Male-biased infant sex ratios and patterns of induced abortion

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Two linked research papers by Urquia and colleagues examine infant sex selection, a long-standing and controversial topic.[1,2] In their first study, the authors investigate birth certificate data to examine skewed infant sex ratios among mothers born in India compared with mothers born in Canada and to compare trends across Canadian provinces.[1] In their second study, they used linked birth, medical and immigration databases to determine infant sex ratios among mothers born outside Canada compared with Canadian-born mothers and to consider the associations with prior planned abortion.[2] These two articles shed new light on potential mechanisms for prenatal sex selection and highlight specific population subgroups in which this practice may be more prevalent. Their results suggest that prenatal sex selection is likely present among first-generation immigrants to Canada from India and provide strong evidence that suggests induced abortions are being used to select for infant sex in Canada. We hope that these findings stimulate discussion toward the re-evaluation and development of public health policies aimed at eliminating the practice of prenatal sex selection in Canada.

Urquia and colleagues assessed variations in infant sex ratios at birth in Ontario between 1990 and 2011, by year of birth, province and parental country of birth, and observed male-biased sex ratios among infants born to parents from India.[1] Particularly striking was the finding of high rates of male-biased infant sex ratios among third (male:female infant ratio = 1.38) or higher orders of birth (male:female infant ratio = 1.66), which are significantly higher than those observed among mothers born in Canada (male:female infant ratio = 1.05).[1] A recent systematic assessment of infant sex ratios reported that the global infant sex ratio in 2012 was 1.13 (male:female).[3] This study identified 15 countries where female mortality was higher than expected, among which India had worsening rates from their 1990 estimates. Is it likely that the male-biased infant sex ratios observed among first-generation Canadians of Indian descent are reflective of these trends? Urquia and colleagues also report on infant sex ratios for a combination of mothers and fathers born in India, Canada and other countries.[1] Paternal country of birth, a rarely reported factor, did not have a stronger association with male-biased infant sex ratios than maternal country of birth. However, the authors found a more pronounced association when both parents were born in India. They were unable to consider second- or third-generation ethnic origins of parents born in Canada, who could have been subject to similar cultural influences.

Most previous studies examining the relation between induced abortions and male-biased infant sex ratios lacked a direct comparison to abortive procedures, mainly because of data limitations.[4] Urquia and colleagues address this knowledge gap among mothers who were born in India and observed male bias for third-born infants preceded by two female siblings after one or more induced abortions.[2] They did not find an association with spontaneous abortion. The authors also note that the interval between second and third births was about four months greater overall if the third child was male and infer that some undocumented procedure may have occurred within the additional period. These two findings strongly suggest that sex-selective abortions are occurring within specific population subgroups.

A review of sex-selection practices estimated that nonmedical abortions accounted for the absence of more than 100 million female fetuses

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Key points

- Infant sex selection, an old practice, has been made easier by the introduction of fetal ultrasonography and newer technologies enabling early embryonic sex identification.
- Recent research shows male-biased sex ratios for infants of parents living in Canada who were born in India and provides insight into the relation between this bias and infant birth order when previous siblings were female.
- Induced abortion was associated with male-biased infant sex ratios among first-generation parents who immigrated to Canada from India.
- Further studies are needed to show if transgenerational cultural biases persist postmigration, to identify potential predictors and to evaluate education or policy strategies.

worldwide over the last 25 years.[5] Urquia and colleagues estimate that about 4500 female fetuses were not born because of observed male-biased infant sex ratios in Canada over the past 22 years.[1]

Infant sex selection has been documented in many cultures and in the medical literature as early as the 18th century.[6] However, it was not until the development of fetal ultrasonography technologies that the ability to identify fetal sex in utero became widely available. Clinical practice guidelines in Canada recommend routine fetal ultrasonography between 18 and 22 weeks gestation for confirmation of gestational age and to detect fetal anomalies.[7] Fetal sex is easily determined at this stage, which may influence parental behaviours. Parents can also obtain ultrasonography before 18 weeks gestation at private clinics to learn the sex of the fetus. In a 2007 policy statement, The Society for Obstetricians and Gynaecologists of Canada did not support termination of pregnancy on the basis of sex and indicated that medical testing should not be used for the sole purpose of sex identification in pregnancy.[8] Some parents and physicians have concerns about this recommendation and argue that it is the right of parents to know the sex of the fetus. However, this right can be abused, which may lead to selective abortions of unwanted female fetuses. A 2012 *CMAJ* article provides a balanced overview on this topic, emphasizing that there is no simple solution.[9]

Abortion in Canada has been legally unrestricted since 1988, with access and funding policies varying by province. Ontario fully funds abortions up to 24 weeks gestation. Contrasting results from the current study with data from more restrictive provinces, such as Alberta (where abortions are permitted and funded up to 20 weeks), could be of interest. However, no suitable data are currently available or have not yet been linked in these jurisdictions, which precludes such a comparison at this time. Hormone-based techniques and proprietary pregnancy kits promise the ability to identify fetal sex. Developments in the field of assisted reproductive therapies can facilitate fetal sex selection before fertilization. The Assisted Human Reproduction Act of Canada banns sex selection of implanted embryos among women undergoing assisted reproductive treatment, consistent with similar laws adopted in Australia and other commonwealth countries. However, in vitro fertilization for the process of sex selection is not illegal in the United States,[10] and it has been suggested that "would-be" parents from commonwealth countries travel to countries with less stringent regulations to exercise this practice.

The difficulty of enforcement and ease with which these laws can be subverted mean that the real question is not whether the practice of prenatal sex selection exists — it is clear from the results of this study and numerous others that it does[3,9] — but why this practice persists, particularly in a Canadian society that espouses sex equality. Can public health initiatives be developed and targeted to at-risk groups that would not stigmatize cultural beliefs and practices? Further studies are needed to show whether transgenerational cultural biases persist postmigration, to identify potential predictors and to evaluate education or policy strategies. Such research might point the way toward influencing the practice of prenatal sex selection in Canada and promoting equitable valuation of the sexes.

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