

Is There an Incipient Turnaround in Asia's "Missing Girls" Phenomenon?

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Abstract

The apparently inexorable rise in the proportion of “missing girls” in much of East and South Asia has attracted much attention amongst researchers and policy-makers. An encouraging trend was suggested by the case of South Korea, where child sex ratios were the highest in Asia but peaked in the mid-1990s and normalized thereafter. Using census data, we examine whether similar trends have begun to manifest themselves in the

two large populous countries of this region, China and India. The data indicate that child sex ratios are peaking in these countries, and in many sub-national regions are beginning to trend towards less masculinization. This suggests that, with continuing vigorous efforts to reduce son preference, the “missing girls” phenomenon could be addressed in Asia.

This paper—a product of the Human Development and Public Services Team, Development Research Group—is part of a larger effort in the department to study socio-political processes and development outcomes. Policy Research Working Papers are also posted on the Web at <http://econ.worldbank.org>. The first author may be contacted at mdasgupta@worldbank.org.

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Monica Das Gupta,¹ Woojin Chung,² and Li Shuzhuo³

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1. Introduction

The proportion of girls “missing” has risen sharply in many parts of East and South Asia in recent decades, raising much concern amongst researchers and policy-makers. There are obvious moral and human concerns generated by such extreme manifestation of gender inequity. The phenomenon also creates the potential for social problems following from shortages of women to marry — for men who face life and old age without a wife or children; for women bought as wives from distant areas with different cultures and languages; and in extreme cases violence against women as some seek to kidnap and sell them to men desperate to find a wife.¹

The trends in the sex ratios of children have seemed to move inexorably towards a greater masculinization of the population. Some researchers have noted that the overall sex ratio of the population has improved somewhat in recent decades in India (Dyson 2001, Klasen and Wink 2002). However, they find that this is driven not by improvements in the sex ratios of children, but by improvements in the sex ratios of adults. Adult female mortality levels have improved relative to those of males, partly because fertility decline reduces maternal mortality and maternal depletion.

In a clear exception to this trend, South Korea has become the first of these Asian countries to register a reduction in the proportion of girls “missing”. The decline is dramatic — from the most masculine sex ratios at birth in Asia the early 1990s, to normal ratios by 2007.² Chung and Das Gupta (2007) found that this is associated with the country’s rapid development and modernization, as sociological theory would predict. Increased urbanization and education eroded the societal structures and values that underpinned son preference — and a change in social norms swept through the population, sharply accelerating the speed of the reduction in son preference.

Extrapolating from the South Korean case, Chung and Das Gupta (2007) suggested that China and India may experience reduction in son preference even before they become as highly developed as South Korea. This is because they have strong public policies to increase gender equity and to equalize the value of sons and daughters to their parents, through vigorous media campaigns and legislation, and more recently financial incentives to parents with daughters³ — in sharp contrast to the highly conservative public policies prevailing in South Korea during this period. On the other hand South Korea is a small homogeneous country in which new ideas can spread more quickly than in these two large countries, but this is partially offset by high volumes of circular migration and rural non-farm employment which help accelerate the diffusion of new norms.

Is there then evidence of trends towards normalization of child sex ratios in other countries in Asia? The literature suggests intimations of such change. For example, there has been a decline in excess female child mortality in the Matlab region of Bangladesh (Alam et al 2007). In India, Retherford and Roy (2003) find that reported son preference has declined in almost all states and socio-economic groups. And in China, Goodkind (2008: Figure 4) finds that the reported sex ratio of births rose slightly between 2000 and 2005, but they fell slightly when standardized for the distribution of birth orders.

These intimations of change raise the question of whether a closer examination of the data may show clearer signs of the beginnings of a turnaround in the “missing girls” phenomenon in other parts of Asia other than South Korea. Here we look for such evidence, focusing in particular on the large populous countries of China and India, and the data suggest that their child sex ratios are peaking, and are beginning to trend towards less masculinization.

2. National Trends

Trends in the sex ratios at birth in East Asia

Sex ratios at birth rose significantly during the 1980s in both South Korea and China (Figure 1). In South Korea, they continued to rise sharply till the mid-1990s, and since then they have fallen so rapidly that by 2007 the ratios are within the biologically normal range.⁴ In China they continued to rise through the 1990s and overtook South Korea, but between 1999 and 2007 the ratios seem to have fluctuated close to 1.20 — with no apparent secular trend either upwards or downwards. In both settings, the annual data fluctuate, partly in response to the desirability of bearing boys versus girls in different animal years in East Asia.⁵

We are unable to provide a comparison with India, since it does not have data on sex ratios at birth of comparable quality.⁶ The data for South Korea are from their official vital statistics data, which are of high quality. The data on sex ratios at birth and child sex ratios for China are taken from the official statistics from the National Bureau of Statistics (NBS) of China, without any adjustments.⁷

Trends in the sex ratios of infant and child mortality

As is well known, sex ratios at birth do not capture the full extent of the removal of unwanted female children, since sex selection can take place after birth. This is especially the case in countries like China and India, where substantial parts of the population lack easy financial and/or physical access to sex-selective technology.

A large literature shows that postnatal sex selection has been common in both countries. In China, the literature focuses largely on infanticide, while in India it focuses largely on differentials in health care utilization in the first years of life.⁸ This difference between the two countries is reflected in Table 1, which shows that the female disadvantage in childhood mortality is highest in China during the first year of life, while in India it is highest between ages 1-4 years. The proportion of children who die in the first year of life is, of course, much higher than that dying during ages 1-4 and thereafter.

The net result in both cases is a striking level of excess female under-5 mortality, which increased in both countries in recent decades⁹ — even as levels of prenatal sex selection

increased. Figure 2 summarizes the trends in the sex ratios of under-5 mortality in the two countries. In China the female disadvantage in child survival increased sharply until 2000, and appears to have improved somewhat thereafter. In India the female disadvantage in child survival has been lower, but gender differentials appear to be worsening.

In interpreting these data, we need to bear in mind the problems of collecting accurate data on child mortality in these settings. Over and above these difficulties, sex differentials in child mortality tend to be underestimated, because if a girl dies early in life parents are less likely to report it than for a boy. Girls who died very soon after birth (for example in cases of infanticide) are especially likely to be under-reported.

Trends in the sex ratios of surviving children in East and South Asia

We therefore focus our analysis on the sex ratios of surviving children, which captures the end result after the effects of both prenatal and postnatal sex selection have manifested themselves. Another advantage of analyzing child sex ratios is that comparable data are available from censuses in all three countries. Unfortunately, India has only decadal censuses, unlike South Korea and China, which also have mid-decadal censuses or sample censuses.

Figure 3 shows the child sex ratios for all three settings. South Korea and China show a sharp increase till the mid-1990s, followed in South Korea by a steady decrease and in China by a continued rise.¹⁰ India has the least masculine child sex ratios of all these settings, but they began to rise significantly from the 1980s.

It needs to be noted that the data on China's child sex ratios are subject to several sources of fluctuation. Firstly, sex ratios at birth fluctuate by animal year in East Asia, as noted above. A study in South Korea showed that parents even shift the reported birth year of a child if they were born close to a more auspicious birth year for children or for children of a particular gender (Lee and Paik 2006). This effect seems to have diminished in recent years in both South Korea and China (Figure 1). Secondly, there can be variation in data quality between years, and between provinces, depending on national and local factors. Thirdly and perhaps most importantly, the mid-decadal data derive from one percent sample censuses, which can differ in quality and robustness of estimates from the full censuses which are conducted decadally. The combined impact of these factors reduces our ability to derive precise conclusions from the trends we observe, especially when analyzing quinquennial trends at sub-national level.

3. China and India: A Closer Look at Trends in the Child Sex Ratios

National trends

We turn to a closer examination of the trends in China and India, large populous countries which account for the bulk of the total "missing girls" in Asia. Given the lack of mid-

decadal census data on India, we have to limit our analysis of Indian trends, as well as our comparison of trends in China and India, to the decadal census data on these countries. However, we are able to use China's quinquennial data to further break down the trends in that country, and this also offers some insights into what may be happening in India.

Figure 4 shows the decadal rate of increase in child sex ratios in India and China. Comparing the rate of increase in child sex ratios during the 1980s with that during the 1990s, we find that it changed little in India, while it rose sharply in China. The rate of increase of masculinization of child sex ratios in China was already 1.7 times higher than that of India in the 1980s, and rose to 4.7 times that of India in the 1990s. These decadal trends suggest that child sex ratios have continued to rise sharply in China.

However, the quinquennial data for China show that the decadal data hide important trends. They show that the rate of increase in China's child sex ratios peaked in 1990-95, and then *fell* sharply (Figure 5).¹¹

The lack of quinquennial data for India precludes this more nuanced analysis. It is evident that the rate of masculinization of India's child sex ratios remained relatively low and unchanged during the 1980s and 1990s. However, as in the case of China there may well be a slowing down in the rate of masculinization of child sex ratios in India which is masked by the decadal data. This would be consistent with the survey evidence that reported son preference is falling across India (Retherford and Roy 2003), and with the results of our sub-national analysis below which shows that most states show a decline in the rate of masculinization of child sex ratios.

Sub-national trends

The trends from the decadal censuses in the sub-national rates of masculinization of child sex ratios in India and China are shown on the lefthand side of Tables 2 and 3 respectively. Bold italics indicate sub-national units where the rate of masculinization was lower than in the preceding decade. The right hand side of Tables 2 and 3 show the actual child sex ratios in these sub-national units.

Sub-national trends in India

The rate of masculinization decreased in most Indian states between the 1980s and the 1990s — including states such as Rajasthan and Uttar Pradesh, which had some of the more elevated child sex ratios in the country. Many of the other states have historically shown lower son preference, and had registered a more modest masculinization during the 1980s, perhaps partly in response to better access to technology of sex-selection. However, the trend was towards greater masculinization in the two states of Western India (Maharashtra and Gujarat), which comprise around 14% of the total population of the country.¹² The upward trend is especially notable in Gujarat state.

The sharpest rise was in the two Northwestern states of Punjab and Haryana — where

child sex ratios were already by far the highest in India in 1981, and indeed have been the highest since official censuses began to be taken in the late nineteenth century (Visaria 1969). They are the only Indian states with child sex ratios as high as those of the provinces in China's East and Central South regions (Tables 2 and 3), though their rate of increase in masculinization during the 1990s was far lower than in these regions of China.

These two states comprise less than 4.5% of India's total population, but contribute a very substantial part of the total masculinization of India's child sex ratios. This makes it especially significant to find that reported son preference fell during the 1990s in these two states as they did across India, including in Gujarat, Maharashtra (Retherford and Roy 2003), and estimated sex ratios at birth in these two states may also have fallen somewhat in recent years (John et al 2008: Table 1.8).

There is an interesting parallel between the trends in the four Indian states that continue to show increasing masculinization of child sex ratios, and those in South Korea just before sex ratios began to normalize. Retherford and Roy (2003) found that in these four states, reported son preference fell during the 1990s even as the estimated sex ratio at birth rose. They attribute this apparent contradiction to the ease of sex-selective technology offsetting the reduction in son preference. This parallels exactly the trends in South Korea until the mid-1990s, when sex ratios at birth continued to rise despite the fact that reported son preference was falling (Chung and Das Gupta 2007). After the mid-1990s child sex ratios began to normalize in South Korea, as the reduced son preference manifested itself above the countervailing effect of technological ease of sex selection.

As mentioned, the analysis of trends in India is hampered by the lack of quinquennial data, and the data for China suggest that the Indian trends would likely show clearer signs of decline were such data available.

Sub-national trends in China

Turning to China's provinces, we look first at the decadal census data for purposes of comparison with the trends in India's states. The first two columns of Table 3 are drawn up to be comparable to the Indian data in Table 2. This shows little evidence of decline in the rate of masculinization of child sex ratios between the 1980s and the 1990s in China's provinces.

However, when we include the quinquennial data in our analysis, we find much more evidence of change. Before turning to this, we need to recognize the limitations of the data. As discussed above, there are several sources of potential fluctuation in the data on child sex ratios in China, especially when examining quinquennial trends at sub-national level. For this reason, we examine not only the quinquennial trends, but also compare two sets of decadal trends: that for 1990-2000 (both derived from full censuses), compared with that for 1995-2005 (both derived from one percent sample censuses). Our conclusions in the following discussion give greater weight to the trends derived from similar data sources. Thus, for example, we conclude that a province shows signs of an

improvement in child sex ratios only if this is indicated in the comparison of the 1995-2005 with the 1990-2000 trends as well as in the quinquennial trends, but not if it is indicated only in one quinquennial period.

The data show that most of China's subnational units experienced a decline in the rate of masculinization of child sex ratios.¹³ These are indicated in bold italics in Table 3. Together they comprised nearly 88 percent of China's population in 2000, and more importantly, include the provinces which have a history of high son preference and correspondingly high child sex ratios.

It is especially striking to note that in many cases, the estimates are *negative*, indicating not merely a reduced rate of increase of masculinization — it indicates that the child sex ratios actually became more feminine than in the preceding period. This is true of half the provinces in the East region (Zhejiang, Fujian, Shandong); Guangxi in the Central South region; and Beijing, Inner Mongolia, and Liaoning in the North and Northeast. In some of these, the pace of normalization of child sex ratios was really striking. Altogether, the child sex ratios became more feminized in subnational units totaling 24 percent of the country's population in 2000.

In provinces totaling another 64 percent of China's population in 2000, the rate of masculinization has decreased — in many cases quite sharply. This includes all the provinces in the East and Central South regions which did not register an actual feminization; much of the Southwest, Northwest and North regions; and Jilin in the Northeast.

Child sex ratios continue to rise in areas comprising ten percent of the population. These include the large metropolises of Tianjin and Shanghai — perhaps partly because loosened migration policies have resulted in inflows of people from rural areas with higher son preference. They also include Heilongjiang in the Northeast, and the minority-dominated provinces of Guizhou, Qinghai and Xinjiang in the Southwest and Northwest. With the exception of Guizhou, all these provinces/metropolises have consistently recorded child sex ratios well below the national average, and have therefore not been the major contributors to China's high child sex ratios.

The raw data on child sex ratios in China's provinces/metropolises are on the righthand side of Table 3, and grey highlighting indicates the period(s) with the highest recorded sex ratio. These data indicate that in over half the provinces, child sex ratios peaked in 1995 or 2000, followed in some cases by a steady decline and in others by fluctuation around the peak.

The provinces in the East and Central South regions of China have had the highest child sex ratios in the country historically (implying the highest levels of son preference), and the ratios soared in the 1990s. With their large populations (57% of China's population in 2000) these provinces have contributed heavily to China's total "missing girls". A reduction or even reversal of this trend in these provinces is thus suggestive of an incipient turnaround for China as a whole.

4. Conclusions

The data indicate that child sex ratios in China and India are peaking, and are beginning to turn around in several sub-national areas. These trends are easier to detect in China, given its quinquennial census data. Several of China's provinces (comprising nearly a quarter of the population) show an actual *feminization* of child sex ratios in recent years, and this is especially striking since many of these provinces had some of the most masculine child sex ratios in China. In provinces comprising nearly another two-thirds of the population, the rate of masculinization has decreased — in many cases strikingly, including in provinces with some of the highest sex ratios. The rest of the provinces (comprising ten percent of the population) continue to show an increasing rate of masculinization of child sex ratios — but with one exception these provinces have sex ratios well below the national average, and are not the major contributors to China's total “missing girls”. It needs to be remembered, though, that the data do not lend themselves to precise estimates of trend, and we can only draw broad conclusions from them.

In India, the rate of increase in the masculinization of child sex ratios fell in most states by the 1990s. The notable exceptions to this were the northwestern states, which have the highest child sex ratios — the only states with ratios comparable to China's national average — but which account for less than 5% of the country's population, and to a lesser extent the two Western states. Our analysis for India is hampered by the lack of mid-decadal census data. For China, the decadal census data showed little if any sign of a reduction in child sex ratios between the 1980s and 1990s, but when viewed in conjunction with the mid-decadal census data they showed clear evidence of such a reduction. For India, even the decadal census data show evidence of slowing masculinization in most states between the 1980s and 1990s, earlier than in China. It seems likely that in India (as in China) the downward trend in child sex ratios is sharper than that indicated by the blunt instrument of decadal censuses. This is also suggested by the data on reported son preference, which has declined across the country during the 1990s, including in the states with the highest sex ratios (Retherford and Roy 2003).

The data suggest an incipient turnaround in child sex ratios in both China and India. We seem to have been spared the specter of national sex ratios rising to 1.6 boys per girl, as in some localities in China¹⁴, or 2 boys per girl, as amongst higher order births in South Korea in the early 1990s. The reasons underlying this trend need to be studied carefully, but there are indications that public policy may have played a role in this. For example, it appears that the government programs in China and India to incentivize parents to raise daughters may have had some impact (Li 2007, Sinha and Yoong, 2009). The media has been found to be powerful in changing social norms in many settings, and a study in India found that it had a striking negative impact on son preference in India (Jensen and Oster 2008). Other factors must also be at play, including increasing levels of education and industrialization.

What are the policy implications of our findings? It would be a great mistake to conclude from these findings that efforts to bring down child sex ratios can be relaxed in these countries. This would be analogous to South Korea's relaxing its efforts at

industrialization when the first fruits of these efforts became perceptible in the 1960s. There is an enormous remaining task of reducing discrimination against girls, especially in China and Northwest India where child sex ratios are very high. Vigorous efforts are needed to counter this, through measures such as media outreach, education, legislation, and direct incentives. And even when sex ratios normalize, it will take years for the adverse effects of past discrimination to play themselves out, for example in the marriage market. The good news, though, is that there seems to be an incipient turnaround in the phenomenon of “missing girls” in Asia.

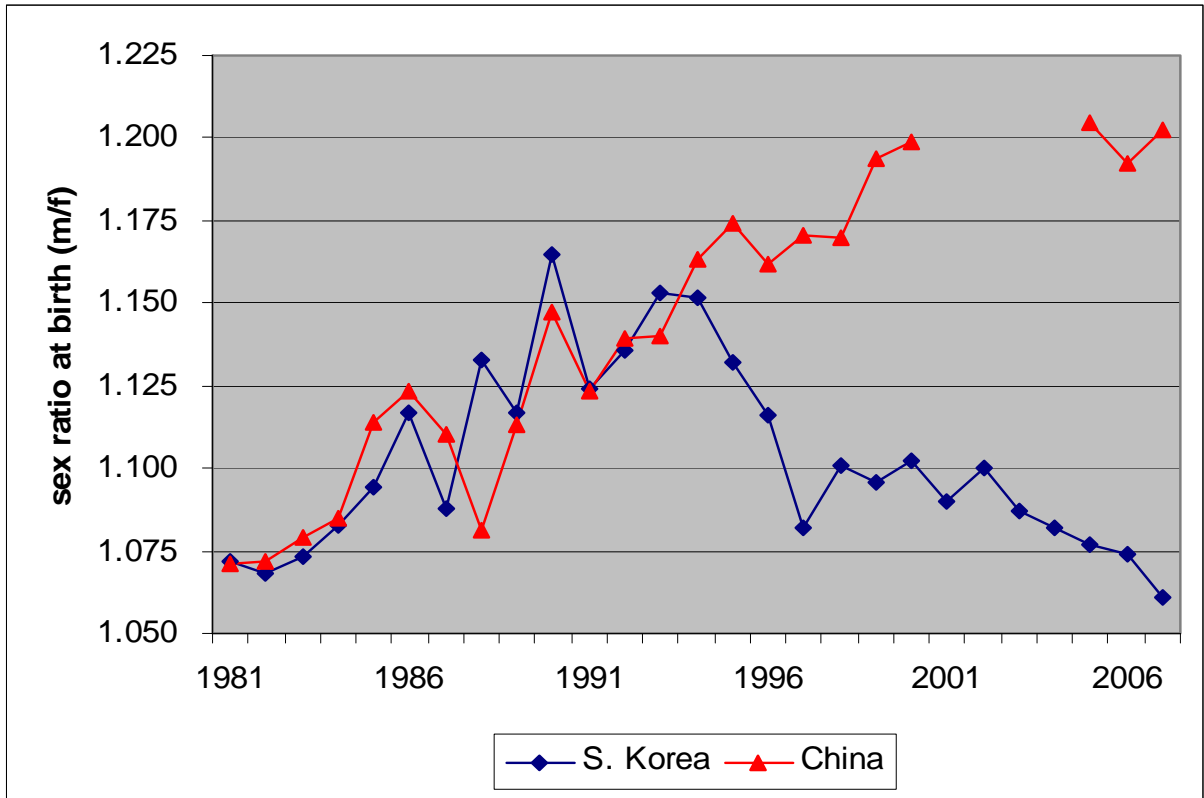
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Figure 1

Trends in the sex ratio at birth, South Korea and China, 1981-2007



Sources:

1. South Korea: vital statistics published by the South Korea National Statistical Office.
2. China: 1980-1987, China Population Statistics Yearbook 1991; 1988, Data Volume of National Family Planning Sample Survey; 1989, China 1990 Population Census; 1990-1999, China Population Statistics Yearbooks; 2000, China 2000 Population Census (long form); 2005, China 1% Population Sample Survey in 2005; 2006, Statistical Communiqué of The People's Republic of China on the 2006 National Economy and Social Development; 2007, Statistical Communiqué of The People's Republic of China on the 2007 National Economy and Social Development.

Table 1 Trends in the Sex Ratios (m/f) of Child Mortality, China and India

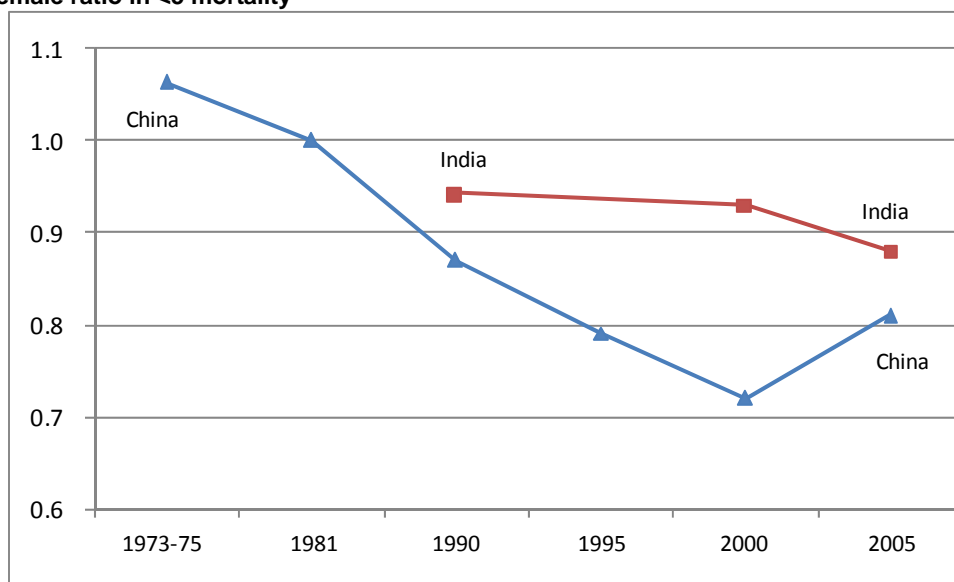
Date	Mortality <1 year		Mortality 1-4 years		Mortality < 5 years	
	China	India	China	India	China	India
1973-1975	1.14		0.97		1.06	
1981	1.06		0.89		1.00	
1990	0.86		0.91		0.87	
1992-93		1.06		0.70		0.94
1995	0.75		1.00		0.79	
1998-99		1.05		0.68		0.93
2000	0.71		0.99		0.72	
2005	0.80	0.98	0.99	0.62	0.81	0.88

Sources:

1. India: NHFS surveys (International Institute for Population Sciences (IIPS) and Macro International. 1995, 2000, and 2007).
2. China: National cancer survey conducted in 1976-1978, and Censuses of 1982, 1990, 2000, and the National 1% Population Sample Censuses of China 1995 and 2005.

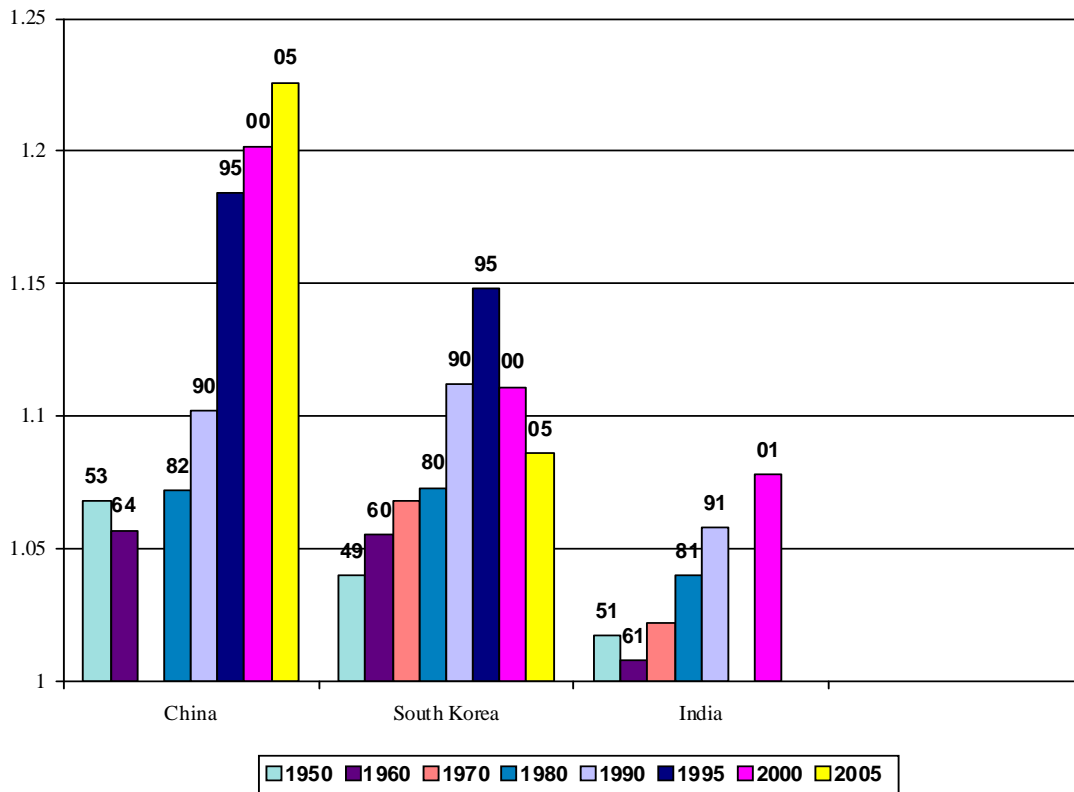
**Figure 2
Trends in m/f ratios in under-5 year child mortality rates, China and India**

male / female ratio in <5 mortality



Source: Table 1

Figure 3 Juvenile (0-4 year) sex ratios in China, South Korea, and India, 1950-2005

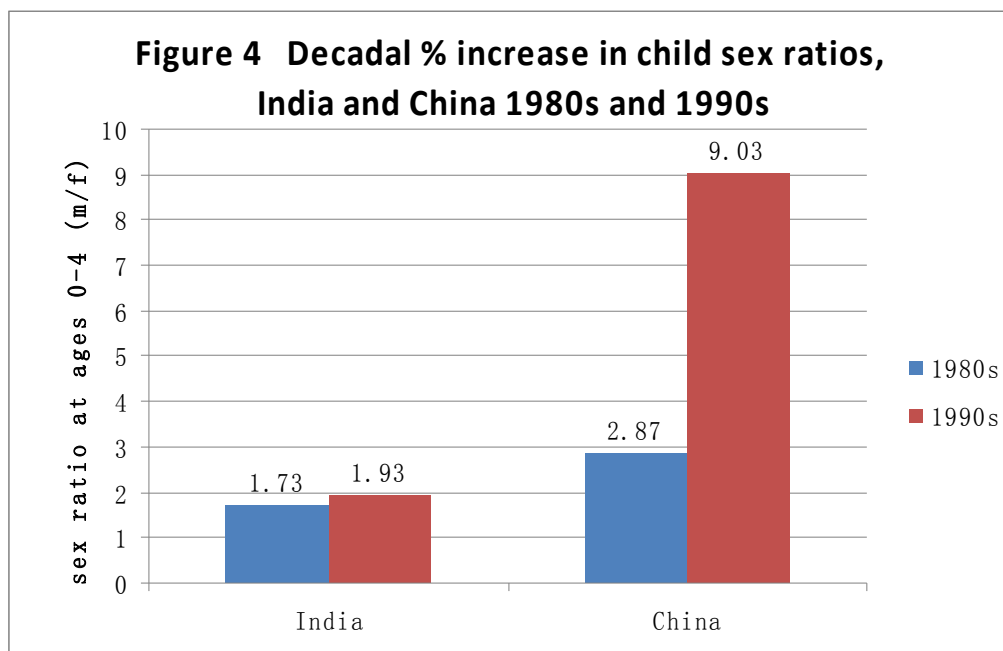


Sources:

1. S. Korea: Population and Housing Censuses of Korea, various years.
2. China: Population Censuses of China 1953, 1964, 1982, 1990, and 2000, and National 1% Population Sample Censuses of China 1995 and 2005.
3. India: Census of India, various years.

Notes:

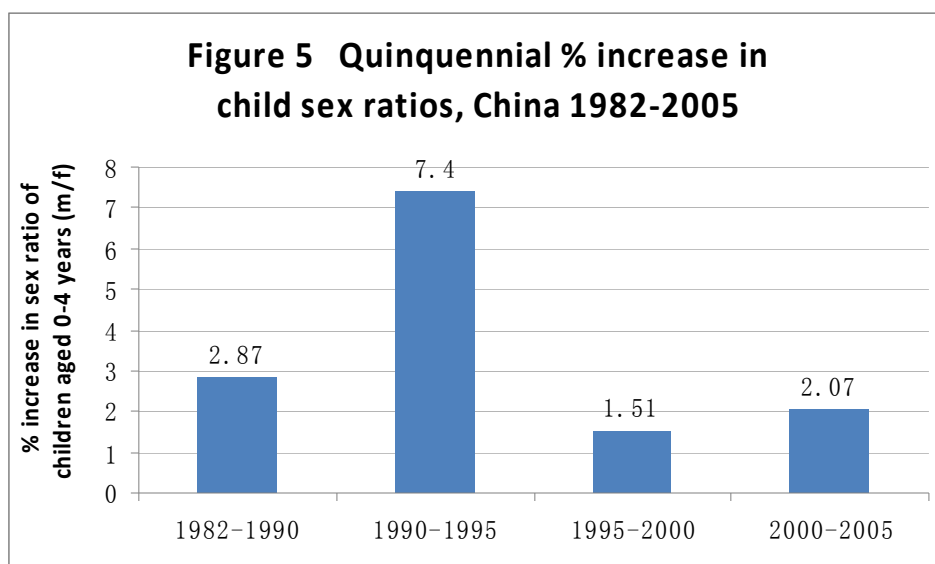
1. The census year is indicated above each bar.
2. The 1991 and 2001 figures for India are the sex ratio of children aged 0-6 years.



Source: Tables 2 and 3

Notes:

1. The data are for the period 1981-91 and 1991-2001 for India, and 1982-90 and 1990-2000 for China.
2. The data pertain to children aged 0-6 in India, and 0-4 in China.



Source: Table 3

Table 2. Trends in the sex ratio (m/f) of children aged 0-6 years, major states of India, 1981-2001

	% change in child sex ratio		Child sex ratio (m/f)		
	1981-1991	1991-2001	1981	1991	2001
India	1.73	1.93	1.040	1.058	1.078
<i>South</i>					
Andhra Pradesh	1.88	<i>1.33</i>	1.008	1.027	1.041
Karnataka	1.56	<i>1.46</i>	1.026	1.042	1.057
Kerala	1.26	<i>-0.25</i>	1.031	1.044	1.041
Tamil Nadu	2.03	<i>0.62</i>	1.034	1.055	1.062
<i>East</i>					
Orissa	2.89	<i>1.53</i>	1.005	1.034	1.050
West Bengal	1.47	<i>0.76</i>	1.019	1.034	1.042
<i>North-central</i>					
Bihar	2.36	<i>1.19</i>	1.019	1.043	1.055
Madhya Pradesh	2.74	<i>2.15</i>	1.022	1.050	1.073
Rajasthan	4.20	<i>0.75</i>	1.048	1.092	1.100
Uttar Pradesh	0.75	<i>0.68</i>	1.070	1.078	1.085
<i>West</i>					
Gujarat	2.08	5.05	1.056	1.078	1.132
Maharashtra	1.05	3.62	1.046	1.057	1.095
<i>Northwest</i>					
Haryana	2.61	7.29	1.109	1.138	1.221
Punjab	3.81	9.60	1.101	1.143	1.253

Source: Census of India 1981, 1991, and 2001. The 1981 and 1991 figures are published on page 13 of Registrar General of India (1992:13). The 2001 figures are published at <http://www.censusindia.net/>

Note: Bold italics indicate a reduction in the rate of increase in child sex ratios between 1981-91 and 1991-2001.

Table 3. Trends in the sex ratio (m/f) of children aged 0-4, provinces of China 1982-2005

	% Change in child sex ratio						Child sex ratio (m/f)				
	1982-1990	1990-2000	1995-2005	1990-95	1995-2000	2000-05	1982	1990	1995	2000	2005
<u>North</u>											
Beijing	-0.89	4.16	-1.36	6.69	-2.37	1.04	1.0733	1.0638	1.1350	1.1081	1.1196
Tianjin	1.40	4.25	6.89	1.86	2.34	4.44	1.0653	1.0802	1.1003	1.1261	1.1761
Hebei	1.53	6.46	5.25	6.29	0.16	5.08	1.0710	1.0874	1.1558	1.1577	1.2165
Shanxi	0.30	1.71	0.84	3.00	-1.25	2.11	1.0871	1.0904	1.1231	1.1091	1.1325
I. Mongolia	1.92	1.61	-3.54	4.60	-2.86	-0.70	1.0579	1.0782	1.1278	1.0956	1.0879
<u>Northeast</u>											
Liaoning	1.81	4.47	-0.53	5.57	-1.04	0.51	1.0630	1.0822	1.1425	1.1306	1.1364
Jilin	1.58	3.12	1.77	2.24	0.86	0.90	1.0583	1.0750	1.0991	1.1085	1.1185
Heilongjiang	1.48	2.20	2.82	1.19	0.99	1.81	1.0492	1.0647	1.0774	1.0881	1.1078
<u>East</u>											
Shanghai	-1.33	5.57	7.24	-1.37	7.04	0.19	1.0589	1.0448	1.0305	1.1030	1.1051
Jiangsu	3.95	9.98	0.06	10.58	-0.54	0.60	1.0734	1.1158	1.2339	1.2272	1.2346
Zhejiang	5.20	-0.25	-1.47	1.01	-1.24	-0.23	1.0843	1.1407	1.1522	1.1379	1.1353
Anhui	-0.40	18.50	9.05	14.23	3.74	5.12	1.0995	1.0951	1.2509	1.2977	1.3641
Fujian	3.54	12.64	-6.00	15.82	-2.74	-3.35	1.0618	1.0994	1.2733	1.2384	1.1969
Jiangxi	2.83	20.81	12.07	13.84	6.12	5.60	1.0671	1.0973	1.2492	1.3257	1.4000
Shandong	5.60	0.30	-4.01	5.54	-4.97	1.01	1.0803	1.1408	1.2040	1.1442	1.1557
<u>Central South</u>											
Henan	5.31	16.01	3.74	15.86	0.13	3.60	1.0835	1.141	1.3220	1.3237	1.3714
Hubei	1.98	19.22	3.50	15.26	3.43	0.07	1.0614	1.0824	1.2476	1.2904	1.2913
Hunan	2.26	14.39	10.09	9.01	4.93	4.92	1.0642	1.0882	1.1863	1.2448	1.3060
Guangdong	1.57	16.84	7.59	8.60	7.58	0.01	1.0917	1.1088	1.2042	1.2955	1.2956
Guangxi	8.40	8.48	-4.65	8.47	0.01	-4.66	1.0875	1.1789	1.2788	1.2789	1.2193
Hainan ¹		18.95	7.24	7.05	11.11	-3.49		1.1431	1.2237	1.3597	1.3123
<u>Southwest</u>											
Chongqing ²						0.62				1.1672	1.1744
Sichuan	3.82	3.93	3.54	0.48	3.44	0.10	1.0682	1.109	1.1143	1.1526	1.1537
Guizhou	-0.51	8.22	13.09	6.61	1.51	11.40	1.0589	1.0535	1.1231	1.1401	1.2701
Yunnan	3.10	5.08	3.59	2.83	2.19	1.37	1.0423	1.0746	1.1050	1.1292	1.1447
Tibet	0.03	-0.51	-0.53	2.04	-2.50	2.02	1.0186	1.0189	1.0397	1.0137	1.0342
<u>Northwest</u>											
Shannxi	0.90	15.25	5.89	9.32	5.43	0.44	1.0837	1.0935	1.1954	1.2603	1.2658
Gansu	2.79	10.02	3.89	6.15	3.64	0.24	1.0546	1.0840	1.1507	1.1926	1.1955
Qinghai	-0.01	4.68	6.28	1.94	2.69	3.50	1.0375	1.0374	1.0575	1.0859	1.1239
Ningxia	1.54	3.02	2.68	2.29	0.71	1.95	1.0419	1.0579	1.0821	1.0898	1.1111
Xinjiang	-0.41	2.28	3.61	-1.42	3.75	-0.14	1.0368	1.0326	1.0179	1.0561	1.0546
Total China	2.87	9.03	3.62	7.40	1.51	2.07	1.0715	1.1022	1.1838	1.2017	1.2266

Source: Population Censuses of China 1982, 1990, and 2000, and the National 1% Population Sample Censuses of China 1995 and 2005.

Notes:

1. Bold italics indicate a period of lower increase in child sex ratios compared with the preceding period. In the case of 1995-2005, this is compared with the period 1990-2000.
2. Grey shading indicates the period with the highest recorded child sex ratios in that province /municipality. When the ratio is very similar in two consecutive periods, both periods are highlighted.
3. Metropolises are indicated in italics.
4. Hainan province was established in 1988. Chongqing municipality was established in 1997.

Endnotes

- ¹ See for example, Das Gupta and Li (1999) on China and South Korea; Kaur (2004) and Chowdhry (2005) on Northwest India; and Ebenstein and Jennings (2008) on China.
- ² Only the sex ratio at birth orders 3 and above is still elevated, but this is a very small proportion of total births in South Korea today. The overall sex ratio is within the biologically normal range.
- ³ For descriptions of the media campaigns and regulations see Croll (2001), Das Gupta et al (2004), and Naqvi (2006), for China's Care for Girls program, see Li (2007), and for the Indian financial incentive program see http://wcdhry.gov.in/balika_samridhi_yojana.htm, and Sinha and Yoong (2009).
- ⁴ See endnote 2.
- ⁵ For some interesting analyses of this, see Lee and Paik (2006) and Do and Phung (2006).
- ⁶ The Indian data on sex ratios at birth derive from the censuses and the Sample Registration System, and from the National Family Health Survey. As Bhat (2006) points out, census and survey data in India tend to under-record female births and over-estimate the sex ratio at birth. He therefore focuses his analysis on the *correlates* of the sex ratio at birth, rather than on its trends (Bhat 2007). The National Family Health Survey was conducted at irregular intervals, and does not provide an annual series of estimated sex ratios at birth comparable in quality to the East Asian figures. In recent years, the Sample Registration System has begun publishing annual estimates of sex ratios at birth (in the form of moving 3-year averages), and over time this will generate a dataset to compare with those of East Asia. Meanwhile, analysts are confined to estimates from very broad ranges of years (Arnold et al 2002: Table 1), and where different data sources offer quite different estimates for the same period (Retherford and Roy 2003: Table 5.1).
- ⁷ Many scholars have adjusted the data to correct for under-reporting of young girls, and obtain differing estimates depending on their method of estimation. Our analysis of trends over time is unaffected by the level of under-reporting, but would be affected if the level changed over time (see endnote 11).
- ⁸ See, for example, Coale and Banister (1994), Gu and Roy (1995), Li and Zhu (2001); Das Gupta et al (2003), Li et al. (2004), and Arokiasamy (2007).
- ⁹ Note that part of this trend is attributable to increases in life expectancy, since this empirically improves male infant survival relative to females (Coale and Demeny 1966). However, in the absence of discrimination boys face higher mortality rates than girls, so this should merely reduce the *excess mortality that male infants* experience relative to females. The fact that male mortality rates are so much lower than that of females in these two countries is indicative of strong discrimination against girls.
- ¹⁰ The child sex ratio was the highest of all these countries in China in 1953, but it fell somewhat by 1964. This may have to do with the strong measures taken by the Communist government to encourage gender equality, and also the establishment of the commune system, which meant that the costs of childrearing no longer fell entirely on the parents but were diffused across the commune.
- ¹¹ The decline may be even sharper than these data imply, if the tendency to under-report girls has increased over time. For example, Judith Banister notes that from 1995 onwards, the counts of children deteriorated because of increasing penalties for parents and local officials for births "outside the plan", and girls were undercounted more than boys, especially below school age.
- ¹² The state population totals are taken from www.censusindia.gov.in, accessed 15 December 2008.
- ¹³ Chongqing metropolis (2.5% of China's population in 2000) was established in 1997, so we do not have enough data points to derive a trend.
- ¹⁴ Xinhua 2007, http://www.chinadaily.com.cn/china/2007-08/24/content_6055339.htm