

STANDARD DEVIATIONS: Coronavirus and Gender Bias

Greetings,

The most seriously affected by the novel coronavirus tend to be older, tend to have comorbidities, **and tend to be men.**

Although the rates of infection seem equally divided among the sexes, the fatality rate for men is 2.8 per cent, whereas it's 1.7% among women.

And it's not just this outbreak. Men also were disproportionately affected during the SARS and MERS outbreaks (also coronaviruses). SARS in Hong Kong, 2003, saw more women than men infected, but the death rate among men was **50 percent higher** (*Annals of Internal Medicine*).

Middle East Respiratory Syndrome is an ongoing issue in the Middle East (esp. Saudi Arabia) and is a camel-vector coronavirus. We observe that 32 percent of men infected with Middle East Respiratory Syndrome die, compared with 26% of women.

And it isn't just coronavirus. Adult men also died at higher rates than their female peers during the influenza epidemic of 1918.

What gives?

Probably no shock to anyone married to one, men are the weaker sex. Well, it appears that there are biological and social factors that are working against men and women seem to mount a more robust immune response.

Women produce an enhanced immune response post vaccination and have more exuberant immune memory.

Like most things with women, the reasons aren't clear. But it's the focus of a lot of research.

A slew of biological factors may be at play, including the female sex hormone **estrogen**, which appears to play a role in immunity, and the fact that women carry two X chromosomes, which contain the highest number of immune-related genes.

It is suggested that women's stronger immune systems confer a survival advantage to offspring, providing antibodies *in utero*, and in breast milk that ward off disease while an infants' immune system is developing.

Mouse studies show that males infected with SARS virus are more susceptible and age makes them even more so. Female mice with ovaries removed or estrogen blocked do worse than control females. Testosterone changes in either sex don't matter to immune status.



But there's a price. Women are far more susceptible to autoimmune diseases, like rheumatoid arthritis and lupus, in which the immune system kicks into overdrive and attacks the body's own organs and tissues. Nearly 80 percent of those with autoimmune diseases are women.

Social and environmental differences may contribute to the disparity we see in the Chinese.

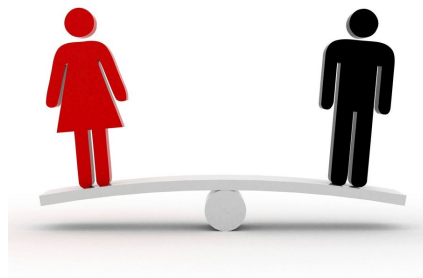
China accounts for nearly one-third of the world's smokers and 40 percent of tobacco consumption worldwide. But just 2 percent of Chinese women smoke, compared with more than half of all men. Respiratory viruses are problematic for this group.

Chinese men also have higher rates of Type 2 diabetes and high blood pressure than women, both of which increase the risk of complications (and death) following infection with the coronavirus. Rates of chronic obstructive pulmonary disease are almost twice as high among Chinese men as among women.

Men may be more likely to assume a "macho" attitude about illness, too; deferring reporting or seeking medical attention until the disease has become severe. Studies have found women are more proactive about seeking health care than men. And men have been turning up in hospitals with more advanced disease. Chinese researchers stress that delayed diagnoses, or severe pneumonia when first diagnosed, increase risk of death.

Public health officials (like me) have emphasized the importance of washing hands well and washing often, to prevent infection and transmission. But several studies have found that **men — even health care workers — are less likely to wash their hands** or to use soap than women.

While it may be too early to make more than general observations about gender and viral disease with this new coronavirus, the data indicate that men and women are different. We exhibit contrasts behaviorally, in terms of comorbidities, biology and our immune system. Some of those contrasts can be attributed to our unique genetics. Some are behaviors that can be mitigated. Smoking cessation, **hand hygiene**, healthy lifestyles, and early symptom recognition are gender-influenced behaviors that affect the battle of the sexes against disease.



Have a great week and be safe,
Bryan

