

CHAPTER 3-2: LIFE CHANCES: DEVELOPMENT AND FEMALE DISADVANTAGE

Paul H. L. Nillesen and Barbara Harriss-White

Mortality which is based on ideas or on an ideal, is an unmitigated evil.

D H Lawrence - *Fantasia of the Unconscious*, Ch.7.

Introduction

From independence to 1997, India's birthrate dropped from 42 to 28 live births per thousand (Pai Panandiker, 1998). This decline in fertility is normally associated with a preceding decrease in the mortality rate. However, sex-ratios for the Indian population suggest that this mortality decline has not occurred equally for both sexes. Table 1 shows the female-male ratios for India since the turn of the century. They are famously characterised by excess female mortality.

Excess relative female mortality refers to mortality that is a consequence of unequal treatment within the household. Equal treatment need not necessarily imply identical quantities of treatment, rather that all members receive what, at least nutritionally and medically, they need.

Table 1: Female-Male Ratio for India 1901-1991

Year	Female-male ratio
1901	0.972
1902	0.964
1921	0.955
1931	0.950
1941	0.945
1951	0.946
1961	0.941
1971	0.930
1981	0.935
1991	0.927*
2001	0.933

Source: Kynch & Sen (1983); *Rajan, Mishra & Navaneetham (1991); Census of India, 2001.

Das Gupta and Mari Bhat (1997) argue that as a result of the decline in fertility women are better at controlling the gender composition of their family. So, given a social preferences for males, the relative mortality rate of girls may actually increase. The mortality rate of a child is influenced first by exposure to life threatening insults and, second, by the quantity and quality of resources allocated to it in its youth. Girls may routinely receive lower quantity and quality food or, at times of acute need, of medical care. Further, the selective and deliberate abortion of female foetuses or infanticide has lately been reported as spreading (Athreya and Chunkath, 1996; Chunkath and Athreya, 1997; George et al, 1992).

The literature discusses two alternative motives for the asymmetrical intra-familial

distribution of resources and care between children of different sex. First, the distribution is argued to accord with the standard economic principles of utility maximisation.¹ This utility is some aggregated family utility function, which in turn depends on total household income. So resources are allocated according to the return a child generates. Second, the distribution of resources within a household reflects social and cultural norms, expressing male preference.² Kishor (1993, 1998) has attempted to test both explanations simultaneously. However, although both economic and cultural factors are found to influence mortality rates, they do so to a differing extent in different classes of a population. It is now generally accepted by scholars, the public and politicians that dowry payments play an important role in the culling of girls. A poor household will not necessarily be as concerned with this as a wealthy family might be, since the poor household does not have any significant wealth to transfer and is compelled to make male and female family members labour, whereas a wealthy family will take inter-generational flows of capital into account when making allocation decisions. The argument is theoretically stylised: most families will have some assets and also engage in wage work.

¹1. For example: Becker & Tomes (1976) Behrman et al. (1982) Browning & Subramanian (1994).

²2. For example: Clark (1983), Dyson & Moore (1983), Caldwell (1986), and Heyer (1992).

We hypothesise first that the allocation of resources in poor households is governed by labour market considerations (the *wage-effect*). Poor households derive most of their income from labour. Second, in households which have accumulated some property, the allocation of resources is expected to be governed by accumulation strategies in turn depending on capital flows between generations (the *wealth-effect*). These households will be more concerned with inheritance norms and marriage transfer payments (dowries) than poorer households which have fewer assets to transfer. The wage- and wealth-effects of the different classes will act in opposing directions (for reasons that are discussed later in the chapter), suggesting that increases in household income, may increase, rather than decrease, the relative disadvantage of females in India. Further, modernisation³ is commonly associated with ‘Sanskritisation’, in which lower castes will try to emulate the cultural attributes of higher castes. So, if, as we argue here, excess female mortality is associated inversely with economic status, poor people will attempt to emulate the behaviour of the rich. ‘Development’ will then be accompanied by increased biases against females. Sex imbalances will be the product not of poverty but of wealth. *It is conceivable that a by-product of India’s economic reforms will be greater, rather than less, female disadvantage.*

³3. Modernisation here refers quite specifically to a release from the deterministic association of caste with a certain occupation.

The possibility that wealth, rather than poverty, might be related to the deteriorating life chances of girls in India has been raised by Clark (1987) and by Heyer (1992). Subsequently, using data from northern Tamil Nadu, Sargent et al. (1996) and Harriss- White (1999) found indications that wealthier, landed household have lower female:male ratios than poorer, landless households. It is urgent to know what is determining the sex-ratios among the labouring peasantry and the capitalist elite. This will be done by dividing the data we use so as to separate out wage and wealth effects.

The chapter is ordered as follows. First, we give a brief and non-technical overview of the mechanisms through which resources are allocated within a household. Second, we examine in greater detail the case of Tamil Nadu and our sample, drawing upon the work of Sargent et al. (1996), Harriss-White (1999) and Nillesen (1999). We can then consider policy responses.

Theories of Intrahousehold Distribution

The way goods are distributed within a household has important implications for policy. Knowledge of the motivating factors behind a differential allocation of resources between boys and girls might allow a government, if it has the political interest, to alter the incentive structure faced by households and thus indirectly to influence relative mortality rates. There are two economic factors at work that

influence the economic strategies of households: the labour market and norms of asset transfer. But these do not exhaust the determinants of sex bias. Culture is a social force which disadvantages women quite independently of their role in the economy. In 1983, Dyson and Moore identified a major subcontinental cultural fault line between the 'north' and the 'south'. The northern patriarchal kinship system features village exogamy; there is co-operation in production between male blood relatives; women are excluded from property ownership; there is higher fertility, relatively low age at marriage, relatively higher infant and child mortality and more masculine sex-ratios. The south differs on all counts, save that of patriarchy. Women are thought to have greater autonomy, even though autonomy is not an unambiguous indicator of advantage, from the point of view of welfare.⁴ These culture-regions have proved to be less distinct on the ground than in the model (Caldwell and Caldwell, 1987). Harriss (1990) argues that the 'discriminatory practices of patriarchy may be unrelated to the wealth and economic status of the household'. Further, Kapadia (1997) (reported in Sundari Ravindran 1999), examining gender inequalities in Tamil Nadu villages, finds it

⁴4. Factors affecting the capacity of women to control, decide and act for themselves do not relate without contradiction. Muslim women for instance may be less educated than Hindu women but village studies show that they have less dowry. They migrate shorter distances yet they have less contact with their natal home than do Hindu women (see discussion in Harriss, 1993, pp. 25-27).

cuts across all classes and castes.⁵ Male preference is ingrained if only because men play an important religious role and are necessary for death rites. Culture influences the divine and moral aspects of the intra-household distribution of resources (Harriss 1990).

Two types of economic model of distribution appear in the literature: unitary models, initially developed by Becker and Tomes (1976), and bargaining models, initially developed by McElroy and Horney (1981).⁶

The Unitary Model

Becker and Tomes argue that the household can be viewed as a single decision-making unit. Parents aim to maximise overall family utility, in which the income and wealth of the children are elements. By maximising the utility function, parents invest so as to reinforce differences, but compensate for this with transfer payments. The result is that if one child obtains a higher return from a

⁵5. However, she notes that women's status is steadily falling, especially in the castes that have bettered themselves economically.

⁶6. Many more models of intrahousehold distribution can be found in the literature, such as for example the Behrman et al. (1982) Separable Earnings-Transfers model. However, they can all be sorted into one of the above categories.

given investment of resources than another, parents respond by allocating more resources to the first child *ex ante*. So, if a male has better employment and earnings prospects than a female, the family will allocate more resources to the male child. The result of fewer resources being allocated to the female child that she needs is likely to lead to a lower survival chance, if household resources are scarce.

Criticism of the unitary approach runs along four lines. First, perfect capital markets and information are assumed. Parents operate in a static environment where all decisions are made simultaneously and with all the necessary information about the future available. In practice, information is sure to be incomplete and imperfect, and may be perceived differently according to which gender it relates.⁷ If perceptions differ from reality, a bias will be introduced into the interpretation of the information and it becomes 'noisy'.⁸ If the information about female wages is less reliable than the information about male wages, for

⁷7. Kynch & Sen (1983); 'In dealing with within-family distribution, the perception of reality - including illusions about it - must be seen as an important part of reality'.

⁸8. Nillesen (1999), using the Lucas supply function framework, finds that, if the mortality rate of children depends on the wage rate and the information about the wage rate, the mortality rate is inversely related to the variance of the error in the wage determination equation.

example, parents will be less responsive to wage changes when they occur for females than when they occur for males. In order to induce an identical decrease in mortality for both male and female children, the increase in wage or employment opportunities for females must then be substantially larger than that for males to compensate for the lower reliability of information about female wage increases (Nilleson, 1999 and for a detailed discussion see Nillesen and Gelfert, 2002). Second, Foster and Rosenzweig (1999) suggest that the role of the daughter in agricultural production may be complementary to that of the son. If the labour market participation opportunities for women were to increase, the demand for a son may increase without it having any effect on the demand for girls. This increase in demand may then be reflected in the lower relative mortality of boys, widening, as opposed to closing, the survival differential. Third, an *ex ante* unequal concern for children of different sex, if found to exist for cultural reasons, will not generate a difference in the levels of return of the different sexes.⁹ Fourth, Folbre (1986) argues that the unitary model is fundamentally misconceived. In practice households are sites of struggles over resources, and these struggles are simultaneously over socially constructed meanings and definitions. It is more realistic to see a household as consisting of individual agents each attempting to maximise his or her utility, not some

⁹9. This can be modelled explicitly using the Behrman et al. (1982) Separable Earnings-Transfers Model.

aggregate family utility function. This latter proposition is developed in bargaining models of intrahousehold allocation.

The Bargaining Model

Social status is not only determined by economic participation, but also by control over resources, which in turn influences individual bargaining power in decision-making. In a bargaining model of marriage, it is theorised that the two agents maximise the product of each partner's utility gain from marriage. Two factors, the ability to earn income, and the possibility of entering the re-marriage market, have been argued to affect the distribution of resources within the household through their effects on the breakdown position. The breakdown position is the utility each agent achieves if not married.¹⁰ Household distribution is determined by a Nash-bargained solution involving both partners and their respective breakdown positions (McElroy, 1990).

Bargaining models differ in two respects from unitary models. First, in unitary models income is pooled and therefore all that matters is total income. By contrast, in bargaining models it is the individual control over income that influences the distribution of resources within the household. Second, the Nash-bargaining model incorporates the opportunity cost of family membership

¹⁰10. The breakdown position is also known as the threat point.

on the distribution of resources within the family.¹¹ However, in wealthier families, as some feminists argue, women's bargaining power may be independent of the resources they control. It depends entirely on the institutional context. Further, as Sen (1990) points out, what determines bargaining power is not solely the contribution to the household, but rather the perceived contribution.

So far we have discussed how households with male and female adult working members make allocative decisions. However, in rich Indian households women play a limited role both in the labour market and in the productive family labour force. Labour market considerations become less important when undertaking allocation decisions, and the logic shifts to keeping wealth within the family. Whereas the wage-effect alters the marginal cost of having daughters, the wealth-effect alters the fixed costs. The transfer of wealth is in turn influenced by society and culture, to which we now turn.

“In India, as in most other developing agrarian societies, kin relationships still constitute for the great majority of people the prime avenue of access to such scarce social resources as information, economic assistance, and political support.”

¹¹11. Known as extra-household parameters such as divorce laws or lone parent benefit.

Dyson and Moore (1983)

The kinship structure is vital to understanding longer-run economic decision-making by wealthier households. In India, kinship is strongly patriarchal, and the inheritance of property favours males over females.¹² Since girls migrate on marriage, the management of any property they inherit is made difficult. A propertied family will thus prefer sons, so as to keep control of the wealth within the family.¹³ Although a married daughter may still have contact with her parents, she will not contribute to their income any longer.¹⁴ Further, increasingly, the bride's family pays a dowry to the groom's family. Even though dowry payments are illegal, following the Dowry Prohibition Act of 1961, they

¹²12. Agarwal (1998) quotes a study by Marty Chen of rural widows in seven states, where only 13 percent of the daughters of landowning fathers inherited any land and even fewer effectively controlled any.

¹³13. However, the preference depends on the liquidity of the assets. If land is at stake, dividing it between many sons is likely to be undesirable, whereas if jewellery is at stake it can easily be divided between daughters.

¹⁴14. In poorer households kinship may be structured so as to prevent the dissipation of resources. In south India a model of kinship involves cross-cousins, to keep resources tightly controlled.

are nevertheless increasing in prevalence and magnitude.¹⁵ Heyer (1992) and Agnihotri (2000) both note that dowry is starting to colonise the south of India, where bride price or small mutual transfers on marriage existed previously. Women have become agents in the display and transfer of wealth. Heyer argues that spending substantially on daughters' marriages and dowries confirms or raises a household's reputation.¹⁶ The wealthy household faces two costs for its daughter; first, a dowry payment to the husbands' family¹⁷ and a stream of gifts subsequently, including loans at zero interest (Dreze et al., 1998). Second, a stream of income from labour is permanently lost. This income might be relatively small in monetary terms, but it covers the shadow benefits from having a cheap source of labour to work on the family land, especially in post-harvest processing and the work of domestic maintenance. So girls are associated with large outflows of capital while boys are viewed as generating a large inward flow of capital upon marriage. The sex of a child at birth may have an immediate impact on household consumption and savings behaviour: the birth of a female child has been theorised to have the same effect as a negative shock on lifetime

¹⁵15. See Heyer (1992).

¹⁶16. See for instance Bloch, Rao & Desai (1998).

¹⁷17. This dowry payment need not be a one-off payment and may involve the daughter's family being required to supply a flow of gifts.

household wealth. Households with more female children will, *ceteris paribus*, reduce their expenditure and increase their savings to pay for a future dowry. Male preference is reinforced and the relative disadvantage of females is increased (Browning and Subramanian, 1994).

Finally, the bargaining power of women may be eroded, rather than strengthened, in wealthy families. Wealthy households conventionally withdraw their women from participation in the labour market. Since housework is perceived as less valuable, the perceived contribution of women to the household will be lower. As a result, female bargaining power will be reduced. Further, if the family views women as agents in the transfer of wealth out of the family, their actual contribution will be negative and their breakdown positions may also be negative. So it is reasonable to test the idea that with the wealth-effect, women's bargaining power is inversely related to the wealth of their family.

India and Tamil Nadu in the 1990s

The probability of survival in India is cruelly influenced by location. Death rates for

all ages are highest in rural areas and in North India. The All-India infant mortality rate in 1996 was 26 per thousand for rural India, compared to 14 per thousand for urban India.¹⁸ In rural areas the generally lower life chances are not

¹⁸18. Source: Sample Registration System Statistical Report, 1996 (excludes

equally shared by males and females. Table 2 shows the estimated age-specific death rates by sex for rural India for 1996. Up to age 30, female mortality is higher than male mortality. Especially for the 0-4 age bracket, the death rate is substantially higher for females than for males. Biologically, however, female infants have a higher resistance to infectious diseases than males so we would expect to find their death rates to be lower, rather than higher. Table 3 shows the child and infant mortality rates for India for 1996 disaggregated by age. Again the rural mortality rates are substantially higher than urban rates.

Table 2: Estimated Age-Specific Death Rates by Sex per Thousand, Rural India, 1996

Age Group	Total	Male	Female
Below 1	84.6	83.7	85.7
1-4	9.3	7.1	11.6
0-4	26.2	24.3	28.3
5-9	2.6	2.2	2.9
10-14	1.4	1.3	1.4
15-19	1.8	1.5	2.1
20-24	2.5	2.0	3.0
25-29	2.6	2.5	2.8

Jammu and Kashmir).

30-34	3.1	3.1	3.1
35-39	3.7	4.2	3.1
40-44	5.2	5.9	4.5
45-49	7.0	8.1	5.9
50-54	11.3	13.0	9.4
55-59	16.2	18.6	13.8
60-64	26.8	29.4	24.3
65-69	38.0	42.5	33.8
70-74	62.9	68.9	56.9
75-79	88.6	95.2	81.9
80-84	120.8	130.1	111.5
85+s	184.4	192.1	177.0
All age	9.7	9.8	9.6

Source: Sample Registration System Statistical Report, 1996 (excludes Jammu and Kashmir).

Tamil Nadu is a state (along with the deservedly more famous Kerala) where the status of women has been relatively high. It now seems to be a demographic microcosm of the subcontinent as a whole. Tamil Nadu's population was nearly 56 million in 1991. From 1981 to 1991, it experienced the second highest fertility decline of all Indian states. As a result of unequal mortality rate decreases for males and females, sex-ratios have converged with the national average. Das

Gupta and Mari Bhat (1997) estimate that between 1981 and 1991 an additional 88,000 girls went ‘missing’ from the census in Tamil Nadu alone. Table 4 reports the sex-ratios for the juvenile population (0-10 years) of Tamil Nadu from 1941 to 2001.

Table 3: Child and Infant Mortality Indicators, India, 1996.

Indicators	Total	Rural	Urban
Child (<5yrs.) Mortality Rate	24	26	14
Infant M.R	72	77	46
Neo-Natal M.R.	47	50	28
Early Neo-Natal M. R.	35	37	23
Late Neo-Natal M. R.	12	13	5
Post Neo-Natal M. R.	25	27	17
Peri-Natal M. R.	44	46	32
Still Birth Rate	9	9	9

Source: Sample Registration System Statistical Report, 1996 (excludes Jammu and Kashmir).

Table 4: Juvenile Population Sex-Ratios for Tamil Nadu and India, 1941-2001

	1941	1951	1961	1971	1981	1991	2001
Tamil Nadu	1010	999	995	984	974	948*	917

India	n/a	n/a	976	964	962	945*	927
-------	-----	-----	-----	-----	-----	------	-----

Source: Chunkath & Arthereya (1997), *(0-6yrs.); Athreya, 2001.

The sex-ratio for the population as a whole in Tamil Nadu, at 974 in 1991, was second highest to that of Kerala. But it hides the secular downward trend for the juvenile population (Table 4). *Between 1981 and 1991 the life chances of girl children in Tamil Nadu deteriorated at a rate 1.5 times the national average, while between 1991 and 2001, the rate of deterioration, at 1.7 times the average, got worse.* Is this deterioration of female life chances in Tamil Nadu linked to economic development and the accumulation of wealth? Will liberalisation *worsen* female life chances?

The Evidence

National level evidence lends increasing support to this hypothesis. In 1982, Rosenzweig and Schultz published an analysis child survival data from a national sample of 1,331 rural households with results that did *not* corroborate it. Finding that children who are likely to be more productive economically, receive a greater share of resources, they observed a general association between household wealth and improved female to male survival chances, which implies that greater equality was practised as household wealth increased. Their data are now one generation old. However, Murthi et al. (1995) use equally old data from 1981 for 296 districts throughout India which supports the hypothesis. They find a negative

and statistically significant association between poverty and female disadvantage. They claim that: 'variables reflecting the general level of development and modernisation (e.g. per capita expenditure, male literacy, urbanisation, and the availability of medical facilities) have a negative but comparatively weak impact on mortality and fertility levels, and, if anything, amplify rather than reduce the gender bias in child survival.' (Murthi et al. 1995).

Agnihotri (1997, 2000) plots state level National Sample Survey data from 1991 for household expenditure (in the absence of that for wealth) against the sex-ratio to test for a U-shaped, 'Kuznets curved' relationship and finds ominously that in many states, Tamil Nadu included, there is either no upwards kink in the decline in the sex-ratio with increasing private income, or that the upward turn is at income levels which will not be reached by other than a tiny minority in the foreseeable future.

Regional evidence is increasingly supportive over time. Browning and Subramanian (1994), using an ICRISAT Village Level Survey panel data set for Central India 1975-1984, find that households behaved as if there were a shock to their lifetime wealth following the birth of a girl. Households with girls reduced total household expenditures and the other components of expenditure as well. By contrast, expenditures increased following the birth of a boy, with the exception of narcotics - a purely adult commodity. The authors reckon their findings

corroborate anthropological evidence that the cost of marriage is an increasing function of wealth. The largest landholding households incurred significantly higher marriage costs in the form of higher marriage expenses and dowries. This is a form of social signalling of the status of the household. Heyer (1992), examining the accumulation of wealth in rural Coimbatore district in South India in the early eighties, recorded significant (then recent) increases in dowry among the landed propertied classes, along with hypergamy (the practice of organising the marriage of girls in an upward direction in status). The dowry (no longer vested in the bride but in the groom's family) plus life-long and open-ended ceremonies connected with the girl's reproductive cycle were the means of expressing improved status and making advantageous connections in agriculture and trade. She argues that the system is driven by brides' households. But within the class with land and non-land property, wealth is redistributed to households with higher ratios of sons to daughters. So daughters tend to be neglected.

George et al. (1992) looked at 13 villages, covering some 13,000 people in KV Kuppam Block of North Arcot-Ambedkar district, very close to the villages we studied. These villages have witnessed striking increases in their productive bases as a result of the Green Revolution. Female infanticide was discovered in six of these settlements affecting 10 percent of newborn girl babies. But no such practice was found in the other seven. Searching for explanations, they point to three: physical remoteness, villages with low levels of education and villages

where land ownership is dominated by the *Gounder* or *Vanniar* caste. Widespread and active land acquisition by *Gounders* over the last two decades of the Green Revolution (Janakarajan, 1986) is quite likely to be accompanied by kinship relations ensuring at best the accumulation of more land, at least the retention of existing land. In the presence of dowries and patrilineal inheritance, it is thus increasingly advantageous to have sons rather than daughters.

Ambedkar and Tiruvannamalai Districts

Sargent et al. (1996) and Harriss-White (1999) provide further evidence that the accumulation of wealth may be causing the deteriorating life chances of girls. They use data from the set of villages ¹⁹ sampled and surveyed in the Ambedkar and Tiruvannamalai districts of Tamil Nadu. Table 5 reports the infant mortality rates for the combined two districts. The village censuses were conducted in 1993 on 3 villages and in 1994 on the other 8 by the MIDS team. Just over 2,000 households were surveyed - nearly 10,000 people (see chapters 1-1 and 1-3).

Sex-ratio data have been organised to examine the relation between caste, class and excess girl child deaths. The child sex-ratios can be seen in Table 6.

¹⁹19. Vegamangalam, Sirungathur, Duli, Vengodu, Vayalur, Meppathurai, Amudhur, and Kalpattu.

Table 5: Gender-Specific Infant Mortality Rates per Thousand for Ambedkar, Tiruvannamalai, and Tamil Nadu, 1995.

	Male	Female
Ambedkar	38.1	45.0
Tiruvannamalai	31.7	39.2
Tamil Nadu	36.9	44.3

Source: Chunkath & Athreya (1997).

Table 6: Child Sex-ratios in villages in Ambedkar and Tiruvannamalai Districts (girls under 7 per thousand boys),1993-4.

Status	Sex-Ratio
Aggregate	856
Scheduled Caste	886
Caste	750
Landless	952
Landed	730
Landed Caste	645

Notes: (i) the data have been tested for misreporting; (ii) it is assumed that the random error is insignificant; (iii) the average disaggregates will not equal the average total because of the category 'other' (Muslim, Christian, etc.).

The overall sex-ratio of 856 is much lower than the state average for this age (946) and is similar to that of Salem and Madurai districts. The figure 750 for caste households is extremely low. If the data for the caste population are disaggregated further according to landownership status, the sex-ratio of 730 is again exceedingly low - on par with the seventh lowest Development Block in the state as a whole and with the under 15 sex-ratio for the business elite of the local town (Harriss-White, 2001). By contrast for those households without land, the sex-ratio of 952 is not much different from the state average of 946. The ratio for scheduled castes follows the state-level trend of being higher than that for the caste population (Sundari and Thombre, 1996). **The lowest sex-ratio for the under-seven age group is found among landed caste households: 645** - not very different from that found in Macdonald's Country Development Block (651) in Salem, the third lowest Block-level sex-ratio in Tamil Nadu. Excess girl-child mortality seems to have appeared most strikingly in a class-specific form among landed households - irrespective of caste - and not because of poverty or distress. **Land accumulation seems to have been accompanied by female disadvantage.**

Economic development and the associated accumulation of wealth appear to have lowered the relative probability of survival of girls. Further, the ratios suggest that the gender-composition of poor landless households is motivated by different factors than in wealthy, asset-rich households. In order to examine the effect of wealth accumulation and its inter-generational transfer on the survival prospects

of a girl child, the MIDS village-level data were truncated into landless and landed sections. By running individual regressions on the sub-samples we can identify whether certain variables influence household sex-ratios differently according to the socio-economic status of the household. The next section reports the results.

Ambedkar and Tiruvannamalai - Poverty Versus Wealth

Households in which there was at least one child under the age of 9 were selected for analysis. Harriss (1990) finds that two-thirds of female mortality occurs before the age of four, however we chose a slightly broader age range in order to keep our sample size at a reasonable level, with a view to truncating it later. The final population size was 1, 071 households. The household was defined as those sharing the same house. The average household size in the total sample was 4.9. The sex-ratio of male to female children under 9 was 1.116 (896 in terms of females per thousand males). The sex-ratio of 5-9 year-olds in the USA in November 1998 was 1.05 (952).²⁰ Applying this ratio to our sample, a total of 59 girls are *missing* from our population.

Following Rosenzweig and Schultz (1982), a survival differential was calculated, by taking the difference in the survival probability of a male and female child.

²⁰20. Source: US Bureau of the Census.

Our data were limited, however, by the fact that only the total number of births by a woman in the family was reported, without indicating whether these births were male or female. We therefore divided the total number of births by two, assuming that there is a roughly equal probability of bearing a son as there is of bearing a daughter. Biologically however, slightly more males are born than females everywhere, and pre- and peri-natal mortality is male biased. Further, in India there is a tendency to underestimate female births because they are not considered as significant, and hence may not be as easily remembered as male births.

To calculate the survival probability, the total number of children under 9 was divided by half the total number of births.

Where m, f are the total number of male or female children under 9 years old in the family, and B is the total number of births to the family. The survival differential, S , is then:

The probability of survival is thus the probability of a 9 year-old being alive in a family, given the number of births in that family. If the child has brothers, sisters, or cousin older than 9, then his or her probability of survival will be lowered. It is likely that the more brothers, sisters, or cousins a new-born child has in the family, the lower its chances of survival are. Female children's life chances have been found to diminish in the presence of sisters (Das Gupta, 1987). The average

survival differential in our sample was 0.0584. This indicates that the probability of a male child surviving is greater than the probability of a female child surviving.

The population was truncated according to landownership generating 347 landless households, and 654 landed households. The under 9 year-old male to female sex-ratio was 1.255 (797) for the landless households and 1.102 (907) for the landed households. Table 7 lists the variables used in the analysis and their sample means and standard deviations.

Table 7: Variable Means and Standard Deviations Landed and Landless Households, Tamil Nadu, 1993-94.

Variable	Total Mean	s.d.	Landless Mean	s.d	Landed Mean	s.d.
Total Males <9yrs.	.9785	.7857	1.0202	.7505	.9771	.8083
Total Females <9yrs.	.8768	.8437	.8127	.7769	.8869	.8747
Total Children	1.8553	.8606	1.8329	.7943	1.8639	.9084
Total Births	4.6032	2.8410	3.7003	2.2788	5.0719	2.991
Male Surv. Prob.	.4856	.3972	.5754	.4075	.4452	.3770
Female Surv. Prob.	.4272	.4268	.4644	.4511	.3989	.4132
Survival Diff.	.0584	.6639	.1110	.6992	.0463	.6373

Electricity Conn. (dummy)	.5303	.5049	.3429	.4754	.6346	.4914
Gross Income 92-93/Rs	19,095.45	32,018.25	6,942.608	2,507.167	25,389.36	39,296.55
Total Value Agri Assets/Rs	26,824.71	56,390.01	2,983.436	1,0837.5	41,062.11	67,089.4
T. Val. Non-Agri Assets/Rs	26,966.72	82,262.68	4,012.272	8,584.53	41,119.41	102,333.3
Total Landholdings/acres	3.2411	5.9680	0	0	5.3077	6.8830
Value of Landholdings/Rs	73,667.3	176,933.4	0	0	120,638.7	213,592.1
Total Wealth/Rs	146,554.2	301,602.4	13,938.32	16,577.41	228,218.5	362,558.2
Ave. Ed. Adult Males	1.2673	1.0350	.8713	.9983	1.4602	.9995
Ave. Ed. Adult Females	.5923	.8067	.4755	.7800	.6490	.8190
Male L.F.P. Ratio	.5520	.2593	.5443	.2598	.5449	.2402
Female L.F.P. Ratio	.4740	.4099	.5077	.4144	.4660	.4093
Sample Size	1,071		347		654	

(Note: Total Wealth equals Gross Income + Total Value Agric. assets + total value

Non-Agric. assets + Total Land Value.)

Source: Field Survey, 1993-5.

The variables and their expected signs are described in more detail below.

a) Landholdings

Landholdings were calculated by adding up the total land owned (in acres) outside and inside the village, irrespective of whether the type of land was wet (*Nanjai*) or

dry (*Punjai*).²¹ We have hypothesised that landholdings will decrease the survival differential. Landed households can provide more productive work and thus make girls more 'attractive' to the household by raising their implicit income potential.

b) Land Value, Total Wealth

Total land value was calculated by summing the values for the different plots of land owned by a household. Total wealth includes total land value, but also includes household gross income for 1992-93, total value of agricultural assets,²² and the total value of non-agricultural assets.²³ We expect that the value of a

²¹21. *Nanjai* and *Punjai* are old classifications used for land revenue purposes by the British. *Nanjai* was referred to as wet land, i.e. irrigated by tank, and *Punjai* was dry land. With the passage of time and the increase in well-based irrigation this classification has lost its meaning as a result of both the productivity and the value of the lands converging.

²²22. This includes the value of wells, electric pumpsets, oil engines, tractors, power tillers, sprays, traditional bullock carts, agricultural implements, plough bullocks, milch animals, sheet, goats, and others.

²³23. This includes the value of homestead land inside and outside the village, buildings inside and outside the village, business assets inside and outside the village, jewellery, and the cash balance.

household's landholdings and total wealth will increase the survival differential, and this effect will be larger in the rich group, as a result of the wealth-effect described earlier.

c) Female and Male Labour Force Participation

Labour force participation was calculated as the ratio of working men or women to the total men or women in the household, at the time the census was conducted.

We expect that female labour force participation will reduce the survival differential in poor households, but have less effect in rich households.

Rosenzweig and Schultz (1982) and Kishor (1993) have confirmed in their empirical work that female labour force participation lowers relative female mortality. Murthi et al. (1995) give five reasons why this might be the case:

- i) female labour force participation raises the returns to “investment” in girls,
- ii) it raises the status of women in society,
- iii) it lowers dowry levels,
- iv) it makes women less dependent on adult sons in old age, and
- v) it raises the bargaining power of women.

Harriss-White (1999) argues that the absence of property among the landless eliminates the problem of distribution at inheritance and that the necessary participation of landless women and girls in the wage labour force increases their relative economic status within the household over their status in households

where women do not work for wages. However, it also depends on what type of jobs women are filling. If the work requires little or no education, then increased labour force participation will give no incentive to ‘invest’ in girls. In this case, increases in labour force participation may actually increase the survival differential because the mother is not present to take care of the children, leaving other family members to look after them. Male infants are likely to be taken to work by mothers, whereas female infants are more likely to be left at home and therefore breastfed less frequently. Further, as Foster and Rosenzweig (1999) argue, female labour force participation may be complementary to a biased sex composition. As female labour force participation increases, the demand for males increases and their relative mortality falls, widening the survival differential. We expect that male labour force participation reduces the relative probability of a female surviving by raising male bargaining power and increasing the perceived expected returns from male children.

d) Education

Educational attainment was averaged across the adult household members.²⁴

Attainment was ranked from 0 to 4, where;

- 0: illiterate;
- 1: primary (up to 7 years of age) or literate without formal education;

²⁴24. Those over 18 years.

- 2: middle (up to 9) or literate with formal education (of less than 5 years);
- 3: secondary matriculation or HHS/pre-university or diploma (tech and non-tech);
- 4: graduates and above.

Education is normally associated with lowering mortality. This will be the case for poor households where we expect to find that male education increases the survival differential. Female education lowers the differential if employment prospects require it. We are led to expect, however, that female education will widen the survival differential in the rich group. An educated woman is better at controlling the mortality of her children, but also better at controlling her fertility and her family composition. Given son preference, this will increase the relative probability of a girl not surviving and thus the survival differential (Das Gupta, 1987). Further, ‘...if gender bias is lower among poorer households, it would be quite possible, in principle, to find a positive bivariate association between parental literacy and gender bias (given the positive correlation between poverty and illiteracy), even if literacy reduces gender bias at any given level of poverty.’ (Murthi et al., 1995).

So we expect the relation between the survival differential and female education to be positive in the rich group, but negative in the poor group. Male education will increase the rate of return to male children and through higher earnings will

raise their relative bargaining power. This will have the effect of raising the survival differential in both groups. Table 8 summarises the hypothesised effects on the survival differential.

Table 8: Summary of Hypotheses

Variable	Wage-Effect	Wealth-Effect
Landholdings	-	-
Land Value	n/a	+
Wealth	n/a	+
Female L. F. P.	-/+	n/a
Male L. F. P.	+	n/a
Female Education	-	+
Male Education	+	0

Note: L. F. P.= Labour Force Participation

Source: Field Survey, 1993.

Before proceeding to examine the truncated samples, a regression analysis was conducted on the whole sample. The model was estimated using total wealth instead of land value in order to make comparisons possible with the truncated samples.²⁵ Table 9 gives the results.

²⁵25. Total wealth is highly correlated with land value, but presents a more general

Table 9: Ordinary Least Squares Regression: Survival Differential Total Sample
Rural Tamil Nadu, 1993-94 with Robust Standard Errors ²⁶

Variable	S
Constant	.5296*** (.0829)
Landholdings	-.0108** (.0043)
Wealth	2.39e-07*** (7.92e-08)
Male Ed.	-.0155 (.0171)
Female Ed.	.0203 (.0211)
Male L. F. P.	-1.2159*** (.1274)
Female L. F. P.	.4273*** (.0492)
R ²	.3310

(Note: * 10 percent significance level; ** 5 percent significance level; *** 1 percent significance level; standard errors are shown in parentheses. L. F. P. = Labour Force

picture of the financial status of a household.

²⁶26. The model was tested for the presence of heteroskedasticity using the Cook-Weisberg χ^2 test; using fitted values of survival: $\chi^2(1)=16.81[0.0000]$. It was found that the null hypothesis of homoskedasticity was rejected at the 5 percent level (using Best Linear Unbiased Estimators), therefore the model was run using robust standard errors.

Participation. Ed.= education).

Source: Field Survey, 1993.

The landholdings coefficient is consistent with the idea that landed households can provide more on-farm, non-wage, work opportunities for girls and women which make them valued. *Increases in wealth are associated with an exacerbation of the survival differential.* Richer households discriminate more against girls than poorer households. This is explained by the wealth-effect, where, in richer households, the transfer of wealth across generations plays an important role in determining the direction and quantity of household resources allocated to different members.

The coefficients on the education variables were not statistically significant. However, the sign on the female coefficient suggests that a *rise in the average education of the adult females in a household exacerbates the survival differential.* Das Gupta (1987) also found this for Punjab. This supports the possibility of a positive relationship between education and gender bias (Murthi et al. 1995). The sign on the male coefficient suggests that a rise in male educational attainment reduces the survival differential. This contradicts our hypothesis, but has potentially positive implications if we extrapolate from this cross-section data to over time.

The coefficients on male and female labour force participation are both statistically significant. Male labour force participation reduces the survival differential between boy and girls, which contradicts our *a priori* expectation. It might be the case that, with most men working, the mother gives more direct care to her children. But the result might also have been a spurious product of seasonal fluctuations in the data. Tamil Nadu is a state where female status was relatively high. If this has changed, it may be women, rather than men, who are driving it. Female labour force participation results in the survival differential increasing. As was theorised earlier, increased participation in the labour market will reduce a woman's time at home and this might adversely affect the survival chances of her female children more than those of her male children. Mothers may also be more likely to engage in wage-work if they have only daughters, whereas they may stay at home, or take the child with them, if they have sons. Daughters do the domestic work and it may be thought that they can take care of themselves, whereas a 'valuable' son cannot be left on his own. Alternatively, our findings provide support for the Foster and Rosenzweig (1999) hypothesis that the role of the female is complementary to the role of the son in an agricultural household. However, without further evidence and disaggregation it is not possible to distinguish between the effects of an increase in female mortality or a decrease in male mortality.

Running the same regression on landless and landed households separately gives

the results shown in Table 10.

Table 10: Comparison of OLS Results on Landless and Landed Households, Tamil Nadu, 1993-94.

Variable	S landless	S landed	S total
Constant	.5618*** (.0946)	.6101*** (.0681)	.5296*** (.0829)
Total Landholdings	n/a	-.00988** (.0050)	-.0108** (.0043)
Wealth	-3.69e-06* (1.94e-06)	2.64e-07*** (9.64e-08)	2.39e-07*** (7.92e-08)
Male L. F. P.	-1.2112*** (.1224)	-1.3586*** (.0845)	-1.2159*** (.1274)
Female L. F. P.	.4518*** (.0782)	.4053*** (.0501)	.4273*** (.0492)
Male Ed.	.0211 (.0320)	-.0216 (.0208)	-.0115 (.0171)
Female Ed.	.0254 (.0414)	.0173 (.0248)	.0203 (.0211)
R ²	.3031	.3598	.3310
Sample Size	347	654	1,071

Source: Field Survey, 1993.

The most striking result is the different effect that wealth has in both sub-samples. *Total wealth **reduces** the survival differential in landless households, but **increases** the survival differential in landed households.* This supports the contention that *prosperity reduces the life chances of girls only when this prosperity is in the form of land or other property.* Since the wealth of an agricultural household lies predominantly in the value of its land, then the direction and way this land is transferred across generations are on the way to being significant factors in determining the optimum sex composition of households so that the economic status of the family is maintained or increased.

The education coefficients were not found to be statistically different between the sub-samples. This may have been caused by the high variance and low precision of the education coefficients, which increase the probability of committing a type II error: failing to reject the null hypothesis when there is actually a significant difference in the values. Nor were the coefficients on female labour force participation statistically significant. On the face of it though, the difference suggests that labour force participation by landless females exacerbates the survival differential more than participation by landed females does. This might be due to the fact that the wage labour undertaken by landless females is not education-intensive and hence does not signal a greater return to female children. The only effect increased participation has is to lower the attentiveness of mothers

to female children.²⁷

We hope to have shown the determinants of excess female mortality rate in these villages. Class position is therefore inversely related to the female mortality rate here. Different strata of a population need looking at separately, rather than in one large sample. Only through a stratified analysis can the roles of material factors in the differential allocation of resources be distinguished and this, in turn, may fine-tune policies intended to remove gender bias.

So What for Policy?

Excess female mortality is a product of both poverty and of wealth. There is a dichotomy in explanations for the apparent gender bias: economic and cultural. There are also two opposing economic effects, one due to the labour market and the other to asset-transfers. Our theoretical model has it that the poor and landless evaluate the gender of their children according to the returns from the labour

²⁷27. However, there is the possibility of a sample selection bias in our population as a result of endogeneity. There may be a correlation between the characteristics that influence the mortality rate and our explanatory variables. It is plausible that the gender composition of a household itself influences the wealth accumulation and landholding strategies in a family, as Browning and Subramanian (1994) argue.

market, as opposed to the rich and landed, whose logic follows from the transfer of wealth. In a society where wealth flows patrilineally, as here, the effect of an increase of wealth for a family is to encourage greater gender bias.

Factors motivating the life decisions of landed and landless households differ significantly. A structural break in the data between poor landless and rich landed households was confirmed using the Chow test. Failing to truncate a population when examining survival differentials will result in a mis-specification error and possibly biased estimates.²⁸

We nevertheless found the following:

- (i) Landownership is reducing the survival differential of children but at a diminishing rate. It has the greatest equalising impact in households with little land.
- (ii) Wealth increases the survival differential of children for rich landed households, but reduces it in poor landless households.

²⁸28. Certainly in India one has to be cautious with birth figures, in view of the gender bias. Further, using cross-sectional data raises problems with heteroskedasticity. This was accounted for using heteroskedasticity consistent standard errors, but we might be interested in the actual pattern and location of the heteroskedasticity.

Our results are consistent with those of the 2001 All-India Census where the juvenile (under 10) and child (under 7) sex ratios - female to male - have registered the most staggering declines in the wealthiest states and most developed districts of North India (Premi, 2001) ²⁹

The Tamil Nadu Government has reacted in two ways to public outcry over the practice of gender cleansing. First, it set up a Protection Scheme for the Girl Child, whereby couples with one or more daughters get financial benefits if they are sterilised (Harriss-White 1999). Second, it has established a 'Cradle Baby Scheme', about which Basu reports:

...cradles have been placed outside selected primary health centres for parents to deposit unwanted girls for adoption, and [this] seems to be meeting with some success. The government has also announced a 1 percent reservation in jobs for these 'cradle babies' when they grow up; while this may be a meaningless provision, the

²⁹29. The child sex ratios of Punjab, Haryana, Delhi and Himachal Pradesh have dropped from 875 ; 879 ; 915 and 951 in 1991 to 793 ; 820 ; 865 and 897 respectively in 2001 (Census of India, 2001, pp 92, 94, quoted in Premi, 2001, p1876).

publicity it generates may be useful. Basu (1999)

However well intended, these schemes only attempt to address the *symptoms*, without altering *the causes* of excess female mortality. The status of women must be altered if excess female mortality is to be halted and reversed. India's policies to reduce the gender imbalance have largely been superficial. This is not for lack of laws and acts, but for lack of enforcement.

So we argue for the *enforcement of the Dowry Act* and the strict *regulation of amniocentesis*. Pending that, civil society stirs, in the forms of social movements and projects by non-governmental organisation, with activities ranging from versions of travelling folk theatre (*kalai payanam*) replete with local idiom and local activists, through village debates about the ideology of patriarchy to individual counselling of mothers and adolescent girls (Athreya and Chunkath, 1996,1998). There is also room for the media shaming of the men of wealthy culling castes and classes. Such responses are generally made by dedicated individuals. They are aimed at both symptoms and causes; but they are drops in the ocean. *These demographic changes are a form of demographic 'structural adjustment' without precedent*. Any incentive or any movement to counter the social relations enforcing the combination of dowry and marriage patterns featuring consanguinity (to keep property within a tight circle of kin), exogamy (in which a bride's contact with her natal family - and her support - is minimised),

and hypergamy (in which dowry compensates for the lower (sub)caste status of the bride) needs much more formidable backing - politically and culturally - than is currently available.

Indian development might draw investment away from land into more liquid forms, so that wealth and its transfer become less associated with males. More fundamentally, the role of patriarchy, the pattern of marriage and residence, and the perception of females in society needs to change. Employment opportunities for females that require skills and take them out of their homes should be encouraged. This will raise the potential economic contribution women can make, and raise their bargaining power, their organising power and their self-confidence. The dowry, which can be seen as a compensating payment for an economically unproductive person, will then become of less importance as women become more independent and economically valuable.

The social and cultural structure of Indian society influences the economic strategies pursued by households. The result of this structure, in combination with economic development, has been to increase female mortality as more families extend their strategies to cover the transfer of wealth across generations. This research has shown that culture influences economic decisions. The question remains whether economic policy can influence the cultural fabric of Indian society, and mitigate the evil of excess female mortality based on the idea or the

‘ideal’ of female subordination, one D H Lawrence would have found as abhorrent as we do.

ACKNOWLEDGEMENTS

We are grateful to Judith Heyer, S. Janakarajan, K. Nagaraj, Jean Sargent, Rajesh Venugopal and the MIDS Jubilee conference participants for their help and constructive discussions.