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GENDER BIAS IN CHINA AND INDIA: AN EVALUATION OF "MISSING GIRLS"

Abstract. Previous research has shown the existence of severe gender discrimination in China and India dramatically affecting female survival during childhood, due to the lack of equity between sexes in the access to primary needs, like food and health care. Excess female mortality, together with antenatal discrimination, have caused imbalanced sex ratios with an estimate of 100 million "missing women" at the global level. The main goal of this study is to evaluate female deficit in China and India, distinguishing between the two main causes of the female shortage: prenatal and postnatal discrimination. Such a distinction is essential to the development of effective contrasting actions. The results show that despite – in relative terms - the overall reduction in female deficit in both countries during the 1980-2000 period, the discrimination against girls persisted during childhood and adolescence.

Keywords: Asia, childhood, female mortality, gender discrimination, sex-selective abortions, sex ratios.

1. Introduction

It was Nobel Laureate Amartya Sen who for the first time, in 1990, introduced the notion of "missing women". The scholar demonstrated the existence of a positive relationship - in several Asian and Northern African countries - between high sex ratios[1] and gender discrimination in the access to goods and services of primary necessity, leading to a survival disadvantage of females during childhood and adolescence. As a result of the excess female deaths, Sen estimated that across the world in absence of gender discrimination there would have been something like 100 million more women (Sen, 1992).

Ever since Sen's seminal study, many scholars, from a variety of backgrounds and disciplines, have addressed this issue, contributing to a lively discussion that has not abated. Using different demographic techniques, the participants in the discussion, have suggested, for the 1990s, figures which vary between 60 million (Coale, 1991) and 90 million (Klasen, 1994). Subsequent estimates, based on the later census returns, suggest a falling intensity of the phenomenon. As a matter of fact, in some countries – including Bangladesh and Pakistan– the female shortage has decreased in relative terms (Klasen and Wink, 2003). Whereas, Guilmoto and colleagues (2018) estimated 239,000 excess under-five female deaths per year in India between 2000-2005. In some Asian countries, above all India and China, ancient prejudices determine not only a higher mortality among girls, but a reduced number of female births as well. The modern preferences for small families and the spread of prenatal diagnostic technologies such as amniocentesis and ultrasound, have given rise to the practice of sex-selective abortions which have engendered a skewed sex ratio at birth.

Over the past few years the sex ratio at birth seems to be readjusting in Asia. In the light of this trend some scholars have set forth the theory of a sex ratio transition (Guilmoto, 2009), particularly suited for the case of South Korea. In this latter country the return to normality has been achieved thanks to cultural changes that made the preference for a son no longer necessary. Scholars demonstrated that this "normalization" was positively associated with the country's rapid development and modernization (Chung and Das Gupta, 2007). In a more recent study, Ram and Ram (2018) reported the gap in life expectancy between genders to have widened as the overall levels of survival improved in India. However, as progresses in life expectancy proceeded, the situation reversed and between 1981-1985 the life expectancy

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[1] The ratio of males to females in a population.

at birth of Indian females overtook that of males for the first time. Despite this female advantage at the national level, the authors highlight that the discrimination against girls persisted during childhood and adolescence with the female under-five mortality rate being 53% higher than that of boys during the same period. Boongarts and Guilmoto (2015) estimated the global number of missing women to have risen by 43% from 1990 (38 million) to 2012 (126 million), with an increase in the number of missing female births from near zero in the 1970s to more than one million per year in the 1990s and 1.6 million per year in the period 2005-2010. According to the scholars, the fairly recent emergence of prenatal sex-selection has not replaced postnatal discrimination, but has considerably contributed to aggravate it by raising the proportion of missing girls.

This paper draws on census data for the years around 1980 and 2000 as well as on United Nations' population estimates to evaluate changes over time in the number of missing women in China and India, the countries most responsible for the shortage of women. The estimates include both women missing due to prenatal discrimination carried out through sex selective abortion (or *never born girls*) and due to postnatal discrimination or excess female mortality at young ages. Such a partition of gender discrimination mechanisms is essential to the development of effective contrasting actions.

2. Background

About a decade after his claim of a female deficit, Sen (2003) reviewed the concept he had previously defined, in order to include a considerable change which had occurred in the mechanism engendering female shortage: the increase in sex ratio at birth (SBR) caused by the widespread practice of sex selective abortion. According to the scholar estimates of missing women should therefore, include both women not alive because of abnormal mortality and *never born girls*. Sen proposed estimating the female deficit based on a comparison, for a given population, of the actual sex ratio (SR) and the one that would exist in absence of gender discrimination; the latter identified in the value of the sex ratio observed in sub-Saharan Africa, assumed to be free from the effects of gender discrimination on female survival. Based on this method, the author reached an estimate of about 100 million women missing at global level. The expected SR used by Sen, however, has been widely criticized due to the existence of different demographic conditions in Sub-Saharan Africa compared to other areas of the world. In particular, in this area the SBR is lower than that observed in other populations. This gives rise to a lower overall SR and, therefore, to overestimates of missing girls.

Criticism on the expected SR adopted by Sen has stimulated new methodological approaches and attempts of estimates. Coale (1991) argued that the expected sex ratio (SR*) should not be considered as a constant, but as the product of the interplay between three main factors. The first factor is the expected value of the SBR in absence of prenatal discrimination, which the author assumes to be equal to 105.9: this figure is the median value of SBR observed in 24 European countries during the years from 1962 to 1980. The second factor are gender differentials in mortality in the case of equal access to basic goods and services (such as food, drinking water, medical treatments and vaccines). In order to represent the expected mortality differences between the sexes in absence of gender discrimination, the author refers to the *West family* of the Model Life Tables introduced by Coale and Demeny (1983). The last factor is migration, which is assumed to be absent or not relevant. Following this approach, Coale reached a worldwide estimate of about 60 million missing women. This estimate, although significantly lower than the one proposed by Sen, provides confirmation of the severe consequences of gender discrimination on women's survival.

Another important methodological contribution was provided by Klasen (1994) who, though generally adopting the method proposed by Coale, criticized two aspects. A main criticism concerns the hypothesis of a constant SBR. Klasen highlighted the existence of a direct relationship between the SRB and life expectancy at birth: in less developed countries improvements in nutritional and health conditions reduce the incidence of miscarriages and stillbirths, which affect mainly male fetuses, implying an increase in the SBR. The other reason for criticism concerns the use of the *West family Model Life Tables* to represent

gender differences in mortality in absence of discrimination. According to the author, the *West family Life Tables* are calculated with reference to countries that have experienced high female mortality -especially during the 19th century- and, therefore, underestimate the number of missing women. The scholar used instead the *East family Tables,* reaching an estimate of 84 million missing women. By contrast, Guilmoto (2012) used observed population age distributions in countries without discrimination as a reference for gender differentials in mortality in absence of female neglect and calculated the number of missing girls by age group. In a more recent article Guilmoto and colleagues (2018), calculated excess under five female mortality (U5MR) comparing the actual U5MR in India with those found in 46 countries with no evidence of gender discrimination and similar mortality rates. Then, using the birth history method (or Brass method) the scholars estimated female U5MR to be 18.5 per 1000 livebirths between 2000-2005 in India, corresponding to 239,000 excess female deaths per year.

So far studies have reached different estimates of the number of missing women, due to the use of different methods. However, all these studies, have confirmed the appalling magnitude of this tragedy as well as the necessity for more research on the persistence of discriminatory practices that are responsible for unnecessary female deaths every year (Bongaarts and Guilmoto, 2015).

3. Methods

China and India are the two countries that have mostly contributed to the shortage of women. In order to understand the phenomenon of missing women it is first necessary to have an idea of its size in these two populations, which jointly represent about 37% of the world population. However, if on the one hand an overall estimate of the phenomenon is essential to assess its severity and its trend over time, on the other hand this does not give us any indication on how the discrimination effectively acts on women's survival. For this reason, the principal aim of this study is to separate the action of prenatal and postnatal gender bias. Indeed, understanding the mechanisms behind the discrimination appears to be essential for the drafting and the implementation of contrasting policies. When discrimination acts before birth through sex-selective abortions, regulations promoting the responsible use of prenatal diagnostic technologies as well as measures focusing on securing the foundations for the self determination of girls and women play an important role in countering the phenomenon (see also World Health Organization, 2011); when, instead, discrimination is concentrated during childhood and adolescence as a consequence of the lack of care given to girls, welfare policies to improve the provision of healthcare and to support the costs of raising children are essential to contrast the excess female mortality. In both cases, interventions to enhance the social value of daughters are key to curbing the phenomenon in the short and medium period as well as to prevent it in the long run.

For our purposes it is, therefore, necessary to use different methodologies depending on whether we want to capture the phenomenon in its totality, before birth or after birth. Assuming that the populations under consideration are *quasi-stable*,[2] we know that the value of the expected sex ratio (SR*) depends on two principal factors: the expected sex ratio at birth (SRB*) and mortality differences between the sexes in absence of gender discrimination. Where such discrimination is acting, so that the actual SR is higher than the expected (SR>SR*), the estimate of missing women is given by the number of women necessary to equal the two ratios (Sen, 1992; Coale, 1991; Klasen, 1994).

It is common knowledge in demographic literature that from a biological point of view – in "normal" conditions - the values of SBR are relatively stable over time and space. In order to assess a "normal" range of SRB, the trend of these values has been observed from the early 20th century until today in a group of countries assumed to be free from discrimination against future babies.[3] According to the standards utilized,

[2] Together with many authors, the quasi-stable population model (a closed population with constant fertility and gradually changing mortality) has been chosen because it reflects the demographic evolution of the developing countries better than the stable population model (constant fertility and mortality).

[3] The following 15 countries have been analyzed: Australia, Austria, Belgium, Bulgaria, Canada, Chile, France, Netherland, Hungary, Italy, Poland, Portugal, Spain, Sweden (1294 overall observations).

three values have been fixed: a minimum (SRB_{min} = 105.48), a medium (SRB_{med} = 105.74), and a maximum (SRB_{max} = 106.14).[4] A critical issue is the quantification of gender differences in survival in absence of discrimination. This study follows the method first proposed by Coale (1991) and, thus, the *West family* of the *Regional Model Life Tables and Stable Population* are used as a reference model to represent gender differentials in mortality given equal treatment of the sexes. Based on the statistics available, the pair of parameters used to identify the West model stable population that best fits each of the analyzed countries are the mortality levels, represented by life expectancy at birth (e_0), and the rate of increase (r).[5] I.e. To detect the stable population, we must use the life table that incorporates the values of r and e_0 recorded in the country in question about 20-30 years before.[6] Identifying the appropriate stable population would be straightforward if the values of r and e_0 matched completely with those reported in the tables. However, this is a very unlikely case and, therefore, it has been first necessary to proceed with a number of linear interpolations.

Finally, to evaluate the prenatal and the postnatal components of the female deficit, the same logic of comparison between actual and expected values of the sex ratio that applies at the population level is followed. For instance, a value of the actual SBR higher than the expected one (SBR>SBR*) indicates a reduction in female births caused by non-natural factors. The difference between the actual and the expected number of females therefore provides an estimate of the number of missing women at birth, that is to say "*never born girls*". Similarly, the number of missing women after birth is estimated by different age groups by comparing the actual sex ratio at age x (SR_x) with the expected value (SR_x^*) in absence of discrimination.

4. Results and discussion

Many scholars have attempted to evaluate the shortage of women, advancing different methodological assumptions, but despite the different outcomes, all of those estimates confirmed the severity of the problem. According to estimates performed in this study, the overall deficit of females in China increased from 20.7 million in 1982 to 25.1 million in 2000 (Table 1).[7] In India, the number changed from about 20 million in 1981 to 26.5 million in 2001. While during these twenty years the absolute number of missing women has increased in both countries, the incidence on the total female population remained stable in China (4.2 %) and showed a remarkable decrease in India (from 6.2% to 5.3%).

The root cause of this tragic gender discrimination can be found in the existence of a strong son preference that, in turn, depends on the complex interaction of cultural, social and economic factors. The cultural components related to kinship systems are probably the main explanation for the presence of this severe gender discrimination. In fact, in patrilineal kinship systems succession is established trough male offspring, resulting in a disadvantage in the female status. Furthermore, owing to the widespread practice of patrilocality, only men contribute to support their parents during old age, while women, once married, leave their families to be absorbed into those of their husbands. It should be emphasized that support in old age is very important in these countries, because of the lack of effective social protection policies.

[4] These values are respectively the first, the second and the third quartile of the average values of the SRB observed in the countries under consideration.

[5] The tables are provided for 13 values of r (from -10 to 50) and 25 levels of mortality, expressed by values of life expectancy at birth for women (with a minimum of 20 years and a maximum of 80 years).

[6] The temporal lag is determined by the median age of the overall population. As regards China, the median age was 21 years in 1982 census and 31 years in 2000 census; as regards India, the median age was 20 years in 1981 census and 22 years in 2001 census.

[7] The evaluations of the total number of missing women have been carried out using three different values of SRB, leading to as many estimates. The same approach has been used to evaluate the two components of the phenomenon, prenatal and postnatal. The results are discussed using only the medium values of the estimates. However, the complete results are given in the tables.

Table 1. Estimates of missing women according to to three different values of SRB. China and India. around 1980 and 2000

Census	Number of Missing women (000)			Missing women per 100 females		
	Lower value	Medium value	Higher value	Lower value	Medium value	Higher value
China						
1982	18,792	20,716	21,965	3.8	4.2	4.5
2000	22,776	25,138	26,672	3.8	4.2	4.4
India						
1981	18,712	19,997	20,831	5.8	6.2	6.5
2001	24,520	26,489	27,768	4.9	5.3	5.6

Source: Author's calculations on data from Registrar General & Census Commissioner, India (1981, 2001); State Statistical Bureau, China (1982, 2000).

For these reasons, spending on the health and education of daughters is often perceived by families as an unfruitful investment, or using an expression common in a number of Asian countries, like "*watering the neighbour's garden*" (Attané and Guilmoto, 2007). Moreover, the cost of a daughter in India is amplified by the custom of the bride dowry supported by parents. Religion is another important reason for son preference. This is particularly true for the ancestor worship and the devotional practices associated with it, which in many cases can be performed only by men.

All these factors cause a strong psychological pressure on couples, and increases their desire to have at least one son. Thus, the preference for male offspring is the main reason for the female deficit, which has been exacerbated by a strong fertility decrease especially in China. For instance, in most high-fertility contexts, it is less common to discriminate against girls, because couples perceive that they can continue bearing children until the achievement of the desired family composition. In such a situation it is likely for girls to suffer a lack of care, but they are not affected by the practice of pre-natal discrimination.

In order to better understand the reasons and mechanisms of action driving the alarming female deficit in the two countries, results are presented separately for gender discrimination acting before and after birth. The prenatal component has been estimated in five-year periods from 1980-1985 to 2000-2005 (Table 2).[8] During 2000-2005, China appears to have a number of missing women at birth nine times greater than that estimated for 1980-1985 **(**from 126,000 to about 1.2 million of girls never born). A first significant increase has occurred since the second half of the 1980s, at the same time as the spread of new technologies for prenatal diagnosis such as ultrasounds and amniocentesis. The overgrowth of sex ratios at birth continued until 2000, when results suggest a first decline. In India at the end of the period the unborn female children have tripled (from 88,000 to 284,000 never born girls) and, also in this case, the increase has occurred since the mid-1980s. The use of sex-selective abortions, however, appears to be lower in this country compared to China. As mentioned above, in both countries the main explanation for these missing female births can be found in the concurrence of the traditional son preference, the diffusion of prenatal diagnostic technologies and the fertility decline. In the beginning, ultrasound spread among the more affluent and well-educated population and among the urban middle-class, because of their higher possibilities of access to information and to health facilities. Thereafter, thanks to the affordability and non-invasiveness of the method, the use of prenatal diagnosis has also expanded to the rest of the population. In these two countries the fertility decline was stimulated or often forced by the population policies adopted by their governments, concerned about the population over growth. The impact of these policies on gender discrimination has

[8] Statistics on births by sex are not available for these two countries, therefore estimates provided by United Nations have been used (*World Population Prospects. The 2008 Revision*). Such estimates give the total number of births and the sex ratio at birth, through which the number of births by sex are calculated.

been particularly strong in China after 1979 with the launch of the One Child Policy, which represents the peak of a long process of birth control. This policy has certainly contributed very significantly to the distortion of sex ratios at birth in China. However, it remains unclear to which extent this distortion is due to the practice of sex-selective abortions or to the under-enumeration of female births. The lack of registration of female births depends on two main reasons, both closely linked to the desire to have at least one son. One is that, if the firstborn is a female, parents may decide to keep the baby without recording the birth in order to have the opportunity of bearing a second child. Relevant studies (e.g. Jha et al, 2006) highlighted that SBR increases with increasing birth order. In other words, having a daughter is not always perceived as negative: parents are more likely to perceive the birth of a daughter as negative when it is considered as an obstacle to the achievement of the desired family composition. The second reason consists in the practice of abandonment or adoption: parents who decide to abandon or place their daughter for adoption do not usually register the birth. Although Chinese authorities argue that SBR distortion is largely justified by the under-registration of female offspring, scholars have shown that, despite non-registered female births are quite common, these cannot entirely account for skewed sex ratios at birth for which the principal explanation has to be found in the existence of severe gender discrimination (e.g. Coale and Banister, 1994).

Table 2. Estimates of "Girls never born" according to three different values of SRB. China and India, 1980-2005

Five-years period	Number of "Girls never born" (000)			"Girls never born" per 100 female births		
	Lower value	Medium value	Higher value	Lower value	Medium value	Higher value
China						
1980-1985	86	126	152	0.8	1.2	1.4
1985-1990	451	500	531	3.6	4,0	4.3
1990-1995	865	908	935	8.4	8.8	9,0
1995-2000	1,010	1,048	1,073	11.2	11.6	11.9
2000-2005	1,141	1,177	1,199	14,0	14.4	14.7
India						
1980-1985	42	88	118	0.3	0.7	1,0
1985-1990	105	153	185	0.8	1.2	1.4
1990-1995	235	286	320	1.8	2.1	2.4
1995-2000	234	285	318	1.8	2.1	2.4
2000-2005	233	284	317	1.8	2.1	2.4

Source: Author's calculations on data from United Nations, *World Population Prospects. The 2008 Revision.*

An evaluation of the phenomenon after birth (Table 3) has been made using data from the 1980s and early 2000s censuses for the following age groups: 0-4, 5-9, 10-14, 15-19. Results show the number of missing women in the age group 0-19 to have increased from more than 6 million in 1982 to about 11.4 million in 2000, while in India the number passed from 7.6 million in 1981 to 14.3 in 2001. The incidence of the phenomenon on the female population of the same age increased as well, rising from 3% in 1982 to 6% in 2001 in China, and from 5% in 1980 to 6% in 2001 in India. These figures show a very alarming situation regarding the effects of gender discrimination on childhood and adolescence. Nevertheless, results from this study highlight the existence of different forms of discrimination prevailing in the two countries. Data for the 2000 census in China show that the number of missing girls is the highest for the 0-4 and 5-9 age groups that is the result of the widespread practice of sex-selective abortions in young birth cohorts. On the contrary, in India discrimination acts mainly during adolescence because of the neglect of primary care.

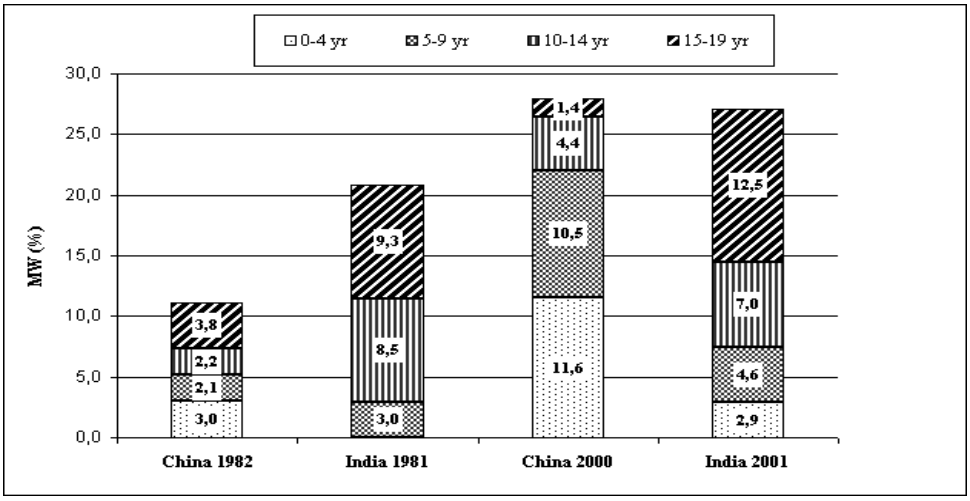
Table 3. Estimates of Missing women in childhood and adolescence according to three different values of SRB. China and India, around 1980 and 2000

Age group	Number of Missing women (000)			Missing women per 100 females		
	Lower value	Medium value	Higher value	Lower value	Medium value	Higher value
			China 1982			
0-4	1,217	1,394	1,509	2.7	3.0	3.3
5-9	921	1,127	1,261	1.7	2.1	2.3
10-14	1,131	1,377	1,537	1.8	2.2	2.4
15-19	2,112	2,353	2,509	3.4	3.8	4.1
			India 1981			
0-4	-	-	-	-	-	-
5-9	1,166	1,342	1,456	2.6	3.0	3.2
10-14	3,287	3,452	3,559	8.1	8.5	8.8
15-19	2,694	2,818	2,898	8.9	9.3	9.6
			China 2000			
0-4	3,498	3,630	3,715	11.2	11.6	11.9
5-9	4,210	4,384	4,497	10.1	10.5	10.7
10-14	2,424	2,660	2,814	4.0	4.4	4.7
15-19	521	713	837	1.0	1.4	1.7
			India 2001			
0-4	1,337	1,544	1,678	2.5	2.9	3.1
5-9	2,586	2,829	2,986	4.2	4.6	4.8
10-14	3,920	4,158	4,313	6.6	7.0	7.3
15-19	5,605	5,801	5,928	12.1	12.5	12.8

Source: Author's calculations on data from Registrar General & Census Commissioner, India (1981, 2001); National Bureau of Statistics, China (1982, 2000).

Data for the 2000/2001 censuses indicate more than 8 million missing girls between age 0-9 in China and about 10 million in the age group 10-19 in India representing respectively 11% and 10% of the corresponding female population (Figure 1). It is also worth noting that in 1981 gender discrimination in China affected the age group 15-19 more than the 0-4 group because prenatal diagnostics became of common use only since the second half of the 1980s. While, in India the greater severity of the phenomenon after birth is linked to the high child mortality rates for both sexes, mostly due to infectious diseases and chronic malnutrition. In such a situation of poverty, parents are compelled to choose how to distribute the limited resources among their children. Some of these decisions, as those concerning vaccinations and medical treatments, can directly affect the survival chance of children (Khera et al., 2014).

Figure 1. Missing women per 100 females alive during childhood and adolescence. China and India around 1980 and 2000 (medium estimates)



Source: Author's calculations on data from Registrar General & Census Commissioner, India (1981, 2001); National Bureau of Statistics, China (1982, 2000).

5. Conclusions

Results from this study have shown that while the absolute number of missing women has increased in both countries during the 1980-2000 period, on the other hand, the incidence on the total female population remained stable in China (about 4%) and showed a remarkable decrease in India (from 6% to 5%). However, looking at the two main forces driving the female shortage, the situation drastically changes. In China, the number of girls never born increased from about 1% in 1980-1985 to about 14% in 2000-2005; such an increase was also visible in India, although to a much lower extent. However, postnatal discrimination was very relevant in the latter country with an increase in the number of missing girls during adolescence (between ages 14 and 19) from 9.3% in 1980-1985 to 12.5 in 2000-2005.

Chinese and Indian governments, together with the international community, have developed several contrasting actions, among which interventions aimed to prevent the practice of sex-selective abortions and to regulate the use of prenatal diagnostic technologies. However, laws and other interventions have often been ineffective. This is mainly explained by the persistence of son preference, which has showed to be deeply entrenched and resistant to the binding force of legislative action. Warranting the same chances of survival for men and women all over the world is a goal of primary importance, not only to ensure the respect of fundamental human rights, but also to avoid the dangerous social imbalances that skewed sex-ratios can produce. For instance, falling birth rates resulting from the reduced number of women, can cause a pronounced aging of the population. This may, in turn, have negative implications on economic growth at the national levels and put the social security systems under pressure. Furthermore, the female shortage implies a *marriage squeeze*. Namely, the deficit of women in union ages entails the exclusion of a significant number of young men from the marriage market, causing serious social consequences. The great majority of these men belong to disadvantaged strata of the society and, frustrated by their condition, they are likely to become prone to violent or risky behaviors. As a matter of fact, in China the *marriage squeeze*

has caused a general increase in crime rates, mainly due to women trafficking and forced marriage migration representing a threat to the security also for neighboring countries (see Hudson and Den Boer, 2004).

The international press has coined the term "*gendercide*" to describe the tragic context of human rights violations behind the women deficit (*The Economist*, 2010). In order to contrast this phenomenon, it is necessary to act in two main directions, both essential. One is to remove cultural, social and economic obstacles, responsible for the existence of a strong son preference, which involves the strengthening of women's social value. Obviously, this is a very long process, as it requires deep changes in society. The other direction is concerned with the promotion of structural incentives, such as the creation of a strong welfare system and the spread of free vaccination and medical treatment campaigns.

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