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ASPECTS OF GENDER BIAS AGAINST FEMALE CHILDREN IN ASIA

P. AROKIASAMY — Regional Patterns of Sex Bias and Excess Female Child Mortality in India

SHORT PAPER

D.-S. Kim — Missing Girls in South Korea: Trends, Levels and Regional Variations
Regional Patterns of Sex Bias and Excess Female Child Mortality in India

Perianayagam AROKIASAMY*

Excess female child mortality in India varies considerably from one region to another, reaching its highest levels in the north. On the basis of extensive data from the 1992-1993 National Family Health Survey, which includes the birth histories of mothers and information on child health care provision, Perianayagam AROKIASAMY makes a comparative analysis of child mortality in the different regions of the sub-continent. Moving beyond a mere description of the problem, he uses the survey data to explore the dynamics of gender bias in child mortality, focusing on the effects of birth order and lower immunization coverage rates as factors of excess female mortality.

Female disadvantage in child mortality has been a subject of particular interest for researchers dealing with demography, epidemiology and sociology. A recent UN (1998a) study observed that 50% of humanity today lives in countries where gender inequalities result in excess mortality of girl children. In developing regions, excess female child mortality reaches mild to moderate levels in many countries of Central America and moderate to high levels in several countries of Sub-Saharan Africa and West Asia (Hill and Upchurch, 1995; United Nations, 1998b). Excess female child mortality is not specific to developing countries. Historical assessments have indicated the existence of excess female child mortality in Europe and North America for the age range 0-14 until the early twentieth century (Tabutin, 1978).

Although levels of child mortality have declined in the last three decades, sex differentials in child mortality actually worsened during the 1980s and 1990s compared with the 1970s in many countries of South-central Asia. In this region, which includes major contributors such as

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China and India, excess female mortality in childhood is estimated to result in about 250,000 preventable deaths among girls under age 5 (United Nations, 1998a). The biggest contribution to this striking female disadvantage comes from India. This issue remains a great challenge for achieving gender equity, and eliminating such differences will also substantially reduce child mortality.

The sex differentials in child mortality in the northern states of India are amongst the highest ever recorded in demographic history. Since the 1970s, India’s sample registration system (SRS) has indicated the extent of sex differences in child mortality. A number of studies, both analytical and field studies, have extensively covered the subject of postnatal discrimination against female children and its impact on excess female child mortality (see Bardhan, 1974; Das Gupta, 1987; Kishor, 1993; Miller, 1981; Sen, 1988). Sex differentials in child mortality are the primary factor accounting for the historically low sex ratio in the Indian population (Visaria, 1967; Bardhan, 1974). The trends in excess female child mortality constructed from SRS data show that sex discrimination continues unabated in the northern states of India (see e.g. Premi, 2002). The failure to remove female disadvantage in child survival persists today, and that is one major reason why the female-male ratio remains high, despite improved survival chances of women with respect to men in the older age groups (see Drèze and Sen, 2002). In addition, recent analyses have documented the rise in sex ratios at birth (number of males per 100 females) during the late 1990s in the northern and western states due to prenatal discrimination in the form of sex-selective abortion (see Arnold, Kishor and Roy, 2002; Parasuraman, 2001). However, analyses have not so far demonstrated any evidence of a major substitution effect whereby prenatal discrimination significantly reduces postnatal discrimination(1). The impact of sex-selective abortion on the overall number of missing girls was not very significant until the early 1990s (see Visaria, 1994).

The country-wide first round of the National Family Health Survey of India (NFHS-1, 1992-93) indicated about 43% excess mortality for female children for India as a whole (Table 1). The recent second round of NFHS (NFHS-2, 1998-99) also indicates about 47% excess female child mortality. Arnold et al. (1998) recently explored the family building pattern in selected states of India, but full data of this magnitude have not so far been used to study the scale of this phenomenon, the regional patterns of excess female child mortality and the gender differentials in childcare. More importantly, the NFHS survey provides an array of socio-economic

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(1) In regions with strong son preference, parents resort to either postnatal (after birth) discrimination of girls or prenatal (before birth) elimination of girls, or both, to remove unwanted girls. Substitution effects occur when parents seek to achieve their preferred sex composition of children by shifting from their earlier strategy of neglecting girl children towards the practice of sex-selective abortion. Prenatal elimination is practised when fertility reaches low levels as a general norm yet parents have a strong desire for sons. Easy access to sex determination techniques tends to make it easier for parents to practice sex-selective abortion (see also Agnihotri, 2001 and Goodkind, 1996 where the substitution effect has been discussed).
status data and broad sample coverage. These data can be used for in-depth analysis of the influence of development factors on gender bias in inter-regional (macro) and intra-regional (micro) contexts. A wider pur-view of such critical areas of analyses is thus made possible thanks to the regional approach (cluster of homogeneous states and not merely the familiar north-south comparison) used in this research, whereas in previous field-based studies or state level analysis, the lack of an adequate sample and the absence of inter- and intra-regional comparability were significant constraints.

Proceeding from this perspective, we use the NFHS-1 (1992-93) data to study three dimensions relating to sex differentials in child mortality and health care provision across the regions of India. First, we analyse excess female child mortality and its progressive rise for female children of increasing rank in the family. Second, sex discrimination in terms of provision of child health care is examined. Third, we assess the regional influences of culture versus the development context of women’s status on discrimination against female children and excess female child mortality.

I. Cultural background and the dynamics of gender bias in child mortality

Excess female child mortality is a distinct and highly visible aspect of gender inequality in India (Mason, 1986). In the absence of a biological basis, excess mortality of girl children in the northern states is attributed to the patriarchal structure of society and the consequent inferior position of women. Dyson and Moore (1983) demonstrated basic social and demographic differences between northern “Aryan” speaking and southern “Dravidian” speaking cultural areas in India. They related the northern Indian kinship structure to low female autonomy, a strong preference for sons and very high levels of sex differentials in child mortality (see also Karve, 1965; Sopher, 1980). The four southern Indian states contain slightly less than a fourth of the country’s population as in 1991.

A large body of gender stratification analyses spanning the past several decades have cited son preference and the low position of women, two culturally embedded dimensions, as primarily contributing to the discrimination against females and the consequent excess female child mor-

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(2) The North Indian kinship structure consists of practices such as marriage of women into unrelated families and outside their places of birth, seclusion of women within and outside their families and observance of purdah (veiling and seclusion of women). By contrast, the South Indian kinship structure is characterized by marriages of women within their place of birth and a preference for uncle-niece cross-cousin marriages where the bride is a known and related person; the customs of seclusion of women within and outside their families and purdah are not rigidly observed. These contrasting cultural systems tend to favour greater female autonomy and lower son preference in the south than in the north (Dyson and Moore, 1983; Karve, 1965).
The patriarchal intra-familial economic structure coupled with the perceived cultural and economic utility of boys over girls, known to be based on religious-caste institutional norms, have been suggested as the original determining factors behind the degree of son preference and the inferior status of women across the regions of India (see Das Gupta, 1987; Dyson and Moore, 1983; Miller, 1981; Kishor, 1993). In the Hindu religious tradition, sons are needed for the cremation of deceased parents and to help in the salvation of their parents’ soul (Arnold, Choe and Roy, 1998). Sons provide support to their parents’ families both before and after marriage, while daughters move on to their husbands’ families after their marriage, from where they are expected to provide little economic or emotional support to their families. Daughters are considered as a net drain on parental resources in patrilineal and patrilocal communities (Dasgupta, 2000).

A principal trend, established by some of the key studies on India, is that the higher mortality of girls over boys is not a general phenomenon but its extent rises as the number of girls in the family increases (see Das Gupta, 1987; Arnold, Choe and Roy, 1998). Another important study in Matlab by Muhuri and Preston (1991) proceeded with the hypothesis that a larger number of children of a particular sex in a family is likely to be associated with higher mortality rates among children of that sex, suggesting that some discrimination needs to be assumed for higher birth order sons also. Yet they also found that the impact of older sisters on the mortality of younger girls was pronounced. These studies have assessed the extent of sex differentials in child mortality as the number of girls increases using either sex composition of living children or birth order.

A related dimension pointed out by studies is that several biomedical and demographic factors may confound the sex differentials in child mortality (see Muhuri and Preston, 1991; Arnold, Choe and Roy, 1998). A few possible mechanisms are mentioned below. First, measles infection of a male passed on to a female child is likely to produce a higher case-fatality rate for the girls and vice versa than infection of a child of the same sex. Second, in a wider context, sex differentials in infectious disease episodes and recovery patterns may result in higher mortality of girls. Third, girls may experience higher mortality because birth intervals may be short due to successive births of girls when parents aim to have a son. Fourth, women’s age at the birth of a child may also tend to have a confounding influence on excess female child mortality, due to the accumulation of larger numbers of births, particularly in the middle ages of 25-36, considering both son preference and the desire for high fertility. However, these

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(3) E.g., Das Gupta’s (1987) study in Punjab found that the burden of excess female child mortality falls on female children born into families that already have a surviving daughter. The study by Arnold et al. (1998) based on NFHS data found clear excess female child mortality for the states of Punjab, Haryana, Rajasthan and Uttar Pradesh, even accounting for socioeconomic status, and observed that it tends to increase with the number of girls in the family.

(4) See Hobcraft’s (1994) study, which reinforced the birth interval effect on child survival.
mechanisms may account for only a fraction of the differentials (United Nations, 1998a). This complexity emphasizes the need to consider the use of suitable child indices other than the sex composition of living children or far less precise measures such as birth order, used in previous studies, to assess sex differentials in child mortality. In this analysis, we will tackle these shortcomings by constructing a new alternative child index representing the sex-specific ranking of children (see data and methodology section for more discussion).

The differentials in mortality between boys and girls in northern India are argued to be largely the result of discrimination against girls in terms of food allocation and medical care\(^\text{(5)}\). In seminal investigations, girls were found to be discriminated against in behaviour-feeding patterns, the dispensation of medical care, and the allocation of love and emotional warmth (Miller, 1981; Das Gupta, 1987). The neglect in health care, food and nutrition is applied selectively in caring for female children especially among higher order births and regardless of socio-economic status (Das Gupta, 1987). Although such cumulative neglect of female children in health, nursing, feeding and basic attention are viewed as a collective mechanism responsible for excess mortality of girls, many studies have found greater evidence to support the hypothesis that sex differentials in the effective utilization of preventive and curative medical care are mainly responsible for sex differentials in child mortality (see Chen et al, 1981; Wyon and Gordon, 1971; Basu, 1989; Timaeus et al., 1998). In the Indian context, both Wyon and Gordon’s (1971) analysis of Khanna study data and Basu’s (1989) study have shown that relative female deprivation in modern medical care provision is a more important determinant than nutritional deprivation in accounting for sex differentials in child mortality. Accordingly, our analysis is based on the assumption that sex disparities in the utilization of modern child health care are the major cause of sex differentials in child mortality.

\(^{5}\) Discrimination used against women is an important mechanism that determines gender inequalities and this is conceptually a principal criterion of women’s status measurement (see Mason, 1986; Federici et al, 1993). At the societal level in India, women face discrimination in terms of social, political and economic opportunities as a result of their inferior status. For example, the majority of women cannot inherit parental property, and political and employment participation by women is very limited. Gender inequalities prevail in work, education, allocation of food and health care, and fertility choices and with much greater prevalence in the northern than in the southern states of India. At the other end, at the family level, women are also exclusively burdened with household chores — cooking, cleaning, collecting water/fuel, caring for children and members of the family amongst many other things.
II. The regional context, development factors and gender bias

The regional commonalities and contrasts in culture, gender bias, development and demography in India are remarkable. They display a consistent pattern of connections which are summed up by a few core aspects of these regional inequalities, as a further basis for presenting the results of regional patterns of gender bias in health care and child mortality. The southern Indian states, which are marked by low levels of gender inequality amongst the regions, also have a comparative development advantage compared with northern Indian states. More than two-thirds of women are illiterate in the north-central region compared to less than half in the south. In the southern and western regions of India, about half of the women are employed, compared with only a quarter in the northern and north-central regions. Data on exposure to the mass media, an indicator of rapid diffusion of modern ideas in recent times and an emerging indicator of social advancement, show that three-quarters of women in the south are exposed to some form of mass media as against a mere third in the north-central region. In terms of health care coverage, more than 80% of women have had at least one antenatal visit and two-thirds of deliveries are assisted by health personnel in the south, compared with again a mere third and less than a fifth respectively in the north-central region. In corroboration, the regions illustrate different demographic regimes of near replacement-level fertility in the south compared with higher levels of fertility and a generally slower pace of fertility decline in the north-central region.

More generally, the regional variations of gender bias and inequalities reflect the extent of patriarchy and its demographic influence across the regions. Accordingly, in this analysis the states are clustered into five regions as defined in the data and methodology section. On the one hand, such cultural differences between the regions may have deepened development and health inequalities, but on the other, such inequalities are also determinants of the position of women in society and tend to have a confounding relationship with gender bias. So within this regional and cultural context of gender bias in child mortality, the study of the relationships between indicators of development and gender bias is a central issue, as such relationships provide a further basis for a clear understanding of the dynamics of gender bias and its policy implications. Although previous studies have focused on these relationships, no definitive conclusions have been reached on the influence of important indicators of development such as women’s education and economic status on gender bias (Chen, 1982; Das Gupta, 1987; Kishor, 1993; Malhotra et al., 1995; Miller, 1981; Murthi et al., 1995; Rosenzweig and Schultz, 1982; Simmons et al., 1982).

Women’s education is well recognized as a key determinant of mortality and fertility declines (see Caldwell, 1986; Caldwell 1998; Cleland...
and van Ginneken, 1988; Hobcraft, 1993; Drèze and Murthi, 2001). However, contrasting evidence has been presented to demonstrate the influence of women’s education on gender bias. The analysis of household level data by Simmons et al. (1982) found that sex differences in mortality declined for educated Indian mothers, while Murthi et al. (1995) reached a similar conclusion after analysing district-level data and noted that, “among development indicators, expansion of female literacy may have worked to reduce the gender bias”. In contrast, Das Gupta (1987) and Bhuinya and Streatfield (1991) have suggested, with caution however, that maternal education possibly increases excess female mortality.

Regarding the influence of household economic status on gender bias, Schultz (1984) and Mosley and Chen (1984) have suggested that economic status effects play a demand-increasing role in the use of modern health care services and have a positive impact on child survival. However, as in the case of education, there are divided arguments concerning the influence of economic status on gender bias in child mortality. Studies by Rosenzweig and Schultz (1982) and Clark (1984) found that sex differences in childhood mortality tend to decrease as the economic status of households increases. Likewise, scholars dealing with the general theme of sex bias have emphasized that sex discrimination is more acute in poorer countries (see e.g. Sen, 1988). These results contrast sharply with a number of district-level analyses on India pointing to a positive impact or weak evidence of the influence of economic status on gender bias in India (see Kishor, 1993; Murthi et al., 1995). Relatively high levels of agricultural development decrease the life chances of females while leaving males’ life chances unaffected (Kishor, 1993). Poverty was found to have relatively smaller effects compared with the powerful effects of female literacy on child survival and gender bias (see Murthi et al., 1995; Drèze and Murthi, 2001). Contrary to their expectation, Muhuri and Preston (1991) found somewhat lower female child mortality among poorer families in Bangladesh. On a more general note, a study of the relationship between economic status and sex ratio of the adult population (age 15+) suggested that female discrimination is less acute in poorer households in India (Krishnaji, 1987). From a macro viewpoint, the economically prosperous states of Punjab, Haryana and even Maharashtra are cited as examples with severe gender bias. Such an array of weak evidence may not rule out the possibility that economic conditions can have a positive impact on gender-sensitive norms.

The contribution to such differences apparently arises from the type of data used and the approaches adopted in their analysis. For this reason, evidence concerning the notion that development may be related or unrelated to gender bias is reassessed in our research.

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(6) Sen (1988) states: “there is a good deal of evidence from all over the world that food is distributed often unequally within the family — with a sex bias against the female and age bias against children. The picture of this discrimination is much sharper and more widespread in poorer countries”. 

III. Data and methodology

Our analysis is based on data from India’s first National Family Health Survey (NFHS-1, 1992-93). The survey covered a nationally representative sample of 89,777 ever-married women in the ages 13-49 — 23,455 in urban areas and 66,322 in rural areas — located in 88,562 households from 25 states of India. The 25 states comprise 99% of the population of India. The content and design of the questionnaire was based on Demographic Health Survey (DHS) questionnaires, with some modifications suited to Indian conditions. As in DHS, the NFHS used a household and a women’s questionnaire, translated into the state languages of India. The fieldwork was conducted in three phases, between April 1992 and September 1993. The birth history data obtained from the women’s questionnaire and analysed in this paper, is a unique and large set of data listing 275,172 births and 32,836 deaths occurring within four years of birth. In a comparative sense these numbers are just short of Hobcraft’s (1994) cross-country analysis of child mortality using DHS data from 25 countries, which reported 280,000 births and 35,000 deaths under five years of age.

Our comparative analysis is presented for the five regions categorized as “northern” (Dehli, Haryana, Himachal Pradesh, Jammu region of Jammu & Kasmir, and Punjab), “north-central” (Bihar, Madhya Pradesh, Rajasthan and Uttar Pradesh), “eastern” (Assam, northeastern States, Orissa and West Bengal), “western” (Goa, Gujarat and Maharashtra) and “southern” (Andhra Pradesh, Karnataka, Kerala and Tamil Nadu). This regional classification is used as a dummy variable to account for regional variation in the all-India level analysis.

This analysis focuses on excess female child mortality in ages 1-3 years (completed age) as it tends to occur significantly and mostly in these ages. Multivariate logistic regression models were employed to study sex differentials in child mortality and child health care utilization. The odds of children dying between 12-47 months and the odds of children of age 12-47 months receiving immunization are estimated. The Stata program was used for this analysis.

The birth history data set is used with a different time-period bifurcation in multivariate analyses. First, for the study of mortality, births that had occurred in the 10 years preceding the date of survey were used to relate the influence of more recent development factors on child mortality, excluding children aged 0-47 months not fully exposed to risk up to age 48 months. The results of the logistic regression models presented in Tables 3 and 6 therefore cover births which had occurred during 48-119 months prior to date of survey (i.e. 1982-88).

(7) In India and developing countries in general, excess female child mortality tends to occur significantly and mostly over the ages 1-4 (exact ages) (see also Tabutin and Willems, 1998, p. 17). The NFHS-1 (1992-93) also shows that excess female child mortality tends to be small and insignificant during infancy (after accounting for biological male disadvantage).
Second, the full-scale picture of the regional dynamics of gender bias in child mortality was assessed using the full set of birth history data, except censored births of 0-47 months\(^{(8)}\) (Table 4 and Figure 1). The full birth history of mothers aged 13-49 was analysed using a newly constructed index namely “sex-specific rank order of children”. The children are indexed as the first, second, third and fourth and above rank by sex, which takes into account the sex-specific parity of children. The index represents both the parity and birth order effect by sex of child in relation to child mortality. It captures sex differentials for each rank of child on a one-to-one basis for the sexes and it provides greater precision concerning the level of child mortality as the number of both girls and boys increases. It is a unique measure of discrimination against female or male children, compared with the conventional method of assessing excess female mortality by sex composition of living children or birth order, widely used in previous studies (see Das Gupta, 1987; Muhuri and Preston, 1991; Arnold, Choe and Roy, 1998). The method that considers living children ignores the mortality experience of children already dead; such an exclusion rules out exact comparison of sex differentials in child mortality. The new index may also mitigate the confounding influences contributed by the biomedical and demographic processes that include sex-selective fatality of infections, birth interval and women’s age at birth.

The above sex-specific rank of children index was used in the logistic regression models of child mortality, which capture the sex differentials in child mortality with increasing rank of the child by controlling for socio-cultural and development factors (results in Table 4).

Our analysis of sex bias in child health care services utilization is based on data from 45,363 surviving children of the 49,369 births which took place in the last four-year period prior to the survey (results in Table 5, Table 7 and Figure 2). The utilization of childhood vaccinations is taken as the indicator of child health care provision, which represents the domain of preventive care. This is a key indicator of child health care on which the NFHS provides information. The vaccinations against six of the major infectious diseases widely prevalent in developing countries — tetanus, diphtheria, pertussis, poliomyelitis, tuberculosis and measles — are an important public health intervention strategy for improving child health and achieving potential reduction in child mortality (Koenig, Fauveau and Wojtyniak, 1991). In this article, we examine the overall gender bias in the use of child health care in terms of various recommended childhood vaccinations, irrespective of the rank of children. Since children in ages 0-11 months are censored because all recommended

\(^{(8)}\) Construction of this index requires longer periods of birth history (the full set is used here) to ensure a higher proportion of women with a higher number of births in order to obtain proportionately adequate numbers of births and deaths at the 3rd and 4th ranks (sex-specific). The ranking of children covering shorter 10 or 15-year periods of birth history, with the censoring of births up to the 4-year period, with effective periods covering births during 5-10 years and 5-15 years, leads to insufficient numbers for higher ranks.
vaccinations are not complete until 12 months, data cover children born and surviving during the last 12-47 months (1988-91). In this case, the analysis of sex bias in health care is not comparable — on a case by case basis — with sex bias in child mortality that uses full birth history data by sex-specific rank index of children. A test run of the sex-specific rank of children index for children born in the last four years yielded a too small and disproportionately unrepresentative number of cases by rank, and was unable to provide statistically reliable results. A variable of birth order stratified by sex was used as an alternative.

Given the retrospective survey data used in this research, individual parental neglect of female children in the provision of health care cannot be related to mortality. In most previous studies, the link between child neglect and mortality was inferential, based on correspondence between sex differences in child mortality and health care (see Das Gupta, 1987; Basu, 1989; Muhuri and Preston, 1991). The exception is Miller’s (1981) work where case studies were reported about neglect of female children and their subsequent death. Such clear comparisons are possible only in a follow-up study. In this analysis, the link is also inferentially demonstrated on the basis of systematic correspondence between sex differences in child mortality and vaccination across regions.

The literature on determinants of child survival in developing countries recognizes the influences of a range of development, cultural, health and demographic factors on child mortality (see Claeson et al., 2000; Hobcraft et al., 1984; Pandey et al., 1998; Mosley and Chen, 1984; Rutstein, 2000). These factors are variously used: firstly, as control variables for assessing excess female child mortality; secondly, to obtain updated insights into the mediating roles of development factors such as mother’s education and household economic status; thirdly, to measure the effects of demographic factors on gender bias in child mortality; and fourthly, to assess the interconnection between culture, development and gender bias. The variables used are measures of development that include: household economic status, women’s education and employment, cultural and background factors (caste and religion), place of residence and demographic covariates (women’s age, age at birth of child, duration of birth interval).

In this analysis, household economic status is represented by the indices of living amenities, possession of modern goods, and exposure to mass media. The index of living amenities constructed on a scale of 0-4 includes: the use of electricity for lighting, gas and electricity used as fuel for cooking, access to a toilet facility and pipe and pump water for the household. The index of possession of modern goods considers the household’s possession of a radio, television and refrigerator on a scale from 0-3. The index of exposure to mass media ranging on a scale from 0-3 includes: women listening to a radio at least once a week, watching television once a week, and going to the cinema at least once a month. In the regression ana-
yses, however, the indices of living amenities and exposure to mass media took preference, given that the index of possession of modern goods is very closely correlated to the above two measures.

IV. Sex differentials in child mortality and health care

1. Evidence of sex differentials in neonatal, post-neonatal and child mortality

Table 1 shows female-male ratios, at state level, in neonatal, post-neonatal and child mortality from NFHS-1. Regarding neonates, these ratios indicate that male mortality is higher than female mortality for all the states of India. This female advantage is abruptly reversed for the post-neonatal period for most of the states. This pattern is not found in the states of Kerala and Tamil Nadu in the south, Assam, Orissa and West Bengal in the east and even Punjab in the northern region. This shift from male disadvantage in neonatal mortality to female disadvantage at the post-neonatal stage of child mortality could be partly due to significant underreporting of female children who were born and died early. This possibility was examined by analysing sex ratios at birth. For the period 10 years before survey, the sex ratio at birth is about 106 males per 100 females, suggesting no significant evidence of underreporting of female children.

At ages 1-4, the female-male ratio of child mortality indicates the level of excess female child mortality for each state (Table 1 and Map 1). The ratios show an extremely high level of excess female child mortality, with the highest in Haryana (+135%), followed by Punjab (+81%) and Uttar Pradesh (+70%). In the cases of West Bengal (+63%), Rajasthan (+59%), Delhi (+56%), Bihar (+55%), Orissa (+45%) and Himachal Pradesh (+44%), excess female child mortality is higher than the national level (+43%). Kerala and Tamil Nadu in the southern region are the only two states where no evidence of excess female child mortality was found. The reversal from male disadvantage in neonatal mortality to female disadvantage in post-neonatal mortality is abrupt for most states of the northern and north-central regions where excess female child mortality is more than 50%. Two earlier studies in the Khanna and Matlab project areas also observed that female mortality was lower than male mortality in the early months after birth, though towards the end of the first year of life female death rates were higher than male death rates (Wyon and Gordon, 1971; D’Souza and Chen, 1980).
<table>
<thead>
<tr>
<th>State</th>
<th>Neonatal mortality</th>
<th>Post-neonatal mortality</th>
<th>Child mortality (12-47 months)</th>
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<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>F/M ratio</td>
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<tr>
<td>Northern region (a)</td>
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</tr>
<tr>
<td>Karnataka</td>
<td>54.4</td>
<td>45.4</td>
<td>0.83</td>
</tr>
<tr>
<td>Kerala</td>
<td>23.4</td>
<td>20.7</td>
<td>0.88</td>
</tr>
<tr>
<td>Tamil Nadu</td>
<td>53.5</td>
<td>38.9</td>
<td>0.73</td>
</tr>
<tr>
<td>India</td>
<td>57.0</td>
<td>48.1</td>
<td>0.84</td>
</tr>
</tbody>
</table>

(a) Sex-specific estimates are not provided for the Jammu region of Jammu & Kashmir (northern region) or for the north-eastern states (eastern region).

Map 1.– Female to male ratio of child mortality (12-47 months) rates

2. **Sex differentials in health care provision**

The corresponding regional variations in health care utilization by sex for surviving children at ages 12-47 months are presented in Table 2. The health care indicators are represented by four recommended vaccinations, namely BCG, DPT-three doses, polio-three doses, measles, and all the above vaccinations as well. The state reports of NFHS-1 (1992-93) indicate higher immunization coverage rates for boys than girls in all states, with varying degrees of difference across the states, except in the case of Goa and Kerala. Table 2 indicates the largest difference in coverage rates for each vaccination in the northern region followed by the north-central region, indicating a strong male advantage in health care provision. The extent of differences by sex for each vaccination is marginal in the eastern region. By contrast, in the southern and western regions, there is no clear pattern of sex differences for various indicators of vaccination coverage.

**TABLE 2.** *Percentage distribution of children aged 12 to 47 months covered by immunization, by sex of child and by region*

<table>
<thead>
<tr>
<th>Immunization indicators(a)</th>
<th>Region(b)</th>
<th>India</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Northern</td>
<td>North-central</td>
</tr>
<tr>
<td>BCG vaccination</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>84.2</td>
<td>47.8</td>
</tr>
<tr>
<td>Female</td>
<td>76.6</td>
<td>41.5</td>
</tr>
<tr>
<td>DPT (3 doses)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>77.1</td>
<td>35.8</td>
</tr>
<tr>
<td>Female</td>
<td>67.6</td>
<td>30.6</td>
</tr>
<tr>
<td>Polio (3 doses)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>77.5</td>
<td>39.4</td>
</tr>
<tr>
<td>Female</td>
<td>68.2</td>
<td>34.4</td>
</tr>
<tr>
<td>Measles vaccination</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>72.5</td>
<td>30.5</td>
</tr>
<tr>
<td>Female</td>
<td>63.5</td>
<td>25.9</td>
</tr>
<tr>
<td>All four vaccinations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>65.4</td>
<td>21.8</td>
</tr>
<tr>
<td>Female</td>
<td>56.9</td>
<td>18.3</td>
</tr>
<tr>
<td>Number of children</td>
<td>5,606</td>
<td>12,007</td>
</tr>
</tbody>
</table>

(a) One dose of BCG vaccine for tuberculosis, three doses of DPT vaccine (diphtheria, pertussis and tetanus), three doses of polio drops and one dose of measles vaccine should be given by the time a child is 12 months old.

(b) Northern region: Delhi, Haryana, Himachal Pradesh, Jammu and Punjab; north-central region: Bihar, Madhya Pradesh, Rajasthan and Uttar Pradesh; eastern region: Assam, north-eastern states, Orissa, and West Bengal; western region: Goa, Gujarat and Maharashtra; southern region: Andhra Pradesh, Karnataka, Kerala and Tamil Nadu.

*Scope:* Children born between 1988 and 1992 and still alive at the date of survey.

3. Multivariate analyses

The gross differentials in child mortality by sex are strikingly high, with major sex differences in health care provision. In accordance with the theoretical position that development, cultural and demographic factors influence these differentials, the levels of excess female child mortality are assessed through multivariate analyses by controlling for the aforementioned factors. Multivariate analyses provide insights into: 1) the levels of excess female child mortality by accounting for variations in development and demographic factors; 2) the extent of neglect of female children in vaccination coverage; and 3) the influence of development factors on gender bias in child mortality and health care.

Excess female child mortality

The odds ratios presented in Table 3 indicate that the overall risk of child mortality for India is 45% higher for girls than for boys, controlling for socio-economic status predictors. This is closer to the 43% shown in direct estimates (Table 1). This national average conceals striking regional patterns of female disadvantage in child mortality. The regional models show that the female disadvantage in child mortality is highly significant for the northern and north-central regions. Since child mortality is a relatively rare phenomenon (<5% of total number of children born), odds ratios can be approximated as relative risks. The odds of excess female child mortality are highest for the northern region (65%), followed by the north-central (59%), western (35%) and eastern (23%) regions, with the lowest for the southern region (13%). These variations possibly indicate the order of the extent of gender inequality prevailing amongst the regions.

<table>
<thead>
<tr>
<th>Region(b)</th>
<th>India</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>North</td>
</tr>
<tr>
<td>Sex of child</td>
<td></td>
</tr>
<tr>
<td>Male (ref.)</td>
<td>1.00</td>
</tr>
<tr>
<td>Female</td>
<td>1.65***</td>
</tr>
<tr>
<td>Number of births</td>
<td>11,935</td>
</tr>
</tbody>
</table>

(a) Control variables in the logistic regression model: women’s age at birth of child, birth order, women’s education and employment, religion, caste, place of residence, indices of household economic status and exposure to mass media.

(b) See footnote 1 in Table 2 for details concerning the classification of regions.

Significance level: *** p<0.001 ; ** p<0.01 , * p<0.05.

In this analysis, excess female child mortality is highlighted by employing the sex-specific rank order of children index. Table 4 presents the results of logistic regression analysis of child mortality by sex-specific rank of children for the full set of birth history data, which provide fresh insights into the dynamics of child mortality. The odds ratio of child mortality by sex-specific rank of female child indicates clearly that the substantial excess mortality of females in the northern and north-central regions increases with respect to other regions as the number of girls born in the family increases. Both the level of excess mortality for increasing rank of daughters compared with sons, and the regional pattern of the dynamics of gender bias in child mortality, are striking. If the rise in risk of death for increasing rank of male child is considered as representing the general parity effect, then the difference in the risk of death of females over males for their respective ranks indicates the excess mortality by rank of the female child (Figure 1).

For India as a whole, for the first, second, third, and fourth and higher rank female children, the risk of dying in childhood is around 35-40% higher than for the first, second, third, and fourth and higher rank male children. The regional models indicate that mortality risks for increasing rank of female child, i.e., the first, second, third, fourth and above
rank, are 37, 62, 88 and 75% higher in the northern region, and 46, 55, 45 and 57% higher in the states of the north-central region compared with the respective ranks for male children. The pattern of excess mortality differs between the northern and north-central regions. Excess female child mortality is somewhat greater for the first female child in the north-central region than in the north, but for the second, third and fourth female child, it is higher in the north than in the north-central region. These risk dynamics of excess female mortality give a disturbing picture of gender inequality. By contrast, for the remaining three regions, excess female mortality is marginal. Moreover, in both the southern and western regions, fourth and higher rank female children are likely to experience a lower risk of child mortality compared with fourth and higher rank male children. Thus, in these two low-fertility regions, boys of higher ranks face higher risks of child mortality compared with girls.

The results from the above models provide a major body of evidence concerning both the level and dynamics of female child mortality risks by specific rank of female compared with male children across regions of India. They clearly indicate that various forms of discrimination are used
Discrimination against female children in the provision of modern health care

In this section, we will show that discrimination in the provision of health care directly contributes to excess female child mortality. Discrimination against female children in the provision of health care is assessed primarily in terms of coverage of children for all recommended childhood vaccinations on which the NFHS-1 provides data. Focusing on childhood immunization has a comparative advantage since it covers all children in ages 12-47 months. NFHS-1 also collected data on curative health care provision with questions on whether medical treatment was provided to the child for the reported episodes of diarrhoea, fever and cough. However, these data are not analysed in this paper due to several limitations. First, these data include a small number of cases. Second, problems relating to sex bias were encountered in recalling and reporting episodes of disease and sex differentials in childhood risks of illness. Lastly, sex differences regarding illness severity perception and definitional interpretations constitute further limitations. These insufficiencies are liable to lead to insignificant evidence or unreliable measurement about female neglect in curative treatment (Timaeus et al., 1998).

Table 5 presents the odds of utilization of child immunization for girls (with boys as the reference category). The results indicate the level of neglect of girls regarding immunization and the strong regional pattern of sex differentials in vaccination coverage. The region-specific models indicate that sex bias in the utilization of childhood vaccination exists mainly in the northern and north-central regions and, to a limited extent, in the eastern region. For each of the recommended childhood vaccinations, namely BCG, DPT-three doses, polio-three doses and measles, the odds ratios indicate a clear regional pattern in the neglect of female children. Compared with boys, female children born during the last four years and surviving at ages 12-47 months have a significantly lower likelihood of receiving childhood vaccination in both the northern and north-central regions. The difference between odds for boys and girls is greater in the north than in the north-central region. By contrast, in the southern and western regions, the likelihood of receiving childhood immunization is nearly equal for both sexes.

Given this overall neglect, it is still necessary to establish whether female neglect rises with the increasing rank of girls with respect to boys in the family, as is the case for excess female child mortality. As stated in the methodology section, it is not possible to construct the sex-specific rank order of children with the data set of children born in the last 12-47 months, as birth histories over a longer duration are required. Instead, a variable of birth order stratified by sex is used as a predictor in logistic regression models. Figure 2 compares the odds of using health care (all
### Table 5. For children aged 12-47 months, region-wise probability by sex of receiving vaccination, India (odds ratios)\(^{(a)}\)

<table>
<thead>
<tr>
<th>Dependent variables(^{(b)})</th>
<th>Region(^{(c)})</th>
<th>India</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Northen</td>
<td>North-central</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>M</td>
</tr>
<tr>
<td>BCG vaccination</td>
<td>0.58***</td>
<td>1.00</td>
</tr>
<tr>
<td>DPT (3 doses)</td>
<td>0.58***</td>
<td>1.00</td>
</tr>
<tr>
<td>Polio (3 doses)</td>
<td>0.59***</td>
<td>1.00</td>
</tr>
<tr>
<td>Measles vaccination</td>
<td>0.63***</td>
<td>1.00</td>
</tr>
<tr>
<td>All four vaccinations</td>
<td>0.69***</td>
<td>1.00</td>
</tr>
<tr>
<td>Number of children</td>
<td>5,606</td>
<td>12,007</td>
</tr>
</tbody>
</table>

\(^{(a)}\) Control variables in the logistic regression model: women’s age at birth of child, birth order, women’s education and employment, religion, caste, place of residence, indices of household economic status and exposure to mass media.

\(^{(b)}\) See footnote 3 of Table 2 for details on vaccines.

\(^{(c)}\) See footnote 1 in Table 2 for details concerning the classification of regions.

Significance level: *** \(p<0.001\); ** \(p<0.01\); * \(p<0.05\).

Scope: Children born between 1988 and 1992 and still alive at the date of survey.

vaccinations) between the sexes by birth order. In the northern and north-central regions, the odds of being vaccinated for all birth orders of female children above one are lower compared with boys of the same birth order. In the northern region, Figure 2 shows an increased neglect between birth order one and higher birth orders. By contrast, the odds ratios indicate only minor differences between the sexes by birth order for the southern and western regions. The declining immunization coverage with birth orders above two of female children compared with the birth order one in the northern region provides complementary evidence about elevated levels of bias against females as the number of girls in the family increases.

This is the first nation-wide survey that provides strong and clear evidence of discrimination against female children in the use of child health care services. Inferentially, this contributes to the well-established pattern of excess female mortality in the northern and north-central states of India. Clearly, there are systematic differences in female disadvantage in child mortality and health care amongst the regions. This discrimination in health care relates to the surviving children born during the last 12-47 months and excludes dead children as no health care data were collected for them. Consequently, it would be reasonable to conclude that sex bias in immunization coverage would have been higher among children who had died. The models regarding vaccination analysis relate to a truncated portion of births within the current time period of the last 12-47 months as against the full set of birth history data used in the analysis of excess female child mortality. These births occurred in the four years prior to the survey, a period in which the country began to experience a faster pace of development. Though such developmental trends are expected to have a disentangling effect on the cultural barriers of gender bias, there is nevertheless a clear indication of intense neglect of female children in terms of health care provision.

**Effects of development on sex bias in health care and excess female child mortality**

The previous results indicate net levels of excess female child mortality and sex bias against female children in vaccination coverage by controlling for demographic and development factors. One of the main aims of this analysis is to discuss the relation between development and gender bias. Thus, separate logistic regression models of child mortality for births in the preceding 10 years, irrespective of rank of children\(^{(9)}\), were constructed for each stratum of key development and demographic variables and by region, with the sex of the child as a predictor variable. The differentials in child mortality are analysed by women’s education, index of living amenities, index of mass media exposure and duration of preceding

\(^{(9)}\) The levels of excess female child mortality for increasing rank of female children by stratum of development indicators are not reported due to a lack of adequate numbers for higher ranks and insufficient statistical robustness.
Figure 2.— Sex differentials in vaccination coverage (all vaccinations) for children aged 12 to 47 months by birth order and region, India (odds ratios)\(^\text{(1)}\)

\(^{\text{(1)}}\) Control variables in the logistic regression model: women's age at birth of child, birth order, women's education and employment, religion, caste, place of residence, indices of household economic status and exposure to mass media.

See footnote 1 in Table 2 for details concerning the classification of regions.

**Interpretation:** First male children are the reference category.

Significance level: \(* \* \* \ p<0.001; \ \* \* \ p<0.01; \ * \ p<0.05.\)

**Scope:** Children born between 1988 and 1992 and still alive at the date of survey.

**Source:** National Family Health Survey (1992-1993).
TABLE 6.– IMPACT OF DEVELOPMENT FACTORS AND BIRTH INTERVAL ON CHILD MORTALITY AT AGES 12-47 MONTHS FOR CHILDREN BORN BETWEEN 1982 AND 1988, BY SEX AND BY REGION, INDIA (ODDS RATIOS)\(^{(a)}\)

<table>
<thead>
<tr>
<th>Development indicators and birth interval</th>
<th>Region(^{(b)})</th>
<th>India</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Northern</td>
<td>North-central</td>
</tr>
<tr>
<td>Mother’s education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illiterate</td>
<td>1.69***</td>
<td>1.00</td>
</tr>
<tr>
<td>Secondary education or above</td>
<td>1.01</td>
<td>1.00</td>
</tr>
<tr>
<td>Index of living amenities (0-4)(^{(c)})</td>
<td></td>
<td></td>
</tr>
<tr>
<td>None (0)</td>
<td>1.98**</td>
<td>1.00</td>
</tr>
<tr>
<td>All four (4)</td>
<td>1.18</td>
<td>1.00</td>
</tr>
<tr>
<td>Index of exposure to mass media (0-3)(^{(d)})</td>
<td></td>
<td></td>
</tr>
<tr>
<td>None (0)</td>
<td>1.94***</td>
<td>1.00</td>
</tr>
<tr>
<td>All three (3)</td>
<td>1.17</td>
<td>1.00</td>
</tr>
<tr>
<td>Duration of preceding birth interval</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Up to 24 months</td>
<td>2.28***</td>
<td>1.00</td>
</tr>
<tr>
<td>24+ months</td>
<td>1.24</td>
<td>1.00</td>
</tr>
</tbody>
</table>

\(^{(a)}\) A logistic regression model was constructed for each indicator and for each region. In each model, the sex of the child is an independent variable. Control variables are: women’s age at birth of child, birth order, women’s employment, religion, caste, place of residence.

\(^{(b)}\) See footnote 1 in Table 2 for details concerning the classification of regions.

\(^{(c)}\) The index of living amenities includes: electricity, pipe/pump water, cooking fuel gas/electricity, indoor toilet.

\(^{(d)}\) The index of exposure to mass media is computed with the following variables: watches TV/ listens to radio once a week, goes to the cinema once a month.

Significance level: *** \(p<0.001\); ** \(p<0.01\); * \(p<0.05\).

birth interval. Other related socio-demographic factors are used as control variables in the models.

Table 6 presents the results of these models. The mortality risk of female children of illiterate women is 69% higher than for boys in the northern region, and 61% higher than for boys in the north-central region. Similarly, for women living in poor households (where the indices of living amenities and that of exposure to mass media take the value 0), the odds of female child mortality are 94-98% higher in the northern region and 46-60% higher in the north-central region. These excess risks of female child mortality are statistically highly significant with very small standard errors. By comparison, models for women with secondary levels of education and above, and women living in better-off households indicate much lower and statistically insignificant levels of excess risk of female child mortality. By contrast, the southern and eastern regions have very small and statistically insignificant excess risks of female child mortality even for illiterate and poor women.

Since birth interval is one of the intermediary factors that confound excess female child mortality, models of sex differentials in child mortality were also constructed by length of birth interval to find the extent of nexus between the two. Results indicate that in the northern and north-central regions where female child mortality is high, shorter birth intervals are strongly associated with very high levels of excess female child mortality. This association is particularly clear in the northern region. This pattern is observed in the western region also. Such excess risks of female child mortality by birth interval provide corroborative evidence that excess female child mortality is concentrated among illiterate and poor women, among whom shorter birth intervals tend to be concentrated. By contrast, in the southern and eastern regions where excess female child mortality is smaller, there are no significant birth interval effects.

Furthermore, the impact of development factors on the neglect of female children in vaccination provision is also assessed. Logistic regression models were constructed by stratum of development indicators and by region, with other socio-cultural and demographic predictors of child mortality as control variables. Table 7 presents the odds of providing vaccination (only DPT vaccination) for female children, with the male child as the reference category. For illiterate women, the likelihood of female children receiving DPT vaccination is significantly lower in both the northern and north-central regions, with a greater difference between the odds for males and females in the north than in the north-central region. Similarly, the difference of odds between boys and girls are substantially greater in these two regions for women from economically poor households. It is clear that the levels of bias against female children in health care provision are very consistent with highly significant levels of excess female child mortality shown for the illiterate and poor women in these two regions. Moreover, the models for educated women and those living in better-off households
TABLE 7.– FOR CHILDREN AGED 12-47 MONTHS, REGION-WISE IMPACT OF DEVELOPMENT FACTORS ON VACCINATION COVERAGE\(^{(a)}\) BY SEX, INDIA (ODDS RATIOS)\(^{(b)}\)

<table>
<thead>
<tr>
<th>Development indicators</th>
<th>Region(^{(c)})</th>
<th>India</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Northern F</td>
<td>M</td>
</tr>
<tr>
<td>Mother’s education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illiterate</td>
<td>0.57***</td>
<td>1.00</td>
</tr>
<tr>
<td>Secondary education or above</td>
<td>0.92</td>
<td>1.00</td>
</tr>
<tr>
<td>Index of living amenities (0-4)(^{(d)})</td>
<td></td>
<td></td>
</tr>
<tr>
<td>None (0)</td>
<td>0.56***</td>
<td>1.00</td>
</tr>
<tr>
<td>All four (4)</td>
<td>0.91</td>
<td>1.00</td>
</tr>
<tr>
<td>Index of exposure to mass media (0-3)(^{(e)})</td>
<td></td>
<td></td>
</tr>
<tr>
<td>None (0)</td>
<td>0.57***</td>
<td>1.00</td>
</tr>
<tr>
<td>All three (3)</td>
<td>0.95</td>
<td>1.00</td>
</tr>
</tbody>
</table>

\(^{(a)}\) In this analysis, vaccination coverage refers to three doses of DPT (diphtheria, pertussis and tetanus) vaccines.
\(^{(b)}\) A logistic regression model was constructed for each indicator and for each region. In each model, the sex of the child is an independent variable. Control variables are: women’s age at birth of child, birth order, women’s employment, religion, caste, place of residence.
\(^{(c)}\) See footnote 1 in Table 2 for details concerning the classification of regions.
\(^{(d)}\) The index of living amenities includes: electricity, pipe/pump water, cooking fuel gas/electricity, indoor toilet.
\(^{(e)}\) The index of exposure to mass media is computed with the following variables: watches TV/ listens to radio once a week; goes to the cinema once a month.

Significance level: *** p<0.001; ** p<0.01; * p<0.05.
Scope: Children born between 1988 and 1992 and still alive at the date of survey.
indicate much lower and statistically insignificant levels of sex bias against female children in health care use, in correspondence with lower excess female child mortality. In the other regions, the odds ratios are insignificant.

To sum up, in the northern and north-central regions, the only significant differences in mortality between boys and girls are observed among children of illiterate and poor women. In the southern region, for educated women and women from richer households, even if the figures concerning immunization are not statistically significant, the trends suggest that within the cultural context, development indicators such as education, economic condition and exposure to mass media may tend to have a dampening effect on gender bias. Related studies dealing with variations in son preference trends in India and China have reported similar differences. In the northern, north-central and western regions of India, where son preference is the strongest, improvements in women’s education and household economic conditions have resulted in a reduction in son preference effects on fertility and contraception (Arokiasamy, 2002). In China, son preference is clustered in the densely populated eastern part of the country and remains strongest in rural farm villages and towns. It is somewhat less pronounced in rural nonfarming villages and weak in the cities (Arnold and Zhaoxiang, 1986).

Conclusions

Our analysis illustrates the dynamics of gender bias in child mortality across the regions of India. In addition, our findings indicate the many distinguishing features of the connections between culture, development and gender bias in child health care and child mortality.

In addition to the strong evidence that female children experience neglect that increases with the number of female births, our results more importantly provide greater precision about the regional pattern of the dynamics of sex differences in child mortality. In the northern and north-central regions, excess female child mortality compared with boys of respective rank is about one-third higher for the first girl child and even greater for girls of higher rank. Given that overall child mortality is not as high in the north as in the north-central region, gender bias is more severe and selective in the north compared with the north-central region. In the eastern, western and southern regions of India, excess female child mortality is marginal and does not rise systematically as the number of female children in the family increases. This apart, high female child mortality is not the absolute rule, as male mortality is higher than that of females for the fourth and higher rank children in the southern and western regions. This is some substantiation of the point suggested by Muhuri and Preston (1991) that parents might consciously neglect individual children.
The connection between excess female child mortality and discrimination against female children in immunization coverage is inferentially demonstrated. As evidence to the maximum excess female child mortality observed in the northern followed by the north-central region, the degree of neglect of female children in terms of receiving the full range of recommended vaccinations is greatest in the northern followed by the north-central region. The likelihood of receiving immunization falls by more than a third for girls (compared with boys) in the north and by about one fourth in the north-central region. By contrast, levels of excess female child mortality are lowest in the south, followed by the eastern and western regions, where no significant evidence of neglect of female children in vaccination coverage is indicated.

Child immunization is one of the major factors determining child survival in South Asia and these striking differences in coverage from a national survey clearly demonstrate a deliberate neglect of female children in modern health care provision. Sex differentials in the treatment of illnesses such as fever, cough and diarrhoea and in nursing care are also part of the explanation. However, data on treatment of such illnesses were not used as they pose potential interpretation problems. Although bias against female children in health care provision is central in explaining excess female child mortality, nutritional differences are also important as they contribute to differences in disease exposure. These combined neglects are the most important components of the causative nexus of factors contributing to excess risk of female child death and might be indicative of female neglect as a whole. Concentrated policy measures of female empowerment are required to combat this social menace of female child neglect.

Elsewhere in South-central Asian countries, the evidence of excess female child mortality is not correspondingly matched with pervasive evidence of sex bias in health care. Such a variable pattern of evidence suggests that policy goals need to prioritize their focus on different pathways. First is the need to address gender-specific child-rearing customs originating in deeply rooted cultural or religious beliefs, not arising from conscious discriminations. Second, the right of girl children to preventive and curative health care provision has to be enforced where evidence suggests conscious discrimination.

Even in circumstances where no specific bias against girls was found in terms of provision of food, health and emotional care, increasing numbers of girls born in a family may also face a number of other disadvantages, as a result of the family’s poor economic condition and patriarchal norms. Arnold (1997) suggested that female children, in families with son preference, may tend to grow up in larger families than male children. Couples with strong son preference will continue childbearing in order to achieve their ideal number of sons. Girls growing up in such circumstances may have to suffer from several social disadvantages in terms of education and marriage costs, all of which may compound to deny them
better living conditions. Policy goals of female empowerment have to address these wider issues of gender inequalities, which are still pervasive.

Another major issue is the relationship between fertility decline and sex bias in child mortality. Das Gupta and Bhat (1997) have argued that a fall in fertility should benefit girls since it reduces the “parity effect”, although an “intensiﬁcation effect” results in increased discrimination against girls at lower parities\(^{(10)}\). The second round of NFHS (NFHS-2, 1998-99) found evidence of increased levels of excess female child mortality in the northern states of Punjab and Haryana, where fertility and child mortality have declined. The second negative aspect of this intensiﬁcation effect is the recent evidence of exacerbated prenatal discrimination. However, fertility decline may contribute to a substantial reduction in absolute numbers of excess female deaths given a fall in higher rank (third and fourth) female children associated with higher levels of excess female child mortality. In the north-central region, excess female child mortality is higher than in the north, although sex bias is more intense in the latter region. This may be due to the very large numbers of births which have occurred in the north-central region as a result of both the large population size and the relatively high levels of fertility. Thus, the macro inﬂuences of fertility decline on sex bias in child mortality suggest a quantum versus intensity issue; and with declining child mortality it is imperative to address both these dimensions with effective social and health policy measures.

Our analysis had the advantage of a large sample size. It shows that improved education, economic status and exposure to mass media tend to reduce gender bias. Moreover, the positive association between high female child mortality and shorter birth interval demonstrates corroborative evidence of this inference, as shorter birth intervals tend to be concentrated among the illiterate and poor women. However, these results are contrary to those of previous studies which suggested that education possibly increases, or does not significantly interact with, sex bias in child mortality (see Das Gupta, 1987; Muhuri and Preston, 1991; Bhuiya and Streatﬁeld, 1991). However, many other household-level data analyses show that sex bias against female children is more intense among the poor and illiterate (see Clarke, 1984; Krishnaji, 1987; Rosenzweig and Schultz, 1982; Simmons et al., 1982). Beyond this, the macro-level regional patterns characterized by low levels of female education and low levels of health care also strengthen the argument that stagnation in development.

\(^{(10)}\) The impact of son preference on excess child mortality for girls tends to vary with the overall level of fertility. The parity effects refer to the higher risk of mortality of girls (discrimination of girls) than boys for high parity (fertility) mothers, as a result of the large proportion of high parity women. This would lead to very significant excess female child mortality. The intensiﬁcation effects refer to increased discrimination against girls when fertility falls rapidly and reaches low levels and where son preference continues to be strong. Girls (lower birth order) of low parity women tend to face intense discrimination. This is likely to result in sex-selective abortion (female foetus) leading to an adverse sex ratio at birth and indicating a dramatic shortfall of juvenile girls (see also Bhat and Zavier, 2003).
opportunities is likely to compound gender inequalities. Caution is required to consider this as a clear emerging pattern. On the one hand, development might reduce gender differences (Drèze and Sen, 2002); but on the other, gender inequality in itself might contribute to development failures in general.

The inter-regional contrasts documented above emphasize the need to consider, as many commentators have argued, the synergetic connection between culture, development and gender bias for promoting health care and removing gender bias. The United Nations study (1998b) also illustrates that evidence of excess female child mortality is not uniform. The average equality seen in sex differentials in child mortality conceals differences across the regions of developing countries, with about half exhibiting excess female child mortality, counterbalanced by excess male mortality in the other half. In short, female disadvantage in child mortality exists in a variety of contexts that encompass development, social organization and cultural values. Given that India contributes to the bulk of excess female child mortality, health and development policy goals need to address disparities between regions in India.

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REFERENCES


REGIONAL PATTERNS OF SEX BIAS AND EXCESS FEMALE CHILD MORTALITY IN INDIA


NATIONAL FAMILY HEALTH SURVEY (NFHS-1), 1992-93, India, International Institute for Population Sciences, Mumbai & ORC Macro, USA.


Using data from the National Family Health Survey of India (1992-93), this analysis documents evidence about the regional pattern of discrimination in the provision of child health care for female children in India. This discrimination is a contributing factor to the 60-65% excess female child mortality occurring in the states of the northern and north-central regions of India. Sex bias in child mortality follows a regional pattern, clearly illustrated by the sex-specific rank of children in families. In the northern and north-central regions, female child mortality compared with boys of respective rank is about one-third higher for the first girl child and even greater for girls of higher rank. In the southern and western regions, evidence of neglect of female children in health care provision and corresponding levels of excess female child mortality is very marginal. Set against the cultural constraints of a patriarchal society, developmental factors tend to reduce gender differences in health care and child mortality, though the opposite might also be the case, with gender inequalities tending to hold back development.

Les variations régionales de la discrimination et de la surmortalité des petites filles en Inde

À partir des données de l’enquête nationale indienne sur la santé familiale (1992-1993), cet article décrit les variations régionales de la discrimination dont sont victimes les petites filles en matière de soins de santé en Inde, discrimination qui constitue le principal déterminant de la surmortalité, de l’ordre de 60-65 %, qui touche les filles dans les États du nord et du centre-nord du pays. Il existe un gradient régional d’inégalité entre garçons et filles en matière de mortalité des enfants qui est bien mis en valeur quand on classe les enfants par rang de naissance parmi les enfants de même sexe. Dans les régions du Nord et du Centre-Nord, la mortalité des filles excède celle des garçons de même rang de naissance de plus d’un tiers pour le premier enfant et davantage aux rangs supérieurs. Dans les régions du Sud et de l’Ouest, les indices de négligence à l’égard de la santé des petites filles et les niveaux correspondants de surmortalité juvénile féminine sont très faibles. Face aux contraintes culturelles liées au système patriarcal, le développement tend à réduire quelque peu les inégalités entre sexes en matière de santé et de mortalité des enfants; mais on peut aussi observer, en sens inverse, que les discriminations sexuelles sont susceptibles de ralentir le processus de développement.

Las variaciones regionales de la discriminación y de la sobre-mortalidad de niñas en la India

A partir de los datos de la encuesta nacional india sobre la salud familiar (1992-1993), este artículo describe las variaciones regionales de la discriminación que afecta a la atención sanitaria a las niñas en la India. Tal discriminación constituye el determinante principal de la sobre-mortalidad, que es del orden del 60-65% y que afecta a las niñas en los estados del norte y del centro-norte del país. El gradiente regional existente en la desigualdad entre niños y niñas en materia de mortalidad infantil se pone claramente en evidencia cuando se clasifica a los hijos de un mismo sexo por rango de nacimiento. En las regiones del norte y centro-norte, la mortalidad de las niñas excede a la de los niños del mismo rango de nacimiento en más de un tercio, si se trata del primer hijo, y más, en rangos superiores. En las regiones del sur y del oeste, los índices de negligencia en lo que respecta a la salud de las niñas y los niveles correspondientes de sobre-mortalidad juvenil femenina son muy bajos. Frente a los factores culturales derivados del sistema patriarcal, el desarrollo tiende a reducir un poco las desigualdades de género en materia de salud y de mortalidad infantil; pero, por otro lado, las discriminaciones sexuales pueden retrasar el proceso de desarrollo.