

## Explaining Asia's "Missing Women": A New Look at the Data

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THE FACT THAT millions of women are "missing" in East Asia and South Asia<sup>1</sup> has received attention from scholars, policymakers, and governments because of its profound human and social implications. Both India and China have banned the use of sex-selective technologies. Officials in both countries have spoken out against female infanticide, and both countries seek in various ways to encourage parents to view daughters as no less valuable than sons. Even a century ago, British colonial authorities in India were trying to redress the problem by imposing collective punishment on villages with highly imbalanced sex ratios among children, while in China clans were offering incentives to parents to raise daughters.<sup>2</sup>

The assumption underlying such policies is that a strong cultural preference for sons is driving the imbalance in sex ratios. The literature relates son preference to a variety of social and economic factors in these regions, which interact to make females less valuable to their families: people are pressured to bear sons while limiting the number of daughters in order to conserve scarce household resources.<sup>3</sup> Households have variously resorted to female infanticide and postnatal withholding of health care; and since the mid-1980s, when technology permitting fairly low-cost determination of the sex of fetuses became available, there has been a shift toward prenatal sex selection by means of induced abortion.<sup>4</sup> And because cases of female infanticide are often not reported as live births, they can be hard to distinguish from the consequences of prenatal sex selection in the reported sex ratio of births.

But another factor may underlie the deficit. According to the literature many diseases—both communicable and noncommunicable—affect males and females differently.<sup>5</sup> If a disease widespread in these Asian popu-

lations were associated with higher rates of female mortality in utero or in early childhood, policies to address the female deficit should look beyond the cultural premises on which they are currently based. And indeed, Baruch Blumberg in his 1976 Nobel Prize lecture mentioned that some studies indicated that women infected with hepatitis B virus give birth to male children in higher proportions than the norm.

Emily Oster (2005) explores this hypothesis further. Extrapolating from studies recording the sex ratios of children born to women infected with hepatitis B, she derived estimates of the proportion of "missing women" attributable to the prevalence of this infection. Her estimates indicate that up to 75 percent of the "missing women" in China could be explained this way. This is consistent with the fact that the vast majority of the "missing females" in China are attributable to excessively masculine reported sex ratios at birth. The implications of her paper are clearly important, and eminent economists such as Robert Barro and Steven Levitt have disseminated the findings widely.<sup>6</sup>

The question then becomes, what proportion of the excess female child mortality is potentially attributable to biological rather than social and economic factors? Because Oster's most striking results are for China, I examine her argument using the data for that country presented in the influential article she cites<sup>7</sup> (Zeng et al. 1993). Writing in this journal, Zeng Yi and colleagues analyzed the data on sex ratios at birth from China's successive censuses and found that while the sex ratio at birth (the ratio of male births to female births) was around the normal range of 1.05–1.06 for first births,<sup>8</sup> it became abnormally masculine at higher birth orders (see Table 1). This pattern was evident in 1982 and 1989, that is, both before and after the spread of sex-selective technology. Is it possible that women's susceptibility to hepatitis B increases with parity? Even if this were the case, the data reveal another twist.

The additional twist is that the sex ratio at birth varies sharply by the sex composition of the living children the woman already has (see Table 2). Zeng et al. show that the sex ratio at birth was normal (1.056) for first births. For second births, it was strikingly different depending on whether the first child was male or female: women whose first child was a son had a low sex ratio (1.014) for the second child, while those whose first child was a daughter had a very high sex ratio (1.494) for the second child. This appears clearly

**TABLE 1** Reported sex ratios at birth in China by birth order of child, 1982 and 1989

Year	Birth order of child				All
	1	2	3	4+	
1982	1.065	1.050	1.094	1.119	1.072
1989	1.049	1.209	1.246	1.317	1.138

SOURCE: Zeng et al. (1993): Table 1.

**TABLE 2 Sex ratios at birth by sex composition of existing children, China 1989–90**

Existing children	Sex ratio at birth of next child
None	1.056
1 son	1.014
1 daughter	1.494
2 sons	0.741
1 son and 1 daughter	1.164
2 daughters	2.249

SOURCE: Zeng et al. (1993): Table 7.

to indicate a sharp preference for sons among women who already had a daughter. Given the huge population sizes from which these rates are derived, the estimates are very robust.

The same pattern of parental preferences is found in South Asia and elsewhere in East Asia, both before and after the spread of prenatal sex-determination technology. Data from Bangladesh, India, and South Korea,<sup>9</sup> pertaining largely to the period preceding the availability of such technology, show that boys and firstborn girls had similar mortality levels—but that girls born to a family which already had a daughter suffered sharply elevated mortality compared to other infants. After prenatal sex-determination technology became widely available, the South Asian and South Korean data indicate that the use of this technology is strongly correlated with the sex composition of existing children<sup>10</sup>—just as in China.

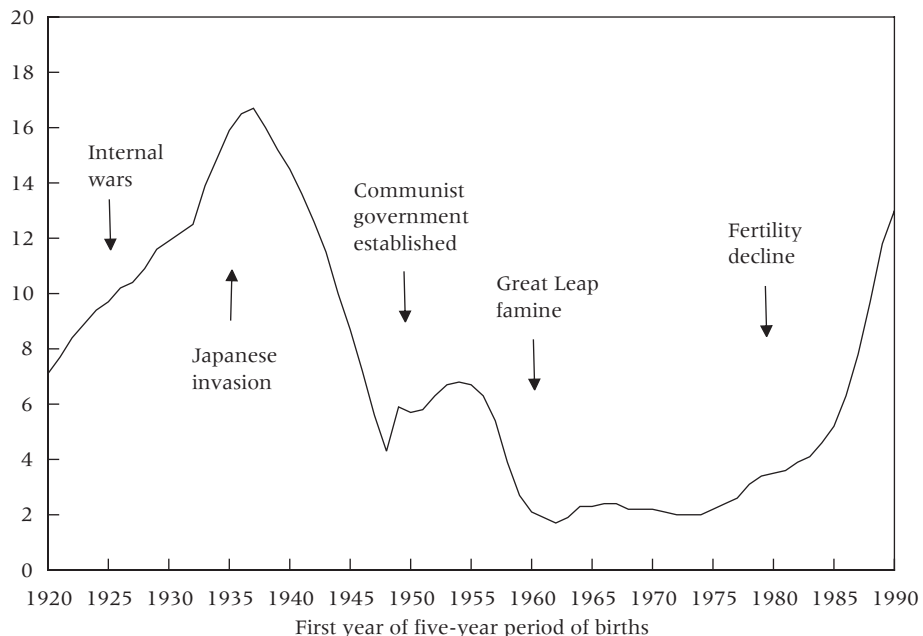
Another issue is that there are sharp, long-standing differences between regions of both China and India in the proportion of females “missing”—differences that have been attributed to cultural variations between regions and ethnic groups.<sup>11</sup> The Han-dominated regions of China show high female deficits, while those populated by several ethnic minorities show lower or no deficits.<sup>12</sup> In India, these regional differences have held consistently since censuses were first taken in the late nineteenth century, with the highest female deficit in the northwestern region and little deficit in the south.<sup>13</sup> Today, these regional differences are reflected in the way ultrasound and amniocentesis tests are used.<sup>14</sup> The northwestern states have experienced a steep rise in the use of these methods of sex detection among women who had only borne daughters as compared to those with a son. By contrast, the southern states show a barely perceptible difference in the use of these technologies by the sex composition of the children already born. Oster does not find clear evidence that the prevalence of hepatitis B corresponds to these regional differences today, and even if such differences existed, can the differential prevalence of the disease have persisted so long in the face of extensive interchange across regions?

Furthermore, changes over time in the extent of female deficits seem consistent with the cultural rather than the biological explanation. In China,

sex ratios fluctuated sharply over the twentieth century, and these fluctuations seem to correspond to resource constraints and ideological shifts (see Figure 1). Sex ratios rose sharply when households were placed under severe resource constraints by the disruption of war in the first half of the century and by fertility decline in the latter decades of the century, constraints which made couples less willing to raise daughters. During the period of strict Communist rule (1949 to the mid-1970s), a strong ideology of gender equality was actively implemented, and this is reflected in normal sex ratios. Even during a crisis as major as the Great Leap famine, the rise in sex ratios was very muted compared to preceding crises. If biological factors were at play, their prevalence would have had to fluctuate in tandem with these observed trends.

The data are consistent with the cultural explanation for the "missing women," rather than with the biological one. Indeed, Oster points to some caveats in discussing her hypothesis. She notes, for example, that although several sub-Saharan African countries have a high prevalence of hepatitis B, they do not show excessively masculine sex ratios at birth (Table 3). Also, she mentions that the basic evidence on the relationship between hepatitis

**FIGURE 1** Percent of excess of male births to female births by five-year birth cohorts, China 1920–95



SOURCE: Das Gupta and Li (1999), calculated from the 1953, 1964, 1982, and 1990 Population Censuses of China; and the 1995 National One Percent Sample Survey.

**TABLE 3 Sex ratios at birth, 1995–2000, for the sub-Saharan African countries with high hepatitis B rates<sup>a</sup>**

Botswana	1.03
Liberia	1.03
Malawi	1.03
Mali	1.05
Togo	1.02
Zimbabwe	1.02
Sub-Saharan Africa	1.04

<sup>a</sup>As listed in Oster (2005): Appendix C.

SOURCE: Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, *World Population Prospects: The 2004 Revision and World Urbanization Prospects: The 2003 Revision*, «<http://esa.un.org/unpp>».

B and the sex ratio of offspring is based on six small studies (Oster 2005: Table 3). Having conducted four of these studies, Blumberg and his coauthors concluded that immunization against hepatitis B would be unlikely to alter the aggregate sex ratio of a population (Chahnazarian et al. 1988).

Oster's study is valuable because it reminds us of the importance of biological factors in affecting sex differentials in health outcomes. However, the evidence indicates that parental preferences overwhelmingly shape the female deficit in South and East Asia. It is hard to see how biological factors could play a significant role in determining the sex ratio at birth when that ratio is so closely related to the sex composition of the children already born in the family. For now, one must conclude that the governments of these countries have been correct to focus their policies on changing the cultural roots of son preference.

## Notes

- 1 Sen (1990), Coale (1991).
- 2 Miller (1981), Hsu (1948).
- 3 This is a vast literature, but see for example Miller (1981), Dyson and Moore (1983), and Croll (2001).
- 4 Goodkind (1996).
- 5 See, for example, Waldron (1983) and Vlassoff and Bonilla (1994).
- 6 Barro (2005), Dubner and Levitt (2005).
- 7 Oster uses Yi as Zeng Yi's surname, but it is actually Zeng in the Chinese custom of putting the surname first.
- 8 Johansson and Nygren (1991), using two centuries of data on births in Sweden, find that the sex ratio at birth rose from around 1.044 in the 1750s to 1.058 in the 1980s. They attribute this rise to improved viability of male fetuses as mothers' nutritional status improved. Hansen et al. (1999) find that in Denmark in the 1990s the sex ratio is above 1.06. Chahnazarian (1988) reviews the literature and puts the normal range at 1.04–1.07.
- 9 Muhuri and Preston (1991), Das Gupta (1987), Choe (1987).
- 10 Arnold et al. (2002), Park and Cho (1995).

- 11 See, for example, Dyson and Moore (1983) and Das Gupta et al. (2003).  
 12 Das Gupta et al. (2003).  
 13 Visaria (1969).  
 14 Arnold et al. (2002).

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