SEX-SELECTIVE ABORTION IN INDIA

ESTIMATES ON THE OCCURRENCE OF SEX-SELECTIVE ABORTION IN INDIA AND SOME POSSIBLE SOLUTIONS TO ELIMINATE THE PRACTICE

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Estimates on the Occurrence of Sex-Selective Abortion in India and Some Possible Solutions to Eliminate the Practice

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INTRODUCTION

Sex-selective abortion is the termination of the life of an unborn child on the basis of sex. Due to the prevalence of extreme son preference in some parts of the world today, girls are aborted simply because they are not male. Sex-selective abortion is a violation of the fundamental rights of women and girls whereby unborn girls are targeted for elimination and women are often pressured by relatives and society to bear a son. The widespread practice of sex-selective abortion in some countries has additionally created serious demographic consequences, causing heavily male-biased sex ratios that will have lasting implications in the years ahead. Over the past several decades, millions of women have gone 'missing' due to sex-selective abortion in many parts of the world, including in China, India, Vietnam, east Asia, parts of the Balkans, and the Caucasus region of Eurasia.[1,2,3,4,5,6,7,8]

Extreme son preference has persisted in many societies for thousands of years. Because of the introduction and wide availability of obstetric ultrasound technology since the late 20th century, however, it is now possible for couples to easily come to know the sex of their child prior to birth. In societies where strong son preference is prevalent and where abortion is both accessible and considered socially acceptable, the practice of sex-selective abortion has been widespread.

India has been among the countries hardest hit by the sex-selective abortion epidemic. Since 1990, approximately 15.8 million women have gone 'missing' from annual birth cohorts. Since 2014, approximately 550,000 girls go 'missing' from the birth cohorts every year due to the practice of sex-selective abortion and other forms of prenatal sex selection.

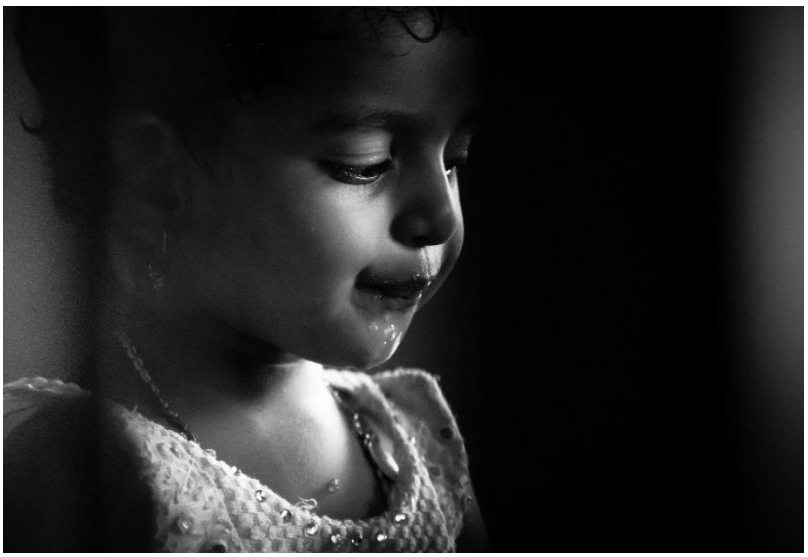
This report provides estimates on the incidence of sex-selective abortion in India over the past three decades. Additionally, an overview is provided on some of the causes of sex-selective abortion. This report identifies characteristics that studies have found to be associated with the practice of sex-selective abortion. In light of the research currently available on the causes of sex-selective abortion and son preference, we offer a number of recommendations for possible solutions and courses of action to combat the practice, including recommendations that may help to fine-tune interventions already in place.

CHAPTER 1

ESTIMATING THE NUMBER OF SEX-SELECTIVE ABORTIONS IN INDIA

ESTIMATING THE NUMBER OF SEX-SELECTIVE ABORTIONS IN INDIA

Since the ready availability of ultrasound technology beginning in the late 1980s and early 1990s, the practice of sex-selective abortion has become widespread in many parts of India. In 1994, with the passage of the Pre-Natal Diagnostic Techniques (Regulation and Prevention of Misuse) Act, 1994 (PNDT Act), the government of India made it illegal to reveal the sex of an unborn child except for strictly medical purposes. However, enforcement of the law varied by jurisdiction, and due to lax enforcement of the law in much of the country, the sex ratio at birth continued to increase even after the passage of the PNDT Act. While the sex ratio at birth appears to have since leveled off since, the sex ratio at birth in India today still remains unusually high, with nearly 1.11 males born for every female.[9]



It is not known how many sex-selective abortions have taken place in India over the past several decades. Some studies have made efforts to estimate the scale of the problem.[10] However, because the practice of sex-selective abortion usually goes unreported, it is all but impossible to know with precision how many sex-selective abortions have occurred since prenatal sex determination technologies have become available. We can, however, estimate the incidence of sex-selective abortion demographically by comparing the observed sex ratio at birth with the expected sex ratio at birth.

There are three principle inputs that are necessary for a demographic-based estimate for the incidence of sex-selective abortion. The accuracy of the estimate depends on the accuracy and certainty of each of these inputs.

The first input is the natural expected sex ratio at birth. It has long been known that the sex ratio at birth is greater than 1.0 males per female. It is not entirely certain why naturally more males than females are born. It has been hypothesized that male births outnumber female births as an evolutionary mechanism to account for the fact that male infants are naturally subject to higher mortality rates than females.[11,12,13,14] A natural sex ratio at birth may also fluctuate over time.[15] Some researchers have posited that the sex ratio at birth is, at least in part, a function of maternal

health.[16] The sex ratio at birth may be influenced by parental health, maternal anemia, the prevalence or severity of the causes of fetal mortality, Hepatitis B, hormones, race, or a variety of other factors that are not entirely understood.[17,18,19,20,21,22,23,24] As a result, there is considerable uncertainty concerning what a natural expected sex ratio at birth would be. Estimating the actual natural expected sex ratio at birth in India is beyond the scope of this report and it is a topic for further research. Figures for the expected sex ratio at birth and methods for estimating the expected sex ratio at birth as proposed by other authors will be employed here to estimate the number of 'missing women' due to sex-selective abortion.

A second crucial input in estimating the incidence of sex-selective abortion is the estimated number of births, specifically the number of female births. There is some difficulty in accurately estimating the number of female births due to the fact that birth registration records in India are poor. The Government of India (GoI), Office of the Registrar General estimates that only 58% of all births in India were registered in 2000 and only 82% in 2010.[25] The GoI estimates that birth registration had increased to 88.8% of all births by 2014.[26] The World Health Organization (WHO) recommends a birth registration target for health information systems of at least 90% of all births.[27] The GoI considers civil registration data to be complete when at least 90% of all live births are registered.[28]

Moreover, there is notable male bias in obtaining birth registration in India. Some couples are less enthusiastic about registering daughters than they are for sons and consequently may fail to have daughters registered. According to the GoI, the sex ratio of registered births in 2010 was 1.17 males registered per female.[29] By 2014, birth registration was still male-biased at 1.13.[30]

The third input on which estimating the number of sex-selective abortions hinges is the observed sex ratio at birth. Ultimately, however, because the sex ratio at birth is derived from birth statistics, the accuracy of an estimate for the observed sex ratio at birth depends on the reliability of estimates for number of births by sex.

It is also known that female infanticide occurs in India and there is the possibility that this practice could account for a significant portion of 'missing' girls.[31] Because we do not know how many terminations are in fact unreported cases of female infanticide, for the sake of simplicity, we will use the term 'sex-selective abortion' to refer to both as the outcome in both cases is the same. The estimates provided for sex-selective abortion in this report also include the occurrence of all other forms of prenatal and pre-conceptional methods of sex selection including sperm sorting and pre-implantation genetic testing. The use of these other prenatal and pre-conceptional methods are believed to be small relative to the occurrence of sex-selective abortion.

Methods and Data

Estimating the expected sex ratio at birth

Because the actual expected sex ratio at birth in India is unknown, we made our calculations on the basis of a variety of scenarios.

In one scenario, per the methodology employed by Anderson (2010),[32] an expected sex ratio of 1.059 was used, the ratio which was noted in Coale (1991)[33] to be the median sex ratio at birth in selected European countries between 1962 and 1980. This rate very nearly agrees with the sex ratio at birth in selected European countries from 1950-1999 as found by Grech (2002).[34] We use the sex ratio noted in Coale (1991) instead of Grech's, however, because infant mortality (a possible proxy for natural fetal mortality trends) in India since 1990 has been closer to those rates seen in European countries during the 1960s and 1970s than infant mortality rates observed in European countries since 1980.[35]

Also, per Anderson (2010), we assumed a second scenario in which the sex ratio at birth was assumed to be 1.066, the observed sex ratio at birth among Asian Indian Americans living in the United States between 1992 and 2004, as found by Abrevaya (2009).[36]

Another possible natural sex ratio at birth was approximated by averaging all yearly observed sex ratios at birth in India between 1965-1985. Obstetric ultrasound did not become widely available in India until the late 1980s and early 1990s,[37] and amniocentesis did not become popular in India until the late 1980s.[38] Consequently, this ratio approximates the sex ratio at birth before the practice of prenatal sex selection became widespread.

The estimated number of 'missing women' due to sex-selective abortion was also calculated assuming a natural sex ratio at birth of 1.07, an approximation for the theoretical upper limit of a natural sex ratio at birth as observed in European countries.[39,40,41] Another scenario was also considered in which the natural sex ratio at birth was set to 1.05, a rate commonly referred to as an approximation of the natural sex ratio at birth, and one that is cited by the WHO as a good approximation.[42] This number also closely approximates the regional expected sex ratio at birth for southern Asia which was estimated by Chao (2019)[43] to be 1.052. As there is good evidence to believe that the sex ratio at birth may vary by region, this baseline ratio from Chao provides further

support for assuming an expected sex ratio at birth approximating 1.05. It is also notable that in the early 1960s, before the widespread use of obstetric ultrasound technology, the sex ratio at birth in India was below 1.05 (shown in Figure 3).

As mentioned above, the natural expected sex ratio at birth may be influenced by a variety of factors including fetal mortality, maternal health, and other factors. Thus, the sex ratio at birth may fluctuate as these factors change over time. Klasen (2002) proposed that the expected sex ratio at birth is correlated with life expectancy at birth, an assumed proxy for general health conditions.[44] In an attempt to account for variations in the naturally expected sex ratio at birth over time, we provided estimates where we assumed an expected sex ratio at birth to follow the equation of the regression line for Non-African populations as found by Klasen (2002).[45]

Estimating the number of sex-selective abortions

Because there is some level of uncertainty regarding data on the number of births by sex (and, by extension, the observed sex ratio at birth), three different models were used for estimating the number of 'missing women' due to sex-selective abortion. All three models used the method for calculating the number of 'missing women' at birth as provided in Anderson (2010).[46]

In Model 1, the number of births was calculated using the mid-year population for males and females at age 0 from the United Nations Department of Economic and Social Affairs (UNDESA), Population Division (hereinafter, simply "UNDESA") World Population Prospects, the 2017 Revision.[47] UNDESA mid-year estimates were used to find figures for the end-of-year population at age 0 through linear interpolation. The number of births for each population cohort was calculated from the end-of year-population at age 0 by sex, using a method of calculation modelled on the method outlined in Barclay (1958).[48]

Person-years lived from age 0-1 were approximated by interpolation. Values for the probability of dying (${}_nq_x$) and the average number of years lived among those dying (${}_na_x$) were obtained from UNDESA abridged life tables for males and females at age 0 in India.[49]

UNDESA abridged life tables provide values for ${}_nq_x$ and ${}_na_x$ for quinquennial periods. Since the analysis required single-year ${}_nq_x$ and ${}_na_x$, UNDESA values for ${}_nq_x$ and ${}_na_x$ were assumed to be the mid-point for each quinquennial period. Single-year ${}_nq_x$ and ${}_na_x$ were calculated through linear interpolation. These values were then used to derive single-year l_1 and L_0.

The observed sex ratio at birth for each year was then derived from the estimated number of births by sex,

$$SRB_t = \frac{B^m{}_t}{B^f{}_t}$$

where SRB is the sex ratio at birth, t is the year, and where B^m and B^f are male and female births respectively.

Data for immigration by sex was obtained through the UNDESA Population Division's Trends in International Migrant Stock: The 2017 Revision.[50] Since UNDESA migration estimates only provide migrant stock by age and sex by country of destination, not origin, it was only possible to subtract out the estimated number of immigrants into India by sex at age 0. UNDESA estimates for migrant stock by sex is given by five-year age groups. UNDESA estimates for migrant stock are also estimated at mid-year, generally every five years from 1990-2015, with one additional unevenly spaced final estimate for mid-year 2017.

The number of immigrant infants into India was assumed to be one-fifth of all immigrants in the five-year age group 0-4. These values were then linearly interpolated to obtain single-year estimates for immigrant stock by sex at age 0. Unfortunately, there was no way to account for infants and children 0-4 years of age born in India and emigrating out of India before turning 5 years of age. As a result, our estimate on the number of sex-selective abortions with Model 1 only includes members of each annual birth cohort that were both born in India (or under its jurisdiction) and still remained in India (or within its jurisdiction) at the end of the calendar year.

According to UNDESA estimates for international migration, immigration into India for children under the age of five from 1990-2017 was male biased (approximately 1.07-1.11). Meanwhile, emigration out of India for this age group may have been less male-biased. According to the Migration Policy Institute's tabulation of U.S. Census Bureau American Community Survey microdata on immigration from India to the United States,[51] the sex ratio of the immigration stock of children under five in 2016 was 1.056. According to the Population Division's 2017 Revision estimates, the United States is the second most popular destination country for Indian migrants after the United Arab Emirates.[52] According to Abel (2014), emigration to the United States accounted for approximately 15% of all international migration from India from 1990-1995, 32% from 1995-2000, 25% between 2000-2005 and approximately 19% from 2005-2010.[53] As is evident from Eurostat migration data,[54] the sex ratio of immigrants from India under the age of five to E.U.

member states from 2008-2015 was about 1.03. Even so, the number of migrants under the age of five in both the E.U. and the U.S. is small in comparison to the number of births in India, and it is uncertain what percentage of these migrants migrated to foreign countries before turning 1 year old.

Nevertheless, it is unfortunate that comprehensive migration data by country of origin and age and sex are not available, as far as we know, and it is possible that, as a result, the estimate on the number of sex-selective abortions in Model 1 could be an overestimate. It is also possible, however, that the insufficiency of migration data could cause Model 1 to be an underestimate.

A different methodology was employed in Model 2, in which the observed sex ration at birth was estimated using UNDESA quinquennial estimates and projections for the sex ratio at birth. Given how even a small change in the sex ratio at birth can greatly impact an estimate for the number of 'missing women', however, quinquennial figures were not nearly granular enough for our purposes. Consequently, single-year estimates were approximated from quinquennial estimates through linear interpolation, assuming UNDESA values as midpoints for each quinquennial period. Because Model 2 used actual estimates for observed sex ratio at birth, Model 2 is unaffected by migration and accounting for net migration is thus unnecessary.

The number of female births was subsequently derived from the sex ratio at birth and from UNDESA annual estimates for the number of births in India. In Models 2 and 3, the annual number of female births is

$$B^f{}_t = \left[\frac{1}{\left(1 + SRB_{mid-yr.,observed}\right)}\right] B_t$$

where B is the number of births, B^f is the number of female births, t is the calendar year, and $SRB_{mid-yr.,observed}$ is the observed sex ratio at birth at mid-year.

In a third scenario (Model 3), figures from the India National Family Health Survey (NFHS)[55,56,57] were used as estimates for the observed sex ratio at birth in our calculations. NFHS sex ratios were then used along with UNDESA annual estimates for the number of births in India[58] to derive figures for female births for each year. Data for the sex ratio at birth for the years 1997-1999 differed between NFHS-2 and NFHS-3. For these years, we chose to use the more recent figures from NFHS-3.[59] In years where, according to NFHS data, the observed sex ratio at birth was lower than the natural expected sex ratio at birth, the number of 'missing women' was assumed to be zero.

UNDESA data was used for number of births instead of GoI vital statistics data, and is preferable to NFHS data, because UN Population Division estimates take into account a wide variety of data sources including all decadal GoI censuses, all NFHS surveys, and other sources.[60] UNDESA

estimates undergo rigorous checking and cross-validation across sources and account for under-enumeration in past censuses.[61]

Estimating the number of 'missing women' in the second generation

We also estimated the number of females in hypothetical second-generation cohorts that were never born because their would-be mothers were terminated by sex-selective abortion a generation prior.

To calculate this, UNDESA Population Division abridged life tables were used for females in India for the years 1985-2020.[62] Data for the probability of dying (${}_nq_x$) over the interval x to $x + n$ in UNDESA abridged life tables are given as values for quinquennial periods where n = 5 for cohorts 5 years of age or older and n = 1 and n = 4 for age groups 0 years of age and 1-4 years of age respectively.

To find single-year q_x, the UNDESA values for ${}_nq_x$ were assumed to be the midpoint for the quinquennial period and were linearly interpolated. q_x was also obtained for single-year age groups through linear interpolation for the age group 1-4 years old and q_0 had previously already been obtained through linear interpolation for single-year estimates. For five-year age groups where $x \geq 5$, single-year estimates for each year of age were obtained using Sprague's fifth-difference formula for interpolation.[63] Female survivors at exact age x (l_x) was subsequently derived from single-year, single-age q_x. Values for the average number of years lived among those dying in a given interval (${}_na_x$) were also used to find single-year values for ${}_na_x$, assuming values for ${}_na_x$ as the midpoint for each quinquennial period and linearly interpolated. Person-years lived at each age (L_x) were approximated by l_x and ${}_na_x$. The population of surviving cohorts each year is

$$P_{(x+n),(t+1)} = P_{x,t}\left(\frac{L_{(x+n),t}}{L_{x,t}}\right)$$

$$= P_{x,t}\left(\frac{l_{(x+n+1),t} + \left[\left(\frac{a_{x|j}}{n_j}\right)\left(l_{(x+n),t} - l_{(x+n+1),t}\right)\right]}{l_{(x+n),t} + \left[\left(\frac{a_{x|j}}{n_j}\right)\left(l_{(x),t} - l_{(x+n),t}\right)\right]}\right)$$

where x is age of the base year, t is the year, n_j is the interval between x and $x + n$ of age-group j, and $a_{x|j}$ is the average number of years lived among those dying, given that the cohort falls into age-group j.

The population for the first year of each 'birth' cohort was approximated as

$$P_{0,t} = W_{0,t}^{missing}\left(\frac{L_{0,t}}{l_0}\right)$$

where $W_0^{missing}$ is the number of 'missing women' due to sex-selective abortion at age 0 from the Model 1 estimate, assuming Coale's (1991) expected sex ratio at birth, L_0 is person years lived from age 0-1, and l_0 is the radix, defined in this analysis as 100,000. The population of each of the cohorts for each subsequent year were calculated by multiplying the previous year's population of the cohort by the previous year's survivorship ratio.

UNDESA quinquennial five-year age group age-specific fertility rate (ASFR) estimates and projections[64] were used to calculate the annual number of births for each hypothetical cohort. Values for $ASFR_{5yr,j}$ (where j is the age group) were converted into single-year $ASFR_j$ through linear interpolation. The number of missing births to all hypothetical second-generation cohorts is

$$B = \sum_{i=2005}^{2017} P_i \frac{(ASFR_{i,j})}{1000}$$

The number of hypothetical births is by calendar year. We also estimated the number of females in our hypothetical second-generation cohorts that would have been terminated due to sex-selective abortion. Here we only considered one scenario where the expected sex ratio at birth was assumed to be 1.059. Again, as with the estimate for the number of sex-selective abortions, we assumed the actual sex ratio at birth for each year to be equivalent to the ratio of male and female births calculated from UNDESA annual population estimates and projections for males and females aged 0. The estimated number of missing women in the second generation was calculated up to 2017.

Results

The results of our calculations are shown in Table 1 below. Assuming, per Coale (1991), a natural expected sex ratio at birth in India of 1.059, we estimate that approximately 15.8 million women have gone 'missing' due to sex-selective abortion since 1990. Assuming the same expected sex ratio at birth in Model 2, the estimated number of sex-selective abortions is approximately 15.1 million. The estimated number of girls eliminated through sex-selective abortion constitutes approximately 4.1 percent of all female live births that would have occurred had sex-selection not been practiced, assuming the Model 1 figure using Coale (1991) estimate for the expected sex ratio at birth. The number of sex-selective abortions per year has varied greatly over the

Table 1.
Estimated number of 'missing' women due to sex-selective abortion in India, 1990-2018.

Source for expected sex ratio at birth	Expected sex ratio at birth	Number of sex-selective abortions in thousands (Model 1)	Number of sex-selective abortions in thousands (Model 2)
Coale (1991)[33]	1.059	15,786	15,107
Abrevaya (2009)[36]	1.066	13,282	12,567
All-India average (1965-1985)	1.064	13,855	13,147
Theoretical upper limit: Urquia (2016),[8] Hesketh (2006)[41]	1.070	11,866	11,130
World Health Organization (2018)[42]	1.050	19,054	18,422
Klasen (2002)[16]	variable	20,234	19,625

intervening decades. Assuming Model 1 with 1.059 as the expected sex ratio at birth, the number of girls 'missing' from the birth cohort peaked in 2005 with approximately 677,000 girls missing. In this model, approximately 549,000 girls were 'missing' from the birth cohort in 2018.

Assuming a natural sex ratio at birth equivalent to the observed sex ratio at birth in India before the wide availability of obstetric ultrasound, approximately 13.9 million women have gone missing from birth cohorts between 1990 and 2018 assuming Model 1 inputs, or 13.1 million if we assume Model 2 inputs. For Model 1, approximately 3.7 percent of all female births that would have occurred were prevented by sex selection.

If we assume Model 1 with an expected sex ratio at birth of 1.064, approximately 608,000 girls went 'missing' from the birth cohort in 2005 when the number of sex-selective abortions peaked. According to this model, about 485,000 girls went 'missing' from the birth cohort in 2018.

Assuming an expected sex ratio at birth equal to the observed sex ratio at birth among Indian American immigrants in the United States per Abrevaya (2009), our estimate decreases to roughly 13.3 million women lost since 1990 in Model 1 or about 12.6 million in Model 2. On the other end of the spectrum, if we assume a sex ratio at birth of 1.05, as many as 19.1 million girls may have been lost during this period.

The variable model for expected sex ratio at birth produces the highest figures, with an estimated 20.2 million women lost to sex-selective abortion assuming Model 1 inputs for female births, and as many as 19.6 million women lost assuming Model 2 inputs.

Estimates utilizing observed sex ratios at birth as found by NFHS-2, NFHS-3, and NFHS-4 are shown in Table 2. Due to NFHS data cutting off at 2016, totals were only possible for the years 1990-2016. In comparison to Table 1, estimates derived from NFHS are notably lower, ranging from 5.3 million assuming an expected sex ratio of 1.07 and 12.5 million assuming a variable sex ratio at birth.

Additionally, we estimate that between 1990-2017 approximately 1.3 million women were never born because their would-be mothers were terminated through sex-selective abortion a generation prior. Among these hypothetical second-generation cohorts, an additional 61,000 girls or fewer would have also been eliminated through sex-selective abortion, assuming the sex ratio at birth for the years the hypothetical cohort was exposed to the 'risk' of having a live birth would have been the same as the actual sex ratio at birth observed over the past 15 years. We say 'or fewer' because the oldest women in our hypothetical cohorts were under 30 by 2017, the year when our calculations cut off. As noted above, the practice of sex-selective abortion is much more common at higher birth orders and at the final birth (even if the final birth is the first birth). Because younger women less frequently experience higher order births than older women and since younger women are less likely to be having their final birth than older women, the sex ratio at birth will inevitably be much lower among younger women than among all women of reproductive age. This estimate could be given greater precision in future research if age-specific and birth order specific sex ratios at birth are taken into account.

Table 2. Estimated number of 'missing' women due to sex-selective abortion in India, 1990-2016 using NFHS data for sex ratio at birth (Model 3)

Source for expected sex ratio at birth	Expected sex ratio at birth	Number of sex-selective abortions in thousands (Model 3)
Coale (1991)[33]	1.059	8,307
Abrevaya (2009)[36]	1.066	6,255
India (1965-1985)	1.064	6,697
Theoretical upper limit: Urquia (2016),[8] Hesketh (2006)[41]	1.070	5,286
World Health Organization (2018)[42]	1.050	11,265
Klasen (2002)[16]	variable	12,485

Discussion

As evident from the range of results found in Tables 1 and 2, even small changes in the expected sex ratio at birth can have a large impact on the estimated number of sex-selective abortions. It is possible that certain factors specific to India or that region of the world may impact the actual expected sex ratio at birth, including factors such as health and perhaps race or other factors, as noted previously. Because the actual expected sex ratio at birth in India in the absence of the practice of sex-selective abortion is not known, the results provided in Tables 1 and 2 should be viewed holistically and no single estimate should be taken as definitive. Rather, Tables 1 and 2 provide a variety of estimates based on varying assumptions. The actual number of sex-selective abortions very likely lies somewhere within the range of estimates provided in Models 1 and 2, ranging anywhere from 11.1 million to 20.2 million 'missing women' since 1990.

We propose that, out of the estimates provided here, the Model 1 estimate based on the expected sex ratio at birth mentioned in Coale (1991) is perhaps the most accurate. If the net effects of emigration can be assumed to be small on the sex ratio of India's under 1 population, Model 1 provides more precise yearly estimates for the observed sex ratio at birth. The expected sex ratio from Coale (1991) was derived from observed sex ratios at birth in contexts where sex-selective abortion generally was not practiced, and this ratio was derived from countries where maternal health status was more similar to that seen in India during the period observed than in the countries used to derive Grech's, Abrevaya's, or Klasen's estimates.

The expected sex ratio at birth approximated by the average observed sex ratio at birth in India during the two decades preceding the wide practice of prenatal sex selection has the advantage of possibly accounting for regional or country-specific differences that could make India's sex ratio at birth naturally higher than that of the European countries used in deriving the median expected sex ratio at birth noted in Coale (1991). The fact that this ratio closely approximates the ratio found in Abrevaya (2009) appears to strengthen the argument that sex ratios among ethnic Indian couples could be naturally higher than among other ethnicities. On the other hand, it is possible that sex ratios at birth in India during the 1960s, 1970s, and 1980s may have been artificially male-biased due to under-enumeration of female births and higher mortality rates

among under-enumerated female infants and children. Indeed, as mentioned previously, registration of births has been male biased even within the last 10 years in India. Studies have noted the persistence of culturally-based female infanticide in India during the period studied in this report.[65,66] Female children in India have also long suffered higher mortality rates than male children due to neglect, including the failure to provide female children with adequate nutrition or health care.[67,68] Higher mortality rates among women in general in India has caused millions of women to go 'missing' from the population, so the effect of mortality due to neglect of female children prior to official registration would likely be observable on the national population level.[69,70] Thus, observed sex ratios from the late 1960s to early 1980s may not be an accurate approximation of the actual natural sex ratio at birth in India.

With respect to the expected sex ratio at birth taken from Abrevaya (2009), it is presumed that Indian women living in Western countries are less likely to practice sex-selective abortion. However, some studies have shown that immigrant women from India continue to practice (or are coerced into practicing) sex-selective abortion even after relocating to the United States [71,72,73] and other Western countries.[74,75,76,77] Moreover, according to one study on Indian immigrants living in Canada, the practice of sex-selective abortion in general was not shown to have decreased significantly among native speakers of Hindi or Punjabi even after having lived in Canada for 10 years or more.[78] As such, Abrevaya's sex ratio at birth for Indian Americans inevitably overestimates the natural expected sex ratio at birth because it includes an unknown number of cases of sex-selective abortion.

The sex ratio at birth of 1.05 is merely a general approximation rather than a figure derived from empirical research, as is the case with the other estimates for expected sex ratio at birth used in this analysis. The expected sex ratio at birth of 1.07 is somewhat arbitrary as well, though studies have noted natural sex ratios at birth as high as 1.07 in some European countries.[79,80]

While Model 2 provides the benefit of not having to account for migration, the drawback of Model 2 is that the sex ratio at birth, the most important and sensitive variable in our calculation, is not dependent on the estimated observed population but rather determines for us the estimated number of female births. As such, we prefer Model 1 estimates as better predictors than those of Model 2.

We prefer the Model 1 estimates to our estimates derived from NFHS data because the sex ratio at birth in the NFHS shows a great deal of variability from year to year, as shown in Figure 1. Differences in the sex ratio at birth are rather sharp for some years. Assuming Coale's (1991) expected sex ratio at birth, NFHS figures imply, for example, 0.09 million sex-selective abortions in 2002 and 0.90 million in 2003—a ten-fold increase in a single year. Again, the year 2010 yields nearly 1 million sex-selective abortions, with that number being halved the following year (0.4 million) and falling again to 0.1 million in 2012, only to rise to nearly 0.6 million in 2015. Such large year-to-year variations in the incidence of sex-selective abortion are not supported by scholarly literature. As such, the trend evident from NFHS figures does not appear to resemble reality.

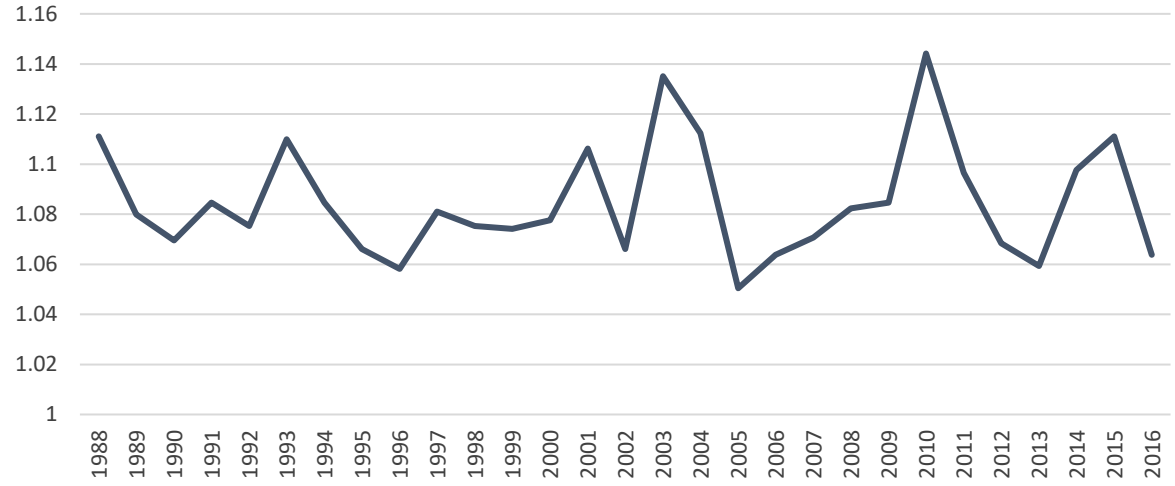
The estimates provided in this report are similar to those put forth by some authors[81,82] and different from estimates proposed by others.[83,84] Jha (2011) estimated 4.2–12.1 million sex-selective abortions between 1980-2010.[85] This range is similar to our own calculations which, when using NFHS data as Jha (2011) did, yields estimates ranging from 5.3 million (assuming a natural sex ratio at birth of 1.07) to 11.3 million (assuming Klasen's variable model).

There are some inherent limitations to the estimates given in this report due to the difficulty of accurately assessing the number of births in India by sex and the uncertainty concerning the expected sex ratio at birth. As the completeness of birth registration in India continues to improve, the accuracy of future estimates will likewise improve.

The sheer number of lives lost due to sex-selective abortion in India is astounding. The fact that millions of women are now 'missing' from the population will undoubtedly have a significant impact on Indian society. Millions of women who otherwise would have contributed to society were never given the opportunity to be born. Sex-selective abortion has left an excess number of men in many parts of India, which is projected to create a marriage squeeze over the coming decades,[86,87] a trend that is likely to have adverse implications for women's rights, fueling violence against women and bride trafficking.

Why is the practice of sex-selective abortion so widespread in India today? Can anything be done to reverse and ultimately eliminate the practice?

Figure 1. Sex ratio at birth, live births: NFHS



Source: NFHS-2, NFHS-3, and NFHS-4. See notes 55-57.

CHAPTER 2

CAUSES OF SEX-SELECTIVE ABORTION IN INDIA

CAUSES OF SEX-SELECTIVE ABORTION IN INDIA

Sex-selective abortion, in India, as in other parts of the world, is fueled by strong son preference, low respect for women, acceptance of abortion, and the high perceived cost of raising a child.

Son Preference

In many parts of India there exists a strong preference for sons over daughters. Couples seeking to achieve their desired number of sons will often resort to sex-selective abortion, particularly if they have not achieved their desired number of sons by the time they have reached their desired family size. On average, women in India have two or three children and the effects of stopping rules and son preference on the sex ratio at birth become most apparent at second and third order births, particularly if women at these gravidities have no sons. Sex ratios in India have been noticeably higher among women with one or two previous daughters and no sons.[88,89] Among Indian immigrant women living in Canada, studies have shown that the sex ratio at third birth is significantly higher than the natural sex ratio at birth if the two previous births were female.[90,91,92] The sex ratio at birth also tends to be higher at final birth, particularly if the first birth is also the last and in states where son preference is strong and widespread.[93]

Men and women who have a strong preference for sons may also seek to achieve their desired number of sons in other ways, including by continuing to have children until their desired

> Prior to the availability of ultrasound, generations past had also resorted to female infanticide to attain their desired number of sons.

numbers of sons are achieved. This practice was widely used in the past, but following the introduction of modern contraceptives and the availability of ultrasound technology, the practice has become much less common.

Prior to the availability of ultrasound, generations past had also resorted to female infanticide to attain their desired number of sons. While infanticide is no longer prevalent,[94] the practice of female infanticide has been reported in communities in limited pockets, such as certain districts in Tamil Nadu in the 1980s and 1990s.[95]

Son preference was also manifested in years past by parents treating undesired daughters more poorly than sons. Female children could be neglected or given lower priority in the allocation of food, immunization, medicine, and education.[96]

A variety of factors are associated with strong son preference. Women with higher levels of education have been shown to display significantly less son preference than women with little or no education or literacy.[97,98,99,100,101,102,103] Men with higher education often display less son preference as well, although the effect is not nearly as strong as it is for women.[104,105,106]

Factors related to income, wealth, and status have also been shown to be associated with son preference. Men and women with a high index of wealth display significantly less son preference than those with low wealth.[107,108,109] Women living in rural areas (as opposed to urban areas) have also been shown to be significantly more likely to display son preference.[110,111,112] Some studies have shown that women from Scheduled Castes or Scheduled Tribes have significantly higher son preference, but other studies have shown conflicting results.[113,114] According to one survey, men from Scheduled Tribes displayed significantly less son preference while women from Scheduled Tribes displayed significantly more.[115]

Some studies have also found that Christians and Muslims desire a lower number or proportion of sons compared to Hindus while Sikhs tend to desire more sons.[116,117] However, other studies have shown varying results. One study found that Christians were significantly less likely to have a stated son preference than Hindus, but that Muslim men were significantly more likely to prefer sons.[118] Another study found that only Muslim women, not men, were significantly more likely to display son preference than Hindus.[119]

Son preference also varies by region. According to one study using data from the NFHS-1 (1992-1993) survey, women in southern Indian states were significantly less likely to display son preference.[120] Other studies have shown that a noticeably smaller proportion of people living in southern states display son preference.[121] The mean ideal sex ratio among respondents in the NFHS-2 (1998-1999) survey was found to be manifestly lower in southern states than in other regions of India, with some variation between the other regions as well.[122] The DHS final report for the NFHS-4 (2015-2016) (the most recently completed NFHS survey at the time of the writing of this report) shows that a smaller proportion of men and women in most southern states and

union territories desire more sons than daughters than men and women in most states in India's central, eastern, and northeastern regions.[123]

Factors Associated with the Practice of Sex Selection

Although strong son preference provides the motivation for couples to practice prenatal sex selection, having greater son preference does not always translate to a greater likelihood of resorting to sex-selective abortion. Factors associated with strong son preference are not always similarly associated with the practice of sex-selective abortion. In fact, many of the factors associated with higher son preference have been shown to be associated with lower sex ratios at birth.

Studies have shown that women with higher levels of education are more likely to give birth to a boy, particularly at birth orders where sex-selective abortion is more likely.[124,125,126] In one study, women with 10 or more years of education were significantly more likely to give birth to a male child if the first child was female than illiterate women were.[127] In another study, it was shown that women with two surviving children increased their likelihood of giving birth to a boy following an ultrasound test as their educational attainment increased, with the trend becoming significant among women with 9-10 years of education.[128] However, the relationship is not strictly linear and some studies have revealed varying trends. Some studies have shown the probability of giving birth to a boy levels off and retreats slightly for women with more than 12 years education,[129] but according to one study, only for women giving birth to their third child.[130]

Although individuals in higher socioeconomic strata are less likely to display son preference, they may be more likely to engage in sex-selective practices than low income individuals. In Punjab, Haryana, and Gujarat, a few states that have been reported to have particularly high sex ratios at birth,[131] having greater wealth is significantly associated with the probability of having a boy.[132]

Studies have also shown that the sex ratio at birth across India overall is much higher among Indian households in the top 20th percentile of wealth as compared to the households in the bottom 20 percent.[133] Being a member of a Scheduled Caste or Schedule Tribe, which may serve to a limited extent as a proxy for low wealth status, however, is not significantly associated with a higher probability of the second birth being a boy after having had an ultrasound.[134]

Women in urban areas are also more likely to give birth to a higher proportion of sons,[135] particularly if they already have two children.[136] However, this trend may be partially attributable to the fact that urban women tend to have fewer children overall. According to one study, when controlling for family size, urban women are significantly less likely to give birth to a larger proportion of sons.[137] Still, recent health survey data in India shows that in the majority of states, the sex ratio at birth is higher in urban areas than in rural areas.[138]

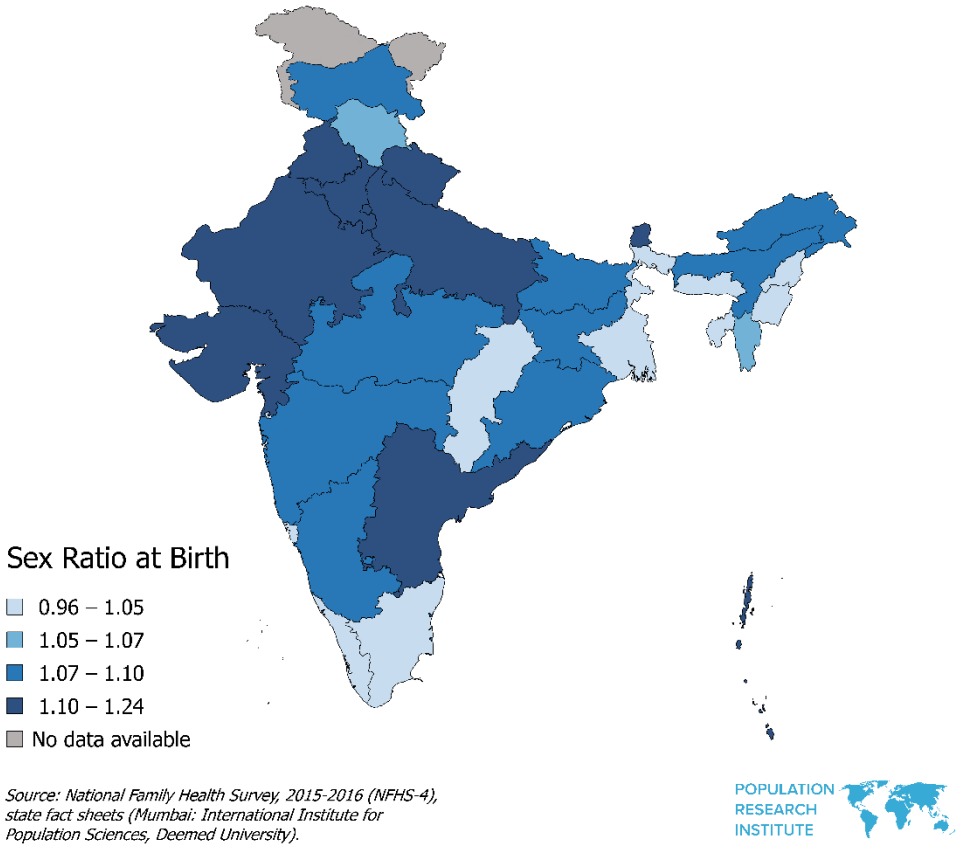
These trends appear to indicate that while people with urban residency, with greater wealth/income, or with higher levels of education may less frequently display son preference, they may also be more capable and willing to act on son preference by resorting to sex-selective abortion.[139] Urban residence, wealth/income, and education often go together as indicators of economic opportunity, and persons with higher levels of achievement in these areas generally have greater access to health facilities, have greater awareness of the means to realize their desired fertility goals, and have greater wealth to expend on ultrasound scans, doctor visits, transportation to clinics, and abortion procedures. Members of Scheduled Castes and Scheduled Tribes are often on the lower socioeconomic strata, although in modern India, belonging to a Scheduled Caste (SC) or Scheduled Tribes (ST) is a less predictable indicator of poverty than it once was. Although son preference remains high among certain groups within SCs and STs, members of SCs and STs overall are not significantly more likely to give birth to a boy than members of other castes.[140]

With respect to religion, however, higher son preference displayed by members belonging to a particular religious group tends to be a more predictable indicator for the sex ratio at birth than socioeconomic variables. Christians, for example, not only display significantly lower son preference, but are also significantly less likely to have a higher proportion of sons than Hindus, even when controlling for family size.[141] One study has found that Muslims are also significantly less likely to give birth to sons than Hindus at third birth and Sikhs are generally more likely to

give birth to sons.[142] Sex ratios at birth have also been shown to be significantly higher among Buddhists at second birth.[143]

The practice of sex-selective abortion is not uniform across all of India and varies by location, family structure, attitudes towards girls, and other factors. In terms of location, as evident from Figure 2, sex-selective abortion is uncommon in several of India's eastern and north-eastern states as well as in the south. On the other hand, throughout most of central, west, and northern India, the sex ratio at birth far exceeds the natural expected sex ratio at birth. According to data from the National Family Health Survey, 2015-2016 (NFHS-4), Sikkim, a state sandwiched between the countries of Nepal and Bhutan, had the highest overall sex ratio at birth of 1.24.[144] Haryana, Punjab, and the union territories of New Delhi, Puducherry, and Andaman and Nicobar Islands all had overall sex ratios at birth exceeding 1.15, and several other states, as shown in Figure 2, were over 1.10.[145]

Figure 2. Sex Ratio at Birth in India, NFHS-4 (2015-2016)*



* Data for sex ratio for each state taken from: Government of India, Ministry of Health and Family Welfare & International Institute for Population Sciences (IIPS). National family health survey (NFHS-4), 2015-16. State fact sheets. Available at http://rchiips.org/NFHS/factsheet_NFHS-4.shtml.

However, looking only at the overall sex ratio for each state fails to tell the full story. In many states, the overall sex ratio at birth may appear normal at first glance, but when the data is segmented by certain demographic characteristics, evidence of the practice of sex-selective abortion becomes unmistakable.

In a majority of states, the sex ratio at birth is higher in urban areas than in rural areas, and in some cases, noticeably so.[146] For instance, in the rural areas of Assam the sex ratio at birth is normal at 1.058.[147] In Assam's urban areas, however, the practice of sex-selective abortion is readily apparent with a sex ratio at birth of 1.26.[148] In other states, like Andhra Pradesh for example, the reverse is the case with sex ratios at birth being higher in rural areas than in urban areas.[149]

It is also well known that sex-selective abortion is much more common at higher order births in general (particularly 2+),[150,151,152] at final birth, and at higher order births if the prior births were girls or if the desired number (or mix) of sons has not yet been attained.[153,154] Sex-selective abortion also becomes more likely in proportion to how many daughters a couple has.[155]

According to the Indian Ministry of Finance's Economic Survey, 2017-2018 (which derived its estimates from the NFHS-4), several states, including Punjab, Haryana, Rajasthan, Gujarat, and Himachal Pradesh, the sex ratio at last birth very nearly approached or exceeded 2.0.[156] According to the survey, the sex ratio at last birth exceeded 1.2 in almost all Indian states and union territories, even in many states where the overall sex ratio at birth was normal.[157] While the all-India sex ratio at birth at first birth was 1.07 for women who had subsequent births, the sex ratio at birth was 1.82 for women whose first birth was also their last.[158] Sex-selective abortion is most often practiced when couples have reached their desired fertility in terms of number of children but have not yet had the number of sons they desired to have.

Declining Fertility

Another factor that has contributed to the high prevalence of sex-selective abortion over the past three decades is declining fertility. As in other rapidly developing countries, rising standards of living and increased per capita wealth in India is causing many couples to upwardly revise their income and lifestyle expectations. Both desired fertility and total fertility in India have fallen in recent decades,[159] possibly as a result of couples looking to save and accumulate wealth rather than using their resources on a large number of children. In recent years in particular, the cost of education has climbed substantially,[160] making larger families less affordable for many middle-class couples.

In the early 1970s, women in India on average had about 5.4 children.[161] Since then, fertility has declined considerably, with the total fertility rate estimated to have fallen to 2.28 children per woman in 2018.[162] As a result, the number of times couples believe they have to 'try' for a boy

has drastically narrowed. Fewer births overall mean a smaller probability of having a male child, and couples often resort to sex-selective abortion to improve their chances.

Reasons Sons are Preferred

Sons are preferred over daughters in many parts of India for a number of reasons. Like many developing countries that are (or were until recently) primarily reliant upon agriculture, sons are valued because they can inherit land and property, and they can carry on the family name. Sons ensure that family wealth stays within the family. Sons are also valued for carrying out funeral rites for their parents as most Hindus believe that a son must fulfill this role.[163] Among the most common reasons men and women cite for wanting a son include carrying on the family name, support in old age or when sick, performing funeral rites, helping out with the family business or chores, and keeping property within the family.[164,165]

The practice of dowry continues to persist in many parts of India, a custom which further contributes to the perception that daughters are a significant financial liability for the family.[166,167] Marriage in much of India is largely patrilocal, meaning that a woman goes on to live with her husband's family and is responsible for caring for his parents after marriage. Those couples who have only daughters are left with little or no support from their married daughters in their old age. Because daughters often leave their birth families after marriage, it has become a common sentiment in India that "raising a daughter is like watering your neighbour's garden."[168] Daughters who do not get married are often perceived as a burden because it is a culturally-based expectation that their parents will continue to provide for them. Men and women from India who do not want another daughter often cite dowry, the financial burdens that come with raising daughters, and concerns that a daughter's misdeeds could bring dishonor to the family as reasons for not wanting a daughter.[169]

Although many in India are aware of the demographic consequences of sex-selective abortion, many couples who continue to practice sex selection often do not believe that their actions will have much of an effect on the problem overall.[170] Many couples who have daughters may also believe that they have already played their part in contributing to a balanced sex ratio in the community at-large and thus may see their pursuit of sex selection as harmless.[171]

For many Indian women, bearing a son is also a status symbol. Due to cultural male bias, women who bear a son are often treated better and are more greatly esteemed than mothers of daughters. Reports have revealed that some women may even derive much of their sense of self-worth from having borne a son or may desire a son to escape the derision of their spouse or in-laws for having borne only daughters.[172] Some mothers may also feel that sons are easier to raise because they do not have to worry about what might happen to them when they are away from the home.[173]

For some in India, the birth of a daughter is treated as a major disappointment. Dr. Ganesh Rakh, a doctor in Pune, India who is trying to improve the status of women by delivering girls for free in his hospital, told the BBC his experience with extreme son preference among some of his patients:

> "The biggest challenge for a doctor is to tell relatives that a patient has died. For me, it was equally difficult to tell families that they'd had a daughter…They would celebrate and distribute sweets if a male child was born, but if a girl was born, the relatives would leave the hospital, the mother would cry, and the families would ask for a discount." [174]

Unequal Status of Women

In general, men in India enjoy greater status than women. This translates to better education and job opportunities for men, as well as greater freedom within the family to make decisions and the ability to secure preferential access to resources. While nearly 87% of men in India are literate, only 68% of women can read or write.[175] According to the Indian Ministry of Finance's Economic Survey 2017-2018, only 75% of women surveyed in the 2015-2016 National Family Health Survey said they were involved in making decisions about their own health or were involved in making decisions about visiting family or relatives.[176] The amount of power men

possess in the family sometimes even permits abusive treatment. It is a sad commentary on this state of affairs that, according to the Economic Survey, only 54% of female respondents believed that wife-beating was unacceptable.[177]

The low status of women often contributes to the incidence of sex-selective abortion as women are often coerced or forced into sex-selective abortion by in-laws, family members, or spouses who are keen that they bear a son.

In a qualitative study of Asian Indian-American women living in the United States, Sunita Puri and her colleagues documented several cases where women self-reported that they received maltreatment or abuse as a result of being pregnant with a girl.[178] Women reported being chastised or berated as "useless" by in-laws for not bearing a son or being denied food and medical attention if they were carrying girls.[179] Women have reported having to submit to repeated abortions in order to satisfy relatives or their spouse.[180] It has also been reported that whether women receive adequate prenatal care or adequate nutrition may in some cases be contingent on whether her unborn child is male or female.[181,182]

CHAPTER 3

POSSIBLE SOLUTIONS

POSSIBLE SOLUTIONS

The Legal Option

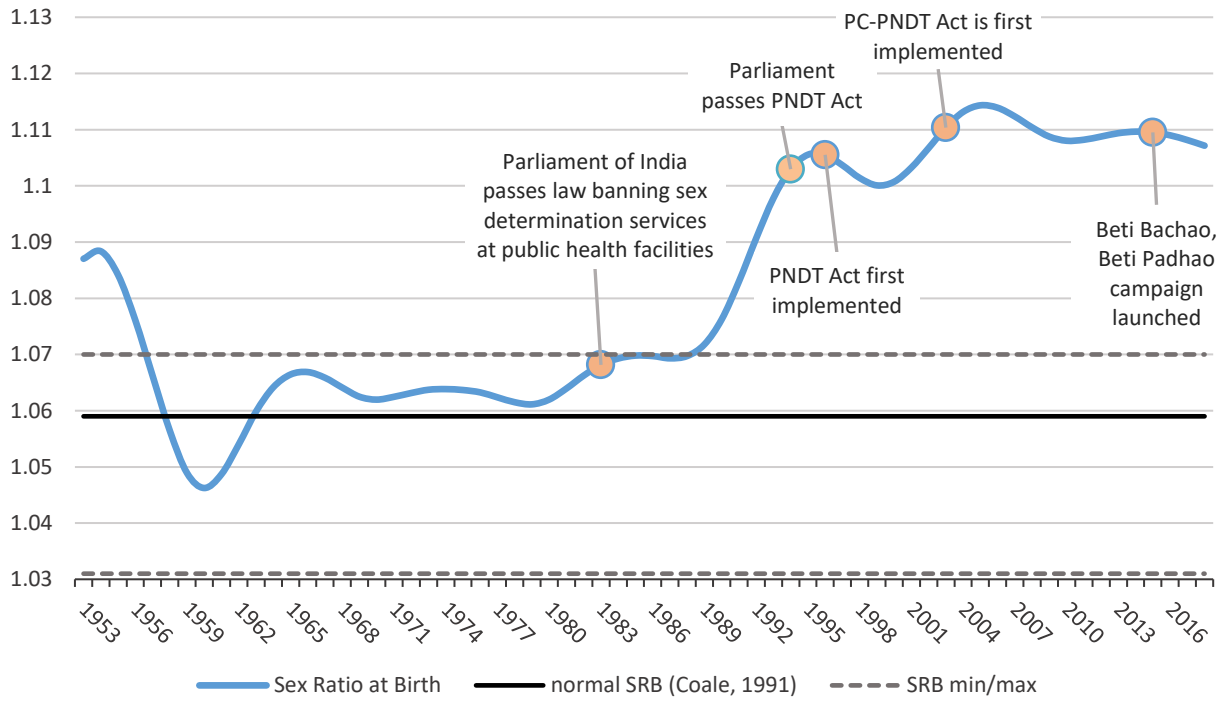
How can sex-selective abortion in India be eliminated? One way is to rigorously implement and enforce policies banning the practice.

Sex selection has a long history in South Asia. Long before the introduction of amniocentesis or ultra-sound technology, female infanticide was practiced in northern and north-western India, among upper castes such as the Rajput and Brahmin castes.[183,184] Because cultural norms did not permit men to marry a woman of an equal or higher caste, female infants born into Rajput families were often terminated.[185] This practice so disturbed the British colonial government in India at that time that it passed the Female Infanticide Prevention Act of 1870 in an attempt to end the practice.

By 1900, it was believed that female infanticide had been all but eliminated among the Rajput caste. However, the practice endured and began to spread to lower castes, where the practice was seen it as a way to avoid paying expensive dowries later on, and members of lower castes came to see the practice as a way to emulate upper-caste lifestyles and to advance their social status.[186] Studies have noted that the practice of female infanticide endured in limited pockets of the country during the 20th century, although the full extent of this practice is not known and the practice is no longer pervasive.[187,188,189,190] Beginning in the late 1980s, however, the emergence of obstetric ultrasound in India made it possible to cheaply and easily determine a child's sex prior to birth. Ultrasound tests cost only a fraction of what it costs to determine the child's sex via other methods like amniocentesis or chorionic villi biopsy.[191] Sonogram machines began to be produced domestically in India on a wide scale in the late '80s and early '90s as well,[192,193] dramatically cutting the cost of the technology and increasing its availability. Rapid economic development in India in the early to mid-1990s and competition among ultrasound providers in India's private health sector made ultrasound technology affordable for the average citizen.[194] As a result, the incidence of sex-selective abortion became widespread and the sex ratio at birth began to increase rapidly.

Alarmed by this trend, the government of India introduced several laws and regulations to stop the practice of sex-selective abortion. In 1983, the Parliament of India adopted a law banning sex determination services at public health facilities.[195] In 1988, the state of Maharashtra adopted the Maharashtra Regulation of the Use of the Prenatal Diagnostic Techniques Act, the first law of its kind in India imposing a complete ban on the practice of prenatal sex determination for both public and private entities.[196] In 1994, the Parliament of India passed a similar law applicable to the entire country called the "Pre-Natal Diagnostic Techniques (Regulation and Prevention of Misuse) Act, 1994" (PNDT Act). The PNDT Act prohibited doctors and midwives from disclosing to patients the sex of their unborn child. It also banned the advertising of prenatal sex determination services, required doctors to keep records for at least two years on ultrasound tests, and established a government advisory board to ensure the law's effective implementation. Clinics and hospitals offering prenatal diagnostic services were also required to register with the government. The law also prohibited the advertisement of sex determination services. The law explicitly prohibited doctors from communicating the sex of the fetus to the mother by any means, including through "signs, or in any other manner."[197] Health care workers who provided sex determination tests or persons who sought such tests in violation of the law could be imprisoned

Figure 3. Sex Ratio at Birth: India, 1953-2018.



Source: Sex-ratio at birth (SRB) calculated from: United Nations, Department of Economic and Social Affairs, Population Division (2017). World Population Prospects: The 2017 Revision. Normal SRB taken from: Coale AJ. Excess female mortality and the balance of the sexes in the population: an estimate of the number of "missing females". The Population and Development Review 1991 Sep;17(3):517-23.

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for up to three years and fined up to 10,000 rupees on first violation and could be penalized up to 5 years in prison and assessed up to a 50,000 rupee fine for a repeat offense. In 1996, the PNDT Act went into effect nationwide.

In the first few years after the law went into effect, the PNDT Act appeared to have an impact. The sharp rise of India's sex ratio at birth seen throughout the early 1990s came to an abrupt halt and began to decline slightly. However, implementation of the law was slow, and enforcement of the law was practically nonexistent.[198] Many sonogram technicians ignored the law altogether and continued to provide sex determination services for profit, simply making their sex screening businesses less conspicuous. Some technicians created mobile clinics by loading their sonogram machines into the backs of vans or other vehicles to skirt the law's restrictions and to more easily escape the notice of law enforcement. Moreover, these mobile clinics allowed unscrupulous technicians to expand their client base, offering prenatal sex determination services in remote and rural areas where people did not have access to stationary clinics.[199,200] As late as 2001, not one clinic had been registered under the PNDT Act to use sonogram machines in the state of Punjab, one of the states hardest hit by the sex-selective abortion epidemic.[201] With poor enforcement of the law, the incidence of sex-selective abortion began to increase again.

By the turn of the century, it had become obvious that not enough was being done to enforce the PNDT Act. In 2001, the Supreme Court of India ruled in *CEHAT v. Union of India* that the government had failed to adequately enforce the PNDT Act and ordered the central government to take the necessary steps to fully implement the law. In *CEHAT*, the Court noted several blatant violations of the PNDT Act, including the failure of the Central Supervisory Board to meet once every six months as required by law and the government's failure to investigate or prosecute health care facilities that were running advertisements for sex determination services.[202]

In response, the central government significantly strengthened the PNDT Act in 2003 with a series of amendments passed as the "Pre-Natal Diagnostic Techniques (Regulation and Prevention of Misuse) Amendment Act, 2002." With the new amendments added to the preexisting statute, the law was renamed the "Pre-Conception and Pre-Natal Diagnostic Techniques (Prohibition of Sex

Selection) Act" (PC-PNDT Act) to make clear that the law's purpose was to ban the practice of prenatal sex selection, not just prenatal sex determination services. The PC-PNDT Act broadened the scope of the previous PNDT Act, applying the law's restrictions to mobile clinics and prohibiting sex selection by any method, including pre-conceptional methods such as IVF. To increase compliance, the new law was extended to allow individuals to file complaints on illegal sex determination services. The new law also established a State Supervisory Board in each state and Union Territory to monitor the implementation of the PC-PNDT Act, to ensure that the supervisory authorities ("Appropriate Authorities") established through the original PNDT Act were functioning as required and to mobilize public awareness against the practice of sex-selective abortion. The new law also clarified the powers delegated to the Appropriate Authorities, including the ability to pursue legal action against violators of the law. Penalties were also strengthened in the new act, increasing the fine for persons seeking prenatal sex determination tests from 10,000 rupees to 50,000 rupees on first offense and from 50,000 rupees to 100,000 rupees on repeat offense. The new law further banned the selling of ultrasound machines to unregistered clinics and set up hotlines for anonymous reporting of sex-selective abortion.[203]

Since the PC-PNDT Act went into effect, the number of registered ultrasound clinics increased markedly and by 2006, nearly 400 ultrasound technicians were prosecuted under the law.[204]

Since the PC-PNDT Act, the incidence of sex-selective abortion has leveled off somewhat, an indication that the new regulations may be having some effect. However, the annual number of sex-selective abortions has yet to decline in a meaningful way. Studies have shown that the likelihood of giving birth to a son did not decrease in the immediate years after the PNDT Act went into effect (1999-2005).[205] A study of sex ratio at birth trends in Maharashtra found that the sex ratio at birth declined significantly in that state shortly following the implementation of the PC-PNDT Act; however, the sex ratio at birth appeared to remain relatively stable after the drop and was above 1.10 as recently as 2012.[206]

Effective Policy Enforcement Paired with Societal Transformation

Because sex-selective abortion remains widespread even after the adoption of comprehensive regulations, is this an indication that a legal approach has failed? Not *per se*, but certainly in its implementation.

As Nandi (2013) found, the PNDT Act has not reduced the incidence of sex-selective abortion, but the law had a significant marginal effect that prevented the sex ratio from increasing further than it would have otherwise.[207]

Part of the reason why the PNDT Act has not yet had the desired effect is that, even with tightened restrictions under the PC-PNDT, the law has been unevenly enforced and slowly implemented. In the state of Haryana, for instance, a state that has been hard-hit by the sex-selective abortion epidemic, penalties for persons caught violating the policy are often delayed because cases are significantly backlogged.[208] The delay in doling out penalties has prevented the PNDT regulations from having the deterrent effect on crime that they would otherwise have had.

Meanwhile, the demand for sex determination services remains high, providing tantalizing financial incentives for sonogram technicians to continue offering these services. According to an article that appeared in the *Wall Street Journal*, Haryana state officials estimate that sex determination may be a $30 million industry in that one state alone.[209]

In order to effect real change, it is essential that effective enforcement of the law be paired with a cultural transformation to respect the equal dignity and value of women and to do away with negative attitudes towards having girls.

In places where the PC-PNDT Act has been rigorously enforced, however, the law has had a very significant effect in reducing the practice of sex-selective abortion. The Hyderabad government, for instance, in 2004 took the initiative of requiring all directors of ultrasound facilities in the district to receive an orientation on the PC-PNDT law's requirements.[210] The facilities were also required to submit to the government records and documentation of their compliance with the law, and the government subsequently took action against clinics that failed to submit sufficient information or that was found to be in violation of the law.[211] The Hyderabad government ended up suspending the registration licenses of 91 clinics, seizing 74 ultrasound machines, and pursued legal action on 18 facilities.[212] Soon after, the sex ratio at birth in Hyderabad sharply declined.

While some local governments have been able to make progress in enforcing the PC-PNDT ban, most localities have little motivation for rigorously enforcing the statute. The legal approach alone will be insufficient in eliminating sex-selective abortion so long as authorities are lax in enforcing the law and as long as people are motivated to skirt around its restrictions. In order to effect real change, it is essential that effective enforcement of the law be paired with a cultural transformation in which there is respect for the equal dignity and value of women and in which negative attitudes towards having girls are done away with.

The past experience of South Korea is perhaps the clearest example of how, taken together, effective restrictions, effective enforcement, and cultural transformation can eliminate the practice of sex-selective abortion.

As in India, sex-selective abortion in South Korea became a pressing problem following the widespread adoption of ultrasound technology in that country. Sex-selective abortion became so pervasive that, at its worst in 1990, the sex ratio at birth peaked at nearly 1.17.[213] Sex-selective abortion in South Korea may have peaked that year in part because 1990 was the Year of the Horse, and Koreans believed that girls born that year would make bad wives later in life.[214]

In 1987, the Korean government passed a law banning prenatal sex determination, but the law had weak penalties and was not enforced.[215] Due to lack of enforcement, the 1987 law, somewhat similarly to India's PNDT Act, had little to no effect—except perhaps in mitigating the incidence of sex-selective abortion in the year the law was passed. Indeed, 1987 saw a relative minimum in the sex ratio at birth. After 1987, however, sex-selective abortion soared.

Recognizing that their initial efforts had failed to resolve the problem, the Korean government in 1994 significantly strengthened the penalties for violating the 1987 law[216] and in the mid-1990s began promoting a national public awareness campaign called "Love Your Daughter" to combat stigma against girls.[217,218,219] Rapid socioeconomic development also occurred during this period, increasing wealth and educational opportunities for women. Soon afterwards, the incidence of sex-selective abortion began to plummet.

At the same time, in the years leading up to 1994, son preference in Korea had also been diminishing. The percentage of women in a periodic national survey who said that they 'must have a son' declined precipitously between 1991 and 1994.[220] By 2007, the sex ratio at birth in the Republic of Korea (ROK) had returned to a normal level.

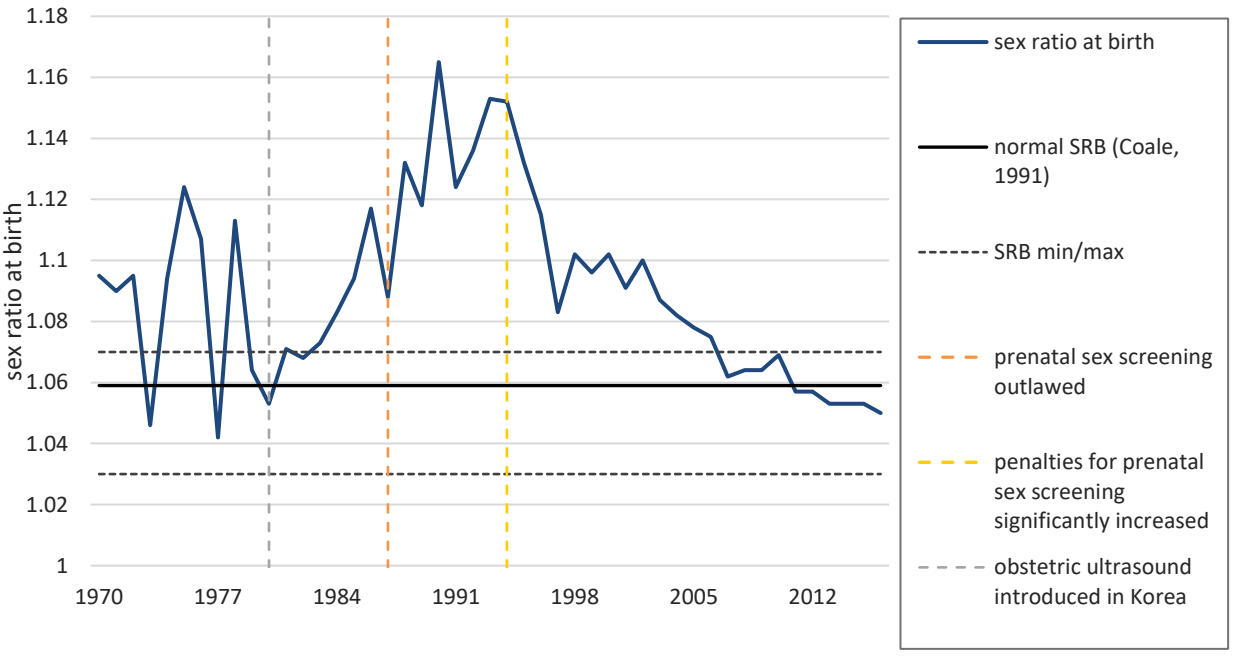
Although sex-selective abortion has now become uncommon in South Korea, the incidence of abortion itself continues to remain very high. According to the Korean Ministry of Health and Welfare, the abortion rate in the ROK in 2010 was 15.8 per 1,000 women of reproductive age,[221] a rate similar to what the abortion rate in the United States was that same year.[222] In 2010, abortion was technically illegal in South Korea except in cases of rape and incest, in cases where the pregnancy threatened serious harm to the

mother's health, or in cases where a parent suffered from an infectious disease or genetic disability. In reality, however, abortion in the ROK during this period was available virtually on demand and the vast majority of abortions were technically illegal.[223,224] While abortion still remains all too common in South Korea, the South Korean experience can still be instructive as a model for reducing the incidence of sex-selective abortion in countries like India.

In order for the Indian government to meaningfully reduce the number of sex-selective abortions, it is necessary that the government, on all levels, fully and effectively implements the PC-PNDT Act, including promptly holding accountable medical practitioners that violate the law. The government must ensure that all ultrasound clinics are registered, and that accurate, up to date records are kept. The Appropriate Authorities must also immediately investigate any clinics suspected of conducting illegal activity and must take swift action against clinics found to be in violation of the law. In districts where the law has been rigorously implemented, the practice of sex-selective abortion has declined sharply.[225] Effective implementation of the law must, however, must be paired with effective societal transformation in order to have lasting impact. Ultimately, the motivation couples and ultrasound providers have for seeking and engaging in sex selection practices must be eliminated.

In an effort to promote social transformation to improve the value and status of girls, the Government of India under Prime Minister Narendra Modi on January 22, 2015 launched Beti

Figure 4. Sex Ratio at Birth: Republic of Korea, 1970-2016.



Source: Statistics Korea, Vital Statistics (annual 1970-2016), obtained through: KOrean Statistical Information Service (KOSIS), kosis.kr. Normal SRB taken from:

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Bachao, Beti Padhao ("Save the daughter, educate the daughter") (BBBP), a nationwide campaign to promote the birth and well-being of girls. The campaign aims to combat the practice of sex selection, promote the education of girls, and advocate for the value and dignity of daughters.[226] Through the campaign, the government has proposed taking various steps to improve the status of girls including through mass media advocacy messaging and social media, ensuring the enforcement of the PC-PNDT Act, increasing the number of institutional deliveries and registered births, reducing undernourishment among girls under the age of 5, and ensuring universal enrollment of girls in education.[227]

The government has allocated 1 billion rupees (approx. $14.3 million USD) from the national budget to fund BBBP.[228] The campaign was initially launched in 100 select districts and later extended to an additional 61 districts in 2015 and 2016.[229] On March 8, 2018, the campaign was expanded to all 640 districts across the country.[230] The BBBP campaign is organized on the federal level through the Ministry of Women and Child Development, the Ministry of Health & Family Welfare, and the Ministry of Human Resource Development. The campaign is also implemented locally through state-, district-, and village-level task forces and committees.[231]

Socioeconomic Development

Despite the positive impact a legal approach can have, some observers have opposed restrictions on sex-selective abortion out of fear that it would reduce access to abortion in general.[232] Some have attempted to justify their opposition by claiming that bans on sex-selective abortion are too difficult to implement, or that, because they may fall short of being effective on their own, a legal approach should not be fully embraced.[233]

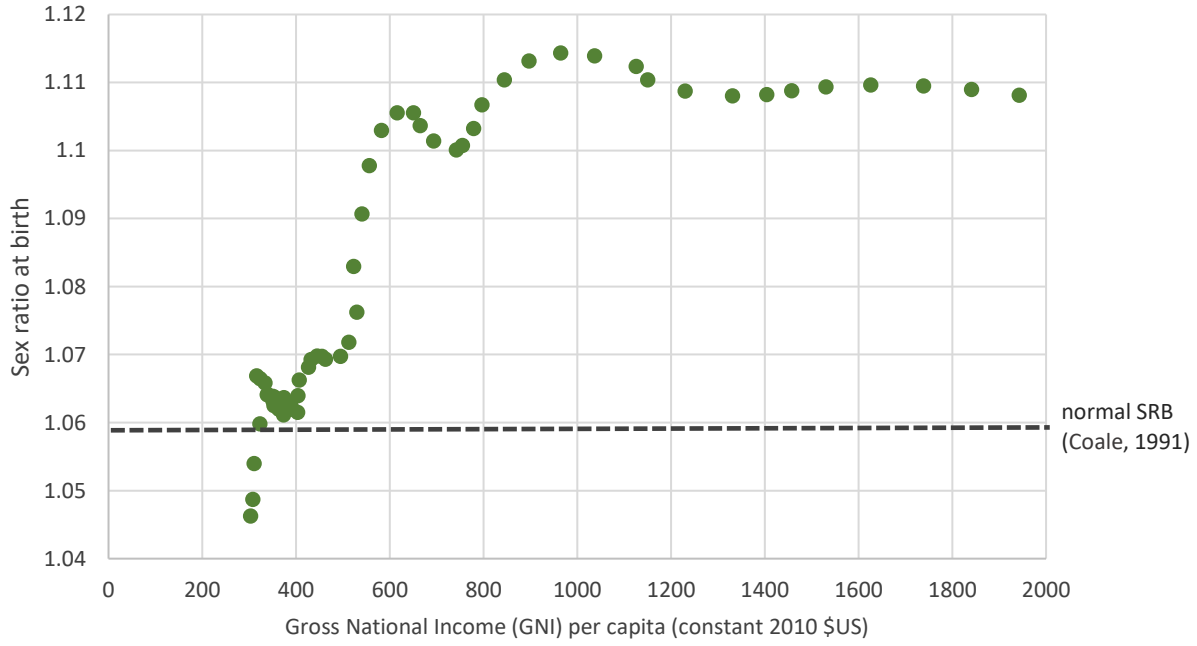
As the example of South Korea appears to indicate, however, enforcement of sex-selective bans is not only possible, but also effective when it is combined with societal transformation. Even though India is a much larger and less tightly regulated country than South Korea, bans in India appear to have had some effect already, and if enforcement is improved, sex ratios will fall accordingly.

Improving socioeconomic development alone does not appear to have meaningfully reversed the high sex ratio at birth in India so far. Figure 5 shows the sex ratio at birth versus India's per capita Gross National Income (GNI) since 1960. As apparent from Figure 5, the sex ratio at birth appears to have risen as GNI per capita has increased, with the sex ratio declining slightly and leveling off when GNI per capita reached approximately $1,000. However, GNI per capita in India surpassed $1,000 in 2005, the same year the sex ratio at birth in India peaked. Rapidly increasing GNI per capita since 2005 has not since reduced the sex ratio in any meaningful way, perhaps an indication that GNI per capita was unlikely to have been one of the factors (or at least the only factor) that caused the sex ratio to decline after 2005.

While the sex ratio at birth may have leveled off over the past decade and a half, the sex ratio at birth still remains very high, hovering slightly below 1.11. In some states, studies have noted that the sex ratio at birth has been higher among upper caste families.[234] Analysis of child sex ratios from the 2001 census have revealed that sex ratios were often higher among educated and affluent groups.[235]

As the Indian economy has grown, couples have increased their aspirations for wealth and consumer goods. Over the past few decades, couples on average have revised down their desired

Figure 5. Per capita GNI and sex ratio at birth in India: 1960-2017.



Source: Sex ratio at birth calculated from estimates for male and female population at age 0: United Nations, Department of Economic and Social Affairs, Population Division (2017). World Population Prospects: The 2017 Revision. GNI per capita from: World Bank, GNI per capita (constant 2010 $US) (NY.GNP.PCAP.KD): World Bank national accounts data, and OECD National Accounts data files. See article for reference for Coale (1991).

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family size, [236] possibly in part due to rising aspirations for wealth and the rising costs of raising children. Lower fertility provides couples fewer opportunities to try for a son. In seeking to attain smaller family size and a particular sex composition among their children, couples often resort to sex-selective abortion to achieve their fertility goals.

As mentioned previously, women with higher levels of education, greater wealth, and urban residency are often more likely to practice sex selection than their counterparts. Thus, trends of increasing urbanization and rising standards of educational attainment that often accompany a rise in socioeconomic development are unlikely in the short term to meaningfully reduce the incidence of sex-selective abortion. As educational attainment, urbanization, and wealth increases in areas where son preference remains strong, the incidence of sex-selective abortion could, conceivably, temporarily rise in the short term. While women in urban areas, with greater wealth, and higher educational attainment may be less likely to display son preference, they are also more likely to give birth to a son. Women with greater wealth, education, and urban residence have easier access to sex-selection technologies and are more readily able to afford services associated with sex-selective abortion.

On the other hand, women from lower socioeconomic strata with less educational attainment and rural residence are more likely to display son preference. As the socioeconomic status of low-income women rises with improving socioeconomic development, the motivation for son preference will be lessened for some women, but for others, rising status will simply make them more able to act on their sex selection preferences.

Indeed, according to one study the sex ratio at birth has a small but statistically significant increase among the emerging middle-class in India,[237] an indication that greater son preference manifested among low-income groups are more likely to be acted upon when a rise in socioeconomic status enables provides them the wherewithal to more readily act on their preferences.

Since son preference is not tied solely to household income but rooted in cultural norms and gender attitudes, the practice of sex selection may rise in the short-term until the effects of rising socioeconomic development help completely transform cultural norms. There is no guarantee that son preference will decrease with improving socioeconomic development, and a full

transformation of cultural norms on their own could take years or even decades. As a result, it is important that active steps be taken to eliminate the practice of sex selection directly and that stakeholders not simply assume that socioeconomic development will solve the problem on its own.

Promoting the Equal Status and Dignity of Women

The practice of sex selection is largely rooted in attitudes and social norms that place the status of men above the status of women. Inequitable gender attitudes and male dominance in family decision-making, in the husband-wife relationship, and in other aspects of family life lend themselves to a belief that males have a more important role to play in family affairs than women do. Men and women who have more inequitable gender attitudes are more likely to have strong preference for sons and are more likely to practice sex selection.

A survey-based study conducted by United Nations Population Fund (UNFPA) found that men and women who have unequal gender attitudes and where the husband demonstrates strong relationship control are significantly more likely to hold views that display a high preference for sons.[238] In fact, in that study, the likelihood of displaying strong son preference was, by far, greater for men and women displaying unequal gender attitudes and relationship control than for any other variable measured in the survey. At the same time, men were significantly less likely to display strong son preference if they customarily engaged in decision-making in conjunction with their spouse or if their spouse generally made the decisions in the family.[239] Men and women were also significantly less likely to display son preference if they had frequently seen other men helping out with household chores.[240] Similarly, both men and women were significantly more likely to display son preference if they witnessed or experienced gender discrimination as a child.[241]

Other studies have found that men are significantly more likely to display son preference if they are promiscuous or think that wife beating is acceptable, and both men and women are significantly more likely to display son preference if they find domestic violence acceptable under certain circumstances.[242]

Addressing unequal gender attitudes is crucial to reducing the incidence of sex-selective abortion in the long-term. Unequal gender attitudes fuel son preference. Son preference in turn provides the motivation for sex selection. Until the motivation for sex selection is removed at its root, men and women will continue to seek the means to select the sex of their child as long as it is feasible for them to do so and so long as the perceived benefits of doing so are not outweighed by the perceived drawbacks. Public awareness campaigns and non-governmental organization activities should seek to promote the equal status and dignity of women and girls.

Some have proposed that increasing female labor participation is one way to reduce gender inequality. Presumably, this would also reduce son preference. Women are more likely to be perceived as an asset in the household if they are wage earners. Attitudes towards women are also likely to improve as a women's role in society increases.

> Attitudes towards women are also likely to improve as women's role in society increases.

However, the relationship between female labor participation and the practice of sex selection may be more complex. Studies have not shown a predictable decline in the sex ratio at birth as female labor participation increases. In one study, higher female labor participation among rural women not earning wages was associated with significantly less son preference when controlling for education, employment, and socioeconomic variables; however, having a job that earns wages (compared to women not employed) was found to be significantly associated with more son preference.[243] Female labor participation also ceased to be a significant factor affecting son preference when controlling for structural and cultural norms.[244] In other studies, female labor participation was actually found to be significantly associated with higher sex ratios at birth.[245]

Women's economic development, however, is not purely a function of labor force participation. As economies transition from low to high development, women's labor participation generally follows a U-curve, decreasing as economic development reduces the need for labor-intensive jobs and increasing again as higher quality jobs become available to women.[246] Thus, it seems necessary to take into account what proportion of working women have quality jobs, since the female labor participation rate in itself may be somewhat misleading.

As the example of South Korea illustrates, during the country's transition away from son preference, women holding higher quality jobs may have had less son preference than lower wage earners. South Korean women holding blue collar jobs in the 1990s and early 2000s were, on the whole, significantly more likely to display son preference than women with no job.[247] Women with white collar jobs, on the other hand, were less likely to express son preference than non-working women during the early '90s; however, the trend was not found to be significant overall.[248] This appears to indicate that women with greater wealth who had the option of staying at home or working a white collar job displayed less son preference while poorer women with blue collar jobs may have had no choice but to work. Thus, for blue collar women, having a son may have been seen as more necessary to provide financial security for the family in the future and because women with less wealth may have believed that, given their own experience, there would be fewer economic opportunities for their daughters. As the Korean economy grew during the 1990s, more economic opportunities became available to women. The concomitant decline in son preference

and the sex ratio at birth, it would seem, was driven in part by increasing economic opportunities for women. If the Korean model can be said to be applicable to other societies, it would seem that as economic development improves, son preference and sex ratio at birth both decline.

However, in India, the scenario is somewhat different. As evident from the previous section of this report, the growth in the sex ratio at birth has slowed as economic development has improved but has not yet declined in a meaningful way. According to one study using data from the NFHS-3 (2005-2006), women with blue collar jobs were slightly less likely to display son preference while women with white collar jobs were slightly more likely to display son preference, though the trend was not significant for either group.[249] More research is needed on how the female labor participation rate and the proportion of women who have quality jobs in India affect the sex ratio at birth.

Discouraging Recourse to Abortion

In order to effect real, immediate, and lasting change in reducing the practice of sex selection, it is necessary that steps also be taken to promote the value of the lives of unborn girls and to actively discourage recourse to abortion.

Sex-selective abortion is not just the result of strongly exhibited son preference, gender inequality, the availability of ultrasound testing, and legal loopholes—as important as all of those factors are. In order for sex-selective abortion to occur, people must also perceive abortion as an acceptable means to achieve their desired family composition. In places where abortion is not legal or socially acceptable, the occurrence of sex-selective abortion is far less likely.

Harmful attitudes devaluing the lives of girls should be addressed. Social attitudes valuing sons, wealth, income, or living standards over the right of girls to live must be changed. All girls have a fundamental and inherent right to be born and to live. Combatting sex-selective abortion must be framed as a human rights issue. Adult women are also affected as well as they are often coerced or forced to abort their daughters by spouses or in-laws. Attitudes that abortion is preferable to

other life- and rights-affirming options such as adoption or foster care must be reversed to give girls a chance at life. As Srinivasan (2011) reports, one woman, who was interviewed by an NGO field worker working to combat female infanticide in Tamil Nadu, related: "If the baby is killed, I will be upset for 2 days," but if the child was given away for adoption, she would ask herself, "Am I a mother? I gave away my offspring."[250]

Programs promoting social change should emphasize positive reasons men and women in India already have for wanting daughters. Public awareness campaigns should also promote the value of girls in general and their right to be born as a fundamental and nonrevocable human right.

A number of interventions used to combat the practice of female infanticide may also be used to combat sex-selective abortion. Infanticide and abortion are not fundamentally different from each other, since both practices involve the elimination of a living daughter. Both practices are generally derived from similar motivations and sets of values, namely finding it acceptable to engage in sex selection by terminating the life of an unwanted daughter.

A study of interventions used in combatting the practice of female infanticide in Tamil Nadu during the late 1990s and early 2000s found that in districts where a variety of interventions were implemented, there was a significant drop in the male-biased sex ratio.[251] Programs introduced as part of the campaign included the Cradle Baby scheme, which set up drop-off points across the state where girl infants could be anonymously left for adoption. The program was also advertised to make people aware of the option to offer their baby up for adoption instead of resorting to infanticide. Srinivasan (2011) estimates that the Cradle Baby scheme could have accounted for as much as a 14 percent reduction in the number of female infanticides in Tamil Nadu.[252]

Other interventions introduced in the state during the period of the study included rigorous enforcement of laws banning the practice and a conditional cash transfer program which provided financial support to families with girls.[253] Programs implemented by nongovernmental organizations also contributed to the campaign's success, interventions that included the formation of special women's groups to advocate against the practice of infanticide and to promote women's financial security.[254] NGOs also provided monetary support for girl children and helped monitor at-risk pregnancies in order to encourage and counsel women to choose life for

their child.[255] Just as steps were taken by local governments in Tamil Nadu to combat the practice of female infanticide, local governments can and should take similar steps to actively discourage recourse to abortion as a means to attain desired fertility.

There are a number of factors that studies have found are associated with women's increased likelihood to resort to abortion in an effort to attain their desired family composition. Women in India are more likely to resort to abortion if they have a higher level of education,[256,257,258] though the relation is not always significant.[259] Recourse to abortion appears to peak for women with secondary levels of education, particularly at third birth, with the trend diminishing slightly for women who have attained postsecondary education.[260,261] However, the sex ratio at birth is significantly higher among women with post-secondary education who are giving birth to their fourth or higher birth order child, as well as for women with less than five years' education at fourth and higher order births.[262]

Families with higher per capita monthly income are more likely to have an abortion than lower income families.[263] Women are more likely to have a repeat abortion if they are not poor.[264] Women are also significantly more likely to undergo a repeat abortion or to abort if they are not members of a Scheduled Caste or Scheduled Tribe.[265,266] Hindu women are also significantly more likely than non-Hindu women to resort to abortion, and abortion is more likely among women who have one or more living daughters or who have had three or more pregnancies in their lifetime.[267,268,269,270]

Public awareness messaging should be aimed towards women with these characteristics as it would make a campaign to reduce the incidence of sex-selective abortion far more effective. Public awareness messaging should focus on demographics where the message is most likely to have an impact on reducing the occurrence of sex-selective abortion.

Public Awareness Messaging

Government, NGO, and faith-based stakeholders should seek to engage in public awareness campaigns to counter cultural norms which provide the motivation for sex selection, including son preference and harmful gender attitudes that undermine women's equality and dignity. Studies appear to show that advocacy through public awareness is likely to be effective in bringing about societal transformation in this area. Women with frequent exposure to media, including cable television, radio, and cinema, are significantly less likely to have a preference for sons.[271,272,273,274]

Groups most likely to exhibit son preference, however, are not always the same groups which are most at risk for engaging in sex-selective abortion, as evident from the findings mentioned above. Thus, messaging should primarily be aimed at groups most likely to practice sex selection rather

than at groups most likely to display strong son preference. Awareness messaging should emphasize messages most likely to resonate with at-risk groups.

Couples that resort to sex-selective abortion often do so on a reasoned cost-benefits basis or on the basis or on the basis of fear rather than on a principled or an emotional desire for a child of a particular sex.[275] Sons are seen as net gain for household income and the couples' long-term financial security, while daughters are often perceived as a net financial loss. Sons also give many couples the reassurance that they will be cared for in old age and ritually cared for after death. Many couples refrain from having daughters due to concerns about their security and family honor. Some women also feel compelled to bear a son due to pressure from family members or spouses and many may practice sex-selection out of fear of mistreatment or abandonment.

Consequently, culturally sensitive messaging that deals with these objections and that promotes the rational benefits of having girls will likely be the most effective. Messaging that incorporates and reinforces the common reasons men and women in India already cite for wanting daughters is most likely to be readily and widely accepted. By playing into positive cultural attitudes towards girls accepted by most couples, messaging will resonate more and will less likely be perceived as foreign or hostile. Studies have shown that men and women report a number of different reasons for wanting a daughter, including emotional support, carrying out certain Hindu rituals such as kanyadan, raksha bandhan, and ancestor worship, providing help around the house or providing help with the family business, providing care for parents when sick or old, and for improving their parent's social status.[276,277] At the same time, however, public awareness messaging should not only seek to reinforce cultural-based reasons why Indian couples desire daughters, but should also advocate for the equal status of girls and their equal potential to contribute to their families.

Public awareness messaging that informs certain groups about India's laws protecting women's equality may have some effect in reducing the incidence of sex-selective abortion. Studies have shown that women who know that sex selection is illegal are significantly less likely to display strong son preference.[278] On the other hand, men who had knowledge of the PC-PNDT Act were significantly more likely to display son preference, but were significantly less likely to display son preference if they knew that Indian law grants daughters rights to inheritance.[279]

While access to media is associated with less son preference, media access may not on its own account significantly reduce the practice of sex-selective abortion *per se*. Two studies have shown that media access is associated with a slight decrease in the likelihood of giving birth to a male child, but in both cases the trend was not found to be statistically significant.[280,281] One study analyzing data from the NFHS-2 survey (1998-1999) found that the sex ratio at birth among mothers with high exposure to media was significantly higher than mothers with little media exposure.[282] At the same time, that same study found that the ideal sex ratio for mothers with low media exposure was much higher than mothers with high levels of media exposure.[283] Research has also shown that women with media exposure are significantly more likely to have terminated a wanted pregnancy, a variable in one study assumed to autocorrelate with the incidence of sex-selective abortion.[284] It appears that the differential effect media access may have on son preference and the sex ratio at birth may result from the fact that frequent media access is an indicator of wealth and perhaps urban residence. Consequently, public awareness messaging through media should take into account that its audience tends to be groups at higher risk for practicing sex-selective abortion.

Conditional Cash Transfer Schemes

Over the past two decades, several social welfare and conditional cash transfer (CCT) schemes have been implemented by state governments and the Union Government to promote the birth and well-being of girls.

CCT schemes have varied greatly from state to state, but essentially these programs provide low income parents of girls with cash payments upon the completion of certain milestones such as birth, completion of immunization schedules, enrollment in or completion of primary or secondary school, or are disbursed after having reached the age of 18 unmarried. In theory, CCT schemes are designed with the intended effect of incentivizing parents of girls to have daughters and to promote their education and well-being through the early years of life. While state governments and

the Union Government have long implemented a variety of CCT schemes, very little research exists to assess whether these programs have been effective, and if effective, to what extent. Currently, almost no research exists on what particular interventions or benefits offered by these programs have been effective and which have not been. CCT schemes have varied greatly, not only in terms of program design, but also in terms of the number of beneficiaries enrolled and the amount of funding and support these programs have received from the government. Some programs have also varied in their implementation over time as some state governments have greatly increased funding for these programs in some cases and at other times have greatly cut back funding or have discontinued programs altogether. Thus, it is not possible to extrapolate from any one study on a particular CCT program to the overall efficacy of CCT schemes in general.

The few studies assessing the effectiveness of CCT schemes that are available appear to show that some of these programs have been at least partially and moderately successful. A survey conducted by UNFPA across five states in India found that the Dhanalakshmi scheme—a CCT scheme for girls implemented by the government of India between 2008-2014—appeared to help shape positive attitudes towards raising daughters among program beneficiaries.[285] Program beneficiaries surveyed in the study were matched with non-beneficiaries possessing similar socioeconomic characteristics and levels of education to account for confounding variables.

The study found that beneficiaries who took part in the Dhanalakshmi scheme were significantly more likely than non-beneficiaries to have gender equitable attitudes towards girls, including being more likely to hold that daughters should have inheritance rights and access to education equal to that of sons.[286]

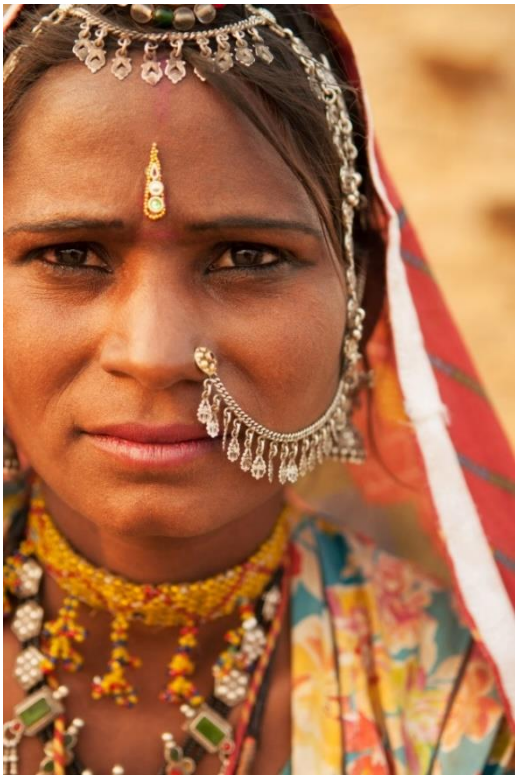
Another study on the CCT program Apni Beti Apna Dhan (Our Daughter Our Wealth) in Haryana found that, from 1994 to 2006, women deemed to be eligible beneficiaries under the program were significantly more likely to have a lower sex ratio among their living children.[287] Eligible beneficiaries were also more likely to have a higher proportion of their ideal number of children be girls, though the trend was not significant.[288]

A study of India's Janani Suraksha Yojana program—a national CCT scheme to reduce neonatal and maternal mortality by encouraging low-income women to give birth in a health facility—found that beneficiaries of the program were significantly more likely to give birth in a health facility.[289] Program beneficiaries also experienced significantly fewer perinatal deaths.[290] These results serve as an indication that CCT schemes which target specific fertility-related outcomes can achieve their objectives when properly implemented.

While other programs have shown mixed results, studies have shown sufficient evidence that CCT schemes can at least be moderately successful in reducing both the incidence of sex selection and inequitable attitudes towards girls. When implemented properly, when sufficiently funded, when made available to a substantial proportion of the eligible population, and when paired with other effective interventions (including enforcement of sex selection bans and promotion of public

advocacy messaging promoting the life, dignity, and equality of women and girls), CCT programs can be effective in reducing the incidence of sex-selective abortion. More research is needed to assess which benefits and programs are successful and which interventions are less effective.

CCT programs may be more likely to succeed if they are adequately funded, consistently sustained over a long period of time, are available to a large subset of the population, have high awareness among the target population, and provide payouts that amount to real money for program beneficiaries (i.e., they provide sufficient incentive for couples to participate). CCT programs have sometimes been criticized for providing tangible benefits to low-income families as the payouts tend to be rather small.[291] For middle class families, other incentives may be more beneficial such as tax breaks for parents of daughters or access to preferred interest rate loans for small business enterprise for qualifying daughters upon completion of schooling.



As part of the Beti Bachao, Beti Padhao campaign, the Government of India has also introduced a special savings program for daughters called Sukanya Samriddhi Yojana (SSY). Under the program, parents of daughters are eligible to open a savings account in their daughter's name until she reaches age 10. Funds deposited into SSY accounts reach maturity 21 years after the account is opened or may be closed upon marriage if the account holder is over 18 years of age. Up to 50% of the account may also be withdrawn after 18 years of age to help pay for the account holder's education.

Funds deposited into SSY accounts are eligible for special interest rates. In the first quarter of 2019, SSY accounts had an interest rate of 8.5%.[292] Funds deposited into SSY accounts are also tax deductible, and interest accrued and withdrawals from the account are tax exempt.[293] The SSY program appears promising and time will tell how successful it will be in encouraging the birth and well-being of daughters.

The Need to End India's Population Control Policies

The population control policies that various Indian states continue to enforce also encourage the practice of sex-selective abortion.

Six states in India currently have in place two-child policies that prohibit civil servants from having more than two children. As studies have shown, these two-child policies have caused a statistically significant male-biased distortion in the sex ratio at birth in states where they are in place.[294] It appears that many couples, in an effort to protect future career prospects of contesting in panchayat elections, may abort unborn girls in order to keep their government-imposed quota open for a son.

As recently as 2010, some conditional cash transfer schemes implemented by state governments to encourage the birth and development of girls required one of the parents to be sterilized as a condition for qualifying for the program.[295] Although some programs have since done away with this requirement, others, like the Government of Andhra Pradesh's Girl Child Protection Scheme, still require a parent to submit in their application to the program a sterilization certificate issued by a medical officer before qualifying to receive social welfare payments. Proof of sterilization is not restricted to girl protection schemes, either, as the Government of India Ministry of Health and Family Welfare's Prerna scheme requires one of the two parents to be sterilized after their second child in order to qualify for program benefits. Such requirements that a spouse be sterilized prior to receiving girl-child subsidies risks counteracting the efficacy of these programs, since couples may be less inclined to participate until they have attained their desired number of sons.

It has long been a popular belief in India that the country is overpopulated. Over-congested cities, poor land management, and widespread poverty have led many citizens in India to believe that much of the country's problems are due to the size of its population. As a result, since the mid-twentieth century, the government of India has persisted in promoting aggressive population control messaging emphasizing birth control and a two-child norm. Through the years, the government has promoted smaller families with slogans such as "wait after one and none after two"[296] on the unproven premise that having fewer children directly translates to having happier, wealthier families.

In response, couples have down-revised their desired fertility, which in turn has narrowed the window to 'try' for a son and has fueled the practice of sex-selective abortion. Although India as a whole is projected to fall below replacement fertility by 2025,[297] the government of India, even today, continues to rigorously advocate for fertility reduction.[298]

CONCLUSION

The widespread practice of sex-selective abortion in India has led to the tragic loss of millions of women and girls. In order for India to reverse this trend, it will be necessary that the strong and laudable restrictions on sex-selective abortion that are already in place be effectively enforced. It will also be necessary that this be paired with effective cultural transformation that recognizes the equal dignity and value of women as well as the dignity and the right to life of every unborn child, regardless of the child's sex, disability status, or any perceived socioeconomic burden that such a child would place on the family. Public awareness messaging must not only target son preference and inequitable gender attitudes but must also seek to target groups most at risk for sex selection and must seek to eliminate the practice of sex-selective abortion directly.

The government of India and international development stakeholders working in cooperation with the government can help improve the situation by promoting the equal dignity of women in society through public awareness campaigns and social welfare programming. The government of India must also rigorously enforce its laws prohibiting prenatal sex determination in order to reduce the practice of sex-selective abortion. While continued robust economic development is important for India, development will not eliminate the practice of sex-selective abortion unless it is paired with behavior change —or at least it will not do so on its own for a long time, during the span of which millions more girls will be lost. Indian states should abandon alarmist population control policies, particularly coercive two-child policies and eligibility requirements for social welfare schemes that require one of the spouses to be sterilized, as these only exacerbate the problem further.

Most importantly, however, adequate safeguards to protect the lives of women and girls in India will not be possible until abortion is abolished, and the dignity and value of every human life is respected through all life stages. Sex-selective or not, the practice of abortion robs girls of the right to live.

ENDNOTES

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