Gender bias against female children in India: Regional differences and their implications for MDGs

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Abstract

The millennium development goals accorded highest priorities for achieving gender equality and women's empowerment. South Asian countries and India are societies with strong patriarchal norms, a high degree of son preference and pervasive gender discriminations. Using National family health survey (1998-99) data, this paper adopts a multiple indicator approach to study gender bias on the basis of a series of female by male ratios with respect to school attendance, use of preventive and curative health care services and child nutrition status. Marked gender differences are demonstrated with respect to each of these indicators. However the gender bias indices of immunization coverage and school attendance indicate consistent sex differences, suggesting systematic neglect of female children. Considerable inequalities amongst the states are also demonstrated. Except south Indian states the odds of female children being underweight, and discriminated against in preventive and curative care and in school attendance are significant.

Key words: gender, bias, regional, inequalities, goals, implication

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Introduction

Millennium development goals highlight the priority accorded to gender equality and women's right as core issues of development. Achieving goals relating to gender equality and gender empowerment are critical for achieving all the major MDGs. However, South Asian countries and India are societies with strong patriarchal norms and high degree of son preference. Consequently, gender discriminations are pervasive. This has been a long recognised problem with resurgence of research interest on the subject. Extremely high levels of gender discrimination against females have been reported in the provision of health care, nutrition, education and resource allocation in northern and western states of India. For instance, the natural biological laws of human reproduction of mankind for balancing its natural sex ratio, has been distorted by man-made norms, customs, traditions, religious beliefs and more recently by sophisticated medical technology to result lower sex ratio in India.

In India, there has been a steady decline of sex ratio from 972 in 1901 to 933 females per 1000 males in 2001. From 1961 to 1991, sex ratios for children under age 10 became more masculine all across India (Bhat, 1989; Das Gupta and Bhat, 1997; Desai, 1994; El-Badry, 1969; Miller, 1989; Parasuraman and Roy, 1991). In South Asia and India traditions, values and customs crusted over time have resulted in the insatiable desire for sons. Sons are preferred over daughters for a number of economic, social and religious reasons, including financial support, old age security, property inheritance, dowry, family lineage, prestige and power, birth and death rituals and beliefs about religious duties and salvation (Dyson and Moore, 1983; Arnold et al, 2002; Kishore, 1993;Das Gupta, 1987; Das Gupta and Mari Bhat, 1997; Basu, 1989, Chen et al, 1981; Levene, 1987; Miller, 1981; Caldwell and Caldwell, 1990). Consequently, women and girls are accorded lower status in the Indian society. Women in India face discrimination in terms of several political, and economic opportunities as a result of their inferior status. Majority of women cannot inherit parental property and political and employment participation are very limited. Gender inequalities prevail in work, education, allocation of food, health care and fertility choices. On the other hand, at the family level women are exclusively burdened with household chores- cooking, cleaning, collecting fuel and water and carring elderly and children (Arokiasamy, 2003).

Pathways of gender bias

Education and employment:

The economic and social rates of returns of education are quite high, and on the whole, higher for women than for men. In patrilineal and patrilocal communities daughter's education is viewed as a waste, because expected returns from educated daughters do not exceed the costs, then female education as an investment becomes unattractive to parents. Yet in most developing countries, women are relatively less educated than men. Girls are either not sent to schools or do not receive the same quality and level of education, as do boys. In India, the gender inequality in enrolments is worse at the secondary and tertiary level than at the primary level. Although benefits of women's education is well recognised, a number of barriers contribute to the gender gaps, with varying intensities across the states.

Child mortality:

In the absence of a biological basis, evidence of excess female child mortality is an important indicator of gender inequalities. A recent review of demographic health survey findings revealed that 27 out of 44 DHS countries had higher girls than boys mortality for children aged 1-4, although the average excess female mortality in 44 countries overall was only 2 percent (Arnold, 1997). In India, the levels of excess female child mortality as a result of son preference have increased during the last several decades (SRS). NFHS-1 (1992-93) indicates that child mortality for girls in India as a whole, at 42.0 per 1000, was 43 percent higher than for boys at 29.4 per 1000 (International Institute for Population Sciences, IIPS, 1995). The corresponding figure from NFHS-2 was 42 per 1000,which was 49 percent higher than boys at 28.

Nutrition:

Girls are more likely to be malnourished than boys in both northern and southern states (Arnold et al, 1998; Sen and Sen Gupta 1983; Pebley and Amin, 1991, Wedley, 1993). Gender differentials in nutritional status are reported during infancy, with discriminatory breastfeeding and supplementation practices. Infant girls are breastfed less frequently, for shorter duration, and over shorter periods than boys (Wyon and Gordon, 1971; Kielmann et al., 1981; Das Gupta, 1987). However, national family health survey indicated some variable evidences where boys and girls are about equally likely to be stunted, underweight but boys were slightly more likely than girls to be wasted (Mishra et al, 1999).

Health care provision:

A frequent debate in the demographic literature focuses on the origin of differences in morbidity and mortality of children, in particular, the relative role of biological and behavioural factors (Lopez and Ruzicka, 1981;Preston, 1976; Langford, 1984; Waldrom, 1983;Hill and Upchurch, 1995;United Nations, 1998). Overall, biological factors are considered to be less important, while discrimination of girls in nutrition, preventive and curative health care seeking have an impact on morbidity and mortality. Female selective infanticide is an extreme form of societal discrimination, but its prevalence is very very small to make a significant impact on excess female mortality. Sex selective abortion is another severe form of gender discrimination, which recent studies have documented.

Differentials in treatment of children by sex is known to be directly linked to the differences in mortality of boys and girls (D'Souza and Chen, 1980; Das Gupta, 1987). Gender differences in health care between girls and boys are the direct consequence of discrimination against females in seeking health care. In India, discrimination of girls in both preventive (immunization) and curative (treatment of illness) care are also reported with varying degrees amongst the states. Studies have recognised this as the main pathway for excess female child mortality. Even when such discrimination is not fatal, it can still produce greater frailty among survivors and thus is an important child health issue in itself (Mosely and Becker, 1991;Mosley and Chen, 1984). Poor health has implication for surviving girls. Their poor health in reproductive years may be perpetuated across generations (Merchant and Kurz, 1992).

Studies across India have found that boys are much more likely than girls to be taken to a health facility when sick (Caldwell, Reddy and Caldwell, 1982; Das Gupta, 1987; Ganatra and Harve, 1994; Govindasamy and Ramesh, 1996;Kishor, 1995). Boys had higher immunization rates than did girls in all except Goa and Karnataka, although the extent of this difference varied by states (Kurz and Johnson-Welch, 1997).

Regional inequalities

A major area of concern and focus in India is the remarkable degree of within regional commonalties and across region contrasts in culture, gender bias, development and demography. Several researchers have recognised a cultural divide between north and south Indian states. North Indian kinship structure with exogamous marriage system favour strong

patriarchal value and lower female autonomy compared to south Indian kinship structure of endogenous marriage system (Dyson and Moore, 1983; Karve, 1965; Sopher, 1980). Though, recent studies have found some blurring of north- south disparity in gender discrimination.

The main objective of this analysis is to examine the regional differences in gender bias against female children. A multiple indicator approach is used unlike, earlier studies, which have focused on selective or individual indicators when dealing with the issue of gender bias against female children. Recognising several pathways of gender bias which cumulatively contribute to excess female mortality and gender inequalities, gender biases are examined on five sub domains namely, school attendance, nutrition, immunization, treatment and child mortality. The levels of gender bias on two available indicators of immunization and school attendance from the two sets of data NFHS and MICS are also compared in order to see the consistency of the two estimates. Accordingly, gender biases are examined. The levels of gender bias in adult literacy and work participation are also compared with the gender biases indices for children.

Data and methods of analysis

In this analysis, we use the national family health survey-2 (NFHS, 1998-99) data set (which is similar to demographic health survey (DHS), conducted in Asia, Africa and Latin America as well as multiple indicator survey (MICS-2000). The NFHS provides information on fertility, fertility preferences, child mortality and child health indicators. The survey also collected data on health related measures such as immunization; morbidities i.e. diarrhoea, respiratory infections, and fever; treatment seeking for these diseases; and anthropometric indicators of nutritional status such as height and weight, for *children under age 3*.

In this analysis, information on treatment of children if the child had fever, cough and diarrhoea are used. On preventive care, information on whether the child was fully immunized or not with respect to the recommended expanded programme on immunization (EPI) vaccines that includes BCG, three doses of DPT and Polio and Measles are used. On education the information on school attendance rate is used. The extent of gender bias against female children has been examined based on sex differences on all these five dimensions. On nutrition, data on weight, height and breastfeeding are used.

Methods of measuring gender bias in health, nutrition and treatment seeking

A multiple indicator approach is used to study state level gender bias. Five sub indices of gender bias are generated on five dimensions of sex differences in school attendance, nutritional status, immunization, and treatment seeking for illness and child mortality. The indices calculations are described below.

We define six indices of gender biases on school attendance, nutrition, immunization, disease incidence, treatment of illness, child mortality and overall index of gender bias.

1.Sex ratio in school attendance

$$\textit{Index of gender bias in schooling: } Rs = \frac{R1 + R2}{2}$$

where, $R1 = \dfrac{\Pr \textit{oportion of girls attending school } (6-10 \textit{ years})}{\Pr \textit{oportion of boys attending school } (6-10 \textit{ years})}$

$$R2 = \frac{\Pr \textit{oportion of girls attending school } (11-14 \textit{years})}{\Pr \textit{oportion of boys attending school } (11-14 \textit{years})}$$

2. Sex ratio in nutritional status

Index of gender bias in nutrition: $Rn = \dfrac{R3 + R4 + R5 + R6}{4}$

where, $R3 = \dfrac{\textit{Median duration of breastfeeding for girls (in months)}}{\textit{Median duration of breastfeeding for boys (in months)}}$

$$\mathrm{R4} = \frac{\text{Proportion of boys below the threshold of } -2 \text{ standard deviation of the median of weight} - \text{for} - \text{age}}{\text{Proportion of Girls below the threshold of } -2 \text{ standard deviation of the median of weight} - \text{for} - \text{age}}$$

$$\mathrm{R5} = \frac{\text{Proportion of boys below the threshold of } -2 \text{ standard deviation of the median of } \textit{height} - \text{for} - \text{age}}{\text{Proportion of Girls below the threshold of } -2 \text{ standard deviation of the median of } \textit{height} - \text{for} - \text{age}}$$

$$\mathrm{R6} = \frac{\text{Proportion of boys below the threshold of } -2 \text{ standard deviation of the median of weight} - \text{for} - \textit{height}}{\text{Proportion of Girls below the threshold of } -2 \text{ standard deviation of the median of weight} - \text{for} - \textit{height}}$$

3. Sex ratio in immunization

Index of gender bias in immunization: $Ri = \frac{R7 + R8 + R9}{3}$

where, $R7 = \frac{\Pr oportion\ of\ \ vaccinated\ \ girls}{\Pr oportion\ of\ \ vaccinated\ \ boys}$

$$R8 = \frac{\Pr oportion\ of\ \ \ girls\ having\ vaccination\ card}{\Pr oportion\ of\ \ \ boys\ having\ vaccination\ card}$$

$$R9 = \frac{\Pr oportion\ of\ \ boys\ not\ vaccinated}{\Pr oportion\ of\ \ girls\ not\ vaccinated}$$

4. Sex ratio of disease incidence:

M/F ratio of proportion of children suffering of cough accompanied by fast breathing= proportion of boys suffered/ proportion of girls suffered

M/F ratio of incidence of fever= proportion of boys suffered/ Proportion of girls suffered

M/F ratio of incidence of diarrhoea= proportion of boys suffered/ proportion of girls suffered

5. Sex ratio in treatment seeking

Index of gender bias in treatment seeking: $Rt = \frac{R10 + R11}{2}$

where, $R10 = \frac{\Pr oportion\ of\ \ \ girls\ taken\ \ to\ health\ \ provider\ (\ for\ diarrrhoea)}{\Pr oportion\ of\ \ \ boys\ taken\ \ to\ health\ \ provider\ (\ for\ diarrhoea)}$

$$R11 = \frac{\Pr oportion\ of\ \ \ girls\ taken\ \ to\ health\ \ provider\ (\ for\ acute\ respiratory\ \inf ection)}{\Pr oportion\ of\ \ \ boys\ taken\ \ to\ health\ \ provider\ (\ for\ acute\ respiratory\ \inf ection)}$$

6. Sex ratio in child mortality

Index of gender bias in child mortality: $Rcm = \frac{\text{child mortality rates for females}}{\text{child mortality rates for males}}$

7. Lastly, a composite index of gender bias against female children has been computed by aggregating the four sub indices of gender bias as shown below.

Composite index of gender bias: $Rc = \frac{Rs + Rn + Ri + Rt}{4}$

This index represents cumulative gender bias against female children, which is compared with F/M ratio on child mortality. This gender bias index is also correlated with gender gaps in overall literacy and work participation rate.

Multivariate analyses

Logistic regression models are used to assess the net effect of variable sex of the child on health, nutrition, treatment, and school attendance, by controlling for related demographic and socio-economic status variables. Five logistic models have been estimated with dependent variables child a) attending school, b) nutritional status below –2SD, c) fully immunized, and d) child with diarrhoea was taken to a health provider and e) child with ARI was taken to a health provider. Since our primary aim is to examine the extent of gender bias, only sex wise odds ratios have been estimated adjusting for other variables. The odds of female children being discriminated against, controlling for several covariates such as, women's age and education level, standard of living index of the household, caste and residence.

Schooling

The gender bias in schooling in terms of female male ratio of school attendance rate by age of child, i.e. 6-10 years and 11-14 years is presented in Table-3.

Table-3: Gender bias in school attendance rate by age of the children, NFHS-2,1998-99.

	Percent of children attending school						
	6-10 years			11-14 years			
States	Male	Female	F/M (R_1)	Male	Female	F/M (R_2)	Rs
Jammu and Kashmir	90.9	82.3	0.91	88.6	71.1	0.80	0.85
Himachal Pradesh	98.9	98.9	1.00	98.2	95.5	0.97	0.99
Punjab	94.1	94.1	1.00	89.1	84.9	0.95	0.98
Haryana	92.5	89.9	0.97	89.1	80.0	0.90	0.93
Delhi	92.1	91.6	0.99	91.0	89.9	0.99	0.99
Rajasthan	87.7	69.6	0.79	84.3	52.7	0.63	0.71
Uttar Pradesh	83.7	73.7	0.88	80.6	62.4	0.77	0.83
Madhya Pradesh	83.1	77.1	0.93	78.5	61.1	0.78	0.85
Bihar	69.3	55	0.79	72.4	52.6	0.73	0.76
Assam	81.8	77.6	0.95	76.3	70.8	0.93	0.94
West Bengal	83.7	82.1	0.98	75.4	68.7	0.91	0.95
Orissa	85.4	81.2	0.95	79.7	66.1	0.83	0.89
Gujarat	86.8	80.4	0.93	79.4	63.1	0.79	0.86
Maharashtra	92.7	90.3	0.97	87.0	82.5	0.95	0.96
Andhra Pradesh	88.2	82.6	0.94	71.0	54.6	0.77	0.85
Karnataka	87.7	85.2	0.97	75.2	68.0	0.90	0.94
Tamil Nadu	95.8	95.6	1.00	84.8	79.6	0.94	0.97
Kerala	97	97.7	1.01	96.9	96.8	1.00	1.00

Female deprivation in schooling is very high in the states of Rajasthan, Bihar, Uttar Pradesh, Gujarat, Andhra Pradesh, Jammu and Kashmir and Orissa. The ratio of female to male school attendance indicates 20-40 percent shortfall of attendance for girls compared to boys in these

states. Comparatively, the shortfall in female schooling is 5-10 percent in the states of Assam, Punjab, Gujarat, Maharashtra, Karnataka, and Tamil Nadu. The F/M ratios for school attendance indicate lesser differences for the age group 6-10 year but more pronounced differences in the ages 10+ years, due to higher dropout rate for girls compared to boys in the later stage. While the gap in primary enrolment is a first stage, girls not being sent to school, discontinuation of girls at middle and second level is the second stage of discrimination of girls is one of the important pathways of gender bias against female children.

Nutrition

Table- 4 shows that comparatively sex differential in nutritional status in terms of underweight and stunting are less pronounced (5-10 percent gap). However, there are notable regional variations.

Table-4: Gender bias in nutritional status of the children by states, NFHS-2, 1998-99

	Percentage of children with												
	Weight for age Below-2SD			Height for age Below-2SD			Weight for height Below-2SD			Duration of any breast feeding (median)			
States	M	F	M/F (R_3)	M	F	M/F (R_4)	M	F	M/F (R_5)	M	F	F/M (R_6)	Rn
Jammu and Kashmir	36.2	32.6	1.11	39.9	37.5	1.06	12.9	16.5	0.78	29.4	30.5	1.04	1.00
Himachal Pradesh	45.2	41.7	1.08	46.2	35.7	1.29	17	16.9	1.01	25.3	23.3	0.92	1.08
Punjab	27.3	30.3	0.90	38.7	39.7	0.97	8.4	5.7	1.47	26.4	18.9	0.72	1.02
Haryana	31.8	38.1	0.83	47.5	53.1	0.89	5.9	4.6	1.28	25.8	23.5	0.91	0.98
Delhi	36.8	31.9	1.15	35.7	38.3	0.93	13.4	11.2	1.20	22.6	19.4	0.86	1.04
Rajasthan	49.2	52.2	0.94	50.2	54	0.93	11.8	11.6	1.02	26.2	24.7	0.94	0.96
Uttar Pradesh	49.6	53.9	0.92	53.4	57.7	0.93	11.4	10.8	1.06	26.4	25.2	0.95	0.96
Madhya Pradesh	52.8	57.6	0.92	49.2	52.9	0.93	19.8	19.9	0.99	24	25.9	1.08	0.98
Bihar	52.8	56.1	0.94	53	54.6	0.97	21.4	20.5	1.04	36	36	1.00	0.99
Assam	35.2	37.1	0.95	50.5	49.7	1.02	14.5	11.8	1.23	36	26	0.72	0.98
West Bengal	45.5	52.3	0.87	36.6	47	0.78	14.8	12.3	1.20	36	33.5	0.93	0.95
Orissa	54.6	54.3	1.01	44.1	43.8	1.01	24.8	23.8	1.04	33.6	36	1.07	1.03
Gujarat	40.3	50	0.81	42	45.3	0.93	13.9	18.6	0.75	22.5	21.2	0.94	0.86
Maharashtra	49.2	50	0.98	38.8	41	0.95	20.3	22.3	0.91	24.5	23.2	0.95	0.95
Andhra Pradesh	35.1	40.2	0.87	37.4	39.8	0.94	9.1	9	1.01	27.8	23.3	0.84	0.92
Karnataka	42.2	45.7	0.92	35.1	38.1	0.92	21.4	18.5	1.16	19.9	20.2	1.02	1.00
Tamil Nadu	35.8	37.6	0.95	29.9	28.9	1.03	20.7	19	1.09	17.8	15.7	0.88	0.99
Kerala	26.2	27.6	0.95	22.1	21.6	1.02	12.5	9.7	1.29	25.4	24	0.94	1.05

The male/female ratios in nutritional status of children indicate moderate levels of nutritional neglect of female children in the states of Gujarat, Uttar Pradesh, Maharashtra, Rajasthan, Delhi, Haryana, Punjab and Andhra Pradesh. The nutritional deprivation of female children in terms of weight for age and breastfeeding is sharper in the above states. However, boys are more likely than girls to be wasted. The reason for lower level of female of wasting may not be limited to differential food intake alone as girls may be less physically active than boys

or may be less prone to nutritional inadequacy, given their relative lower requirements. Although, nutritional neglect cumulatively indicates lesser gender gaps, long-term nutritional inadequacy tend to have many negative consequences such as increasing risk of disease, deterioration in physical and mental health and intergenerational impact of nutritional inadequacy.

Immunization

Of the three indicators considered for the index of immunization, two relate to utilization and non-utilization of immunization. The female/male ratio presented in Table-5 shows clear evidence of pronounced gender differences in immunization coverage in most states among children between 1-2 years of age. Girls have a tremendous disadvantages in immunization coverage. The F/M ratio of children who had received all the required vaccination varied from 0.41 for Assam to 1.16 for Andhra Pradesh. The ratios across the states indicate no evidence of gender bias in the states of Kerala, Tamil Nadu, West Bengal, Orissa and Andhra Pradesh, but Haryana, Rajasthan are surprising addition to this.

Table-5: Gender bias in immunization of the children by states, NFHS-2 1998-99.

States	Percent of children									
	Fully immunized			Vaccination card			Not Vaccinated			
	M	F	F/M(R_7)	M	F	F/M(R_8)	M	F	M/F(R_9)	Ri
Jammu and Kashmir	61.4	50	0.81	54.4	46.2	0.85	8.6	13.1	0.66	0.77
Himachal Pradesh	87.2	78.9	0.90	63	44.7	0.71	0.2	5.8	0.03	0.55
Punjab	74.5	69.2	0.93	49.6	34.9	0.70	5.2	12.9	0.40	0.68
Haryana	62.4	63.2	1.01	9.2	10.8	1.17	26.2	22.2	1.18	1.12
Delhi	71.8	67.2	0.94	48.2	37.7	0.78	2.6	8.3	0.31	0.68
Rajasthan	16.9	17.6	1.04	14.5	15	1.03	21.8	23.4	0.93	1.00
Uttar Pradesh	23.6	18.8	0.80	21	19.8	0.94	27.5	31.5	0.87	0.87
Madhya Pradesh	27.3	17.9	0.66	27.7	22.6	0.82	11.5	16.1	0.71	0.73
Bihar	13	9	0.69	18.4	16.4	0.89	14.8	18.9	0.78	0.79
Assam	22.3	9.2	0.41	39.4	22.4	0.57	30.2	37.7	0.80	0.59
West Bengal	44.2	43.5	0.98	56.4	59.6	1.06	12.9	14.3	0.90	0.98
Orissa	44.1	43.3	0.98	48.1	43.8	0.91	8.3	11	0.75	0.88
Gujarat	53.1	52.9	1.00	33.5	30	0.90	6.7	6.5	1.03	0.97
Maharashtra	80.8	76.3	0.94	51.5	46.6	0.90	2.1	1.8	1.17	1.01
Andhra Pradesh	54.2	62.8	1.16	38.1	44.2	1.16	5	4	1.25	1.19
Karnataka	62.8	57.1	0.91	39.8	42.7	1.07	8.3	7	1.19	1.06
Tamil Nadu	89.5	88	0.98	45.9	45.7	1.00	0	0.6	0.00	0.99
Kerala	77.1	82.6	1.07	63	63.5	1.01	2.5	1.9	1.32	1.13

Another indicator considered as children who had not received any vaccination at all were possibly from households with very little access to health care and poor socio-economic condition. The M/F ratios of children not given vaccination ranged from 0.03 in Himachal Pradesh to 1.32 in Kerala. The ratio value of above one indicates female advantage in the states of Maharashtra, Andhra Pradesh, Karnataka and Kerala with Haryana and Gujarat as surprising addition to this group. Female disadvantage is indicated in the rest of the states at varying levels.

The value attached to the safe keeping of vaccination cards may be considered as an indication of interest shown by the parents, especially the mother, in the health and well being of the individual child. So the third indicator considered as gender disparity (female/male ratio) in terms of the possession of the vaccination card. The ratios varied from 0.57 to 1.17 across the states. The ratio value above one in West Bengal, Andhra Pradesh, Karnataka, Tamil Nadu and Kerala indicates that female children were in advantageous position with Haryana and Rajasthan to this group. Varying levels of female child disadvantage is seen for rest of the states.

The overall index of gender bias in immunization shows very high levels of female neglect the ratio value lower than one by 20-45 percent in the states of Assam, Himachal Pradesh, Punjab, Madhya Pradesh, Bihar, and Jammu and Kashmir. Moderate levels of female neglect the ratio value lower than one by 5-20 percent are indicated in the states of Uttar Pradesh, Orissa. Again Rajasthan, Haryana, Gujarat, Delhi and West Bengal are surprising omissions here. However, the ratios for the indicators i.e. school attendance, nutrition and treatment seeking, show significant degree of gender bias in these states. The index value indicates no evidence of female child neglect in the south Indian states.

Incidence of illness by sex

When examining gender bias in treatment of illness, as a prior it is important to examine sex difference in illness. The linkage between severity and duration of infection, the medical treatment received, its timing and case fatality rates by sex are clearly complex (Faveau, Koening and Wojtyniak, 1991). Diarrhoeal disease, Malaria and Acute Respiratory Infections are leading causes of infant and child mortality in developing countries and in India, but incidence of these diseases vary by sex. The NFHS-2 asked question on fever, cough accompanied by breathing, diarrhoea with blood also. However these data have several

limitations and recall biases. Mothers might not be sure exactly when their child was ill. Underreporting of illness increases with the length of the recall period. Recall biases also tend to vary across the Indian states for the different symptoms due to varying levels of literacy and awareness levels of diseases and treatment seeking. These are likely to affect male-female comparisons. Second, if the sex of the child affects the perceived severity of the condition, the data obtained about boys and girls will be affected differently. Apparently lower female morbidity might result from a bias against reporting incidence of sickness among female children although the question asked is exactly same (Hill and Upchurch, 1994). Moreover, if mothers classify girls as ill, only when they have more severe disease than boys, that differences could affect treatment seeking. Given such biases it is necessary to first to examine sex differences in incidence of illness.

Table-6 shows the sex differentials in the incidence of illness; diarrhoea, fever and acute respiratory infection.

Table-6: Sex differentials in the incidence of illness,NFHS-2,1998-99

	Percent of children who had												
	Cough accom. by fast breathing			Fever			Any diarrhoea			Diarrhoea with blood			
States	M	F	M/F	M	F	M/F	M	F	M/F	M	F	M/F	Combine
Jammu and Kashmir	23.3	20.9	1.11	40.5	37.9	1.07	34.1	31.2	1.09	3.5	4.7	0.74	0.98
Himachal Pradesh	12.1	9.2	1.32	29.8	29.9	1.00	31.4	31.3	1.00	5	3.7	1.35	1.22
Punjab	16.2	12.5	1.30	26.2	23.4	1.12	10.3	9.2	1.12	0.5	0.7	0.71	1.04
Haryana	11.9	11.6	1.03	23.5	23.9	0.98	12.9	15.1	0.85	2.2	1.4	1.57	1.15
Delhi	20.6	11.9	1.73	39.8	30.1	1.32	29.7	30.6	0.97	1.1	2.4	0.46	1.05
Rajasthan	24.1	19.6	1.23	25.9	25.7	1.01	21.2	18.2	1.16	3.6	3.2	1.13	1.17
Uttar Pradesh	22.7	19.4	1.17	28.9	26.6	1.09	23.8	22.8	1.04	3.9	3.6	1.08	1.1
Madhya Pradesh	30.7	27.6	1.11	33.4	28.6	1.17	23.8	22.9	1.04	4.1	4.5	0.91	1.02
Bihar	21.8	21.6	1.01	30.4	31.5	0.97	17.1	18.3	0.93	2.7	3.1	0.87	0.94
Assam	18.9	16.6	1.14	31.8	24.4	1.30	7.3	9.2	0.79	1.6	2.8	0.57	0.83
West Bengal	27.7	21.6	1.28	30.2	29.7	1.02	8.8	7.6	1.16	1.1	0.9	1.22	1.22
Orissa	24.5	20.2	1.21	37.2	34.7	1.07	20.5	30	0.68	4.7	4.2	1.12	1.01
Gujarat	10.7	11.4	0.94	21.3	20.1	1.06	19.8	19.7	1.01	1	1.6	0.63	0.86
Maharashtra	14.8	12.1	1.22	38	36.7	1.04	24.7	26.1	0.95	1.6	1.8	0.89	1.02
Andhra Pradesh	20.9	17.6	1.19	29.4	27.7	1.06	16.5	13.6	1.21	1.4	1.6	0.88	1.09
Karnataka	8.5	7.3	1.16	28	23.8	1.18	13.5	14.3	0.94	0.5	1	0.50	0.87
Tamil Nadu	12	8.4	1.43	22.2	22.5	0.99	14.7	14	1.05	1.3	2.2	0.59	1.02
Kerala	25.4	20.1	1.26	44	38.9	1.13	14.9	8.1	1.84	1.5	0.3	5.00	2.7

Result indicates that boys have higher incidence of cough in all the states except Gujarat. The incidence of fever is also reported to be higher for males in most states. However, the reported incidence of diarrhoea with blood is higher for females compared to males. With respect to the incidence of all the three diseases, girls have lower reported incidence compared to boys. In general, the prevalence in terms of incidence of illness is higher for boys.

Treatment seeking

An important way in which gender bias manifests is that girls tend not to be taken for health care as often or as early in their illness as boys because girls may receive less attention from parents. Also first-born girls tend to receive better health care than their younger sisters. Women and girl children particularly girls face the greatest problem in acquiring adequate health care. The neglect of girls in the use of curative health services is an important link that directly account for female mortality disadvantage.

Analyses tend to examine whether among those children who were sick are there sex differentials in being treated at all or type of treatment received. However, sex differentials in the source of treatment are more helpful to explain sex differential in mortality. Also this relationship is confounded by sex differentials in the timing of use of different providers and with the severity of the conditions. For instance, girls might be taken to professional health provider only after their conditions have deteriorated too far for treatment to save their lives. In Uttar Pradesh, northern India, boys were taken to city hospitals when warranted while girls saw less qualified doctors (Khan et al., 1991). Basu (1989) examined both the source and type of treatment in conjunction. Her study focused on two groups of children aged less than 12 years living in a resettlement slum in New Delhi; the parent of one group had migrated from Uttar Pradesh and those of other from Tamil Nadu. In addition to sex differences in both groups in the proportion of illness receiving no treatment, the northern Indian girls were more likely to receive non-professional treatment than boys. Therefore, the sex differentials in proportion being treated by a professional health provider are more crucial.

The data on the timing of use of different health services have not been collected in this survey. So we examine the sex differences in treatment of children. The F/M ratio in the proportion of children, who were taken to health provider is presented in Table 7.

Table-7: Gender bias in treatment seeking for diarrhoea and ARI, NFHS-2, 1998-99

States	Percent of children treated for						Rt
	Diorrhoea			ARI			
	Health provider			Health provider			
	M	**F**	**F/M (R_{10})**	**M**	**F**	**F/M (R_{11})**	
Jammu and Kashmir	81.6	80.6	0.99	81.1	69.6	0.86	0.92
Himachal Pradesh	91.8	91.3	0.99	95.7	95.6	1.00	1.00
Punjab	91.1	89.7	0.98	92.4	95.7	1.04	1.01
Haryana	94.3	90.7	0.96	87.8	88.0	1.00	0.98
Delhi	81.8	77.9	0.95	82.8	84.6	1.02	0.99
Rajasthan	59.5	56.7	0.95	62.2	58.4	0.94	0.95
Uttar Pradesh	60.6	63.8	1.05	64.5	57.1	0.89	0.97
Madhya Pradesh	62.9	55.6	0.88	59.7	55.9	0.94	0.91
Bihar	49.8	50.7	1.02	62.2	54.1	0.87	0.94
Assam	52.7	44.1	0.84	44.4	38.0	0.86	0.85
West Bengal	58.6	48.9	0.83	55.7	47.5	0.85	0.84
Orissa	50.6	43.1	0.85	61.7	50.7	0.82	0.84
Gujarat	65.6	60.5	0.92	74.6	68.0	0.91	0.92
Maharashtra	78.3	76	0.97	81.7	88.5	1.08	1.03
Andhra Pradesh	73	64.2	0.88	72.1	66.3	0.92	0.90
Karnataka	73.8	62	0.84	78.3	73.0	0.93	0.89
Tamil Nadu	69.6	64.8	0.93	82.7	83.1	1.00	0.97
Kerala	78.8	77.8	0.99	87.3	76.8	0.88	0.93

For diarrhoeal treatment the ratio ranges from a ratio of 1.05 in favour of girls 0.83 in favour of boys. In terms of being taken to a health provider for diarrhoeal treatment girls are at significant a disadvantage in six states namely Madhya Pradesh, Assam, West Bengal, Orissa, Andhra Pradesh and Karnataka. The F/M ratio range widens for treatment of ARI showing higher levels of gender bias in treatment seeking in these states. A strong indication of female neglect is that, although the incidence of diarrhoea with blood is higher for females the sex ratio in treatment indicates very significant neglect of female children.

Child mortality

Excess female child mortality is a more precise outcome indicator of gender bias. A large body of research has explored dynamics of excess female child mortality in northern states of India, where excess female child mortality is the highest in the world. The female/male ratio in child mortality indicates the disadvantageous in child mortality.

Results of regression analysis shows the pathways gender biases contributing to excess female child mortality.

Table-8: Overall gender bias in immunization, schooling, nutrition, treatment seeking and child mortality, 1998-99

States	Indices of gender bias						Literacy 7+ Lr(F/M)	Work Participation Rate(Wr)(F/M)
	Ri	Rs	Rn	Rt	Rc	Rcm		
Jammu and Kashmir	0.77	0.85	1.00	0.92	0.89	1.48	0.64	0.44
Himachal Pradesh	0.55	0.99	1.08	1.00	0.90	1.03	0.79	0.80
Punjab	0.68	0.98	1.02	1.01	0.92	4.03	0.84	0.35
Haryana	1.12	0.93	0.98	0.98	1.00	2.19	0.71	0.54
Delhi	0.68	0.99	1.04	0.99	0.92	1.26	0.86	0.18
Rajasthan	1.00	0.71	0.96	0.95	0.90	1.78	0.58	0.67
Uttar Pradesh	0.87	0.83	0.96	0.97	0.91	1.85	0.61	0.34
Madhya Pradesh	0.73	0.85	0.98	0.91	0.87	1.34	0.65	0.64
Bihar	0.79	0.76	0.99	0.94	0.87	1.39	0.56	0.39
Assam	0.59	0.94	0.98	0.85	0.84	0.79	0.78	0.42
West Bengal	0.98	0.95	0.95	0.84	0.93	1.29	0.78	0.33
Orissa	0.88	0.89	1.03	0.84	0.91	0.94	0.67	0.47
Gujarat	0.97	0.86	0.86	0.92	0.90	1.25	0.73	0.51
Maharashtra	1.01	0.96	0.95	1.03	0.99	1.29	0.78	0.61
Andhra Pradesh	1.19	0.85	0.92	0.90	0.96	1.67	0.72	0.62
Karnataka	1.06	0.94	1.00	0.89	0.97	1.13	0.75	0.56
Tamil Nadu	0.99	0.97	0.99	0.97	0.98	1.24	0.78	0.54
Kerala	1.13	1.00	1.05	0.93	1.03	0.75	0.93	0.30

Levels of excess female child mortality indicates positive relation with levels of gender gap in school attendance. The nutritional neglect of girl children also shows positive link with excess female mortality. Gender bias in immunization similarly shows positive correspondence with excess female child mortality. Composite index is not showing any clear association with the level of child mortality.

Multivariate analyses

The above indices of gender bias against female children in terms of these multiple indicators are based on unadjusted differences. Therefore, logistic regression analyses have been used to examine the net effects of gender bias in various domains of neglect. Results of logistic regression models are presented in Table-8 with dichotomous categories of ‘yes’ and ‘no’, for four dependent variables, namely children fully immunized, underweight, school attendance, treated for diarrhoea and treated for ARI. The odds of female child receiving care in yes category with male as reference are estimated controlling for background variables such as women’s age, education, household standard of living, place of residence and Caste. An odds ratio of 1.00 indicates that the odds of that outcome are the same for boys and girls.

Table-9: Logistic regression analysis of gender bias by selected variables, NFHS-2, 1998-99

Ref-Male

States	Odds of female child being				
	fully immunized	Attending school (6-14)	Underweight	Taken to health provider(Dia)	Taken to health provider (ARI)
Jammu and Kashmir	0.67	0.73***	0.83	0.86	0.60**
Himachal Pradesh	0.59	0.88*	0.84	0.82	1.38
Punjab	0.68**	0.84**	1.16	0.99	0.84
Haryana	1.25	0.65**	1.22	0.92	1.26
Delhi	0.63**	1.06	0.79	0.65	1.53
Rajasthan	1.13	0.43***	1.06	0.89	0.72**
Uttar Pradesh	0.79	0.53**	1.1	1.19	0.74**
Madhya Pradesh	0.58***	0.46**	1.12	0.74*	0.86
Bihar	0.68	0.60***	1.12	1.02	0.71**
Assam	0.35***	1.1	1.13	0.52	0.72
West Bengal	0.96	0.75**	1.30**	0.55	0.76
Orissa	1.12	0.84*	0.97	0.79	0.68**
Gujarat	0.99	0.75**	1.36**	0.78	0.79
Maharashtra	0.77	0.83**	0.94	0.86	1.07
Andhra Pradesh	1.39	0.57*	1.16	0.57	0.56**
Karnataka	0.79	0.69*	1.05	0.57	0.66
Tamil Nadu	0.98	0.84*	0.99	0.76	1.01
Kerala	1.37	0.94	1.03	0.92	0.73

***<0.01,**<0.05,*<0.1

Table-10: Socio-economic and demographic features of major states of India.

State	Birth rate (2000)	Death rate (2000)	1996-98 IMR	Expectation birth		Per capita income	Percentage Below poverty line
				Male	Female		
Andhra Pradesh	21.3	8.2	65	61.2	63.5	14878	15.8
Assam	26.9	9.6	75	56.6	57.1	9792	36.1
Bihar	31.9	8.8	62	60.4	58.4	4813	42.6
Gujarat	25.2	7.5	62	60.9	62.9	18685	14.1
Haryana	26.9	7.5	67	63.7	64.6	21551	8.7
Himachal Pradesh	22.1	7.2	60	64.6	65.2	17786	7.6
Jammu*	19.6	6.2	50	-	-	12373	-
Karnataka	22.0	7.8	57	61.6	64.9	16654	20.0
Kerala	17.9	6.4	14	70.4	75.9	17709	12.7
Madhya Pradesh	31.2	10.2	88	55.6	55.2	11626	37.4
Maharashtra	20.9	7.5	48	64.1	66.6	22604	25.0
Orissa	24.3	10.5	96	57.1	57.0	8733	47.2
Punjab	21.5	7.3	52	66.7	68.8	23254	6.2
Rajasthan	31.2	8.4	79	59.1	60.1	13046	15.3
Tamil Nadu	19.2	7.9	51	63.2	65.1	18623	21.1
West Bengal	32.8	10.3	83	58.1	56.9	14894	27.0
Uttar Pradesh	20.6	7.0	51	62.2	63.6	9323	31.2

In most states, the odds of female children receiving immunization are significantly lower. Besides Kerala, the surprising exceptions are, Haryana, Rajasthan, Orissa, Andhra Pradesh, where odds ratios are greater than one but not significant. Steeply lower odds ratios are

indicated in the states of Punjab, Delhi, Madhya Pradesh and Assam, indicate that gender bias is very strong in these states.

The odds of females being underweight are significantly higher in a majority of states. Strong nutritional deprivations among females are noticed in the states of West Bengal, Gujarat, Haryana, Punjab and Andhra Pradesh.

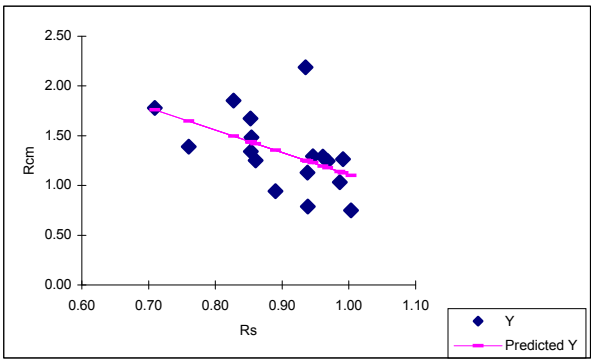
A stronger evidence of gender discrimination is found with respect to treatment seeking for Acute Respiratory Infection. The odds of female children being taken to a health provider is about 20-45 percent lower in the states of Jammu and Kashmir, Rajasthan, Uttar Pradesh, Bihar, Orissa, and Andhra Pradesh. The patterns of sex differentials in treatment seeking for diarrhoea similarly indicate evidences of a strong gender bias.

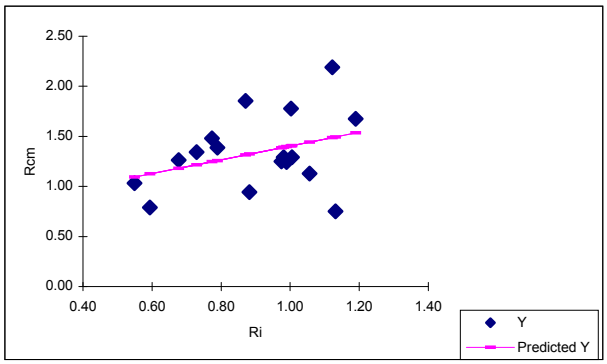
Socio economic condition and gender bias

The relationship of various sub-indices and composite indices of gender bias with female disadvantage in child mortality and development indicators are examined by using bi-variate linear regression plots.

Levels of excess female child mortality indicate positive relation with levels of gender gap in school attendance and nutritional neglect of female children. Gender bias in immunization similarly shows positive correspondence with excess female child mortality. Neglect in treatment, however indicates an opposite trend. This needs to be looked into further. Reporting bias may be a reason. Composite index shows no clear association with the level of child mortality.

The composite index of female bias indicates a strong positive relation (correspondence) with the gender gap in adult literacy and poverty ratio. Per-capita income of the states shows a good correspondence with the composite gender bias index. However, female/male ratio in work participation indicates no relation with the composite index of gender bias.


Rcm
Rs
Y
Predicted Y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Ri
Y
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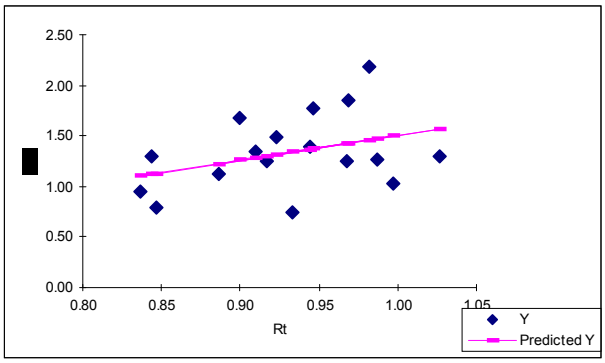
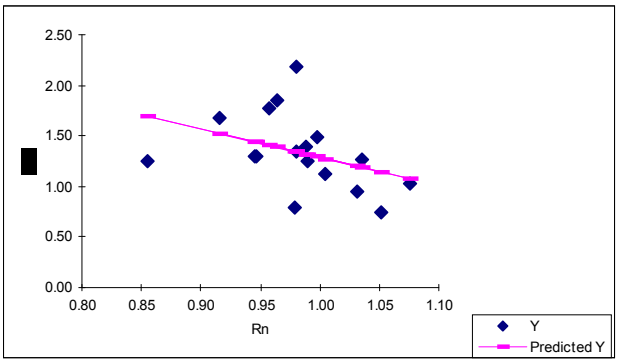
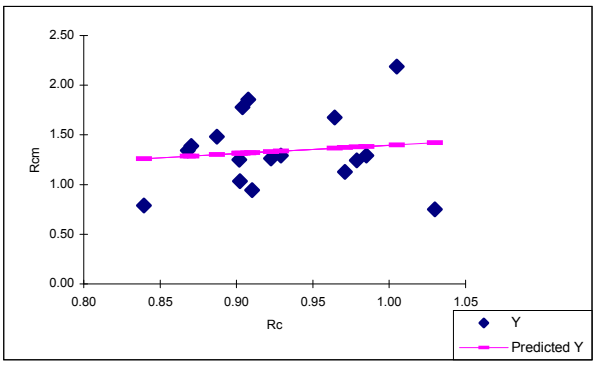
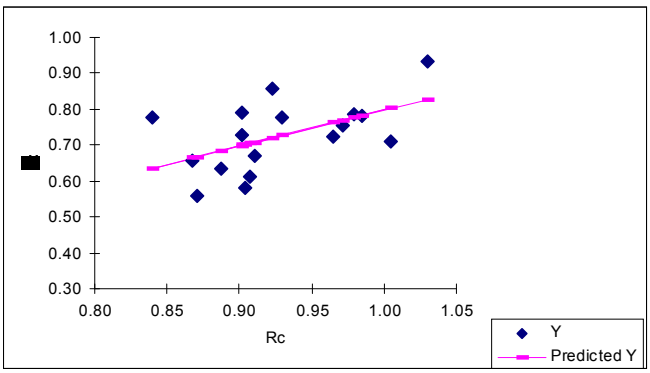
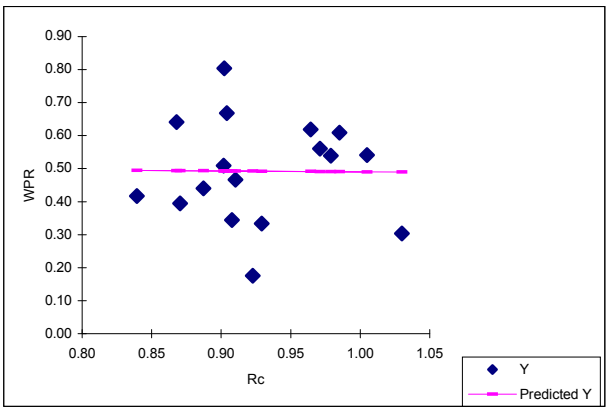
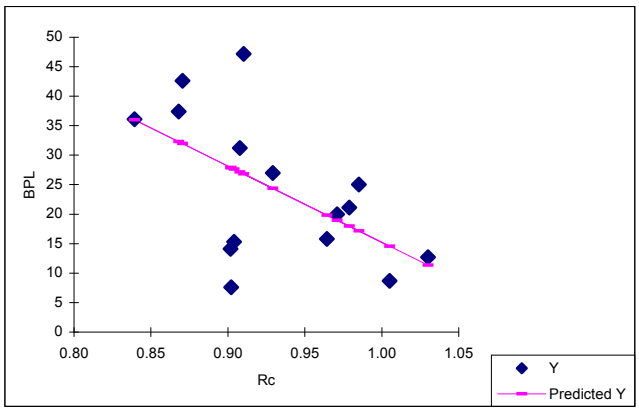

Rt
Y
Predicted Y


Rn
Y
Predicted Y


Rcm
Rc
Y
Predicted Y


Rc
Y
Predicted Y


WPR
Rc
Y
Predicted Y


BPL
Rc
Y
Predicted Y

Conclusion

The four sub indices of gender bias and the composite (cumulative) index provide a comprehensive base to conclude about the extent of gender bias across the states. This cumulative index shows a significant degree of gender bias against female children in most north and north central states of India (Table-9). However, gender bias indices relating to immunization coverage indicate more striking levels of discrimination of female children. Index of immunization and school attendance indicate consistent and sharper sex differences suggesting systematic neglect of girls. In the south Indian states and Maharashtra, gender bias is marginal with Kerala showing favourable condition for females.

A comparison of gender bias in terms of this composite index and female disadvantage in child mortality indicates good correspondence for a majority of the states. However, in the states of Haryana, Assam, and Orissa the two ratios of composite index of gender bias and that of child mortality indicate opposite conditions. Secondly, while F/M ratios of child mortality indicate greater degree of gender inequalities, the ratio of composite index shows a narrower range of gender inequalities across the states. The intensity of gender bias or the lack of it is further highlighted in the chart showing a summary of gender bias patterns across the states. The chart documents that gender inequalities are well highlighted for immunization, school attendance, treatment, child mortality, and composite index of gender bias.

The extent of gender bias demonstrated in this analysis has serious implication for achieving millennium development goals. The path to halving and further eliminating female discrimination in school attendance, nutrition, health care use and female disadvantage in child mortality appear to be long in India. Reaching millennium development goals in states with overall grading of intense gender bias, will take longer than what is now envisaged. This is a major issue of concern in the bigger northern states. In relation to each of the millennium development indicators, specific policy focus is required for narrowing gender differentials.

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