Sex Ratio patterns among the scheduled castes in India 1981-2001

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Abstract: The ratio of girls to boys (ie. Sex ratios) in India reveals excess girl child deficit in comparison with developed and many other developing countries. Masculinisation in the juvenile sex ratio (i.e. f/m ratios) in Indian population further gets momentum during the last decade (Agnihotri 2001, 2002) in the wake of prosperity (Siddhanta et all 2003). Such lowering in f/m ratios cannot be explained away by the popular escape hatches of yester days, like - migration, under counting and biological factors, rather indicate the presence of human factors, which point out the change in behavioral pattern in the presence of socio-economic and cultural contexts. Sex ratio patterns in the Indian population show considerable variations by regions, religions, prosperity classes, social groups e.g. scheduled castes and tribes, location i.e. urban or rural and even by age groups. While some of these variations have been given adequate attention in the received literature e.g. the north south divide, many others e.g. variations in the sex ratio patterns among the scheduled castes and the scheduled tribes have not. It is important however, to study these patterns so as to understand the nature and evolution of the gender bias that may exist among these groups.

The analysis below looks at the sex ratio patterns among the scheduled castes in the country as revealed by the population census data for 2001 and the previous census. Traditionally, the sex ratio patterns among the scheduled castes have been presumed to be more balanced than among the overall population, but the facts even from the 1991 census reveal otherwise. In fact in certain pockets where sex ratios among the overall populations have been masculine, the f/m ratio (FMR) figures among the scheduled castes are also alarmingly low. A comparison of the data from the 1991 and 2001 census shows a disturbing trend of spread of low female to male sex ratio in the child population among the scheduled castes to newer regions and intensification of such masculinity in the existing pockets. What is even more worrying is this emergence of 'daughter dislike' in pockets hitherto assumed to be free from such biases. This should be a matter of serious concern to policy planners, researchers and activists alike.

Key Wards: Female-to-male Ratio, Girl Child Deficit, Social Groups, Contour Map, Socio-spatial diffusion, etc.

JEL Classification: J16, O18, R12, Z1, etc.

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Introduction: Low female to male sex ratios (f/m ratios) in the Indian population has been a subject matter of long and considerable debate. The concern about the low and declining f/m ratio has been further intensified after the publication of the 2001 census data which showed a considerable lowering of the f/m ratios in the child population. The masculinity of the sex ratios in certain pockets was so strong as to raise an alarm in different quarters about the high incidence of female feticide based on pre-natal sex determination. Research during the last few years has clearly indicated an accelerated trend of sex selective abortion, significantly higher levels of 'female deficit' in the urban areas, and intensification of this trend among the urban and the rural rich. There is however a clear need to disaggregate the sex ratio data by different factors, identify regions and groups with unusually low female to male ratios and deliberate on remedial measures. Analysis of the sex ratio patterns among the scheduled castes is a step in this direction.

While disaggregated analysis of the sex ratio data by factors like region or age has been common in the received literature, sex ratio patterns among different social groups has not gained much currency. Usually, the presence of the scheduled caste and the scheduled tribe population is handled in the overall analysis of by incorporating their percentage in the population as a 'dummy variable'. Besides, there is a tendency to club these two groups together under the common rubric of being poor, marginalized or of the labour supplying class (Boserup, 1970). The need to look at the scheduled caste and the scheduled tribe population separately and explicitly, and analyze the sex ratio patterns among them was elaborated in Agnihotri (1996 and later in 2000). Distribution of these two population groups in the country as well as the social dynamics of the 'mainstreaming' of these two groups in the society has been quite different. The lowering of the FMR among the child population in the scheduled castes has been much more alarming in certain pockets and the correlates of the f/m ratio among them have followed different dynamics compared to the tribal or the non-SC / ST population. The analysis below examines these issues further.

Usually the data on the scheduled population in the earlier census publications used to be released with a considerable time lag compared to the data for the overall population. During the 2001 census, however, this time gap has been substantially lower and the district-wise population data for the SC population by the 5 year age group are available now. These will form the basis of the present analysis and facilitate a comparison with a similar analysis of the data from the 1991 census done earlier (ibid).

While the overall population sex ratios are affected by migration figures, the sex ratio in the younger population is not. As such an analysis of the child sex ratio data is considered more appropriate (Sopher, 1980, Miller 1981). Usually, the census figures for the 0-6 year age group become readily available due to the imperative of estimation of literacy figures in the country. It has been argued elsewhere, however (Agnihotri, 2000), that an analysis of the 5-year age group data by the 0-4 and 5-9 year age group in the census is more appropriate for the purpose of a better understanding of the gender biases that obtain in any group.

Apart from the disaggregation of the data by the 5-year age group, it is also important to separate these by the location i.e. urban and the rural. As more than 80% of the SC

population is based in rural areas, the analysis first looks at the district level sex ratio patterns in the rural population. It then takes up the sex ratio patterns for the urban population after analyzing the distribution of the SC population in the urban areas. It appears that the access of the SC population to the urbanization process has often not been commensurate with their proportion in the overall district population.

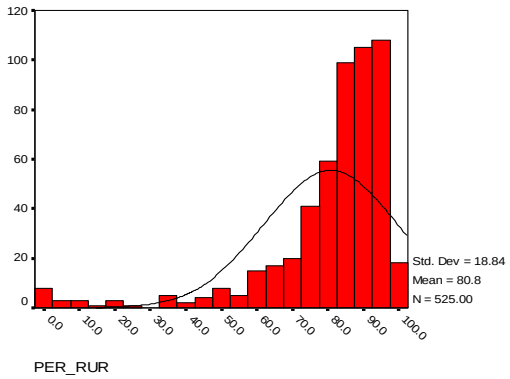
Analysis of the data reveals an increasing trend of lowering of child sex ratio (f/m) between 1991 and 2001. More and more districts are showing a lower FMR figure in 2001 compared to those in 1991. More disturbingly, the masculinisation of sex ratios in the districts having low FMRs in 1991 is further aggravated in 2001. The third and the more worrying pattern is the breach in the traditional 'north south divide' in the sex ratios which showed lower FMRs in the north western part of the country and higher FMRs in its south eastern part with the Narmada - Sone axis acting as a barrier between the two. Like the legendary sage Agastya, low FMRs have decisively breached the Narmada – Vindhya barrier with emergence of epicenters of female child deficit in the Madurai – Theni belt in Tamilnadu or the Dhule-Satara belt in Maharashtra.

The discussion is organized as follows; the next section looks at the sex ratio patterns in the 0-4 and 5-9 age groups using the 2001 data and briefly looks at the pattern of sex ratios in urban population. Section III presents a new but useful representation of the sex ratio patterns through 'cumulative curves' providing time series comparison of how the f/m ratios have evolved for the 0-4 and the 5-9 age group between 1981 and 2001. Final section concludes.

II

The backdrop: The scheduled castes constituting about 16.2% of the country's population represent historically disadvantaged sections of the society. According to the 2001 Population Census India has 585 districts with SC habitants. There are as many as 520 districts where SC population accounts for more than 10% of the district population. Most districts have the SC population mainly residing in rural area (Figure-1).

Figure 1: Distribution of Rural SCs out of the total population



To begin with however, we look at the f/m(0-4) and f/m(5-9) figures at the state level for the urban as well as the rural population. The usefulness of the analysis of FMRs by these five year age groups have been elaborated elsewhere (Agnihotri, 2000). Very briefly, the f/m values in the 0-4 age groups are an outcome of a mixed pattern of excess male mortality during infancy and the excess female child mortality during the next four years

of life. In the absence of any interference, there is always an excess of male mortality during infancy since the female fetus and the female infant is biologically stronger compared to her male counterpart (Waldron, 1987). This biological advantage wanes during the subsequent years of life due to the inequality faced by the girl child in access to food, nutrition, health-care and other life sustaining resources. As a reason there is an emergence of excess female child mortality based on behavioral as opposed to the biological reasons. The stronger the inequality, the larger is the excess female child mortality. F/m ratios in the 0-4 age-group represent a mixed outcome of these opposing trends. But there is a stronger influence exerted by the excess male infant mortality since infant mortality accounts for a major share of child deaths[4].

In the 5-9 age group however, f/m ratios reflect the net outcome of the 'tug of war' between the two opposing trends at the 5th birthday. The stronger the discrimination against the girl child, the lower is the f/m ratio at the 5th birthday. This net 'female deficit' is reflected in each of the single year age cohort in the 5-9 year group. Usually therefore, the f/m ratios in the 5-9 year age group are lower than those in the 0-4 age group the difference being determined by the extent of discrimination against the girl child. This does not hold true, however, where there is an active element of pre-natal elimination of daughters through sex selective abortions (or in some cases infanticide). In such a situation f/m ratios in both the age groups are quite low. We will see the instances of this while analysing the district level data.

Table – 1 (in Appendix) provides state-wise figures for the f/m ratios in the 0-4 and 5-9 year age group population for the total, rural and the urban population. It also provides the population in absolute terms for the 0-9 age group. Some of the states e.g. Mizoram or Meghalaya have very small SC population and the f/m figures will as such be subject to a statistical fluctuation. Most other states have a sizeable SC population. The table also gives the % of the SC population staying in the urban area. Except the urban states like Delhi and Chandigarh and major states of Maharashtra, Gujrat and Goa, only a small fraction of the SC population of different states resides in urban areas. We map therefore, the rural f/m ratios for the 0-4 and 5-9 population below.

Figure-2: F/M ratio for the 0-4 and 5-9 year age group by states – 2001 census data

The spatial distribution of FMR 04 and FMR 59 for rural population shows certain striking patterns. While the f/m ratios in the 0-4 age group show a clear north-west to south-east gradient across a cut-off value of 935, the f/m ratios in the 5-9 age-group show a north – south divide around a cut off value of 940.

State level data however conceal considerable intra-state variations. It is the district level data that produces more intriguing and nuanced patterns. While the district of Fatehgarh Sahib records the lowest 0-4 FMR of 750 for the rural population, the number of districts with f/m ratio below 880; (about 40), is not just confined to Punjab and Haryana but small clusters of such low f/m can be observed in the states of Gujrat, Maharastra, and TamilNadu. Figures 3A1 to 3C2 below indicate how the low FMR region spreads from an epicenter (f/m < 880) in Punjab and Haryana to a larger area covering the north –

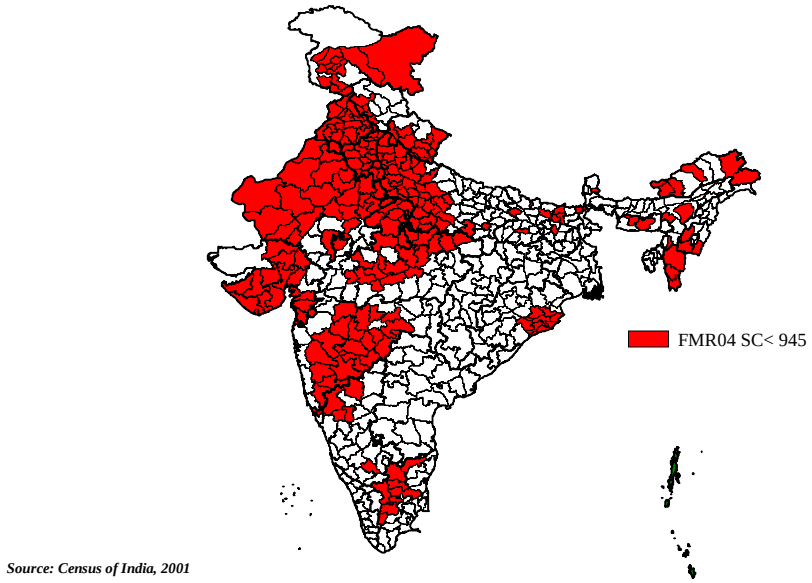
[4] About 90% of the deaths under-10 happen by the 5th birth day, infant mortality accounts for nearly 66% of the under-5 mortality while mortality in the first month (neo-natal) accounts for 66% of the infant deaths.

western states and a sizeable chunk in Gujrat, Maharashtra and Tamilnadu for f/m < 940. The corresponding figures for the f/m in the 5-9 year age group shows larger number of districts with very low (below 880) and low (below 910) f/m ratios. Interestingly, this pattern spreads in the easterly direction towards eastern UP and Bihar before engulfing a large contiguous belt of northern region while making clear ingress in the southern and eastern region.

A comparison with the 1991 data reveals that the contiguous region where f/m 0-4 was lower than 960, more or less coincides with a region in 2001 where f/m is below 945. This indicates an intensification in the lowering of the f/m ratios as well as its spread into the southern districts. Elsewhere (Agnihotri, 2000) it has been argued that the cut off level of f/m of 960 essentially correspond to the figure for sex ratios at birth. Regions where female child was discriminated against, the f/m ratios in 0-4 age group went below 960 while in other regions these remained above this level. Such a scenario perhaps obtained where the discrimination had not taken proactive forms like female foeticide. Once this has started, the f/m ratio at birth has also started becoming lower and tell tale signs of this can be seen in the lowering of the threshold.

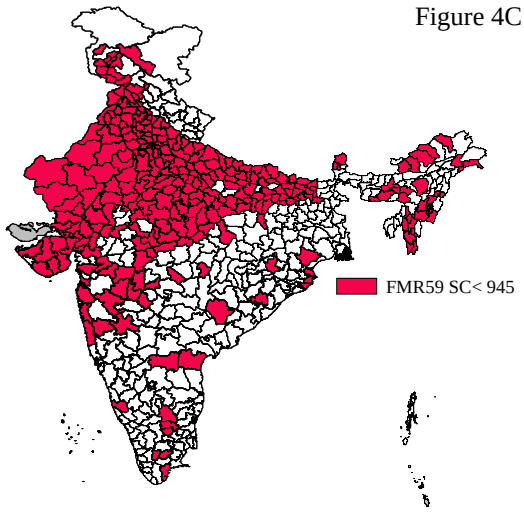
Figure 3: Spatial Pattern of FMR04
among the SCs in Indian Districts, 2001

Figure: 3C



Source: Census of India, 2001

Figure 4: Spatial Pattern of FMR59
among the SCs in Indian Districts, 2001



Interestingly, the f/m 5-9 does not quite show such an intensification for the very low levels of f/m. The regions with f/m below 910 remain more or less the same as were seen in the 1991 census. However, the larger region of f/m below 945 (Figure 4C) in 2001 coincides with a similar region in 1991 with a cut off level of 960.

The affected districts of these three states act as the epicenter, the source of the problem. These epicenters exactly match with the epicentres[5] of the declining 0-6 sex ratio for the general population as evident from the 2001 data. These districts are not the new ones to be affected only recently but had been the loci of discrimination since long[6].

How does the urban SC population behave? Table - 2 (in Appendix) provides a state wise comparison of the child population in urban areas for the over all and the SC population. The % of child population in urban areas gives us the extent of urbanisation sans temporary migration. Barring North East and some of the highly urban states / UTs, the urbanisation among the SC population is significantly lower compared to the total

[5] The concept of epicenter has already been discussed in earlier papers by Agnihotri 2002, 2003.
[6] Evidence of low 0-4 sex ratio among the SC population had been there even in 1981 census.

population. In absolute terms too, the % of SC population staying is rural areas is low at all India level, 17.5% compared to 28% for the overall population.

Data in table 1 shows that the f/m ratio for the urban SC population in 0-4 age group is 932 at all India level, which is 21 points lower compared to the f/m ratio in rural population. However, major contribution to this difference comes from UP, Gujrat and Himachal Pradesh. In other states the urban f/m ratios are more or less comparable with the rural ratios. Wherever the rural f/m ratios are low, e. g. Punjab, Haryana and Delhi, the urban f/m ratios are low too. Where the rural ratios have intermediate values e.g. MP, Maharashtra and Rajsthan, the urban ratios show intermediate values and where the rural ratios are high as in southern and eastern states, the urban values are high too. One could say that the SC population has by and large tended to emulate the other castes.

A similar pattern can be noticed in the 5-9 age group f/m ratios. Himachal, UP and Gujrat again show lower ratios in urban areas but in most other states the rural and the urban f/m ratios are comparable. The SC households in three states are discriminating against their girl child through neglect as well as through pro-active elimination.

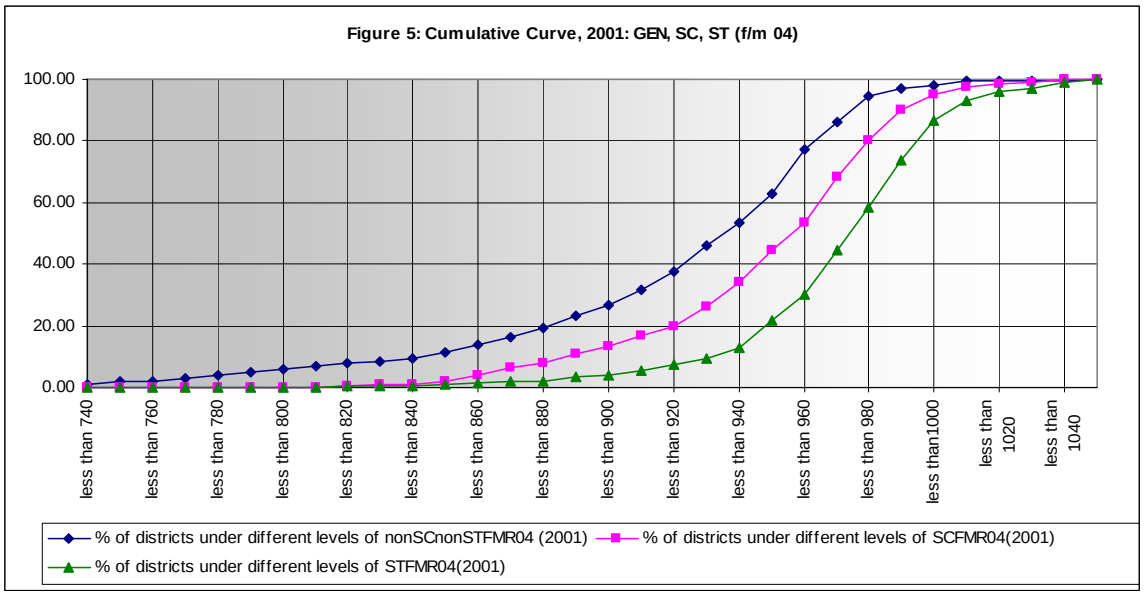
We also see a four-fold combination of f/m 0-4 and f/m 5-9. There are regions where both are low. This is the region where discrimination against the girl child is actively done. Then there is the traditional pattern of higher f/m in the 0-4 age-group and low f/m in 5-9 age-group. Here the lowering of sex ratio in the 5-9 age group is due to the excess female child mortality due to neglect. Third group of districts is where both the age groups show balanced sex ratios. There are hardly any set of districts where f/m are low in 0-4 age group while those in the 5-9 age group are high. But where this happens, it is plausible to say that the active discrimination against the girl child may have intensified in the 5 years preceding the census. This is because the 0-4 year age group indicates what has happened in the five years immediately preceding the census while 5-9 age group data represents the dynamics 6-10 years before the census year.

III

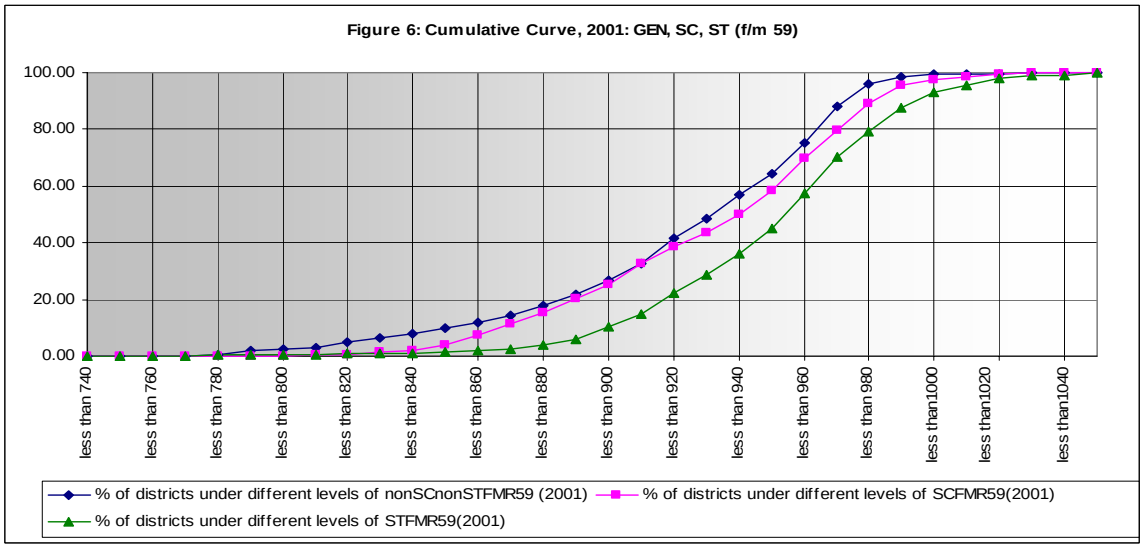
Cumulative curves, a new representation: Intensification of the problem is quite clearly shown through a rather unusual but very useful representation of the f/m ratios. This representation called cumulative curve is borrowed from the idea of ‘cumulative curve’ used in welfare economics and shows the % of districts having f/m ratio below a given cut-off level plotted against the cut-off level. Figure 5 gives the cumulative curve for the f/m ratio for the 0-4 year age group for the SC, ST and the non-ST/SC or the ‘general population.

Several points can be noticed. The curve will always begin with zero % districts below certain cut off value of the f/m ratio at some low value of the f/m ratio and rise as the cut-off level increases. The lower such value, and the more the area under the low end curve, the more masculine the sex ratios are. The % of districts will eventually reach 100% at some high value of the f/m ratio. We notice that the f/m ratios among the general population are more masculine followed by the SC and then the ST. Nearly 20% of the districts have f/m ratios below 880 for the general category where as the corresponding

levels for the SC is 920 and for the ST it is even higher, 950. Similarly at the higher end 95% of the districts get covered at the cut off value of 980 for the general category while the corresponding level for the SC is 1000 and the ST, 1020. Another way of inferring the masculine nature of the sex ratios is to take a particular cut off e.g. 900. While only 4% districts have f/m 0-4 below this level for the ST, corresponding % for the SC is 13.5 and for the general category it is nearly 27% [7]. Quite clearly the cumulative curve for the SC population occupies a position intermediate between the general and the tribal segment.



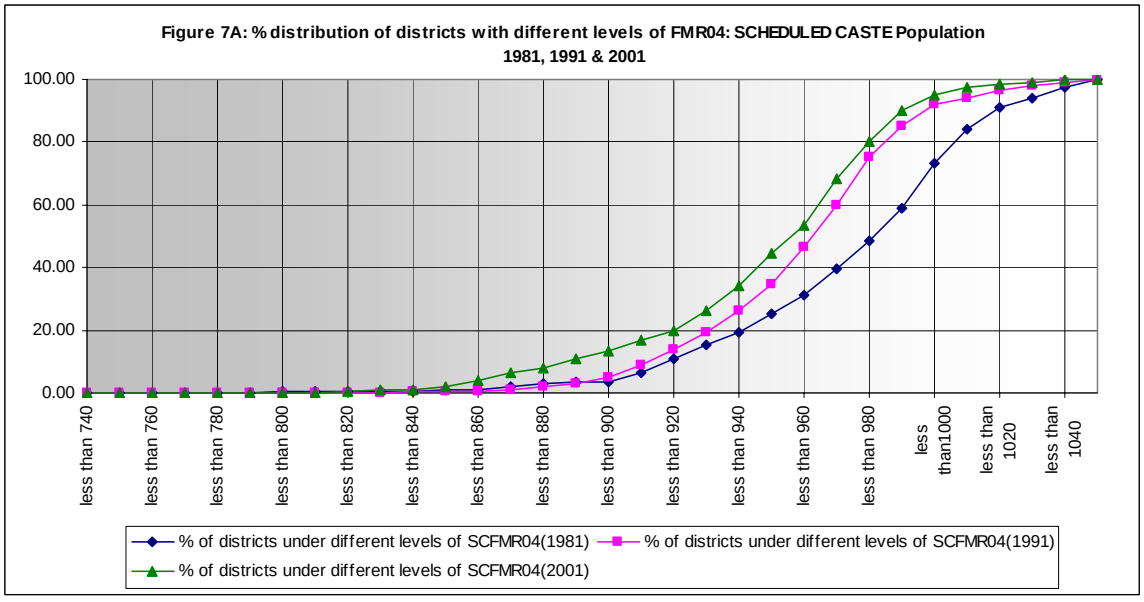
The picture for the f/m ratios for the 5-9 year age group is not that neat (figure 6). The curve for the SC and the general groups move quite close to each other with the curve for the ST being quite separate and favourable to the girl children. While a sizeable % of districts for the general (18%) and the SC population (15%) have f/m ratios below 880, only 4% of the districts have such low ratio among tribal children (5-9 year age group).

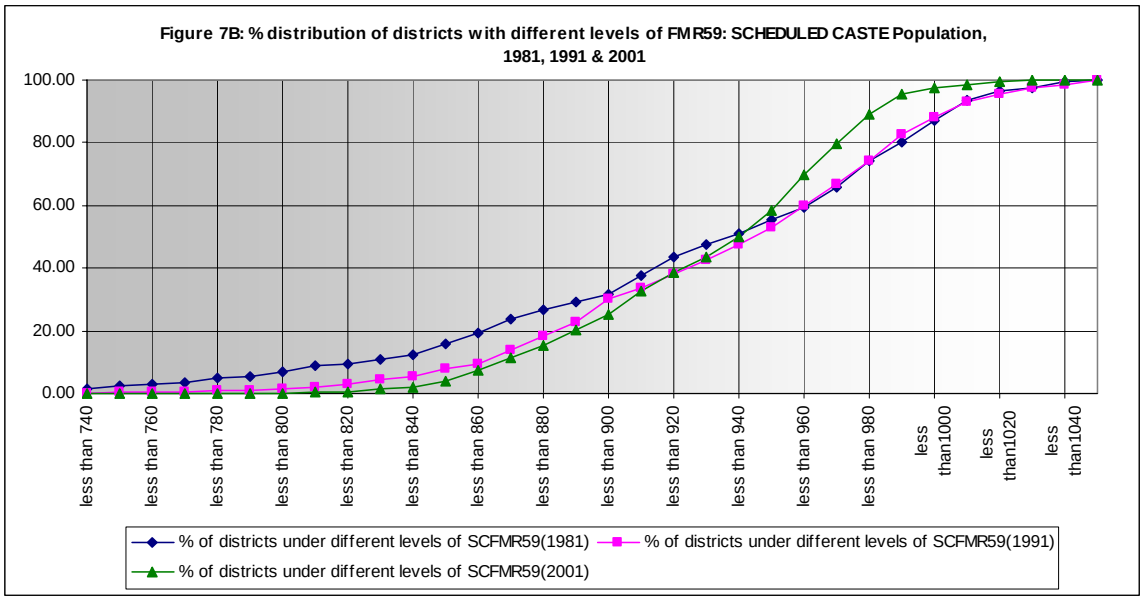


[7] It may be argued that such a 'cumulative' curve does not accord weight to a district proportionate to its population. This is conceded and the exercise to incorporate the population 'weight' of a district is underway

Cumulative curves can also be useful for the time series comparison. Figure .. a, b and c show the curves for the general, the SC and the ST population for the three data of the three population census of 1981, 1991 and 2001. Growing masculinisation of the sex ratios across the decades can be seen clearly from the rising portion of the curve at the lower end. Similarly, the higher end is also getting compressed towards lower f/m ratios and the % of districts covered below a cut off level of 1000 has rapidly increased for all the three population age groups. This by itself is not undesirable as the reduction in f/m values above 1000 is more an indicator of reducing infant mortality. When the IMR levels are high, more male children die and the f/m ratio in the 0-4 years age-group goes up and is often above 1000 or 1020. But we are not labouring this point further here.

Time-series data for the 5-9 year age group is more intriguing. The cumulative curve for the f/m ratio (5-9) for the 1991 data shows that SC sex ratios were much more masculine compared to those for the general population. This situation slowly improved in 1991 and only in 2001 the SC pattern has come to occupy an intermediate position between the general and the ST population. It is pertinent to remember that the masculine f/m ratio in the 5-9 age group is more due to neglect, unequal access of the girl children to food, nutrition and care including health care (Miller, 1981; Agnihotri, 2000) whereas more masculine f/m ratios in the 0-4 age group are result of the pro-active elimination with the use of the technology. The more accessible the technology, the lower is the f/m 0-4. No wonder, the general population has shown 'intensification' of the declining trend more strongly than the SC and the ST.





One plausible inference that can be drawn from this pattern is that the dynamics of the discrimination against the daughter among the scheduled castes have shifted from the neglect route to the more pro-active route of pre-natal sex determination and feticide. Unlike some of the other census data e.g. 1971, the data of 1981 census is reputed to be of a good quality. As such the strongly low f/m values in the 5-9 age group indicated there can not be attributed to reporting errors. One has to acknowledge that the 'lowness' of the f/m ratios has shifted from very low values of the 70s, to relatively higher values in the population of the 90s as reflected in the census 2001 data. At the same time, the steady worsening of the f/m ratio (0-4) between 1981 to 2001 indicates an access to 'feticide services' as well as well as rise of such feticide service seeking behaviour.

IV

Emulating the 'higher' castes – *Mahajano ye na gataah sa panthah* :

We thus see that the child sex ratio patterns among the scheduled castes have tended to follow the pattern among the 'general' or the other castes rather than those among the scheduled tribes. Thus clubbing the two groups together, as is traditionally done in the policy as well as academic circles is inappropriate. Second, the role of the 'region' seems to be more significant than the factor of being the part of 'scheduled castes'[8]. Table below presents an interesting statistics on the f/m ratio among the 0-4 and 5-9 age group by the % of the SC population in three group of districts with low (<10%), medium (10-20%) and high (>20%) percentage of the SC population. Among districts with low, moderate and high concentration of the Scheduled caste population one could notice lowering of FMR 5-9 among the districts where scheduled caste population has moderate or high concentration. A further indication perhaps that in such districts the scheduled

[8] Sopher (1980) has made similar observation about region being more influential than religion.

castes start behaving 'more like the higher castes than they used to be' as described by Dreze and Sen (1995) for the SC population in UP.

Percentage of Scheduled Caste Population		Low *(<10 percent)*	Moderate *(10- 20 percent)*	High Above 20%
Number of districts/ % of districts to total districts		160 (27%)	271 (46%)	149 (25%)
SC FMR 0-4	Total	946	954	944
	Rural	952	958	947
SC FMR 5-9	Total	945	927	918
	Rural	950	927	919

Goody and Berreman in their persuasive analyses have already drawn attention towards female subordination being a 'precondition' of upward social mobility a point further amplified by Vishwanath (2004) more recently in the context of the analysis of the female infanticide during the colonial rule. As long as the scheduled castes follow the same female-regressive social make up that has characterised the landowning and hypergamous upper castes, the cancer of female feticide is bound to spread among them. Given the process of 'sanskritisation' they are subject to this is inevitable unless social reform accompanies their upward mobility. Higher female workforce participation which had earlier characterised the scheduled castes may come down in the wake of prosperity for the sake of 'status production' (Papanek, 1989). The SC female children may then face the double burden; sanskritisation on one hand and reduced economic worth on the other. Extricating them from the 'twin danger' is a challenge for the society indeed!

Appendix

Table 1: State Level Sex Ratios (f/m): SC – Population by five year Age-Group (Total, Urban and Rural)

State Code	Area Name	Population 0-9 (Total)	f/m ratio 0-4			f/m ratio 5-9			f/m ratio 0-9		
			Total	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban
00	INDIA	42108780	949	953	932	924	924	923	936	937	927
01	JAMMU & KASHMIR	173133	898	903	868	914	922	873	907	913	870
02	HIMACHAL PRADESH	318186	933	**935**	**889**	951	**954**	**914**	942	945	903
03	PUNJAB	1625115	862	864	858	870	871	863	866	868	861
04	CHANDIGARH	36936	902	841	909	883	809	891	892	824	899
05	UTTARANCHAL	408395	937	941	913	936	940	914	937	941	913
06	HARYANA	1057474	868	869	864	864	863	865	866	866	865
07	DELHI	556124	905	904	905	902	893	903	903	898	904
08	RAJASTHAN	2846351	929	931	924	895	893	901	911	911	911
09	UTTAR PRADESH	10373101	948	**953**	**912**	896	**898**	**886**	920	923	898
10	BIHAR	4092632	985	985	981	907	906	910	942	943	942
11	SIKKIM	6489	955	**964**	**865**	966	**970**	**922**	961	967	897
14	MANIPUR	12345	984	978	988	961	967	958	972	972	972
16	TRIPURA	111736	960	958	971	965	**975**	**912**	963	968	938
18	ASSAM	438765	966	**969**	**941**	955	**958**	**935**	960	963	938
19	WEST BENGAL	4186420	965	965	964	960	**963**	**943**	963	964	952
20	JHARKHAND	932233	996	1000	974	957	959	950	975	978	960
21	ORISSA	1393533	966	966	965	962	962	965	964	964	965
22	CHHATTISGARH	627159	973	973	975	965	964	970	969	968	973
23	MADHYA PRADESH	2500611	939	939	938	915	912	927	927	925	932
24	GUJARAT	789756	893	**908**	**867**	889	**901**	**868**	891	904	867
27	MAHARASHTRA	2128804	941	942	938	947	949	944	944	946	941
28	ANDHRA PRADESH	2711435	977	978	973	970	968	982	973	972	978
29	KARNATAKA	1942328	964	965	958	975	978	965	970	972	962
30	GOA	4223	953	889	1003	996	1000	994	975	944	998
32	KERALA	498527	958	957	961	968	966	981	963	961	970
33	TAMIL NADU	2299625	965	964	967	961	960	965	963	962	966
34	PONDICHERRY	31106	977	975	981	1000	993	1008	988	984	994
12	ARUNACHAL PRADESH	1559	961	928	1007	934	893	981	946	910	992
15	MIZORAM	34	na	na	na	na	na	na	na	na	na
17	MEGHALAYA	2755	920	934	889	967	992	929	946	964	913
25	DAMAN & DIU	977	898	843	990	833	763	936	865	803	961
26	DADRA & NAGAR HAVELI	913	896	897	896	995	1042	909	943	962	903

Table 2: State wise comparison of the child population in urban areas for the over all and the SC population

	% urban child population	
	All	SC
INDIA	28.3	17.5
Jammu & Kashmir	25.9	15.5
Himachal Pradesh	10.7	5.8
Punjab	34.4	23.0
Chandigarh *	88.8	**90.2**
Uttaranchal	27.2	14.7
Haryana	29.2	20.7
Delhi *	93.0	**91.4**
Rajasthan	23.8	18.2
Uttar Pradesh	21.0	10.6
Bihar	10.8	5.9
Sikkim	11.4	8.5
Arunachal Pradesh	21.0	**45.9**
Manipur	23.5	**63.5**
Tripura	16.9	15.8
Meghalaya	19.5	**35.2**
Assam	13.1	11.8
West Bengal	28.6	12.9
Jharkhand	23.1	16.0
Orissa	15.6	10.8
Chhatisgarh	20.7	19.7
Madhya Pradesh	27.0	22.0
Gujarat	38.2	**36.1**
Daman & Diu *	31.3	41.1
Dadra & Nagar Haveli *	24.5	32.1
Maharashtra	43.5	36.8
Andhra Pradesh	27.3	15.4
Karnataka	34.4	22.7
Goa	50.5	**58.2**
Kerala	26.0	17.2
Tamil Nadu	44.0	27.8
Pondicherry *	66.4	41.5

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