

# Definitions and Data Interpretation Notes

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## Health Indicators

A health indicator is a characteristic of an individual, population, or environment which is subject to measurement and can be used to describe one or more aspects of the health of an individual or population. Indicators are usually expressed as rates such as crude or age-adjusted rates. One of the most well known health indicators is the infant mortality rate, the number of infant deaths per 1,000 live births. Other familiar indicators are related to specific causes of death, for example, the diabetes death rate. Indicators in this Atlas are those with public health significance and therefore provide opportunities for focusing interventions that will improve the population's health status.

## Leading Causes of Death

Ranking causes of death is a popular method of presenting mortality statistics. This method has been used for over 50 years to show the most frequently occurring causes of death and their relative impact. All states use a standard method used to classify causes of death, and periodically, the cause of death lists are updated based on the International Classification of Diseases (ICD).

This Atlas concentrates on the most prevalent causes of death in Florida: heart disease, cancer, chronic lower respiratory disease, unintentional injury, stroke, diabetes, Alzheimer's disease, nephritis, suicide, influenza and pneumonia, chronic liver disease and cirrhosis, hypertension, Parkinson's Disease, septicemia, and HIV/AIDS.

## International Classification of Diseases

The International Classification of Diseases (ICD) is the system used to code and classify mortality data from death certificates. The ICD is designed to promote international comparability in the collection, processing, classification, and presentation of mortality statistics. This includes providing a standardized format for reporting causes of death on death certificates. The reported conditions are translated into medical codes through use of this classification system, which is published by the World Health Organization (WHO). In order to keep abreast of changes in medical knowledge, the ICD is revised approximately every ten to twenty years. The ICD revisions and years each were used in Florida are:

Revision	Years Used	Revision	Years Used
Second	1917-1920	Seventh	1958-1967
Third	1921-1929	Eighth	1968-1978
Fourth	1930-1940	Ninth	1979-1998
Fifth	1941-1948	Tenth	1999-Present
Sixth	1949-1957		

Due to these revisions, some of which involve major changes, year-to-year comparisons of deaths by cause can be misleading unless such comparisons span a period of years in which only one revision was used or in which the changes from one revision to another were minor.

In this Atlas, the International Classification of Diseases Eighth Revision (ICD-8) was used for the coding of 1970 through 1974 underlying causes of death, the Ninth Revision for was used for years 1979-1989, and the Tenth Revision (ICD-10) was used for coding the 1999 through 2003 underlying causes of death. Two causes of death, Alzheimer's disease and HIV, were not yet classified at the time the ICD-8 was issued. Changes from the ICD-8 to ICD-9 were minor but differences between the ninth and tenth revisions are more apparent. ICD-10 contains major changes, so that a greater or fewer number of deaths are now assigned to certain causes than

under ICD-9 rules. Causes that changed the most include Alzheimer's disease and pneumonia.

### ICD Codes by Cause of Death

Cause of Death	ICD-8	ICD-9	ICD-10
Heart Disease	390-398, 402, 404-429	390-398, 402, 404-429	I00-I09,I11,I13,I20-I51
Cancer	140-209	140-208	C00-C97
Chronic Lower Respiratory Disease	491-492	490-494,496	J40-J42,J43,J44,J45-J46,J47
Unintentional Injury	E800-E869, E880-E929	E800-E869, E880-E929	V01-X59,Y85-Y86
Stroke (Cerebrovascular Disease)	430-434, 436-438	430-434, 436-438	I60-I69
Diabetes	250	250	E10-E14
Alzheimer's Disease	Not applicable	331.0	G30
Nephritis	582-584	580-589	N00-N07,N17-N19,N25-N27
Suicide	E950-E959	E950-E959	X60-X84,Y87.0
Influenza & Pneumonia	470-486	480-487	J09-J11,J12-J18
Chronic Liver Disease & Cirrhosis	571	571	K70,K73-K74
Septicemia	038	038	A40-A41
Essential Hypertension & Hypertensive Renal Disease	401	401,403	I10,I12,I15
Parkinson's Disease	342	332	G20-G21
HIV/AIDS	Not applicable	042-044	B20-B24

#### *ICD codes and causes of death used in this atlas*

### Quartiles

The maps in the Florida Mortality Atlas are colored using a quartile method. In this method, data (age-adjusted death rates) are calculated and then ranked from lowest to highest for all 67 counties. Next, the counties are divided into four groups. Each group is assigned a number from 1 to 4. The counties with the lowest ranking rates are assigned to the first quartile (1) and are shaded with the lightest color, while the counties with the highest-ranking rates are assigned to the fourth quartile (4) and are shaded with the darkest color. Because quartiles are calculated using data from all 67 counties, the color-coded map provides a relative ranking among counties.

Because mortality varies by county, the quartile limits are different for each map, and the range of values represented by a given quartile varies from map to map. Therefore, comparisons of the spatial patterns of mortality across maps should be limited to comparing relative differences between different groups (e.g. whites to nonwhites). To determine whether the mortality rates were absolutely higher or lower for one group than for another, the reader must study the relevant legends and compare the quartile limits.

### Rates

Much of community health assessment involves describing the health status of a defined community by looking at changes in the community over time or by comparing health events in that community to events occurring in other communities or the state as a whole. In making these comparisons, we need to account for the fact that the number of health events depends in part on the number of people in the community. To account for growth in a community or to compare communities of different sizes, we usually develop rates to provide the number of events per population unit.

A rate consists of a numerator and a denominator. The two numbers are divided, then multiplied by a constant (such as 100,000) to provide the number per 100,000 population.

The numerator is the number of health events. This is often the same as the number of people who experience an event, but for some health conditions, one person may experience the event more than once. For example, one individual may have multiple hospitalizations for the same condition in a given year.

To measure incidence or prevalence of the condition, you usually want to count people. To measure the public health burden, you may want to count events. Actions based on the data may be different depending on whether the rate represents many individuals with only one event or a smaller number of individuals who have had many events. It is customary to count only events that occur among the population at risk.

The denominator is also known as the population at risk. Everyone in the population at risk must be eligible to be counted in the numerator if they have the event of interest. For example, in looking at female cervical cancer, we cannot include men in the population at risk. Once the numerator and denominator are established, a decision must be made as to the appropriate rate to use.

### **Crude and Age-Adjusted Death Rates** *Crude Death Rates*

A crude rate is calculated by dividing the total number of events in a specified time period by the total number of individuals in the population who are at risk for these events and multiplying by a constant, such as 1,000 or 100,000 [e.g., (numerator/denominator) × constant].

Example: The total crude death rate in Orange County for 2002 is the number of total deaths in Orange County (numerator) divided by the population of Orange County in 2002 (denominator). The result of this calculation is multiplied by 100,000 (constant) to arrive at the 2002 crude death rate per 100,000 population for Orange County.

$(6,469 \text{ (total deaths)} / 962,531 \text{ (total population)}) \times 100,000 = 672.1 \text{ deaths per } 100,000 \text{ population}$

Although useful for certain purposes, the crude death rate as a comparative measure has a major shortcoming: it is a function of the age distribution of the population at risk. For example, the population at risk in one county may be primarily elderly persons ages 65 and older while the population at risk in another county may be primarily of persons ages 40 to 50. Crude rates are recommended when a summary measure is needed and it is not necessary or desirable to adjust for other factors. For example, rates of infectious diseases, such as tuberculosis and hepatitis, are usually not age adjusted, because public health officials are interested in the overall burden of disease in the total population irrespective of age.

### *Age-Adjusted Death Rates*

The frequency with which health events occur is almost always related to age. In fact, the relationship of age to risk often dwarfs other important risk factors. For example, acute respiratory infections are more common in children of school age because of their immunologic susceptibility and exposure to other children in schools. Chronic conditions, such as arthritis and atherosclerosis, occur more frequently in older adults because of a variety of physiologic consequences of aging. Mortality rates tend to increase after the age of 40.

Because the occurrence of many health conditions is related to age, the most common adjustment for public health data is age adjustment. The age-adjustment process removes differences in the age composition of two or more populations to allow comparisons between these populations independent of their age structure.

The age-adjusted death rate is a summary measure that eliminates the effect of the underlying age distribution of the population. The result is a figure that represents the theoretical risk of mortality for a population, if the population had an age distribution identical to that of a standard population. For example, a county's age-adjusted death rate is the weighted average of the age-specific death rates observed in that county, with the

weights derived from the age distribution in an external population standard, such as the U.S. population.

In the past, the National Center for Health Statistics (NCHS) age-adjusted rates using the US 1940 standard population. Other agencies used the US 1970 Standard. Beginning with 1999 data, federal agencies began age-adjusting to the US 2000 Standard Million Population.

Example: To calculate the Age-Adjusted Death Rate, follow these steps:

1. Calculate death rates per 100,000 for each age group.
2. Multiply this rate by the 2000 US population proportion. This is the standard 2000 US population proportion, which FloridaCHARTS.com uses to calculate age-adjusted death rates.

Age	2000 Proportion
0-14 years	0.021470
15 - 24 years	0.138646
25 - 34 years	0.135573
35 - 44 years	0.162613
45 - 54 years	0.134834
55 - 64 years	0.087247
65 - 74 years	0.066037
75 - 84 years	0.044842
85 and over	0.015508
All ages	1.000000

3. Sum values for all age groups to arrive at the Age-Adjusted Death Rate.

Age Groups	Deaths	Population	Crude Rate Per 100,000	Population Proportion (2000)	Age-Specific Rate
0-14	62	1,950,000	3.2	0.021470	0.68704
15-24	82	1,210,000	6.8	0.138646	0.9427928
25-34	303	1,480,000	20.9	0.135573	2.8334757
35-44	686	1,400,000	49	0.162613	7.968037
45-54	1,630	1,020,000	159.8	0.134834	21.5464732
55-64	3,457	730,000	475.9	0.087247	41.5208473
65-74	6,352	580,000	1,093.4	0.066037	72.2048558
75-84	5,443	290,000	1,878.3	0.044842	84.2267286
85 +	2,050	70,000	2,841.5	0.015508	44.065982
All Ages	20,065	8,730,000	229.8	1.000000	276.0

Age-adjusted death rates enable health professionals to measure health conditions versus the distribution of persons by age. Age-adjusted death rates are more useful than crude death rates when comparing death trends from different populations. For instance, crude death rates may show a disease to be low in County A when compared to County B. But, is this the true picture of what is occurring in these counties? Since crude death rates are sensitive to the distribution of persons in the population, it could be that County A's rate is low because fewer people at-risk of dying live in County A than in County B. Age-adjusted death rates can also help to study death trends in a single county over time. Age-specific death rates within the county may remain stationary over time, but with an aging population the crude death rate may increase from the higher number of persons at greater risk of dying.

Age-adjusted rates are utilized throughout the Florida Mortality Atlas.. The availability of official Hispanic

population data from the Office of Economic and Demographic Research began in 2004. Therefore Hispanic rates are available beginning with this year.

Age-adjusted rates are important for the following reasons:

- Age-adjusted rates answer the question: "How does the rate in my county compare to the rate in another even though the distribution of persons by age may vary?"
- Age-adjusted rates are specialized measurements and therefore should not be compared with other types of rates or be used to calculate the actual number of events.
- Age-adjusted rates can illuminate important trends by removing age-related differences.
- Age-adjusted rates using the same standard US populations (1940, 1970, or 2000) may be compared. Because of shifts in the distribution of persons by age in each year, rates calculated using the 1940 standard population, for example, should not be compared to rates calculated using the 2000 standard population.

*Multi-Year Death Rates*

Rates based on small numbers of events can fluctuate widely from year to year for reasons other than a true change in the underlying frequency of occurrence of the event. This is especially true in counties with small populations. To alleviate this problem, a multi-year has been used instead of a single-year rate.

A multi-year rate combines several years of data into one rate. The Florida Health Atlas uses age-adjusted rates from three consecutive years to calculate multi-year rates by using the average of three years of the total number of deaths and the average of three years of the population at risk to come up with a single rate per 100,000 population.

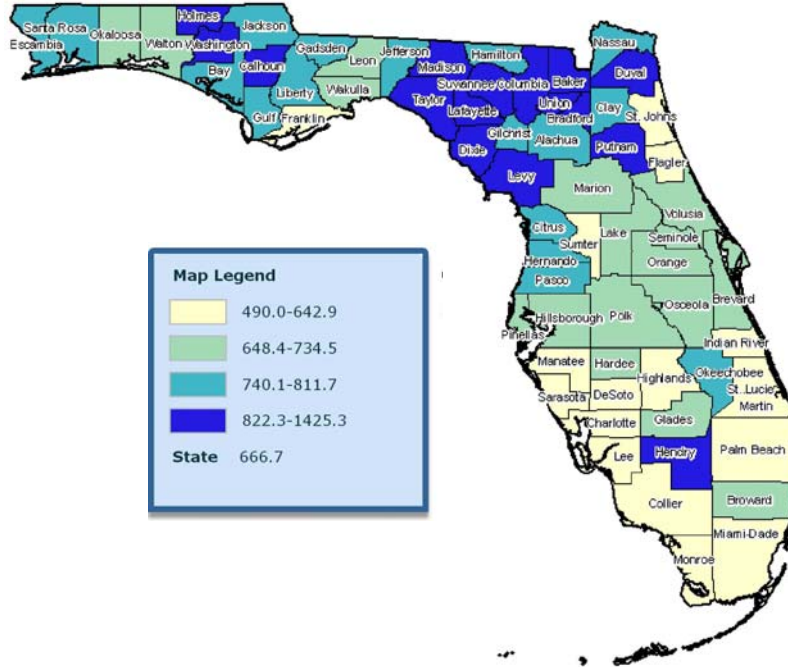
*Example: 3-Year Rate*

Total Deaths in Orange County		Total Population in Orange County	
Year	Number of Deaths	Year	Population
2007	6,526	2007	1,109,714
2008	6,696	2008	1,115,248
2009	6,501	2009	1,115,169
3-Year Average: 19,723 / 3 = 6574		3-Year Average: 3,340,131 / 3 = 1,113,377 3-Year Rate: (6574 / 1,113,377) X 100,000 = 590.5 deaths per 100,000 population	

Age adjusted and crude mortality rates across Florida counties are chromatically depicted below. Note that the age-adjusted rates are significantly lower than the crude rate. Many counties that fall into the third and fourth quartiles using the crude rate are in lower quartiles when the age-adjusted rate is used. The reverse is true for some counties, while other counties remain in the same relative quartile when either rate is used. The age-adjusted mortality rates give a more accurate view of death rates in Florida because they control for the differences in age structure from county to county.

## Age Adjusted Rate

### Age-Adjusted All Causes 3-Year Death Rate, 2007-2009



## Crude Mortality

### Total Deaths from All Causes, 2007-2009 Per 100,000 Total Population

