

[Trends with time]** in sex ratios in Canada

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Abstract

Objective: To examine the trends in the proportion of annual live births that were male in Canada and to compare the trends with those in the United States.

Design: Analysis of census data.

Setting: Canada as a whole and 4 main regions (West, Ontario, Quebec and Atlantic).

Subjects: All live births from 1930 to 1990.

Outcome measures: Sex ratio (expressed as the proportion of total live births that were male [male proportion]) overall and by region.

Results: The male proportion in Canada ...

Conclusions: The ...

*[]** title altered to keep the reader neutral*

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The sex ratio, usually reported to be about 105 liveborn males per 100 liveborn females(1), can vary within and between populations and change over time. For example, the sex ratio in some Latin American countries decreased from 1967 to 1986(2) whereas in Japan and Italy it increased during the periods 1900 to 1978(3) and 1930 to 1990(4) respectively.

Reasons for such changes are difficult to identify, but numerous demographic and environmental factors have been shown to be associated with variations in sex ratios within and between populations.

Race appears to be a factor. Sex ratios are reported to be lower in black populations than in white populations(56) and relatively higher in Asian populations.(78)

Parental age has also been shown to affect the sex ratio. James and Rostron⁹ reported that as paternal age increased, the sex ratio decreased. Although the association with maternal age in their study was inconclusive, Ulizzi and Zonta(4) found that as maternal age increased, the sex ratio also increased.

Animal studies have suggested that decreased maternal condition or adverse environmental conditions during pregnancy are associated with a decreased sex ratio^{10,11} In studies of human populations, a decreased rate of stillbirths was associated with an increased sex ratio,³⁴ which perhaps reflected the effect of improved perinatal care.

Exposure to environmental toxins has been shown to alter the sex ratio of live births in both human populations and animal models^{7,12-20} ° This may reflect differential toxicity, which occurs when the reproductive system is exposed to agents that stimulate ovulation.²¹⁻²⁶ It has been postulated that the mechanism of action of some toxins may be similar to hormonally induced ovulation, which causes an excess of female births,^{7,21,27} and that the toxins may alter female gonadotropin levels at the time of conception.'

Several other factors have been reported to affect sex ratios, including seasons, wars, birth order, certain diseases and various social factors^{7,28-34}

Trends in the sex ratio of live births in Canada have not been previously investigated. We undertook this study to examine the ratio from 1930 to 1990 in Canada overall and in 4 main regions within Canada.

Methods

The "livebirth sex ratio" is the standard term used to report the ratio of male:female live births and is either the number of liveborn males per 100 liveborn females or the proportion of liveborn males of all live births. The former statistic is a true sex ratio, whereas the latter (which is the statistic reported in this study) is more properly referred to as the female proportion." For example, a sex ratio of 105 equates to a male proportion of 51.2%.

We obtained from Statistics Canada the annual number of live births by sex and province for the period 1930 through 1990.³⁵ From this information we calculated the annual male proportion by dividing the number of liveborn males by the total number of live births for each study year. These proportions were calculated for Canada as a whole and for 4 main regions within Canada: the West (British Columbia, Alberta, Saskatchewan and Manitoba); Ontario; Quebec; and the Atlantic region (New Brunswick, Nova Scotia, Prince Edward Island and Newfoundland). These regions represented approximately 29%, 25%, 37% and 9% of the Canadian population respectively (based on the 1990 population of 27.3 million).

We analysed the data

For confirmatory purposes, we examined livebirth data from the United States for the period 1970-90 using the methods we applied to the Canadian data. We calculated the male proportion in the United States overall and in 9 major regions New England, Middle Atlantic, South Atlantic, East North Central, East South Central, West North Central, West South Central, Mountain and Pacific.

Results

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Jim:

I'm attaching two files with somewhat different layouts. The usa.raw file is one birth count per line with variables for region, sex and year. The can.raw file is one line per year - the variables fc and mc are the total female and male births and fnf, fpei, ... and mnf, mpe, ... are the provincial counts.

Unfortunately, I don't have the earlier USA data. That would be fun to look at!

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