispanic |
|---|---|---|---|---|---|
| 1 | Cancer 104.4 | Diseases of heart 113.5 | Diseases of heart 153.7 | Diseases of heart 129.0 | Cancer 150.2 |
| 2 | Diseases of heart 69.9 | Cancer 106.7 | Cancer 149.2 | Cancer 123.8 | Diseases of heart 149.0 |
| 3 | Stroke 36.2 | Unintentional injury 86.0 | Alzheimer's 42.5 | Stroke 33.4 | Chronic lower respiratory diseases 46.7 |
| 4 | Unintentional injury 22.9 | Diabetes 49.9 | Stroke 39.4 | Unintentional injury 30.8 | Unintentional injury 37.8 |
| 5 | Alzheimer's disease 18.4 | Chronic liver disease and cirrhosis 40.3 | Unintentional injury 35.1 | Diabetes 28.9 | Alzheimer's disease 30.5 |

Number of deaths per 100,000 population age-adjusted to the 2000 U.S. standard.

Except American Indians, cancer, not diseases of the heart, was the number one cause of death among females in all other race/ethnic groups (**Figure 2B-3**, **Table 2B-4**). Diseases of the heart were the 2nd leading cause of female mortality among Asians, Blacks or African Americans, Hispanics or Latinos, and White non-Hispanic females. Alzheimer's disease was the 3rd leading cause of mortality among Black or African American females, and the 4th leading cause among Asian, Hispanic, and White non-Hispanic females. Influenza and pneumonia was the fifth leading cause of death specific to American Indian females. Chronic lower respiratory diseases were the third leading cause of death specific to White non-Hispanic females.

**Figure 2B-3**
**Age-adjusted* Mortality Rates for the Five Leading Causes of Death by Race/Ethnicity among Females, Arizona, 2008**

| Rank | Asian or Pacific Islander | American Indian or Alaska Native | Black or African American | Hispanic or Latino | White non-Hispanic |
|---|---|---|---|---|---|
| 1 | Cancer 74.0 | Disease of heart 103.1 | Cancer 146.3 | Cancer 101.6 | Cancer 126.8 |
| 2 | Diseases of heart 55.7 | Cancer 93.2 | Diseases of heart 142.5 | Diseases of heart 100.3 | Diseases of heart 114.3 |
| 3 | Stroke 38.9 | Diabetes 52.1 | Alzheimer's disease 53.5 | Stroke 31.9 | Chronic lower respiratory diseases 43.7 |
| 4 | Alzheimer's disease 22.5 | Unintentional injury 44.4 | Stroke 37.5 | Alzheimer's disease 30.4 | Alzheimer's disease 34.2 |
| 5 | Unintentional injury 16.3 | Influenza & pneumonia 33.3 | Diabetes 29.2 | Diabetes 27.7 | Stroke 29.7 |

Number of deaths per 100,000 population to the 2000 U.S. standard.

### Figure 2B-4
### Age-adjusted* Mortality Rates for the Five Leading Causes of Death by Race/Ethnicity among Males, Arizona, 2008

| Rank | Asian or Pacific Islander | American Indian or Alaska Native | Black or African American | Hispanic or Latino | White non-Hispanic |
|---|---|---|---|---|---|
| 1 | Cancer 149.4 | Unintentional injury 132.6 | Diseases of heart 164.1 | Diseases of heart 161.2 | Diseases of heart 190.0 |
| 2 | Diseases of heart 90.4 | Diseases of heart 127.5 | Cancer 150.1 | Cancer 151.8 | Cancer 179.5 |
| 3 | Stroke 32.8 | Cancer 126.4 | Stroke 42.9 | Unintentional injury 41.7 | Chronic lower respiratory disease 50.8 |
| 4 | Unintentional injury 31.1 | Chronic liver disease and cirrhosis 52.1 | Unintentional injury 40.6 | Stroke 34.3 | Unintentional injury 50.4 |
| 5 | Influenza and pneumonia 27.8 | Diabetes 46.4 | Diabetes 35.4 | Diabetes 29.4 | Stroke 27.8 |

Number of deaths per 100,000 population to the 2000 U.S. standard.

Diseases of the heart followed by cancer were the two leading causes of death among Black, Hispanic, and White non-Hispanic males (**Figure 2B-4**; **Table 2B-4**). Unintentional injury was the first leading cause of death among American Indian males, followed by diseases of the heart and cancer. In 2008, cancer was the number one cause of deaths among Asian males.

In 2008, based on the age-adjusted mortality rates, diabetes was the 5th leading cause for American Indian, Black, and Hispanic males.

### Figure 2B-5
### Age-adjusted* Mortality Rates for the Five Leading Causes of Death by Gender in Urban** and Rural Areas, Arizona, 2008

| Rank | Urban male | Urban female | Rural male | Rural female |
|---|---|---|---|---|
| 1 | Diseases of heart 177.6 | Cancer 121.5 | Diseases of heart 210.4 | Cancer 127.1 |
| 2 | Cancer 168.8 | Diseases of heart 110.5 | Cancer 191.4 | Diseases of heart 122.0 |
| 3 | Unintentional injury 45.9 | Chronic lower respiratory diseases 37.7 | Unintentional injury 77.6 | Chronic lower respiratory diseases 44.0 |
| 4 | Chronic lower respiratory diseases 45.1 | Alzheimer's disease 34.8 | Chronic lower respiratory diseases 51.4 | Unintentional injury 35.7 |
| 5 | Stroke 28.7 | Stroke 29.3 | Stroke 31.5 | Stroke 34.3 |

Number of deaths per 100,000 population age-adjusted to the 2000 U.S. standard.
**Urban = Maricopa, Pima, Pinal and Yuma counties. The remaining counties comprise Arizona's rural areas.

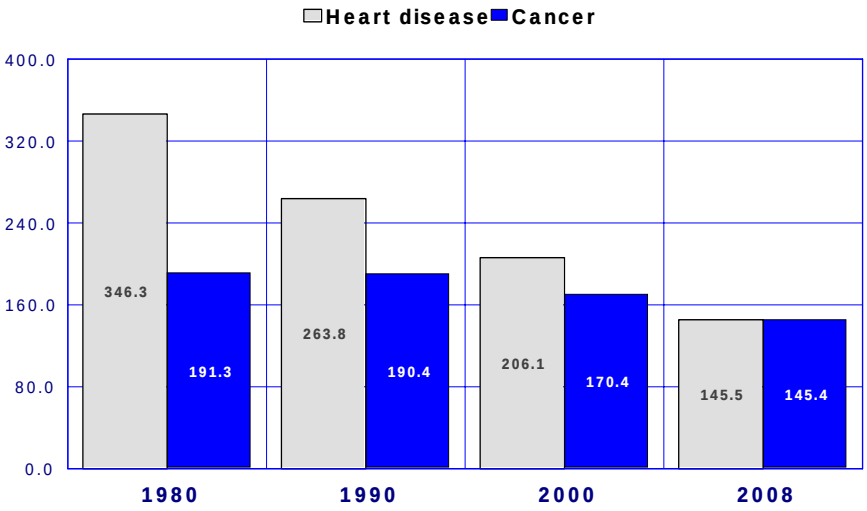
In 2008, the profile of the leading causes of death differed by gender for the residents of the urban (Maricopa, Pima, Pinal, and Yuma counties) and rural (all the remaining counties) areas of the State (**Figure 2B-5**, **Table 2B-5**). For both urban and rural males, diseases of the heart were the leading cause of death with cancer, unintentional injuries, and chronic lower respiratory diseases in second, third, and fourth positions respectively. Cancer exceeded diseases of the heart as the leading cause of death among both urban and rural females. Stroke, was the fifth leading cause of death in urban and rural areas regardless of gender. Alzheimer's disease was the fourth leading cause of death among urban females.

The age-adjusted mortality rate for diseases of the heart decreased by 58.0 percent from 346.3 deaths per 100,000 population in 1980 to 145.5/100,000 in 2008 (**Figure 2B-6**). The age-adjusted mortality rate for cancer declined substantially less by 24.0 percent during 1980-2008. In Arizona, the relative risk of death from the two leading causes narrowed from 81 percent greater for heart disease in 1980 to 0.1 percent greater in 2008.

In 2000, 1,436 more Arizonans died from diseases of the heart than cancer (**Table 2B-1**). In 2008, the number of deaths from heart disease exceeded the number of cancer deaths by 111.

The unintended consequence of the reduction in heart disease mortality is that cancer, in the near future, will replace diseases of the heart as the leading cause of death.

**Figure 2B-6**
**Comparison of Age-adjusted* Mortality Rates for Heart Disease and Cancer (Malignant Neoplasm), Arizona, 1980, 1990, 2000 and 2008**

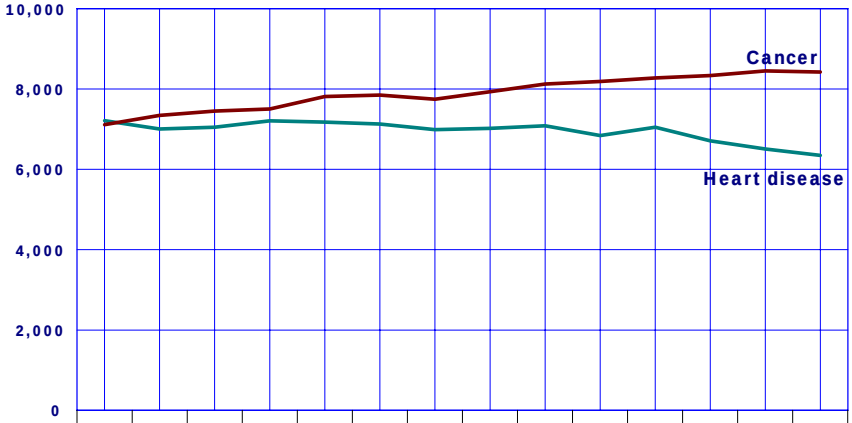



*Adjusted to the 2000 standard U.S. population.

The prediction, that "in the early 21st century cancer will displace heart disease as the leading cause of death", was originally published in the 1990 edition of the *Arizona Health Status and Vital Statistics* report (p.90).

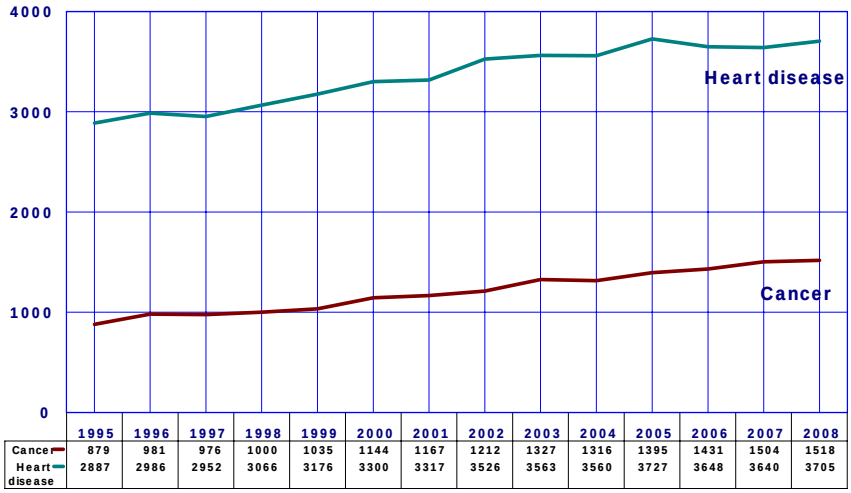
In fact, for the past ten years cancer has already been the number one cause of death among Arizonans aged 0-84 years (**Figure 2B-7**). Beginning in 1996, the annual number of cancer deaths exceeded the number of deaths from heart disease. In 2008, 2,076 more Arizonans 0-84 years old died from cancer (8,423) than heart disease (6,347).

**Figure 2B-7**
**Number of Deaths from Heart Disease and Cancer among Arizonans 0-84 Years, 1995-2008**




| | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cancer | 7,112 | 7,345 | 7,453 | 7,502 | 7,815 | 7,849 | 7,745 | 7,936 | 8,123 | 8,190 | 8,278 | 8,336 | 8,451 | 8,423 |
| Heart disease | 7,214 | 7,005 | 7,048 | 7,210 | 7,177 | 7,128 | 6,989 | 7,023 | 7,084 | 6,841 | 7,047 | 6,712 | 6,507 | 6,347 |

**Figure 2B-8**
**Deaths from Heart Disease and Cancer among Arizonans 85+, 1995-2008**

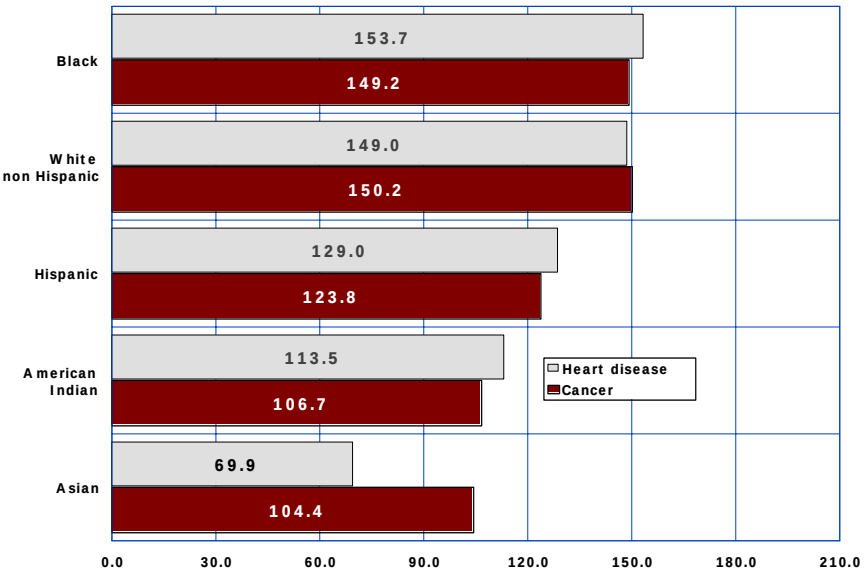



| | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cancer | 879 | 981 | 976 | 1000 | 1035 | 1144 | 1167 | 1212 | 1327 | 1316 | 1395 | 1431 | 1504 | 1518 |
| Heart disease | 2887 | 2986 | 2952 | 3066 | 3176 | 3300 | 3317 | 3526 | 3563 | 3560 | 3727 | 3648 | 3640 | 3705 |

It is only among the oldest, 85 or older, that heart disease continues to be the number one cause of death (**Figure 2B-8**). In 2008, the elderly aged 85 years or older accounted for 15.3 percent of all deaths from cancer but 36.9 percent of all deaths from heart disease. In 2008, the median age at death from heart disease was 81 years (**Table 2D-3**) and only a minority of deaths (41.0 percent, **Table 2D-4**) was premature, i.e., before reaching the expected years of life at birth for all U.S. residents (77.9 years in 2006).

From 1995 to 2008, the number of deaths from cancer increased by 72.8 percent among Arizonans 85 years or older, a 2.6 times greater rise than the one seen for diseases of the heart (a 28.3 percent increase).

**Figure 2B-9**
**Age-adjusted Mortality Rates for Heart Disease and Cancer by Race/Ethnicity, Arizona, 2008**




Arizona's Blacks were 2.2 times more likely to die from diseases of the heart and 1.4 times more likely to die from malignant neoplasms in 2008 than Asians, the group at the lowest risk of both heart disease and cancer death among race/ethnic groups (**Figure 2B-9**, **Table 2B-4**).

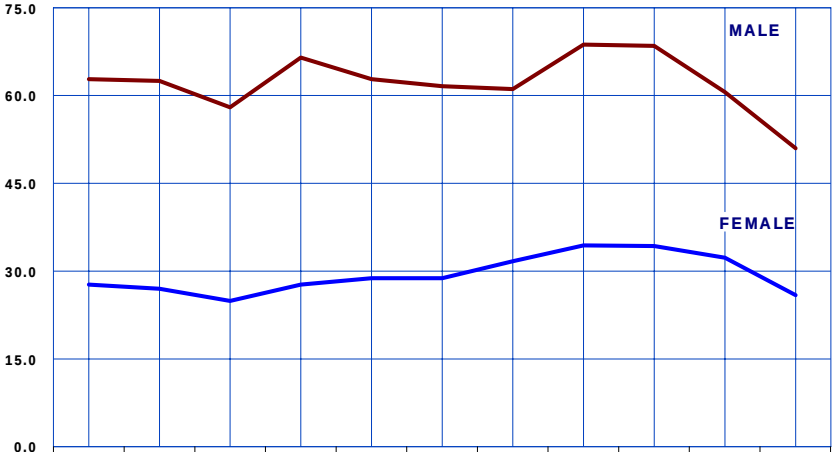
Among Asians and White non-Hispanics, the relative risk of death from cancer exceeded the mortality risk of death from heart disease in 2008 (**Table 2B-3**).

Number of deaths per 100,000 population age-adjusted to the 2000 U.S. standard.

The number of deaths from unintentional injuries decreased by 19.3 percent from 3,156 in 2006 to 3,014 in 2007, and 2,548 in 2008 (**Table 2B-1**). In 2008, based on age-adjusted mortality rates, accidents ranked third as a leading cause of death for males and fifth for females. From 2006 to 2008 the age-adjusted mortality for accidents decreased by 25.5 percent for males and by 24.5 percent for females (**Figure 2B-10**).

In 2008, the number of deaths in motor vehicle accidents declined to 874, the lowest annual number of deaths since 1993. (Due to record high gas prices in 2008 there were, arguably, fewer drivers on Arizona roads, and less driving). Arizonans experienced particularly large increase in the number of accidental drug overdoses from 362 deaths in 1998 to 669 deaths in 2007. In 2008, unexpectedly, the number of deaths from accidental poisoning by drugs decreased by 43.8 percent to 376 (**Table 2B-9**).

**Figure 2B-10**
**Age-adjusted Mortality Rates for Accidents (unintentional injuries) by Gender and Year, Arizona, 1998-2008**



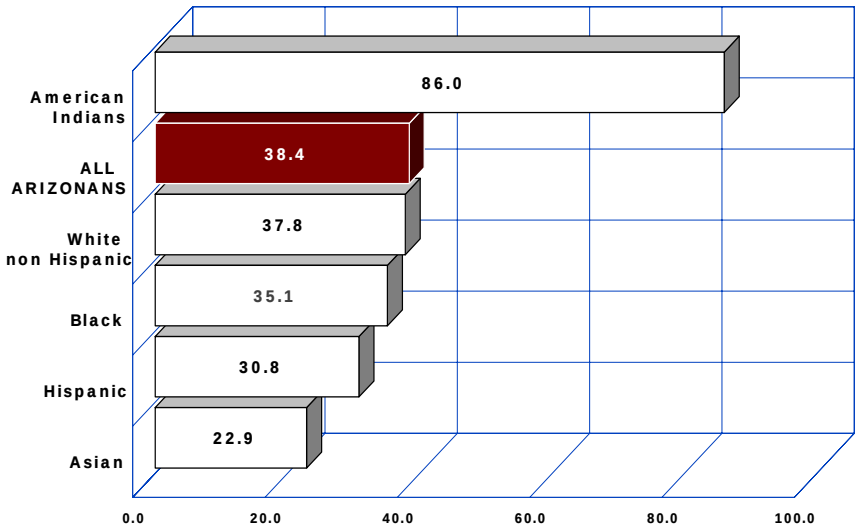

| | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Female | 27.7 | 27.0 | 24.9 | 27.7 | 28.8 | 28.8 | 31.7 | 34.4 | 34.3 | 32.3 | 25.9 |
| Male | 62.8 | 62.5 | 58.0 | 66.5 | 62.8 | 61.6 | 61.1 | 68.7 | 68.5 | 60.6 | 51.0 |

Number of deaths per 100,000 population age-adjusted to the 2000 U.S. standard.

The American Indian death rate for unintentional injuries (86.0/100,000) was 3.8 times greater than the rate for Asians (22.9/100,000), the group at the lowest risk of unintentional injury death among race/ethnic groups in the State (**Figure 2B-11**, **Table 2B-4**).

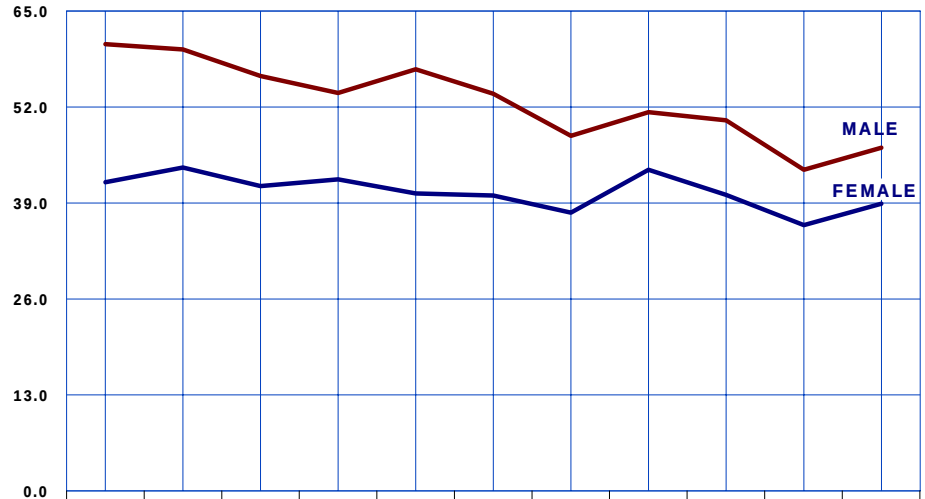
In 2008, Apache (121.8/100,000) and Navajo (89.6/100,000) counties had the two highest age-adjusted mortality rates for unintentional injuries (**Table 5E-11**).

**Figure 2B-11**
**Age-adjusted Mortality Rates for Accidents (unintentional injuries) by Race/Ethnicity, Arizona, 2008**




Number of deaths per 100,000 population age-adjusted to the 2000 U.S. standard.

**Figure 2B-12**
**Age-adjusted Mortality Rates for Chronic Lower* Respiratory Diseases by Gender and Year, Arizona, 1998-2008**



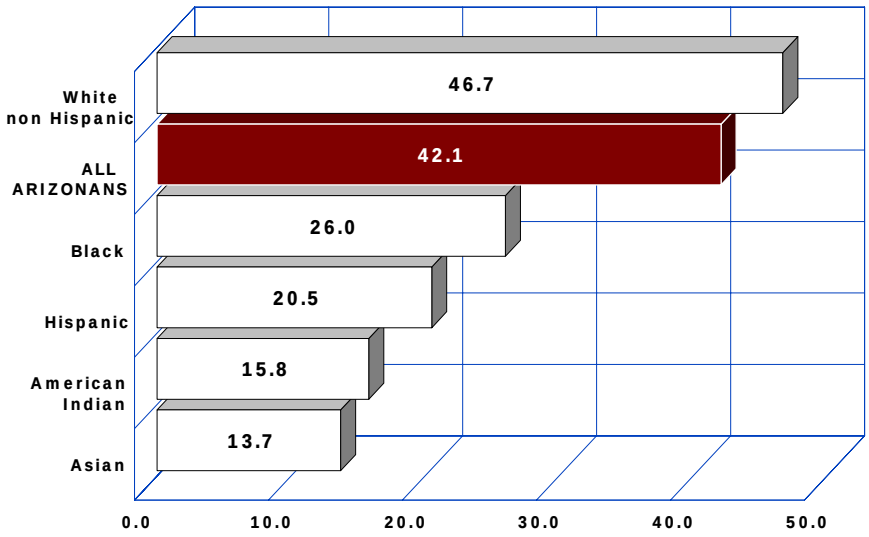

| | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Female | 41.8 | 43.8 | 41.3 | 42.2 | 40.3 | 40.0 | 37.7 | 43.5 | 40.1 | 36.0 | 38.9 |
| Male | 60.5 | 59.8 | 56.2 | 53.9 | 57.1 | 53.8 | 48.1 | 51.3 | 50.2 | 43.5 | 46.5 |

*Number of deaths per 100,000 population age-adjusted to the 2000 U.S. standard.
*This ICD-10 title corresponds to Chronic Obstructive Pulmonary Disease (ICD-9 title)

In 2008, chronic lower respiratory diseases (bronchitis, emphysema, asthma) were the 3rd leading cause of death among Arizona residents (**Table 2B-1**). From 2005 to 2007, the mortality rates for chronic lower respiratory diseases (CLRD) decreased for both genders (**Figure 2B-12**, **Table 2B-2**). In 2008, the age-adjusted mortality for chronic lower respiratory diseases increased by 8.1 percent among females, and by 6.9 percent among males.

Urban females had the lowest mortality rate for CLRD (37.7/100,000) among the gender by region groups (**Table 2B-5**). Rural males, the group at the highest mortality risk for CLRD (51.4/100,000), were 14 percent more likely in 2008 to die from this cause than urban males (45.1 deaths per 100,000).

**Figure 2B-13**
**Age-adjusted Mortality Rates for Chronic Lower* Respiratory Diseases by Race/Ethnicity, Arizona, 2008**



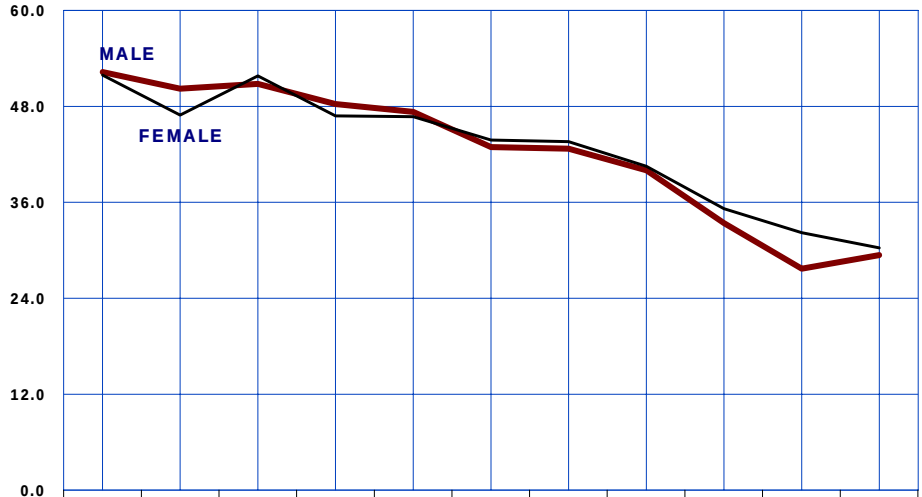

Number of deaths per 100,000 population age-adjusted to the 2000 U.S. standard.

Death rates for emphysema, chronic bronchitis, asthma and other lower respiratory disorders were substantially higher among White non-Hispanics (46.7 deaths per 100,000) than they were among Blacks or African American (26.0/100,000), Hispanics (20.5 deaths per 100,000), American Indians (15.8/100,000), and Asians (13.7/100,000; **Figure 2B-13**, **Table 2B-4**).

Cerebrovascular disease and diseases of the heart are two of the leading causes of death that share many risk factors such as hypertension, smoking, obesity and high levels of cholesterol. The age-adjusted mortality rate for stroke decreased by 41.8 percent from 51.7 deaths per 100,000 population in 2000 to 30.1/100,000 in 2008 (**Table 2B-3**).

In 2008, the number of deaths from cerebrovascular disease was greater among females (1,204) than males (873, **Table 2B-4**). Females remained at greater risk than males to die from a stroke in 2002-2008, as they were in 2000 (**Figure 2B-14**). However, in 2008 the age-adjusted mortality rate for stroke increased among males, while it continued to decline among females (**Figure 2B-14**, **Table 2B-2**).

**Figure 2B-14**
**Age-adjusted Mortality Rates for Cerebrovascular Disease by Gender and Year, Arizona, 1998-2008**



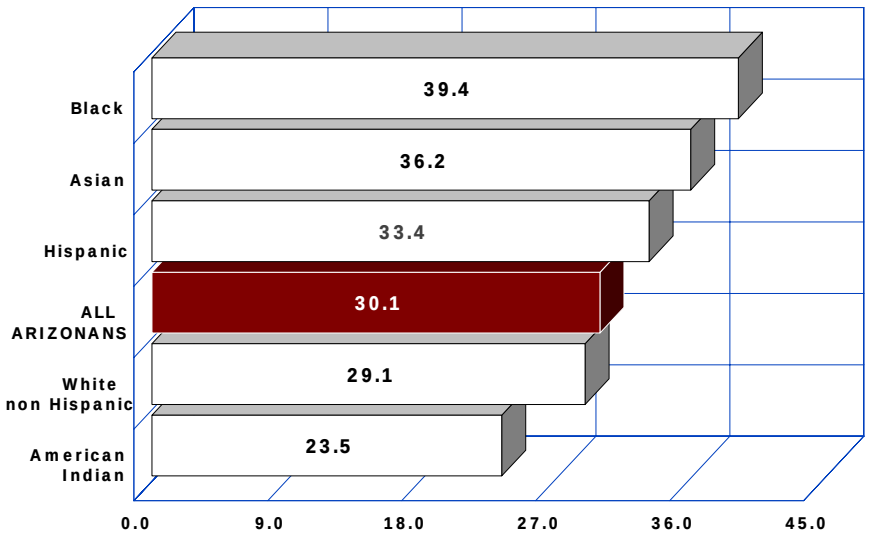

| | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Female | 51.9 | 46.9 | 51.8 | 46.8 | 46.7 | 43.8 | 43.6 | 40.5 | 35.2 | 32.2 | 30.3 |
| Male | 52.3 | 50.2 | 50.8 | 48.3 | 47.3 | 42.9 | 42.7 | 40.0 | 33.4 | 27.7 | 29.4 |

Number of deaths per 100,000 population age-adjusted to the 2000 U.S. standard.

Compared to Arizona's rate, Blacks or African Americans were 30.9 percent more likely to die from cerebrovascular disease in 2008 (**Figure 2B-15**, **Table 2B-4**). The 2008 mortality rate for cerebrovascular disease among American Indians (23.5/100,000) was the lowest among race/ethnic groups.

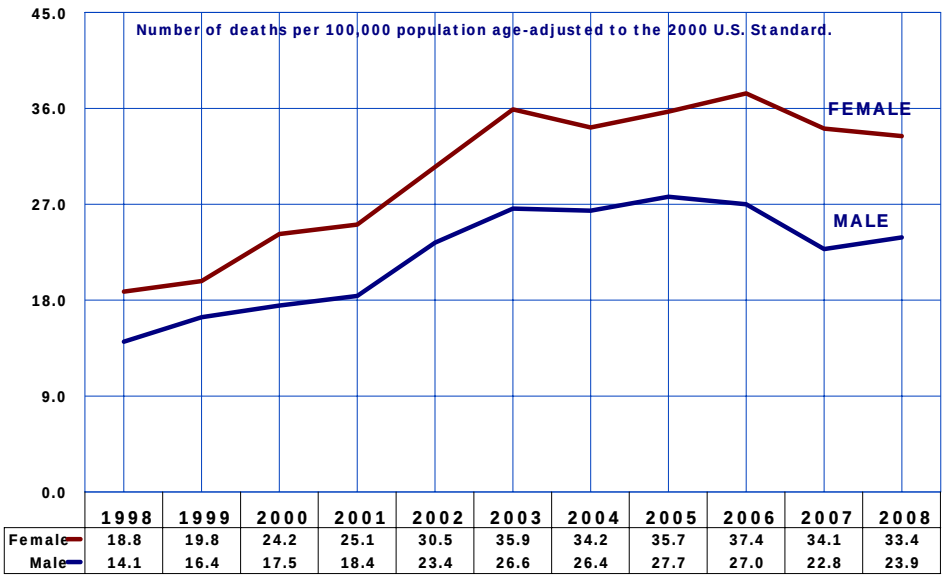
American Indian females had the lowest mortality rate for cerebrovascular disease among gender by race subgroups (21.8 deaths per 100,000, **Table 2B-4**), while Black or African American males had the highest rate of 42.9 deaths per 100,000.

**Figure 2B-15**
**Age-adjusted Mortality Rates for Cerebrovascular Disease by Race/Ethnicity, Arizona, 2008**




Number of deaths per 100,000 population age-adjusted to the 2000 U.S. standard.

**Figure 2B-16**
**Age-adjusted Mortality Rates for Alzheimer's Disease by Gender and Year, Arizona, 1998-2008**




| | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Female | 18.8 | 19.8 | 24.2 | 25.1 | 30.5 | 35.9 | 34.2 | 35.7 | 37.4 | 34.1 | 33.4 |
| Male | 14.1 | 16.4 | 17.5 | 18.4 | 23.4 | 26.6 | 26.4 | 27.7 | 27.0 | 22.8 | 23.9 |

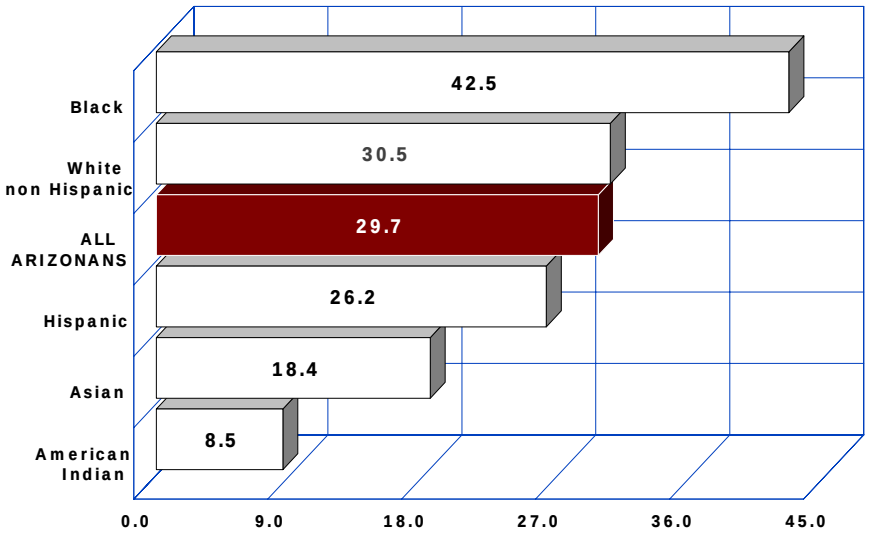
Note: The rates for 1998-1999 are comparability-modified.

Based on the number of deaths in 2008, Alzheimer's disease was the 4th leading cause of death for females and 7th leading cause for males (**Table 2B-4**).

The age-adjusted mortality rate for Alzheimer's disease among females decreased for the second consecutive year by 10.7 percent from 37.4/100,000 in 2006 to 33.4/100,000 in 2008 (**Figure 2B-16**). The age-adjusted mortality rate for Alzheimer's disease slightly increased for males by from 22.8/100,000 in 2007 to 23.9/100,000 in 2008

In 2008, the age-adjusted death rate for Alzheimer's disease was 39.7 percent higher for females than for males.

**Figure 2B-17**
**Age-adjusted Mortality Rates for Alzheimer's Disease by Race/Ethnicity, Arizona, 2008**




Number of deaths per 100,000 population age-adjusted to the 2000 U.S. standard.

The age-adjusted mortality rates for Alzheimer's disease in 2008 were higher among Black or African American (42.5 deaths per 100,000) than they were among White non-Hispanic (30.5 deaths per 100,000), Hispanic or Latino (26.2/100,000), Asian (18.4/100,000), and American Indian residents of Arizona (8.5/100,000; **Figure 2B-17**, **Table 2B-4**).

White non-Hispanic residents of Arizona disproportionately contributed to mortality from Alzheimer's disease. In 2008, White non-Hispanics accounted for 60.3 percent (**Table 10C-1**) of the State's population, but 88.7 percent of all deaths from Alzheimer's disease (1,845 out of 2,080; **Table 2B-4**).

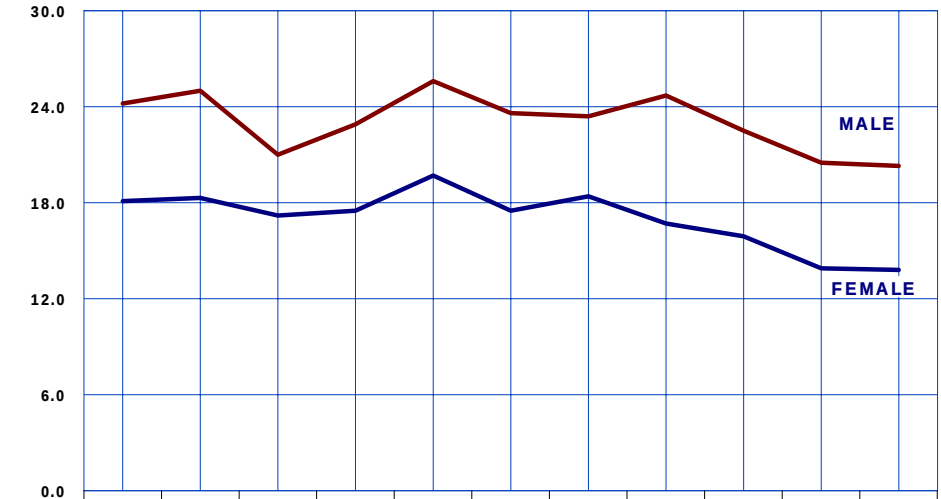
In 2008, the median age at death from Alzheimer's disease was 88 for females and 86 for males (**Table 2D-3**).

In 2008, diabetes was the 7th leading cause of death among Arizona residents (**Table 2B-1**). Both men and women experienced a decline in mortality rates for diabetes from 2005 to 2008 (**Figure 2B-18**).

In 2008, in addition to 1,147 deaths that had diabetes assigned as the underlying cause, another 1,613 deaths had diabetes assigned as a contributing factor (**Figure 2B-1B**. The diabetes-related death rate of 40.4/100,000 (**Table 6A-6**) was 2.4 times greater than the rate for diabetes as underlying cause (16.8/100,000, **Table 2B-2**).

The diabetes-related death rate includes all mentions of diabetes on the death certificate as the underlying or other than underlying cause.

**Figure 2B-18**
**Age-adjusted Mortality Rates for Diabetes by Gender and Year, Arizona, 1998-2008**



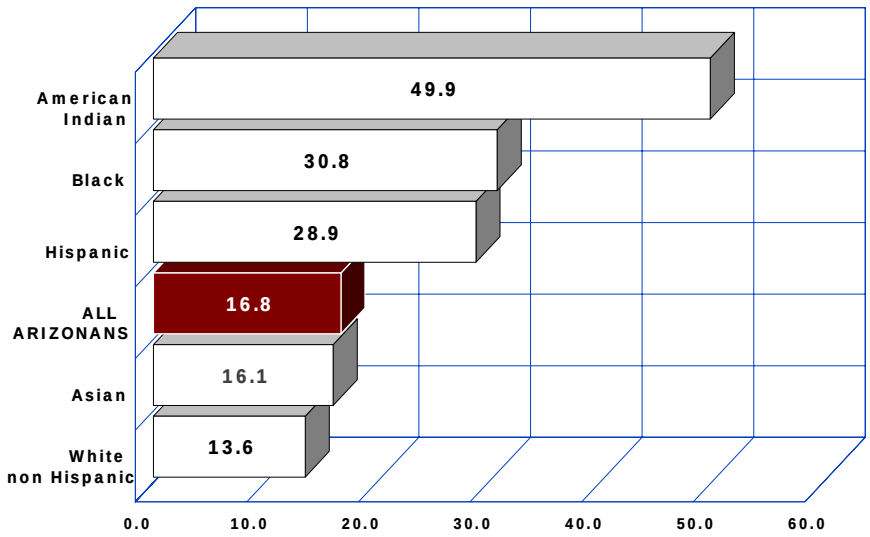

| | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Female | 18.1 | 18.3 | 17.2 | 17.5 | 19.7 | 17.5 | 18.4 | 16.7 | 15.9 | 13.9 | 13.8 |
| Male | 24.2 | 25.0 | 21.0 | 22.9 | 25.6 | 23.6 | 23.4 | 24.7 | 22.5 | 20.5 | 20.3 |

Number of deaths per 100,000 population age-adjusted to the 2000 U.S. standard.

In 2008, compared to Arizona's rate, American Indians were 3 times more likely to die from diabetes (49.9 deaths per 100,000; **Figure 2B-19**, **Table 2B-4**). The rate of 13.6 deaths per 100,000 among White non-Hispanics was the lowest rate among race/ethnic groups in the State.

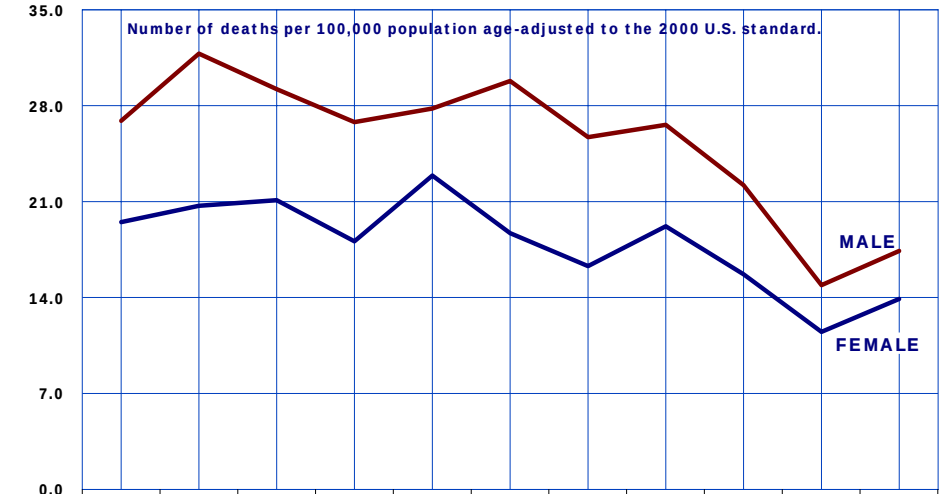
Among the 15 Arizona counties, in 2008 Graham (37.3/100,000), Greenlee (36.5/100,000), Santa Cruz (32.4/100,000), and Apache (32.1/100,000) had the highest mortality rates for diabetes (**Table 5E-11**).

**Figure 2B-19**
**Age-adjusted Mortality Rates for Diabetes by Race/Ethnicity, Arizona, 2008**




Number of deaths per 100,000 population age-adjusted to the 2000 U.S. standard.

**Figure 2B-20**
**Age-adjusted Mortality Rates for Influenza and Pneumonia by Gender and Year, Arizona, 1998-2008**




| | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Female | 19.5 | 20.7 | 21.1 | 18.1 | 22.9 | 18.7 | 16.3 | 19.2 | 15.7 | 11.5 | 13.9 |
| Male | 26.9 | 31.8 | 29.2 | 26.8 | 27.8 | 29.8 | 25.7 | 26.6 | 22.2 | 14.9 | 17.4 |

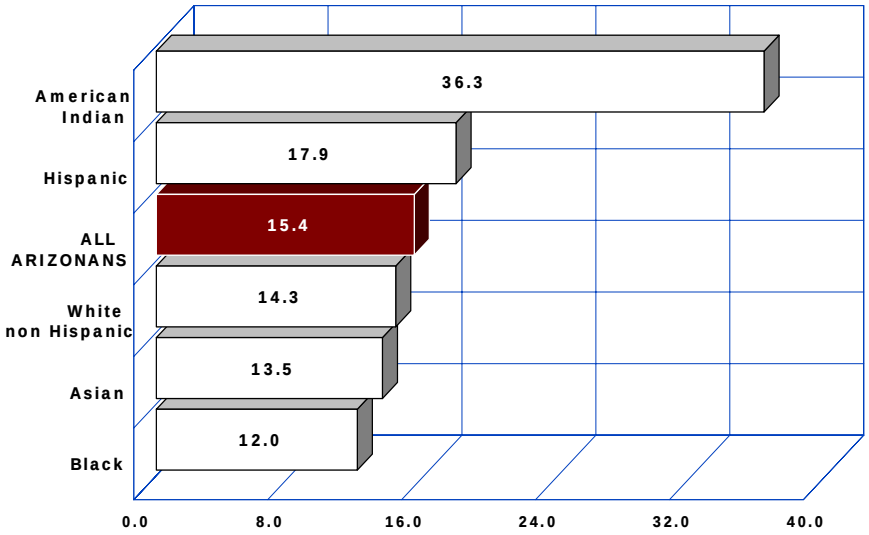
Note: The rates for 1998-1999 are based on the number of deaths according to ICD-9. The rates for 2000 and beyond are based on the number of deaths according to ICD-10. For comparability, the rates for 1998-1999 were adjusted using the preliminary comparability ratio of 0.6982 from NCHS. Comparability ratio of 1.0 indicates that the same number of deaths was assigned to a cause of death whether ICD-9 or ICD-10 was used.

The number of deaths from influenza and pneumonia increased by 21.1 percent from 875 in 2007 to 1,060 in 2008 (**Table 2B-1**). In 2008, influenza and pneumonia were ranked the 8th leading cause of death in Arizona. Among the 1,060 deaths, influenza was identified as the underlying cause for 19 of them, while pneumonia was listed as the underlying cause on 1,041 death certificates (**Table 2B-6**).

The mortality rate for influenza and pneumonia increased for females from 11.5 deaths per 100,000 in 2007 to 13.9 deaths in 2008 (**Figure 2B-20, Table 2B-2**). The mortality rate for influenza and pneumonia also increased for males from 14.9 deaths per 100,000 in 2007 to 17.4/100,000 in 2008.

In 2008, Arizona males were 25.2 percent more likely to die from influenza and pneumonia than females.

**Figure 2B-21**
**Age-adjusted Mortality Rates for Influenza and Pneumonia by Race/Ethnicity, Arizona, 2008**




Number of deaths per 100,000 population age-adjusted to the 2000 U.S. standard.

In 2008, American Indian residents of Arizona had the highest mortality rate for influenza and pneumonia (36.3 deaths per 100,000) among the race/ethnic groups. The age-adjusted mortality of 12.0/100,000 among Blacks or African Americans was the lowest rate among race/ethnic groups in the State (**Figure 2B-21**, **Table 2B-4**).

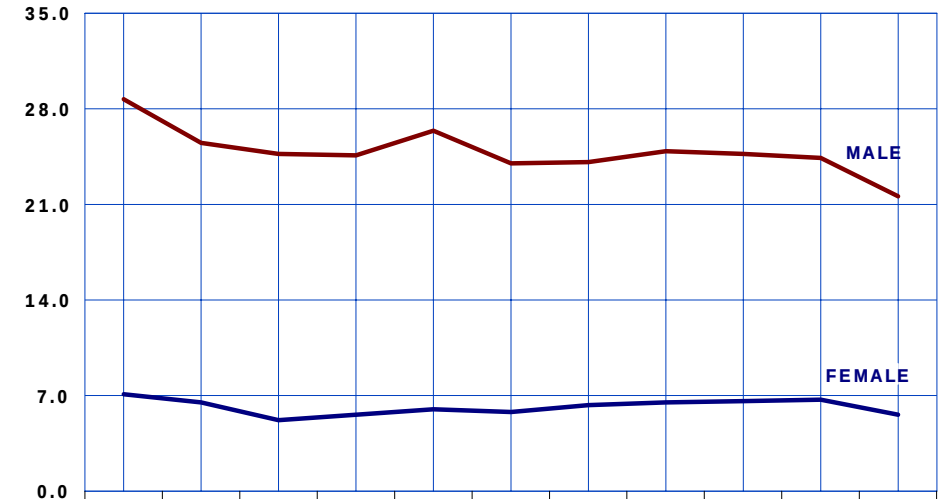
Compared to the State death rate for influenza and pneumonia, Greenlee County's rate was 1.9 times greater (28.7/100,000), and so was the Apache County's rate of 28.6/100,000 (**Table 5E-11**).

In 2008, suicide was the 6th leading cause of death among males. It was not ranked among the top ten causes of mortality for females. The age-adjusted suicide rate decreased by 13.0 percent from 15.4 suicides per 100,000 residents of the State in 2007 to 13.4/100,000 in 2008; the lowest suicide rate since 1990 (**Table 2B-3**).

The suicide rate decreased for females from 6.7 suicides per 100,000 in 2007 to 5.6 in 2008 (**Figure 2B-22**, **Table 2B-3**). The male mortality risk for suicide also decreased from the 2007 rate of 24.4/100,000 to 21.6/100,000 in 2008.

In 2008, suicide posed a 3.9 times greater mortality risk for males (21.6/100,000) than females (5.6/100,000).

**Figure 2B-22**
**Age-adjusted Mortality Rates for Suicide by Gender and Year, Arizona, 1998-2008**




| | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Female | 7.1 | 6.5 | 5.2 | 5.6 | 6.0 | 5.8 | 6.3 | 6.5 | 6.6 | 6.7 | 5.6 |
| Male | 28.7 | 25.5 | 24.7 | 24.6 | 26.4 | 24.0 | 24.1 | 24.9 | 24.7 | 24.4 | 21.6 |

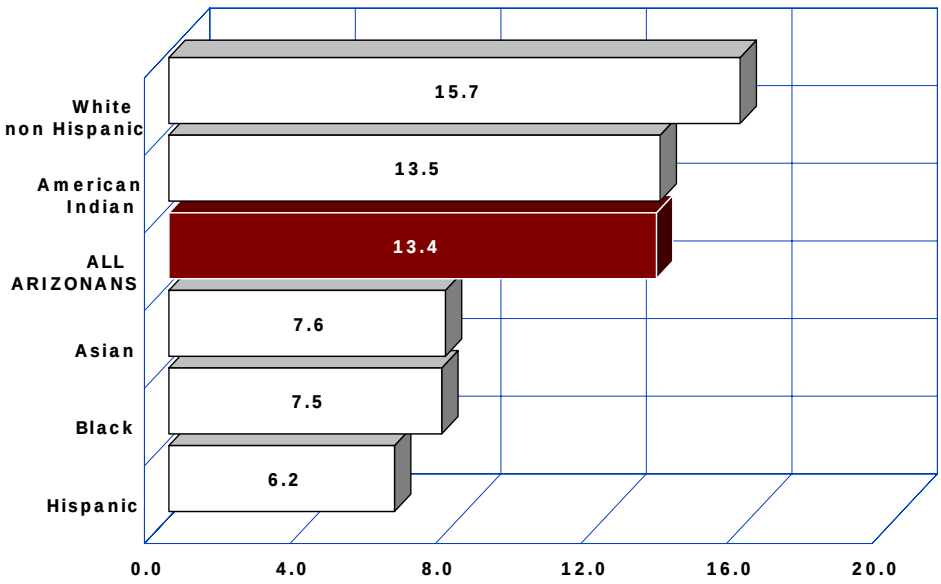
Number of deaths per 100,000 population age-adjusted to the 2000 U.S. standard.

Suicide rates in 2008 were substantially higher among White non-Hispanics (15.7 suicides per 100,000), than they were among American Indians (13.5/100,000), Asians (7.6/100,000), Blacks or African Americans (7.5/100,000), and Hispanics (6.2/100,000; F**igure 2B-23**, **Table 2B-4**).

The number of suicides among American Indians increased by 51.4 percent from 35 in 2007 to 53 in 2008.

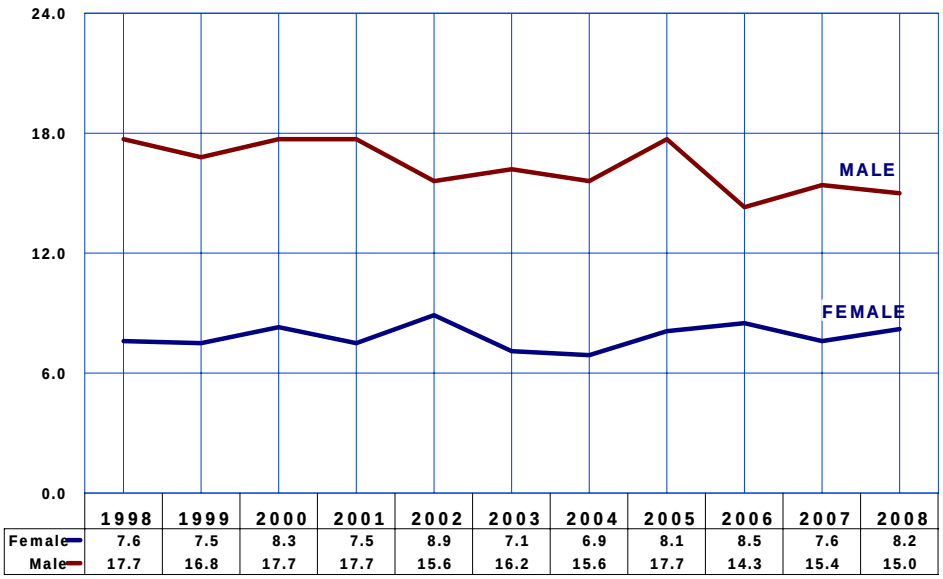
The age-adjusted mortality rates varied in Arizona in 2008 from 2.1 suicides per 100,000 residents of Santa Cruz to 29.3 suicides per 100,000 residents of Apache County (**Table 5E-11**).

**Figure 2B-23**
**Age-adjusted Mortality Rates for Suicide by Race/Ethnicity, Arizona, 2008**




Number of deaths per 100,000 population age-adjusted to the 2000 U.S. standard.

**Figure 2B-24**
**Age-adjusted Mortality Rates for Chronic Liver Disease and Cirrhosis by Gender and Year, Arizona, 1998-2008**




| | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Female | 7.6 | 7.5 | 8.3 | 7.5 | 8.9 | 7.1 | 6.9 | 8.1 | 8.5 | 7.6 | 8.2 |
| Male | 17.7 | 16.8 | 17.7 | 17.7 | 15.6 | 16.2 | 15.6 | 17.7 | 14.3 | 15.4 | 15.0 |

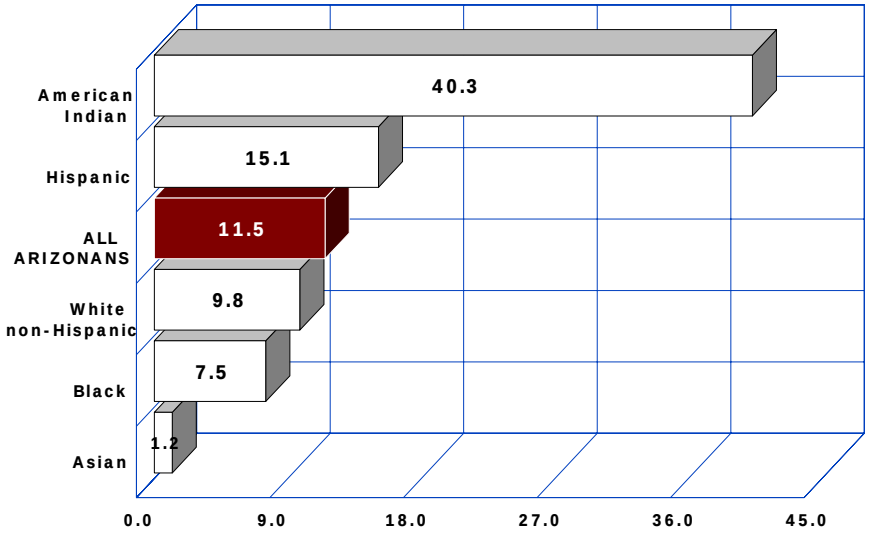
The number of deaths per 100,000 population age-adjusted to the 2000 U.S. standard.

Chronic liver disease and cirrhosis was the 10th leading cause of death in Arizona in 2008 (**Figure 2B-1, Table 2B-1**). Among the 760 deaths due to chronic liver disease and cirrhosis, 479 (63.0 percent) were males (**Table 2B-4**).

The temporal changes from 2007 to 2008 in mortality from chronic liver disease and cirrhosis differed by gender, decreasing by 2.6 percent for males and increasing by 7.9 percent for females (**Figure 2B-24**, **Table 2B-3**).

In 2008, Gila and Mohave counties had the highest mortality rates for chronic liver disease and cirrhosis (**Table 5E-11**)

**Figure 2B-25**
**Age-adjusted Mortality Rates for Chronic Liver Disease and Cirrhosis by Race/Ethnicity, Arizona, 2008**




Number of deaths per 100,000 population age-adjusted to the 2000 U.S. standard.

The 2008 death rate for chronic liver disease and cirrhosis among American Indians (40.3 deaths per 100,000) was 33.6 times greater than the rate among Asians (1.2/100,000) (**Figure 2B-25, Table 2B-4**). The rate for Hispanics (15.1 deaths per 100,000 population) was the second highest among racial/ethnic groups in the State.

Compared to the median age at death from all causes (77 years), those who died from chronic liver disease and cirrhosis were 19 years younger (58 years, **Table 2D-3**).