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Female Infanticide in Rural South India

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Infanticide has been practiced in all continents, but little dependable primary data exist on this subject. Presented here are the findings on female infanticide for a rural, south Indian population. These data were collected as part of a major four-year field study on child growth and survival in a population group numbering 13,000 and have been confirmed directly with the families concerned. Female infanticide is practiced in only 6 of the 12 study villages affecting about 10 percent of newborn girls. Reported here are the demographic consequences and social factors associated with them. Seventy-two percent of all female deaths were due to feticide and misclassification of these deaths would grossly distort the significant child survival achieved by this population.

Among humans, infanticide is a longstanding and widespread practice [1]. The study of infanticide among humans - its motivations, methods and determinants - has a long history extending from the commentaries of early travelers to contemporary field work-based studies. However, long-term scholarly interest in the subject and decades of intensive anthropological field work on the related topics of household formation, birth practices and child care yield surprisingly little dependable information on infanticide, especially direct infanticide. It is difficult to obtain firsthand, carefully confirmed data on infanticide cases and the social variables related to it, in quantities sufficient to allow theory testing.

Absence of information on direct or indirect infanticide in a given study does not necessarily mean that such practices are non-existent. The researchers simply may have overlooked them, intentionally or unintentionally. Several reasons explain scholarly inattention to infanticide. Most important, there is the problem of gathering enough data on direct or indirect infanticide through a brief field trip. Even in a large study population (of over a thousand, for instance), the number of infanticides that might occur is small. For example, Sargent, who has written an insightful study of witchcraft and infanticide in a West African population, learned of five cases of infanticide during her field trip of 1976-77 [2]. In addition to the problem of small numbers of cases, the subject of infanticide

bears a certain amount of stigma for both the population concerned and the anthropologist who studies it.

Therefore, most anthropological studies, particularly of deliberate and direct infanticide, rely on inferential evidence; largely secondhand reports from inform ants who inform the anthropologist of infanticides they have heard about [3]. In such local studies of direct infanticide, the numbers of reported cases are still quite small, thus limiting theory testing and analysis. For instance, in their study of the Tarahumara of Mexico, Mull and Mull interviewed 20 women regarding their knowledge of infanticide [4] They found that 95 percent of the women knew of at least one case of infanticide when the mother had no husband or had 'too many children'. 55 percent know of at least one case of infanticide of a 'damaged' child, and 10 percent knew of at least one case in which a sickly infant had been killed. All the women questioned knew of at least one such circumstance. Due to the limitations of their data, Mull and Mull could provide little insight beyond, this basic information on people's knowledge of various instances of infanticide, the methods used and some anecdotes. Bugos and McCarthy's study of infanticide among the Ayoreo, a tribal population of southwestern Bolivia, involves a more quantitative approach [5]. Their field work, conducted from January 1980 to March 1981, provides information on many more cases of infanticide than they discuss since they limit their study to 'well-documented cases in which the mother was a party to the decision to kill the child... and to only those cases in which the sex of the infanticide victim is known [6]'. They are concerned mainly with the reasons for infanticide and their analysis reveals two general patterns: infanticides due to the condition of the mother or infant, and infanticides due to uncertain social or physical factors (such as being resettled on a reservation). Analysis of the marital histories of the mothers involved reveals the overarching importance of marital instability.

Larger state-level populations can be studied through archival data, such as parish records or early censuses [7]. But this strategy is constrained by the necessity of having to infer infanticide from the data and the lack of firsthand observational insights on related aspects of the society under consideration [8].

A contemporary analysis of official statistics on infanticide cases in Canada, on the other hand, provides direct and confirmed evidence in 148 cases for 1961-1979 [9]. But like the historical/census-based studies, this one is limited in its ability to provide an understanding of the social context and motivations. The authors are removed from the people who committed the infanticide; they cannot interview them and must instead infer motivations on the basis of the

social/cultural data available, such as age and sex of the victim, age and sex of the person who killed the infant and her/his relationship to the infant.

In an extensive informant-based study of infanticide, Nutini examines 250 cases of infanticide in an area of rural Mexico, which are proven and confirmed on the basis of detailed interviews [10]. Many of the cases in the study occurred while Nutini was in the field, but others are included on the basis of recall and their details are thus not as reliable as the others. His detailed research on infanticide is possible because of his long-term residence in the area (every summer over the past 30 years), widespread social networks, and rapport with the people of several villages. The data reveal a complex pattern of witchcraft beliefs as ideological justification for the infant deaths, and social patterning of the victims whereby high parity children are killed, girls more frequently than boy's in recent times.

Study Area and Population

The larger study, of which the infanticide data constitute one part, was conducted in a rural area in the South Indian state of Tamil Nadu. The research was carried out in 12 villages of K.V Kuppam block, North Arcot Ambedkar district, Tamil Nadu state, south India, for four years beginning September 1986 [11]. The 12 study villages are noncontiguous, scattered in the peripheral areas of K.V. Kuppam block. Most villagers are Hindus, and small proportions are Christian converts. While villages in the study area differ slightly from each other in their caste composition, the average distribution is 56 percent Gounders, 31 percent Harijans, 11 percent Other Backward Castes; and 2 percent Forward Castes [12]. Sixty percent of the mothers in the study are illiterate.

Socio-culturally, the study area is Dravidian, a term which implies - in addition to language, distinct features of marriage, intrahousehold dynamics, female status and other practices, in comparison to non-Dravidian north India [13]. Most notably, characterizations of Dravidian socio-cultural dynamics emphasize consanguineous marriages, sometimes between uncle and niece, first cousins or more extended kin relations within the same village or micro-region [14], relatively equal treatment of sons and daughters in terms of food and medical care, and relatively high status of adult women within the household vis-à-vis males in the same household. Literacy rates of women are higher in the south than the north and currently all new teachers in government primary schools in Tamil Nadu must be women. Fertility rates tend to be lower in the south than the north [15]. The Tamil Nadu state government has instituted special monetary

incentives for marriages of girls above the age of 18 years who have completed the 8th standard. Sex ratios (both for the juvenile and total populations) in recent decades have been near equal at the district level [16].

None of this however should be taken to imply that gender equality prevails in south India. Instead, one should realize that gender inequality exists, but is less extreme than in India's northwest. Furthermore, it should be remembered that this typification is drawn in very general comparison to the more patriarchal north-west and should not be assumed to apply to all contexts in the south where considerable variation from the general pattern can be found within a region, village or even family.

The data on female infanticide were gathered as a part of prospective study carried out between 1 April 1987 and 30 September 1989. All pregnancies in the 13,000 population during this period were followed. The study includes a total of 773 birth outcomes involving 772 married women and one unmarried woman. There were 766 singletons and seven sets of twins. Total live births were 759 of which 378 were male and 381 female. The observed sex ratio at birth is not significantly different (at $p=0.05$) from the standard sex ratio at birth of 105 males to 100 females observed in large populations worldwide. Of the 21 stillbirths, 8 were male and 13 female.

Each village had an assigned village-level worker whose primary function was to provide education about childcare to village mothers. The worker in all cases was a local resident of the village and had been trained at RUHSA (Rural Unit for Health and Social Affairs headquartered in Kavanur village). The village worker's normal duties included keeping track of reproductive events among the entire village population, a task which was accomplished through visiting each home every 10 to 12 days. Every house in which an infant is born is visited within two days of the birth. Such regular home visiting generates high quality household demographic data since no pregnancy and its birth outcome can be overlooked by the health workers.

The fact that an infanticide has been committed is widely discussed among the village women. To the outsider, however, the cause of death is misreported. The village worker, though, is from the same village and is aware of the possibility of infanticide. This is confirmed with the mother and immediate relatives. After about five months following the establishment of excellent rapport with the study families, in many cases the field team had knowledge of the intent of infanticide even before the birth occurred. The father or other family members

would tell the village worker that if the current pregnancy resulted in the birth of a female, it would be killed.

The infanticide data on which this paper is based, therefore, are unusually dependable. The reported number of cases is a conservative estimate. At least three other female infant deaths during the period are likely to have been infanticides, and unconfirmed female infanticide may account for the disproportionate number of females (13 out of 21) reported as stillbirths (infanticide at birth may be misreported as 'Sevappu'- blue baby syndrome or as a stillbirth). These deaths are probable, but not certain infanticides and thus they are not included in this study as infanticides. Also not included are female infanticides that occurred before the reference period or subsequently [17].

Other information gathered concerns the village in which the infanticide occurred; caste of the household in which the infanticide occurred; age, sex and birth order of the reference infant; twinship status of the reference infant; and marital status of the mother. The following discussion reports on the analysis of these variables in relation to the cases of female infanticide.

Patterns of Infanticide

In the study population of 13,000 there were a total of 773 birth outcomes recorded, involving 759 live births of which 378 were male and 381 female. Among the cohort of live born infants. 56 died in the period of two and a half years (from 1 April 1987 to 30 September 1989), and of these there were 23 males and 33 females, Thus the male to female mortality ratio was about 3:4, a very low ratio compared to worldwide statistics for societies where gender bias towards infants is not significant, which indicate slightly higher male mortality in infancy and early childhood due to the biological higher vulnerability of boys.

Of these deaths, 19 were confirmed infanticides. In other words, of the total 56 deaths, more than one-third were confirmed infanticides. There was no infanticide among the 23 male deaths. Among the 33 female deaths, there were 19 infanticides. Thus more than half the female deaths in the 12 study villages were direct infanticides. In the six villages in which all the infanticides occurred, infanticides constitute 72 percent of female deaths (excluding the only case of the female infanticide in which the mother was unmarried). Thus, the `natural' death rate in this area for female infants is substantially increased through the practice of direct infanticide [18]. Using the infant deaths of the two one-year cohort (obtained by following each year's cohort prospectively for one year), an infant

mortality rate (IMR, deaths per 1,000 live births) of 69 was obtained for the whole study population: if we subtract the deaths due to female infanticide, the IMR drops to 46 In other words, in the six villages where the practice is prevalent, female infanticides constitute 9.7 percent of all female births.

There were only female infanticides during the study period. However, one case of male infanticide had occurred just before the beginning of the study period (February 1987), where the mother lost her husband and killed the male child soon after birth, after which the mother remarried. The unwed mother, on the other hand, unsuccessfully tried to abort the pregnancy, and then killed the baby girl when it was born. Maternal motivations for infanticide may therefore be said to vary on the basis of marital status (the mother's motivations, in turn, are likely to be influenced by her natal family and their concern for loss of status). It is likely that, no matter what the infant's gender, an unmarried or a newly married mother who becomes widowed may be impelled to commit infanticide. Unwed motherhood as a motivation for infanticide had been documented in early Europe [19] and contemporary Canada [20]. Another case of male infanticide occurred after the study period, where the child suffered from a severe congenital anomaly. Despite corrective surgery and post-operative care (free of cost) for over two months, the child was killed day it was taken home.

The prevalence of female infanticide in the study villages corresponds with a report of gender-specific infanticide in a nearby population, the Kallars of Madurai district [21]. The Kallars in this district are small holding farmers and landless agricultural laborers who sometimes resort to poisoning second-born and subsequent daughters. According to local hospital staff estimates reported in the article, a very high percentage of female infants are victims of infanticide. The statistics are shocking. Nearly 600 female births in the Kallar group are recorded in the Usilampatti government hospital every year. Of these, an estimated 570 babies vanish with their mothers.... Hospital sources estimate that nearly 80 percent of these vanishing babies - more than 450 - become victims of infanticide [22].

This implies that, within the subgroup discussed, about 70 percent (450 out of 570) of infant girls fall prey to infanticide. Such a high percentage merits careful local investigations for confirmation, but is not beyond the realm of possibility given historical data on similarly high rates in north-west India during the 19th century [23] and the pattern reported for a region of contemporary Rajasthan in which very few girls are kept alive [24].

In terms of the possible historic roots of female infanticide (direct or indirect) in south India, we can only speculate about the Kallar practice [25] or what the present study shows for K V Kuppam block, though the PR's field conversations revealed a pattern which is at least several generations old. Adding weight to the possibility that the practice is longstanding are some references to female infanticide in south India in the 1800s among the Kallars, Khonds, and Todas [26]. It is possible, therefore, that the contemporary situation has antecedents far back in time, but attempts at more detailed historical reconstruction have yet to be made.

One of the more interesting and perplexing results of this analysis is the clearly demarcated village clustering of female infanticide cases. All 19 cases of female infanticide occurred in six of the study villages, which are in the same part of the block; there were no cases in the other six villages. Overall (all ages combined) sex ratios confirm the pervasiveness of this pattern and its effects on village demographics. In the 12-village study population, the overall sex ratio (females per males) at the time of the study was 977.5. In the villages where female infanticide was practiced, the sex ratio was 939.8, while in the other villages it was 1018.6. Sex ratios in the under-five age group also reflect this differential distribution, with a surplus of boys in the former villages and a surplus of girls in the latter at all times during four years. Also, the PR observed instances of deliberate female neglect more frequently in the former than in the latter villages.

The villages in which female infanticide occurs tend to be remote with less educated populations than villages with no cases of female infanticide. They are located in a hilly and more isolated part of the block and cut off from outside influences more notably than the non-infanticide villages. Of the six infanticide villages, only two have a bus service, while all but one of the other six villages, have a bus service.

The caste composition of the villages with the female infanticide cases differs from the other villages in that they are predominantly Gounder, with lower proportions of the other caste groups. Of the 18 cases of female infanticide (of married mothers), 17 were among the Gounders. The remaining one case occurred among the Arunthatis (cobblers), a scheduled caste [27]. Like Gounders, Arunthatis, are highly consanguineous groups. No cases occurred among the Harijans. Consanguineous marriages are common in this area. Most frequent are marriages between uncle and niece, and first and second cousins. In the six villages where female infanticide occurs, rates of consanguinity are much higher (almost 65 percent of the families) than in the non-infanticide villages (about 40 percent of the families). Specifically, uncle-niece marriages form six percent of

marriages in the non-infanticide villages as compared to 11.2 percent in the infanticide villages. The significance of this correlation has yet to be explained, since it involves a very different kinship dynamic than that operating in northwest India where female infanticide is clearly associated with hypergamy and extensive exogamy.

Another distinguishing feature of the villages where female infanticide occurred is that they are also villages in which all the twins were born; over the entire study period, no twins were born in the other villages [28]. As in many other cultural contexts, the chances of a female twin dying through direct or indirect infanticide, in either a male-female or female-female sex, are very high [29]. In this study area, none of the twins died as a result of direct infanticide, but the senior author is aware that a female twin may be more subject to neglect than a male twin, and a female infant born after a set of twins is very likely to be killed.

The age at which death occurred is predominantly very young. Seventeen of the 19 female infanticides occurred within seven days of birth, one on the ninth day after birth, and the remaining one on the 16th day. In the entire study population, there were a total of 18 female infant deaths during the first seven days after birth, of which 17 were confirmed infanticides (the single non-infanticide death was due to prematurity of the infant). Thus, the first week of life is extremely risky for female infants, but not because of 'natural' causes.

Notably, only one female infanticide, (by a married mother) involved a first-born daughter. All the other victims had birth orders greater than one, and each of these families had at least one surviving female child at the time, and usually they had two. This pattern corresponds to the well-known parity-specific practice of female child neglect in northwest India that seems to protect and preserve first-born daughters but discriminates against higher parity daughters [30]. Discrimination in child treatment based on the child's gender interacting with birth order has also been documented in Tokugawa, Japan [31].

Although the Gounders involved in female infanticide live in remote villages, they comprise the upper social stratum of their villages. In fact, Gounders own a significant proportion of the land in North and South Arcot districts. To assert that, relatively speaking, the Gounders are well off does not mean that they do not feel economic pressures when it comes to raising daughters. As in northwest India, it is precisely the costs of raising daughters according to upper class rules that create severe constraints on household finances.

Excess Female Mortality

The data on 12 south Indian villages discussed here unequivocally show that female infanticide greatly increases the area's female infant mortality level. Indeed, if one were seeking to explain high rates of infant mortality in this region, ignoring the role of direct female infanticide would entail overlooking the cause for the majority of female infant deaths.

The results of this study challenge concepts about the benefits of rural socio-economic development and biomedically-oriented health care programs. First, the research suggests that the villages in which female infanticides occurred are less 'developed' in terms of urban linkages, services and education than the non-infanticide villages. Although one cannot assume that by simply bringing 'development' to the more remote and less 'developed' villages would necessarily bring about an immediate reduction in female infanticide, this is a possibility that should be further investigated. It is unlikely, however, that 'development' by itself would be sufficient in the short run, since it has been found that, with increased resources, people who favor sons over daughters follow a pattern of diverting more resources to sons than to daughters. Second, a simple biomedical approach to improved infant mortality rates in the area would have only a small effect in changing the 'unwanted' status of certain daughters. A holistic approach is required for changing such a complex system of values performing to girls and women, and an extensive study of the underlying social dynamics in this micro-region (such as marriage payments, marriage links among villages, women's economic opportunities, etc.) would be helpful in constructing policies necessary to reduce female infanticide.

In terms of public health involvement, the intensive home visitation system combined with carefully maintained household-by-household birth records, has proved to be effective elsewhere in India [32], in reducing deaths of unwanted daughters and promoting pregnancy planning to prevent future unwanted births. Also related, and on the positive side, is the recent decline in fertility rates in the area 33, a possible indication that fewer babies are becoming victims of infanticide. The option of sterilization for women who have obtained the desired number and gender composition in their offspring may significantly reduce the number of unwanted female births. Other government policies related to raising the status of women may also have a beneficial impact: scholarships for women students, special emphasis on women in poverty alleviation programs, reservations (reserved slots) in local community organizations for women, and special care for widows. One recent indication of Tamil women's relatively high

status and position, even in the public domain, is their use of voting power to have prohibition reinstated.

This study of a south Indian population is a positive step forward in that it provides information that can be useful to planners in many different fields of effort. As a recent note in the newsletter Safe Motherhood comments, 'Such measures can only be successful if better data - separate information about girls' and boys' mortality rates, for instance - are available to planners of health and education. Girls are the future of all nations, so it is high time the scales were balanced [34]

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Notes

1. See reviews in Mildred Dickemann, 'Demographic Consequences of Infanticide in Man', Annual Review of Ecology, and Systematic, Vol. 6, 1975, pp. 107-37; Barbara D Miller, The Endangered Sex Neglect of Female Children in Rural North India (Ithaca, NY, Cornell University Press, 1981, Ch.2); Susan C M Scrimshaw, 'Infanticide in Human Populations: Societal and Individual Concerns' in Glenn Hausfater and Sarah Blaffer Hardy (eds), Infanticide: Comparative and Evolutionary Approaches (Aldine Publishing Company, Hawthorne, NY, 1984, pp. 439-62); and Sheila Johansson, 'Delayed Infanticide in Glenn Hausfater and Sarah Blaffer Hardy (eds.), Infanticide: Comparative and Evolutionary Approaches, (Aldine Publishing Company, Hawthorne, NY, 1984, pp. 463-85).

2. Carolyn Sargent, 'Born to Die: Witchcraft and Infanticide in Bariba Culture'. Ethnology, Vol. 27, 1988, pp. 79-95.

3. The literature on indirect infanticide (which results mainly from lack of food, medical care, and other kinds of life-supporting attention to an infant) is relatively abundant and based more on firsthand evidence of intra-household discrimination. For example, on north India: B D Miller (see n. I): on Bangladesh, Stan D'Souza and Lincoln C Chen, 'Sex Differentials in Mortality in Bangladesh', Population and Development Review, Vol. 6, 1980, pp. 257-70; Lincoln C Chen, Emdadul Huq and Stan D'Souza, 'Sex Bias in the Family Allocation of Food and

Health Care in Rural Bangladesh', Population and Development Review Vol. 7, 1981 pp. 55-70; on pre-20th century Europe: Johansson (see n. 1); and on 19th century America: E A Hammel, Sheila R Johansson, and Caren A Ginsburg, 'The Value of Children during Industrialization; Sex Ratios in Childhood in Nineteenth-Century America', Journal of Family History, Vol. 8, 1983, pp. 346-66.

4. Dorothy S Mull and J Dennis Mull, 'Infanticide among the Tarahunara of the Mexican Sierra Madre' in Nancy Scheper-Hughes (ed.), Child Survival: Anthropological Perspectives on the Treatment and Maltreatment of Children (Boston, D Reidel, 1987, pp. 11 3-32).

5. Paul E Bugos, Jr. and Lorraine M McCarthy, 'Ayoreo Infanticide: A Case Study' in Glenn Hausfater and Sarah Blaffer Hardy (eds.), Infanticide: Comparative and Evolutionary Approaches.

6. Ibid. p 519.

7. See, for example, G William Skinner. 'Infanticide as Family Planning in Tokugawa Japan', paper prepared for the Stanford Berkeley Colloquium in Historical Demography, San Fransciso, 1984, and 'Conjugal Power in Tokugawa Families: A Matter of Life and Death' in Barbara D Miller (ed.), Sex and Gender Hierarchies, New York, Cambridge University Press, forthcoming; R Sauer, 'Infanticide and Abortion in Nineteenth-Century Britain, 'Population Studies, Vol. 32, 1978, pp. 81-93; R Trexler, 'Infanticide in Florence: New Sources and First Results', History of Childhood Quarterly, Vol. 1, 1973, pp. 98-116; Josiah Cox Russell, The Control of Late Ancient and Medieval Population, The American Philosophical Society, Philadelphia, 1985: Regins Schulte, 'Infanticide in Rural Bavaria in the Nineteenth Century in Hans Medick and David Warren Sabean (eds.), Interest and Emotion; Essays on the Study of Family and Kinship, Cambridge University Press, New York, 1988, pp. 77-102; and Linda Gail Arrigo, 'Female Infanticide and Social Stratification in Republican China: New Perspectives from the Book Survey of Farm Families', paper presented at the Western Conference on the Association for Asian Studies, California State University, Long Beach, 1985.

8. Anthropologist G W Skinner is an exception since he has undertaken fieldwork in contemporary Japan to complement his analyses of archival data on the Tokugawa period.

9. Martin Daly and Margo Wilson, 'A Socio-biological Analysis of Human Infanticide' in Glenn Hausfater and Sarah Blaffer Hardy (eds.), Infanticide: Comparative and Evolutionary, Perspectives.

10. Hugo G Nutini, 'Traditional and Contemporary Configuration of Infanticide in the Tlaxcala-Pueblan Valley, Mexico' in Hector Correa (ed.), A Comparative View of the Ethical, Social and Technological Aspects of Unwanted Pregnancies and Their Outcomes, Praeger, forthcoming.

11. Sabu George gathered the data on female infanticide as an incidental part of his study of infant and child growth and survival patterns. During his first six months in the field, he noticed several cases of female infanticide and therefore felt the need to study this subject. The data reported here, therefore, are dated from April 1987 rather than from September 1986 when he first arrived. It should be remembered that, while his initial purpose was not to study infanticide, it was necessary to do so because these deaths are not amenable to prevention by the usual health and nutrition education strategies and thus present a special challenge to child survival programs.

12. For information on the meaning of the terms Other Backward Castes and Forward Castes, see Marc Galanter, Competing Equalities, Law and the Backward Classes in India, University of California Press, Barkeley, 1984.

13. See the classic work by Irawati Karve, Kinship Organization in India (Asia Publishing House, New York, 1968) and more recent studies: David E Sopher, 'The Geographic Patterning of Culture in India' in David E Sopher (ed.). An Exploration of India: Geographical Perspectives on Society and Culture (Cornell University Press, Ithaca, NY, 1980, pp. 289-326); Miller (see n. 1); Tim Dyson and Mick Moore, 'On Kinship Structure, Female Autonomy, and Demographic Behavior in India', Population and Development Review, Vol. 9, 1983, pp. 35-60.

14. See, for example, Rao, P S S 'Inbreeding in Various Religious and Social Groups in South India', Human Genetics and Adaptation, Vol. 1, 1982, pp. 15-3 1.

15. Dyson and Moore (see n.14).

16. Barbara D Miller, 'Changing Patterns of Juvenile Sex Ratios in Rural India, 1961-1971', Economic and Political Weekly, 3 June 1989, pp. 1229-36.

17. Some mothers whose children were victims of female infanticide during the reference period were known to have had their next female child, born after 30 September 1989, also die from infanticide.

18. The reader should recall that, in addition to the cases of confirmed direct infanticide, other female infant deaths might have been direct infanticides (not confirmed) or indirect infanticides brought about through nutritional or medical neglect.

19. Maria W Piers, Infanticide (W W Norton and Company, New York, 1978).

20. Daly and Wilson (see n. 9).

21. India Today, 'Born to Die', 15 June 1986, pp. 10-1 7.

22. Ibid, p. 13.

23. Kanti Pakrasi, 'Effect of Infanticide on Sex Ratio in an Indian Population', Zeitschrift fur Morphologns and Anthropologie, Vol. 62,1970, pp. 214-30; K B Pakrasi and B Sasmal, 'Infanticide and Variation of Sex Ratio in a Caste Population of India', Acta Medica Atixologica (Italy), Vol. 9, 1971, pp. 217-28; Mildred Dickemann, 'Female Infanticide. Reproductive Strategies and Social Stratification' in N A Chignon and W Irons (eds.), Evolutionary Biology and Human Social Behavior: An 'Anthropological Perspective', Dulbury Press. North Scituate, Massachusetts, 1979, pp. 321-367; Miller (see n. 1, ch. 3), and Alice Clark, 'Limitations on Female Life Chances in Rural Central Gujarat', The Indian Economic and Social History Review, Vol. 20, 1983, pp. 1-25.

24. India Today, 'Rajasthan: A Murderous Tradition', Vol. 13, 1988, pp. 22-24.

25. See India Today (n. 21).

26. Edgar Thurston. Ethnographic Notes in Southern India, Delhi, Cosmo Publications, 1975 [1907].

27. The mother involved in this case is known to have done away with her subsequent female infant born after 30 September 1989.

28. The villages where the twins were born are known throughout the area for having a high rate of twinship. For related research, see A H Bittles, A Radha Rama Devi, and N Appaji Rao, 'Consanguinity, Twinning and Secondary Sex Ratio in the Population of Karnataka, South India', Annals of Human Biology, Vol. 15, 1988, pp. 455-60.

29. See Gary Granzberg, 'Twin Infanticide: A cross-cultural Test of a Materialist Hypothesis', Ethos, Vol. 4, 1973, pp. 405-512; and Susan McGeorge, 'Twinning in Tlaxcala, Mexico', unpublished Ph D dissertation, Department of Anthropology, University of Pittsburgh, 1991.

30. Miller (see n. 1, pp. 104-05); Betty Cowan and Jasbir Dhanos. 'The Prevention of Toddler Malnutrition by Home-Based Nutrition Education' in D S McLaren (ed.), Nutrition in the Community: A Critical Look at Nutrition Policy, Planning, and Programs (John Wiley and Sons, New York, 1983, pp. 339-56); and Monica Das Gupta, 'Selective Discrimination against Female Children in India', Population and Development Review, Vol. 13, 1987, pp. 77-100.

31. Skinner (see n. 7).

32. For a discussion of Ludhiana CMC's approach, see Barbara D Miller, 'Female Infanticide and Female Child Neglect in Rural North India' in Nancy Scheper-Hugbes (ed.), Child Survival: Anthropological Perspectives on the Treatment and Maltreatment of Children, D Reidel, Boston, 1987, pp. 95-112.

33. Shireen J Jejeehboy, 'Women's Status and Fertility; Successive cross-sectional Evidence from Tamil Nadu, India', Studies in Family Planning, Vol. 22, 1991, pp. 217-30.

34. `Girls Matter Too', The Lancet, 1991, 2, p. 813.