



# Conclusions

*“There seems to be no doubt that, speaking comparatively, the price of maleness is weakness” (Allen 1934).*

The fact that women live longer than men was observed at least as far back as 1750, when the first national census was used to compute mortality rates in Sweden. Studies of the genealogy of nobles in Europe show generally greater male than female mortality from 1330. The data are poor for earlier times, but generally show greater mortality for females than for males.

Today, males have greater mortality than females throughout the world. The very few exceptions are in southern Asia where it has been demonstrated that females receive less food and health care than males. With relatively equal treatment, males universally experience greater mortality than females.

Males have greater mortality at all ages, even before birth. It is estimated that there are 107–170 male conceptuses for each 100 females conceptuses, but only 105 males are born for every 100 females. After birth, the greatest difference between male and female mortality rates is around age 22, when the rate is more than three times as great for males as for females. The mortality rates for both sexes during the early adult years are low, but differ considerably between the sexes. Most deaths during this period for both men and women are due to accidents, suicide, and homicide. In fact, the peak in the sex mortality differential at age 22 has been called “the testosterone spike.”

Of 72 selected causes of death, only six yielded greater female than male age-adjusted death rates in 1998 in the United States: breast cancer, Alzheimer’s disease, asthma, rheumatic fever, pregnancy/childbirth, and kidney infections. These six causes together account for only 6.7% of the total female age-adjusted death rate. The age-adjusted death rates for the 10 major causes of death (heart disease, cancer, accidents, cerebrovascular diseases, chronic obstructive pulmonary diseases, suicide, infectious and parasitic

diseases, pneumonia and influenza, diabetes mellitus, and homicide) are all greater for males than for females. The male age-adjusted death rate due to the major cause of death for both sexes, heart disease, is almost twice that for females. The major cause of death that yields the greatest difference in age-adjusted death rates between the sexes is suicide, which is 4.3 times greater for males than for females.

Evidence suggests that the sex mortality differential is due to both biological/genetic and environmental/behavioral risk and protective factors. Genetics, in the form of the X and Y chromosomes, as well as hormones, appear to play a part. There is evidence that the primarily female hormone, estrogen, is protective for females, while the primarily male hormone, testosterone, is detrimental. Estrogen protects the heart and blood vessels. Testosterone, in contrast, tends to promote higher blood pressure, suppress the effectiveness of the immune system, and increase thrombosis. In the early part of the 20th century, one of the ways of dealing with mental retardation was castration. A study of the mortality at one of these institutions showed that castrated males lived substantially longer than intact males, in fact even longer than females. The earlier the castration was done, the longer the castrated males lived. On average, for each year earlier that the castration occurred, the men lived an additional .28 years. There is also evidence that males tend to have more iron in their bodies than females do, which tends to increase mortality.

For almost all of the animal species studied, the males have higher mortality than the females. These animals included nematodes, crustaceans, mollusks, insects, spiders, reptiles, fish, and mammals, including primates. Greater male longevity in animals appears to be related to monogamy and greater male care of offspring.

Two studies compared the mortality between males and females in similar circumstances. One study involved Catholic teaching orders, and the other considered kibbutz members in Israel. Both studies showed

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that when the roles and environments are very similar between the sexes, the sex mortality differentials are actually greater than they are in the general population.

Evidence also exists to support the behavioral hypothesis for the sex mortality differential. The greatest factor studied that involves behavior influencing the sex mortality differential is cigarette smoking. Smoking increases mortality and more men than women smoke, so that exacerbates the sex mortality differential. Males also tend to practice other risk-taking behaviors more than females, as evidenced by their greater suicide rates.

Evidence does *not* support the conventional explanation that greater male labor force participation causes greater male mortality. In fact, females who work in the labor force tend to have lower, sometimes much lower, mortality rates than females who do not work.

Regarding the future of the sex mortality differential, many have speculated that it will widen, while others expect it to narrow. In the recent past, each has happened in different parts of the world. In the former Soviet bloc countries, the differential has increased to as much as 13.5 years in the Russian Federation. The increase is thought to be due to males' adoption of self-destructive behaviors, such as excessive alcohol use, greater cigarette smoking, accidents, suicide, and

homicide; these behaviors are apparently induced by the extremely poor economies. The reason these behaviors have been adopted more by males than females is open to speculation.

In contrast, in the United States, the sex mortality differential has decreased since its peak of 7.8 years in the 1970s to 5.7 years. This narrowing may be attributable to more similar behaviors between the sexes, such as smoking, but there is no evidence that this narrowing has been due to greater female labor force participation. Although the sex mortality differential may narrow in the future, the author believes that the biological and genetic factors will cause the differential to remain for many years to come.

The evidence cited in this paper demonstrates that there are significant biological reasons for the sex mortality differential. These basic biological differences can be masked, as has been the case during much of mankind's history, because of the poor environment and poor maternal and childbirth practices; they can also be exacerbated by, for example, cigarette smoking in the male. Because of the interaction between biological factors and environmental factors, it is not possible at this time to accurately determine the relative contribution to the sex mortality differential of the two sets of factors. Further research, especially with respect to the Human Genome Project, is expected to contribute to our understanding of the differential.