

Suicide rates in China, 1995–99

Michael R Phillips, Xianyun Li, Yanping Zhang

Summary

Background A wide range of suicide rates are reported for China because official mortality data are based on an unrepresentative sample and because different reports adjust crude rates in different ways. We aimed to present an accurate picture of the current pattern of suicide in China on the basis of conservative estimates of suicide rates in different population cohorts.

Methods Suicide rates by sex, 5-year age-group, and region (urban or rural) reported in mortality data for 1995–99 provided by the Chinese Ministry of Health were adjusted according to an estimated rate of unreported deaths and projected to the corresponding population.

Findings We estimated a mean annual suicide rate of 23 per 100 000 and a total of 287 000 suicide deaths per year. Suicide accounted for 3·6% of all deaths in China and was the fifth most important cause of death. Among young adults 15–34 years of age, suicide was the leading cause of death, accounting for 19% of all deaths. The rate in women was 25% higher than in men, mainly because of the large number of suicides in young rural women. Rural rates were three times higher than urban rates—a difference that remained true for both sexes, for all age-groups, and over time.

Interpretation Suicide is a major public-health problem for China that is only gradually being recognised. The unique pattern of suicides in China is widely acknowledged, so controversy about the overall suicide rate should not delay the development and testing of China-specific suicide-prevention programmes.

Lancet 2002; **359**: 835–40
See *Commentary* page 813

Introduction

The official report on mental health by the Chinese government,¹ presented at a WHO-Ministry of Health collaborative meeting held in Beijing in November, 1999, identified suicide as one of the priorities for mental-health work in China, and reported a national suicide rate for 1993 of 22·2 per 100 000. When applied to China's large population, this rate translates to over 250 000 suicide deaths per year and makes suicide one of the leading causes of death for the country. The Ministry of Health has provided WHO with official mortality statistics that include deaths from suicide since 1987,² but the 1999 report represented the first high-level recognition of the public-health importance of suicide for China.

Despite the availability of official figures, reported estimates of China's suicide rate vary over a wide range; for example, reported rates for 1990 range from 13·9³ to 30·3⁴ per 100 000. This disparity stems from two separate causes. Like many developing countries, China does not have a complete vital registration system; the official mortality figures provided to WHO are based on data from about 10% of the population (more than 100 million individuals). This sample is collected from locations that have relatively good reporting mechanisms, so it has a much higher proportion of urban residents than is true of the population as a whole. Given the large differences in urban versus rural suicide rates (rural rates are three-fold higher than urban rates), presentation of the suicide rate in the overall sample as China's national rate, as is done in some of the WHO statistical annuals² and by several authors,^{5–7} seriously underestimates China's suicide rate.

The second reason for the confusion is that the Global Burden of Disease (GBD) study^{4,8} and the 1999 WHO World Health Report⁹ estimate much higher suicide rates for China than the official figures from the Chinese Ministry of Health published in the WHO statistical annuals.² The GBD study applied several adjustments to mortality data from China's Disease Surveillance Points system to estimate 343 000 suicides in 1990 (30·3 per 100 000), and WHO used similar methods to estimate 413 000 suicides in 1998 (32·9 per 100 000). On the basis of these results—which are about 40% higher than official Chinese figures—China accounts for 21% of the world's population but for 44% of all suicides in the world and for 56% of all female suicides in the world.¹⁰

In this paper, we aim to present an accurate picture of the current pattern of suicides in China on the basis of conservative estimates of the rates of suicide in different sex, age, and region cohorts. We use the most recent mortality data for China provided by the Ministry of Health, and detailed population and mortality estimates from China's Bureau of Statistics, to estimate the numbers and rates of suicide in China for 1995–99. The reliability of these figures and the reasons for the differences between these conservatively adjusted “official” suicide rates and the much higher rates estimated by the GBD study and WHO are discussed.

Methods

The statistical division of the Chinese Ministry of Health provided mortality data (with categories from the 9th revision of the International Classification of Diseases) for

Beijing Suicide Research and Prevention Center, Beijing Hui Long Guan Hospital, Beijing 100096, China (M R Phillips MD, X Li MD, Y Zhang MD); and **Department of Social Medicine, Harvard Medical School, Boston, MA, USA** (M R Phillips)

Correspondence to: Dr Michael R Phillips
(e-mail: phillips@public3.bta.net.cn)

Population group	Age-group (years)												
	15-34			35-59			60-84			All ages			
	Population (millions)	Suicide rate*	% of all deaths due to suicide	Population (millions)	Suicide rate*	% of all deaths due to suicide	Population (millions)	Suicide rate*	% of all deaths due to suicide	Population (millions)	Suicide rate*	Number of suicides	% of all deaths due to suicide
Region													
Rural	342.5	30.3	20.4%	264.4	29.5	6.3%	95.0	82.8	2.1%	981.2	27.1	26 916	4.0%
Urban	91.3	10.2	10.3%	81.5	8.3	2.5%	27.3	16.7	0.5%	254.5	8.3	21 098	1.5%
Rural/urban ratio	..	2.98	..	..	3.56	..	..	4.96	..	..	3.27	..	..
Sex													
Women	216.2	32.1	29.0%	169.0	25.6	7.7%	63.1	64.3	2.0%	606.7	25.9	156 841	4.4%
Men	217.6	20.0	12.1%	176.9	23.4	4.4%	59.2	72.0	1.7%	629.0	20.7	130 173	2.9%
Male/female ratio	..	0.62	..	..	0.91	..	..	1.12	..	..	0.80	..	..
Sex by region													
Rural women	170.5	37.8	31.0%	128.3	31.3	8.7%	49.2	77.9	2.3%	480.3	30.5	146 335	4.9%
Rural men	172.0	22.8	13.1%	136.1	27.8	4.9%	45.8	88.0	2.0%	500.9	23.9	119 580	3.3%
Rural male/female ratio	..	0.60	..	..	0.89	..	..	1.13	..	..	0.78	..	..
Urban women	45.7	10.8	15.8%	40.6	7.5	3.1%	13.9	16.1	0.6%	126.4	8.3	10 506	1.7%
Urban men	45.6	9.5	7.4%	40.8	9.0	2.1%	13.4	17.3	0.5%	128.0	8.3	10 592	1.3%
Urban male/female ratio	..	0.89	..	..	1.20	..	..	1.08	..	..	1.00	..	..
Total population	433.9	26.0	18.9%	345.9	24.5	5.6%	122.3	68.0	1.8%	1235.7	23.2	287 013	3.6%

*Per 100 000. Following the classification of the urban and rural population used by the Chinese Ministry of Health, the urban population is the population of cities and the rural population is the population of towns and counties.

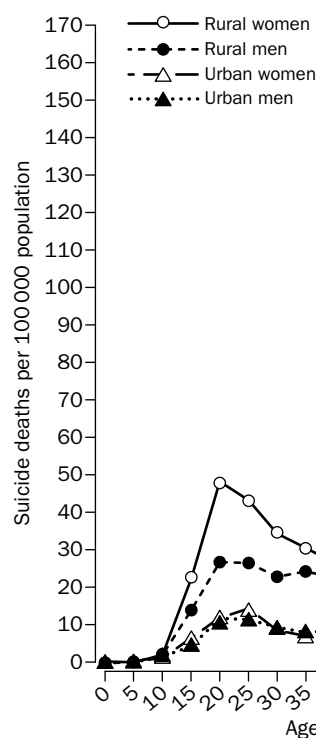
Table 1: Mean annual rates of suicide in different population groups in China, 1995-99

1995-99 from its vital registration system. These data provide the rates of death by cause and sex for 18 5-year age-groups for urban and rural residents (a total of 72 cohorts). Over the 5 years, this system recorded 3.53 million deaths and 78 000 suicides from a sample population of, on average, 110 million individuals located in 21 provinces, 36 cities, and 85 counties. The data are based on physicians' death certificates, which are submitted to police departments by family members and then forwarded to the municipal, provincial, and national departments of health. Families are required to present death certificates to get permission for cremation or burial.

Over the 5 years, 57% of the population covered by this registration system was urban (from cities), but data from China's Bureau of Statistics¹¹ indicate that the proportion of the population living in cities during this period was only 22%. We adjusted for this regional unrepresentativeness by projecting the sex-specific, age-specific, and region-specific mortality rates in the vital registration data for each year to the total population for each year reported by the Statistics Bureau;¹¹ the proportion of the total population assigned to each of the 72 cohorts is based on the proportions found in the Statistics Bureau's 1995 1% sample survey¹¹ (a nationally representative sample of 12.4 million individuals).

Mortality estimates reported by the Statistics Bureau for each year are used to estimate the rate of unreported deaths in the Ministry of Health vital registration system. The expected number of deaths in each cohort is estimated by distribution of the total number of deaths for each year reported by the Statistics Bureau¹¹ to the 72 cohorts; the proportion of total deaths assigned to each cohort is based on the proportion of deaths in each cohort in the 1995 sample survey,¹¹ which identified 79 619 deaths. The rate of unreported deaths for each year in each age, sex, and region cohort in the Ministry of Health vital registration system is then estimated by comparison of the expected number of deaths in the cohort (based on the Statistics Bureau data) with the number of deaths predicted by applying the Ministry of Health's overall crude death rate for the cohort.

Finally, the total number of suicides for each cohort in each year was calculated by adjusting the suicide rate in the Ministry of Health data by the estimated rate of unreported deaths and then applying this adjusted rate to the population of the cohort in the specified year. The mean annual number of suicides for the different cohorts are the simple means over the 5 years, and the mean rates are the combined number of suicides divided by the combined size of the cohort over the 5-year period. The national, region-specific, and sex-specific numbers and rates of suicide were



Rates of suicide in China, 1995-99

Rank	Cause of death	Rate of death*	Proportion of all deaths in group (%)	Rank	Cause of death	Rate of death*	Proportion of all deaths in group (%)
Rural women				Urban women (continued)			
1	Chronic bronchitis, emphysema, and asthma	117.40	18.95	9	Pulmonary heart disease	9.28	1.91
2	Cerebrovascular disease	102.62	16.56	10	Road-traffic accidents	8.40	1.73
3	Pneumonia	31.27	5.05	11	Colon and rectal cancers	8.34	1.72
4	Suicide and self-inflicted injury	30.47	4.92	12	Suicide and self-inflicted injury	8.31	1.71
5	Perinatal conditions	24.72	3.99	13	Pneumonia	8.04	1.65
6	Pulmonary heart disease	18.35	2.96	14	Nephritis and nephrosis	7.37	1.52
7	Stomach cancer	15.58	2.52	15	Breast cancer	7.25	1.49
8	Liver cancer	14.78	2.39		All causes	485.64	100.00
9	Acute myocardial infarction	13.94	2.25	Urban men			
10	Birth trauma, hypoxia, and birth asphyxia	12.89	2.08	1	Cerebrovascular disease	126.82	20.36
11	Oesophageal cancer	12.52	2.02	2	Chronic bronchitis, emphysema, and asthma	62.03	9.96
12	Tracheal, bronchial, and lung cancers	11.52	1.86	3	Tracheal, bronchial, and lung cancers	48.05	7.72
13	Road-traffic accidents	11.04	1.78	4	Liver cancer	30.79	..
14	Drowning	10.64	1.72	5	Acute myocardial infarction	30.49	4.90
15	Chronic rheumatic heart disease	8.61	1.39	6	Stomach cancer	23.43	3.76
	All causes	619.52	100.00	7	Road-traffic accidents	21.00	3.37
Rural men				8	Chronic liver disease and cirrhosis	12.46	2.00
1	Chronic bronchitis, emphysema, and asthma	122.41	16.89	9	Oesophageal cancer	11.74	1.89
2	Cerebrovascular disease	115.70	15.96	10	Diabetes mellitus	10.23	1.64
3	Liver cancer	36.30	5.01	11	Pulmonary heart disease	9.72	1.56
4	Gastric cancer	27.75	3.83	12	Colon and rectal cancers	9.69	1.56
5	Pneumonia	26.86	3.71	13	Perinatal conditions	9.54	1.53
6	Road-traffic accidents	26.50	3.66	14	Suicide and self-inflicted injury	8.27	1.33
7	Tracheal, bronchial, and lung cancers	25.91	3.57	15	Pneumonia	7.69	1.23
8	Suicide and self-inflicted injury	23.87	3.29		All causes	622.77	100.00
9	Perinatal conditions	21.69	2.99	Total population			
10	Oesophageal cancer	21.32	2.94	1	Cerebrovascular disease	110.41	17.02
11	Pulmonary heart disease	18.05	2.49	2	Bronchitis, emphysema, and asthma	107.15	16.51
12	Acute myocardial infarction	17.12	2.36	3	Liver cancer	24.78	3.82
13	Drowning	17.08	2.36	4	Pneumonia	24.66	3.80
14	Chronic liver disease and cirrhosis	15.59	2.15	5	Suicide and self-inflicted injury	23.23	3.58
15	Pulmonary tuberculosis	11.61	1.60	6	Tracheal, bronchial, and lung cancers	22.27	3.43
	All causes	724.85	100.00	7	Stomach cancer	20.93	3.22
Urban women				8	Perinatal conditions	20.39	3.14
1	Cerebrovascular disease	102.42	21.09	9	Road-traffic accidents	18.07	2.78
2	Chronic bronchitis, emphysema, and asthma	53.44	11.00	10	Acute myocardial infarction	17.67	2.72
3	Tracheal, bronchial, and lung cancers	22.60	4.65	11	Pulmonary heart disease	16.41	2.53
4	Acute myocardial infarction	21.09	4.34	12	Oesophageal cancer	15.16	2.34
5	Diabetes mellitus	14.62	3.01	13	Drowning	12.00	1.85
6	Gastric cancer	11.66	2.40	14	Chronic liver disease and cirrhosis	11.26	1.73
7	Liver cancer	11.02	2.27	15	Birth trauma, hypoxia, and birth asphyxia	10.40	1.60
8	Perinatal conditions	9.76	2.01		All causes	648.86	100.00

Uses categories from the 9th revision of the International Classification of Diseases. Rates are adjusted for estimated proportions of missing deaths. Following the classification of the urban and rural population used by the Chinese Ministry of Health, the urban population is the population of cities and the rural population is the population of towns and counties. *Per 100 000.

Table 2: Leading causes of death in different population groups in China, 1995–99

calculated by combining the numbers from the corresponding cohorts. The rates of death for other causes considered in the vital registration mortality data were calculated in the same manner. Yearly rates were standardised to the distribution of the 1995 population.

Role of the funding source

None of the funding sources for the Beijing Suicide Research and Prevention Center had any role in the study design, data collection, data analysis, data interpretation, or writing of the report.

Results

As shown in table 1 and the figure, we found that rural suicide rates were an average of three-fold higher than urban rates, and that these differences held true for men and women and in all age-groups. Moreover, the increase in suicide rates from middle age onwards was much more striking in rural areas than in urban areas, and started at an earlier age in the rural areas. Given these high rural rates and the large proportion of the population that lives in rural areas, 93% of all suicides occurred among rural residents.

Rates in women were an average of 25% higher than in

men, but this difference was mainly due to the large number of suicides in young rural women. Suicide rates among young rural women were 66% higher than rates among young rural men, whereas rates in men were somewhat higher than in women among middle-aged urban residents and among elderly residents of both urban and rural areas.

Suicide accounted for 3.6% of all deaths in China and was the fifth most important cause of death (table 2). It was the 4th most important cause of death for rural women, the 8th most important cause for urban women, the eighth most important cause for rural men, and the 14th most important cause for urban men. The toll was particularly high among young adults: suicide was the leading cause of death in individuals 15–34 years of age, accounting for 18.9% of all deaths. In this age-group, it was the leading cause of death for rural and urban women, and the second most important cause of death (after motor-vehicle accidents) for rural and urban men. In rural women aged 15–34 years, suicides accounted for almost a third of all deaths, and the rate of death by suicide was 7.3-fold higher than that from medical complications during pregnancy, childbirth, and the puerperium (37.8 *vs* 5.2 deaths per 100 000).

The yearly suicide rate (standardised to the 1995 population) was quite stable over the 5-year period, ranging from a low of 22.6 per 100 000 in 1999, to a high of 24.3 per 100 000 in 1997. The rates for the four sex-by-region cohorts varied over a wider range, but there was no clear trend either up or down over the study period: the range in suicide rates for rural women was 29.3–31.7 per 100 000; for urban women 7.8–9.4 per 100 000; for rural men 22.6–25.7 per 100 000; and for urban men 7.6–8.8 per 100 000. There were no important variations in the sex ratios or the rural-to-urban ratios of suicide rates over the 5 years.

The method we used for adjustment for uncounted deaths (based on total deaths estimated by the Statistics Bureau) resulted in an overall increase of 18% in the unadjusted suicide rate, but did not alter the pattern or relative importance of suicide. Projecting the rates in the Ministry of Health data to the corresponding population groups without adjusting for uncounted deaths resulted in an overall suicide rate of 19.6 per 100 000; the corresponding mean annual number of suicides (242 544) accounted for 3.4% of all deaths.

Discussion

China is one of a very few countries that report higher rates of completed suicide in women than in men (others include Kuwait and Bahrain¹²). Rates in women are only 25% higher than in men, but much press attention¹³ has focused on the contrast between China and Western countries, in which the male-to-female ratio of completed suicide is almost always greater than 2:1 and frequently greater than 3:1.¹⁴ In fact, the sex reversal seen in China is an extension of the lower male-to-female ratio of suicide rates seen in India and some other Asian countries:⁷ according to estimates from the GBD study,⁴ the ratios for China, India, and Other Asia and Islands (ie, other parts of Asia) in 1990 were 0.81, 1.10, and 1.48, respectively, whereas the ratios for the other five regions of the world considered in the study ranged from 2.13 (Middle Eastern Crescent) to 4.64 (Sub-Saharan Africa). The impression that Asian women are a high-risk group for suicidal behaviour is also supported by studies that find much higher rates of attempted suicide among young Asian women living in the West than among their Western counterparts.¹⁵ What is unique about China is that the sex difference in completed suicide rates is largely driven by the very high rate of suicide in young rural women. In many Western countries, the trend over the past several years has been in the opposite direction: rates in women have been stable or decreasing while rates in men, particularly among young age-groups, have been increasing.¹⁶

The rural versus urban differences in China's suicide rates are larger, more consistent across cohorts, and, arguably, more important than the sex reversal. Few countries provide national rates segregated by urban versus rural residence, so there is much less opportunity for international comparisons than is the case for sex. The data that are available, which mainly come from developed countries, show no clear pattern: some countries have somewhat higher rates in urban areas and other countries have higher rates in rural areas, but the differences often vary by age-group and sex, and are not nearly as striking as the three-fold difference seen in China.¹⁷

The rural versus urban differences in suicide rates in China are most noticeable in elderly people. In almost all countries in the world, the highest rates of suicide are in elderly age-groups, particularly in elderly men,¹⁸ so China is not unusual in this respect. What is unique about China is the five-fold difference between urban and rural rates

among elderly people. Comparison of our results with those of other countries¹⁸ indicates that rates of suicide among elderly rural residents in China, particularly among elderly rural women, are among the highest reported for any country. Given the high status accorded to the elderly in Chinese culture, this finding is particularly noteworthy.

There are several theories about the relatively high rates and unique pattern of suicide in China,^{5-7,12,19-22} but very little systematic research. Most theories focus on the low status and limited opportunities for rural women in China, but rural women in many developing countries have low social status and are subject to various forms of domestic violence,²³ so these theories are insufficient to explain the unique characteristics of suicide in China. Preliminary results from our continuing studies suggest the following hypotheses. There are no strong religious or legal prohibitions against suicide in China, so people with serious mental disorders or chronic life stressors (such as incurable illness) might consider suicide an acceptable method of relieving their misery or of reducing the financial and emotional burden they cause their family. In this generally permissive environment, acute stressors (such as family conflicts) in individuals who do not have an underlying mental illness can also result in impulsive suicidal behaviour, particularly among young rural women who have very limited social-support networks. Partial support for this second hypothesis is provided by a case-control study on attempted suicide carried out by our centre and the Chinese Academy of Preventive Medicine:²⁴ we found that only 38% (57 of 151) of people who attempted suicide suffered from a diagnosable mental illness and that severe stress from acute life events is a more important predictor of suicidal behaviour than the presence of a mental illness.

In rural areas, the ready availability of potent pesticides in the homes of most residents makes this the preferred method of deliberate self-harm; dichlorvos and parathion (organophosphate insecticides) are the most frequently ingested compounds. We suspect that the lethality of the method used, and the lack of well trained medical personnel who can manage pesticide poisoning in the countryside, result in high rates of mortality among people who impulsively ingest pesticides but do not intend to die. This situation leads to an overall increase in the rate of completed suicides in rural areas and—since deliberate self-harm is much more common in women than in men—a relative increase in the rates of completed suicide among women, particularly among young rural women. Clearly, a major component of prevention efforts in rural areas will be limiting the production, restricting the sale, and possibly mandating the location and method of storage of these potent poisons.

A previous study²¹ that extrapolated suicide rates in the official Ministry of Health mortality data from 1987 to 1994 to the Chinese population (without adjusting for uncounted deaths) reported national suicide rates (17.7–22.6 per 100 000) that are similar to the unadjusted mean rate we found for 1995–99 (19.6 per 100 000). Moreover, the pattern of suicide for 1987–94 was also similar to that reported here. Thus, the rate and pattern of suicide in China has been remarkably stable over this 13-year period (1987–99). Unfortunately, the data available on suicide rates in China before 1987 is of doubtful reliability, so assessment of the effect of China's recent economic reforms (which started in 1978) on the rates and pattern of suicide in the country is impossible.¹⁰

Data from other Asian countries that have reliable suicide statistics over extended periods,²⁵⁻²⁶ and recent data from eastern Europe²⁷ show striking fluctuations in suicide rates that seem to parallel sociocultural changes, so the social and

economic changes accompanying China's modernisation are also likely to influence suicide rates. But the direction of the change is unknown: China's current suicide rates could either be falling from even higher rates present during the Cultural Revolution era (1966–76) because of the greater political stability and prosperity, or increasing because of the new social stresses associated with economic reform.

The Ministry of Health vital registration system is large but probably not representative of the poorer rural and urban areas that do not have adequate health reporting mechanisms. To what extent this lack of representativeness affects the suicide figures is unclear, but comparison with results from a smaller, more representative epidemiological surveillance system—the Disease Surveillance Points (DSP) system run by the Chinese Academy of Preventive Medicine—suggests that the effect is not great. The DSP system, which is used in the GBD⁸ and WHO²⁸ mortality estimates, records about 50 000 deaths per year from 145 sites around the country that cover a total population of about 10 million individuals, so it is one-tenth the size of the Ministry of Health vital registration system. Our earlier report¹⁰ using DSP data from 1990 to 1994 found that the pattern of suicides was essentially identical to that reported here, with the exception that the DSP suicide rates in elderly urban men were higher. In 1990, the overall suicide rates estimated by the two systems were very similar,¹⁰ but more recently the DSP estimates have been lower than those reported by the Ministry of Health vital registration system: from 1995 to 1997 (the last 3 years for which DSP data are available²⁹), the mean DSP suicide rate was 15.4 per 100 000, compared with a mean unadjusted rate of 20.2 per 100 000 for the same time period in the Ministry of Health data. Part of the reason for the differences could be that the DSP data, unlike the Ministry of Health data, include a category not found in the International Classification of Diseases (“accidental death, external cause unknown”) that probably contains some suicides. Unfortunately, the detailed sex by age-group by region suicide rates are no longer provided in the annual DSP publications,²⁹ so these data cannot be used to do the type of analyses provided in this paper.

The method of estimating the rate and distribution of uncounted deaths affects the estimated suicide rate and, to a lesser extent, the pattern of suicides. Using mortality data from the Statistics Bureau, we estimated the uncounted death rate in each of the 72 cohorts for each year. Lacking detailed data, we had to assume that unreported deaths within each cohort are evenly distributed across causes, which might not be the case. Adjustment for uncounted deaths in this manner led to an increase in the overall suicide rate of 18%; this degree of upward adjustment for uncounted deaths is consistent with the results of a 1995 study by the DSP system²⁹ that used the “capture-mark-recapture” method to estimate overall rates of unreported deaths of 13% in rural areas and 15% in urban areas.

The validity of these estimates also depends on the accuracy of the reporting of the cause of death. There are no coroners' reports for unnatural or accidental deaths in China, so there is the opportunity for family members to influence physicians' recorded cause of death. In some parts of rural China, beliefs in the evil effects of the “wandering spirits” of people who died by suicide might make families reluctant to admit that the death was a suicide,³⁰ and in urban areas many families feel ashamed about a suicide in the family,⁵ but our own experience in talking with the families of over 1000 suicide victims is that these concerns, even when present, do not often result in a deliberate misclassification of the cause of death. Indeed, the relatively high suicide rates seen in China could be

partly explained by lower rates of deliberate misclassification than in countries where suicide is illegal or where suicide results in serious social, financial, and legal repercussions for the family. A continuing national study on accidental deaths by our centre and the Chinese Academy of Preventive Medicine will help determine the rates of these types of misclassification.

Another problem in using either the Ministry of Health or DSP data to project national rates and frequencies of deaths by cause is that the definitions of the urban and rural populations used in these vital registration systems are different from those used by the Statistics Bureau. The Statistics Bureau regards both cities and towns as the urban population, but the urban data from the Ministry of Health and DSP systems are mainly from the non-agricultural population of large and middle-size cities, and the rural data are mainly from counties and towns. Thus we have projected the urban mortality data from the Ministry of Health to the city population reported by the Statistics Bureau and the rural mortality data to the combined town and county population. This match is fairly good, but not perfect. Another source of potential confusion is China's large “floating population”: at present most deaths among rural residents who go to cities for work are still registered as rural deaths because their residence permits remain rural. As more and more rural residents either live in the suburban areas of cities or travel to work in cities, the distinct urban and rural patterns of suicide (and other health conditions) could merge.

Despite adjusting the rates for uncounted deaths, our estimate of China's mean suicide rate for 1995–99 of 23.2 per 100 000 is still much lower than the GBD⁴ estimate of 30.3 in 1990 and the WHO⁹ estimate of 32.9 in 1998. The GBD and WHO estimates make two adjustments to the DSP data that result in much higher suicide rates. The rates of uncounted deaths that they use to adjust the crude mortality figures are much higher than those calculated directly from the Statistics Bureau data because they estimate the total number of deaths by applying a general growth-balance method (and some other adjustments) to the census data.²⁸ For example, in 1998, WHO estimated that there were 9.30 million deaths in China⁹ compared with the Statistics Bureau's estimate of 8.07 million deaths,¹¹ a difference of 15%. The Statistics Bureau's estimates of total deaths are based on an annual 1 per 1000 household sample survey in which respondents are asked about deaths in the household over the previous year; these surveys are subject to recall error so they might underestimate the total number of deaths, particularly in young children. But the life tables estimated by WHO for the nation as a whole²⁸ do not allow for separate urban and rural estimates of deaths by age and sex. Thus, the GBD or WHO estimates cannot be used to assess differences in the pattern of deaths between urban and rural areas—differences that are particularly important for suicide.

The second adjustment made in the GBD and WHO estimates is to reassign many deaths coded in the DSP data as “accidental death, external cause unknown” or “other type of violent death” to suicide.⁸ This results in a large increase in the proportion of total deaths attributed to suicide. In 1990 (the year used for the GBD estimates), 34% (2197 of 6465) of all accidental deaths recorded in the DSP data³¹ were for these two unspecified causes, and many of these were reassigned to suicide; this adjustment increased the proportion of deaths attributed to suicide from 3.0% (1448 of 48 122) to 4.6% (2233 of 48 122), an increase of 54%. Detailed assessment of the 1990 DSP data found that 932 of these 2197 unspecified accidents were actually deaths (not accidents) of unknown cause that

probably should not have been reassigned to suicide. By 1997, the proportion of accidental deaths due to unspecified causes in the DSP data dropped to 14% (770 of 5520),²⁹ and the proportion of deaths attributed to suicide after reassignment increased from 2.5% (1305 of 51 759) to 3.0% (1568 of 51 759)—a more modest increase of 20%. The appropriateness of this method of reallocating unspecified accidents is currently unknown, but will be assessed as part of the continuing study by our centre and the Chinese Academy of Preventive Medicine.

Unfortunately, the confusion about China's suicide rates will be increased by the recently released 2001 WHO World Health Report³² which—by contrast with our findings and with previous estimates from WHO—reports a suicide rate for China of only 14.0 per 100 000 “in the most recent year for which data are available” (no year is specified), and a remarkable 17.2% drop in China's suicide rate from the 1988–90 period to the 1996–98 period. The statistical annex of the report estimates the suicide rate in 2000 for the entire Western Pacific Region as 20.3 per 100 000; but 76% of the population of this region lives in China, so it is hard to compromise this regional rate with the 14.0 per 100 000 rate for China provided in the text of the report. Moreover, no explanation is given for the 57% drop in the reported rate compared with the 1998 suicide rate for China of 32.9 per 100 000 previously reported by WHO.⁹

There remains controversy about the absolute numbers of suicides in China, but there is little argument about the public-health importance of suicide and about China's unique pattern of suicide. Similar to our results, the WHO estimates for 1998 indicate that suicide accounted for 4.4% of all deaths in China and was the fourth most important health problem for the country in terms of lost disability-adjusted life-years.⁹ Given the size of this public-health problem, developing and testing China-specific preventive interventions for high-risk groups are urgent tasks. The Ministry of Health, in collaboration with WHO, held a workshop on suicide prevention in March, 2000, that took the first steps towards developing a national suicide-prevention programme.³³

Contributors

M R Phillips did the statistical analysis and wrote the paper, and X Li and Y Zhang provided essential insight into the interpretation of the results.

Conflict of interest statement

None declared.

Acknowledgments

During the preparation of this paper, the work of the Beijing Suicide Research and Prevention Center was supported in part by grants from the Ford Foundation, the American Foundation for Suicide Prevention, the Swedish International Development Agency, the Research Grants Council of Hong Kong, the Save the Children Fund, and Befrienders International.

References

- 1 Yin DK. Current status of mental health work in China: problems and recommendations. *Chin Ment Health J* 2000; **14**: 4–5 (in Chinese).
- 2 WHO. World Health Statistics Annual. Geneva: WHO, 1989, 1990, 1993, 1995.
- 3 He ZX, Lester D. What is the Chinese suicide rate? *Percept Mot Skills* 1999; **89**: 898.
- 4 Murray CJL, Lopez AD. Global Health Statistics: a compendium of incidence, prevalence, and mortality estimates for over 200 conditions. Cambridge, MA: Harvard University Press, 1996.
- 5 Prichard C. Suicide in the People's Republic of China categorized by age and gender: evidence of the influence of culture on suicide. *Acta Psychiatr Scand* 1996; **93**: 362–67.
- 6 Desjarlais R, Eisenberg L, Good B, Kleinman A. World mental health: problems and priorities in low-income countries. New York: Oxford University Press, 1995.
- 7 He ZX, Lester D. The gender difference in Chinese suicide rates. *Arch Suicide Res* 1997; **3**: 81–89.
- 8 Murray CJL, Lopez AD. The Global Burden of Disease: a comprehensive assessment of mortality and disability from diseases, injuries, and risk factors in 1990 and projected to 2020. Cambridge, MA: Harvard University Press, 1996.
- 9 WHO. The World Health Report 1999. Geneva: WHO, 1999.
- 10 Phillips MR, Liu HQ, Zhang YP. Suicide and social change in China. *Cult Med Psychiatry* 1999; **23**: 25–50.
- 11 China Bureau of Statistics. China population statistics yearbook. Beijing: China Statistics Publication Office, 1996–2000 (in Chinese).
- 12 Cheng ATA, Lee CS. Suicide in Asia and the Far East. In: Hawton K, van Heeringen K, eds. International handbook of suicide and attempted suicide. Chichester: John Wiley and Sons, 2000: 29–48.
- 13 Brown P. No way out. *New Scientist* March 22, 1997; 34–37.
- 14 Cantor CH. Suicide in the Western World. In: Hawton K, van Heeringen K, eds. International handbook of suicide and attempted suicide. Chichester: John Wiley and Sons, 2000: 9–28.
- 15 Bhugra D, Desai M, Baldwin DS. Attempted suicide in west London, I: rates across ethnic communities. *Psychol Med* 1999; **29**: 1125–30.
- 16 Hawton K. Gender differences in suicidal behaviour. *Br J Psychiatry* 2000; **177**: 484–85.
- 17 Lester D. Why people kill themselves: a 1990s summary of research findings on suicidal behavior, 4th edn. Springfield, IL: Charles C Thomas, 2000.
- 18 Harwood D, Jacoby R. Suicidal behavior among the elderly. In: Hawton K, van Heeringen K, eds. International handbook of suicide and attempted suicide. Chichester: John Wiley and Sons, 2000: 275–91.
- 19 Shiang J, Barron S, Xiao SY, Blinn R, Tam WCC. Suicide and gender in the People's Republic of China, Taiwan, Hong Kong, and Chinese in the US. *Transcultural Psychiatry* 1998; **35**: 235–51.
- 20 Lee S, Kleinman A. Suicide as resistance in Chinese society. In: Perry EJ, Seldon M, eds. Chinese society: change, conflict and resistance. London: Routledge, 2000: 221–40.
- 21 Qin P, Mortensen PB. Specific characteristics of suicide in China. *Acta Psychiatr Scand* 2001; **103**: 117–21.
- 22 Ji J, Kleinman A, Becker AE. Suicide in contemporary China: a review of China's distinctive suicide demographics in their sociocultural context. *Harvard Rev Psychiatry* 2001; **9**: 1–12.
- 23 Heise LL, Raikes A, Watts CH, Zwi AB. Violence against women: a neglected health issue in less developed countries. *Soc Sci Med* 1994; **39**: 1165–71.
- 24 Li XY, Yang RS, Zhang C, et al. A case-control study of the risk factors in attempted suicide. *Chin J Epidemiol* 2001; **22**: 281–83 (in Chinese).
- 25 Chong MY, Cheng TA. Suicidal behavior observed in Taiwan: trends over four decades. In: Lin TY, Tseng WS, Yeh YK, eds. Chinese societies and mental health. Hong Kong: Oxford University Press, 1995: 209–18.
- 26 Yoshimatsa K. Suicidal behavior in Japan. In: Peng KL, Tseng WS, eds. Suicidal behavior in the Asia-Pacific region. Singapore: Singapore University Press, 1992: 15–40.
- 27 Sartorius N. Recent changes in suicide rates in selected Eastern European and other European countries. *Int Psychogeriatr* 1995; **7**: 301–08.
- 28 Lopez AD, Salomon J, Ahmad O, Murray CJL, Mafat D. Life tables for 191 countries: data, methods and results. Geneva: WHO, 2000 (GPE Discussion Paper No 9).
- 29 Ministry of Health Department of Disease Control and Chinese Academy of Preventive Medicine. Annual Report on Chinese Diseases Surveillance (1995–1997). Beijing: People's Medical Publishing House, 1997–1999 (in Chinese).
- 30 Pearson V. Goods on which one loses: women and mental health in China. *Soc Sci Med* 1995; **41**: 1159–73.
- 31 Ministry of Health Department of Epidemic Prevention and Chinese Academy of Preventive Medicine. Annual Report on the Disease Surveillance System, 1990. Beijing: Hua Xia Publishing House, 1992 (in Chinese).
- 32 WHO. The World Health Report 2001. Geneva: WHO, 2001.
- 33 Beijing Hui Long Guan Hospital Research Center of Clinical Epidemiology. Report on the March 22–24, 2000, meeting of the Ministry of Health and the WHO on suicide prevention. *Chin Ment Health J* 2000; **14**: 295–98 (in Chinese).