

WHERE THE BOYS ARE: SEX RATIOS AND ENVIRONMENT

by Michael Gough

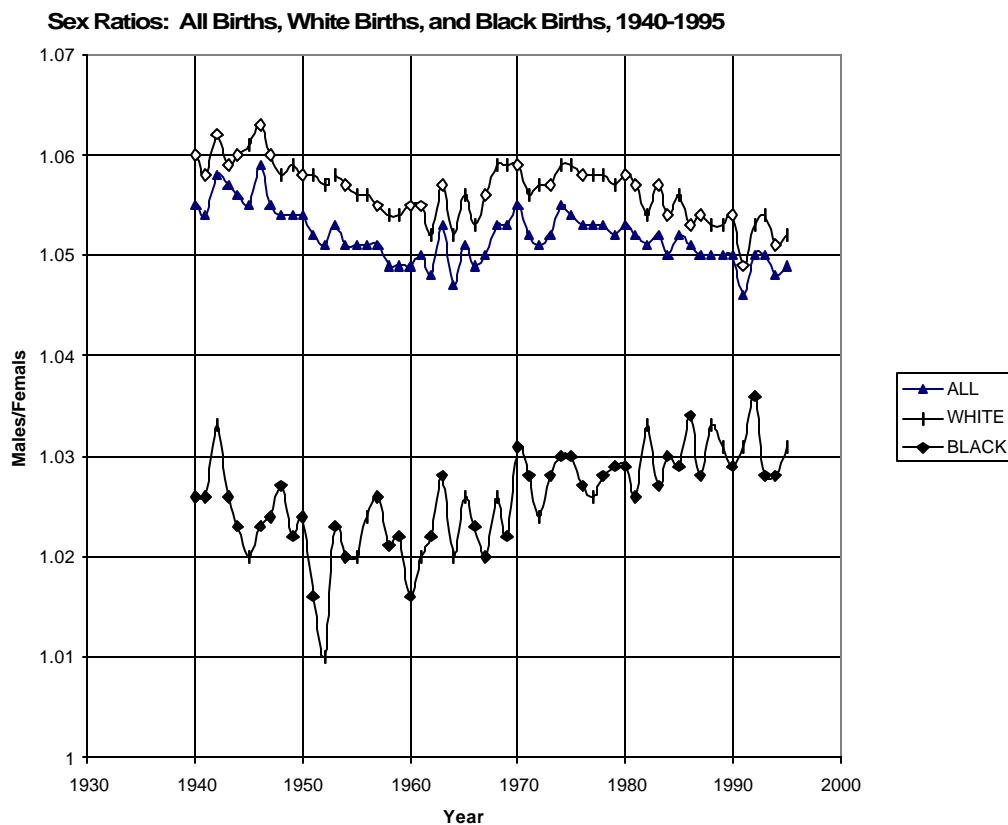
DESPITE WHAT YOU MAY HAVE HEARD, environmental exposures are not causing a decrease in births of baby boys. The 1996 “sky-is-falling” book, *Our Stolen Future: Are We Threatening Our Fertility, Intelligence and Survival?—A Scientific Detective Story*, brought new environmental worries to those who read it. That book’s authors, Theo Colborn, Dianne Dumanowski, and John Peterson Myers—a zoologist, journalist, and environmental fund-raiser, respectively—claimed that many commonly used plastics and pesticides contain “endocrine disrupters,” chemicals that interfere with the functioning of hormones such as estrogen and testosterone. The authors state that those chemicals cause or contribute to

just about every known disease and adversely affect human reproduction.

Peter Montague echoed that theme in “Something is Terribly Wrong,” published in *Rachel’s Environment and Health Weekly* in December 1997. He proclaimed that “Baby boys [are] disappearing.” A series of lectures by Devra Lee Davis of the World Resources Institute further publicized frightening news that something in “the environment,” most likely endocrine disrupters, was causing a decrease in the percentage of male babies.

But the data show that more boys are being born in some populations and more females are being born in others, and

Figure 1



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Table 1

**National Air Pollution Emission Data, 1970-1996
(in thousand short tons)**

Year	Carbon Monoxide	Nitrogen Oxides	Volatile Organic Compounds	Sulfur Dioxide	Lead
1970	128,761	21,639	30,817	31,161	220.9
1990	96,535	23,772	20,985	23,136	4.1
1996	88,822	23,393	19,086	19,113	3.9

Source: Environmental Protection Agency, *National Air Pollutant Emission Trends, 1900-1996*, 1997 p. ES-4.

that the fluctuations in male versus female birth ratios are not associated with environmental pollution. The “disappearing boys” scare appears to be nothing more than another case of bad or incomplete science being used to justify an ideologically desired conclusion.

THE STORY OF SEX

Despite all the blame that was heaped on queens and consorts who failed to bear a male heir, mothers have little to do with the sex of their children. Gender is decided by the luck of the genetic draw in the father.

Each human egg contains one copy of each of twenty-three chromosomes. It has one chromosome involved in sex determination, the X sex chromosome, and twenty-two other chromosomes. The sperm also contains one set of the other twenty-two chromosomes, but its sex-determining chromosome can be either an X or a Y. The zygote that develops after a sperm fertilizes an egg has two sets of chromosomes, one from each parent. If the fertilizing sperm carries an X chromosome, the resulting zygote will be female. If the fertilizing sperm carries a Y chromosome, the resulting zygote will be male. Although the number of X-bearing sperm typically equals the number of Y-bearing sperm, there is always an excess of male babies. The reasons for the excess are not known. But the Y chromosome is a puny thing, carrying only a few known genes, while the X chromosome is larger. It is possible that the Y-bearing sperms, being a little lighter, have a small advantage in the race to fertilize an egg.

Whatever the explanation, slightly more male babies are born. In the United States, the “sex ratio,” the number of male babies versus the number of female babies, varies by race. The ratio is highest among Asians, lower in whites, and still lower in blacks.

POLLUTION AND SEX RATIO TRENDS

The most concrete and specific claim about decreasing sex ratios in the United States appeared in the 1 April 1998, issue of the *Journal of the American Medical Association (JAMA)*. The authors of the paper, Dr. Davis and her colleagues, examined birth records for all races in the United States between 1970 and 1990. They concluded that the sex ratio fell during those two decades and worried that an environmental factor could be causing the decline. Their conclusion about the decrease is correct. Their worry about endocrine disrupters or some other environmental exposure causing the decrease is not.

The upper line on Figure 1 represents the sex ratio of boy babies to girl babies born to whites, the middle line represents the ratio for all babies, and the lower line represents the ratio for blacks. As can be seen, the sex ratio for babies born to all races fell between 1970 and 1990 just as Davis et al. reported (since 1990, the ratio has continued to fall but shows signs of flattening out). But decreases are nothing new. The sex ratio for all races fell steeply from 1946 through 1962, climbed rapidly in the eight years between 1962 and 1970, and then fell again. If environmental agents cause the changes in ratios, those agents must have increased in the immediate post-World War II period, decreased in the 1960s, and increased again in the 1970s and 1980s.

Perhaps a hypothesis can be developed to relate environmental exposure to the changes in sex ratio. But one has not been offered by those, such as Dr. Davis, who point to a decline in male births as “sentinel events,” warning of other health problems to follow. Certainly it can not be a simple relationship.

The data in Table 1 show that air pollution, using several different measures, was increasing in the 1940s, when the sex ratio was high and continued to increase as the ratio fell in the

Table 2

**Temporal Changes in Airborne Dioxin Levels
(the maximum recorded level is set at 1.0 and other levels
are presented as relative values)**

Year	Green Lake, NY*	Lake Siskwit on an island in Northern Lake Superior**
1930	0.006	0.06
1940	--	0.13
1950	--	0.33
1960	--	0.70
~1965	1.0	--
1971-74	--	1.0
1982	--	0.72
~1988	0.5	--

Sources, from: * EPA, *Estimating Exposure to Dioxin-Like Compounds Volume II: Properties, Sources, Occurrence and Background Exposures*, 1994, p. 4-48.

** J. Czuczwa and R. Hites, *Environmental Science and Technology* 26 (1986): 195-200.

1950s and early 1960s. Air pollution peaked around 1970, when the sex ratio was again high. Air pollution has decreased since 1970, during the period that the sex ratio has also fallen. It is difficult to imagine how exposures to pollutants that affect the sex ratio would be increasing during a period of generally decreasing pollution. Further, because the sex ratios fluctuated during a period in which pollution increased steadily, it cannot be argued that there is some kind of time lag between exposure to pollution and a fall in the sex ratio.

Davis and her colleagues suggest a number of specific chemicals that might be affecting the sex ratio. The most notorious of those compounds is dioxin.

As shown on Table 2, concentrations of dioxin measured at two different sites increased dramatically from the 1930s through the 1970s, a period in which the sex ratio both increased (1940 to 1946 and 1962 to 1970) and decreased (1946 to 1962). Dioxin emissions began to fall in the early 1970s, just at the time the decline in sex ratios seen in the 1970 to 1990 period was getting underway. Those data indicate that there is no clear relationship between dioxin emissions and sex ratio, just as there is none between airborne pollutants and sex ratio. (The Environmental Protection Agency accepts airborne concentrations of dioxin as a good proxy for dioxin exposures because essentially all dioxin enters the environment as airborne emissions that then fall to earth.)

WHERE THE BOYS ARE

The absence of any clear relationship between pollution levels and sex ratio makes Davis et al.'s conjecture about a connection unlikely. There is, however, a stronger argument against

the conjecture. The differences in the changes in sex ratios in whites and blacks make it untenable.

With the exception of peaks in 1942 and 1948, the black sex ratio generally declined between 1940 and 1952. After 1952, however, the sex ratio among blacks increased. In direct contradiction to Davis' argument that something in the environment is causing declines in the sex ratio, there was no decrease in the black sex ratio during the 1970s and 1980s. Instead, it increased. If an environmental agent were causing the decreased ratio in whites, why would it not have a similar effect on blacks? Would Davis and her colleagues contend that pollution somehow is greater in residential areas inhabited by whites than by blacks? Or would they postulate that some other agent or chemical counteracts the effects of endocrine disrupters in blacks and in fact fosters an opposite trend in sex ratio?

The outrage of Davis, her colleagues, and the authors of *Our Stolen Future* about environment chemicals is misplaced. The changes in sex ratio in the United States are no more than fluctuations that have been seen in the past. There is no relationship between the sex ratio and exposure levels. Trends in sex ratio among different subgroups of the population have moved in different directions, which argues against environmental exposures playing a major role in determining sex ratios.

WHERE THE GIRLS AREN'T

Remarkably, Davis and the others do not discuss truly monumental changes that human activity has inflicted on sex ratios. They overlook the effects of sex-selective infanticide in China and sex-selective abortion in South Korea and Taiwan. These changes they overlook are not unintended consequences of

Table 3

**Sex Ratios in South East Asian Countries, 1972 - 1990
(Boys/Girls at birth X 100)**

Year	China	South Korea	Taiwan	Singapore	Hong Kong	Japan
1972	106	108.5	106	107.5	106	106
1980	107	107	107	108.5	106	106
1986	110.5	110.5	108	108	106	105.5
1990	113.5	114	109.5	107.5	107	105.5

Source: *The Economist*, December 19, 1998, page 57.

industrial pollution, which would be the case in the United States if Davis' conjecture were correct.

As shown on Table 3, the ratio of boys to girls at birth in those countries has skyrocketed. Between 1972 and 1990, the ratio jumped from 106 in 1972 to 113.5 for China, from 108.5 in 1972 to 114 in 1990 for South Korea, and from 106 to 109.5 for Taiwan. Such increases are not seen in other South East Asia countries. The sex ratio increased in Singapore between 1972 and 1986, but it has fallen back to 1972 levels. The sex ratio in Hong Kong has remained relatively constant, but it may have increased since 1986. In Japan, the sex ratio has declined slightly, just as it has for births to all races in the United States.

Davis and the authors of *Our Stolen Future* sell themselves as compassionate individuals with an overwhelmingly interest in human and environmental welfare. Yet they do not mention the greatly increased sex ratios in some Asian countries. Certainly, they do not mention the explanation: infanticide and sex-selective abortion. That oversight seems even more remarkable because Davis and many of her colleagues are avowed feminists. Where is their concern for the millions of unborn girls that lie under the increased sex ratios in some countries?

The huge oversight by Davis, et al. indicates that they will continue to look for any kind of change in any aspect of human health that they can blame on endocrine disrupters or other environmental chemicals. Knowingly or unwittingly, they will fail to analyze data about black births that might con-

tradict their claims, or they will fail to report such analyses. Blaming chemicals raises money for their organizations, increases pressures on legislators and policy makers for more regulation of the chemical industry and other manufacturers, and attracts attention to the valiant researchers (themselves) who discovered the new risk, whatever it may be. Real human welfare problems, for example, the killing of baby girls in Asia are of no importance and have no worth in Davis and others' efforts to reach those goals.

SUGGESTED READINGS

- Devra Lee Davis, Michelle B. Gottlieb, and Julie Stampnitzky, "Reduced Ratio of Male to Female Births," *Journal of the American Medical Association* 1998; 279: 1018-1023 (April 1, 1998).
- Michele Marcus, John Kiely, Fujie Xu, Michael McGeehin, Richard Jackson, and Tom Sinks, "Changing Sex Ratio in the United States, 1969-1995," *Fertility and Sterility* 1998; 70: 270-273 (August 1998).
- Michael Fumento, "Medical Journals Gives New Meaning to 'Political Science,'" *Wall Street Journal*, January 21, 1999.
- Michael Gough, "Birth Study Unfairly Blames Pollution," (letter to the Editor) *Wall Street Journal*, February 23, 1999.