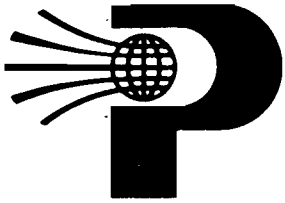

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Mortality from accidents and violence in India and China

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Comments Welcome

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MORTALITY FROM ACCIDENTS AND VIOLENCE IN INDIA AND CHINA

With the rapid decline in mortality from infectious and parasitic diseases, fatality from accidents and violence is increasingly being viewed as a major public health problem in developing countries. Because the victims of accidents of violence are typically young men and women who could be of immediate service to their nation, and for those who die there are many more who become disabled and suffer for long intervals, the subject is far more important than usually realized. But the idea that accidents and violence have definite causes, and preventive measures directed to those causes could just be as practical and reasonable as those of many other diseases, is yet to gain ground among policy makers and public at large in these countries. Under the circumstances, a thorough analysis of available data would prove invaluable in raising public awareness and suggesting policy interventions, but the very neglect of the subject had also meant that little effort was made in the past to collect useful information, and whatever little that was gathered was not published in a manner suitable for an in depth examination of the causes.

Mercifully, the situation appears to be slowly changing. In this paper we have analyzed some recent data on mortality from accidents and violence for China and India, which together account for about half of the population in the developing world. The data admittedly are not of very high standard, but they do reveal some interesting patterns that may very well be true. Although data on

India are especially suspect, they are more detailed and varied and thus we have devoted more space for their discussion. As this is one the first studies examining such data, the analysis is mainly descriptive and exploratory in nature.

Data Sources and Their Limitations

For India, there are three different sources of information on mortality from accidents and violence. First is the police records. Under the Indian Criminal Procedure Code, all unnatural deaths or deaths under suspicious circumstances are to be reported to the nearest police station or magistrate, and their cause of death ascertained by a medical examiner. The Bureau of Police Research and Development, New Delhi, is in charge of collecting and compiling this information at the national level. The data so collected are tabulated and published annually in Accidents and Suicides in India, and Crime in India. This information also appears in an abridged form in the annual publication of the Central Statistical Organization, Statistical Abstract. While the data on homicides from this source are available from 1952, national-level data on accidents and suicides became available only from 1964. Moreover, data for the first two years were incomplete because several states did not furnish the required information. Even to this day, the coverage remains inadequate with respect to accidental deaths. A further shortcoming of the data is that reported homicides are number of cases instead of number of deaths.

The second source is the Civil Registration System.

Unfortunately three out of four deaths go unregistered in India. Registration appear to be particularly incomplete for deaths from suicides and homicides. Even though the police records are themselves deficient, the number of deaths from suicides reported by this source for 1984 was ten times higher than that given in Registrar General's report on vital statistics. Homicides were sixteen times higher. Data appear to be somewhat better for accidents with police records showing only an excess of 100 per cent.

Only about ten per cent of the registered deaths in India are medically certified. If these were a random sample of deaths in the population, the proportion of deaths from each cause could be used to estimate cause-specific death rates. But, since most of the medically certified deaths are institutional events, and persons with certain types of ailments or injury have a greater tendency to seek hospital care than others, these deaths cannot be regarded as random samples. Furthermore, geographical coverage is highly skewed. About sixty per cent of the medically certified deaths are from Maharashtra, a state with only nine per cent of India's population. For such populous states as Uttar Pradesh, Bihar, West Bengal, Tamil Nadu, no information is given on medically certified deaths.

In order to bridge the data gap on causes of death, the Registrar General of India introduced a 'model' registration scheme in 1965 in rural areas. Under the scheme the para-medical staff of Primary Health Centers gather information on causes of deaths

occurring in the villages they are located through the 'lay-diagnosis-reporting' technique. The procedure involves identification of the probable cause of death from the reported symptoms and conditions prior to death through a stage-by-stage elimination process. The medical officer of the PHC is supposed to scrutinize the records maintained by the field staff and correct the errors made while arriving at the cause of death. In addition, he is also expected do an independent field-investigation of the ten per cent of the reported deaths. This scheme, initiated in 1965 on a limited scale, was extended to all major states of India by 1967. The collected data are now published annually in the series on Survey of Causes of Death (Rural). The cause-of-death information is available from this source for roughly two per cent of the deaths occurring annually in India. Since the information obtained relies solely up on the recall of symptoms and conditions prior to death instead of an autopsy, it cannot be regarded as very accurate. There are also several other problems with the data:

1. Strictly speaking, the Survey of Causes of-Death (SCD) is not conducted on a representative sample. The survey is confined to PHC-headquarter villages, which are usually large and have a semi-urban appearance; thus the smaller, remote villages are left out of the sample. Until very recently, even the selection of PHCs for the survey was not according to a random sampling design.

2. Data on population at risk that are essential for rate computation are not collected along with the survey. Therefore, in order to estimate death rates by cause, one has to use the

proportion of deaths by cause from SCD along with the estimate of crude death rate from another survey such as the Sample Registration System. Since the errors in the two sources are independently distributed, they get magnified when estimates of cause-specific death rates are computed.

Table 1. Comparison of Age Distributions of Deaths Recorded in the Survey of Causes of Death and the Sample Registration System in Rural Areas of India, 1987

	Age Interval								
	<1	1-4	5-15	15-24	24-34	35-44	45-54	55+	Total
SCD	16.0	8.6	4.8	4.6	5.4	5.8	7.1	47.7	100.0
SRS	29.3	15.2	5.7	4.4	3.9	4.3	6.7	30.6	100.0

3. There is evidence suggesting underenumeration of deaths of women and children in the survey. The data from the SCD consistently show an excess of male over female deaths of the order of 25 per cent, when the more reliable SRS data suggest only an excess of 5 per cent. Further, according to the SCD roughly a quarter of all deaths in a year are those of children under age five, while the true proportion could be nearly twice as high (see Table 1). The SCD, on the other hand, reports about half of the deaths are of persons aged 55 and over, while the true figure is probably around one-third. A tendency to exaggerate ages of the diseased is probably responsible for the higher proportion of deaths of the elderly in the SCD.[1] An important consequence of

[1] This bias is minimal in the SRS as a consequence of its longitudinal character wherein the report on the age at death is

these biases is that the diseases of men and elderly get undue importance in the cause-of-death data at the expense of diseases of women and children. They can, however, be remedied by using the SRS age-sex distribution of deaths to weight the cause-specific death proportions of the SCD.

4. Nearly half of the deaths of ages 55 and over are reported to be due to senility. The source, therefore, probably understates the volume of mortality from cardiovascular diseases. It is, however, unlikely that deaths from accidents and violence are affected severely as they can be identified with relative ease.

5. Perhaps due to the smallness of the sample, state-level data on deaths from suicide, homicide and specific accidents are not published. Smallness of the sample also make it difficult to discern trends in cause-specific mortality. In this respect, the data from the Bureau of Police Research and Development (BPRD) are decidedly superior.

In spite of these limitations, the SCD is by far the most reliable source of information on mortality for accidents and violence in India. In this paper we have utilized mortality estimates from this source in all international comparisons. However, the bulk of the evidence on regional variations and time trends comes from the BPRD data.

For China we have used the data as reported in the World Health Statistics Annual. The data are given separately for rural

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derived from the age reported in an earlier round when the person was alive (see Bhat, 1987).

and urban areas and cover about 10 per cent of the total population. The urban data refer to Bejing and 36 other cities; the information for rural areas comes almost entirely from the eastern half of the country where majority of the population is settled. The data have been complied on the basis of the Ninth Revision of the International Classification of Diseases. The quality of data appear to be superior than those on India. We had access to data only for three years, 1987, 1988 and 1989. Therefore no attempt has been made here to analyze time-trends or regional differences, other than the rural-urban variation.

Contribution of Accidents and Violence to Overall Mortality

An inverse association has generally been noted between the percentage of deaths from external causes and the overall level of mortality (e.g. Marcusson and Oehmisch, 1977, Taket, 1986). Available data for India and China appear to confirm this finding. According to the SCD data, 6.4 per cent of the total deaths in rural India in 1984-88 was due to accidents and violence. If we make an adjustment for the greater omission of deaths of women and children in SCD, the proportion falls to exactly six percent.[2] An analysis of medically certified, registered deaths showed a slightly higher figure, seven per cent, which is as it should be if these deaths were mainly from urban areas. Rural China, with a life expectancy 14 years higher than India's, has a significantly

[2] The adjustment was done using the SRS age and sex distribution of deaths.

larger percentage of deaths from the external causes, 11 per cent. However, somewhat surprisingly, for urban areas of China only eight per cent of the total deaths are reported to be from accidents and violence. We will soon show that this unexpected finding is to due to an equally perplexing difference in the suicide rates of rural and urban areas.

For those who might think that we are dealing with relatively small percentage of deaths, Table 2 would make clear the gravity of the problem. In both China and India, accidents and violence are the leading causes of death among adolescents and youth. In rural China, over half of the deaths in ages 1 to 34 is due to external causes. In the age interval 15-24, two-thirds of the deaths are from these causes. Although their importance begins to diminish after age 35, they continue to figure among the leading causes until retirement from work. In India, accidents and violence account only for a small percentage of deaths in ages below five since the fight against the infectious diseases is still being waged. However the importance of accidents and violence rapidly rise after age five. In ages 5-44, 21 per cent of deaths are due to these causes. The respiratory tuberculosis, which is the next leading cause in this interval, is only half as important as accidents and violence.

As is common everywhere, in China and India too, males are more likely to die from accidents and violence than females. In rural China while 10 percent of females deaths are from external causes, nearly 12 per cent of males die from these causes. In

rural India six percent of female deaths and seven percent of male deaths are due to accidents and violence. Moreover, males in India are at a greater risk of dying from accidents and violence than females at every age interval (see Table 2). In China, the risk is higher among males in all ages, except in the age interval 15-24, and in infancy.

Table 2. Percentage of Deaths from External Causes by Age and Sex, Rural areas of India and China

Age interval	Rural India, 1984-88			Rural China, 1987-89		
	Total	Male	Female	Total	Males	Female
0	0.9	1.0	0.8	11.3	10.7	12.0
1-4	4.7	6.0	3.5	49.1	53.3	44.2
5-14	19.2	22.6	15.5	55.5	60.8	47.5
15-24	30.3	35.2	26.0	66.1	63.6	69.0
25-34	21.4	27.2	15.2	43.2	45.1	40.5
35-44	13.6	16.4	9.4	27.1	28.4	25.1
45-54	8.1	8.6	7.1	11.9	12.7	10.6
55+	2.2	2.5	1.8	3.8	4.0	3.7
All ages	6.4	7.3	5.4	11.0	11.6	10.2
Weighted total using SRS data	6.0	6.8	5.1	-	-	-
Total recorded deaths from all external causes	6,208	3,902	2,306	102,432	58,689	43,743

When the contributions of accidents, suicides and homicides to the total mortality are separated assessed, some interesting similarities and dissimilarities can be seen between India and China (see Table 3). In India, accidents account for 5.1 per cent of the total deaths while their share in total mortality in China is only slightly higher, 6.7 per cent. Homicides account for only 0.2 per cent of the deaths in both China and India. However, between the two there is a large difference in the reported contribution of suicides to the total mortality. In rural India

only 0.7 percent of the deaths is attributed to suicide while in rural China 4.1 per cent of the deaths is reported to be from this cause. Whether this reflects a genuine difference in the suicide rates of the two countries, or idiosyncracies in reporting, is worth probing. We will come back to this question later in this paper.

Table 3. Percentage of Deaths from Accidents, Suicides and Homicides by Age, Rural areas of India and China

Age interval	Rural India, 1984-88			Rural China, 1987-89		
	Accidents	Suicide	Homicide	Accidents	Suicide	Homicide
<1	0.9	0.0	0.0	11.2	0.0	0.0
1-4	4.6	0.1	0.0	48.9	0.0	0.2
5-14	18.7	0.4	0.2	52.4	2.3	0.7
15-24	23.0	6.1	1.2	28.4	36.0	1.7
25-34	16.2	3.8	1.3	21.3	20.5	1.3
34-44	10.4	2.2	0.9	15.4	11.0	0.7
44-54	6.8	0.9	0.4	6.5	5.2	0.2
55+	1.9	0.2	0.1	2.1	1.7	0.0
All ages	5.3	0.8	0.3	6.7	4.1	0.2
Weighted total using SRS data	5.1	0.7	0.2	-	-	-

When the shares of each cause in the total mortality are examined by age, we find that in India, at every age interval, accidents are far more important causes of death than either suicide or homicide. However in China, though accidents are far more important in childhood ages, suicide is an equally important cause of death beyond age 15.

A comparison with some developed countries would put these figures in the proper perspective. According the figures given in the World Health Statistics Annual, in USA, 7 per cent of the

total deaths in 1989 was from external causes; out of which the share of accidents was 4.5 per cent, suicide 0.7 per cent, and homicide 1.4 per cent. In Sweden in 1987 5.4 per cent of the total deaths was from external causes, with accidents accounting for 3.1 per cent of the share, suicides 1.7 per cent and homicide 0.6 per cent. When compared with these figures, China's 11 per cent share of deaths from external causes looks highly unusual for a country at its level of industrialization. The discrepancy is in part due to the high incidence of suicides in China, and in part due to its middle-heavy age structure.

Overall Rate of Mortality from Accidents and Violence

Since for India we have multiple data sources of varying quality, it seems proper to evaluate them first before any attempt is made to compare them with the Chinese data. Table 4 shows the estimates of death rate per 100,000 population from various external causes from the BPRD, medically certified deaths of Civil Registration, and the SCD. The estimates shown refer to either the middle or the beginning of the decade 1980-90. The estimates from the BPRD were derived by dividing the recorded deaths by the mid-year population estimates for the country. As the population at risk was not clearly identifiable for the other two sources, the death rates were derived by multiplying the proportion of deaths from each cause with the crude death rate estimates from the SRS.

When comparing the estimates it should also be borne in mind that coding practices were not identical in the three sources. The

medically certified deaths have been coded according to the ninth revision of the International Classification of Diseases but deaths from animal bites and other natural or environmental factors, which assume importance in the Indian context, were not recorded separately. A large percentage of deaths have been coded as from other forms of violence presumably because medical examiners were not in a position to determine whether the deaths were from accidents, or suicide or homicide. The other two sources have employed their own lists in coding the data. The BPRD data have been coded according to a fairly exhaustive list but deaths from falls have been included in 'other accidents'. No data were given on deaths from 'other violence'. The SCD data do not show deaths from accidental poisoning separately. Moreover, deaths from other accidents have been clubbed together with the non-classifiable ones.

In Table 4 two sets of estimates are presented as from the SCD, one that did not incorporate an adjustment for the bias in the recorded age-sex distribution of deaths from all causes noted earlier, and the other that included an adjustment using the SRS distributions. This adjustment has the effect of reducing somewhat the death rates from most accidents, suicide and homicide. However, death rates from accidental drowning and fall are inflated by the adjustment. These corrections, however, do not significantly alter the following conclusions emerging from the comparison of the three main sources of data:

1. The police records understate substantially the deaths from

accidents, including those originating in traffic. Less than one-third of the accidental deaths are captured by this source. At least one-third of the suicides are also missed by the source. However, when it comes to homicide, police records appear to be more complete than any other source.

Table 4. Death Rates per 100,000 Population from Various External Causes in India According to Three Different Data Sources

Cause of Death	Bureau of Police Research and Development, 1980-84	Medically Certified Deaths from Vital Registration, 1982-84	Causes of Death Survey, 1984-88	
			Unadjusted	Adjusted
All accidents	17.9	69.9	67.2	63.7
Road accidents	3.2	12.0	16.5	14.2
Other transport accidents	1.8	6.0		
Poisoning	0.9	3.0	-	-
Fall	-	6.3	4.1	5.1
Fire	2.0	25.5	8.8	8.4
Animal bite	0.6	-	9.9	10.0
Other natural factors	0.6	-	3.5	3.5
Drowning	3.4	3.9	11.6	12.3
Fire arms and explosives	0.3	-	-	-
House collapse	0.2	-	-	-
Other accidents	4.8	13.1	11.2 *	10.2 *
Suicide	6.4	1.6	10.2	8.3
Homicide	3.9	0.9	3.5	2.7
Other violence	-	15.3	-	-
All external causes	28.1	87.7	80.9	74.7
No. of deaths from external causes	988, 852	43,380	6,208	

* Includes deaths from 'undetermined' causes.

2. Medically certified deaths from the vital registration system underreport the volume of mortality from suicide and homicide either because of the omission of non-institutional deaths, or due to an extremely cautious approach adopted while assigning deaths to these causes.

3. Even though the overall level of accident mortality suggested by

the medically certified deaths and the SCD are similar, mortality attributed to specific accidents are at variance with one another. In particular, the medically certified deaths appear to overstate mortality from fire and flames while understating the deaths from drowning and submersion. A probable reason for this is that more cases of accidental fire reach hospitals than those of drowning, and/or that accidental fire cases are more in urban areas while those of drowning are more numerous in rural areas.

In spite of the fact that the SCD data are based on a relatively small sample of deaths, they appear to pose the least problems. We have, therefore, employed the data from this source while comparing with those of China. It is worth noting here that the well-known 'Khanna study' in Punjab villages in 1957-59 had reported a death rate of 63.3 per 100,000 from accidents which compares favorably with the estimates derived from the SCD (Gordon, Gulati and Wyon, 1962). The Khanna study, however, did not record a single death from motor-vehicle accidents.[3] Apparently, the causes of fatal injuries have changed drastically in rural India since the days of Khanna study.

Table 5 presents the estimates of death rates from cause-specific data on accident and violent deaths in rural areas of China and India. For comparison we have also presented similar data for USA. To eliminate the disturbances that could arise from

[3] The Khanna study results were based on a sample of mere 615 deaths, 23 of which were caused by accidents. No deaths were recorded from either suicide or homicide.

the differences in the age structure of the population, the death rates of India and USA have been standardized using the age structure of China's rural population. However, the standardized death rate were not substantially different from the observed ones for either India or USA.

Table 5. Death Rates per 100,000 Population from Various External Causes in China, India and USA

Cause of Death	Age-Standardized Death Rates *		
	Rural China, 1987-89	Rural India, 1984-88	USA, 1987-88
All accidents	44.9	62.7	34.8
Motor-vehicle accidents	8.8	14.7	19.6
Other transport accidents	0.9		1.6
Poisoning	2.6	-	2.1
Fall	5.3	5.2	2.7
Fire	1.4	8.7	1.7
Animal bite		9.3	-
Other natural factors	1.4	3.4	-
Drowning	13.3	11.1	1.8
Suffocation	3.5	-	-
Falling object	2.2	-	-
Other accidents	5.4	10.3 a	5.3
Suicide	27.2	9.4	11.0
Homicide	1.3	3.1	8.8
Other violence	-	-	1.2
All external causes	73.5	75.3	55.7
No. of deaths from external causes	102,366	6,208	301,97[illegible]

* Age distribution of Rural China, 1987-89, has been used as the standard.
a Also includes non-classifiable violent deaths.

Even though we had observed a large difference between India and China in the proportion of deaths from external causes, the overall mortality from these causes is around 75 per 100,000 in both the countries. However, the overall death rates mask vast differences in the individual causes of accidents and violence. Death rates from accidents and homicide are significantly higher in India than in China, while that of suicide is reported to be

substantially lower. Accidents that account for the higher mortality in India are traffic accidents, accidental fire and those caused by natural and environmental factors. In both the nations, drowning is the most common form of non-motor-vehicle accident in rural areas, and its intensity is marginally higher in China. If suicide, drowning and traffic accidents are the leading causes of fatal accidents and violence in rural China, traffic accidents, accidents from natural and environmental factors, and drowning are the leading causes of fatal injuries in rural India.

The higher incidence of traffic accidents in India can be attributed to its greater traffic density. Around 1985, China had only four motor vehicles per 1,000 population while India reported a figure three times as large.[4] The higher mortality from accidental fire in India may partly be due to the use of kerosene stoves for cooking (more common in urban areas, though) and flammable fabrics such as nylon for clothing. However, as we shall see later, a part of the excess mortality from 'accidental' fire, particularly those of women, could in reality be suicides or homicides. An important component of accidental deaths from natural and environmental factors in India is the snake bite. The SCD data not reported here show that it accounts for two-thirds of the deaths from animal bite. The remaining being rabies (25 per cent) and scorpion bite (7 per cent). Apart from these, mortality from natural calamities such as flood, cyclone, lightening,

[4] These figures are taken from the Statistical Yearbooks of respective countries.

excessive heat or cold also appears to be higher in India. Either India is more exposed to the vagaries of nature, or its people are less-equipped to combat them.

China reports significant number of deaths from accidental suffocation. It is reported as the leading cause of accidental deaths in infancy. Apparently the reported deaths from this cause in India were not large enough to show them under a separate category. But it should be remembered that a signific[illegible] percentage of infant deaths are omitted in the SCD. In USA and Western Europe, increasingly these deaths are being coded as 'Sudden infant death syndrome' in order to stress its unclear causation. Apparently in China the old practice still continues.

A detailed comment on the observed differences in the rates of suicides should await the examination of age, sex and rural-urban differentials. It is, however, interesting to note the inverse association implied by the reported suicide and homicide rates for the two countries. Such an inverse relationship is anticipated by the frustration-aggression hypothesis that holds that homicides are outward-directed reactions to frustration while suicides are aggressions directed toward the self (Henry and Short, 1964). According to this view, the variation in national homicide and suicide rates is the product of the degree to which societies impose restrictions on letting out ones emotions and frustrations. Thus, in a way, China's low crime rate is at the cost of high suicide rate. However, as we will soon see, this mode of explanation does not fit all the facts of the case.

The overall mortality from external causes in India and China is significantly higher than in USA. The main reason for the difference is the fatality from non-transport related accidents. The number of deaths from these injuries for 100,000 population is 48 in India, 36 in China and only 14 in USA. This is a clear indication of the fact that many of the deaths from such common causes of accidents as drowning, fire or fall in the developing world are preventable. The death rate from motor-vehicle accident is however higher in USA, but not high enough to outweigh the lower mortality from other accidents. The rate of homicide is also substantially higher in USA, but the suicide rate is equally low, at least compared with China. The reported rate of suicide for India is somewhat lower than that of USA but there are reasons to suspect the accuracy of the Indian figure.

Sex differentials in Mortality from Accidents and Violence

As was done earlier, we shall first examine the data on India from the three different sources before comparing them with China. Table 6 presents the relevant data in the form of male-female ratios in the reported deaths. For the SCD, Table 6 shows two sets of sex ratios, one computed directly from reported deaths by sex, and the other adjusted for the underenumeration of female deaths.[5]

[5] On the assumption that deaths from all the causes were uniformly affected by the underenumeration, the observed sex ratios were deflated by the factor 1-105/125, or 16 per cent.

Table 6. Ratio of Male Deaths to 100 Female Deaths in India by Various External Causes According to Three Different Data Sources

Cause of Death	Bureau of Police Research and Development, 1977-79	Medically Certified Deaths from Vital Registration, 1982-84	Causes of Death Survey, 1984-88	
			Unadjusted	Adjusted
All accidents	192	131	170	142
Road accidents	454	349		
Other transport accidents	400	468	389	327
Poisoning	131	217	-	-
Fall	-	196	212	178
Fire	43	37	39	33
Animal bite	162	-	154	130
Other natural factors	179	-	129	108
Drowning	133	277	142	119
Fire arms and explosives	640	-	-	-
House collapse	170	-	-	-
Other accidents	192	247	252	212
Suicide	148	133	135	113
Homicide	-	539	346	291
Other violence	-	203	-	-
All external causes	179	142	169	142

Although the three sources had differed on the volume of mortality from various external causes, they seem to agree on the pattern of sex differentials. More males than females die from all injuries except those caused by fire. The male susceptibility is particularly high in the case of traffic accidents and homicides where male deaths outnumber female deaths by at least three to one. However, in the case of accidental fire, fewer than two male deaths are recorded for every five female deaths. All the three sources indicate that suicides are more common among males than females. When compared with the other two sources, the SCD data, especially after the adjustment, suggest smaller excesses in male mortality from accidents and violence. The adjusted SCD data suggest an overall surplus of 42 per cent in male deaths from all external causes; this happens to be in perfect agreement with the excess

implied by the medically certified deaths - even though the individual injuries do not show such an exact correspondence - because of the disproportionate coverage of accidental fire deaths.

Table 7 shows the deaths per 100,000 population from various external causes by sex for China, India and USA. The Indian data chosen for the comparison is again based on the SCD that incorporate corrections for underenumeration of deaths of women and children. The rates shown are not standardized for age because, in this case, the standardization resulted only in minor variations.

Table 7. Death Rates for 100,000 Population from Various External Causes by Sex in China, India and USA

Cause of Death	Rural China, 1987-89		Rural India, 1984-88		USA, 1987-88	
	Males	Females	Males	Females	Males	Females
All accidents	57.3	31.9	72.2	54.6	54.7	24.4
Motor-vehicle accidents	12.2	5.3	20.6	7.4	27.9	11.4
Other transport accidents	1.2	0.7			2.8	0.5
Poisoning	3.2	1.9	-	-	3.5	1.3
Fall	6.5	4.0	6.3	3.8	5.2	4.5
Fire	1.6	1.2	4.5	12.5	2.5	1.5
Animal bite	1.4	1.4	11.0	8.9	-	-
Other natural factors			3.7	3.4	-	-
Drowning	16.1	10.4	13.2	11.4	2.9	0.7
Suffocation	3.7	3.3	-	-	-	-
Falling object	3.7	0.7	-	-	-	-
Other accidents	7.6	3.1	12.9	7.3	9.9	4.5
Suicide	23.1	31.5	8.4	8.2	20.3	5.1
Homicide	1.9	0.8	3.9	1.5	13.4	4.2
Other violence	-	-	-	-	2.0	0.7
All external causes	82.3	64.3	84.5	64.3	90.4	34.4

China and India show remarkably similar levels and sex differentials in total mortality from external causes. While female mortality from all external causes is around 65 per 100,000 in both the nations, male mortality is around 80 to 85 per 100,000 - suggesting an excess of about 30 per cent among males. In USA,

male mortality from external causes is somewhat higher than that of India and China, but female mortality is nearly half of what is observed in the two developing countries. It seems judicious to examine the rates for at least one more Western nation before drawing what seems to be a significant inference. From the World Health Statistics Annual, 1989 we note that in Sweden in 1987, deaths from all external causes for 100,000 population was 79.4 among males and 41.4 among females. It therefore appears as though that with development, male mortality from accidents and violence changes very little - even though injuries causing the fatality may not remain the same - but female mortality from accidents and violence declines substantially. This gives us an important clue to the evolution of sex differentials in mortality.

Which specific injuries are responsible for the change in the sex differential? By comparing the rates of USA with those of India and China, we find that with development, though men do gain from reduced mortality from many accidents, especially drowning, they loose because of higher mortality from motor-vehicle accidents and homicide. It should be noted that many European countries do not have higher homicide rates than that of India or China. But they generally have higher male suicide rates. For example, in Sweden in 1987, the homicide rate among males was 1.5 per 100,000 while the suicide rate was 26 per 100,000. Thus the overall difference in male mortality from external causes tend to be negligible between the East and the West. In the case of females, death rates from non-motor-vehicle accidents and suicides are

substantially lower in developed countries such as USA, and they more than compensate for the slightly higher rates of homicide and motor-vehicle accidents. The most striking difference among females is in the suicide rates. The age standardized suicide rate for 100,000 females is 4.5 in USA, 9.3 in rural India, and 31.5 in rural China. This appears to reflect the social conditions of women in the respective cultures, but the suggested difference between India and China seems too large.

Although we observed very similar sex differentials in India and China in total mortality from all external causes, individual injuries show some variations. India shows larger excess mortality among males from traffic accidents than China. In India, mortality from accidental fire among females is nearly three times of males while it is slightly lower among females in China. On the other hand, in China, the suicide rate of females is nearly 50 per cent higher than males while it is reported to be about equal among men and women in India. It is, therefore, not inconceivable that some of the reported deaths of women from accidental fire in India are in reality suicides. However, even if we treat all the excess female mortality from burns as suicides, the suicide rate in rural India would only reach to 16 per 100,000 females, which is still far too below the rate reported for rural China.

In China, suicide, drowning and traffic accidents are the leading causes of fatal injuries among both males and females. The importance of traffic accidents is, however, substantially lower among females. In India, suicide does not figure among the three

leading causes of fatal injuries. Accidents from motor-vehicles, natural and environmental factors, and drowning are the leading cause among males, while accidental fire, drowning and natural and environmental factors are reported as the three leading causes among females. However, if some of the accidental fire deaths are self-inflicted, then suicide ought to be considered as one of the leading causes of violent deaths among females.

Age Pattern of Mortality from Accidents and Violence

It was noted earlier that accidents and violence account for greater share of mortality at ages 5 to 44 compared with other ages. However, it does not follow from it that death rates from accidents and violence would also be higher in those ages. The estimates of age-specific death rates from various types of injuries in rural areas of India and China are given in the appendix tables A1 and A2. For India we have only the SCD providing the necessary data, hence the question of comparing with other sources does not arise. However, one limitation of the India data should be mentioned: It was not possible to compute death rates separately for the age intervals 0-1 and 1-4 because of the non-availability of the relevant data from the SRS. Also the last interval for which the death rates could be calculated is for the years 55 and over, while the data for China are available up to the years 75 and over.

Figure 1 shows the age-specific death rates from all external causes for males and females separately. The box on the left side

compares the rates for rural China and USA. In China, the age-specific mortality from all external cases has the U-shaped pattern, similar to the age-pattern of death rates from all causes. In USA the mortality from accidents and violence has a J-shaped pattern with age. An inspection of detailed cause-specific data presented in the appendix tables discloses that high mortality from accidental drowning and suffocation among Chinese children is responsible for the variation in the age curve of mortality. Another difference worth noting is the pronounced peak in mortality in ages 15-44 among US males which is not seen among the Chinese. This is associated with the high fatality from automobile accidents in USA.

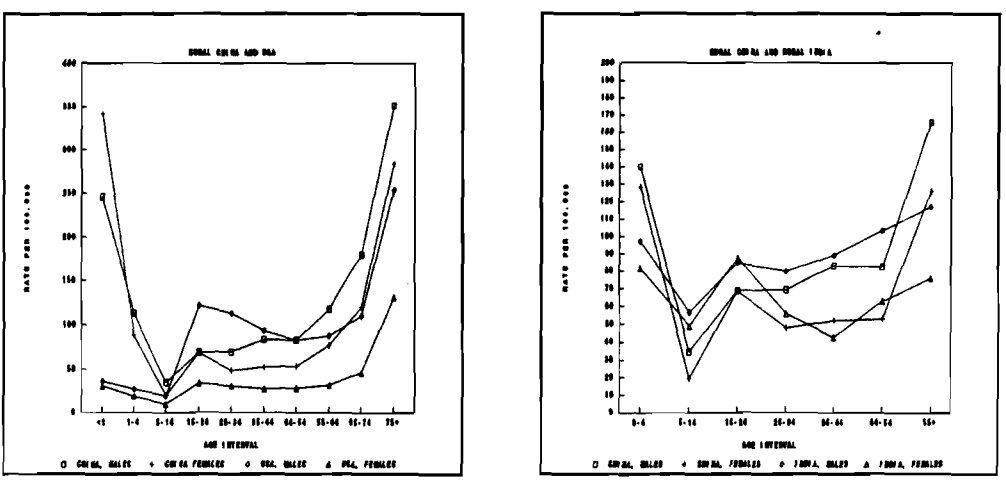

Figure 1. Death Rates from External Causes by Age and Sex

The box on the right side compares the rates for rural areas

China and India. The age-patterns of mortality from accidents and violence in India and China seem to be similar except for the fact that in India neither the increase in mortality at ages beyond 55, nor the decrease in mortality in early childhood is as pronounced as in China. It is difficult to judge whether this is a true fact, or an artifact of the errors in the Indian data discussed earlier. In both the countries, however, data for females show a peak at ages 15-24, which may be associated with the high rate of suicide among young women. Beyond this age interval, males have higher death rates from accidents and violence than females, with the Indian data showing larger differential by sex.

Figure 2 shows the age pattern of mortality from all transport accidents. In China, mortality from traffic accidents rise steadily with age among both males and females. The mortality of males shows a similar increasing trend with age in India, but that of females declines up to the age interval 35-44, and then tends to rise again. This curious pattern among India females may be an indication of the seclusion enforced on them, but one cannot be certain without an in-depth analysis. Neither countries, however, show the pattern of USA, where mortality from traffic accidents peaks at ages 15-24 among both males and females. The male mortality in India shows a slight elevation at this age interval, but it is almost imperceptibly so. But the Indian data clearly indicate that death rates from traffic accidents among children in that country is even higher than that of USA. This is an indirect confirmation of the fact that in developing nations, the toll of

pedestrians in motor-vehicle accidents is quite high (WHO, 1989). On the other hand, in developed countries, drivers tend to be the main victims in motor-vehicle crashes, which explains the excess mortality in ages 15-44.

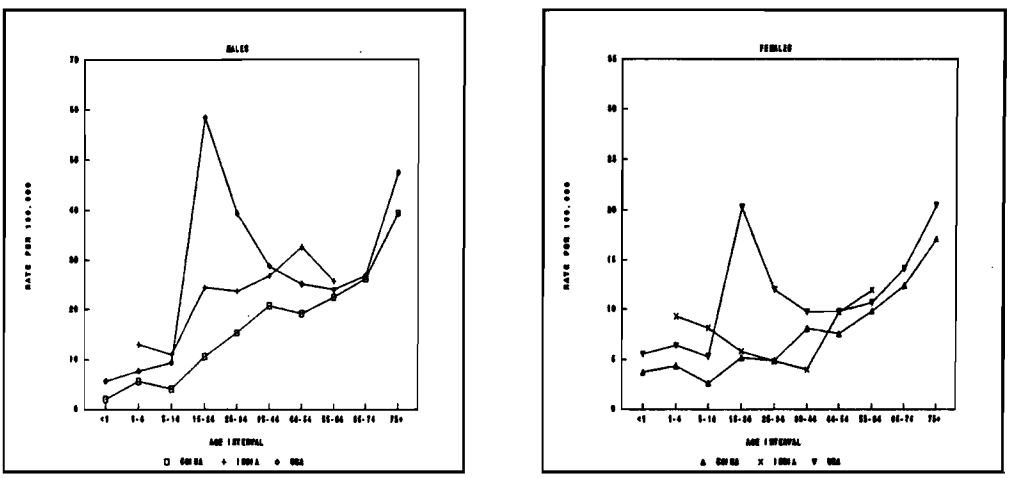

Figure 2. Death Rates from Transport Accidents by Age and Sex

In both China and India, the risk of accidental drowning is highest in early childhood, and it declines sharply thereafter. The fatality appears to be especially high in Chinese children. For the age interval 0-4, the reported death rate from accidental drowning is 65 per 100,000 in rural China, while its 22 per 100,000 in rural India. After this age interval, however, the differences between the two countries are negligible. For the very next interval of 5-14, the reported rates are 17 in China and 16 in India. The reason for the high fatality from accidental drowning

among Chinese children remains unclear.

In India, accidents caused by natural and environmental factors are one of the leading causes of fatal injuries. An important component of this group is animal bite, whose age-specific mortality has a V-shaped pattern, with a steady decline until age 30 or so, and then rising with age (see Figure 3). Other natural and environmental factors such as excessive cold and heat show a U-shaped age profile, with their mortality concentrated at both ends of the life span. If the death rates from animal bite are somewhat higher among males than females at every age interval, other natural factors appear to make no distinction between the sexes.

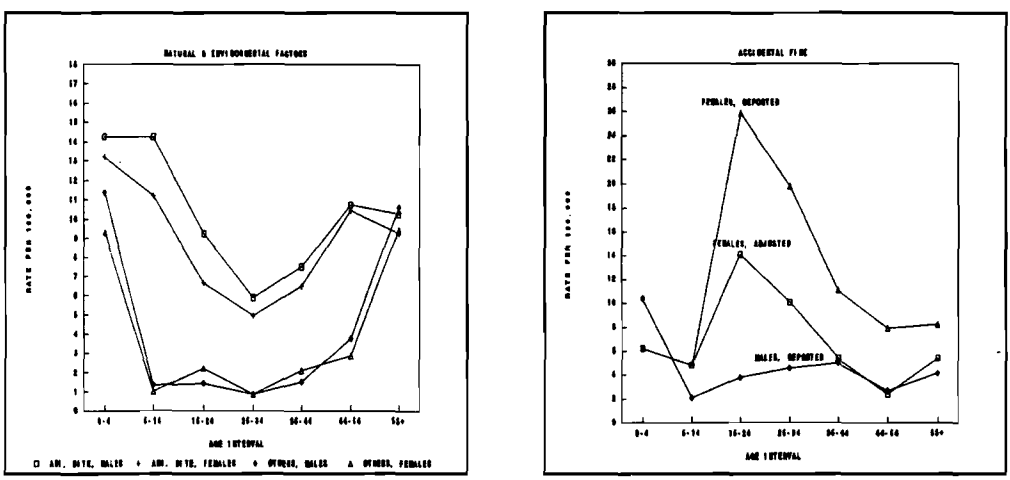

Figure 3. Accidental Death Rates from Natural & Environmental Factors and Fire in India by Age and Sex

In the Indian context, an accident that shows a strong gender preference in its fatality is the injury from fire and flames. Its age pattern is shown in Figure 3 for males and females separately. Females face a greater risk of dying from this cause than males at all ages, except for the first five years of life. The excess mortality attains a peak at the age interval 15-24 where the female death rate is six times higher than the male rate. Given the history of suttee and bride-burning in India, it is natural to doubt whether these reported deaths are really accidents. But it is useful to note that excess female mortality from this cause were not uncommon in the populations of the past. International mortality statistics compiled by Alderson (1981) shows that in USA, in 1901-05, female mortality from fire and heat exceeded the male rate by 35 per cent. The same source also discloses that around the same period, the excesses were 27 and 42 per cent in England & Wales and Italy, respectively.

For the contemporary populations, data given in the World Health Statistical Annual show that in Sri Lanka, Mauritius and Egypt the risk of mortality from fire and flames is higher for females than males. In Egypt, in 1987, female deaths exceeded the males by 62 per cent and in Mauritius, during 1983-85, female deaths from fire and flames were 250 per cent higher. As in India, the excess was much larger for the age interval 15-24 than for all ages.

The use of kerosene stoves and home-made lamps are generally blamed for the excess female mortality from accidental fire in the

Indian subcontinent. A WHO survey in 1966 reported that 28 per cent of the fire- related deaths in Sri Lanka were from accidents with kerosene lamps (WHO, 1966). The use of cheep, but flammable materials for clothing and shelter make matters worse. It should also be noted that while the cigarette smoking is on the rise in the subcontinent, the habit of using ashtrays has failed to catch up.

Even after considering these facts, the reported death rate for Indian females from accidental fire seems too high. If the death rate for Sri Lankan women in the age group 15-24 was 3 per 100,000 in 1983-85, the Indian figure was 26 per 100,000 in 1984-88. It seems unlikely that all the difference could be explained by accidents associated with the use of inflammable substances. Figure 3 shows what would be the female mortality from accidental fire in India at ages above 15 if the sex differentials in the death rates were as observed in Sri Lanka in 1983-85. The overall death rate from accidental fire among Indian females would be 40 per cent lower than the reported figure of 12.5 per 100,000. The remaining deaths (5 per 100,000) can be treated as a rough estimate of the number of suicides or homicides incorrectly reported as accidents.

The most intriguing age-pattern of fatality is that of suicides. Figure 4 compares the age pattern of suicide rates in China, India and USA. Men seem to have a similar age pattern of suicides in the three countries: A sudden surge in suicides at ages 15-24 is followed by a fairly constant rates until age 55 or

so, after which there is a steep increase. However, until recently the suicide rate for US men was showing a trend of steady increase with age (Dublin, 1963; Holinger, 1987). But an increase among younger men and a decrease among older males in recent years seems to have altered the age pattern of suicides.

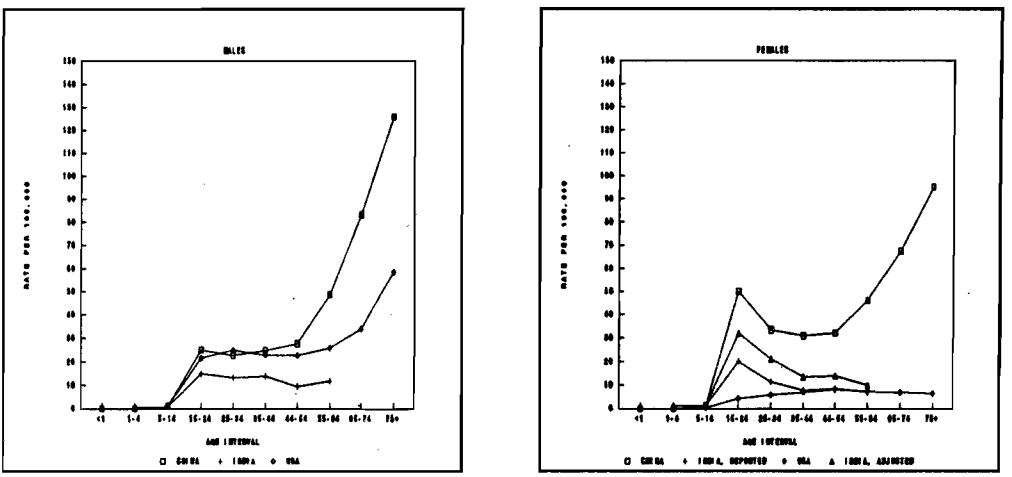

Figure 4. Death rates from Suicide by Age and Sex

In the Indian data presented in Figure 4, the increase in suicide rates at older ages is not so perceptible perhaps because of the open interval of 55+ employed in the tabulation. It is also possible that some of the suicides of the elderly were classified as deaths due to senility in the SCD data we have employed. Interestingly, the suicide rates for males are not significantly different in China and USA until age 55 or so. After this age, however, suicides among Chinese men increase much more rapidly than

those of USA. The Indian rates are lower than those of USA and China at every age above 15. So it cannot be said that the reported rates of suicide among Indian males are lower only because of the underreporting at older ages.

Among both Chinese and Indian women, there is a sharp increase in the rate of suicide in the age interval 15-24, and then it begins to fall. In China, as in males, the rate once again shows a steep increase after age 55. We cannot observe this increase at older ages in Indian females, probably because of the data limitations mentioned earlier. Among females of USA, the peak at the age interval 15-24 is not seen; the rate increases slowly until age 35, and then it levels off. Also, unlike the trend among males, there is no increase in the rate at older ages. Even though Chinese and Indian women have a similar age pattern of suicide, at least up to age 55, the rates are always lower among Indian women. The rate of suicide among Indian women is, however, substantially higher than that of US women at younger ages. Beyond age 35, the rates are similar among Indian and US women.

The high incidence of suicide among young women of Asia has been widely noted (e.g. Headley, 1983). In the age interval 15-24, Chinese women have a rate two times that of men; in India, though the reported rate is higher by only one-third, if some of the reported accidental fire deaths are suicides, the rate could be twice as high as men's. Young women in Asia appear to be more prone to suicide because of a tradition of arranged marriages, joint family and prohibition on divorce. Girls have little say in

the choice of their mate, and marriage negotiations can be so stressful for girl's parents that some daughters may even consider themselves as a burden for the family. Some may commit suicide because they are not happy with the choice their parents have made for them. Among those who do get married, many find their hopes shattered after entering the conjugal home. The social sanction against divorce, and unwillingness of parents to accept them back, leaves them with no other choice but to take one's own life. As women who find the system too oppressive succumb to death, the selectivity makes suicide rates fall after the peak ages of matrimony.

We are, however, still left with the problem of explaining the observed difference in the Chinese and Indian suicide rates. In China, the system of arranged marriages has been abolished, though the extended family is still in vogue and divorces are rare. The institutions of arranged marriage, joint family and sanctions against divorce are still firmly rooted in the Indian social milieu, which ought to make Indian women to be more prone to suicide. Is it possible to explain the difference from the high 'accidental' fire deaths, which might not be so accidental? In Figure 4 we have shown the suicide rates for Indian females adjusted on the assumption that all of the erroneously classified accidental fire deaths estimated earlier were suicides in reality. The difference between the Indian and Chinese suicide rates are now smaller, but a large difference still remains unexplained. With the adjustment, the overall suicide rate for females in India

increases from 8 to 13 per 100,000, which remains much short of the Chinese figure of 31 per 100,000.

Another possibility we ought to consider is the inclusion of some suicides in India in the category of 'other' external causes. The reported death rate for females from 'other' accidents in India was 7 per 100,000 (see Table 6). This category also included violent deaths from undetermined causes. The age-specific mortality rates from these causes are shown in Figure 5. If a large number of suicides were included in this category, the age pattern mortality should be similar to that of suicides in Figure 4. Instead we find the age patterns of both males and females more similar to those of all external cases shown in Figure 1. Indeed, the ratio of deaths from of 'other' external causes to that of all external causes was approximately the same at all ages. Even the sex ratios were similar. There is, of course, a small hump in the age interval 15-24 in the pattern for females shown in Figure 5, suggesting the inclusion of some suicides in this category. But so does the pattern for all causes shown in Figure 1. In other words, there is no reason to suspect that deaths classified under 'others' category were disproportionately those of

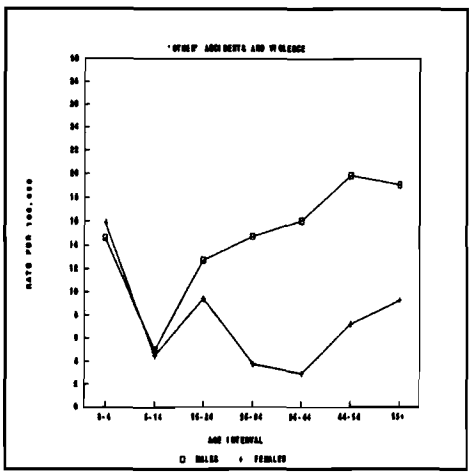

Figure 5. Death Rates from 'Other External Causes' in India by Age and Sex

suicides. If it is assumed that suicides were distributed among the deaths classified under 'other' external causes in the same proportion as they are distributed among deaths from all external causes, then the reported suicide rate should be raised by no more than 2 per 100,00. Our best guess is that the suicide rate in India is no more than 10 per 100,000 for males and 15 per 100,000 for females.[6] The observed difference between suicide rates in rural areas of India and China is too large to be dismissed as arising from reporting biases.

Many western scholars have, however, assumed that incidence of suicide would be high in India because of the belief in life after death, and the custom of suttee (immolation of widow on her husband's funeral pyre) among the Hindus (e.g., Dublin, 1963). Durkheim considered India as classic soil for what he called the 'altruistic suicide' - suicide committed willingly as a part of ones duty or belief (Durkheim, 1951). Adding considerable weight to such a point of view are studies in Sri Lanka, Malaysia, Singapore, Fiji, Trinidad and Jamaica that show higher incidence of suicide among the people of Indian origin than among other ethnic groups (Straus and Straus, 1953; Kearney and Miller, 1985; Maniam,

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[6] This also includes a correction for the probable omission of suicides at older ages. In particular, we assumed that suicide rates at older ages in India increase at the same rate as observed in Sri Lanka in 1983-85. Although it made some difference to the rate for the open interval 55+, it had little impact on the overall suicide rate.

1988; Chia, 1983; Haynes, 1984; McCandless, 1968). The reported rates for the people of Indian origin in these countries vary from 50 to 150 per 100,000 population! If these figures are applicable to the Indians in their motherland, then either the SCD has substantially understated the percentage of deaths from all external causes, or there is a large underenumeration of deaths in the SRS. Both, in our view, are quite unlikely. On the other hand, because they are most likely to feel alienated, it is typical to find immigrants to have considerably higher rates than both their host country, and their country of origin (Sainsbury, 1986). It is possible to argue that India may indeed have a relatively moderate level of suicide:

1. Although Manu, the ancient law-giver of the Hindus, did not condemn suicide, and even permitted it in certain special cases by drowning at the junction of scared rivers, by starvation or by fire, other ancient religious and political texts have denounced suicide and prescribed severe penalties (Rao, 1983).
2. It is important to recognize India's diversity and its caste system. It is only the Brahmins and members of other upper castes, who are relatively well informed about these dogmas and rites; members of lower castes are governed by different sets of rules, customs and beliefs.
3. A more universal belief among Indian's is that persons dying from unnatural causes would not attain Moksha (salvation), instead would be transformed as ghosts haunting the scene of their death (Carstairs, 1955; Rao, 1983).

4. As Durkheim has himself argued while accounting for the difference in the suicide rates of Catholics and Protestants, 'if religion protects man against the desire for self-destruction, it is not that it preaches the respect for his own person to him with arguments sui generis; but because it is a society. .... The details of dogmas and rites are secondary. The essential thing is that they be capable of supporting a sufficiently intense collective life' (Durkheim, 1951, p. 170). We fail to see why the same argument cannot be extended to Hindus or Buddhists.

5. Suicides are sometimes viewed as the mortality of depressive mental illness. In the opinion of several psychiatrists, while manic and hypomanic cases are not rare to find in India, depressed patients are conspicuous by their absence (Carstairs, 1955; Rao, 1983). The lower incidence of depression among Indians has been attributed to the longer duration of breast feeding; it is believed that deprivation from suckling at this stage helps to build a pessimistic personality (Carstairs, 1955).

6. At old age, man as the head of an extended family wields considerable authority. He is, therefore, less likely to feel alienated and think of self destruction.

7. In fatalistic societies, one's failures and frustrations could be easily ascribed to the role of the Invisible Hand. Failures cause resignation, but not aggression either toward the self or against others. Indeed, because the need to achieve is low, there may not be any clear scoring system to measure success and failure. The absence of such a standard for female roles is also said to be

the reason for the low incidence of suicide (also, perhaps homicide) among Western women (Wilson, 1981). It is also possible to explain the lower incidence of suicide among Catholics than Protestants by an appeal to the difference in the level of 'achievement-motive' (McClelland, 1961).

It should be reiterated that the above arguments apply especially to men in developing societies; we have already discussed the circumstances that lead young women to commit suicide.

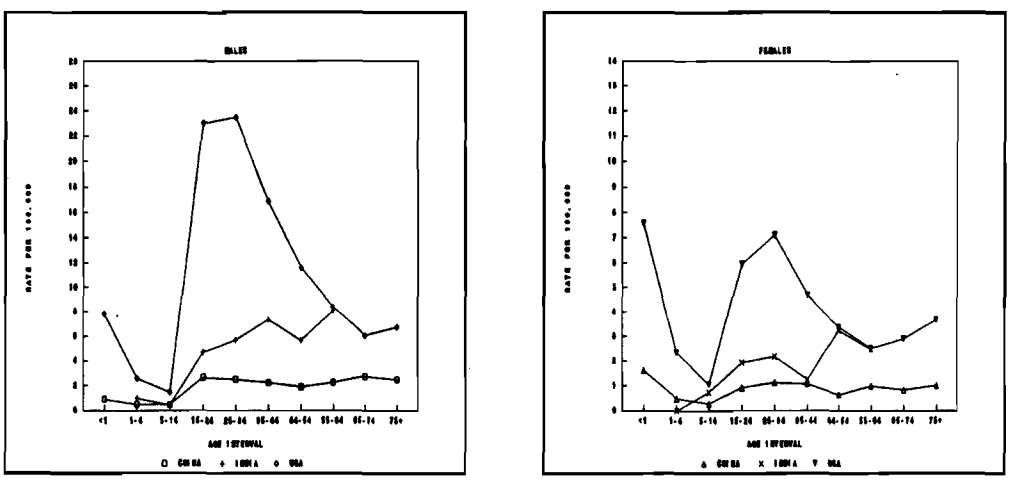

Figure 6. Death Rates from Homicide by Age and Sex

The overall homicide rates in China and India are substantially lower than in USA, but are there similarities in the age pattern of mortality? Figure 6 makes a comparison of the age pattern of homicide rates in China, India and USA. Three countries

have distinct patterns of their own. In China, the homicide rate is approximately the same for all ages above 15. In India, the risk of death from homicide increases with age fairly steadily. In USA, there is a rapid increase in the incidence of homicide after age 15; it declines steeply after age 35, reaching the Indian level at around age 55 but stays above the Chinese level even late in life. In contrast to the pattern observed in the case of suicide, males and females in the respective countries show similar age patterns of homicide. Another interesting pattern revealed is the high homicide rate among children below the age of five in USA. The Chinese and Indian data do not show this pattern, even though one hears of incidence of female infanticide in these two countries. It is quite possible that such deaths have gone unreported in the data presented here. Another limitation of the data given here is that homicides were classified by age and sex of the victims only. For policy purposes it is more important to examine the data by age and sex of the person committing the crime.

Although the foregoing discussion raised some interesting questions regarding the age patterns of mortality from various accidents and violence in China and India, it might not be immediately obvious from it which were the leading causes of fatal injuries at different age intervals. Table 8 summarizes the information on the leading causes of fatal accidents and violence by age for males and females separately.

In infancy, accidental suffocation is the most important external cause of death in China. It accounts for three out of four

deaths from external causes. As we have already pointed out, its importance has probably been exaggerated in China because of the coding practices pursued there. In India natural and environmental factors are reported as the leading external causes. Among these two important ones are excessive cold and bites of snake, dog and scorpion. Beyond the topical climate, poor housing conditions may be responsible for the high death rates from these causes in India.

Table 8. Leading Causes of Violent Deaths at Different Age Intervals in Rural areas of China and India *

Age Interval	Rural China, 1987-89		Rural India, 1984-88	
	Males	Females	Males	Females
< 1	Suffocation (74%)	Suffocation (75%)	Animal bite (18%) Exce. cold (13%)	Exce. cold (19%) Animal bite (12%)
1-4	Drowning (77%)	Drowning (76%)	Drowning (28%) Traffic acci. (15%) Animal bite (13%)	Drowning (29%) Animal bite (18%) Traffic acci. (14%)
5-14	Drowning (64%) Traffic acci. (12%)	Drowning (56%) Traffic acci. (13%)	Drowning (31%) Animal bite (25%) Traffic acci. (19%)	Drowning (29%) Animal bite (23%) Traffic acci. (17%)
15-24	Suicide (36%) Traffic acci. (15%) Drowning (14%)	Suicide (73%)	Traffic acci. (29%) Suicide (18%) Drowning (11%)	Fire (30%) Suicide (23%) Drowning (15%)
25-54	Suicide (32%) Traffic acci. (23%)	Suicide (64%) Traffic acci. (13%)	Traffic acci. (30%) Suicide (14%)	Fire (28%) Suicide (19%) Traffic acci. (10%)
55+	Suicide (42%) Traffic acci. (16%) Fall (13%)	Suicide (49%) Fall (15%) Traffic acci. (10%)	Traffic acci. (22%) Fall (14%) Suicide (10%)	Traffic acci. (16%) Fall (14%) Suicide (10%)
All Ages	Suicide (28%) Drowning (20%) Traffic acci. (15%)	Suicide (49%) Drowning (16%)	Traffic acci. (24%) Drowning (16%) Animal bite (13%)	Fire (19%) Drowning (18%) Animal bite (14%)

* The percentage to total deaths from all external causes is given in parentheses.

In the age intervals 1-4 and 5-14, drowning is the predominant cause of violent deaths in the rural areas of China and India. Bites of animals and traffic accidents also take significant toll

of children in Rural India. In the age intervals 15-24 and 25-54, suicide is the main cause of violent death in China, especially among females. In India, suicide takes the second place; the first being traffic accidents among males, and accidental fire among females. Among 15- to 24-year old, drowning continue to account for significant number of deaths in rural areas of India and China.

Among those aged 55 and over, suicide continues to be the leading external cause in China, though it is not as important as in the younger ages. In India, traffic accident is the main cause of violent death at older ages. Accidental fall is another leading cause of fatal injuries among the elderly in both India and China. It accounts for 10 to 15 per cent of deaths from external causes at ages 55 and over.

Regional and Urban-Rural Variations

China and India are two of the largest countries in the world and, therefore, it would not be unexpected to find large regional variations in the pattern of fatal injuries. It would also be worth examining the rural-urban differences in these countries since it might provide clues to how the pattern is likely to change with time. Unfortunately, for China, we have data only on the rural-urban difference; for India, though we have data on both regional and rural-urban variations, they come from a relative less reliable source, namely, the Bureau of Police Research and Development. Nonetheless, they are not less interesting.

(a) China: Table 9 presents data on death rates from accidents

and violence in rural and urban areas of China. Since the age-standardization was of little consequence, only the observed rates have been reported. The table reveals some surprising differences in the rates for rural and urban areas. Mortality from accidents and violence is substantially lower in the urban areas than in the rural areas. If mortality from all external causes was 74 per 100,000 in the rural areas, the urban rate was only 42 per 100,000. Even the share of external causes in the total fatality was only 8 per cent in the urban areas, against a figure of 11 per cent in the rural areas.

Table 9. Death Rates for 100,000 Population from Various External Causes by Sex in Rural and Urban Areas of China, 1987-88

Cause of death	Rural China			Urban China		
	Total	Males	Females	Total	Males	Females
All accidents	44.9	57.3	31.9	31.4	37.7	24.7
Motor-vehicle accidents	8.8	12.2	5.3	8.9	11.9	5.6
Other transport accidents	0.9	1.2	0.7	1.1	1.4	0.9
Poisoning	2.6	3.2	1.9	2.6	3.0	2.2
Fall	5.3	6.5	4.0	6.5	5.9	7.2
Fire	1.4	1.6	1.2	0.7	0.8	0.6
Natural & environmental factors	1.4	1.4	1.4	1.2	1.0	1.4
Drowning	13.3	16.1	10.4	4.6	6.3	2.9
Suffocation	3.5	3.7	3.3	0.7	0.7	0.6
Falling object	2.2	3.7	0.7	0.7	1.1	0.2
Other accidents	5.4	7.6	3.1	4.3	5.6	3.1
Suicide	27.2	23.1	31.5	9.5	8.4	10.6
Homicide	1.3	1.9	0.8	1.9	2.6	1.2
All external causes	73.5	82.3	64.3	41.6	46.8	36.1

The external causes tend to be less important in the cities of China because of low incidence of drowning and suicide. Their rates in the urban areas is only one-third of the levels in the rural areas. The reduced fatality from drowning in urban areas is

not surprising, given the reduced risk in the urban environment and the likelihood of prompt medical attention. But the huge difference in the suicide rates between rural and urban areas is contrary to expectation. During the period of industrialization in the West, urban residents had shown greater inclination towards suicide than rural folks, though the gap has greatly narrowed in recent years (Dublin, 1963). The high rate of suicide in urban areas, especially in large cities, has been attributed to the social isolation of the individual and a state of anomie that characterizes urban living (Durkheim, 1951). The opposite pattern observed in China today may be an outcome of the social and economic upheaval of the recent past and its differential impact on the rural and urban residents.

Usually a low incidence of drowning in urban areas is counterbalanced by a higher fatality from motor-vehicle accidents. But in China, mortality from motor-vehicle accidents in urban areas is about the same as in rural areas. Perhaps motorization of urban traffic in China is still at such a stage that its somewhat higher levels than in rural areas is compensated by such factors as better maintenance of vehicles, traffic regulations and availability of emergency medical care. The low incidence of traffic accidents also helps to explain why one does not observe significant sex differentials in the mortality from external causes in urban China. As we saw earlier, in the industrialized countries, it was the high fatality of males in motor-vehicle crashes that caused the strong sex differentials to emerge in the mortality from all

external causes.

However, like in the industrialized countries, in urban China mortality from external causes has a J-shaped age pattern (see Figure 7). The U-shaped pattern observed in the rural areas switches to the J-shaped pattern in the urban areas mainly because of low incidence of drowning and accidental suffocation among urban children. The fact that choking is found to be relatively infrequent among them seems to indicate that its high incidence reported among the rural babies may not all be due to the coding procedures as hypothesized earlier. Nor can it be assumed that these deaths are from infanticide since female children do not show a higher risk.

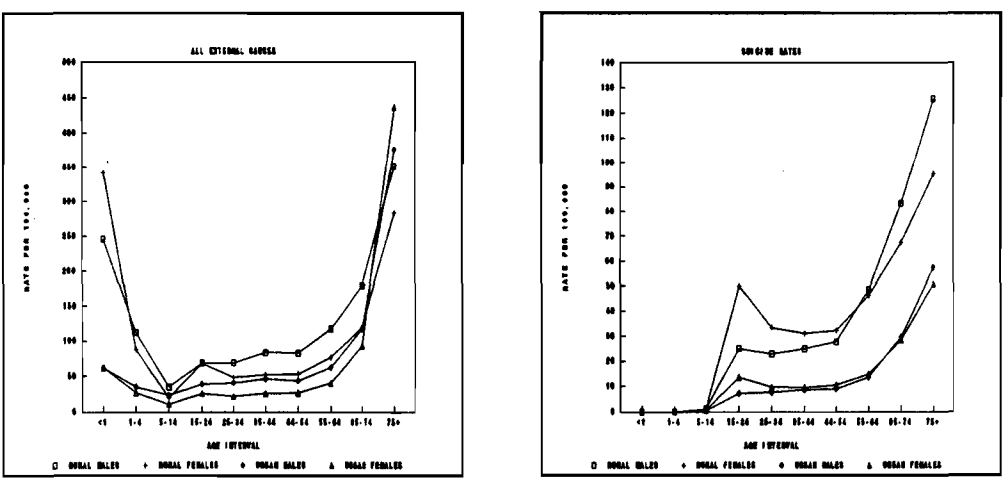

Figure 7. The Age Pattern of Death rates from All External Causes and of Suicides in Rural and Urban Areas of China

Among other causes, it might be worth examining the age patterns of suicide in the rural and urban areas since large difference was detected in the overall levels. From Figure 7, it is clear that the differences are negligible. At all ages, except 75 years and over, suicide rates are substantially lower in the urban areas for both men and women. In towns and villages, women are more prone to commit suicide than men when they are young; at older ages the rates for men increases more steeply than those of women. Thus the age pattern does not give us a clue to the mystery of high suicide rates in rural China.

(b) India: Data on death rates from selected external causes for the major states of India and pooled estimates for the eight largest cities are presented in Table 10. Additional information on mortality from selected accidents is provided in Table 11. Because of their poor quality, one ought to proceed cautiously in interpreting these data. As shown earlier, the police records, from which these estimates are derived, understate the volume of mortality from most causes. However, the hope is that they do not give a distorted picture of the regional variations.

Unlike the Chinese data examined earlier, the Indian data in Table 10 show the presence of a strong positive association between urbanization and fatality from transport-related accidents. Tamil Nadu, which has the second largest percentage of urban population among the Indian states, ranks first in fatal traffic accidents. Maharashtra, which ranks first in urbanization stands second in mortality from transport accidents. Predominantly rural states

such as Bihar, Orissa and Kerala show very low fatality from this cause. Further confirmation of the strong association between urbanization and fatal traffic accidents comes from the rates recorded for the eight largest metropolitan cities of India. The average rate for them is more than twice of the all-India average. The union territory of Delhi, which is 93 per cent urban, and where the predominant mode of commuting is through motorized vehicles, has a fatality rate twice as large as the observed average for the metropolitan cities.

Table 10. Death Rates from External Causes per 100,000 Population from Police Records for Major States and Cities of India, 1982-84 @

State/City/U.T.	Transport accidents	Total non-transport accidents	Total accidents	Suicide	Homicide	All external causes
Andhra Pradesh	6.6	9.3	15.8	5.9	2.7	24.5
Assam	3.4	7.6	11.0	10.1	3.5	24.6
Bihar	2.4	3.8	6.1	0.9	4.6	11.7
Gujarat	2.9	13.1	16.0	4.8	3.1	23.9
Haryana	3.8	7.2	11.0	3.9	3.4	18.2
Himachal Pradesh	2.9	6.7	9.6	2.5	1.8	13.9
Jammu & Kashmir	4.3	4.6	8.9	0.5	1.6	11.1
Karnataka	5.4	14.3	19.7	12.7	2.5	34.9
Kerala	2.9	7.1	10.1	19.6	2.0	31.7
Madhya Pradesh	5.8	24.2	30.0	5.6	4.7	40.3
Maharashtra	8.6	27.8	36.3	5.9	3.1	45.3
Orissa	2.9	9.8	12.7	7.8	2.3	22.8
Punjab	5.1	5.3	10.4	1.8	4.9	17.1
Rajasthan	3.5	8.5	12.0	2.6	2.8	17.4
Tamil Nadu	10.2	10.4	20.6	12.2	2.8	35.6
Uttar Pradesh	4.6	5.6	10.2	2.2	6.8	19.2
West Bengal	4.4	7.3	11.7	14.0	3.4	29.1
Delhi (U.T.)	24.5	23.9	48.4	6.3	6.6	61.3
Metropolitan cities #	12.7	22.8	35.5	7.9	3.5	46.9
India @	5.3	11.2	16.5	6.6	3.9	27.0

Average for the cities of Bombay, Calcutta, Delhi, Madras, Bangalore, Ahmedabad, Hyderabad and Kanpur.
@ Rates shown here were computed by excluding 23,994 accidental deaths of 1983 for which state-specific breakdowns were not available.

Among the transport-related deaths, about two-thirds occur on the roads (see Table 11). A large component of the remaining one-

third of the deaths is due to railway accidents. The regional pattern in the death rates from road accidents shows a strong association with the motorization of traffic. The correlation between the number of registered motor vehicles per population and fatality rate from road accidents is as high as 0.91. This, however, does not explain why Tamil Nadu shows unusually high incidence of deaths from this cause. The annual death toll from road accidents per 1,000 motor vehicles is 9 in Tamil Nadu compared with the all-India average of 4; Delhi and Maharashtra show a rate as low as 2 per 1,000 motor vehicles. It is doubtful that underreporting could alone account for the observed deviation. It needs to be investigated whether factors such as road conditions, overcrowding, speeding, and poor maintenance of vehicles are responsible for the high fatality from road accidents in Tamil Nadu.

Large underreporting has rendered the police data on the regional variation in mortality from non-transport accidents untrustworthy. Because the reporting of these accidents in a state tend to be uniformly either good or bad for all causes, the death rates from various accidents show strong ecological correlations among themselves. For example, death rates from 'other accidents' have a correlation coefficient of 0.83 with drowning, 0.83, with accidental fire, and 0.55 with accidents from natural and environmental factors. On the other hand, these accident do not show significant association with either road accidents or suicide or homicide. There is no conceivable reason why the non-vehicular

accidents should be associated among themselves but not with other forms of violent deaths, particularly when the reported correlations excluded the data for cities. It seems safe to assume that such a relationship exists in the published data because of the low priority accorded to the recording of these accidents in some states while others have been more scrupulous. From what we can judge, the data appear to be more complete in cities and in the states of Maharashtra and Madhya Pradesh. In the states of Bihar, Uttar Pradesh, Punjab and Jammu and Kashmir, mortality data from non-transport accidents are particularly deficient.

Table 11. Death Rates per 100,000 Population from Selected Accidents from Police Records for Major States and Metropolitan Cities of India, 1982-84 @

State/City/U.T.	Road accidents	Other transport accidents*	Poisoning	Fire	Animal bite	Other natural & environmental factors	Drowning	Other accidents
Andhra Pradesh	4.7	1.9	0.7	1.5	0.1	0.6	3.8	2.5
Assam	1.1	2.3	0.5	0.6	0.5	0.5	2.9	2.6
Bihar	1.2	1.2	0.3	0.8	0.2	0.4	1.3	0.9
Gujarat	1.1	1.9	0.7	4.7	0.2	1.0	2.5	4.0
Haryana	2.4	1.3	0.6	1.5	0.1	0.7	2.0	2.3
Himachal Pradesh	2.8	0.1	0.7	0.4	0.0	1.9	1.1	2.7
Jammu & Kashmir	4.0	0.3	0.0	0.2	0.0	1.1	1.0	2.3
Karnataka	4.7	0.7	1.8	2.2	0.4	0.3	5.2	4.4
Kerala	2.3	0.7	0.5	0.4	0.1	0.2	3.9	2.1
Madhya Pradesh	4.0	1.7	0.7	3.5	1.8	1.4	8.0	8.8
Maharashtra	3.2	5.4	1.2	6.8	0.8	0.6	7.2	11.0
Orissa	1.8	1.1	0.8	0.4	0.8	1.0	3.2	3.6
Punjab	3.3	1.9	0.4	1.2	0.0	0.5	1.0	2.2
Rajasthan	2.4	1.1	0.3	1.3	0.0	0.6	3.7	2.5
Tamil Nadu	7.5	2.7	3.2	2.1	0.1	0.2	2.3	2.5
Uttar Pradesh	3.3	1.3	0.2	0.9	0.1	0.6	0.9	2.9
West Bengal	3.6	0.8	1.8	1.3	0.2	0.3	1.2	2.6
Delhi (U.T.)	19.4	5.1	0.9	7.9	0.0	0.5	1.8	12.6
Metropolitan Cities #	11.6	1.2	1.3	8.2	0.1	0.4	2.7	10.1
India @	3.5	1.8	0.9	2.1	0.4	0.6	3.2	4.0

* From air and railway accidents only; other transport accidents have been included in the category of 'other accidents'.

@ See the note for Table 10.

Despite the poor quality of data on mortality from non-vehicular accidents, one striking feature does emerge from these tables: The incidence of fatal drowning in cities is lower than in rural areas while that of accidental fire is significantly higher. Because the recording of deaths is better in the cities, the difference in the case of drowning is much larger than what the data in Table 11 show. On the other hand, the difference is exaggerated in the case of fatality from fire, but underreporting may not be sole reason for all the observed difference. According the published data, in the metropolitan cities of India, one out of three reported deaths from non-transport accidents is due to fire, while the all-India average is one in five. As kerosene stoves are more frequently used in urban areas, the reported higher mortality from accidental fire there is in the expected direction. Also giving some credibility to the police data on accidents is the observation that death rates from animal bites and other natural and environment factors are much lower in the cities, which is certainly consistent with one's expectations.

The suicide rates show substantial regional variations. The southern states of Kerala, Tamil Nadu and Karnataka, and the eastern states of West Bengal and Assam show relatively high suicide rates. The entire northern belt, from Bihar to Punjab, report extremely low rates of suicide. Could this pattern be attributed to the degree of completeness of statistics on suicide in different states ? A correlation analysis suggested that the reported suicide rates varies positively with reported rates of

accidental poisoning (correlation coefficient, 0.55) and varies inversely with reported deaths from accidents from natural and environmental factors other than animal bite (-0.52). Other accidental deaths and homicide did not reveal any strong association with suicide. The statistically significant relationship between accidental poisoning and suicide does raise the possibility that some of the reported accidental deaths from poisoning could have been suicides by poisoning. But since the correlation is positive, the addition of these deaths to suicides would only accentuate the observed regional disparities. However, if some of the deaths attributed to natural and environmental factors are indeed suicides, the true regional pattern of suicide could be different from the one indicated by the reported rates. But odds are against possibility that suicides are mistaken for accidental deaths from natural and environmental factors.

We have earlier eluded to the possibility that some of the accidental fire deaths, especially those of females, could in reality be suicides. While statistically significant relationship was not found between reported rates of suicides and accidental fire, an analysis of data on the method used to commit the act did confirm our suspicion. As we saw earlier, the victims of accidental fire are primarily women, and fire is also a means used to commit suicide more among them than among men. In 1977-79, among the reported cases of suicides, the fire was the means employed in 11 per cent of the female cases and 4 per cent the male cases. Table 12 presents information on the methods adopted to

commit suicide in different parts of India. The data show a strong positive relationship between the percentage of suicides committed by burning oneself and the reported mortality from accidental fire. For example about 20 per cent of the reported cases of suicide in India's big cities are inflicted through fire, compared with the all-India average of 6 per cent. It may be recalled that reported death rates from accidental fire in the Indian cities are also substantially higher than in the country. The correlation between the incidence of fatal accidents and suicides by fire is as high as 0.83. Drowning is another means used more by women than men to commit suicide. However, there is no statistically significant relationship between the accidental and suicidal cases of drowning. But as one would expect from our earlier discussion, the correlation between the percentage of suicides by poisoning and reported fatality from accidental poisoning is high and statistically significant (0.59).[7]

Although there are significant regional variations, poison is the most commonly used method to commit suicide. Interestingly, it is more frequently used in states reporting higher rates of suicide (see Table 12). The correlation between the suicide rate and

[7] These positive correlations seem to indicate that a certain constant percentage of suicides are reported as accidental deaths in all the states. On the other hand, a negative correlation would have suggested that misclassification was not uniform in all the states, and thus the observed regional variation could not be trusted.

percentage of suicides by poisoning is 0.68 in the data presented in Table 12. There are two plausible explanations for the observed correlation. First, as suicides from poisoning are more difficult to detect, in states reporting low suicide rates, a large number of such cases are not counted, not even as accidental poisoning.[8] Second, in states reporting high incidence of suicides, poison is available easily to those contemplating suicide, and the availability does have an impact on the suicide rate. It is difficult to rule out either of the two, but the positive association we had found between reported incidence of accidental poisoning and suicide by poisoning appears to support the availability hypothesis. Unfortunately the police data do not give direct information on the type of poison involved, but other studies have indicated that it is usually a common insecticide (Rao, 1983). It is, however, unclear why insecticide should be more accessible to people of West Bengal, Kerala and Tamil Nadu and not to those in agriculturally more prosperous regions such as Punjab.

The northern states such as Uttar Pradesh, Bihar, Madhya Pradesh, Punjab, which report low incidence of suicide, have relatively high homicide rates. In the southern states, where suicides are more frequent, homicide cases are rare. But the product-movement correlation coefficient between the homicide rate

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[8] If they were counted as accidental poisoning, we would have observed an inverse association between reported cases of accidental poisoning and suicide rate.

and suicide rate, though negative, is not statistically significant (-.28). However, if Himachal Pradesh and Jammu & Kashmir - two small northern states that report low rates of both suicide and homicide - are excluded, the correlation does become significant (-0.52). In this connection, it may also be noted that in India's large cities suicide rates are higher than the all-India average while the homicide rates are lower. However, Delhi, with a high homicide rate, does not fall into this pattern; perhaps so because of its proximity to Uttar Pradesh. The general pattern of high suicide rates and low homicide rates in Indian cities is consistent with the Western experience.

Table 12. Percentage Distribution of Suicides by Method Used to Commit the Act for Major States and Cities of India, 1977-79

State/City/U.T.	Method used for committing suicide (in per cent)						Suicide rate, 1977-79	Males cases for 100 female cases
	Railway track	Poison	Fire	Drowning	Hanging	Others		
Andhra Pradesh	9.7	23.1	5.6	33.5	13.8	14.3	6.2	135
Assam	7.7	5.2	2.8	22.0	36.8	25.5	10.8	296
Bihar	8.5	10.4	10.3	26.2	18.7	25.9	1.1	129
Gujarat	6.6	22.2	16.4	22.7	8.7	23.5	4.9	127
Haryana	9.2	2.7	9.3	29.1	27.6	22.1	3.9	116
Himachal Pradesh	0.4	7.4	2.7	13.7	29.7	46.1	2.1	241
Jammu & Kashmir	0.0	12.9	8.2	11.8	15.3	51.8	0.5	166
Karnataka	2.1	19.2	5.2	32.2	15.4	25.9	13.6	133
Kerala	5.2	38.1	0.7	14.6	33.7	7.7	14.9	219
Madhya Pradesh	11.7	9.5	9.9	17.6	30.9	20.4	4.0	151
Maharashtra	5.7	26.8	11.8	26.6	14.0	15.1	5.4	146
Orissa	6.9	27.4	1.6	14.4	28.3	21.3	7.2	137
Punjab	29.1	9.3	7.5	18.1	22.2	14.0	1.8	337
Rajasthan	12.0	6.6	8.9	41.4	13.9	17.2	2.1	128
Tamil Nadu	7.5	34.0	6.1	18.9	13.1	20.5	9.0	169
Uttar Pradesh	16.5	5.3	11.1	14.0	16.7	36.3	2.9	171
West Bengal	4.4	41.0	4.5	5.7	25.4	19.0	13.4	109
Delhi (U.T.)	14.4	11.0	21.7	11.0	11.5	30.4	4.7	168
Metropolitan cities	2.6	19.9	18.7	16.4	15.5	26.9	5.6	131
India Total	7.1	25.3	6.4	19.7	21.2	20.2	6.1	148
Males	9.2	24.3	3.6	16.8	23.4	22.3	7.1	-
Females	3.9	26.9	10.7	24.1	18.0	16.4	5.1	-

The issue of homicide cannot be discussed meaningfully without

reference to the incidence of other crimes. Baldev Raj Nayar, who sometime ago did a detailed study of crimes in India observed that incidence of homicide and other offenses against the person tend to be spatially correlated with violent property offenses, such as robbery and dacoity (gang robbery), and with fraudulent practices, such as cheating, counterfeiting and criminal breach of trust (Nayar, 1975). He also observed that, as a group, offenses against the person was positively associated with the rate of growth of urbanization (but not with the level of urbanization), and negatively associated with unemployment and population density. It also had a strong positive relationship with the police strength, suggesting that either police are deployed more to areas of high crime rate, or their presence helps in the detection of crime, if not reducing the incidence.

Because of the highly uneven coverage of deaths from non-vehicular accidents in different parts of India, the observed regional variation in the overall mortality from all external causes is not reliable. For whatever it is worth, the metropolitan cities and states Maharashtra and Madhya Pradesh show relatively high mortality from external causes, while the northern states as block show relatively low mortality form these causes.

Trends in Mortality from Accidents and Violence

Time series data on Chinese mortality from accidents and violence were not available to us. For India, though the death rate estimates from the Registrar Generals's Survey of Causes of

Death are generally higher, they show large year-to-year fluctuations because they are based on a sample, and were computed using information on the overall mortality from a system mounted on another sample (i.e, SRS). On the other hand, the estimates made from the police records though less complete, show much smoother time-trend. In the following discussion we have made an attempt to use the data from both the sources in order to check the reliability of the trends they suggest. Although information does exit for some causes for earlier periods, because of their non-comparability, we have focused mainly on the period since 1970.[9] The latest year for which the information is available from the SCD is 1988, while the BPRD data are available only up to 1984 for accidents and suicides and up to 1986 for homicides. It should be recalled that while the coverage of BPRD is whole of India, the SCD covers only rural areas.

According to the SCD data, the share of external causes in the overall mortality has increased steadily in rural India since the mid-1960s (see Figure 8). In the late 1960s, about three per cent

[9] A major problem was in the treatment of deaths from 'other accidents' in the BPRD data in the years before and after 1971. Deaths classified under this category show a sudden fall in 1971, as though the coding procedure underwent a change. Deaths from several accidents showed a steep increase beginning that year. However, the official publications providing the data do not make a reference to the change in the coding practice if there was one.

of all deaths was from external causes. It had reached to 6.5 per cent in the late 1980s.[10] This naturally raises a question whether this trend is due to an increase in the death rates from external causes, or from a decline in the mortality from other causes. In the right-side panel of Figure 8 we have shown the trend in the overall death rate from external causes as revealed by the SCD and BPRD data. In order to reduce the fluctuations in the SCD-based estimates, and to make the underlying trend more visible, we have plotted the three-year moving averages of the estimates instead of the raw figures from this source.

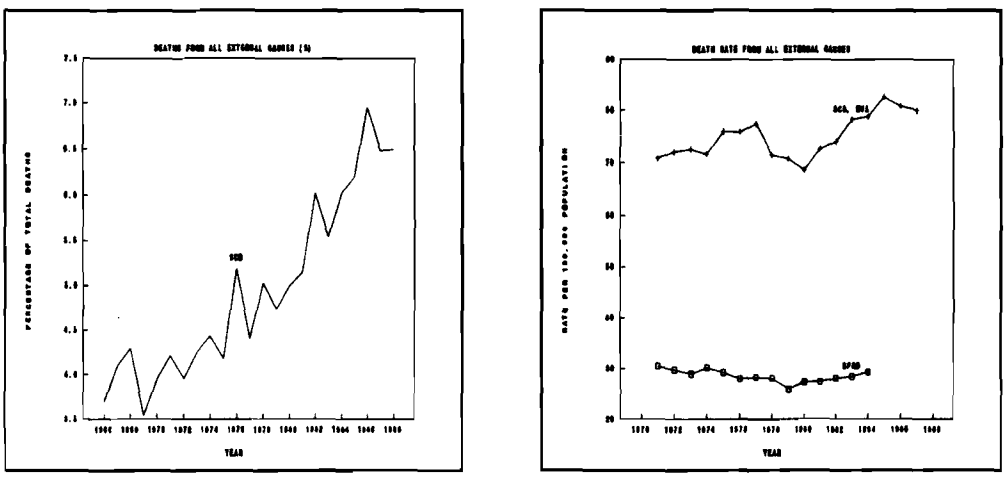

Figure 8. Trends in Deaths from All External Causes as Percentage of Total Deaths and as Rate per 100,000 Population, India

[10] These and other estimates quoted in this section are not adjusted for the suspected under enumeration of deaths of women and children in SCD because estimates for all the years were affected by this, more or less, to the same degree.

Both sources indicate a rise in the overall mortality from external causes during the 1980s. However, the two sources do not suggest a similar trend for the 1970s. The BPRD data suggest a steady decline in the death rates while the SCD data show an uneven trend for this decade. Both, however, suggest that mortality from all external causes reached a minimum around 1979.[11] In Table 13 we have shown the estimates of average annual rate of change in the death rates from various external causes for the 1970s and 1980s.[12] The average annual increase in the mortality from all external causes in the 1980s was 1.5 per cent according to the BPRD data, and 1.3 per cent according to the SCD data. The similarity in the suggested rates of increase is remarkable, even though the two estimates do not refer exactly to the same years. However, with the BPRD data showing an average decline of the same order as the increase it had shown for the 1980s, and the SCD data showing a statistically insignificant increase, no correspondence can be seen for the 1970s.

Because the external causes are such an heterogenous group, we must examine the trends in the death rates from each of the accidents and violence to obtain insights into the factors causing

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[11] Even though the smoothed estimates from the SCD attain their lowest value in 1980, the un-smoothed figures had their lowest value in 1979.

[12] These growth rates were derived by fitting the 'kinked-exponential' function to the observed trend in the death rates. See Boyce (1985) for the advantages and methodology of computation.

the change. The trend in mortality from one of the important members of this group, transport accidents, is shown in Figure 9. Both sources indicate that the death rate from transport accidents has been rapidly rising in India. According to the SCD, the annual increase in the mortality was about three per cent during the 1970s and 1980s (see Table 13). The BPRD data show an increase of five per cent per annum in the early 1980s, while the rate was only one per cent during the 1970s. The average rate for the entire period is thus about the same as that suggested by the SCD.

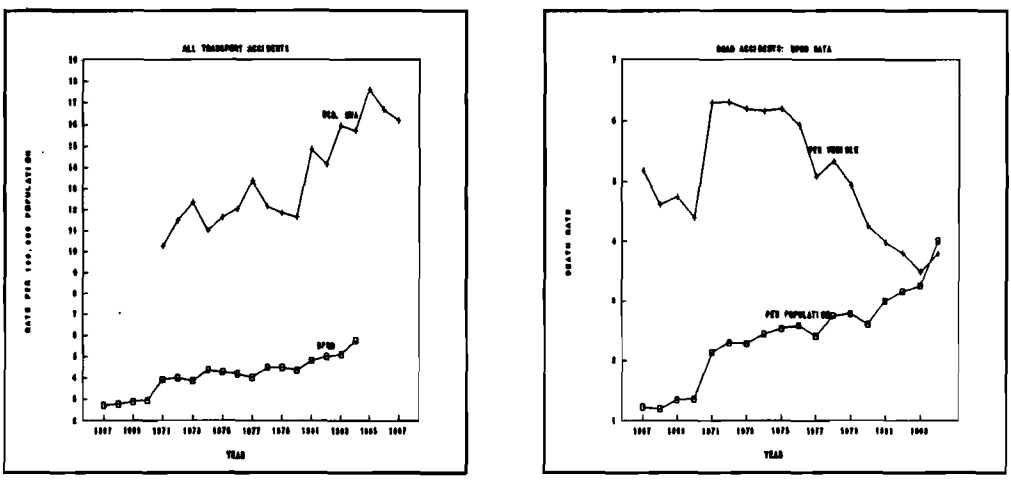

Figure 9. Trends in Death Rates from Transport Accidents in India

The BPRD also presents data separately on motor-vehicle accidents and other transport accidents. An examination of this data suggests that it is mainly the mortality from motor-vehicle accident that had shown a rising trend. The average rate of

increase in the death rate during 1971-84 is about four per cent per year. Death rates from other transport accidents (largely railway accidents) did not show a statistically significant upward trend during the period. The rise in mortality from road accidents could be attributed to the phenomenal growth in the motor vehicles in recent years. When the trend in the death rate per motor-vehicle is examined, we actually find a steady decline in the rate since 1976 (see Figure 9). This, however, should not be immediately attributed to safety improvements because the increase in the motor vehicle was so large as to decrease the population per vehicle.

One can view road accidents as a joint outcome of the size of the population and number of vehicles. Assuming a Cobb-Douglas 'production' process with constant returns to scale, we obtained the following result with the Indian data of 1971-84:

$$Log[D/P] = 0.213 + \underset{(2.38)}{0.481}\ Log[V/P] - \underset{(0.27)}{0.005}\ T \qquad R^2 = 0.90,\ DW = 1.77,$$

where D is deaths from road accidents, P is the population, V is number of registered motor vehicles, T is the time, and the values shown in parentheses are t-ratios.

The analysis clearly indicates that death rates from road accidents rose because of the increase in motor vehicles per population. Once this increase is accounted for, the time trend in the death rate became insignificant. The estimated elasticity of 0.48 suggests that under Indian conditions a one per cent increase in the motor vehicles makes deaths from road accidents rise by half

a per cent. Note that deaths from road accidents do not increase in the same proportion as the number of vehicles because of the fall in the population per vehicle. The above results also imply that a one per cent increase in the population also results in about half a percent (or more precisely, 1.0-.48) increase in deaths from road accidents. Interesting, estimates made from the cross-sectional data for 1982-84 also indicate elasticities of similar magnitude:

$$\text{Log}[D/P] = 0.507 + \underset{(3.35)}{0.554}\ \text{Log}[V/P] \qquad R^2 = 0.41,\ N = 18.$$

It may be noted here that half century ago, Smeed (1949) had made similar computations for the Western countries which implied an elasticity of 0.34 for motor vehicles and 0.73 for the population. Thus an increase in motor vehicles in India causes more fatal injuries than it did in the industrialized nations fifty years ago. One reason for this could be the composition of vehicles. Although the growth was seen among all types of motor vehicles in India in recent years, the increase was much steeper in the case of two-wheelers. This is a great deal of direct evidence showing much higher injury and fatality rates for two-wheeled motorized vehicles (see Waller, 1985). Our attempt to estimate separately the elasticities for two-wheelers and other vehicles proved futile because of high muticollinearity. However, both time-series and cross-sectional regressions did indicate the possibility that the elasticity estimate for two-wheelers could be larger than that of other vehicles.

Among other accidents, fire and drowning assume importance in

the Indian context. The trends in mortality from these causes are shown in Figure 10. Both sources indicate that there has been a sharp increase in the fatality rate from accidental fire during the 1980s. The increase was of the order of 4 to 6 per cent per year. However, the evidence for the 1970s is ambiguous. The rates derived from the BPRD indicate the possibility of slight decline during this period. The SCD suggests an increase in the early 1970s, followed by a sharp decline in the latter half of the decade, 1970-79. Nevertheless, both sources suggest a reversal of trend around 1979.

Table 13. Estimates of Annual Rates of Change (in Per Cent) in Death Rates from Various External Causes for India in 1970s and 1980s

Cause of Death	Bureau of Police Research and Development		Causes of Death Survey (Rural)	
	1971-79	1979-84	1970-79	1979-88
All accidents	-1.2 *	0.8	0.4	0.7
Transport accidents	1.2 *	4.7 *	3.0 @	2.9 @
Road accidents	2.3 *	6.5 *	-	-
Other transport accidents	-0.2	1.3	-	-
Non-transport accidents	-1.9 *	-0.8	-0.5	0.3
Poisoning	-6.7 *	-1.6	-	-
Fall	-	-	-1.5	-1.8
Fire	-1.0 @	5.6 *	-1.9	4.2 *
Animal bite	-6.2 *	8.0 *	1.2	-1.9 @
Other natural factors	0.9	-7.5	-	-
Drowning	-1.5 *	-4.5 *	0.9	-3.5 *
Other accidents	-1.6 *	-0.2	-1.1	3.5 *
Suicide	-3.9 *	2.5 *	0.7	3.1 *
Homicide	0.9 @	2.6 *	-0.7	2.8 *
All external causes	-1.6 **	1.5 **	0.9	1.3 @

@ Significant at 0.10 level.
* Significant at 0.05 level or beyond.

Contrary to the trend in accidental fire, the incidence of deaths from drowning declined rapidly during the 1980s. Both sources confirm this, and suggest a rate of decline of 3 to 5 per

cent. The BPRD data also indicate that fatality from drowning is on a long-term decline, with the pace quickening after 1979. But, while agreeing on the possibility of sharp decline in the 1980s, the rates computed from SCD show an irregular trend for the 1970s.

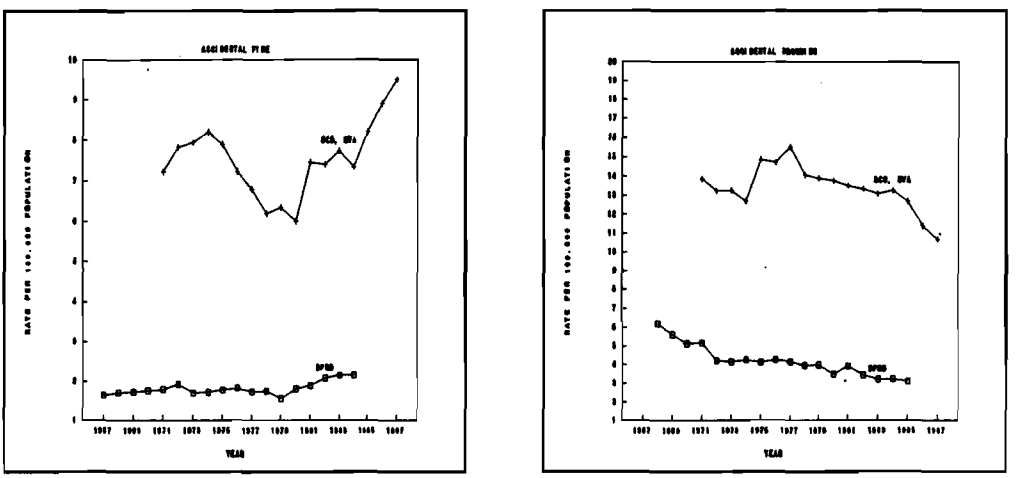

Figure 10. Trends in Death Rates from Accidental Fire and Drowning in India

Either because of contradictory evidence, or from the lack of information from one of the sources, we cannot be certain of the tends in fatality from other accidents. Nevertheless, a comment on the observed trend in fatality from animal bite is perhaps in order because of its importance in the Indian setting. According to the BPRD data, mortality from bites of animals such as snakes and dogs fell rapidly in the 1970s, but rose steeply in the early 1980s. We have reason to doubt the accuracy of the published figures for the

years 1980 to 1984 from this source, and thus the increase may be spurious.[13] The rates from SCD do indicate a decline in mortality from animal bites during the 1980s. They, however, do not show a decline during the 1970s.

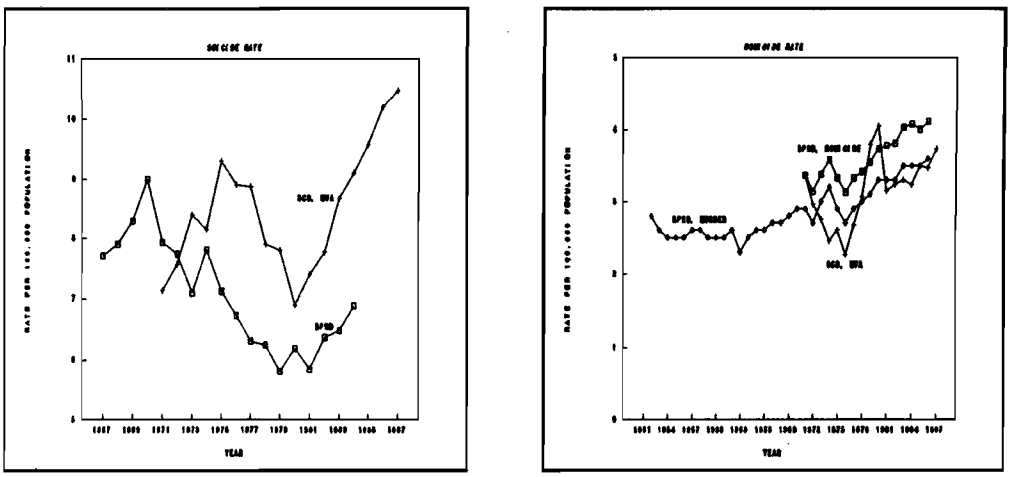

Figure 11. Trends in Suicide and Homicide Rates in India

[13] The Statistical Abstract for 1987, from which we have taken the data, had raised substantially the previously published figures for the years 1980 to 1983 on deaths from animal bite. But the sum of deaths from all accidents do not match the published total because it had remained the same as give in earlier years. While the figures published earlier do appear to be unusually low, the 'revised figures appear to be unusually high. Though we have used the latter, it is possible that the former figures were correct.

The rate of suicide also appears to have increased sharply during the 1980s (see Figure 11). Both sources confirm this, and the indicated rise is of the order of 2 to 3 per cent per annum. Interestingly, according to the BPRD data, suicide rates were falling during most of the 1970s. The SCD data while confirming the fall in the latter half of the decade, suggest that the incidence was rising during the first half of the decade. Since this increase in the early 1970s is shared by a number of causes, it may be reflecting the quality improvements either in the SCD, or in the SRS from which the crude death rates were taken. The similarity in the trends of suicide rates suggested by the two sources after 1976 is too striking to dismiss them as artifacts of data errors. Interestingly, the BPRD data indicate that compared with males, suicide rates of females fell less rapidly during 1970s but increased more rapidly during the 1980s (see Table 14).

The police records also provide information on the probable motive for suicide. This information is certainly not very reliable, especially in a country like India where, due to illiteracy, few of the victims can leave behind a note, even if they were inclined to do so. Nevertheless, it would be a mistake to dismiss this information as totally useless. Table 14 presents data on the reported causes of suicide, and how they are changing with time.

Dreadful diseases and marital problems are reported as the leading causes of suicide in India, but for about half of them no information is available on the motive. As one might have

suspected, women are more inclined to take their own lives because of marital problems and stifled love affairs than do men. Suicides from almost every cause had shown a tendency to fall during the 1970s, and to rise again during the 1980s, which appears to conform the skepticism expressed by Durkheim a century ago about the usefulness of this type of information. However, there are some exceptions to the general trend in the above data that do make some sense. Suicides for the reasons of poverty and dreadful diseases, which had rapid falls in the 1970s, did not share the general rise in the 1980s. This is at least partially consistent with the trends in the incidence of poverty. According to the estimates made by the Indian Planning Commission, the percentage of population below the poverty line declined from about 50 per cent in the early 1970s to 40 per cent in the early 1980s. The government statistics suggest a further fall in poverty in the 1980s, though the trend in the suicide rate do not appear to confirm this.

With the rapid decline in mortality, and better access to health care, it is not surprising if the incidence of suicide from dreadful diseases such as leprosy had shown a downward trend, and if it did not respond to the general upsurge in suicidal behavior in the 1980s. Other causes of suicides showing a deviant trend are those arising from property disputes and stifled love affairs. Suicide rates from these causes had remained nearly constant during the 1970s and the early 1980s. The reason for their deviant behavior is, however, unclear.

By employing the BPRD data one can also analyses the trend in the suicide rate by the method used to commit the act. During the general fall in the suicide rate in the 1970s the method showing the steepest fall was that of poisoning. Suicide rates from two other important methods, drowning and hanging, did not show an appreciable decline. Unfortunately data are not yet available for the 1980s to assess which methods were gaining in popularity.

Table 14. Percentage Distribution of Suicides by Cause, and Annual Rate of Change in Suicide Rate by Cause

Cause of suicide		Percentage distribution by causes, 1977-79		Annual rate of change in suicide rate by cause	
		Male	Female	1971-79	1979-84
Failure in examination		1.9	1.3	-7.8 *	8.7 *
Quarrel with parents-in-law		7.2	12.2	-6.3 *	3.7 *
Quarrel with spouse		4.2	8.7	-6.5 *	9.3 *
Poverty		3.3	2.6	-9.3 *	-0.3
Love affairs		5.0	6.9	-1.3	1.3
Insanity		2.9	2.6	-4.0 *	9.5 *
Property dispute		3.2	2.0	1.0	-3.1
Dreadful disease		16.6	15.7	-6.4 *	2.8
Unemployment		1.7	0.5	@	@
Bankruptcy		1.0	0.6	@	@
Death of dear-ones		0.6	0.6	@	@
Fall in social reputation		1.4	1.1	@	@
Other and unknown causes		50.9	45.3	-2.4 *	1.3
All causes	Total	100.0	100.0	-3.9 *	2.5 *
	Males	-	-	-4.3 *	2.2 *
	Females	-	-	-3.3 *	3.0 *

* Significant at 0.05 level or beyond.
@ Included in other and unknown causes due to non-availability of data for the entire period.

On homicide, data from police records are clearly superior, and available for a longer period (see Figure 11). However, it is only for the period after 1970 that we have information on the culpable homicide not amounting to murder, and the total homicide rate could be calculated from this source. The incidence of murder has been steadily rising in India since 1960, except for the

brief interruptions in 1963 and 1972. The low rates for these two years could be attributed to the war with China in 1962, and with Pakistan in 1971. A general decrease in the crime rate during the periods war (and a subsequent rise) is a frequently observed phenomenon (Archer and Gartner, 1984). However, incidence of murder did not decline during the 1965 war with Pakistan, though a number of other crimes did show a fall (see Nayar, 1975).

According to the police records, the homicide rate reached a peak in 1974, following an economic crisis. The increase in violent crimes supposedly prompted the government to declare a state of internal emergency in 1975. Whatever the real reason for the declaration of emergency, it did have the desired effect on homicide rate as it hit an all-time low in 1976. But since then the homicide rate has gone up at an accelerated pace. The average rate of increase in the 1980s is three per cent per year, which is three times the average rate for the 1970s. Even though the rates from the SCD show a highly irregular trend in the 1970s, they do confirm the acceleration in the 1980s.

An examination of the data on motives shows that personal vendetta (20 per cent) and dispute over property (15 per cent) are the main reasons for homicide. Other important motives are material gain, sexual causes and sudden provocation, each of which account for about 7 to 9 per cent of the cases. During 1971-86, homicides committed for personal vendetta and material gain have grown more rapidly than others. Homicide rates from sudden provocation, sexual causes, and property disputes have not shown a

clear tendency to increase during this period.

Before concluding, it is worthwhile to examine how far the age-distributional changes could explain the trends in the crude rates discussed above. We should distinguish between two plausible effects: a change in the crude rate without any change in the age-specific rates, and a change in the age-specific rates because of cohort-size variations. Indirect standardizations with the Indian age distributions show that the first of the two effects was negligible, and contrary to the observed trends in the crude rates in most cases. The mechanical effect of age structural changes during 1971-81 was to raise the suicide rate by five per cent and the homicide rate by four per cent. For 1981-87, the impact was found to be extremely small for both. But, as we saw earlier, the crude rate of suicide actually fell during most parts of the 1970s, and rose during the 1980s. Although the crude homicide rate did register an increase during 1971-81, the age distributional changes could account for only about half of the observed increase. Furthermore, the homicide rate continued to rise during the 1980s which the age-structural changes cannot explain at all. The age-standardization also revealed that the effect of age structural changes was even more trivial on all types of accident mortality.

A number of authors have observed a positive relationship between the size of the cohort and their suicide or homicide rate (e.g., Brenner, 1971; Easterlin, 1980). This is assumed to be a manifestation of the increased competition. In USA, the analysis of time series data indicates a strong positive correlation between

suicide, homicide, non-motor vehicle accident mortality rates of young adults and the proportion of the population in the age interval 15-24 (Holinger, 1987). How far the trends we observed in India could be due to such a phenomenon? The decennial censuses show that during 1971-81, population in the interval 15-24 grow by nearly three per cent while the total population increased by slightly more than two per cent. The age distributions from the SRS, while confirming this trend during the 1970s, indicate that the proportion of the population in the age interval 15-24 might have fallen during the 1980s. Population projections also indicate a similar trend for the 1980s.[14] Thus the age-distributional changes where such that they might have increased the mortality from violent causes during the 1970s, and reduced their level during the 1980s. We, however, do not observe such a trend for any cause; the suicide rate in fact shows the opposite trend. Therefore it is safe to assume that population variables had little role to play in the observed changes in mortality from accidents and violence.

Prevention and Control

With the data at hand, it was only possible to sketch a broad picture of the levels, trends and regional variations in mortality from accidents and violence. To suggest preventive measures a more in depth examination of causal factors is necessary. Nonetheless,

[14] The age distributions from the 1991 census of India are not yet available.

from the forgoing analysis a few suggestions can be made on the priority areas for preventive action.

Our data show that drowning in childhood is a major public health problem in both China and India. Much has been written about drownings in bathtubs and swimming pools in developed countries, but little is known about the causes of drowning in the developing world. A WHO study in the 1960s noted that in the city of Nagpur, India, majority of drownings are in domestic wells (WHO, 1966). Most of the reported deaths were, however, those of adults. It seems unlikely that this is a major risk factor among children, since domestic wells usually have a protective mud wall to stop the surface water from flowing into them. It is certainly within the reach of these countries to launch a public health campaign involving the local community to identify the sites of frequent drownings and take necessary preventive measures such as mounting fences, gates and other protective barriers at those places. Wherever it is not feasible to erect fences, such as at river edges, rescue equipments could be made available at selected spots.

To save life, immediate medical attention is a must in the case of drowning. There appears to have been some improvement in this respect in India as we observed a slow, but steady, decline in the death rate from drowning. But the rates are still very high. A policy measure that may help to bring down the incidence of drowning drastically, and seems practical, is to train some young men and women of each community in giving

cardiopulmonary resuscitation. This could be implemented by involving local women and youth organizations.

Motor-vehicle accident is the next important cause to worry. As the Indian data indicate, mortality from this cause is showing a steep increase. The risk appears to be particularly high among pedestrians. Based on the experience of developed countries, a number of legislative measures and promotional activities have been suggest to reduce mortality from this cause (e.g. WHO, 1989, Waller, 1985). They include measures for wearing seat belts or helmets, enforcement of speed limits, discouraging drinking and driving, prevention of overcrowding, regular inspection of vehicles, segregation of fast and slow moving traffic, improvement and construction of roads, designing safer vehicles, provision of emergency medical care, establishment of safety councils, training children to use pedestrian walkways, how to cross the road and to avoid playing on the road. However, these measure are unlikely to be successful without the development of a safety lobby. For that to emerge, it is essential that public be sensitized on how these accidents occur and on their social cost. Collection and analysis of more data on accidents would certainly make a beginning in this direction.

Mortality from accidental fire appears to be unusually high in India, especially among young women. Although one can debate on how much of this is really caused by accidents, it cannot be denied that Indian women are more exposed to this risk from the use of kerosene stoves, home-made lamps, clothing made from flammable

fabrics and saris that can easily brush against hot surfaces. There is a need to mount an nation-wide educational campaign to sensitize the public on the dangerous involved, and to promote the use of safer stoves and lamps. There is also the need to take macroeconomic measures to promote the use of clothing made from flame-retardant fabrics and to discourage the use of kerosene for cooking and lighting. In cities such as Bombay and Delhi, where the incidence of accidental fire is particularly high, legislative measures to promote the use of smoke alarms and fire extinguishers should be explored. Again, the success in a large measure would depend upon how vocal women and safety lobbies are.

Suicides pose far greater public health problem than homicides in both the countries considered here. Going by the experience of Western nations, it is also not a cause that can be prevented easily. Nevertheless, several measures that may help to bring down the incidence of suicide can be suggested: First is the establishment of community suicide prevention centers, especially in regions of high suicide rates, such as Kerala and West Bengal in India.[15] Wherever the telephone service is inadequate, walk-in clinics could be opened. Two supporting measures would be necessary to make these centers perform effectively. Attempted

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[15] There is some literature suggesting that these centers might not be of much help (see Clarke and Lester, 1989 for a review). However, most of the studies on the subject seem to ignore the problem simultaneous causation, i.e, deliberate location of suicide prevention centers in areas of suicide rate.

suicide should be ceased to be treated as a criminal offence so that suicidal persons can freely choose the help of a counselor. The existence of these centers should be well publicized, but only along with a strong message that suicide is an escapist's solution to life's problems and that it brings grief and suffering to those close to the person committing the act. Such a precaution is necessary because suicide is often an imitative behavior, and publicity can have an adverse impact on the suicide rate (Clarke and Lester 1989).

Second plausible measure is to restrict the access to lethal means to commit suicide. At first thought, this seems futile because it is always possible to find a way to die. But evidence seems to be accumulating that reduction in the availability of frequently employed methods results in a fall in the suicide rate (Clarke and Lester 1989). This seems to suggest that people often commit suicide because of easy access to a lethal means during a moment of temporary despair and weakening of the moral restraint against the act. Our own data on India suggest that suicide rates are higher in states where poison is the means more frequently used to commit the act, and where the incidence of accidental poisoning are higher. We were unable to explain the large difference the suicide rates of rural and urban areas of China, but it would not be surprising if this is partly due to the greater availability of pesticides in rural China. There is thus a case for examining the system of marketing and distribution of pesticides in these countries, and taking steps to curb their misuse.

The third strategy for reducing the suicide rate is to confront the socio-economic conditions that are responsible for its high incidence. Unemployment and alcoholism are considered to be strongly associated with suicide rates, and their reduction may help to bring suicide rates down. However, in India and China, a more important reason for suicide is the low status accorded to young women. The empowerment of women through female education and by mobilizing public opinion against sex-discrimination, and liberalization of grounds for divorce are, therefore, likely to have a greater impact; however, as female roles become similar to those of males, more women are likely to commit suicide for the same reasons men do currently.

The homicide rate is so low in China that many countries can learn from its experience. The major challenge there is to keep it at that level as households acquire more freedom in choosing the items of consumption and production. In India, one observes a sharp rise in the incidence of homicide since 1976. Revenge is becoming more important as a motive for murder. This seems to indicate that people are loosing faith in the penal system, and taking law unto their own hands. The prompt detection and speedy conviction of criminals can go a long way in restoring credibility to the system. Unless the figures are highly misleading, India's own experience during the so called emergency period (1975-76) is a pointer to the fact that a determined law-enforcing machinery is able to check the upsurge in the crime rate. For a lasting solution, however, it would be essential to address the problems of

unemployment and inequality that plague the nation.

Summary

In this paper we have analyzed some new material on the epidemiology of deaths caused by accidents and violence in China and India. Data on China come from medically certified deaths for over 100 million people in the eastern part of the country. For India we have used the data collected through a lay-reporting scheme in rural areas, along with those compiled by the Police. Even though the data for India seem less satisfactory, the availability of duel data sources helps in narrowing down the region of uncertainty.

The analysis reveals that for both males and females, the total volume of mortality from external causes is about the same in India and China. However, the specific causes of accidents and violence that make up the total appears to be quite different in the two countries. In rural China, drowning in childhood and suicide among adults are the leading external causes; deaths from transport accidents form only a distant third. The rate of suicide, especially among young women, is extremely high in rural China. In urban China, however, suicide and drowning are much less frequent, and mortality from traffic accidents are also not significantly higher than in the rural areas. Thus the overall mortality from external causes in the urban areas is nearly half of its level in the rural areas.

In rural India, in addition to drowning, accidents from

natural and environmental factors such as animal bite and excessive cold cause substantial fatality among children. At older ages, traffic accidents among males, and accidental fire among females are reported as the leading external causes. However, one must also treat suicide as a leading cause of violent deaths among Indian women since there is a possibility that a large proportion of the reported deaths from accidental fire are in reality suicides. In Indian cities, though drowning is less common, deaths from traffic accidents and fire are more frequent. The incidence of suicide is somewhat higher in the cities while the homicide rate is somewhat higher in the rural areas.

For India, there is a strong evidence indicating a steady increase in mortality from road accidents and homicides, and a decline in fatal drownings. Suicides and accidental-fire deaths have also shown a tendency to increase during the 1980s, after a fall in the 1970s. From the available data it was not possible assess the trends in mortality from accidents and violence in China.

The paper also discusses the probable factors underlying the levels, trends and patterns in these two countries and suggest some policy measures for the prevention of mortality from violent causes.

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Appendix

Table A1: Age- and Sex-Specific Death Rates from External Causes, Rural India, 1984-88

Cause of Death	Age Interval							All ages
	0-4	5-14	15-24	25-34	35-44	45-54	55+	
				Males				
All accidents	95.5	55.4	64.8	60.8	67.8	88.2	97.0	72.2
Vehicular accident	13.0	10.9	24.4	23.7	26.9	32.7	25.7	20.6
Fall	8.1	4.5	3.7	3.8	4.5	9.7	16.5	6.3
Fire	10.4	2.1	3.8	4.6	5.0	2.7	4.1	4.5
Animal bite	14.3	14.3	9.3	5.9	7.5	10.7	10.2	11.0
Other natural factors	11.4	1.4	1.4	0.9	1.5	3.8	10.6	3.7
Drowning	23.7	17.3	9.6	7.3	6.3	8.8	10.8	13.2
Other accidents	14.6	5.0	12.7	14.7	16.0	19.8	19.0	12.9
Suicide	0.7	0.8	15.0	13.2	13.9	9.4	11.9	8.4
Homicide	1.0	0.4	4.7	5.7	7.3	5.6	8.1	3.9
All external causes	97.1	56.7	84.5	79.7	89.0	103.2	116.9	84.5
				Females				
All accidents	80.4	46.9	65.3	42.1	33.3	50.8	66.0	54.7
Vehicular accidents	9.3	8.2	5.8	4.8	4.0	9.7	11.9	7.4
Fall	6.2	2.9	1.9	1.9	2.3	5.4	9.9	3.8
Fire	6.2	4.8	25.9	19.8	11.1	7.9	8.2	12.5
Animal bite	13.2	11.2	6.6	5.0	6.5	10.4	9.3	8.9
Other natural factors	9.3	1.0	2.2	0.9	2.1	2.9	9.5	3.4
Drowning	20.2	14.3	13.4	6.0	4.4	7.2	8.0	11.4
Other accidents	15.9	4.5	9.4	3.8	2.9	7.2	9.3	7.3
Suicide	1.2	1.3	20.2	11.5	8.0	8.6	7.2	8.2
Homicide	0.0	0.7	1.9	2.2	1.3	3.2	2.5	1.5
All external causes	81.6	48.9	87.4	55.7	42.4	62.7	75.6	64.3

Source: India, Registrar General Survey of Causes of Death (Rural), Issues for 1984 to 1988.

Table A2: Age- and Sex-Specific Death Rates from External Causes, Rural China, 1987-89

Cause of Death	Age Interval										All ages
	< 1	1-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75+	
Males											
All accident s	245.0	112.0	33.0	41.1	43.9	56.0	53.0	66.3	93.3	222.8	57.3
Motor-vehicle accidents	1.6	5.1	3.8	9.6	14.3	18.8	17.2	20.6	23.8	33.6	12.2
Other transport accidents	0.4	0.5	0.2	1.0	1.1	1.9	2.0	1.9	2.4	5.9	1.2
Poisoning	6.6	2.4	0.8	2.1	2.4	3.3	4.2	7.5	10.2	18.3	3.2
Fall	5.1	2.7	1.7	3.9	4.9	7.6	8.1	12.7	19.3	66.7	6.5
Fire	3.1	3.1	0.7	0.8	0.7	0.7	1.0	2.0	5.2	28.0	1.6
Natural factors	4.2	0.7	0.4	1.1	1.2	1.8	1.6	2.3	3.8	9.6	1.4
Drowning	9.2	86.7	22.2	9.9	5.5	5.9	5.9	7.4	13.1	28.7	16.1
Suffocation	183.1	2.0	0.3	0.5	0.5	0.5	0.4	0.5	0.6	2.3	3.7
Falling object	1.1	3.4	0.7	3.7	5.0	6.2	5.0	4.2	3.7	4.7	3.7
Other accidents	30.7	5.3	2.2	8.5	8.4	9.1	7.5	7.3	11.3	25.0	7.6
Suicide	0.0	0.0	1.1	25.0	22.8	24.9	27.7	48.6	83.2	125.8	23.1
Homicide	0.9	0.5	0.4	2.7	2.5	2.2	1.9	2.2	2.7	2.5	1.9
All external Causes	245.9	112.5	34.6	68.7	69.2	83.1	82.5	117.1	179.3	351.0	82.3
Females											
All accidents	340.0	87.7	18.1	17.3	13.3	20.0	19.8	29.1	51.0	186.4	31.9
Motor-vehicle accidents	3.2	3.9	2.5	4.7	4.4	7.2	6.6	8.4	10.8	13.6	5.3
Other transport accidents	0.5	0.4	0.1	0.5	0.5	0.9	1.0	1.4	1.6	3.5	0.7
Poisoning	7.2	2.4	0.8	1.6	1.5	1.5	1.8	2.6	4.8	7.8	1.9
Fall	5.8	2.2	0.9	1.2	1.1	2.2	3.3	5.6	11.7	72.0	4.0
Fire	5.0	1.8	0.4	0.4	0.2	0.4	0.3	0.8	3.7	22.0	1.2
Natural factors	6.9	3.9	0.9	0.9	0.6	0.8	1.1	1.3	2.0	11.4	1.4
Drowning	13.9	67.2	11.0	5.5	2.8	3.4	2.5	4.7	9.9	30.6	10.4
Suffocation	257.7	1.8	0.1	0.1	0.1	0.1	0.1	0.2	0.3	1.3	3.3
Falling object	1.4	0.6	0.4	0.6	0.5	0.7	0.7	1.3	1.2	1.7	0.7
Other accident	38.4	3.6	1.0	1.9	1.7	2.8	2.5	2.8	4.9	22.5	3.1
Suicide	0.0	0.0	1.2	49.9	33.4	30.9	32.2	46.2	67.5	95.2	31.5
Homicide	1.6	0.5	0.3	0.9	1.1	1.1	0.6	1.0	0.8	1.0	0.8
All External causes	341.6	88.2	19.5	68.3	47.9	52.0	52.7	76.3	119.4	283.3	64.3

Source: World Health Organization World Health Statistics Annual, Issues for 1989 and 1990.

MORTALIDAD POR ACCIDENTES Y VIOLENCIA EN INDIA Y CHINA

MARI BHAT

Resumen

En este documento hemos analizado algun material nuevo en la epidemiología de las muertes causadas por accidentes y violencia en China e India. La información sobre China proviene de muertes certificadas por médico de sobre 100 millones de personas en la parte Este del país. Para la India se utilizó información reunida a través del sistema de informantes legos ("lay reporting") en áreas rurales, junto con la recopilada a través de la policía. A pesar de que la información para la India parece menos satisfactoria, la disponibilidad de las fuentes de información de duelos ayuda a reducir el rango de incertidumbre.

El análisis revela que para hombres y mujeres, la mortalidad total por causas externas es aproximadamente la misma en la India y China. Sin embargo, las causas específicas por accidentes y violencia que integra el total, parece ser muy diferente en los dos países. En la zona rural de China, las causas externas líderes son los ahogados en la niñez y los suicidios entre adultos; las muertes por accidentes de transporte están en un distante tercer lugar. La tasa de suicidio, especialmente entre las mujeres jóvenes, es extremadamente alta en la zona rural de China. En la zona urbana de China, sin embargo, el suicidio y los ahogados son mucho menos frecuentes, y la mortalidad por accidentes de tránsito es también más alta que en las áreas rurales. Así, la mortalidad total por causas externas en las áreas urbanas es casi la mitad del nivel en las áreas rurales.

En la zona rural de la India, además de los ahogamientos, los accidentes por factores naturales y medioambientales, tales como mordida de animales y frio excesivo, causan una sustancial fatalidad entre los niños. En edades más avanzadas, los accidentes de tránsito entre los hombres, y los accidentes con fuego entre las

mujeres, son informados como las causas externas líderes. Sin embargo, se debe tratar también al suicidio como una causa lider de muertes violentas entre las mujeres de la India desde que hay una posibilidad de que una gran proporción de las muertes informadas por accidente y fuego son más frecuentes. La incidencia del suicidio es algo más alta en las ciudades, mientras que la tasa de homicidio es algo más alta en las áreas rurales.

Para la India, hay una fuerte evidencia que indica un continuo crecimiento en la mortalidad por accidentes de carretera y homicidios, y un descenso en ahogamientos fatales. Las muertes por suicidios y accidentes por fuego también muestran una tendencia a crecer durante la década del ochenta, después de una caída en los setenta. A partir de los datos disponibles no fue posible establecer la tendencia en la mortalidad por accidentes y violencia en China.

El documento también trata los probables factores que subyacen en los niveles, tendencias y patrones en estos dos países y sugiere algunas medidas de políticas para la prevención de mortalidad por causas violentas.

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