The Lesser Child: A Study of the Interlinkages between Child Sex Ratios and Discrimination against the Girl Child in Punjab

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This paper seeks to investigate whether improvement in sex ratios translate into better health and nutritional outcomes for the girl child through an in depth study of these indictors in the region of Punjab. In recent years, both the child and overall sex ratios have shown improvement in the state. We analyze whether this improvement has narrowed gender discrimination against the girl child in Punjab, through an empirical investigation of the indicators of childcare and well-being, using National Family Health Survey data. We also evaluate the cash transfer schemes being implemented for the welfare of the girl child in Punjab. Our analysis shows that in most dimensions of childcare there continues to be a bias against the girl child, with little improvement over time. For cash transfer schemes our analysis reveals that these are unimaginative, arbitrary and rigid. Eligible households have to comply with many regulations to benefit. Thus, in spite of progressive intentions behind these schemes and even some marginal positive outcomes, very few households have benefited. We recommend, therefore, that in spite of marginal benefits of transitory schemes such as cash transfers, what is needed from a medium-term and long-term perspective is a mix of gender-aware cultural initiatives, educational incentives and institutional policy programs that can grapple with the complexity of economic, social and cultural factors that impinge upon the well-being of the girl child in Punjab.

Introduction

Gender inequality is deeply ingrained in many regions of the developing world. One of the most noted manifestations of gender discrimination is the abysmally low sex ratio across many parts of the world.[1] This phenomenon was first noted by Sen (1990), who developed the concept of "missing women"[2] or the additional number of women who would have been alive, had they been treated at par with men. He compared the actual sex ratios in many developing countries with the expected sex ratios that would have prevailed had there been equal treatment of men and women in society. His estimates showed that the number

of missing women in the world was close to 100 million, making it one of the worst catastrophes of the 20th century.

Low child sex ratios indicate that there is a higher risk of female mortality for young children in the age group of 0-4 years, a time when care and attention are crucial determinants of mortality (Arokiasamy, 2002). Most scholars agree that there is discrimination against the girl child in many developing countries. However, it remains a point of contention whether there is indeed any bias against the girl child in terms of care and attention at the household level. Rosenzweig and Schultz (1982), Pandey et al. (2002) and Dasgupta et al. (2009) believe that there is a pronounced gender bias against the girl child that reveals itself through a combination of active bias (e.g. intentionally not taking a girl child to school), passive bias (e.g. taking longer to realize that a girl is sick than would be the case for a boy) and selective favoritism (choices made by resource constrained families that favor boys over girls). Hill and Upchurch (1995) conducted an empirical study on the basis of evidence collected from District Health Survey (DHS) in 38 countries and found that female mortality disadvantage across a number of countries in Asia and Africa are closely connected to female disadvantage in immunization and lack of treatment in case of common childhood illnesses.

Other scholars, however, find no evidence of such forms of discrimination against girls. Deaton (2003) finds no differences in vaccination rates of girls and boys on the basis of District Health Survey data collected from several developing countries. Duflo (2005, 113) has stated "even in countries where preference for boys is strongest, there is no evidence that girls are discriminated against in normal circumstances." Marcoux (2002) conducts an extensive study on the basis of survey data collected from six developing countries, traditionally known for high levels of gender discrimination, between 1985 and 1997. His findings reveal that gender discrimination in nutritional status and anthropometric indicators has systematically disappeared over time. Similarly Sommerfelt and Arnold (1998, 152) conclude that the extent of intra household discrimination against the girl child is so small that it does not reveal itself in large-scale household survey data. Other scholars believe that in India and other parts of South Asia, there is evidence of discrimination in medical care and expenditure but not in allocation of food (Makinson, 1994; Ueyuma, 2007; Sharma, 2014).

The Case of Punjab

Despite Punjab's distorted development pattern, characterized by high sectoral unevenness due to the agriculturally-oriented path of development, pursued both during the colonial phase (canal colonies) as well as the post-colonial phase (Green Revolution), the state is viewed by many academic scholars and most policy makers in India as one of the most developed states of India due to its relatively high levels of per capita income, developed infrastructure and low levels of poverty in comparison with other Indian states (P. Singh, 1994, 2008). However, this 'development' co-exists with a highly patriarchal social structure

and culture wherein the bias against girls and women is persistent (Kaur, 2013). Punjab ranks fifth in terms of human development and sixth in terms of overall development when compared with other Indian states but this rank falls to 19th on the gender development index (UNFPA, 2014). 16 per cent of girls in the state are missing at birth (UNFPA, 2014).[3] Both the child sex ratio and the overall sex ratio in Punjab are among the lowest compared to all other major states of India (Census of India, 2001, 2011).

Gender discrimination, neglect of the girl child and high degree of preference for sons are a pervasive reality in Punjabi society (Purewal, 2010). Miller (1981) first documented this phenomenon in her anthropological study of several states of northern India, including Punjab. She states, "The preference for sons in Punjab is so strong that daughters must suffer in order that the family's personal and culturally mandated needs remain fulfilled." Cowan and Dhanoa (1983) conducted a field survey in Ludhiana district of Punjab and found that there were pronounced differences in mortality and nutritional status of young boys and girls. She discovered that such differences were most pronounced among wealthy landed peasants, although they exist among the poor landless peasants as well.

In recent years, many studies reflect on the fact that even after decades of high economic growth, there has been little shift in the perception of people towards girls and women in society. Rapid economic growth and increasing literacy levels have led to smaller family sizes, decreasing fertility levels and late marriage, yet the desire for male progeny continues unabated in Punjabi families. Patel (2007) and Bose (2007) conducted two extensive studies in north India. Both these studies show that the "son complex" is deeply engrained in Punjabi society. The status and position of women in society is intricately linked to the birth of a son. In most parts of the state, though people now prefer to have smaller families, yet the preference for sons continues unabated. In an extensive study conducted across districts with the worst sex ratios in Punjab, Himachal Pradesh, Haryana, Rajasthan and Madhya Pradesh, John et al. (2008) find similar results. In Punjab, the study was conducted in the Fatehgarh Sahib district. This study reported that for most respondents in the region, the desired family composition comprised of one son and one daughter. The study also reported that the prevalence of sex selective female abortions was inherently linked to desired family composition. If the first child is a boy, then most people do not opt for sex selection, as the gender of the second child does not matter much. However if the first-born is a girl, the practice of sex selective abortion gains momentum for the second child.

As far as gender discrimination in care, attention and well-being of girls in Punjab is concerned, the evidence is mixed, similar to the trend in other regions of the world exhibiting son preference. Dasgupta (1987) conducts an extensive study on gender discrimination at the household level in the state on the basis of an extensive survey of 400 households in Ludhiana district of Punjab. She notes, "There is no doubt that a girl receives less attention than what is bestowed on a son. She is less warmly clad, she is not so well fed as a boy and when ill, her parents are not likely to make the same effort as in the case of a son to ensure

her treatment." According to Dasgupta (1987, 75), "Preference to the son and the low status of women in Punjabi society are the two main factors contributing to discrimination against the girl child in the state." Years later, the picture remains unchanged as a number of other studies have also reported high levels of male bias in the provision of health care, nutrition, education and resource allocation in most parts of north India, especially Punjab and Haryana (Wyon and Gordon, 1971; Chaturvedi et al., 1996; Asfaw et al., 2007; UNICEF, 2011; Tiwari, 2013; and Sharma, 2014). These studies suggest that the root cause of such forms of discrimination is the patriarchal, intra-familial family structure of Punjab where the economic, religious and cultural utility of girls is perceived to be less than that of boys. However, Levinson et al. (2003) presents a more nuanced picture showing a decline in difference in gender mortality in early years. These results are based on two studies conducted across 18 villages in Morinda district of Punjab-one in 1971 and the other in 2001. They report that while the mortality difference between boys and girls (in the age group of 0-3 years) was as high as 85 per cent in 1971, it had narrowed down to merely 13-14 per cent in 2001. This decline in mortality differences was observed across caste groups. They attribute this decline to economic prosperity and smaller sized families. These factors also contribute to better care and attention being provided to female children in the family. John et al. (2008) report that gender differences in mortality were largely due to the practice of female feticide and sex selective abortions. They do not find any evidence of discrimination against the girl child in provision of healthcare and nutrition. Thus, while the inferior status of the girl child in Punjab has been clearly demonstrated by a large body of literature, contention remains on whether this inferior status exists in allocation of resources, medical expenditure and food within the household.

In recent years, the relative position of the girl child in the state seems to have improved to a certain extent, as indicated by both overall sex ratio and child sex ratio. While the overall sex ratio has risen from 874/1000 in 2001 to 893/1000 in 2011, registering an increase of 19 points, the child sex ratio has improved by 48 points from 798/1000 to 846/1000. Punjab has registered the most rapid improvement in child sex ratio among all states of India. The state government claims that this improvement signifies a substantial decline in the degree of son preference in the state as a result of positive interventions by the government, strict enforcement of the Pre Natal Diagnostic Test (PNDT) Act and numerous schemes initiated to promote the interest of the girl child in the state. It is against this background that the paper attempts to analyze whether there has indeed been an improvement in the status of the girl child in Punjab. The main questions that this paper seeks to address are as follows -:

1) What is the extent of gender bias in Punjab with respect to healthcare, health seeking, and nutritional status and mortality levels among young children?
2) Has there been any improvement with respect to care and attention devoted to girl child in the state over time?

3) What are the other socioeconomic and community characteristics, which have had an impact on nutritional and health status of a child? Is gender a significant factor in these characteristics?
4) What are the policies being implemented in the state to improve the health and nutrition of the girl child? Have these policies been effectual in improving the health and nutrition of girl children in the state?

Data Sources

The present study makes use of data from subsequent rounds of National Family Health Survey NFHS-2 (1998-99) and NFHS-3 (2005-06). This is a nationally representative survey conducted by the Ministry of Health and Family Welfare. While NFHS-3 data set is based on a representative sample of 109,741 households across India and 2,968 households across Punjab, NFHS-2 data is based on 90,000 households across India and 1,876 households across Punjab. Information on various schemes for the girl child in question has been collected from official government documents of the central and the state government, newspaper reports and other studies conducted on the subject.

Methodology

In the first part of the analysis (Section One), we adopt a multiple indicator approach in order to evaluate gender discrimination in various facets of care and wellbeing, nutrition and mortality of young children in Punjab in comparison with the other major states of India. In order to do so, we construct three indices - Childcare Disparity Index (CDI), Nutritional Disparity Index (NDI) and Mortality Disparity Index (MDI). These indices have been constructed for two subsequent years, 1998-99 and 2005-06, using the NFHS data.

In the second part of the analysis (Section Two), we use Logistic Regression Analysis to understand child-specific, parental and community characteristics, which influence the nutritional status of a child. The variables included in the model are divided into two categories: dependant variables and explanatory variables. The dependant variable is the nutritional status of the child. The main explanatory variable in the study is the gender of the child. Other socio economic and community characteristics are considered as control variables.

In the third part (Section Three), we conduct a desk review of various programs implemented by the government for the welfare of the girl child and evaluate their efficacy with respect to their design, implementation mechanism and coverage.

Section One: Multiple Indicator Approach to examine gender discrimination among young children

We examine gender disparity along the following dimensions: disparity in childcare, disparity in nutritional status, and gender bias in child mortality.

a) Disparity in Child Care

We measure disparity in childcare with three indicators: initial duration of breastfeeding, immunization coverage of children and health-seeking behavior for common childhood diseases.

1) Initial duration of breastfeeding:

The initial growth of a child depends on the duration and frequency of breastfeeding, since breast milk provides important nutrients to infants and protects them against certain infections. Across many developing countries, there is a pronounced gender bias in the duration of breastfeeding due to the desire to invest more in sons' health as well as the desire to have fewer children after a son is born (Young Lives, 2012). However, after the birth of a daughter, most parents desire to have another child soon afterwards. As a result, girls are breastfed for shorter time periods, less frequently and for shorter durations than male infants (Arokiasamy, 2002; Mishra, 2004; Jayachandra and Kuziemko, 2010 and Tiwari, 2013).

Table 1: Gender Differences in median duration of breastfeeding (months)

	2005-06			1998-99		
State	Boys	Girls	Mean differences	Boys	Girls	Mean differences
Andhra Pradesh	23.8	22.5	1.3	27.8	23.3	4.5
Bihar	32.6	23.9	8.7	36	36	0
Gujarat	23.9	21.5	2.4	22.5	21.2	1.3
Haryana	25.4	23.6	1.8	25.8	23.5	2.3
Karnataka	20.2	20.7	-0.5	19.9	20.2	-0.3
Kerala	26	24.1	1.9	25.4	24	1.4
Madhya Pradesh	24.3	22.5	1.8	24	25.9	-1.9
Maharashtra	23.7	20.8	2.9	24.5	23.3	1.2
Orissa	36	32.6	3.4	33.6	36	-2.4
Punjab	22.1	21.1	1	26.4	18.9	7.5
Rajasthan	23.9	23.3	0.6	26.2	24.7	1.5
Tamil Nadu	16.1	13.8	2.3	17.8	15.7	2.1
Uttar Pradesh	27.2	23.9	3.3	26.4	25.2	1.2
West Bengal	36	33.2	2.8	17.8	15.7	2.1
All India	25.4	23.6	1.8	26.4	24.6	1.8

Source: computed from NFHS-3 (2005-06) and NFHS-2 (1998-99).

Data from NFHS points to the fact that the median duration of breastfeeding is higher for male children as compared to the female children in Punjab (Table 1). However, gender differences in duration of breastfeeding have narrowed down over time. Data from NFHS-2 (1998-99) shows that boys are breastfed nearly six months longer than the girl child but in NFHS-3 (2005-06) the median duration of breastfeeding is only a month longer for the boys as compared to girls. In terms of gender bias in median duration of breastfeeding in 2005-06, Punjab has made a marked improvement from NFHS-2 (1998-99) when the bias in terms of median duration of breastfeeding was the most pronounced in Punjab, in comparison with the national average and all other major states. However, by 2005-06 the gender discrimination in terms of median duration came down so drastically that it was higher than only two states: Karnataka (where girls are breastfed longer than boys) and Rajasthan (where the median duration of breastfeeding among boys is only six days more than that of girls).

2) Immunization coverage of children:

Children are required to be immunized against some childhood diseases namely tuberculosis, diphtheria, whooping cough, tetanus, polio and measles, under the Universal Immunization Programme. These diseases can turn out to be fatal in the absence of timely vaccination (Ministry of Health and Family Welfare, 2001).

In Table 2, we present data on the sex-wise distribution of immunization coverage of children aged 12-23 months. NFHS data reveals that even after crossing infancy a large proportion of children in the state are not fully vaccinated with vaccination coverage deteriorating over time. In 1998-99, 74.5 per cent of male children and 69.2 per cent of female children were fully immunized but in 2005-06 only 64.7 per cent of male children and 53.7 per cent of female children had received full immunization coverage. The performance of Punjab has deteriorated both in terms of coverage of children as well as female disadvantage in immunization coverage. On the other hand, at the all-India level, female disadvantage in immunization coverage has remained approximately same, and overall coverage has improved from 43.1 per cent to 45.1 per cent for males and from 40.9 per cent to 41.5 per cent for females. However, immunization coverage at the all-India level remains substantially below that of Punjab. The state-wise trend reveals that there are significant differences related to immunization coverage across major states. Among developed states like Maharashtra, Kerala and Andhra Pradesh, there has been a significant deterioration in immunization coverage and the female disadvantage in immunization coverage has become more pronounced. While in Haryana, the coverage has remained approximately constant between the two time periods but the marginal female disadvantage in immunization has been overcome. Coverage has improved in many of the poorer states such as Madhya Pradesh, Rajasthan and Bihar although the initial level of immunization coverage in these states in 1998-99 was very low and improved coverage in 2005-06 remains so.

Table 2: Gender Differences in Immunization Coverage (%)

	2005-06			1998-99		
State	M	F	% Differences	M	F	% Differences
Andhra Pradesh	52.7	38.9	13.8	54.2	62.8	-8.6
Bihar	38	26.6	11.4	13	9	4
Gujarat	48.5	41.8	6.7	53.1	52.9	0.2
Haryana	63.3	67.6	-4.3	62.3	63.2	-0.9
Karnataka	54.5	55.5	-1	42.2	45.7	-3.5
Kerala	74	76.7	-2.7	77.1	82.6	-5.5
Madhya Pradesh	44.3	35.9	8.4	27.3	17.9	9.4
Maharashtra	60.7	56.2	4.5	80.8	76.3	4.5
Orissa	48.8	55	-6.2	44.1	43.3	0.8
Punjab	64.7	53.7	11	74.5	69.2	5.3
Rajasthan	26.3	26.7	-0.4	16.9	17.6	-0.7
Tamil Nadu	80.7	81.2	-0.5	45.8	45.7	0.1
Uttar Pradesh	24.9	20.9	4	23.6	18.8	4.8
West Bengal	61.5	66.9	-5.4	45.8	45.7	0.1
All India	45.3	41.5	3.8	43.1	40.9	2.2

Source: Computed from NFHS-3 (2005-06) and NFHS-2 (1998-99)

3) Gender discrimination in health seeking

A number of studies show that there is discrimination against the girl child in terms of access to hospital treatment, expenditure on medicine and care received during illness (Dasgupta, 1987; Asfaw et al., 2007; and Zimmerman, 2012). Kynch and Sen (1983) in a study based on admissions data from two large public hospitals in Mumbai, find very striking and clear evidence that hospital-admitted girls were typically more ill than boys, suggesting that a girl has to be more stricken before she is taken to the hospital (see also Sen, 2001). In our analysis here, we have measured disparities in terms of proportion of male and female children who were taken to a health provider and received treatment for diarrhea and fever, since these are the two most common childhood illnesses. Our analysis reveals that female disadvantage with respect to treatment received for diarrhea and fever has increased significantly in Punjab during the period under study (see Table 3). In 1998-99, while 91.1 per cent of male children and 89.7 per cent of female children were taken to a health provider in the event of fever and diarrhea, in 2005-06 only 82.3 per cent of male children and 65.1 per cent

of female children were taken to a health provider. It is important to note that though both in 1998-99 and 2005-06, Punjab and Haryana retain the two top slots in this category for both male and female children, the gap in Punjab between male and female percentage has widened (with bias against female children) between these two time periods. At the all-India level also, percentage of children receiving treatment has declined from 73.2 per cent for males and 72 per cent in 1998-99 to 64.8 percent for males and 61.9 per cent for females. The state-wise trend also reveals that the level of gender bias in treatment seeking was the highest in Karnataka, Orissa and Andhra Pradesh in 1998-99, while the worst performing states in terms of discrimination in treatment-seeking behavior in 2005-06 are Punjab, Karnataka and Madhya Pradesh.

Table 3: Gender Discrimination Health Seeking Behavior (percentage)

	2005-06			1998-99		
State	M	F	% Differences	M	F	% Differences
Andhra Pradesh	68	64.2	3.8	73	64.2	8.8
Bihar	50.6	46.9	3.7	49.8	50.7	-0.9
Gujarat	60.5	56.4	4.1	65.6	60.5	5.1
Haryana	82.3	75	7.3	94.3	90.7	3.6
Karnataka	73.8	62	11.8	73.8	62	11.8
Kerala	64.8	62.8	2	78.8	77.8	1
Madhya Pradesh	62.9	59.4	3.5	62.9	55.6	7.3
Maharashtra	79.3	74	5.3	78.3	76	2.3
Orissa	71.9	65.6	6.3	58.6	48.9	9.7
Punjab	82.3	65.1	17.2	91.1	89.7	1.4
Rajasthan	63.9	56.7	7.2	59.5	56.7	2.8
Tamil Nadu	69.6	62.1	7.5	69.6	64.8	4.8
Uttar Pradesh	66.5	54.9	11.6	60.6	63.8	-3.2
West Bengal	58.9	38.9	20	69.6	64.8	4.8
All India	64.8	61.9	2.9	73.2	72	1.2

Source: computed from NFHS-3 (2005-06) and NFHS-2 (1998-99)

With these three indicators, we have prepared a Child Care Disparity index (CDI) by taking the male to female ratios for the three variables under consideration. The values on all these ratios are summed up and their average gives the value of CDI value for each state. We present states' CDIs in the ascending order for ease of comparison of states' performance. The results for 1998-99 are presented in Table

5 and those for the year 2005-06 are presented in Table 4. While Punjab ranked 13th in terms of CDI in 1998-99, its position has improved to 11th in 2005-06. Punjab's performance has improved relative to states like Bihar, Uttar Pradesh and West Bengal. However, the level of gender discrimination in Punjab is still very high compared to other developed states like Maharashtra, Gujarat and the southern states of Karnataka, Andhra Pradesh, Tamil Nadu and Kerala. Thus our analysis reveals that in terms of gender disparities in childcare, Punjab has made some improvements between 1998-99 and 2005-06, and remains one of the top states in terms of overall immunization coverage and healthcare treatment. While gender discrimination in duration of being breastfed has narrowed down significantly, girls in Punjab continue to face high levels of disparity in immunization coverage and treatment.

Table 4: Gender Disparity in Health Care (2005-06)

State	Median Duration of Breastfeeding (months)		% Fully Immunized		% Received treatment		CDI	Rank
Andhra Pradesh	23.8	22.5	52.7	38.9	68	64.2	1.15	10
Bihar	32.6	23.9	38	26.6	50.6	46.9	1.29	14
Gujarat	23.9	21.5	48.5	41.8	60.5	56.4	1.11	8
Haryana	25.4	23.6	63.3	67.6	82.3	75	1.03	3
Karnataka	20.2	20.7	54.5	55.5	73.8	62	1.04	5
Kerala	26	24.1	74	76.7	64.8	62.8	1.02	1
Madhya Pradesh	24.3	22.5	44.3	35.9	62.9	59.4	1.12	9
Maharashtra	23.7	20.8	60.7	56.2	79.3	74	1.09	7
Orissa	36	32.6	48.8	55	71.9	65.6	1.02	2
Punjab	22.1	21.1	64.7	53.7	82.3	65.1	1.17	11
Rajasthan	23.9	23.3	26.3	26.7	63.9	56.7	1.04	4
Tamil Nadu	16.1	13.8	80.7	81.2	69.6	62.1	1.09	6
Uttar Pradesh	27.2	23.9	24.9	20.9	66.5	54.9	1.18	13
West Bengal	36	33.2	61.5	66.9	58.9	38.9	1.17	12
All India	25.4	23.6	45.3	41.5	64.8	61.9	1.07	

Source: adapted from National Family Health Survey (NFHS)-3; 2005-06

Table 5: Gender disparity in health care (1998-99)

State	Median Duration of Breastfeeding (in months)		% Fully Immunized		% Received treatment		CDI	Rank
Andhra Pradesh	27.8	23.3	54.2	62.8	73	64.2	1.06	8
Bihar	36	36	13	9	49.8	50.7	1.14	12
Gujarat	22.5	21.2	53.1	52.9	65.6	60.5	1.04	6
Haryana	25.8	23.5	62.3	63.2	94.3	90.7	1.04	4
Karnataka	19.9	20.2	42.2	45.7	73.8	62	1.03	3
Kerala	25.4	24	77.1	82.6	78.8	77.8	1.00	1
Madhya Pradesh	24	25.9	27.3	17.9	62.9	55.6	1.19	14
Maharashtra	24.5	23.3	80.8	76.3	78.3	76	1.04	5
Orissa	33.6	36	44.1	43.3	58.6	48.9	1.05	7
Punjab	26.4	18.9	74.5	69.2	91.1	89.7	1.16	13
Rajasthan	26.2	24.7	16.9	17.6	59.5	56.7	1.02	2
Tamil Nadu	17.8	15.7	45.8	45.7	69.6	64.8	1.07	9
Uttar Pradesh	26.4	25.2	23.6	18.8	60.6	63.8	1.08	10
Tamil Nadu	17.8	15.7	45.8	45.7	69.6	64.8	1.07	9
All India	26.4	24.6	43.1	40.9	73.2	72	1.04	

Source: Adapted from NFHS-2; 1998-99

Note: The higher the value of the index, the greater is the discrimination against the girl child.

b) Disparity in Nutritional Status

The nutritional status of a child reflects their food intake and overall health. A number of studies have compared gender disparity through nutritional status of children. Young Lives (2012) conducted a cross-country study among 12,000 children in Peru, Ethiopia, India and Vietnam. The study proved that gender bias in nutritional status was the most pronounced in India among all these developing countries. They found that girls in India are severely discriminated against in terms of resource allocation within the household, especially dairy products, meat and eggs. The study also showed that the incidence of stunting was much higher among girls than boys. Arokiasamy and Pradhan (2006) and Tiwari (2013) conducted studies based on analysis of NFHS data and found that there was pronounced

gender bias in stunting, being underweight and prevalence of anaemia. A large number of field based studies conducted in different parts of the country have also revealed that the incidence of malnutrition among girls is much higher than boys across many parts of the country (Sen and Sengupta, 1983; Chaturvedi et al., 1996; Mehrotra, 2006; Moatula and Lhundgim, 2014; and Sharma, 2014).

The measures used in the NFHS to assess nutritional status of children are weight-for-age, height-for-age and weight-for-height. These are commonly interpreted as indicators of total, chronic and acute malnourishment. On the weight-for-age scale, children whose weight falls below two standard deviations of the international reference population, as recommended by the World Health Organization, are considered as underweight. The 'deficit in height-for-age' measure provides an indicator for the extent to which children are stunted. Children whose weight-for-height is below two standard deviations of the reference population are considered to be wasted [4] or too thin (IIPS, 1995).

In 2005-06, about 25 per cent of the children in Punjab were underweight, which along with Kerala had the lowest rate among all Indian states. In India as a whole more than 40 per cent of children were underweight (NFHS-3) at the time. In terms of long-term nutritional indicators i.e. stunting and wasting, Punjab fares much better than other states as well as the all India average. However, Table 6 and Table 7 show that there has been very little improvement in nutrition indicators in the state between 1998-99 and 2005-06. In 1998-99, 38.7 per cent of boys and 39.7 per cent of girls in the state were stunted; by 2005-06 the proportion of stunted girls remained same while the proportion of stunted boys narrowly fell to 36.7 per cent. The proportion of wasted boys rose from 8.4 per cent to 9.6 per cent and girls from 5.7 per cent to 8.6 per cent. We construct the Nutritional Disparity Index (NDI) to compare the nutritional status of boys and girls. The NDI is the average of the sum total of the female to male ratios for underweight, stunted and wasted children. In 1998-99, there was the least disparity between the nutritional status of boys and girls and Punjab ranked at the top of all states. However by 2005-06 the state's ranking fell to twelve and it was outranked by most other states with the exception of Bihar and Orissa. There has been very little reduction in the proportion of malnourished children in the stateand gender differences have become very stark.

c) Gender Bias in Child Mortality

Evidence of excess female child mortality is an important indicator of gender inequality. Sen (2001) identifies seven types of gender inequalities and consigns number one to mortality inequality, the other six being: natality inequality, basic facility inequality, special opportunity inequality, professional inequality, ownership inequality and household inequality. Miller (1997) documents that women in northern India have a much higher mortality rate than men due to the differences in food, healthcare and attention given to boys and girls. Similarly Rosenzweig and Schultz (1982) use econometric analysis to highlight that higher level of mortality among girl children in Asia is due to gender differences in investment in children. Subsequent studies have shown that gender discrimination

leads to higher mortality among females than males in many developing countries across Asia and Africa (Kishore, 1993; D'Souza and Chen, 1980; D'Souza, 2005; Ueyuma, 2007; Dasgupta et al., 2009; Young Lives, 2012). Evidence from NFHS points out to the fact that in Punjab (see Table 8), mortality rates for boys is much higher than girls (32.9 compared to 26) in the neonatal period.[5] This difference narrows down in the infancy period[6] (45.6 compared to 44). But in early childhood (under 5), mortality rate is higher among girls than boys (58.9 to 51.3). The same trend is observed at the all-India level and across most other states of India with the exception of Maharashtra, Orissa, Karnataka, Kerala and Tamil Nadu. There has been a decline in mortality levels for both boys and girls in Punjab from 1998-99 (see Table 9) to 2005-06 and gender differences seem to have narrowed down. The trend is similar at the all-India level as well.

Table 6: Gender Bias in Nutritional Status of Children (2005-06)

	Stunting		Wasting		Underweight			
State	M	F	M	F	M	F	NDI	Rank
Andhra Pradesh	42.8	42.6	19	18.3	31.7	33.4	1.004	11
Bihar	54.3	57.1	28.2	25.2	54.3	57.8	1.0032	13
Gujarat	51.6	51.8	20.6	18.5	46.4	42.4	0.938	3
Haryana	46.7	44.5	20.5	19.1	41.9	43.1	0.971	8
Karnataka	44.9	42.5	17.5	15.4	38.7	36.3	0.921	2
Kerala	25.8	23.1	11.9	12.7	24	21.8	0.956	6
Madhya Pradesh	49.2	50.7	36.8	32.3	59.5	60.6	0.975	9
Maharashtra	47.3	45.1	17.8	16	36.7	37.3	0.956	5
Orissa	43.6	46.4	15	14.6	39.4	41.9	1.033	14
Punjab	**36.7**	**39.7**	**9.6**	**8.6**	**23.9**	**26.3**	1.025	**12**
Rajasthan	44.7	42.2	20.8	20.1	40.3	39.5	0.963	7
Tamil Nadu	32.7	29	18.1	17	31.5	28	0.904	1
Uttar Pradesh	56.2	57.5	15	14.6	52.6	43.7	0.9421	4
West Bengal	45	44.1	28.2	25.2	37.4	40	0.981	10
All India	48.1	48	16.3	15.5	41.9	43.1	0.992	

Source: Computed from NFHS-3; 2005-06 and state reports of NFHS

Table 7: Gender Bias in Nutritional Status of Children (1998-99)

	Stunting		Wasting		Underweight			
	M	F	M	F	M	F	NDI	Rank
Andhra Pradesh	44.1	43.7	9.1	9	35.1	40.2	1.04	11
Bihar	53.4	57.7	21.4	20.5	52.8	56.1	1.03	9
Gujarat	50.5	49.7	13.9	18.6	40.3	50	1.18	14
Haryana	47.5	53.1	5.9	4.6	31.8	38.1	1.03	8
Karnataka	42	45.3	21.4	18.5	42.2	45.7	1	4
Kerala	38.8	41	12.5	9.7	26.2	27.6	0.96	2
Madhya Pradesh	50.2	54	19.8	19.9	52.8	57.6	1.05	12
Maharashtra	36.6	47	20.3	22.3	49.2	50	1.13	13
Orissa	53	54.6	24.8	23.8	54.6	54.3	0.99	3
Punjab	**38.7**	**39.7**	**8.4**	**5.7**	**27.3**	**30.3**	**0.93**	**1**
Rajasthan	38.7	39.7	11.8	11.6	49.8	52.2	1.01	7
Tamil Nadu	37.4	39.8	20.7	19	35.8	37.6	1.01	5
Uttar Pradesh	35.7	38.3	11.4	10.8	49.6	53.9	1.03	10
West Bengal	49.2	52.9	14.8	12.3	45.5	52.3	1.01	6
India	45.3	48.9	15.7	15.2	45.3	48.9	1.03	

Source: Computed from NFHS-3; 2005-06 and state reports of NFHS

A Mortality Disparity Index (MDI) is constructed as the ratio of mortality rates of females to males under-five. This age group is selected because despite an adverse sex ratio at birth (favorable to males) higher male mortality during infancy balances the sex ratio by the age of one. After that, disparity in childcare increases the risk of female mortality. The states are ranked in ascending order on MDI in Tables 8 and 9. We find that Punjab ranked at the bottom with respect to MDI in 1998-99 and there has been no change in its position in subsequent years and continues to remain at the bottom in 2005-06. Thus, although infant and child mortality levels are lower in Punjab than the all-India average and those of most other states, gender biases in mortality levels in the state are much higher than what is observed at the all-India level and in most other states. This points out to the fact that young girls in the state are at a disadvantage in terms of indicators of household care and attention.

Table 8: Gender Disparities in Mortality (2005-06)

	Neonatal Mortality		Infant Mortality Rate		Child Mortality Rate		MDI	Rank
State	M	F	M	F	M	F		
Andhra Pradesh	56.7	47.2	77.1	58.7	85.6	71.1	0.83	1
Bihar	43.1	41	59.7	70.8	82.7	108.3	1.3	10
Gujarat	47.8	41.8	63.1	62.5	72.2	82.5	1.14	5
Haryana	26	23.4	45.3	45	55.2	63	1.14	13
Karnataka	40.9	34.7	57.5	48.1	71.4	60.6	0.84	6
Kerala	16.5	12.4	21	14.3	22.3	16.6	0.74	4
Madhya Pradesh	52.7	50.1	80.9	82.8	103.6	112.7	1.08	7
Maharashtra	37.9	33.1	48.3	42	55.8	55.7	0.99	2
Orissa	53.3	38.5	21.6	20.9	103.7	84.4	0.81	8
Punjab	32.9	26	45.6	44	51.3	58.9	1.14	14
Rajasthan	47.7	49.4	70.5	75.2	87.7	99.4	1.13	11
Tamil Nadu	29.7	22.7	37.6	37.8	47.3	47.9	1.01	12
Uttar Pradesh	56.3	53.2	80.9	85.2	100.9	124.7	1.23	9
West Bengal	50.8	24.9	59.7	70.8	82.7	103.8	1.25	3
All India	40	36.8	56.3	57.7	69.7	79.2	1.13	

Source: Computed from NFHS-3 (2005-06).

From the multi indicator analysis conducted above, we conclude that the improvement in over-all sex ratio and child ratio in the state suggests improvement in some aspects of household care and attention devoted to the girl child. However, there are marked gender differences in healthcare, treatment, immunization and nutrition status of boys and girls. These differences manifest themselves in higher levels of childhood mortality among girls. After having examined the extent of gender bias against the girl child in terms of health and nutrition outcomes, in the next section we have applied econometric techniques to understand the probable causes behind such forms of bias.

Table 9: Gender Disparities in Mortality (1998-99).

	Neonatal Mortality		Infant Mortality Rate		Child Mortality Rate		MDI	Rank
State	M	F	M	F	M	F		
Andhra Pradesh	45	27.9	72.9	68.7	88.2	94.5	1.07	8
Bihar	42.1	31.5	75.5	75.8	104.6	116	1.10	10
Gujarat	46.6	37	69	59.4	92.4	89	0.96	5
Haryana	32.2	36	52.9	66	66	94.2	1.42	13
Karnataka	53.6	34.8	70.1	54.1	89.7	76.6	0.85	2
Kerala	19.6	10.6	24.7	16.6	30.6	21.1	0.68	1
Madhya Pradesh	67.3	51.7	97.2	87.5	141.1	148	1.04	7
Maharashtra	38.8	37.4	54.7	51.6	69.4	70.6	1.01	6
Orissa	36.9	32.6	121.3	109.9	121.3	109.9	0.9	4
Punjab	34.4	37.9	49.7	65.2	55.4	87.4	1.57	14
Rajasthan	57.5	50.4	88.9	87.2	115.7	134.9	1.16	11
Tamil Nadu	35.5	36.6	50.2	51.8	62.3	66.8	1.07	9
Uttar Pradesh	64.5	59.4	94.8	96	120.9	144.2	1.19	12
West Bengal	64.6	46.4	57.3	44.2	74.7	67.1	0.89	3
All India	50.7	44.6	74.8	71.1	97.9	105.2	1.07	

Source: Computed from NFHS-2 (1998-99).

Section Two: Logistic Regression Analysis

In this section we use logistic regression analysis to examine whether gender is a significant factor in explaining nutritional status and well-being of the child. We have followed Alderman, Hoddinott and Kingsey (2006) and take anthropometric measures and use weight for age Z-score and height for age Z-score as indicators of childhood nourishment and well-being. Child weight and height are considered outputs of a health production function, the inputs of which include nutritional intake, exposure to infections and health care. Height and weight are thus affected by all of the pathways through which gender bias operates (Waldron, 1987). The analytical model is specified as under-:

$$Nutritional\ status = F\ (C_i, P_i, H_i,)$$

Where nutritional status is a function of the child's characteristics (C_i), parents' characteristics (P_i) and household characteristics (H_i).

Dependent Variables: The main dependent variables in our framework are the odds of having a low weight-for-age and low height-for-age child as compared to a normal weight-for-age and height-for-age child. These measure the extent to which a child is underweight or stunted

Independent Variables: The main explanatory variable in this model is the gender of the child. Other socio economic variables are considered as control variables. They are broadly divided into parental characteristics, community characteristics and household characteristics. Parents' characteristics that we control for are education of the mother, nutritional status of the mother and mother's age; household characteristics in our analysis include the caste and wealth index of the household and the community characteristics in the above analysis include presence of a toilet facility and piped water at home, location of the household and receipt of supplementary nutrition through Integrated Child Development Scheme (ICDS) or *Anganwadi* centers.

Table 10: Logistic Regression Analysis for Low Weight for Age

Variable	β	Exp β	SE	95% CL
Mother's Age				
<19	0	1		
20-29	1.436	0.548*	0.286	0.313-0.96
30+	-0.342	0.71	0.384	0.334-1.50
Mother's BMI				
Normal	0	1		
Underweight	0.781	0.458	0.126	0.429-0.953
Mother's Education				
Illiterate	0	1		
Literate	-0.437	.659*	0.189	0.450-0.941
Preceding Birth Interval				
<24 months	0	1		
>=24 months	-0.448	0.639*	0.204	0.429-0.952
Gender				
Male	0	1		
Female	0.346	1.413*	0.16	1.033-1.975

Caste				
SC	0	1		
Non SC	0.067	1.082	0.189	0.738-1.550
Ownership of TV, Refrigerator and motorcycle				
No	0	1		
Yes	-0.057	0.375**	0.358	0.185-0.73
Area of Residence				
Urban	0	1		
Rural	-0.573	0.945	0.217	0.618-1.445
Access to toilet at home				
No	0	1		
Yes	-0.136	0.815*	0.179	0.614-1.241
Access to Piped Water				
No	0	1		
Yes	-0.504	0.604*	0.264	0.360-1.042
Supplementary Feeding in ICDS				
No	0	1		
Yes	-0.267	0.788*	0.223	0.434-0.978

Source: Computed from unit records of NFHS-3 (2005-06).
Notes: p*<0.05, p**<0.01.

Table 11: Logistic Regression Analysis for Low Height for Age

Variable	B	Exp β	SE	95% CL
Mother's Age				
<19	0	1		
20-29	1.984	6.721*	0.186	4.313-9.698
30+	1.342	5.71*	0.384	3.334-7.506
Mother's BMI				
Normal	0	1		
Underweight	0.029	1.123	0.286	0.529-1.953
Mother's Education				
Illiterate	0	1		

Literate	-0.437	0.672	0.189	0.535-1.741
Preceding Birth Interval				
<24 months	0	1		
>=24 months	-0.648	0.529*	0.214	0.329-1.052
Gender				
Male	0	1		
Female	0.247	1.323*	0.129	0.987-1.772
Caste				
SC	0	1		
Non SC	-0.017	0.882	0.189	0.638-1.405
Ownership of TV, Refrigerator and motorcycle				
No	0	1		
Yes	-0.042	0.225**	0.358	0.181-2.773
Area of Residence				
Urban	0	1		
Rural	-0.566	0.988*	0.226	0.418-0.963
Access to toilet at home				
No	0	1		
Yes	-0.662	0.926*	0.009	0.432-1.071
Access to Piped Water				
No	0	1		
Yes	-0.124	0.304	0.264	0.663-1.042
Supplementary Feeding in ICDS				
No	0	1		
Yes	-0.275	0.992	0.223	0.234-1.963

Source: Computed from unit records of NFHS-3 (2005-06).
Notes: p*<0.05, p**<0.01

Results

Tables 10 and 11 above present the results of logistic regression analysis for the two anthropometric Z scores (weight for age Z-score and height for age Z-

score). The results of our analysis indicate that in Punjab, girls are more likely to be underweight (odds ratio=1.413, p*<0.05) and stunted (odds ratio=1.323, p*<0.05). As far as parental characteristics are concerned, the age of the mother and preceding birth interval of more than 24 months are associated with lower odds of being underweight and stunted in both the models. In addition to this, education of the mother is associated with lower odds of being underweight. Sen (2001) also argues that women's education and empowerment greatly help to reduce child neglect and mortality. Household and community characteristics reveal that wealth index of the household (as indicated by the presence of television, refrigerator and motorcycle) at home and access to toilet at home are associated with lower odds of being underweight and wasted. The presence of piped water at home is associated with lower odds of the child being underweight. This proves that sanitation and hygiene are important determinants of health status and well-being of a young child. This trend has also been documented in literature. Children who live in poor sanitation and hygiene have frequent bouts of diarrhea, which has a negative impact on their overall wellbeing (Barker, 1993). The regression model also shows that supplementary feeding through ICDS has an impact on alleviation of short-term nutrition (Table 10) (lowering the odds of being underweight) but does not influence long-term nutritional well-being (does not lower the odds of being stunted) (Table 11).

These empirical results indicate that malnourishment among children in Punjab is deeply rooted in gender biases as well as socioeconomic profile of children. Gender, along with the household's socioeconomic profile has a significant impact on both short-term nutritional status (being underweight) as well as long-term nutritional status (stunting) of a young child. Children from the disadvantaged households, in terms of parental education and nutritional status, household's assets, lack of sanitation, and clean water, face a greater risk of being undernourished than those living in the better-off environments. Maternal health and education also emerge as important determinants of the nutritional status of a young child. Hence investment in sanitation facilities, maternal health and education should be strengthened. Supplementary feeding programs need to be introduced. These measures will help alleviate constraints faced by the population related to health and sanitation, antenatal care, maternal education and provision of health facilities and will help to improve both short term and long term nutritional status of children, especially girls.

Section Three: Policy Initiatives for the Girl Child in the State

It is believed that state policies can have an important role in curbing gender bias against the girl child. When the state makes free provision of nutrition, healthcare and education, the need to ration scarce household goods among family members is lessened (Duflo, 2005). This can, in turn, be an important contributing factor in ensuring better care and attention to girl children, especially those belonging to disadvantaged families.

Since 2001, the government has launched a number of initiatives to curb the declining sex ratio in Punjab. These include campaigns organized at the ground

level, strict implementation of the Pre Natal Diagnostic Test (PNDT) Act,[7] and better antenatal care for expecting mothers and promotional schemes for the girl child. The government has also attempted to strictly track pregnancies through a network of ASHA (Accredited Social Health Activists) workers and promotion of institutional deliveries under *Janani Suraksha Yojna* [Safe Birth Scheme] (Nanda, 2013). Religious organizations and NGOs also launched campaigns highlighting the ills of gender discrimination. The *Akal Takht*, the highest temporal authority of Sikhs, the majority religious community in Punjab, issued a declaration proclaiming that anyone indulging in the practice would be declared a "*Kudi maar*" (daughter murderer) and excommunicated from the Sikh faith (Dagar, 2007).

In recent years, the government has launched a new policy initiative in the form of cash transfer schemes (CCTs) to promote better care for and attention to the girl child. These schemes (see Table 12) provide a set of financial incentives to poor families to encourage them to ensure certain minimum requirements like registration of birth, immunization, enrollment and retention in school and delaying the age of marriage beyond 18 years (UNFPA, 2010a). The ultimate objective of the schemes is to change attitudes towards girl children.

Table 12: Review of Cash Transfer Schemes for the Girl Child in Punjab

Name of the scheme	Year	State/Central government	Conditionality	Benefits	Number of Beneficiaries
Kanya Jagriti Jyoti Scheme [Girl Child Empowerment and Enlightenment Scheme]	2009-10	Central government	Below Poverty Line (BPL) families who adopt two child norm[8]	INR 5000 deposited in account at the time of birth. From 6 to 12 years of age INR 1200 per annum scholarship and from 12 to 18 years INR 2400 per annum scholarship. Lump sum amount of INR 100,000 paid on attaining 18 years of age	8000

Balri Rakshak Yojna [Girl Child Protection Scheme]	2005	Punjab government	BPL families who practice family planning method after birth of a girl child	Monthly incentive of INR 500 provided family adopts sterilization after birth of girl child. A lump sum amount of INR 20,000 when girl child attains 18 years	316
Dhanlaxmi Scheme [Girl Child Scheme]	2008	Central government	All girl children born after November 19, 2008 in Sirhind block of Fategarh Sahib. The following conditions are fulfilled for the girl child: registration of birth, complete immunization, enrollment and retention in school, delaying the age of marriage beyond 18 years.	An insurance cover is taken on birth of the girl child and on attaining 18 years the girl receives INR 100,000	Not known

Bebe Nanki Ladli Beti Kalyan Scheme[9] [Mother Nanki's Beloved Daughter Welfare Scheme]	2011	State government	Families whose income falls below INR 30,000 per annum and who have adopted two child norm and sterilization method of family planning	Girl child receives INR 5000 at birth, INR 1250 on complete immunization, INR 500 on enrollment in school and passing class 1 to 5; INR 1000 on enrolment in secondary school and passing class 6 to 9; INR 1500 on passing class 10 to 12 and a consolidated amount of INR 100,000 on attaining 18 years	Not known

Source: Authors' compilation based on review of schemes from the Department of Women and Child Development, Government of Punjab

One of the major flaws of all of these cash transfer schemes is that they are implicitly related to population control, despite the fact that overpopulation is not a problem in the state. Punjab has a Total Fertility Rate (TFR) of 1.9, which is below the replacement level of 2.1 (Census of India, 2011). According to UNFPA (2014), when cash incentive schemes are linked to sterilization, women have to undergo the sterilization surgeries. These schemes thus undermine women's reproductive rights, fertility choices, their control over their bodies and their privacy. Intended beneficiaries are also required to meet with a number of other stringent and unreasonable conditions. For example, the intended beneficiaries are required to provide a number of documents such as birth certificate, income certificate, domicile certificate, bank statements, Below Poverty Line (BPL) certificate and record of undergoing sterilization by one of the parents (UNFPA, 2010a). The difficulty in accessing the scheme is also evident from the fact that the coverage has been extremely limited (Gopal, 2010). Since the *Balri Rakshak Yojna* came into operation in March 2005, only 316 girls have benefitted from the scheme across the state. The reach of these cash transfer schemes in Punjab has been extremely limited by the state government's failure to launch an active awareness campaign about them. These schemes also suffer from a number of drawbacks in terms of implementation - opening up of bank accounts, absence of redressal officers, delays in receiving payments and absence of compiled data on the same (Sekher, 2012 and 2014). Most beneficiaries value the cash incentives given to the girl child. However they face a number of problems in assessing the scheme, getting certificates

issued and receiving the payment. Some beneficiaries also reported that they had to give bribes to officials in order to get the required certificates and receive the sanctioned amount (UNFPA, 2014).

Thus, our analysis reveals that most of the schemes and initiatives that were undertaken in the last decade were based on strict control over pregnancies, which helped to reverse the declining sex ratio to some extent. These schemes have been designed to ensure better nutrition, healthcare and education for young girls, through regular monitoring by state agencies and use of monetary incentives. However, the cash transfer schemes are sadly wanting in terms of design, implementation mechanism and outreach (Singh and Singh, 2017 forthcoming). These drawbacks of the schemes need to be addressed by the state agencies so that the schemes can lead to more holistic development of the girl child in terms of healthcare, nutrition and educational attainment.

Conclusion

The result of our analysis shows that although the state has made remarkable progress in reversing the trend of declining overall sex ratio and the child sex ratio in the last few years; however, a lot still needs to be done to narrow down the gender differences in indicators of household care and attention. Punjab is one of the best performing states in many aspects of childcare such as immunization, health care treatment received by children and low levels of infant and child mortality. Yet, these have not resulted in lessening gender disparity in childcare. As a result, Punjab consistently lags behind the national average in gender bias against girls. Along many indicators such as immunization coverage and treatment for common illnesses, the gender bias has worsened over time. Even in the case of nutritional indicators, wherein these disparities were not very large initially, the situation has worsened for girls over time. The results of our regression analysis have reiterated the fact that gender has a significant impact on nutritional status along with location of the household caste, parental education, household's assets, and availability of local health services, sanitation, and clean drinking water.

Policy makers in Punjab have attempted to correct the gender bias in indicators of household care and attention through a range of cash transfer schemes. However, the existing cash transfer schemes tend to be inflexible in character. Due to a number of conditions being attached to them, their usage has been very poor and has consequently failed to have much impact on the welfare of girl children in the state.

To conclude, our analysis demonstrates that gender disparity in nutrition and childcare is a complex socioeconomic phenomenon, very intimately connected to household's social status and wealth as well as maternal nutrition, education and empowerment. As an interim measure, provision of supplementary nutrition can help to alleviate short-term malnourishment especially in the case of poor families. Even the existing cash transfer schemes for the girl child can also work, if modified, as a useful mechanism to encourage poor families to invest in health and education of girls. However, from medium-term and long-term

perspectives, a gender-aware mix of cultural initiatives, educational incentives, institutional and state-directed policy programs including creation of employment opportunities for women are needed to grapple with the complexity of economic, social and cultural factors that influence the status and wellbeing of the girl child in Punjab.

Notes

[1] In this paper, we use the Indian definition of sex ratio, which is the number of females per one thousand males (Census of India, 2011). This convention has been employed to (a) make this study comparable to other Indian scholarly works on sex ratios in India (b) conform to the availability of Indian data (c) facilitate dissemination of results to Indian policymakers who are used to the Indian definition of sex ratios. The internationally accepted and used definition of sex ratio is just the opposite of the Indian definition i.e. the number of males per one thousand females. We were conscious of the potential benefit of placing our study more usefully in the body of international literature by using the international definition but, on balance, we decided that using the Indian definition would be more fruitful in terms of its potential impact on academic thinking and policy making in India and Punjab.

[2] Sen's methodology was refined by Coale (1991). He argued that Sen had compared the sex ratios in Asian countries with those of the developed nations of Europe and North America. However, Coale considered this unfair as these regions had very high sex ratios as a result of high levels of male mortality in past wars. Coale refined Sen's calculations and concluded that the number of "missing women" is 60 million and not 100 million as suggested by Sen (Coale, 1991, 522).

[3] UNFPA stands for United Nations Population Fund, the initials being an acronym for an older organization name.

[4]Wasting represents a deficit in muscle mass and fat mass compared with the amount in a normal child of a given height (UNICEF, 2011).

[5] Neonatal period is the first 28 days after birth.

[6] "Infancy" is the period until the age of one.

[7] Punjab has the highest number of convictions under the act with 112 cases and 24 convictions (UNFPA, 2010).

[8] The "two child norm" is a subtle policy effort in India. Schemes with this conditionality encourage, and not force, family planning by restricting benefits to households with no more than two children.

[9] Nanki was the elder sister of Guru Nanak (1469-1539), the founder of the Sikh faith. She is believed to be the first person to recognise that her younger brother was a spiritually gifted child. She is a highly revered figure in Punjab and is believed to have played a crucial role in influencing Nanak's teachings against gender discrimination. A scholarly study on the subject is N.G.K. Singh (1993). See also Jakobsh (2003).

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