Hundred years of juvenile masculinity in India: Why the contemporary pattern is important?

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Abstract: Since the beginning of the last century, sex ratio (male to female) in India is showing disturbing patterns with relatively fewer numbers of females compared to males. The magnitude of juvenile masculinity has increased since 1980s with no sign of reverse. The time trend of juvenile sex ratio brings out demographic transition type 'sex ratio transition' in Indian population. Using data from the last hundred years, the paper tries to figure out the pattern of sex ratio transition at all India as well as at the state level. Spatial pattern of juvenile sex ratio have been judged and contemporary increase in masculinity have been highlighted. Despite the common wisdom that juvenile sex ratio in India is rising since the last century, the present paper indicates that juvenile masculinity is a long-standing problem of India that gets momentum during the recent period due to demographic as well as socio-economic forces.

Key Words: Juvenile Sex Ratio, India, Historical Trend, Regional Disparity, Spatial Pattern, Contemporary Trend, Female Neglect, Gender Vulnerability, Sex Selection, Diffusion.

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Sex ratios in India are growing masculine. Since the beginning of the last century, sex ratios in Indian population (male to female) is showing a disturbing pattern with relatively fewer numbers of females as compared to males. Masculization of juvenile population brings forth alarming changes in population dynamics not only in India, but also in many Asian countries more intensively in China and South Korea. Due to lack of data, these changes were not identified immediately after the onset of the problem resulting in a huge toll of 'missing females' in Asian continent.

Unlike demographic transition, where different Asian countries do show different pathways of fertility and mortality decline, the trend and patterns of population sex ratio within Asia is more or less comparable though the magnitude of masculinity may differ widely. Unlike the world wide pattern of sex ratios, the majority of Asian countries now display a male dominance in their population. This feature is more pronounced in the most populous countries like China, India, Indonesia, Bangladesh and Pakistan. However, the consequence of such masculinity will certainly affect the future population dynamics not only in the national context but also at the world level.

India's experience in the current process of population masculanization is crucial to understand due to its age structure, which have a tremendous potential for further distortions in population stabilization. Such a trend if continued will result in a serious marriage squeeze with excess young adult male compared to lesser number of potential brides (Guilmoto, 2007). Demographers have expressed concern regarding the grave consequence of marriage squeeze when the marriage system in Asian continent is considered as a base for social organization, far different from western world. Moreover, in the backdrop of increasing gender based violence, trafficking, discrimination and vulnerability of women and girls[1], existing pattern of masculinity, if continued, not only endanger demographic stability but also will lead to serious social distortions. Such a

[1] For example in India, where total crime rates are falling, crime against women in all categories including rape, molestation, sexual harassment, dowry harassments, dowry deaths and abduction are on the rise (CWDS 2002, Dowry in India 2004).

situation can even induce general crime rate as unmarried young men are supposed to have crime prone attitude (Steffensmeier and Allan 1996, Hurwitz and Smithey 1998, Edlund et all 2007).

However, in order to combat rising masculinity in India's juvenile population it is important to understand the trend of sex ratios, the nature of such social problem and its possible association with trends of different socio-economic and demographic attributes. The present paper is an attempt to shade some light on these issues. Using Historical data regarding juvenile sex ratios in India, the paper tries to cater the changing perspective of gender distortions in juvenile population. Employing mapping technique the paper also tries to highlight the spatial propagation of high sex ratios within the country. Finally the study indicates that the masculinity in juvenile population in India is a persistent phenomenon which gained momentum since 1980s, thus showing sharp increase in juvenile sex ratio during the contemporary period.

The paper is organized as follows. In the next section, we highlight the major motivation of the study followed by historical trend analysis of juvenile sex ratio variations at the country level. The state level disaggregated analysis presented in section III and contours of juvenile sex ratio increase have been depicted in Section IV. Finally, the paper concludes by flagging the salient features, so important for future policy discourse.

1. Motivation of the study:

'Why has the proportion of women in India's population been declining' during the last century when one expected it to rise with improvement in health and life expectancy? (Dandekar 1975).Thirty three years ago Kumudini Dandekar had raised this question in an influential paper published in Economic and Political Weekly. But still, the question is partly unanswered. Several attempts had been made to analyse the reasons behind the excessive manifestation of gender discrimination in India. Considerable effort has been made to estimate the number of missing females in Indian sub-continent (Sen 1979, 2003; Coale 1991, Klasen 1994, Klasen and Wink 2003, Jha et al. 2006, Srinivasan et al. 2007, 2008 etc.). The literature partly endorses that excessive gender bias in child mortality might be the most important proximate determinant of sex ratio disequilibrium which is

caused by lower autonomy of females in general and discrimination in food, nutrition and heath care services in particular (Bardhan 1974, Miller 1981, 1987; Agnihotri 2000, Agnihotri et all 2002, Siddhanta et all 2003, 2004, 2005, 2006). But even then the rising proportion of males in India compared to its female counterpart, and the resulting contemporary rise in masculinity cannot be solely explained by the gender discrimination hypothesis, when gender discrimination in food, health care and education is declining in Indian subcontinent (Bhat et al. 2002). Perhaps the most important thing is that the puzzles of dynamics of the Indian sex ratio have not even been adequately addressed in the received literature. The time trend of sex ratio pattern and its relation with socio-economic and other demographic characteristics have not been addressed, at least in details. This calls for an explanation in terms of the process dynamics behind the masculanization in Indian population. In absence of comparable historical data set, such analysis cannot be pursued. However, exploiting the existing data from Mukherjee (1979), population census reports, Maddison (2003) and historical fertility and mortality estimate by Mari Bhat published in Srinivasan (1989); the present chapter tries to unfold the changing pattern of child sex ratio trend at the national and also at the state level. The result of such analysis may be found to be important to understand why the contemporary Indian juvenile sex ratio should be of an utmost concern for the researchers, planners, policy analyst and activists alike. Rather than testing the hypotheses on juvenile sex ratios-society-economy linkages through an econometric model, which is so common in the literature, we employ descriptive methods to depict the changing contours of juvenile masculinity and to show its possible association with some socio-economic and demographic characteristics.

2. Juvenile Sex Ratio Variation in India: Analysis of Historical Trend

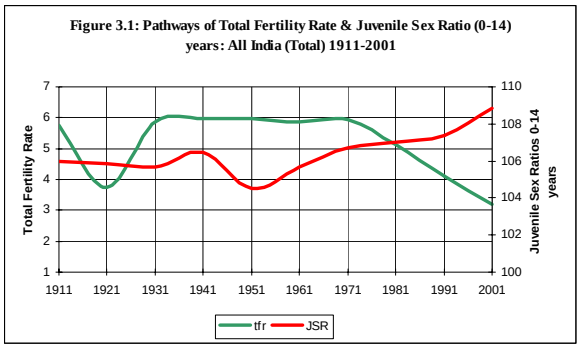
During the last hundred years, Juvenile Sex Ratios 0-14 years age group have shown a very disturbing pattern with sex ratio values mostly higher than balanced sex ratio of 105. From 1911 to 1941, the juvenile sex ratio has remained stagnate around 106 with a slight fall in 1951, then an increase from 1961, again languished around 107 up to 1991 and finally a sharp increase between 1991 and 2001. The time trend is clearly nonlinear with several points of inflection which hints that the process dynamics behind juvenile masculinity changes with time. It is important to highlight that during this last hundred

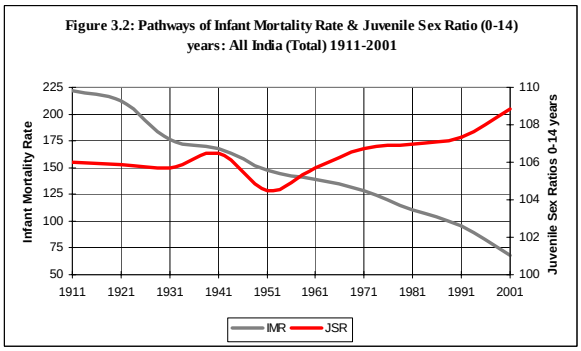
years, the country had followed a demographic transition path from high fertility - declining mortality to relatively lower fertility and low levels of mortality. While the Indian demographic transition have adequately been addressed in the literature (Ref: Guilmoto & Rajan 2001, Bhat and Xavier 1999), the sex ratio transition is partly unaddressed due to the fact that the later is very much unique to parts of Asian countries, not much observed in the demographic history of Europe, America and former Soviet Union. Far from being independent of each other, both types of transition should have some intricate linkages as both the phenomena are related to population dynamics, more so with population growth and its composition.

Unlike in China, where imbalance in sex ratio is thought to be a consequence of fertility decline due to the enforcement of one child policy (Banister 1987, Attané I. 2002, 2004; Das Gupta, M., *et al*., 2002, Wu et al. 2003 etc.) in India it is hard to conclude that sex ratio disequilibrium is purely a consequence[2] of fertility decline when in parts of the subcontinent fertility is declining at the cost of missing girls(Iyer et al 2005). However a historical perspective can only help us to check the relationship between these two types of phenomena and to analyse any form of possible causalities. The present section tries to unveil this issue using descriptive techniques as discussed below.

We employ simple bivariate graphs to analyse the pathways of juvenile sex ratios 0-14 years age group and different other socio-economic and demographic attributes to infer the possible inter-dynamics between sex ratio transition and proximate as well as structural factors. Over the last century, the country had followed a transition path, which is evident from the following figure 3.1 and 3.2 that represent juvenile sex ratio and total fertility rate/ infant mortality rate over the time period 1911 to 2001. The fertility and mortality indicators are scaled according to the left vertical axis. The juvenile sex ratio is scaled as shown in the right axis.

[2] rather a cause





Two types of inferences can be drawn from the above figures. Firstly, onset of increase in juvenile sex ratio initiates in the context of persistence of high fertility at very high level, i.e., six children per women, but after a considerable time lag. Fertility rate in India was stagnated around six children per women up to mid 1960s[3] and sudden increase in juvenile sex ratio after 1950s hints that other aspects of demographic transition might be more important to understand the process dynamics behind the onset of increasing masculinity in child population. This other aspect is nothing but infant mortality rate which shows a secular decline during the last century with some periodic oscillations starting with high level of mortality up to 1921 followed by a sharp fall up to 1941 and finally, a systematic decline since then. As the second figure indicates that juvenile sex ratios starts rising only after a considerable fall in infant mortality (125 per thousand infants), which implies that parity effect might be an important process dynamics behind the onset of increasing sex bias in juvenile population. More specifically, it implies that excess mortality of girls was concentrated in the higher parities and therefore as infant mortality declines the proportion of mortality at the higher parity declines even faster, resulting in increase in proportion of males in the child population given the fertility level constant. Such an observation might indicates excessive gender discrimination at the higher order birth, highlights the importance of gender bias in child mortality as a possible major proximate determinant of sex bias in the juvenile population during that period.

[3] The unusual fall in fertility during 1921 is much inconsistent with the time trend, should be interpreted with caution. Such a fall in fertility if not caused by serious estimation error might be related to the quality of health of the population, particularly the epidemic of 1918.

However the most exciting findings from the above analysis is so called 'demographic transition' type "sex ratio transition' which seems to obey *text-book type transition scheme* with mortality decline first and gender bias in child mortality following after a lag. The time lag might be more than fifty years which is lesser than the time gap between mortality decline and subsequent fertility decline. As presented in the figure 3.1, after a stagnation of fertility values at six children per women, total fertility rate starts declining only after mid sixties[4] with sufficient fall in infant mortality and increase in gender bias in child mortality. So it will be incorrect to anticipate the onset of rising gender bias in child sex ratio as a consequence of fertility decline, rather it might be more responsive to falling trends in infant mortality[5].

Demographic transition has a tremendous implication for socio-economic development of the population, consists of three main stages. The first stage is characterized by high fertility –high mortality syndrome. In the second stage mortality is declining but fertility is still high resulting in a huge population growth and finally in the third stage, both fertility and mortality trends are declining. Demographic history of Europe, America or contemporary pattern of India, Bangladesh, Sri Lanka, Brazil, etc, have experienced different forms of demographic transition with fertility decline after a considerable fall in mortality level. However the time lag between mortality decline and fertility decline varies widely and there are a number of countries which do not necessarily show considerable time lag between mortality decline and subsequent fertility decline. In general, mortality decline is considered in demographic literature as a pre-requisite[6] for fertility decline. On the other hand, the history of demographic literature does not indicate similar type of transition scheme in terms of population sex ratio or its implication on demographic transition. India's experience thus seems to be quite unique where population sex ratio does show similar type of transition with mortality declining first and then subsequent rise in gender bias in child mortality after a time lag, together

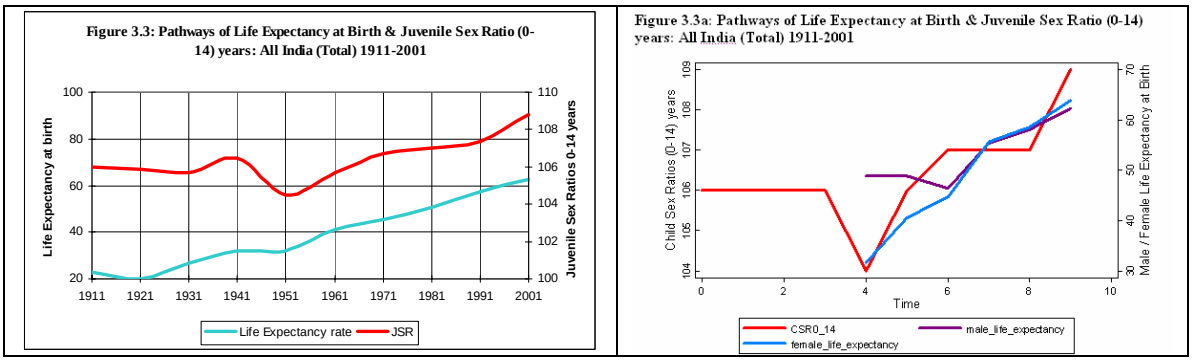
[4] As reflected in 1971 fertility data.
[5] Apparently it seems that decline in trends of infant mortality rates and rising trend of juvenile sex ratio together make a conducive environment for the onset of fertility decline in India. However such an ad hoc hypothesis will be incorrect owing to the fact that decline in fertility was started first in South India where juvenile sex ratio still belongs to its normal level (i.e. around 105).
[6] However, there are some cases in the historical records of United States during 1800 where fertility has declined without prior mortality decline (Heines 1998).

which plays a crucial role behind the process of fertility decline at least in some parts of the sub continent (i.e. Punjab, Haryana, Gujarat etc.).

Montgomery (1999) brings out a new agenda on mortality decline and subsequent demographic response. While analyzing the impact of mortality decline in fertility behaviour, he argued that '…in settings in which both mortality and fertility is high to adopt a new strategy of family limitation, is to embark on a risky course of innovation, one that lacks clear social guidance and normative support. Few people would expose themselves to criticism if they adhere to the status quo. Potential innovators might well be deterred by the prospect of child loss, even if they view the likelihood of mortality as low in comparison to what it was in the past. They might feel unable to proceed without additional confirmation of their views, and may therefore delay until very sure of the lower risk'. This conception might also be applicable in describing sex ratio transition in India. Conservatism in risk taking in a high mortality environment or in a situation of uncertainty may lead to the possibility of greater potential loss than an equivalent potential gain resulting in a time lag between mortality decline and increase in gender ratios or rising sex ratios after a considerable fall in Infant mortality rate[7]. With increasing assurances regarding child survival, parents may then begin to influence the sex composition of their siblings using discriminatory as well as non-discriminatory strategies. Thus mortality decline must be assumed to be central to the onset of increasing gender bias in juvenile population.

Another important finding that needs to be highlighted is the pace of mortality decline during 1921 to 1941 and a subsequent fall in juvenile sex ratio during 1941 to 1951. This might be, partly due to the biological advantage of female foetus and female infants owing to the joint effect of rapid fall in infant mortality or sustained increase in life expectancy on the one hand and excessive gender disparity in life expectancy during this period. The following figure 3.3 and 3.3.a indicate the pathways of life expectancy and its gender gap and corresponding trend of juvenile sex ratio during 1911 to 2001.

[7] This type of arguments can be found in the new theories of Psychology and economics (Kahneman and Tversky 1979), Camerer and Kunreuther 1989, Conlisk 1996, Mellers et al 1998 etc.) According to this literature, the anticipation of regrets can be an unappreciated consideration in decision making in cases of uncertainty.



While life expectancy at birth or improving health environment can reduce the risk of child mortality and foetal wastage, the relatively lower maternal health condition may subject to a greater loss of male foetus and male child owing to biological reasons. As a result of such inequality embedded health development, may give some biological advantages to relative life chances of female babies. Beside that the episodes of catastrophic mortality events and moreover the socio-political turmoil of that period may leave lesser space for gender discrimination resulting in relatively balanced sex ratio of the juvenile population. It should be noted that through out the first half of the last century juvenile sex ratios in India was staggering around a higher than biologically optimum value (i.e., 105 males per 100 females) showing high degree of gender discrimination in a relatively poor health environment. But after a series of disastrous mortality experience and gender bias in life expectancy at birth and restless socio-political situation, it seems plausible to hypothesize that female child may enjoy some biological advantages which is partly reflected in the unusual lowering of sex ratio during 1951[8]. But such natural gain[9] seems to be immediately checked by conscious intervention, showing a sharp rise in juvenile sex ratio since independence, pointing towards excessive gender discrimination with higher assurance of infant survival.

The increasing trend of juvenile sex ratio since the beginning of the 1950s, thus, might be an demographic response to changing pattern of mortality scenario or/and the

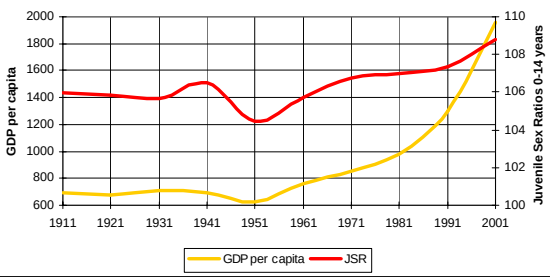
[8] Even then, the quality of enumeration during the census period might also be questionable when the livelihoods of the greater Indians were at a high risk due to famine, epidemic and political turmoil.

[9] Waldron (1993) have argued that female foetus and female infants are biologically stronger than male foetus and infants due to the possession of only one X chromosomes which have a greater risk X-linked recessive disorder than females. Another biological explanation for sex differences in mortality is the immaturity of males relative to females at all stages of foetal development. Pollard and Hyat (1999) argued that by four months of gestation, skeletal development is three weeks more advanced in the female foetus compared with the male and, at birth; girls are four to six weeks more mature than boys. It also appears that in bio social literature that female infants are physiologically more matured in several organ systems and this is thought to contribute to their greater survival chances at birth (Tanner 1989). Waldron 1983 further argued that males have much greater respiratory distress syndrome in the neonatal period which is due to the immaturity of male lungs. Also owing to their lower immune resistance capacity, male infants have higher death rates from infectious diseases.

consequence of improvement in health care facilities. The progress of health care facilities may also have some influence over increasing manifestation of gender bias even if mortality decline is partly exogenous to families. This can be analyzed on the basis of pattern and change of health indicators like life expectancy at birth. The risk of mortality can also be reduced with effective public health facilities and can show a possible 'win-win' solution with lower morality and higher attainment of cultural satisfaction (i.e., son preference). The figure 3.3 and 3.3.a confirm that after a considerable improvement in health measures and reduction in gender bias in life expectancy (which may be associated with development of public health investment) sex ratio starts showing a rising trend due to excess discrimination in the wake of health development.

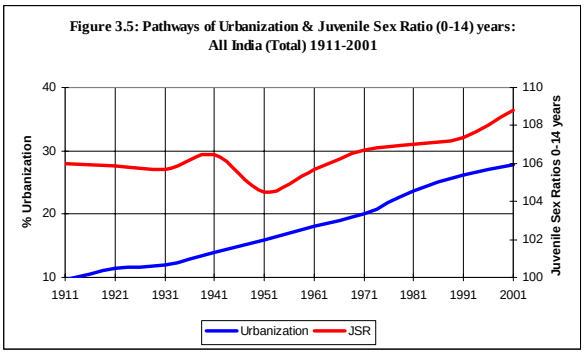
Since juvenile sex ratios and mortality depend on many factors, the above simple bivariate maps do not always seems adequate to understand the complex process behind changing time pattern of gender bias in child population. Even then, the above illustrative graphs hint some possible explanations which may have adequate relevance. Next, we highlight three important aspects of socio-economic development and its relation with juvenile sex ratios. Literature on child mortality as well as juvenile sex ratio indicate that socio economic environment can play a crucial role to describe the pattern as well as the magnitude of child mortality and gender bias in child population. Such socio-economic factors may be of different kind but due to limited availability of historical data, we confine our analysis within economic prosperity and education for which a corresponding data is available from several reports of Indian Population census and from the book "World Economy: Historical Statistics" by Angus Maddison published by OECD (2003). The path ways of Gross Domestic Product per capita and juvenile sex ratios is depicted in the following figure 3.4.

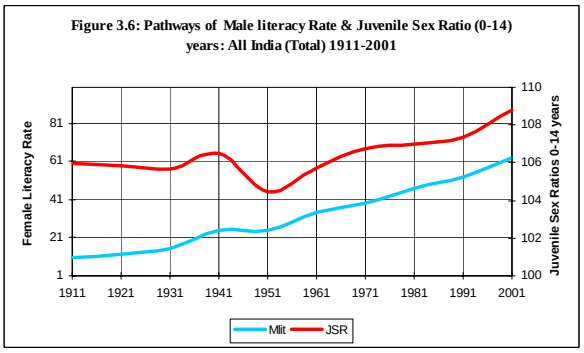
Figure 3.4: Pathways of GDP per capita & Juvenile Sex Ratio (0-14) years: All India (Total) 1911-2001

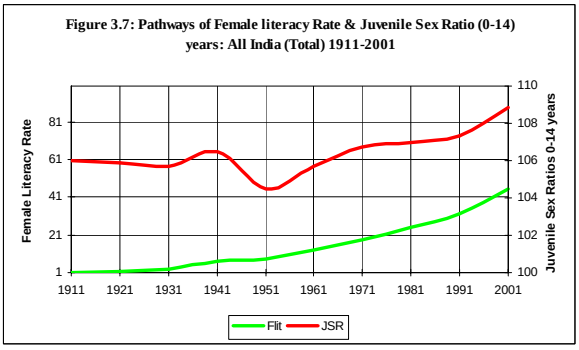


The movement of these two variables are strikingly similar at least up to 1971 and beyond 1981 the pace of increase in GDP per capita may be substantially high than the increase in gender bias in juvenile population. The onset of increase in gender bias in child mortality thus supposed to be closely associated with increase in prosperity violating the standard wisdom - *greater discrimination among the poor segment of the society or eventual gender equality at higher levels of prosperity*. Such an observation further strengthen the already established positive prosperity effect on juvenile sex ratio with more insight – the effect of prosperity on masculinity in juvenile population in India might be embedded in the historical context (Agnihotri 2000, Siddhanta et al. 2003, Siddhanta 2006).

The following figures show the pathways of urbanization, female literacy and male literacy and corresponding juvenile sex ratios during 1911 to 2001. Together these figures indicate that the process of urbanization and/or the process of educational development in India do not correspond to gender-equity as the increasing manifestation of gender bias among the child population have occurred only after considerable improvement in urbanization, male literacy and female literacy. While urbanization, prosperity and male literacy are supposed to be the three important indicators of economic modernization (Murthi et al. 1995, Dreze et al. 2000), female literacy is supposed to be an indicator of social development which thought to be an important factor regarding gender empowerment or female autonomy that might have a strong influence over reproductive behaviour. But even then, rising juvenile sex ratio with corresponding increase in female education casts doubt regarding the role of female literacy on reproductive behaviour, also points towards its association with female autonomy. The following bivariate charts together indicate that neither economic development nor social development is found to be conducive for the survival chances of female babies in India.







The onset of increasing masculinity in juvenile population, while have a strong similarity with its socio-economic and demographic characteristics of that period, the changing pattern of juvenile sex ratios since 1951, does not seem to have any clear similarity with changing perspective of socio-economic change that have occurred during this time period. The sex ratio pattern during the later half of the last century shows a clear nonlinearity with increasing pace of masculinity up to 1971 then relatively lesser manifestation of juvenile masculinity up to 1991 and then a sharp increase during 1991 to 2001. Such change in the magnitude of sex ratio increase seems to be related with fertility dynamics which need to be elaborated. In a high fertility and relatively lower mortality set-up, juvenile sex ratio showed a rapid increase up to 1971, which might be well associated with excessive gender discrimination at the higher parities. According to Dasgupta and Bhat (1999) such an effect can be related to 'parity effect' where discrimination is distinctly more concentrated at the higher order births. But such pattern does not seem to continue with similar magnitude – during 1971 to 1991, the pace of increase in juvenile masculinity is rather slow with the onset and corresponding sharp decline in fertility. The lowering of rate of change of juvenile masculinity in the wake of fertility decline indicates two possible change in population dynamics – firstly, relative weakening of parity effect and secondly, relatively lesser manifestation of son preference

in child population with quantity-quality transition. When effective use of contraceptive technology have a strong impact on the pace of fertility decline in India, the reduction of excessive manifestation of son preference during 1971 and 1991 seems to be plausible as the process dynamics behind fertility decline is fairly gender neutral in its effects on unwanted fertility. But again the 'natural gain' of demographic transition enjoyed by female gender seems to be checked very quickly with a corresponding sharp increase in juvenile sex ratio during 1991 to 2001. Growing masculinity with declining fertility indicates a possible role of some external factors, points to believe that sex selection technology seems to play a very crucial role in endangering juvenile population within a very short period of time. It should be noted that juvenile sex ratio have increased since 1991 in a situation where socio economic characteristics are not strikingly different from the past decades, cast slight doubt regarding the efficacy of the female neglect thesis rather indicates the possibility of the abuse of medical technology related to pre-natal sex selection and killing of unwanted girl babies in the womb.

It shows that the process behind juvenile sex ratio increase in India is dynamically complex, and the strategy behind such excessive maleness in juvenile population is not similar throughout the time period 1911 to 2001. So the complexities regarding the Indian sex ratio should be analysed from different angles, from different disciplines, not confining within any subjectual belief which might not be much helpful for designing any policy directives, so important to tunnel out the girl child from the '*Chakravyuha*'[10] of excessive vulnerability as well as discrimination.

One important lacunae of the above analysis might be that it is not adequately sensitive to the socio-economic, cultural as well as regional diversities of India. India is a country which has a tremendous regional variability in different socio-economic and demographic characteristics. So the pattern of juvenile sex ratio at the country level may hide regional intricacies that might be more important to have an understanding about the process of

[10] A term used by Agnihotri (2003) The Chakravyuha is an army formation mentioned in the Hindu epic Mahabharata. It is a seven-tier defensive spiral formation, used by Dronacharya, commander-in-chief of the Kaurava army.The formation is likened to a chariot wheel.

masculinization in Indian population. However, availability of historical data is rather limited at the country level when the analysis of the changing pattern with time should be done on the basis of more disaggregated unit of analysis[11]. It would be more illuminating if we could proceed such analysis at the state and even at the district level. Unfortunately, similar data for all attributes (analyzed so far) are not available even at the state level, though due to the indispensable work of Mukherjee (1979)[12] and the population census reports of the subsequent years, it is possible to get information regarding the juvenile sex ratio at the state level ranging from 1881 to 2001. Using this information, the next section will try to highlight the changing pattern of juvenile sex ratios for some of the major Indian states where excessive masculinity seems to be an important issue.

3. Time trend of juvenile sex ratios: analysis of some fore-runner states.

While the country level trend of the juvenile sex ratio of the age group 0-14 years does indicate a clear nonlinearity and the persistence of masculinization through out the entire century, it often conceals regional intricacies which may have important implications for planning and implementation for development work on gender-neutral child survival in particular and population balance in general. It has often been argued in academic discourse[13] that juvenile sex ratio is increasing when the actual data for the entire last century indicates that such problems is persisting for a long period in India and have increased only after a considerable socio-economic development, more so with rapid technological progress. Even then, juvenile sex ratio for the age group 0-14 in 2001 is 109 which is slightly higher than the corresponding value of 1901 (106 boys per 100 girls).

The state level variations within the country seem to be substantial with some states having persistently high level of juvenile sex ratio through out the last century. These states are Haryana, Punjab, Gujarat, Uttar Pradesh and Rajasthan. The following table 3.1

[11] More specifically at the district level or may be at the sub-district level.

[12] S B Mukherjee (1979) had made the original attempt to reconstruct the age distribution of Indian population covering the period 1881-1961 for main territorial subdivisions of contemporary India and produced a comparable historical dataset, so important for deepened understanding of Indian demographic history. Renowned demographers Paul Demeny opined that this book is not only '… an authoritative description of a phenomenon that is of interest in its own right, but will also be utilized in future demographic analysis that require such data as raw material' (quoted from the forward note of Mukherjee (1979) by Paul Demeny). Several distinguished demographers often use this book as an authoritarian source of Indian demography (Bhat 1989, 2002; Guilmoto 1988 etc), some of them also viewed this as holy as 'Bible'.

[13] as well as in media

depicts the pattern of child sex ratios at national as well as at the state level during 1881 to 2001. As the table shows, in number of states the sex ratios are persistently high through out the entire time period, for some states the trend is increasing while for some other it has declined though the pace of decline is not much impressive.

Table 3.1: Time Trend of Juvenile Sex Ratios (0-14): all India, some States, 1881-2001

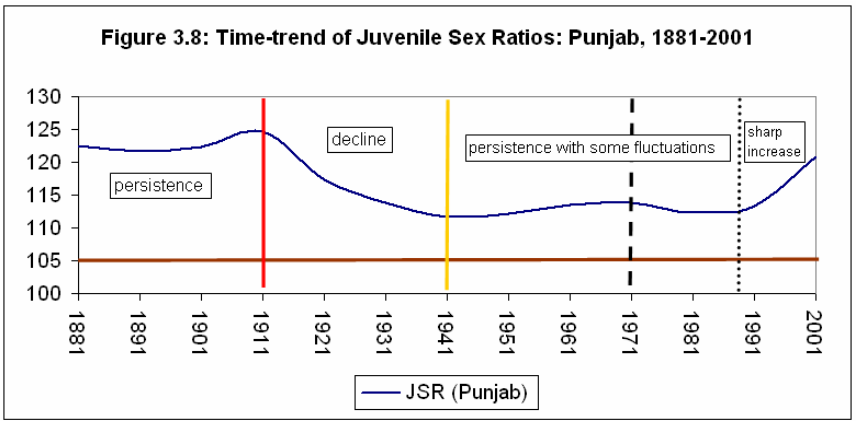
States	1881	1891	1901	1911	1921	1931	1941	1951	1961	1971	1981	1991	2001
India	108	107	106	106	106	106	106	104	106	107	107	107	109
Andhra Pradesh	105	104	103	102	100	101	106	102	102	102	102	104	105
Assam	108	105	105	102	106	106	109	108	103	102		103	105
Bihar	105	103	103	103	105	105	107	105	106	109	108	110	107
Gujarat	110	108	109	108	107	106	106	106	108	109	108	108	113
Haryana	122	117	115	118	112	114	107	110	112	114	113	115	119
Himachal Pradesh	111	109	107	106	108	104	107	101	103	103	104	105	109
Jammu & Kashmir		112	109	110	111	112	112		107	107	105		106
Kerala		102	103	103	102	103	102	102	102	102	102	103	104
Madhya Pradesh	108	108	108	105	106	105	106	105	106	106	106	106	107
Maharashtra	107	104	104	103	104	103	104	104	104	105	105	107	109
Mysore	102	102	103	101	100	101	100	99	101	101	101	103	105
Nagaland		105	104	100	101	101	107	106	103	103	104	103	105
Orissa	106	104	102	102	101	102	102	100	101	101	100	102	104
Punjab	122	122	122	125	117	114	112	112	113	114	112	113	121
Rajasthan		114	113	112	111	110	109	108	110	111	108	110	111
Tamil Nadu	100	101	100	99	99	100	101	99	102	102	103	104	106
Uttar Pradesh	114	111	111	112	112	111	111	108	111	115	114	112	112
West Bengal	108	109	108	108	109	109	109	105	104	103	103	104	105
Andaman & Nicobar	122	98	115	107	116	109		108	103	105	106	104	105
Delhi	98	116	110	119	115	114	112	129	111	112	112	111	115

Source: "The Age Distribution of the Indian Population: A reconstruction for the states and territories, 1881-1961" by Sudhansu Bhusan Mukherjee, East-West Centre

Legends: State/Country with Juvenile Sex ratio more than 105

State/Country with Juvenile Sex ratio less than 100

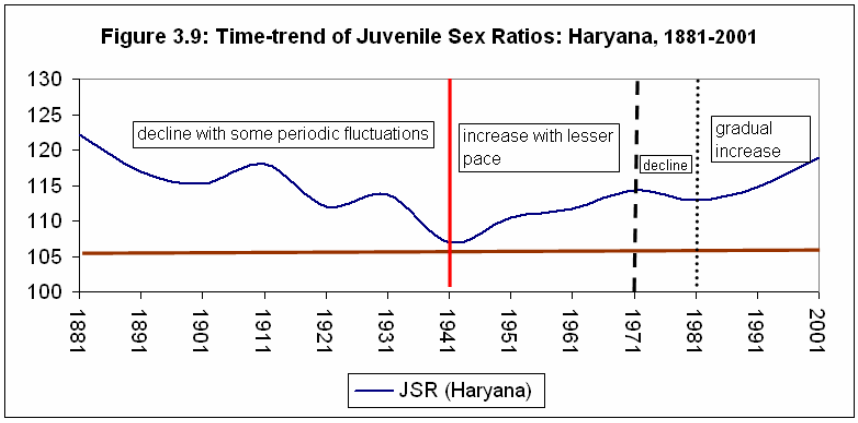
The time trends at the state level do not always obey the national pattern; rather indicate regional disparity is child sex ratio variations. Juvenile masculinity in the North Western part of the country (i.e., Punjab, Haryana, Delhi) is a matter of concern, often identified in the literature as a region, abundantly vulnerable for the life chances of female babies. The literature on Indian sex ratio has repeatedly drawn scholars attention regarding the growing anti female bias in Punjab when the excessive masculinity in juvenile population shows a very disturbing trend with very high sex ratios up to 1911, then a gradual fall up to 1941, followed by the persistence of juvenile sex ratios more than 113 up to 1991 (with some obvious fluctuations) and then a sharp increase.



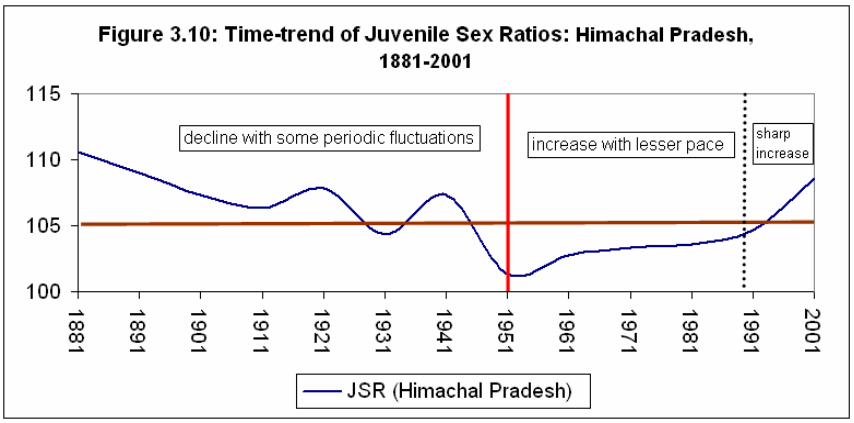
Likewise, in Haryana, another state known to have a historical cultural bias against girl children does show interesting time trend, starting with a declining pattern with some periodic fluctuations up to 1941, then a rise up to 1971 followed by a slight decline up to 1981 and then a gradual increase. Such nonlinearity in time trend of juvenile sex ratio of these two states should have a close relation with its fertility and mortality pattern which call for a thorough periodic analysis. But again due to unavailability of historical data such an important issue can not be pursued. However, the decline in juvenile sex ratio up to 1941 might be related with falling infant mortality and rising life expectancy and gender bias in health for which female children may enjoy some sort of biological advantage even in those engendered society. The pattern since 1941 may be closely associated with some improvement in health environment, further decrease in infant mortality and onset of fertility decline. Finally, the increase in juvenile sex ratios during the last two decade might be a joint-outcome of 'female neglect' (Dasgupta 1987[14], Premi 1994, Bhat et al 2002) as well as diffusion of sex selection technology (Booth et al. 1994, Chowdhry 1994, Kishwar 1995, Arnold 1996, Khanna 1997, George et al. 1998 etc.[15]), which is supposed to be wide spread in these neighboring states.

[14] In her classic study "Selective Dscrimination against Female Children in Rural Punjab, India", Monica Das Gupta opined that in 'Punjabi society discrimination against female children is closely related to individual parents' family-building strategies … neglect is applied selectively among female children'. The study clearly founds much greater gender discrimination in medical care than in food allocation.

[15] The study found calculative attitude of the parents in shaping the sex composition of their siblings by purposive strategies – sex selection, on the basis of birth order, sex sequence of previous children and number of sons. The study also highlights the role of patriarchy and the unethical conduct of some medical practitioners as well as organization in providing the necessary service to killing the unwanted baby-foetus.



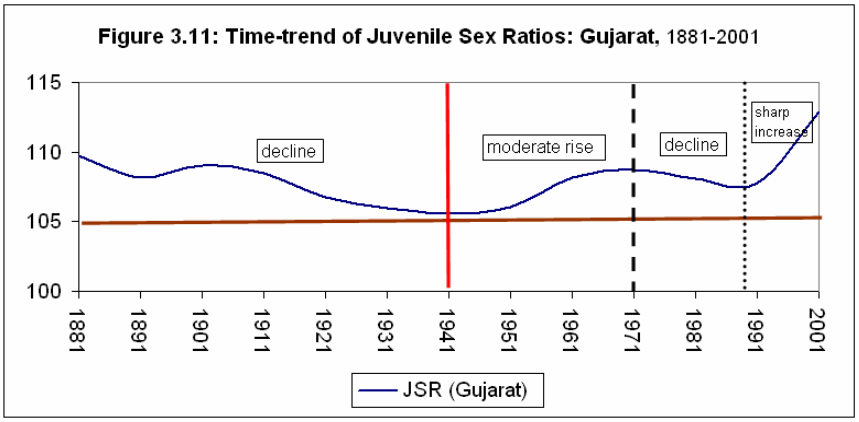
The state of Himachal Pradesh also does show intriguing pattern since the last half of the twenty century. From a very low level of Juvenile sex ratio (101 in 1951) the time trend shows an increasing pattern with lesser pace up to 1991 followed by a sharp increase,[16] very similar to neighbouring states of Punjab, Delhi and Haryana.



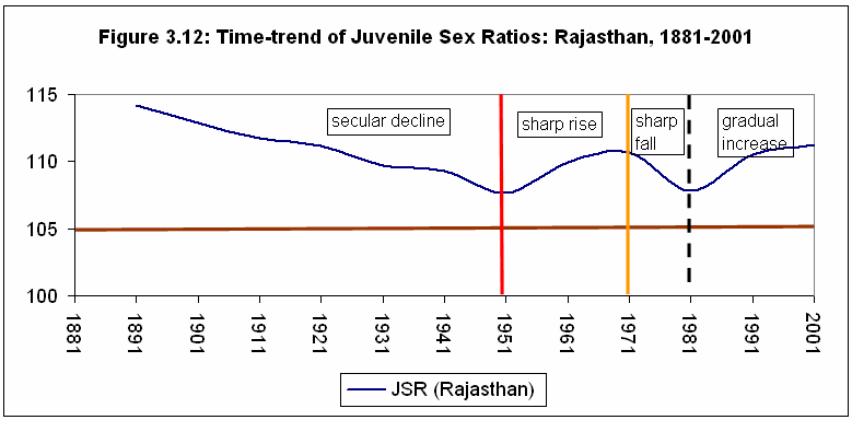
Even in geographically distant state like Gujarat, the time trend of juvenile sex ratio also seems to be much similar with Punjab, Haryana and Himachal Pradesh. After an initial decline in JSR up to 1941, the time trend has shown an increasing pattern up to 1971, followed by a sharp decline up to 1991, and lastly a sharp increase during 1991 and 2001. Without much confusion, it can be stated that such pace of increase in contemporary juvenile masculinity might be related with well entrenched diffusion of sex selection, pointing towards excessive female foeticide in at least some major parts of this state[17].

[16] with no sign of reverse

[17] The circumstantial evidences of sex selective foeticide in the prosperous urban areas of Gujarat is documented in "Gujarat: An emerging 'epi-centre' of female deficit" By Siddhanta, Nandy & Agnihotri, 2003. The chairperson of Centre for Women Development studies also addressed that the state Gujarat topped the list with sex detection clinics spreading even to small towns.



The time trend of juvenile sex ratios for the state of Rajasthan shows a secular decline up to 1951, followed by a rise up to 1971, then a fall up to 1981 and at last, an increasing trend (figure 3.12). The pace of rise in juvenile sex ratios since 1981 seems to be rather slow, much different than what has been observed in Punjab, Haryana, Himachal Pradesh, Delhi[18] and even in the neighbouring state of Gujarat. The flattering of juvenile sex ratio during 1991 to 2001 may evoke the role of sex selective diffusion among the majority of the population of this state and may be more prone to gender-based discrimination that have a strong root in the history and contemporary cultural of this state[19].



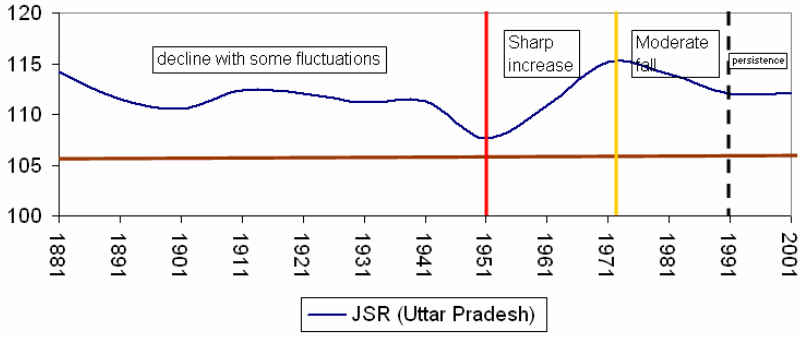
Uttar Pradesh, one of the most populous state in India, is characterized by 'mutually-reinforcing nature of different types of inequality' (Drèze and Sen 1996) related to class,

[18] After showing a fairly stable juvenile sex ratio at around 111 boys per 100 girls, the state of Delhi has shown a sharp increase in its JSR values (115) between 1991 and 2001.

[19] Gender bias in basic entitlement seems to be substantial in Rajasthan (Siddhanta et al. 2003, 2005, Mohanty 2006 etc.). Beside that the status of women in this state, if not fully, is still determined by traditional culture, namely – patriarchy. The 'Sati' incidence of 1987 at Deorala village of Sikar district brings out the aggressive proliferation of regressive cultural practice even in the later part of the so-called 'modernized' and/or 'civiliged' twenty-first century.

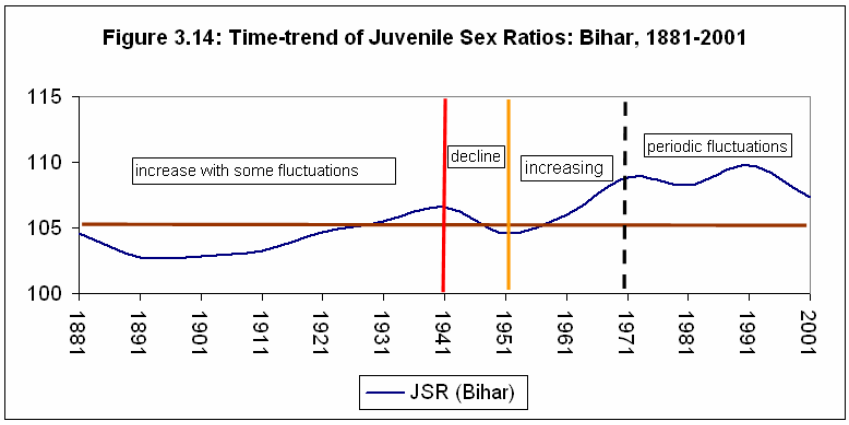
caste and gender[20]. The state does show interesting time pattern of juvenile sex ratio which is much similar to its contiguous state like Rajasthan and Bihar. Similar to Rajasthan, the juvenile sex ratio of this state shows a declining trend up to 1991 followed by a sharp rise up to 1971, then a decline up to 1991. During 1991 to 2001 the juvenile sex ratio of the state is staggering around at a high level of 112, if continued will have a disastrous demographic outcome in decades to come. While the sharp increase between 1951 and 1971 might be a consequence of parity based gender discrimination, the decline of juvenile sex ratio from 1971 to 1991 might be associated with lesser manifestation of son preference with the onset of fertility decline, at least in some parts of the state. The contemporary pattern since 1991 highlights staggering gender discrimination at the lower parity – a pattern associated with engendered fertility decline. However, the efficacy of diffusion of sex selection is slightly questionable though cannot be ruled out[21]. Sex selective foeticide, if practiced, the intensity of abuse might be much lower than Punjab, Haryana, Himachal Pradesh and Gujarat.

Figure 3.13: Time-trend of Juvenile Sex Ratios: Uttar Pradesh, 1881-2001



[20] National Family Health Survey reflects severe gender disadvantage in the rural parts of this state.

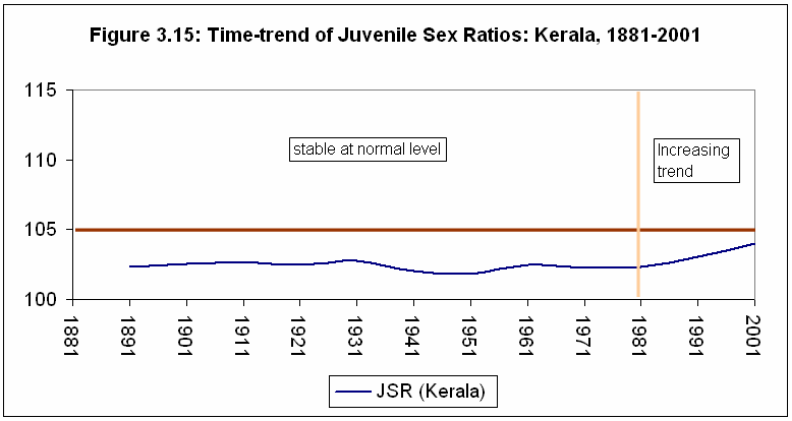
[21] At least some of its urban segment, particularly the western border districts which are contiguous to Punjab and Haryana, Child sex ratio of 2001 shows alarming decline. The urban tehsil of Shajahanpur records the worst child sex ratios(0-6) in the country. George (2007) points out the very disturbing child sex ratio of urban industrialized Sonbhadra and expressed concern about the possible unethical conduct of medical professionals.



The state of Bihar exhibits puzzling pattern of juvenile sex ratios with some periodic oscillations. Unlike the other neighboring states[22], infant mortality rate of Bihar is historically strikingly low though the pace of fertility decline is rather slow, together which indicate that 'female neglect' might be an important proximate determinant of juvenile sex ratio in this state. However the slight fall in JSR value during 1991 to 2001, may be related to recent decline in fertility owing to quantity-quality transition with relatively lesser manifestation of gender bias in its child population.

Apart from the masculine juvenile sex ratios in the North and North-Western states of India, which is also traditionally known as male centered kinship region where status of female is supposed to be socially and culturally restricted by age-old tradition, the time trends of the Juvenile sex ratio of the Southern states are much different. Among the Southern states, the sex ratios of Karnataka and Kerala has been found to be gender-neutral, though the state of Tamil Nadu does exhibit an increasing trend during the last thirty years (Census 2001, Agnihotri 2002, 2003, Srinivasan et al 2008). Even then close inspection of the data presented in Table 3.1 indicates the possibility of future gender distortion in the juvenile population in the so called 'female friendly' southern regions including Kerala. After showing a balance sex ratio for 100 years, the juvenile sex ratio of Kerala is slightly increasing since 1981[23], though we must wait for the next census to make any substantial comment regarding the possibility of 'missing females' among the so called gender neutral Keralites.

[22] like - Uttar Pradesh, Bihar & West Bengal
[23] Patel (2008) also expressed her deep concern regarding the recent rise in child sex ratios in Kerala.



This section brings out the time trends of juvenile sex ratios at the state level which sometime differs from the national trend. In a number of states, we observe a sharp increase during the contemporary period, points to believe that technological intervention might be at work. Analysis on the basis of more disaggregative unit may certainly help us to understand the contemporary pattern of juvenile sex ratios or/and its intensification with time, at least in certain parts of the country. The trend analysis, pursued in this section, indicates one very important dimension of juvenile sex ratios – rising masculinity in the child population is basically a contemporary issue, though it may have some historical roots. It will not be correct to state that rising masculinity in the juvenile population is an ever-increasing syndrome since the beginning of the last century[24], rather should be considered as a continuing phenomenon in the backdrop of modern technology-led economic development. When excessive manifestation of gender bias is supposed to be a contemporary phenomenon, it is expected to be well tackled, if not fully, by effective policy discourse. However, the policy to combat growing masculinity in Indian population should be contextual owing to the expected huge fiscal requirement for policy intervention on one hand, and its area wise requirement on the other. The next section of this chapter, tries to shade some light on the changing perspective of regional disparity in sex ratio pattern using the historical data set from 1891.

4. Contours of juvenile sex ratio Increase: A regional perspective

While the trend analysis can help us to understand the nature and magnitude of the problem, it often fails to highlight where the problem occurs or where it penetrates. The

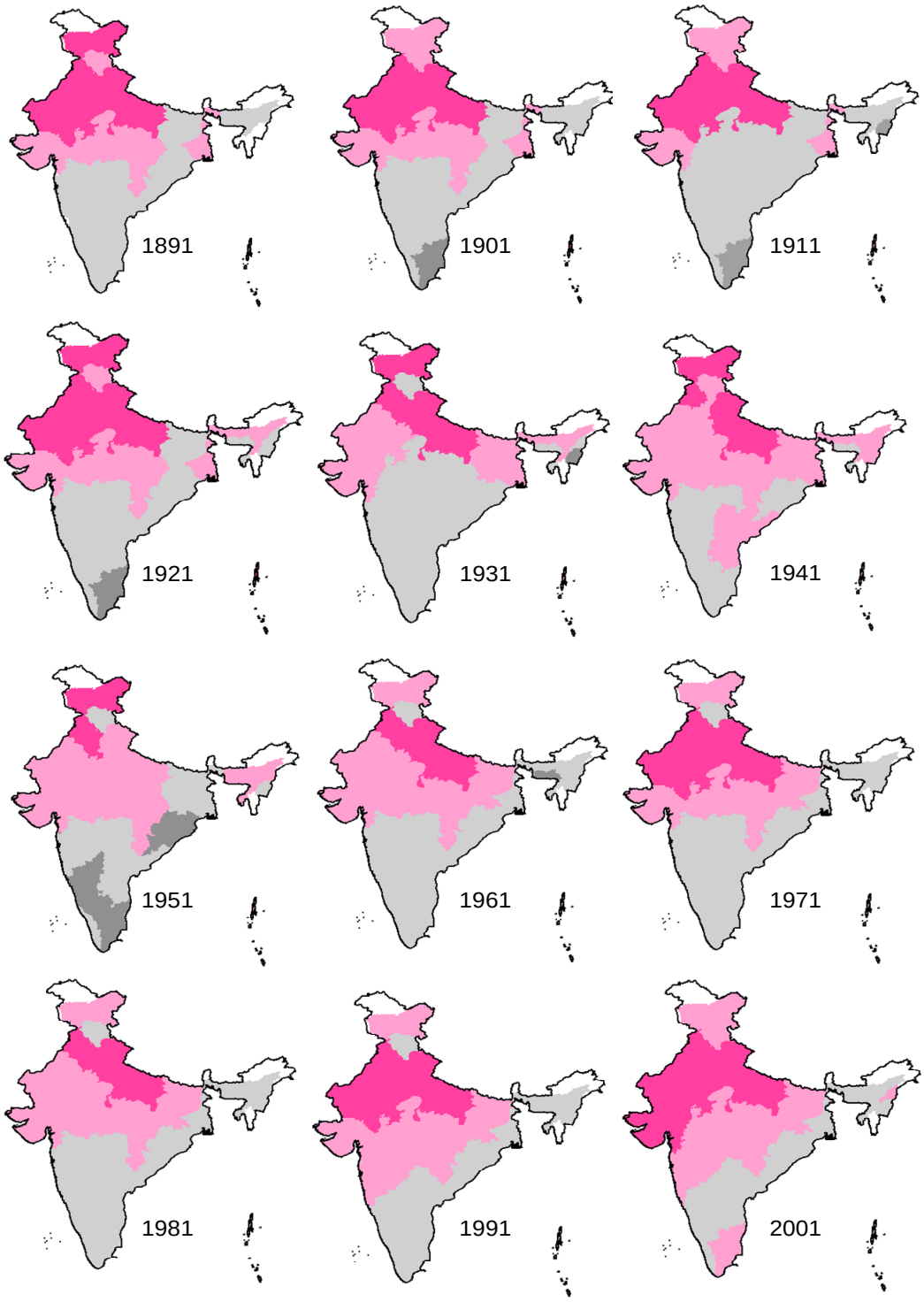
[24] as repeatedly argued in the literature of sex ratios and also in mass media

state level disaggregative analysis of the previous section confirms wide regional variability in juvenile sex ratios on one hand and brings forth the striking similarities of sex ratio pattern among some neighbouring states, on the other. This section, thus tries to highlight the spatial pattern of sex ratios using a panel dataset from 1891 to 2001 to facilitate a comparative analysis to understand the changing contours of juvenile masculinity in Indian population.

A map speaks more than thousand words. Mapping techniques thus found to be very effective to understand the nature and magnitude of any social problem that has spatial connection. We have chosen, therefore, to bring the contours of sex ratio increase to depict the situation and its change on the basis of mapping technique[25].

In order to represents the maps of juvenile sex ratios, first we classify the data into four categories according to *subjective stratification strategy*. We have chosen 105 as a normal sex ratio of the juvenile population in a non discriminatory environment[26]. We shade dark grey for states with sex ratio values less than 100 as such values indicate poor health conditions as well as high infant mortality in a non discriminatory mode[27]. We shade light grey for states with sex ratio values 100-105 as this category indicates rather balanced situation but with a chance of relatively higher male child mortality. We shade light pink for areas with juvenile sex ratios more than 105 but lesser than 110 and finally use dark pink (i.e. states with JSR>110) to highlight the most affected regions. The following panel of maps shows the spatial distribution of juvenile sex ratios (0-14 years) for the time period 1891 to 2001.

[25] Use of mapping technique is a common tool applied in demography, anthropology, sociology and even in economics.
[26] There is long debate regarding the normal sex ratio of the juvenile population. According to Klasen 2003, the contemporary expected sex ratio at birth of India would be very close to 104, while according to Guilmoto 2007, the expected sex ratio would be 105 or even 106. We have chosen 105 as the possible benchmark as it is the weighted mean of sex ratio at birth for a set of 16 industrialized countries which lies between 104 and 107 (Srinivasan et. al 2007). The list of counties is given in appendix 3.1 with their respective sex ratio at birth values.
[27] In a non discriminatory environment, the risk of child death is biologically more pronounced for the boys than their counterparts.



Map 3.1: Changing Contours of Juvenile sex ratios in India, All India, State level, 1891-2001

The above sex ratio maps do confirm spatial contiguity in its pattern. It shows that state level sex ratio figures seem to be spatially continuous, far from being random. But the geographical contiguity, as envisaged from the above maps, does not always seem to be continuous with time rather shows some erratic pattern up to 1941. Even then, robust clustering of juvenile sex ratio at the north and north western part of the country seem to be obvious and such patterning of high juvenile sex ratio are mostly confined within northern and central parts of India. During 1891 to 1911, the areas with high juvenile sex ratios (more than the standard normal 105 males per 100 females) have shrinked though the pattern of intensified gender bias in child population actually seems to be staggering. The pattern of spatial contiguity of juvenile sex ratio of 1921 is almost similar to 1901 which decreases considerably during 1931 but increases rather inconsistently up to 1941. Such erratic movement of juvenile sex ratio during this pre-independence period needs detailed analysis, beyond the scope of this present study. However, the effect of socio-economic and political turmoil of this period may be an important aspect of such erraticism. The quality of census enumeration during this period may also be questionable. During 1891 to 1941, the state of West Bengal is showing persistent gender bias in juvenile population – an agenda completely overlooked in the cultural history of West Bengal[28]. When the spatial patterning of high juvenile sex ratios seems to be erratic during 1891-1951, the gradual shrinking of areas with juvenile sex ratios more than 110 is found to be very consistent, indicating gradual fall in intensified gender bias in juvenile population during the first half of the last century. But since 1951, the geographical distribution of juvenile sex ratios is found to be systematic. As the maps show, during this period, gender bias against girl child might be widespread in north and north western part of the country and such cultural practice have intensified with time. The sex ratio maps of 1961 and 1971 clearly divide India into two parts. Sex ratios in the Northern and Western part has been distinctly more masculine than those in the southern – eastern part; a trend that has been attributed to the regressive cultural practices in the north western region and relatively female friendly culture in the south-eastern part (Dyson and Moore 1983). Sopher (1980), Miller (1981) and Agnihotri (2000) also highlight the excessive manifestation of gender bias among the northern and north western parts of the country.

[28] The state of West Bengal is known to be a demographically advanced state owing to its strong hold of intellectual base.

Apart from this cultural difference between these regions, the other characteristics of such 'North-South' divide are distinctly different land inheritance system, historical influence and more prominently difference in the arrangements in the socio-political institutions.

Up to 1971, the spatial pattern of juvenile sex ratios seems to be culturally mediated - indicating 'female neglect' agenda as an important contributor of gender bias in child population. It should be noted in this connection, that up to 1971, the fertility level of the country is staggering around six children per women and only starts falling during 70s with sufficient reduction in infant mortality rates. Robust clustering of states with high juvenile sex ratios up to 70s clearly substantiates excessive gender discrimination at the higher birth order in an environment of stalling fertility and falling mortality. But such Parity based gender discrimination, rather seems to be confined within a particular geographical setting and does not traverse towards the other cultural geography of Indian population.

Intensification of gender bias in Child population seems to have reduced during 1971 to 1981, but again starts growing since 1981. During 2001, the geographical coverage of areas with juvenile sex ratios more than 110 seems to be the highest in the last 100 years. Such increase in areas with high juvenile sex ratios might indicate intensification of gender vulnerability, which is particularly relevant in the north and north western part of India. Beside such intensification effect, the increase in areas with juvenile sex ratio more than 105 during 1981 to 2001 also needs to be flagged. The 2001 map of juvenile sex ratio clearly indicates that girl child vulnerability is no more confined within north and north western part of the country. It could be located in some parts of 'female friendly' south. The changing contours of high juvenile sex ratios calls for more in-depth analysis as such pattern as well as regional variations cannot be explained only in terms of traditional cultural bias or land inheritance system or historical influence rather indicates the efficacy of diffusion of sex selection technology and the arrangements of socio-

political organizations that seems to be relevant in viewing the recent increase in non-secularism in the socio-political organizations in some of the major Indian states[29].

Conclusion

The above analysis thus highlights some salient features of juvenile sex ratios which are partly unaddressed in the literature. First and foremost this paper tries to highlight that the masculanization in Indian population is a staggering phenomenon of Indian demography which gets momentum during the recent period after a considerable increase in prosperity and educational level. The variations of time trend of juvenile sex ratios is clearly related to other demographic characteristics namely mortality decline, improvement in life expectancy, gender bias in life expectancy and fertility pattern. Even then, the association between socio-economic factors and juvenile sex ratios cannot be ruled out as the time trend of juvenile sex ratios starts growing only after improvement in GDP per capita and/or improvement in literacy. The study chalks out different transition schemes in sex ratio patterns and brings out one new feature of demography - 'sex ratio transition'- a probably unique characteristics of India as well as Asian demography with mortality declining first, followed by increase in juvenile sex ratios and growing masculinity in juvenile population in the wake of fertility decline.

India is not a monolith. Owing to its socio-economic and cultural diversities, the magnitude of regional variations in sex ratios is found to be substantial and such regionility might be comparable with the demographic masculinization of China. The state level trends of juvenile sex ratio do confirms the regionality in its pattern and also hints that the process dynamics behind such persisting phenomenon is complex, starting from gender discrimination or 'female neglect' to diffusion of sex selection technology. But the penetration of excessive masculinity in contemporary child population is found to be higher in those states where discrimination against girl child is embedded in its culture.

[29] However the impact of contemporary increase in non secularism in socio-political organizations on juvenile sex ratio needs in depth investigation, an important research agenda beyond the scope of the present study. But even then we must highlight this issue in viewing the recent literatures on development economics and demography that endorses that 'polities which foster local accountability is the most conducive to rapid development including rapid fertility decline' (Dasgupta 2002).

It is important to undergo periodic analysis of juvenile sex ratios, so that the policy variables can properly be identified. When the masculinity in juvenile population is persisting for such a long period, it is hard to believe that any scientific formula can reduce the century old concern very promptly; rather it might be more important to frame a policy directives giving adequate emphasize towards some salient features that may have sufficient potential to make the juvenile population more masculine. The systematic sharp increase in juvenile sex ratio during the last two decades in contrast to some erratic pattern of the earlier period seems to be an important feature that may have some future implications. Despite the historical 'North-South' divide in juvenile sex ratios, the striking contemporary similarity in its pattern, at least in some parts, clearly points towards sex selective diffusion which has enormous potential to lead the population as well as the society towards greater instability. It is now important to focus the contemporary patterns, trends, determinants and geographical contours of juvenile sex ratios to highlight the possible core areas of female deficit as the campaign against sex selection and some of the corrective action have to begin at the 'epi-centres' themselves. Above all, it is now really important to unmask the different line of diversities in the contemporary increase in juvenile sex ratios not only to focus the target variables but also to find ways for minimizing potential social loss in coming future.

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Appendix 3.1

Countires	SRB	Year
Australia	106	2004
Canada	105	2003
Chile	105	2003
France	105	2004
Germany	105	2004
Guatemala	104	1999
Italy	106	2003
Japan	105	2004
Kazakhstan	106	2003
Morocco	105	2001
Netherlands	105	2004
Polland	106	2004
Romania	106	2003
Spain	106	2003
United Kingdom	105	2003
Venezuela	107	2002