INTENSIFYING MASCULINITY OF SEX RATIOS IN INDIA: NEW EVIDENCE 1981-1991

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ABSTRACT

We use data from the 1981 and 1991 censuses of India to examine (a) sex ratios among infants aged under 2, (b) child mortality (q5) by sex, and (c) estimated period sex ratios at birth (SRB) calculated by reverse survival methods, to see whether bias against female children persists during development and fertility decline, and whether techniques of prenatal sex determination and abortion of female foetuses are spreading in India as elsewhere in Asia.

In 1981, rural and urban infancy sex ratios and estimated SRB for most states appear within the 'normal' range (104-106 males/100 females). However, urban Punjab, Haryana, Chandigarh and Jammu and Kashmir in the North / North-West zone appear masculine (108 or more). In 1991 however, these North / North-Western urban areas show starkly masculine SRB's, as do the corresponding rural areas, Delhi, UP, and urban Gujarat, Bihar, Rajasthan, MP, Maharashtra, Assam and Arunachal Pradesh. Values reach as high as 118 for urban Punjab.

The sex ratios of child mortality indicate that despite mortality declines, many regions that showed female disadvantage in 1981 continued to do so in 1991, and some areas worsened. Some Southern regions that showed 'normal' mortality sex ratios in 1981 now have ratios adverse to females in 1991.

This increase in masculinity of period SRB's indicates that the preference for male children in India is unchanged by fertility and mortality decline and socio-economic development. Since the increased masculinity is more in urban areas, which have higher literacy rates and better coverage of vital registration and health services, it suggests that the trend is due to the spread of prenatal sex determination and selective abortion of female foetuses rather than female under-registration or infanticide. The trend coexists with the excess female child mortality and female infanticide persisting in many parts of the country, for which we summarize evidence. In the aggregate, parents in India thus do not appear to be substituting prenatal for post-natal sex selection techniques,

Introduction

Highlighted by sensational titles such as "The endangered sex" (Miller, 1981) or "More than 100 million women are missing" (Sen, 1992), studies have long drawn attention to the unfavourable life chances of females versus males in various parts of East and South Asia. This female disadvantage is particularly concentrated in infancy and childhood years, and is rooted in long-standing social patterns of preference for male children. Practices regulating the numbers of female children in a family included female infanticide, abandonment or out-adoption of girls, under-reporting of female births, and selective neglect of girl children leading to higher death rates among them. Lately in China and South Korea, pre-natal sex determination techniques and selective abortion of female foetuses are increasingly implicated (Asia-pacific Population Report, 1995; Johansen and Nygren, 1991; Park and Cho, 1995; Zeng Yi et al, 1993).

When fertility declines and preference for male children remains strong, parents still take steps to ensure the birth and survival of sons,

and prenatal sex determination and selective abortion of females are apparently preferable to female infanticide or abandonment of baby girls. Pre-natal sex selection techniques appear to substitute for post-natal methods in these regions, as shown by increasing masculinity of sex ratios at birth, coupled with more equitable sex ratios of infant and child mortality (Goodkind, 1996). That is, fewer girls are allowed to be born, but those who are born are more wanted and tend to survive.

These issues are also significant in South Asia, which shares with East Asia a long-standing tradition of son-preference. In India, the issue has mostly been examined in terms of the masculinity of the observed population sex ratios, which however are sensitive to sex-specific migration patterns of adults (Kundu and Sahu, 1991; Rajan, Mishra and Navaneetham, 1991, 1992; Raju and Premi, 1992; Srinivasan, 1997; Visaria 1969). However, the persistent preference for male children and disfavour against females, leading to excess female mortality particularly at young ages, has also been discussed as a key factor (Agnihotri, 1996; Kishor 1993; Miller 1981). In India, juvenile sex ratios, (ages 0 to 4 or 0 to 9), largely shaped by child mortality sex differentials, indicate anomalous masculinity. That is, counter to the global norm of sex ratios at young ages being moderately masculine and mortality sex differentials favouring females, in many parts of India, juvenile sex ratios are highly masculine and female infants and children have higher death rates than males, a phenomenon termed ‘excess female child mortality’.

An important dimension of inquiry into changes in the relative pattern of birth and survival of male versus female children in India has been comparatively neglected, mainly due to lack of data: Indian authorities do not routinely publish data on sex ratios among births reported in the Census or Sample Registration System enumeration years. A few regional studies suggest that cohort sex ratios at birth are

anomalously masculine in some parts of the country, particularly in the North (Clark and Shreeniwas, 1995 for Gujarat; Mason et al, 1992 for Karnataka; Rajan, 1996; and Visaria and Rajan, 1996 for Kerala). Therefore, it is not clear whether parents in India as in East Asia are substituting pre-natal for post-natal discrimination against girl children, or whether bias against females is lessening over time. One all-India study has examined changes in juvenile sex ratios (ages 0-4) between 1981 - 1991, alongside trends in mortality sex ratios and fertility rates, and concluded that during fertility decline in India, parents are not substituting prenatal for post-natal discrimination against girls, but are adding these two strategies. Male bias thus appears to be intensifying (Das Gupta and Bhat, 1997).

Our study further explores this issue, with more disaggregated and age-focused data. Using the 1981 and 1991 censuses of India, we present ratios among numbers of boys and girls aged 0 and 1 (taken together to minimize the effect of age-misreporting). Next, using an unorthodox application of the technique of 'reverse survival' we estimate sex ratios at birth for these two census years. We also present sex ratios of child mortality (q5) from the censuses for these two time points. We examine variations by rural/urban residence and state/region, drawing attention to the specific sub-regions of India where changes are taking place over the decade. We summarize what is currently known about the incidence of female infanticide and prenatal sex selection in India. We place the evidence within the context of social and economic development in India, especially relating to the situation of women.

Global patterns in SRB's

Sex ratios at birth (henceforward SRB's), refer to the ratio of male to female children, born in a specific period such as a year, or among all the children ever born to cohorts of women. In most human

populations, more boys than girls are conceived, and despite greater male than female foetal wastage, more boys than girls are born. This leads to a fairly stable SRB observed among human populations in countries with good vital registration, of approximately 104 to 106 boys per 100 girls (Johansen and Nygren, 1991). Subsequently, mortality rates at every age are slightly greater for boys than for girls due to a combination of biological and behavioural factors. Thus, with increasing age the population sex ratio balances out, to a slight female dominance overall. Most societies irrespective of level of income or development exhibit this pattern.

In societies that have marked preference for male children however, a different pattern is seen. In South Asia, population sex ratios are persistently male dominant. In East Asia, SRB's appear highly masculine especially in recent years. This trend clearly cannot be attributed to migration. In South Korea and China respectively, both of which have good coverage of vital registration, SRB's as high as 112 and 113 males per 100 females have been observed among all births. First order births are within the normal range (approximately 104-105 in each society). Second and higher order births however soar up to 120 and more for China, and third and higher order births to 185 and more for South Korea (Asia-Pacific Population and Policy Report No. 34, 1995). Clearly therefore, biological patterns of SRB's are in these regions being overwhelmed by behavioural factors rooted in parents' preference for at least one male child (Coale and Banister 1990; Johansen and Nygren 1991; Hull 1990). These skewed sex ratios at birth combined with masculine sex specific survival rates have generated the problem of millions of "missing" females in East and South Asia (Coale 1991; Sen 1992).

Several mechanisms are advanced to explain the phenomenon of excessively masculine SRB's. In China, mechanisms include non-reporting of female births (leading to omission of girl children in any and all subsequent official records, and is tantamount to denying their social existence), abandonment and/or out-adoption of girls, and female infanticide (Hull 1990; Johansen and Nygren 1991). All these mechanisms can be viewed as varying types of discrimination against female children. Lately, in China and South Korea where there is a combination of lowered fertility, continued strong son preference, and widespread access to medical facilities, the increased use of prenatal sex determination techniques leading to abortion of female foetuses is implicated as underlying the phenomenally masculine higher birth order sex ratios observed there (Asia-Pacific Population and Policy Report No. 34, 1995; Park and Cho, 1995; Zeng Yi et al, 1993).

Regional trends in juvenile sex ratios in India

In India, analyses focus on juvenile sex ratios rather than sex ratios at birth. This is firstly due to concern with excess female child mortality, which arises from the selective neglect of girl children compared to boys, manifest in childhood years rather than around the time of birth (Das Gupta, 1987; Dyson, 1988). Second, data on period sex ratios at birth are difficult to get in India. The Census of India does not publish this statistic. Such data are only occasionally published by the Sample Registration System (SRS) of certain states, and thus nation-wide analyses are ruled out. Vital statistics registration is of varying quality and completeness in different parts of the country, as are hospital records. Thus all-India or time-trend investigations of period SRB's are difficult, though some intra-state analyses are emerging (Visaria and Rajan, 1996, for Kerala). For the present analysis too, special

arrangements had to be made with the office of the Registrar General of India to get the necessary data.

Extensive national and regional analyses of juvenile sex ratios in India, on the whole indicate that more masculine juvenile sex ratios and higher female than male child mortality go hand in hand (Agnihotri, 1996; Das Gupta, 1987; Das Gupta and Bhat, 1997; Clark and Shreeniwas 1995; Kishor 1993). That is, higher juvenile sex ratios at ages 0 - 4 are accompanied by higher female than male child mortality at ages 5 - 9. A well-known regional pattern is observed: the Northern and North-Western parts of India, including the states of Punjab, Haryana, Rajasthan, Western UP, etc., are the areas most unfavourable to the life chances of female children. Other areas of the country, including the East, Central area and the South, exhibit more balanced rates.

A broad generalization has been made: the Northern/North-Western regions of India fall within the so-called Northern cultural and demographic zone, characterized by higher fertility, higher mortality, more masculine sex ratios, and lower status of women. The Northern zone traditionally had a wheat-based agrarian economy (where women are less involved), and social systems marked by dowry, exogamous marriage and the seclusion of women. In contrast, the South is broadly characterized by rice-based agrarian systems (with a much greater role for women), endogamous marriage systems, marriage payments that are more egalitarian between bride's and groom's families, and less seclusion of women. Women's literacy and education levels are also much higher in the South than the North. The status of women is higher in the South, which also has lower fertility and mortality rates, and more "normal" sex ratios (Dyson and Moore, 1983).

Other scholars stress that the simplistic dichotomization of India into "Northern" vs. "Southern" zones is inadequate. The rice-cultivating

Eastern regions could never be fitted into either pattern. Within-region variations have been ignored in this dichotomization, such as the "belt of female infanticide" in the Salem / Dharmapuri / Madurai districts of Tamil Nadu noted by Chunkath and Athreya (1997). Alternative spatial patterns ranging from 5 to 19 clusters of India's districts have been proposed, taking into account ecological and economic sub-regions, areas with greater proportions of Scheduled Caste / Scheduled Tribe populations (who are characterized by more gender-egalitarian cultures), and other criteria. In these alternative groupings too, however, juvenile sex ratios appear most masculine in the Northern/North-Western region of India: a so-called 'Bermuda Triangle' for the female child exists in a zone of 24 districts including parts of Haryana, Western Uttar Pradesh, some of Rajasthan, and the ravine areas of Madhya Pradesh (Agnihotri, 1996).

Female demographic disadvantage in the context of development

Globally, it should be pointed out that gender-imbalanced demographic measures are by no means simply associated with poverty or "under-development", such that poorer nations have more female disadvantage. African, Latin American and Caribbean nations, all with varying levels of poverty and living standards, exhibit 'normal' sex ratios at birth and of mortality. Any gender inequalities these countries may have is apparently manifested in other domains. On the other hand, countries such as China, South Korea and India which have a socio-cultural pattern of preference for male children, irrespective of level of development and type of economic organization, exhibit gender imbalances in demographic measures that persist over time In India, too, the relationship between social and economic development and female disadvantage is not clear-cut. On the broadest level of generalization, the process of development in India has been mostly to

women's detriment. The 1974 Report of the Committee of the Status of Women in India (GOI, 1974) was the first to point out that despite the progressive promises and provisions of the Indian constitution, development since Independence was accompanied by a deterioration in women's situation, indicated by worsening sex ratios, declining female work participation rates, and persistent shortfalls in literacy and female mortality.

The trend since then has not been positive either. The majority of Indian women are involved in the agricultural sector, and have been adversely affected by agrarian development. First, while land reforms focused on redistributing land to the landless, in practice ownership was invested in the household head, always seen as the senior male. Women's alienation from the most critical productive resource has thus been progressively institutionalized. Women's use rights in land, where they exist, are exercised during the goodwill of the male kin who have effective control over the land (Agarwal, 1994).

Second, though the Green Revolution dramatically increased food production and allayed fears of population growth outstripping food supply in India, it adversely affected women's work participation. Evidence from Punjab, Haryana, UP, and Tamil Nadu, shows that the Green Revolution narrowed the range of agrarian tasks, displaced women from traditional occupations, and placed them at the bottom of the new labour hierarchies. Women's occupations became increasingly impermanent and casualized due to technological changes coupled with traditional norms about the gender-based division of labour (Sen, 1982; Kapadia, 1992; Nayyar, 1989; Nigam, 1988). Though the initial impact of Green Revolution technology was to increase the demand for labour to fertilize, weed, and harvest the new High Yielding Varieties (HYV's), this trend was short-lived, and did not much involve women.

For example, in Gujarat, farmers utilizing HYV technology preferred male to female labour since they felt that men were more efficient, more suited to the 'high-technology' innovations, could work for longer hours at a stretch, and could fulfill demands for group labour. Though women received lower wages than men even for the same work, they had no training for even the simplest new tasks such as spraying, and were thus excluded (Hirway, 1979). In Bihar as in Gujarat, female work participation was substantially lower in irrigated districts, and the rise of mechanized dehusking and flour-making industries deprived women of significant work they had hitherto performed (Hirway, 1979; Sinha, 1988). Varghese (1991) states that rural Indian women's paid work participation is declining, and they are highly concentrated (approximately 80% of female workers) in the agricultural labour and unpaid family worker sectors. The increased casualization of female labour is accompanied by consistently greater unemployment rates among women than men. He thus concludes that the 'female marginalization thesis' is supported in the Indian agrarian context.

Non-farm opportunities have not kept pace with the displacement of rural women. Though Deshpande (1993) shows that many urban women workers are absorbed into new occupations such as in export processing zones, and argues that despite low wages and poor working conditions they contribute up to 1/3 of household income, pull their families above the poverty line, and thus gain a measure of respect and autonomy, Ramaswamy (1993) argues that the vast numbers of women (94% of the total female workforce) in the unorganized occupational sector indicates the failure of the Indian planning process with respect to women. The organized sector, depending on newly emerging technologies, offers little to the many women displaced from rural or sunset industries. There are opportunities only for the few who are educated and skilled. Though female literacy is rising, parents in

much of India do not encourage their daughters to attend more than a few years of school, since education is seen as an unprofitable investment in girls who will marry and move to their husbands' households. Much of the impetus for girls' education comes from the increasing demand for literate brides on the part of young educated men. Women thus cannot compete for the new opportunities in significant numbers. Moreover, the masculine bias of the organized sector tends toward decreased security of even those women involved, as trade unions in India have usually downplayed the needs of women workers, who have had to set up parallel organizations as a result. Ramaswamy concludes that in India, "developmental processes have only pushed women to states of survival" (1993: p 323).

But development has marginalized women in other developing nations too, which nonetheless continue to exhibit gender-balanced demographic measures. The fact that economic development devalues women is alone not sufficient to make families discriminate against daughters. It is pointed out that both economic and cultural factors are jointly responsible for the variations in the status of women, and consequent sex differentials in the birth, wantedness, care and survival of male and female children (Kishor, 1993). Socio-cultural trends in India do place women at an increased disadvantage. Scholars note the spread of dowry nationwide to communities and castes where it had never been the custom. Insufficient research attention has been paid to analyzing the reasons for this phenomenon. The bulk of sociological research in India on the topic of kinship is abstract and descriptive in nature, viewing women as objects of study and exchange, and not problematizing the underlying causal and consequential gender relations (Agarwal, 1994; Ramaswamy, 1993).

Some attribute the spread of dowry to the process of

'Sanskritization', whereby lower castes achieve upward class and caste mobility by emulating the customs of the upper castes, particularly dowry and female seclusion. Others attribute the changes to the young age structure of the country, such that there is a greater ratio of young marriageable girls to potential mates in the higher age group; this increases the 'price' of the grooms (Rao, 1993). The rise of consumerism is also implicated, drawing people into a growing web of expectations and demands. The continued importance of kin networks for economic resource mobilization, the spread of the dowry custom, the growing amounts of dowry changing hands, and the increasing importance of land acquisition strategies for family class enhancement, has led to the concentration of wealth in families where the ratio of male children is greater, and female children are increasingly seen as liabilities (Clark, 1987; Heyer, 1992).

The relation between such economic and socio-cultural patterns and female mortality disadvantage has been investigated with all-India level and smaller-scale, localized analyses. All-India studies indicate that districts with higher indicators of conventional development, such as urbanization, industrial production, and agricultural productivity had significantly lower female vs. male survivorship, while girls in areas with a greater concentration of Scheduled Caste/Scheduled Tribe populations (who are said to have more gender-egalitarian norms than the Indian mainstream), endogamous marriage patterns, and greater female empowerment measured by women's labour force participation and education, fared better (Agnihotri, 1996; Kishor, 1993; Murthy et al 1996). These studies thus identify a constellation of economic and socio-cultural factors jointly affecting female disadvantage, improving on earlier and simpler models of female agrarian labour force participation alone (Bardhan, 1974).

The findings of smaller-scale studies however do not lend themselves to such consistent generalizations. The role of women's education in ameliorating female child mortality disadvantage might seem self-evident, and the district-level studies cited above support the notion. However, smaller-scale studies in rural Punjab and Gujarat indicate that mothers with some education might be more efficient in discriminating against their daughters, particularly in asset-poor households. Schooling may make women more aware of health, hygiene and nutrition, but education alone is not enough to transcend the nexus of conditions that leads families to consider daughters a liability. Education often domesticates women rather than liberates them (Das Gupta, 1987; Clark and Shreeniwas, 1995).

Regarding the role of economic assets, studies in rural Tamil Nadu suggest that female child mortality disadvantage is greater among the landed and upper-caste groups, where women also are more secluded and have lower rates of work participation (Harriss-White, forthcoming; Heyer, 1992). In rural Gujarat, however, lower caste and landless groups are the ones where daughters appear in greater jeopardy (Clark and Shreeniwas, 1995). While the specific castes involved depend on local conditions, the common factor is the family's effort to acquire land or other economic advantages through mobilizing kinship networks and manipulating the marriage of their sons and daughters. In a patrilineal kinship system where marriages are arranged on principles of dowry and hypergamy, and where women are objects of exchange along with other forms of wealth, excess female mortality is argued to be an inevitable outcome (Clark, 1987).

Contradictions notwithstanding, a pattern is discernible where increasing economic marginalization and social devaluation make daughters increasingly come to be seen as liabilities. Families therefore

respond by discouraging the birth and survival of female children. Numerous studies document widespread gender inequality within households in the allocation of food and health care; women and girl children have last priority. This directly heightens female mortality (reviews in Agarwal, 1994; Kishor, 1995). While selective neglect of daughters has been more extensively researched in the Indian context, the related issues of female infanticide and foeticide have been less examined, for reasons obviously connected with the sensitivity of the issues. The main findings not surprisingly come from the documentation efforts of women's groups and NGO's active in these fields rather than from academic writings.

Female infanticide in India

Infanticide is an age-old practice among human populations, to regulate the numbers of children and eliminate the less wanted offspring. The practice of "exposing" girls or weak or deformed babies was noted in ancient Roman and Greek society in the West (Scrimshaw, 1984). Little is known about female infanticide in India prior to the advent of British observers (Miller, 1987). However, since then, female infanticide has been widely recorded among upper caste (especially Rajput) groups in Northern and North-Western India.

Historically, the main reasons for this practice in India included the system of hypergamy, whereby women must marry into a social group above their own. Among the uppermost castes, this was impossible. Equally unthinkable were notions that the rules of hypergamy could be transgressed or that girls could remain unmarried, thus girls in these groups were killed, and boys married females from sub-castes slightly lower than their own. Nineteenth century records indicate large groups of villages in Rajasthan and Gujarat, comprising several hundred upper caste households, where no female child had been allowed to survive

for many generations (Vishwanath, 1996). In that era female infanticide was also part of a set of household strategies among these same land-owning upper-caste groups, to acquire further holdings and improve and consolidate their household socio-economic status. This was achieved through manipulating the marriage of sons and acquiring dowry from daughters-in-law; daughters clearly, as dowry-takers, were a liability in this scheme of things (Clark, 1983).

Similar reasons are suggested to explain the resurgence of female infanticide in modern India. Female infanticide has been recently noted among some castes in remote village clusters in rural South India, in Tamil Nadu state, a region where this practice was historically unknown. Increasing landlessness and poverty, accompanied by an escalating custom of dowry, high gender differentials in wages, low education among women and few economic opportunities for them are suggested reasons for the rise of female infanticide here (George et al, 1992; Chunkath and Athreya, 1997).

In rural North India, the practice apparently never died out. Jeffery et al (1984) state that up to the 1900's, female infanticide was practiced among Rajput castes in Bijnor, UP state. Their study in the 1980's in villages around Bijnor town then noted that part of a traditional birth attendant's duties continued to be disposal of unwanted (i.e. girl) children at birth. They also report that the practice is spreading across the social spectrum to caste groups among whom it had never been practiced.

A 1995 investigation by Adithi, an NGO working in rural Bihar state, revealed that female infanticide, foeticide, and excess female child mortality due to selective neglect were widespread in the 8 districts studied. Infanticide was carried out by 'dais' (traditional birth attendants), who were coerced by the senior male kin of the woman giving birth, over-riding the protests of the women in the family. Fear of reprisals,

poverty, and lack of alternative occupation led the 'dais' to comply. Other medical practitioners such as compounders and doctors also carried out infanticide when approached by the family members of a newly born girl child. There was no difficulty in committing infanticide, because the birth and death followed quickly upon each other, with no certificate recorded for either event. Abortion of female foetuses was also conducted by unscrupulous medical practitioners, especially after techniques like sonography became widespread. The report also describes how the traditional skill of 'dais' in identifying the sex of a foetus in the 7th or 8th month of pregnancy is used to avert the birth of a daughter. Estimating a count of 68,000 'dais' in 7 contiguous and culturally similar districts of Bihar, and that each 'dai' killed about 2 infants a month (according to the interviews), Adithi estimates that the number of female infanticides each year in these districts could total as many as 16,32,000.

The Adithi report also noted that earlier, only upper castes such as Rajputs and Brahmins practiced female infanticide, but it had now spread to all other groups, including Scheduled Tribes, Christians and Muslims. The main reasons indicated were the spread of dowry with exorbitant demands; due to marginalization of women from traditional occupations and the concentration of income in the hands of men, with the consequence that women's seclusion and dependence on men increased and men began to assert their right to emulate upper caste customs including female infanticide. Violence against women is growing, within and outside the home. Bihar has extremely low female literacy: 23.1% (Adithi, 1995).

Prenatal sex determination and sex selective abortion in India

Abortion was legalized in India in 1971, after a 1965 UN mission to India recommended this step to strengthen the population policy, and the Shantilal Shah Committee Report of 1966 also advocated

it to reduce the numbers of illegal and unsafe abortions that were prevalent. Although the stated reasons for passing the Medical Termination of Pregnancy (M.T.P.) Act were humanitarian (to 'help' victims of sexual assault), health-related (to provide an alternative to those whose contraceptive measures failed) and eugenic (to reduce the numbers of 'abnormal' children born), there was a strong population control motivation underlying the passage of the Act (Menon, 1996).

In 1975, amniocentesis techniques for detecting foetal abnormalities began to be developed in India, at the All India Institute of Medical Sciences, New Delhi. It was soon known that these tests could detect the sex of the foetus also, and doctors at the Institute noted that most of the 11,000 couples who volunteered for the test wanted to know the sex of the child and were not interested in the possibility of genetic abnormalities. Most women who already had two or more daughters and who learnt that their expected child was female, went on to have an abortion (Chhachhi and Sathyamala, 1982).

Between 1977 and 1985, in an effort to curb this misuse of the technique, three circulars were sent to Central and State government departments making the use of prenatal sex determination for the purpose of abortion a penal offense (Kulkarni, 1986). A campaign against prenatal sex determination and female foeticide (termed "femicide") was also launched by women's groups, civil liberties groups and health movements. In 1984, a broad-based coalition, the "Forum Against Sex Determination and Sex Pre-selection" (FASDSP) was formed, headquartered in Bombay, that monitors all aspects of the situation, documents the spread of the technique, its growing use, and legal and policy steps taken against it. As a result of these efforts, the state government of Maharashtra passed the Maharashtra Regulation of the Use of Prenatal Diagnostic Techniques Act in 1988. The states of Punjab,

Gujarat, and Haryana followed suit and the Central Government passed the Prenatal Diagnostic Technique (Regulation and Prevention of Misuse) Act in 1994. The Act states that determining and communicating the sex of a foetus is illegal; that genetic tests can be carried out only in registered facilities; and only offered to those women who meet certain medical criteria, such as being over age 35, having a family history of genetic disorders, etc.

However, these acts are full of loopholes. Most of the restrictions pertain to government facilities. Private laboratories and clinics are not banned from carrying out sex determination tests: they are only required to be registered. Second, the government can overrule the decisions of the body set up to monitor facilities, which is empowered to suspend or cancel the licenses of offending clinics or laboratories. The government can also exempt any facility from the Act. While in Maharashtra the monitoring committee included representatives of NGO's, the State Directorate of Medical Education and Research, and the Indian Council of Medical Research, the Central Government Act appointed only two State employees as regulators. Given the dubious record of the State as a monitoring body, the Act is thus considerably weakened. Furthermore, an ordinary citizen cannot directly move the courts, but must approach the monitoring body, which can refuse to release any records if it is deemed in the public interest to keep them sealed. Moreover, these regulations cover ultrasonography facilities to a much lesser extent, and this technique is also being widely used for sex determination. The possibility that newer technologies will be developed to determine the sex of the foetus has not been allowed for (Arora, 1992; Menon, 1996; Sengupta, 1992). The result of such partial regulation is that sex determination and selection facilities have privatized, commercialized, and mushroomed. Doctors indicated that despite bans, they would continue to communicate the sex of the foetus to parents who wanted to

know, verbally rather in writing, and would hike the fees of the test to compensate for the legal risk. The bans in Maharashtra did not have much impact, as sex determination facilities have continued to burgeon (Kishwar, 1995).

Some systematic studies clearly indicate the increasing spread and acceptability of the techniques. A 1982 study of Ludhiana, an urban area in Punjab state, questioned 126 randomly selected individuals, of whom approximately half each were male and female; and the majority of whom were educated and middle class. All the respondents had heard of the amniocentesis test; 66% of them thought it was intended for sex determination; few knew that it was actually for detecting foetal abnormalities. While 73% of the women and 59% of the men believed that a girl should be aborted if the couple already had two or more daughters, only 25% of the respondents felt that a boy should be aborted if the couple already had two or more sons. The reasons given indicated the nature of male-dominated society, dowry problems, greater responsibilities in bringing up daughters, and social pressure to bear sons. Over 71% of the respondents felt that amniocentesis as a sex determination test should not be banned (Singh and Jain, 1985).

These results were uncannily echoed over a decade later, in rural Maharashtra state, among six villages of Pune district, three with road and access to a health facility, and three others more remote and without these amenities. Results indicated that 49 out of the 67 women interviewed in-depth were aware of ultrasound and/or amniocentesis techniques and 45 per cent of those who knew approved of aborting female foetuses. Only four women were aware that such tests were for actually for the detection of foetal abnormalities (Gupte, Bandewar and Pisal, 1997). The spread of awareness of these techniques to rural areas is thus clearly documented.

The increase in number and reach of facilities offering sex determination and abortion is also clear. In the early 1980's, Jeffery et al (1984) noted that in villages adjacent to Bijnor town in UP state, clinical services offering sex determination and abortion had already appeared. The first newspaper reports of private clinics offering sex selection techniques appeared in 1982 - 83, in cities such as Amritsar, Bombay, and Delhi. Within 2-3 years thereafter, the numbers of such clinics rose to several hundred in the larger cities, and several dozen in smaller towns in Maharashtra, UP, Punjab, and Gujarat states. It is reported that the clinics were offering services from the late 1970's onward, but were brought to widespread public attention and formed the subject of a Parliamentary debate only in the early 1980's, after a senior and well-connected official's wife underwent an abortion of a foetus that was mistakenly diagnosed as female, but turned out to be male (Ahluwalia, 1986).

The use of these techniques thus grew widespread not only in towns, but also among rural areas with access to a road or transport system to the nearest town. Newspaper reports describe mobile sex selection clinics, offering ultrasound detection and immediate abortion if the foetus is female, in smaller towns of Haryana state in the mid-1980's. The clientele included farmers who had come from villages half-an-hour away by road (Vishwanathan, 1991). Remote districts that lacked basic amenities such as drinking water or electricity have been reported to have sex determination clinics; where refrigeration and cold chain facilities for vaccinations are not available but amniotic fluid samples are sent in ice packs to towns for testing (FASDSP and Saheli, no date, cited in Menon, 1996). Grassroots workers and concerned medical practitioners have observed an increase in female foeticide in all segments of society in rural Bihar state, especially after sonography

techniques became common. Unscrupulous doctors identify the sex of the child, and provide abortion if it is female (Adithi, 1995).

Nor is the cost of the test (ranging over time from Rs. 500 to over Rs. 1,000) a barrier. While we may expect that the largest consumers of such tests may be those with at least a modicum of disposable income, education, and awareness of medical technology, landless labourers and marginal farmers are also apparently willing to take out loans at high rates of interest to avail of these tests (FASDSP and Saheli, no date, cited in Menon, 1996). In 1981-82, the approximate average daily wage of a skilled male agricultural worker in Punjab was Rs. 25, that of female and male field or other worker ranged from Rs. 10-13. In Haryana, the figures are Rs. 18 for skilled workers, and Rs. 7-15 for female and male field and other workers. By 1991-92, the figures were Rs. 84 for skilled male workers in Punjab, Rs. 77 in Haryana, and around Rs. 40 in Bihar and Tamil Nadu. Field workers in these states earned Rs. 30-40 in Punjab/ Haryana, and Rs. 20-25 in Bihar and Tamil Nadu (Government of India, 1983; 1993). Thus, even taking the seasonality of wages, other expenses, and rural indebtedness into account, affording the price of a sex determination test would not be totally out of the question even for the poorer sections of rural society, especially in the relatively rich states of Punjab and Haryana. The logic underlying the motivation is illustrated by the now infamous slogan: "Better Rs. 500 today than Rs, 5,00,000 tomorrow" that was widely used in the early 1980's to advertise sex determination clinics until protests from women's groups put a stop to it. The slogan may no longer be used, but the underlying logic: that an expenditure now (on the test) will save many multiples of the sum later (on dowry, if the foetus is a girl), still holds.

Performing the tests has become an extremely profitable practice for doctors. A rough calculation may be made, that if the fee for a test is

currently around Rs. 1,000, and a clinic performs 10 to 12 such tests a day, based on a 6 day work-week, a clinic can gross up to Rs. 2.8 lakh (one lakh = one hundred thousand; approximately 40 rupees = 1 US $) a month. Some newspaper reports describe the tremendous wealth amassed by practitioners offering this facility, and how training doctors in the techniques has itself become a lucrative business. Nor is this trend toward exploitation confined to the 'modern' medical sector. In March 1991, health and consumer groups in Gujarat successfully lobbied the State Government to ban a best-selling herbal pharmaceutical product called "Select" that according to the manufacturer, claimed to use an ancient Ayurvedic technique called "Punsavana Prayog" to change the sex of a pregnant woman's foetus to male (VHAI 1992).

Attitudes of medical practitioners reveal that they view sex determination tests as a "humane" service they provide to couples not wishing any more daughters; as a regrettable but unavoidable result of the preference for sons in Indian society which they feel powerless to change; and as a necessary weapon in the 'population control' arsenal (Kulkarni, 1986). Many also argue that aborting a female is preferable to condemning an unwanted daughter to a lifetime of neglect and abuse. These attitudes are also echoed among large sections of the general public (R. P. Ravindra, 1995). Further, some eminent economists also endorse the argument that abortion of females is preferable to neglect, and assert that if the sex ratio of India further worsens as a result of these technologies, then the law of supply and demand will operate and raise the value of women; thus, curbing these tests and technologies is unnecessary or even retrograde (Kumar, 1983 a and b).

Making even approximate computations of the numbers of such procedures occurring in India is difficult. One retrospective estimate (Saheli, Delhi, cited in Arora, 1996) suggested that between 1978 - 82

nearly 78,000 female foetuses were aborted after sex determination tests. Arora (1996) also cites a statistic purporting to come from the Registrar General of India, that based on hospital records alone 3.6 lakh female foetuses were aborted in India between 1993 - 94.

It was early pointed out that the distribution of such facilities in India was greater in areas where females were more devalued, i.e. the North - North-west (Patel, 1988). During the time period in question in this study (1981 - 1991), we can assume that such techniques would have been more widely available in urban areas, though there is every indication that their awareness and use spread into the rural hinterlands too. Urban areas are characterized in developmental terms by higher literacy especially among females, more non-agrarian employment opportunities, more paid employment opportunities for women, and better infrastructure, including availability of health services.

Thus, while contrasting urban / rural SRB's over time in India, one might investigate whether urban SRB's grow progressively more "normal", with improved education and greater accuracy of reporting / recording births, and decreasing scope for female infanticide or abandonment of girls. Moreover, in urban areas, economic opportunities for women would be greater, increasing their worth, and a more egalitarian ethos may accompany increasing education, income, and exposure to diverse groups and thoughts.

On the other hand, if gender stratification in India is intensifying, attested by the increase of phenomena such as dowry and marginalization of women, many urban families would not necessarily have greater incentive to welcome the birth of girls. They would also have more access to the means to avert their birth, i.e. prenatal sex determination techniques and selective abortion, which may be seen as more acceptable and practicable alternatives to female infanticide, abandonment, or non-

registration of girls' births. In fact, families with some amount of education and disposable income might have better access to these techniques and thus be more efficient in discriminating against their daughters. Particularly with fertility falling in many parts of the country with urban areas in the forefront, Indian families may take steps to ensure that at least one son is born to them, as do Chinese or Korean families. It is these possibilities that we investigate in this study.

Data and methods

We use data from the 1981 and 1991 censuses of India. We present sex ratios of children aged 0 and 1, i.e. under age 2. We also estimate sex ratios at birth by means of the 'reverse survival technique' (UN Manual X, 1983, Chapter VIII) using the counts of boys and girls aged under 2 and observed male and female q2 mortality probabilities in the 1981 and 1991 Census of India records, fitting to a South Model Coale and Demeny Life Table (Coale and Demeny 1966). In essence, the technique is based on the notion that children aged x are the survivors of births that occurred x years ago. Therefore, it is possible to take the numbers of children observed at age x, and observed mortality probabilities for children in that population, and, using a model life table suitable in shape and level of mortality for the population in question, "resurrect" the numbers who have died.

The authors warn that the technique is sensitive to age-misreporting, especially for children aged 0 or 1. Our estimates overcome this potential danger by basing calculations on children aged 0 and 1 taken together, i.e. those under age 2. (In calculations not presented here, we examine sex ratios among infants aged 0, and the results are virtually identical to those among infants aged <2; none differed by more than 2%). Moreover, we use this technique to generate sex ratios among children ever born, not to present or evaluate estimates of actual fertility.

Even if there is a nation-wide tendency to under-report the numbers of females (a contention doubted by Visaria, 1969), the comparison we present, that is the trend over time in sex ratios, should not be affected. In the absence of statistics on period sex ratios at birth, we argue that infancy sex ratios and estimated SRB's provide information that can illustrate and evaluate the impact of continuing son preference in India, under conditions of social change, economic development, declining fertility and mortality, and spread of new medical technologies. Analyses of such issues up to now have used juvenile sex ratios, that are more shaped by sex differentials in child mortality than by SRB's.

We also present sex ratios of under-five mortality probabilities for children (q5) for 1981 and 1991. We present these figures for each state, for rural and urban areas. SRB's within the range of 103 - 106 males per 100 females are considered "normal", a value of 107 is borderline masculine, those higher than this are excessively masculine. For mortality, ratios that favour females (i.e. male to female ratio greater than 1) are considered normal. Ratios that favour males are considered anomalous.

Results

The main results are presented in Table 1, which shows observed sex ratios at age 0+1 and estimated SRB's, for 1981 and 1991, for rural and urban regions, by state and zone. Ratios here are always presented as males per 100 females.

The results can be very simply summarized. First, there is by and large little difference between sex ratios at ages 0+1, and estimated sex ratios at birth. As may be expected, once mortality at infant ages is taken into account the ratios lessen, but only very slightly. However, in some states, predominantly in rural areas, the ratios heighten slightly,

such as rural MP, North-Eastern states (Mizoram, Nagaland, Arunachal Pradesh, Tripura), South (rural Kerala, Tamil Nadu, Karnataka), urban and rural Maharashtra and Orissa. In 1991, much fewer regions show this pattern: Himachal Pradesh, and urban parts of Sikkim, Goa, Dadra and Nagar Haveli, and Pondicherry.

In 1981, most parts of the country exhibited infancy sex ratios and sex ratios at birth that were not abnormally masculine. The all-India SRB's appear within the normal bounds. The few masculine regions were mostly within the North / North-Western zone, such as urban Jammu and Kashmir, and Chandigarh and Haryana. Surprisingly, the Lakshadweep union territory indicates very high masculinity, with values ranging from 109 to 112. Some states (Andhra Pradesh and urban Tamil Nadu in the South; Manipur, urban Nagaland, Meghalaya and Arunachal Pradesh in the North East; Madhya Pradesh and urban Orissa in the Centre; Rajasthan, urban UP and rural Bihar in the North / North-West; urban Dadra and Nagar Haveli), show SRB that may be seen as too feminine (below 103). We speculate that this might be due to under-reporting of infants that may have been born alive, but died shortly thereafter. They would not be enumerated and would thus not show up in either the counts of infants, or the mortality statistics. Since neonate and infant boys have higher mortality than girls, boys may be over-represented in the uncounted children, leading to unusually feminine SRB's.

In 1991, the picture greatly changes. The all-India urban SRB appears slightly too masculine, at 108. We see that a stark shift toward excess masculinity occurs mostly within the Northern/North-Western zone. All urban areas in this zone now exhibit highly masculine SRB's, ranging from 107-118. Most rural areas (with the exception of Bihar and UP) also appear highly masculine. The lowest values are 105-107

for rural Bihar and UP. The highest values reach 118 for urban Punjab and 116 for urban Haryana. The Central zone states of Maharashtra, MP and Gujarat also exhibit masculinity of SRB's in urban areas, in the range of 107-111. In the East, urban Arunachal Pradesh still shows a high SRB, 109.

The Southern states appear normal. The Lakshadweep Union Territory (off the Kerala coast) that had highly masculine SRB in 1981 is in the normal range in 1991. The phenomenon noted in 1981 of excess femininity of SRB's has greatly lessened, now noted only in Dadra and Nagar Haveli, urban Nagaland, and rural Arunachal, Manipur and Madhya Pradesh. This could be due to improved enumeration and tabulation, or lessening of male infant/child mortality due to improvement in health facility coverage, or to the general countrywide trend toward masculinization of SRB's.

Table 2 gives sex ratios of mortality probabilities at childhood ages (q5), for rural/urban areas and state/zone. Overall, though levels of child mortality in India have declined considerably from approximately 152 per 1000 (both sexes, all India) in 1981 (Census of India, 1981:5) to 96 per 1000 in 1991 (Rajan and Mohanachandran, 1997, based on 1991 Census records), the sex ratios of mortality actually decline (i.e. grow more male-biased) 1981-1991, indicating that mortality fell more for males than females. Positive changes, i.e. lessening female mortality disadvantage 1981-91 are seen in only very few small areas, such as Himachal Pradesh, the Union Territories of Delhi and Chandigarh, urban West Bengal, and Mizoram. In the North, the decline, (i.e. increasing female disadvantage) appears in some states: rural Rajasthan, urban Haryana, all of UP and Bihar. All these states had female-disadvantaged mortality sex ratios in 1981. In the Central zone, all the states show a marked decline; Orissa, which had 'normal' mortality sex ratios in 1981

now shows female disadvantage in 1991. In South India, rural Tamil Nadu shows a sharp decline from normal to female disadvantage, in keeping with the rise of female infanticide reported in that region. Karnataka and Goa ratios also indicate a slight decline to female disfavour, in contrast with their normal ratios in 1981. While the 1991 Census mortality figures for urban Kerala also indicate female disfavour, infant and child mortality is generally so low in the state, that a small absolute difference between the sexes has translated into a large difference in the ratio in this case. Thus, in the case of urban Kerala, we do not suggest at this time that excess female child mortality has suddenly emerged in this state since, unlike Tamil Nadu, no study has identified this phenomenon here. This logic also applies to some Union Territories and states in the North-East, that indicate extreme values of the sex ratios. 1981 values such as 152 for urban Meghalaya or 128 for urban Sikkim are an artefact of small sex differences in low levels of mortality.

To contextualize the scenario of birth and life chances of male and female children in India, Table 3 gives the change in fertility in different regions of India 1982- 1994. This decade witnessed a moderate (20%) fertility decline in the country as a whole, from a TFR of 4.5 in 1982 to 3.5 in 1994 (SRS Reports). By region however, we observe dramatic declines in the Southern states, such that Kerala now has below replacement fertility, Tamil Nadu is at replacement, and Karnataka and Andhra Pradesh are below the national average. The Eastern states also register moderate declines. The Central, Northern and North-Western states, with the exception of Gujarat and Punjab, record much more modest gains.

The demographic picture that emerges 1981-91 is one of declining fertility and mortality, overall worsening sex ratios of child mortality and increasing masculinity of SRB's. Many prior studies showed that

higher birth order females were at the greatest risk of mortality in Northern and North-Western India (Das Gupta, 1987; Kishor, 1995). It is therefore conceivable that with declining fertility, the proportion of births of higher order would decline, lowering excess female child mortality overall. Since the mortality ratios have not shown lessening female disadvantage in the face of declining fertility, this contention is clearly not upheld. Furthermore, SRB's in the North-North-West regions indicate increasing sex selection to ensure that the greater proportion of babies born are of the wanted (male) sex. Thus, excess female child mortality appears combined with prenatal sex selection in a specific zone of the country - the North / North-West, to create a 'double jeopardy' for Indian daughters there, with general female mortality disadvantage in other regions that have 'normal' birth patterns.

The numerical magnitude of the impact of sex selective abortion in India is not great as yet. In East Asia, the impact of such practices amounts to only about 5% of female births (Asia Pacific Population Policy Report No 34, 1995). In India, the impact is less than this. Since the 1991 all India rural SRB was within the normal range, if we examine the change in all-India urban SRB from 104 in 1981 to 108 in 1991, and consider that an SRB of 106 is the upper bound of 'normal' (to be conservative), then only 2% of female births are affected. This translates to a shortfall of 74.6 thousand female births (all-India urban). Since official records of induced abortion in India are notoriously flawed and incomplete, Mishra et al (1997) have estimated the likely number of abortions occurring in India using the National Family Health Survey data (1992-93). They show that the possible numbers of induced abortions for all-India were 207.1 thousand (Mishra et al, 1997, Table 7).

Discussion and Conclusion

The first point we highlight here is the great need for suitable data to be collected and released in a timely manner by the Government of India. The census does collect information on the number of births in the enumeration year; a small amendment to the question could provide information on the sex of the infant. Statistics on period SRB's for all parts of India could then be directly furnished, removing the need for indirect estimation to illuminate this important question. In our findings, it should be kept in mind that the SRB's have been estimated based on the reported numbers of infants aged under 2 years, and are thus may be affected by any under-registration of female births or female infanticide, though we argue otherwise.

However, even with indirectly estimated measures, clearly, there is a marked shift towards increasing masculinity of SRB's in North / North-West India, especially in urban areas. This suggests the rising use of prenatal sex determination and sex selective abortion there. The evidence we have summarized, and the spatial distribution of the SRB figures we present, indicate plausibly that sex determination and selection techniques are being increasingly used in some parts of the country. The trend initially began (as might be expected for a medical technological innovation) in urban areas and spread out to the rural surroundings, especially concentrated in those regions of the country that have a socio-cultural history of disfavour towards women. As we saw, in 1981, only urban areas of the North-Western region had somewhat abnormal SRB's. By 1991, urban and rural parts of the North-West, and urban parts of Central regions, all had masculine SRB's. Since the increased masculinity is seen in urban areas, we cannot attribute the trend to increased under-reporting of girls, or rise in female infanticide, both of which are less likely to be successfully carried out in urban areas.

Some argue that increasing masculinity of SRB's could also be caused by development, especially in the health sector, because improved health conditions provide better life chances to male foetuses that are by nature more frail and prone to die. The trend in many parts of India between 1981 and 1991 of SRB's moving from excess femininity to normal masculinity may be due to this factor. The intense masculinity in the North/North-West region is a however a little difficult to attribute entirely to improved health. If improvements in health were mainly at the bottom of increasing masculinity of SRB's, then regions such as Kerala and urban areas elsewhere in the South would also have witnessed much more masculinity of SRB's than they have. We thus conclude that improved male survivorship is in itself an insufficient explanation for the temporal and spatial trend in sex ratios in India. Since, as discussed above, other alternative explanations such as female infanticide and under-registration of births are less likely in urban areas, the spread of pre-natal sex determination and abortion are further implicated.

Evidence indicating women's increasing economic marginalization and greater socio-cultural devaluation underlines the contention that development in India has generally been to the detriment of women. Despite gains in education, longevity, and income for some groups of women, large sections of Indian society still consider daughters a liability, and would apparently prefer to avert their birth. While infanticide in earlier eras had been confined to certain limited caste and geographical groups, neglect of daughters and female infanticide and foeticide appear widespread in some parts of Indian society, and have pervaded groups and classes where they were hitherto unknown (Adithi, 1995; Harriss-White, forthcoming; Jeffery et al 1984). In fact, the co-existence of female foeticide, infanticide, and selective neglect of girls renders the distinction between pre- and post-natal sex selection techniques invidious: the bias against girls is entrenched, and the choice of methods may depend

on convenience rather than conscience. Some scholars have gone so far as to term the persistent and multi-layered bias against girls, 'gender-cleansing' (Harriss-White, forthcoming).

However, while the aggregate statistics 1981-91 indicate that pre- and post-natal sex selection methods co-exist in many regions, conclusions regarding additive rather than substitutive strategies should also consider whether some local differences are being obscured in the aggregate. A study of a rapidly urbanising and changing rural area near New Delhi revealed that local parents, belonging to the Jat community, had an ideal family composition of 2 sons and a daughter, and thus formed the clientele of the flourishing local sex determination clinics. However, the subsequent infant/child mortality rates among their children did not reveal female disadvantage any more (Khanna, 1995). This suggests that a pattern of substitution is indeed occurring. More such micro-level studies would more clearly illuminate whether within any region, some families use certain strategies and others follow other methods, or whether both strategies are indeed being followed by the same groups. Future research should prioritize examination of demographic behaviour in India from gendered perspective, that scrutinizes development trends and policies and focuses on the nexus between cultural and economic factors and household organization and strategies.

The contention that selective neglect or infanticide affect mainly higher birth order girls and that therefore the gender imbalance in demographic rates and indicators should decline with decreasing fertility and mortality is clearly not upheld in this study. In fact, the ideational shift to controlled fertility that includes acceptance of modern means of contraception has, in India, also meant a growing societal acceptance of medical technologies surrounding conception, pre-natal sex selection, and abortion. Abortion selectively directed against female foetuses is

acceptable to large sections of society in the name of 'population control', or couples' greater reproductive choice. The secular societal trend that increasingly devalues female lives remains largely unquestioned.

The argument that an adverse sex ratio will lead to a shortage in the supply of women, which will drive up their value since demand will remain high, is also clearly untenable. The sex ratio in India has been noted to be adverse to females, and more or less steadily worsening, since the first recorded Census of 1881. The population sex ratio of India declined from 972 females per 1000 males in 1901 to 929 per 1000 in 1991. In this same period, the status of Indian women has been steadily eroding, despite gains made in some sectors by some groups of women. A "shortage" of women does not lead to their increasing valuation, but to greater restrictions and control over them. The increasing intensity of violence against women in all domains of life is testimony to this.

The trend towards greater spread and acceptance of pre-natal sex selection techniques despite legislative proscription, combined with persistent female disfavour in mortality ratios, combines to produce a scenario that is not likely to ameliorate in the near future. These demographic phenomena are themselves only symptoms of the worsening situation of women in the Indian socio-economic developmental context. Any policy measures must not focus exclusively on regulating or banning technology used to women's detriment, but must also address the root causes of devaluation of Indian women, or they will not succeed in eradicating discriminatory practices but will drive them underground where they will continue to flourish.

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Table 1 See Ratios at ages 0+1, and estimated sex ratios at birth; 1981-1991

State Region	1981 Sex Ratio(M/F) Observed ratio Estimated SRB 0+1						1991 Sex Ratio (M/F) Observed ratio Estimated SRB 0+1					
	Rural	Urban	Total	Rural	Urban	Total	Rral	Urban	Total	Rural	Urban	Total
India	103	104	103	103	104	103	106	108	106	106	108	107
North/ Nothwest												
Himahel Pradesh	105	105	104	105	105	105	108	113	108	109	114	109
Jammu & Kashmir	105	110	106	105	110	105	-	-	-	-	-	-
Punjab	107	108	107	105	107	106	117	119	118	117	118	117
Rajasthan	103	103	103	101	102	103	108	111	108	107	110	107
Haryana	109	107	109	108	106	107	114	117	114	113	116	114
Delhi (UT)	105	104	106	105	106	105	111	111	111	110	110	110
Chandi- garh (UT)	112	103	108	111	107	108	110	109	109	110	109	110
Gujarat	105	108	106	104	107	105	107	112	109	106	111	108
Uttar Pradesh	104	102	104	103	102	102	107	109	108	106	108	106
Central Madhya Pardesh	101	102	102	102	101	101	103	108	102	102	107	103
Bihar	102	104	102	101	103	101	107	108	107	105	107	105
Maha- rashtra	102	101	102	106	105	106	103	108	104	106	109	107
Orissa	101	103	102	104	102	104	104	104	104	103	103	103
Goa	104	105	104	104	105	104	103	106	104	103	107	104
East North- East												
W. Bengal	102	104	103	103	103	103	104	105	105	103	104	101
Assam	-	-	-	-	-	-	105	108	105	104	107	105
Mizoram	103	100	102	104	100	103	102	104	103	103	104	103
Nagaland	101	103	102	102	103	102	99	103	100	103	104	103
Meghalaya	102	104	102	102	104	102	101	103	100	101	103	101
Arunachal Pradesh	100	105	101	102	102	105	102	101	109	102	109	102
Tripura	105	104	105	106	104	106	104	104	104	104	104	104
Manipur	101	101	101	101	100	101	103	105	103	102	105	103
Sikkim	105	99	104	104	98	104	105	123	106	105	124	106

South												
Kerala	102	107	103	103	106	103	106	106	106	105	106	105
Andhra												
Pradesh	101	102	101	102	102	101	103	104	103	103	103	103
Tamil Nadu	103	102	103	104	101	103	105	105	105	105	105	105
Karntaka	102	104	103	103	104	103	105	105	105	105	105	105
Union territorries												
Andamans	102	94	101	104	95	101	100	104	101	100	103	101
Lakshd-												
weep	109	110	110	109	108	109	102	106	104	102	106	104
Dadra Nagar												
Have	98	100	98	99	103	99	101	94	100	101	101	101
Pondicherry	102	102	102	103	103	103	103	105	104	103	106	105

Sources: Census of India 1981 and 1991
Any value above 107 can be considered excessively Masculine

Table 2

State/ Region	1981 Sex rate of child motality q5 m/f			1991 Sex rate of child motality q5 m/f		
	Rural	Urban	Total	Rural	Urban	Total
India	93	98	94	89	95	90
North.North West						
Himachal Pradesh	104	107	104	108	110	109
Jammu & Kashmir	97	102	97	-	-	-
Punjab	87	92	88	92	92	89
Rajasthan	89	89	89	85	90	86
Haryana	81	89	82	81	82	83
Delhi (UT)	85	95	94	89	96	96
Chandigarh (UT)	88	99	97	107	110	110
Uttar Pradesh	83	86	84	79	82	79
Bihar	87	90	86	72	79	73
Central						
Madhya Pradesh	96	98	96	92	92	91
Maharashtra	101	106	101	100	104	93
Orissa	103	101	103	93	86	93
Gujarat	92	94	92	80	82	81
Goa	106	103	105	96	91	96
East/ North East						
West Bengal	99	99	98	92	152	91
Assam	-	-	-	103	108	102
Mizoram	107	111	108	113	108	102
Nagaland	106	132	108	100	107	95
Meghalaya	105	126	107	104	105	103
Arnachal Pradesh	106	152	107	104	91	107
Tripura	105	108	105	102	104	101
Manipur	104	103	102	90	94	92
Sikkim	120	128	120	110	106	107
South						
Kerala	113	101	112	94	88	94
Andhra Pradesh	105	107	106	106	108	102

Tamil Nadu	101	104	102	88	100	102
Karnatka	101	102	102	96	97	96
Union territories						
Andamans	107	92	106	112	102	113
Lakshaweep	121	105	115	136	91	103
Dadra Nagar Haveli	113	97	112	133	136	113
Pondicherry	103	104	104	107	103	103

see explanation in the text

Source: Census of India, 1981 Occasional Paper No. 5 of 1988
"Child mortality estimates of India"
Demographic Division, Office of the Registrar General of India
Ministry of Ho

Table 3. Profile of fertility decline in Major states of India (82-1994)

State/ Region	Total Fetility Rate (TFR) 1992	1994	% decline
India	4.5	3.5	22.20
North/North west			
Rajasthan	5.3	5.1	10.10
Uttar Pradesh	5.7	5.1	10.10
Haryana	4.9	3.7	24.50
Punjab	4.0	2.9	27.50
Bihar	5.6	4.6	17.90
Central			
Madhya Pradesh	5.3	4.2	20.80
Gujarat	4.2	3.1	26.20
Maharashtra	3.8	2.9	23.70
Orissa	4.3	3.3	23.30
East			
West Bengal	4.1	3.0	26.80
South			
Andhra Pradesh	3.9	2.7	30.80
Karnataka	3.6	2.8	22.20
Kerala	2.9	1.7	41.40
Tamil N adu	3.3	2.1	36.40

Source: Sample registration System, 1982, 1994.

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