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Does a legal ban on sex-selective abortions improve child sex ratios? Evidence from a policy change in India

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ABSTRACT

Despite strong recent economic growth, gender inequality remains a major concern for India. This paper examines the effectiveness of a public policy geared towards the reduction of gender inequality. The national Pre-Conception and Pre-Natal Diagnostics Techniques (PNDT) Act of 1994, implemented in 1996, banned sex-selective abortions in India. Although demographers frequently mention the futility of the Act, we are among the first to evaluate the law using a treatment-effect analysis framework. Using village and town level longitudinal data from the 1991 and 2001 censuses, we find a significantly positive impact of the PNDT Act on female-to-male child sex ratio. Given the almost ubiquitous decline in the observed child sex ratio during this period, we argue that the law was successful in preventing any further worsening of the gender imbalance. We find that a possible absence of the law would have led to at least 106,000 fewer female children.

1. Introduction

The recently released data from the Indian 2011 census has refocused the world's attention on the dark side of India's demographic change — a low and falling ratio of girls to boys. For the last 40 years, each successive census has found the number of young girls shrinking relative to boys. Interestingly, the deterioration in the child sex ratio has occurred in the face of rising living standards and improvements in every other indicator of demographic change and human development — average life expectancy, infant mortality, male and female literacy, fertility rate, and schooling enrollment of children.

India is one of a handful of countries that has significantly more males than females. The problem is particularly severe at younger ages; the child sex ratio (i.e., the number of girls per 1000 boys in the 0–6 years age group) has declined steadily — from 964 in 1971 to 962 in 1981, 953 in 1991, 927 in 2001, and 914 in 2011.[1] Although a distorted child sex ratio is observed in other Asian countries, including China, Taiwan, Singapore and Vietnam, India has one of the lowest child sex ratios in the world.

The low child sex ratio in India arises from the practices of sex-selective abortions and excess female infant mortality, both of which are the result of a strong cultural preference for sons over daughters.[2] Some estimates have put the number of 'missing females' (i.e., unborn girls) in India as high as 37 million (Sen, 2003).

The low and falling child sex ratio in the country is a matter of grave policy concern, not only because it violates the human rights of unborn and infant girls but also because it deprives the country of the potential economic and social contribution of these 'missing women.' In addition, there may be longer-run adverse impacts from a marriage market

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[1] The natural sex ratio in a population typically ranges from 950 to 970 girls per 1000 boys. In the rest of the world, sex ratio is generally reported as male-to-female. The Indian Census has been historically reporting female-to-male ratios and we will use this definition throughout this paper.

[2] Yi et al. (1993), Park and Cho (1995), Junhong (2001), Lin and Luoh (2008), and Zhu et al. (2009) study prenatal sex selection practices in East Asian countries. Almond and Edlund (2008), Almond et al. (2009) find male-biased sex ratio among the children of Asian immigrants in US and Canada. Li (2002), Das Gupta (2005), Qian (2009), Ebenstein (2010) evaluate the impact of family planning policies on gender imbalance. Rosenzweig and Schultz (1982), Das Gupta (1987), Clark (2000), Foster and Rosenzweig (1999), Duflo (2003), Jayaraj and Subramanian (2004), Qian (2008), Chamarbagwala (2010) examine the association between socioeconomic status of adult women with relative outcomes for girls versus boys. Drew et al. (1986), Norberg (2004), Oster (2005), Lin and Luoh (2008) discuss possible noneconomic factors affecting gender imbalance.

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squeeze caused by an excess supply of male relative to female youth.[3] Already, states like Haryana and Punjab, where the sex ratio has been extremely distorted for several decades, have been experiencing bride trafficking.

After abortion was legalized in India in 1971, and technologies to diagnose the sex of the fetus became widely available, the practice of sex-selective abortions became widespread. As the prices for sex-selection diagnostic tests fell during the 1980s and 1990s, the practice became even more rampant. The Indian government finally responded to this problem by passing the Pre-Conception and Pre-Natal Diagnostics Techniques (PNDT) (Prohibition of Sex Selection) Act in 1994. The PNDT Act prohibited the use of diagnostic methods to diagnose the sex of an unborn child. However, there is a general perception within India that the Act has not been effective, as the child sex ratio has continued to fall. India's home (interior) secretary, Mr. G.K. Pillai, echoed this sentiment when he admitted recently that "… whatever measures that have been put in over the last 40 years have not had any impact on child sex ratio and therefore that requires a complete review."[4]

Secretary Pillai's assertion is not quite accurate, since the child sex ratio could have deteriorated even more in the absence of policy measures, such as the PNDT Act. The problem is that while there have been a large number of empirical studies of the child sex ratio in India and in other countries in recent years, none has focused on the impact of legislation or a policy intervention on improving the boy-girl balance.[5]

To our knowledge, our paper is the first to explore the causal impact of a major legislation – the PNDT Act – on the child sex ratio. While the Government of India began enforcing the PNDT Act from 1996, it was non-binding for the western Indian state of Maharashtra, since that state already had its own PNDT-type law in place since 1988. Therefore, the implementation of the PNDT Act in 1996 in all the other Indian states provides us with an exogenous policy variation.We exploit this policy variation across states to analyze the causal impact of the legislation on gender imbalance, using a rigorous treatment-effect analytical framework.

Our main outcome variable of interest, the child sex ratio (number of girls per 1000 boys of age below 6 years), depends on two factors — sex ratio at birth and gender-specific mortality rates among children ever born. Preventing the abortion of girl fetuses will directly reduce the masculinity of the sex ratio at birth. However, the law might have induced an additional behavioral shift among households. Unwanted girl fetuses, if not aborted by virtue of the PNDT Act, could grow up as unwanted children in the household and be deprived of important resources such as nutrition and medical care, thus being more vulnerable to infant and child mortality. The use of the child sex ratio (instead of the sex ratio at birth) permits us to capture the effect of the PNDT Act on both the number of female babies born relative to male babies as well as on differential mortality across young boys and girls.[6]

There is one other way in which our paper is unique. Unlike previous studies on child sex ratios in India, which use highly-aggregate state or district-level data, we use disaggregated Census data on more than half a million Indian villages and 1500 towns over two time periods – 1991 and 2001 – to evaluate the impact of the PNDT Act on child sex ratios. Using these longitudinal datasets, our methodology incorporates various time-invariant and time-varying socioeconomic and cultural characteristics, which often determine the sex selection behavior of communities.

To anticipate our results, we find a significant positive causal effect of the PNDT Act on the child sex ratio, with the magnitude of the effect varying across different subsamples. The positive effect of the PNDT Act we obtain runs counter to the generally-perceived ineffectiveness of the law in the popular Indian press. One reason for the popular misperception is that the child sex ratio in much of India, including in the state of Maharashtra, worsened significantly during the 1991-2001 period. However, our empirical results suggest that the gender imbalance in India would have worsened even more in the absence of the PNDT Act.

Our research provides a silver lining to the generally bleak view of the 1996 PNDT Act. The significant impact of the PNDT Act in improving the child sex ratio suggests that, with better enforcement, a ban on sex-selective abortions can not only halt – but even reverse – the declining trend in the child sex ratio in India. Encouragingly, the Indian government has taken a step in the right direction by expanding the provisions of the PNDT Act in 2003, and by improving enforcement of the law in recent years.

2. Sex-selective Abortions in India

Abortion was legalized in India by the Medical Termination of Pregnancy Act of 1971. However, the law required abortions to be performed by registered medical practitioners, and only under certain acute medical conditions affecting the pregnant woman. Abortion as a choice, except for unwanted pregnancies resulting from rape, was not legalized.

Fetal sex determination techniques such as amniocentesis, originally intended for the detection of fetal abnormalities, were first introduced in 1975 (Luthra, 1994). The rampant misuse of amniocentesis and other techniques, such as chorionic villas sampling and ultrasound, for aborting female fetuses rapidly became a major concern, and it remains so till this day (Arnold et al., 2002; George, 2002; George and Dahiya, 1998; Sudha and Rajan, 1999; UNFPA, 2001).[7] The astonishing pace at which the network of private clinics providing sex determination and abortion services grew was marked by two features — the tests were cheap (Wertz and Fletcher, 1993) and they were widely available, even in remote rural areas bereft of basic amenities and health facilities (possibly because of the widespread use of portable ultrasound equipments and amniocentesis kits) (Ganatra et al., 2001; Menon, 1996).

Although data paucity prevents us from obtaining dependable statistics on sex-selective abortions in India, several studies have attempted to estimate the number of unborn girl fetuses from secondary sources. The results, though marked by wide variation, indicate the severity of the problem. Jayaraman (1994) and Arnold et al. (2002) estimate the number of aborted girl fetuses to be between 50,000 and 100,000 every year. Other studies suggest that the incidence rate could be even higher — e.g. using data from the Special Fertility and Mortality Survey (1998) of 1.1 million Indian households, Jha et al. (2006a) estimate that between 450,000 to 540,000 sex-selective abortions take place in India each year.[8]

Anti-sex determination campaigns during the mid-1980s focused attention on the vast scale of the problem, especially in the urban areas of

[3] Angrist (2002) studies the long-run impact of sex imbalance on marriage and labor markets. Messner and Sampson (1991) in the context of US and Edlund et al. (2007) in the context of China associate male-biased sex ratios with increased violence. Francis (2009) examines the impact of gender imbalance on bride price and child outcomes in Taiwan. Hudson and Boer (2002, 2004) argue that societies with high male-to-female sex ratio have always experienced higher violent crime rates. Hesketh (2009) discusses the possible marriage market related outcomes of the gender imbalance in China.

[4] *The Economic Times*, 1 April 2011.

[5] For example, Arnold et al. (2002) use NFHS 1998-99 data to link the prenatal use of ultrasound and amniocentesis by pregnant women with sex-selective abortions and the sex ratio at birth. Visaria Visaria (2007) uses primary data from the states of Gujarat and Haryana to find evidence of sex-selective abortions, particularly for higher birth orders. Patel (2007 ed.) provides a comprehensive overview of sex-selective abortions in India. Subramanian and Selvaraj (2009) employ a logistic regression approach to analyze the odds of the birth of a boy child between the pre-ban and post-ban periods. Using five rounds of data from the National Sample Surveys (NSS), they find no significant difference in the odds of a boy-birth before and after the 1996 PNDT.

[6] Another factor that may differentially affect the mortality rates of young boys and girls is the access to subsidized public goods. For example, with cheap access to healthcare facilities, households may be less likely to neglect girls. Hence, our analysis uses information on the access to healthcare and other infrastructural facilities, whenever possible.

[7] The association between abortion laws and sex selection have been studied in some other countries. For example, Lin et al. (2010) find that with widely available prenatal sex determination techniques in Taiwan, a legalization of abortion, in 1985, led to more male-biased sex ratios at birth. However, they also find that excess female child mortality may have reduced by 20% as a consequence. The negative association between sex-selection techniques and female-to-male sex ratios has also been studied, in the context of China by Li and Zheng (2009), and in the context of Nepal by Valente (2010).

[8] However, the estimates by Jha et al. (2006a) have been contested. See further discussions in Bhat (2006), George (2006), Jha et al. (2006b).