

FEMALE EQUALITY AND SUICIDE IN THE INDIAN STATES

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Summary.—Indian suicide rates rose by 76% in the 10 years between 1984 and 1994. In this study of the 16 principal states of India, male and female suicide rates in 1994 were associated with measures of equal education for men and women. Male suicide rates were associated with equal life expectancy for men and women. Equal income for women and men was not associated with suicide rates. Unlike earlier studies, no inverse association was found between equal attainment in education and suicide sex ratios. The Indian findings thus do not conform to patterns found in more developed economies. Given increasing human development in India, it seems probable that suicide rates in that country may increase two to three times over coming decades.

The tendency for higher suicide rates to be associated with increased equality of opportunity for women has been shown in several studies. Lester (1996a, p. 88) has shown using cross-national data for the 1960s and 1970s that equality in education and economic attainment for women were associated with higher suicide rates. Increasing economic equality was associated with higher female to male suicide ratios. Stack and Danigelis, in a study of 45 nations, found that modernization was associated with lower suicide sex ratios, which in turn largely reflected higher female suicide rates (Stack & Danigelis, 1985). Hassan and Tan, in a replication of the study of Stack and Danigelis using Australian data, report both rise and fall over time in female suicide rates during a period when opportunities for women were becoming more similar to those of men (Hassan & Tan, 1992). In a comparison of 37 nations, a component of the United Nations Development Programme's "Human Development Index"—the "Life Expectancy Index"—showed a significant negative correlation with male suicide rates (Mayer, 2000b, p. 369). A second measure, the "Gender Empowerment Measure," was significantly correlated with both male and female suicide rates for the 26 nations for which data were available (Mayer, 2000b, p. 371).

There has been little study of the effect of increasing equality for women on suicide in developing countries and none, apparently, for India. Suicide is a growing problem in India. Between 1984 and 1994, the suicide rate for the country as a whole rose from 6.8 to 9.9 per 100,000. A number of

¹The research on which this study is based was supported by an ARC Small Grant from the University of Adelaide. The author is grateful to Tahereh Ziaian for her comments on an earlier draft of the paper. Please address correspondence to P. Mayer, Ph.D., Politics Department, University of Adelaide, Adelaide, South Australia 5005, Australia.

the Indian states, especially those in south India and West Bengal have suicide rates which are high by world standards. The Union Territory of Pondicherry, for example, had a suicide rate in 1994 of 68.5 per 100,000 (for a detailed examination see Vaidyanathan, Mayer, & Steen, 2001). Kerala had a suicide rate of 28.0 and Tamil Nadu 16.0 per 100,000 (National Crime Records Bureau, 1995, pp. 53-56). Although there are a number of hospital-specific studies of suicides (e.g., Jayaraman, 1991; Jayaraman, Ramakrishnan, & Davies, 1993; Latha, Bhat, & D'Souza, 1994, 1996; Singh, Singhi, Sood, Kumar, & Walia, 1995), there has been relatively little systematic study of social aspects of Indian suicide.²

This study examined the correlations between the suicide rates in India's major states and several different measures of equality of achievement of the sexes in education, health, and nutrition.

DATA

In 1991 the United Nations Development Programme (UNDP) began publishing comparative figures for the "Human Development Index", which summarizes national achievement on three dimensions of development, in its annual *Human Development Report*. The components of the Human Development Index are per capita real Gross Domestic Product measured in terms of Purchasing Power Parity (the conventional measure of economic well-being), life expectancy at birth (a measure of access to health), and the attainment of literacy (a measure of human capital development and empowerment). In 1995 the UN programme added comparative assessments of disparity in human development between women and men—what it termed "gender equality" (1995). Based on the earlier "Human Development Index," the new "Gender-related Development Index" summarizes equality of achievement between men and women in terms of the same basic components: income (the "Equally Distributed Income Index"), life expectancy (the "Equally Distributed Life-expectancy Index"), and literacy (the "Equally Distributed Education Index") (details of the construction of the Indexes are given in United National Development Programme 1995, pp. 130-133). The "Equally Distributed Education Index" is composed of the harmonic mean of two elements, the percentages of female and male literates, weighted by the percent of each sex in the population, and the percentages of each sex enrolled in school. The "Equally Distributed Life-expectancy Index" measures average life expectancies for each sex, adjusting for the tendency for women to live longer than men. The "Equally Distributed Income Index" is

²Among the exceptions to this generalisation are Aleem (1994), Lester and Natarajan (1995), Lester (1996b), Halliburton (1998), Tousignant, Seshadri, and Raj (1998), Vijayakumar and Rajkumar (1999), Mayer (2000a, 2001), Vaidyanathan, *et al.* (2001), Mayer and Ziaian (2002), Steen and Mayer (2003), Ziaian and Mayer (submitted).

the most complex of the measures. In essence it measures the ratio of females' and males' average wages adjusted for their respective shares of the economically active population. In broad terms, the "Gender-related Development Index" reduces overall national scores on the "Human Development Index" as aggregate sex differences increase. Shiva Kumar (1996) has computed this Index and its component indices for the 16 largest Indian states.³

This study examined the correlations between indices for income, life expectancy, and education and the total male and female suicide rates as well as the suicide sex ratios for states for which Kumar provided values. Of necessity, this study relies upon India's official suicide statistics. Paripurnanand Varma in his pioneering study, *Suicide in India and Abroad*, offered the opinion that official figures report only half—perhaps only a third—of the suicides which occur each year (Varma, 1976, p. 127). This is a figure which has been echoed by many subsequent authors. Steen and Mayer recently conducted a systematic investigation into the effect of social construction factors, such as quality of the administrative system or the religious composition of the population, on accidental deaths due to drowning, burns, and unspecified causes—causes of death commonly held to be more likely to contain misclassified or hidden suicides. On the basis of our findings which will be presented in a book, we conclude that there is no significant evidence of systematic misreporting or concealment of suicides in the Indian context.

Data on the number of suicides recorded in the Indian states for 1994 were obtained from the National Crime Records Bureau (1995). Because India's population has a pronounced masculine bias—927 females were recorded for every 1,000 males in the 1991 Census of India—female and male suicide rates were recomputed using estimated mid-year female and male population figures for each state (for a discussion of the growing masculine bias in India's population, see Mayer, 1999). For those under 18 years, population figures were also adjusted to reflect the low proportion (7%) of suicides in this age range.

It was hypothesized, given published findings for other countries, that suicide rates—especially for women—would be higher in Indian states in which women and men are more equal. It was also predicted that in those

³Kumar did not compute the Gender-related Development Index or its components for the smaller Indian states and Union Territories, whose populations were under 5 million. A number of alternative "gender equality" measures for India have been developed (see, e.g., Hirway & Mahadevia, 1996; Mehta, 1996; Prabhu, Sarker, & Radha, 1996). Although the overall pattern of rankings generated by these alternative measures is broadly similar, the position of individual states is affected by the components of each proposed index. I have used Kumar's rankings in this study because they correspond most closely to the internationally comparable figures reported annually by the United Nations Development Programme.

same states, the female to male suicide sex ratio would be lower. In addition, it was hypothesized that greater equality between the sexes in literacy would show a positive and stronger correlation with suicide rates than the other components of the "Gender-related Development Index."

RESULTS

Pearson correlations between the United Nations Development Programme's "Equally Distributed Income Index" and the 1994 rates of suicide by sex are in Table 1. There is a weak positive correlation between the suicide rate for females in the predicted direction. There is no perceptible correlation between greater equality in income and either male or total suicide rates. There is a moderate correlation with the suicide sex ratio although the correlation is positive, contrary to the predicted sign. None of the correlations with the income index is statistically significant.

TABLE 1
UNITED NATIONS DEVELOPMENT PROGRAMME MEASURES OF GENDER
EQUALITY IN DEVELOPMENT AND SUICIDE IN 16 INDIAN STATES

Measure	Suicide Rate			Female/Male
	Total	Male	Female	Ratio
Equally Distributed Income Index	.01	-.04	.15	.31
Equally Distributed Life-expectancy Index	.43	.52*	.22	.37
Equally Distributed Education Index	.77†	.79‡	.54*	.44
Gender-related Development Index	.65†	.68†	.46	.50*

*Two-tailed $p < .05$. † $p < .01$. ‡ $p < .001$.

The second of the component indices, the "Equally Distributed Life-expectancy Index" is a proxy for the attainment of sex equality in health. In much of the 20th Century, male life expectancy in India exceeded that for females. Since 1991, female life expectancy has exceeded that of males and is projected to continue for at least several decades (Mayer, 1999).

It is evident from the table that greater equality in life expectancy is moderately and significantly correlated with higher values in the male suicide rate. The correlation between greater equality of life expectancy and the overall India suicide rate is weaker and not significant. The correlation with female suicide rates is also weak but unexpected, given other published findings. The positive correlation with the suicide sex ratio contradicts the hypothesized association, but is consistent with the differential correlation with male and female rates.

Inspection of the scattergrams shows that exceptional and equal longevity in the state of Kerala influences the strength of the observed correlations. For the correlation with the male suicide rate, Cook's D is 2.29, well above the usual 'rule of thumb' value of 1 at which extreme cases become a con-

cern. Because Kerala is well recognised as a leader in human development, it is not possible to exclude the state's data from the analysis (see, e.g., Ramachandran, 1998).

Educational attainment is widely recognised in the development literature as a primary indicator of empowerment (see, e.g., Drèze & Sen, 1995). The literature provides conflicting findings about the relation between education and suicide. Lester reported a positive association between education and suicide in a study of 43 nations (Lester, 1996a). By contrast, Saucer found no significant correlation between education and suicide rates for 50 of the U.S. states (Saucer, 1993). Values presented in Table 1 show that in India, greater equality of educational attainment is strongly and significantly correlated with higher total and male suicide rates. Female suicide rates are also significantly correlated with equality in education, although the association is not as strong. Regression analysis shows the male suicide rate rises more rapidly than the female rate with increases in equality of literacy. As a consequence there is a positive correlation between the suicide sex ratio and the education index, but this association is not statistically significant.

Once again, Kerala, where very high literacy for both females and males has been attained, shows increases in the strength of the observed correlations, although Cook's D exceeds 1 only for the correlation with male suicide ($D=2.1$).

The pattern of associations for the summary "Gender-related Development Index" is very similar to that for education. There are positive and significant correlations between the overall Index and for male and total suicide rates. The female suicide rate is associated with the overall Index but is not statistically significant. The suicide sex ratio is slightly more strongly correlated with the "Gender-related Development Index," and this association is statistically significant.

DISCUSSION

The incidence of suicide in India rose by 76% between 1984 and 1994. The findings reported here suggest that as educational attainments continue to rise, and as sex differences in education decline, these adverse trends in increasing rates of suicide will continue and may even accelerate as education rises in the heavily populated states of the Gangetic Plain where current female literacy is low. Nevertheless, this analysis also produced a number of unexpected results.

The associations in cross- and intranational studies between increased equality of women and men—especially in education—and lower suicide sex ratios were not replicated in the Indian states. Indeed, contrary to expectations, the strongest association with higher equality was with male suicide rates.

One possible reconciliation of the difference between these results and those reported elsewhere might be that they are directly due to India's generally low human development, especially in education. It may be that the attainment of equality is basic literacy—as measured by the Equally Distributed Education Index—is only moderately associated with higher rates of female suicide. The higher female suicide rates found in developed nations may only be associated with equality in higher education. This conjecture receives support from a study of 26 relatively developed economies in which a second United Nations Development Programme index, the "Gender Empowerment Measure"—that summarizes equality in access to administrative and managerial positions, political representation, and in professional and technical employment—had moderate and significant association with female suicide rates (Mayer, 2000b, p. 371).

These results for India do not support the findings of earlier studies in economically developed countries of an inverse association between increased equality for women and men with suicide sex ratios. Nevertheless, as human development increases in India in coming decades and other Indian states approach the equality of men and women in literacy and life expectancy already achieved in Kerala, suicide rates in those states may well increase two or even three times.

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Accepted April 2, 2003.