Tools of the Trade:

SEX RATIOS for ANALYZING MORTALITY DATA

The role of sex in analyzing mortality data is very basic and important. It is widely accepted that men and women have different mortality patterns. Mortality rates listed by cause and sex display these differences. Men tend to have higher death rates for most causes of death and especially so for external causes (unintended injury, homicide, suicide, etc.) and occupation-related diseases (pneumoconiosis, respiratory cancer, bronchitis, etc.). While women tend to have lower death rates for most causes, they will sometimes have similar or even higher death rates than males for chronic diseases/conditions (atherosclerosis, cerebrovascular disease, diabetes, etc.). Part of this is attributable to the fact that women have a longer life expectancy. A female born in 1986 had a life expectancy of 78.3 years compared to 7 1.3 years for a male. Life expectancy differences between the sexes widened for many years after 1900, but since 1980 they have begun to narrow.

Computing a Sex Ratio

A convenient-and effective tool for highlighting the differences in mortality experience between the sexes is the SEX RATIO -- the ratio of male to female cases. For example, the 1987 death rate for suicide among male residents of the state was 21.2 per 100,000 population and, among females that year, it was 4.5. Simply divide the male rate of 21.2 by the female rate of 4.5 to obtain the sex ratio of 4.7. You can now say that the suicide rate in 1987 was 4.7 times higher among males than females in the state.

Sex Ratios by Cause of Death

A common approach to revealing the role of sex in mortality is to list death rates by cause and sex in order of their sex ratio. The table on the opposite page fists age-adjusted death rates by sex for selected leading causes of death to Pennsylvania residents in 1987. The order of causes is determined and displayed by the sex ratio, from high to low. HIV infection tops the list by quite a wide margin. This cause of death is predominant among males in Pennsylvania, primarily transmitted among homosexual men. Second on the list is suicide with a ratio of 4.5. Homicide placed third with 3.0 and both aortic aneurysm and unintentional injury (non-motor vehicle) had a sex ratio of 2.9 to tie for fourth place. The age-adjusted death rate for motor vehicle collisions among males was 2.5 times higher than the corresponding rate for females. As the list approaches 1.0 (even distribution), you will notice the predominance of the more chronic diseases/conditions associated with the elderly, such as cerebrovascular disease, pneumonia/influenza, and atherosclerosis.

Limitations of the Sex Ratio

Before using the sex ratio, one should understand its limitations. First and foremost, the sex ratio is based on the assumption that the population being observed is equally divided between males and females. In almost all cases, this is simply not true. In most general populations of any size, women begin to outnumber men at around age 20 and this figure increases with age. For this reason, age-specific and sex specific death rates may be more useful in comparing differences between the sexes.

Other factors are also believed to influence the differences in mortality outcome between the sexes. Life style may play a major role. For example, the incidence of lung cancer and other respiratory ailments is more common among men who, in general, have a longer history of tobacco use. However, the sex ratio of lung cancer has been decreasing as more women are becoming victims of long term tobacco use. Also, men tend to consume more alcohol than women and, therefore, have a higher incidence of cirrhosis of the liver. Racial or ethnic origin and socioeconomic factors can be very important among certain causes of death and also should not be overlooked.

A general rule to follow when using sex ratios is first to review the makeup of your population by sex, race, ethnicity or any factor you think may be important. It may also be a good idea to list or cite these demographic characteristics of the population along with your presentation of sex ratios for mortality rates. Sex ratios are convenient and effective tools but may be misleading or provide incomplete information when presented without other vital statistics. They are best used as a starting point or complement for presentation of other, more detailed information.

AGE-ADJUSTED DEATH RATES* BY SEX AND SELECTED CAUSES BY SEX RATIO, PENNSYLVANIA RESIDENTS, 1987

Cause	Total	Male	Female	Sex Ratio
HIV Infection	3.1	5.9	0.4	14.8
Suicide	11.3	19.1	4.2	4.5
Homicide	5.5	8.3	2.8	3.0
Aortic Aneurysm	3.9	6.3	2.2	2.9
Unintentional Injury (Non-motor vehicle)	14.3	21.7	7.5	2.9
Motor Vehicle Collision	16.7	24.1	9.5	2.5
Liver Disease/Cirrhosis	7.9	11.7	4.8	2.4
Chronic Obstructive Pulmonary Disease	17.3	25.4	11.7	2.2
Heart Disease	183.4	244.2	137.1	1.8
Malignant Neoplasms	143.9	176.3	120.6	1.5
Pneumonia/Influenza	11.8	15.0	9.7	1.5
Nephritis/Nephrosis	6.2	7.4	5.4	1.4
Septicemia	6.7	7.6	6.1	1.2
Cerebrovascular Disease	28.3	29.7	27.3	1.1
Diabetes	11.1	11.7	10.7	1.1
Atherosclerosis	2.7	2.6	2.7	1.0

*Age-adjusted rates are computed by the direct method using 1940 U.S. population as the standard. Rates are per 100,000.

NOTE: For more detailed information on sex ratios, see *Epidemiology in Health Services Management* by G. E. Alan Dever, Aspen Systems Corporation, Rockville, Maryland, 1984.