Sex Differences of Infant and Child Mortality in China

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The purpose of this paper was to study the sex differences in infant mortality and mortality before the age of 5 in China, and the differences between urban and rural areas on the one hand and urban areas of mainland China and Hong Kong on the other. Published data from the 1982 and 1990 national censuses, the mortality survey of 1976, and UN's publications were used to calculate sex differences and sex ratios of mortality. Infant mortality of both sexes decreased notably from the 1970's onwards, the sex ratios of mortality being 1.15 in 1973–75, 1.06 in 1981 and 0.86 in 1990. A remarkable decline of mortality before the age of 5 was also seen in both sexes, but the sex ratios of mortality were not greatly altered, remaining less than 1 from the 1970's on. In rural areas female infants and young children had a higher mortality compared with males than in urban areas. In Hong Kong, the sex differences of infant and early child mortality were much smaller than in urban areas of mainland China.

Key words: mortality, sex differences, infants, children, sex preference, China, Hong Kong.

INTRODUCTION

Since 1980's, the sex ratios[1] at birth in China has increased remarkably (1–4). As shown in Table I, the sex ratios at birth in China were 107.80 in 1981, but as high as 111.75 in 1990. Meanwhile, the sex ratios at birth in the Nordic Countries, USA and Japan have remained between 105 and 106 (5). In Hong Kong and Singapore, the sex ratios at birth in the 1980's were only slightly higher than in the other Western countries, but less than 108 (5).

Three possible explanations for the unusual sex ratios at birth in China have been suggested: 1) underreporting of female births, 2) prenatal sex determination and abortion of female foetuses, and 3) infanticide and abandonment of newborn girls (2, 3). All three causes reflect a preference for male babies by parents, family and probably the whole society. If this sex preference affects the sex ratios at birth, it can be also be expected to influence the sex ratios of mortality in infancy and early childhood. The sex ratio of mortality should reflect the sex preference in a more authentic and valid manner than the sex ratios at birth, because sex preference cannot easily affect fertility behaviour, and the medical facilities for determining the sex of the foetus are still not easy to access in many areas of China. After their birth, however, female and male children may be treated differently in terms of the distribution of household resources, nutrition, health care or educational opportunities, which, undoubtedly, will lead to sex differences in mortality and morbidity during infancy and early childhood.

It is commonly recognized that regional socioeconomic disparity is one of the important determinants influencing the mortality of different populations. Hong Kong is part of China's domain, and the Chinese people in Hong Kong are of the same ethnic origin and share the same traditional and cultural norms, beliefs and life styles as the people in mainland China. Hong Kong, however, is a well-developed area by global standards, and now provide a westernized socio-economic environment quite different from that of the mainland. If the sex differences in mortality can be found on the mainland, but not in Hong Kong, it can be suggested that socio-economic factors are more important than cultural factors.

The purpose of this study is to analyse sex differences in mortality during infancy and early childhood in China by using the data from the national censuses and other population surveys. The differences between urban and rural areas of China will be mutually compared, and urban areas of mainland China will be compared with Hong Kong.

[1] "Sex ratios at birth means the number of boys actually born alive compared to the number of girls actually born alive in a certain time period, such a year" (9).

Table I. *Sex ratios at birth in China and some other countries, 1980–1990*

Countries	Reference Period	Sex ratios at Birth
China		
1982 1 per thousand Survey[1]	1981	107.80
1982 Population Census[1]	1981	108.40
1987 1 per 100 Survey[1]	1986	110.94
1988 2 per 100 Survey[1]	1987	111.00
1990 Population Census[1]	1989	111.28
1990 Population Census[1]	1990 (to June 30)	111.75
Nordic Countries[2]	1981	105.78
	1989	105.81
USA[2]	1980	105.28
	1987	105.00
Japan[2]	1982	105.47
	1990	105.44
Hong Kong[2]	1984	106.45
	1989	106.12
Singpore[2]	1983	107.76
	1989	107.68

Sources: [1] [28], [2] [5]

MATERIALS AND METHODS

The data were derived from: 1) 10 Percent Sampling Tabulation on the 1990 Population Census of the People's Republic of China (6), 2) 10 Percent Sampling Tabulation on the 1982 Population Census of the People's Republic of China (7) and 3) China's Cancer Epidemiology Survey of 1976[1] (8). In addition, the World Health Statistics Annual series were used when calculating and analysing the sex differences of mortality in Hong Kong (5).

The population and the death data from the 1990 Census were recorded for three separate periods of time, i.e., the first half of 1989, the second half of 1989 and the first half of 1990. The reporting of deaths during the first and second halves of 1989 was much less complete than in the first half of 1990 (9), which is why only the last period was used when calculating the mortality. The reported deaths of the first half of 1990 were doubled to approximate the annual deaths of 1990, and the deaths applied to the mid-year 1990 age structure obtained from the 10 Sampling Tabulation on the 1990 Census of China.

The main outcome measures are mortality rate, sex differences in mortality and sex ratios of mortality. The mortality rate per thousand was calculated by dividing the number of deaths in a sex-age-specific group during a defined period by the number of children in the same group. The sex differences of mortality were calculated as mortality in males minus mortality in females. Sex ratios of mortality were calculated by dividing the mortality in males by mortality in females. The population aged less than 5 was chosen as the study population. In addition, the changes in the mortality rate over time were measured by percentages.

[1] "This was a nationalwide attempt to record the cause of death, age and sex of decedent, and other details for all the 18 million deaths recorded in China during the three-year period 1973–75" (9).

RESULTS

Table II depicts the mortality and the sex differences and ratios in mortality in infancy and early childhood in 1990. The infant mortality of females was higher than that of males for the country as a whole. Infant mortality was higher in rural areas for both sexes than in urban areas, and female infants experienced a higher mortality than males in both areas. In rural areas, excess female infant mortality (female mortality – male mortality) was more than 5 times higher than that of urban areas. In urban areas, early childhood female mortality was higher than that of males only in the 1 year age group. In rural areas, however, female mortality was higher than that of males in most age groups.

Table III shows that both infancy mortality and early childhood mortality decreased rapidly from 1973–75 to 1990. The decrease in mortality rates in males and females in infancy was different, 43.1% for males and only 24.0% in females. That leads to a decline in the sex ratio of infant mortality.

Urban areas of mainland China in 1990 and Hong Kong in 1989 are compared in Table IV. The male mortality rate in China was nearly four times as high

Table II. *Mortality rates per thousand and sex differences and sex ratios of mortality in infancy and early childhood in China in 1990 by one-year age group and area (Source: [6])*

Area and Age	Mortality Rate		Difference (male-female)	Sex ratio (male/female)
	male	female		
Whole Country				
0	29.00	33.71	−4.71	0.86
1	4.10	4.51	−0.41	0.91
2	2.47	2.78	−0.31	0.89
3	1.54	1.52	0.02	1.01
4	1.21	1.05	0.16	1.15
Urban Areas[a]				
0	18.31	19.35	−1.04	0.95
1	2.04	2.14	−0.10	0.96
2	1.45	1.42	0.03	1.02
3	0.95	0.76	0.19	1.24
4	0.77	0.70	0.07	1.10
Rural Areas[a]				
0	31.65	37.31	−5.66	0.85
1	4.65	5.14	−0.49	0.90
2	2.73	3.14	−0.41	0.87
3	1.70	1.72	−0.02	0.99
4	1.33	1.14	0.19	1.16

[a] Urban areas here include both cities and towns; rural areas refer to counties in 10% sampling tabulation of the 1990 census of China

as that in Hong Kong both in infants and at the age of 1–4 years. The difference was even more marked among females, the mortality rate being nearly 5.5 times higher in China than in Hong Kong. The sex ratios of mortality in China were lower than in Hong Kong in both age groups, showing that in comparison with males, female infants and young girls have a higher risk of dying in the urban areas of China than in Hong Kong.

DISCUSSION

During the past decades in developed countries, the decreasing infant mortality has been accompanied by increasing sex ratios of infant mortality (male to female) (10, 11). This means that in the early days female infants had a relatively higher probability of dying than male infants compared with the present times. However, through the development of economy, the improvement of public health measures and the cultural changes in society, the biological su-

Table III. *Mortality rate (per thousand), sex ratios of mortality and change in mortality rate (%) at the ages of 0 and 1–4 in China in 1973–75, 1981 and 1990*

Age	Sex	Mortality Rates			Change		
		1973–75[a]	1981[b]	1990[c]	1973–75–1981	1981–1990	1973–75–1990
0	M	50.97	39.40	29.01	−22.70%	−26.37%	−43.08%
	F	44.36	37.26	33.71	−16.01%	−9.53%	−24.01%
	M/F	1.15	1.06	0.86			
1–4	M	9.06	4.00	2.35	−55.85%	−41.25%	−74.62%
	F	9.28	4.44	2.48	−52.16%	44.14%	−73.28%
	M/F	0.98	0.90	0.95			

Source: Calculated from [a] [8], [b] [7], [c] [6]

Table IV. *Mortality rates (per thousand) and the sex ratios of mortality during infancy and childhood in urban areas of China and Hong Kong*

Sexes	Infant		1–4 years	
	China (urban areas) 1990[1]	Hong Kong 1989[2]	China (urban areas) 1990	Hong Kong 1989
Male	29.01	7.46	1.31	0.33
Female	33.71	6.28	1.26	0.23
Sex ratios	0.86	1.19	1.04	1.43

Source: Calculated from [1] [6], [2] [29]

periority of female infants has become evident. The female infants' mortality decreased more rapidly than that of the male infants, resulting in a trend of increasing sex ratios of mortality.

Above we have shown that China's infant mortality in both sexes has decreased remarkedly during the past two decades. The decline of male infant mortality was evidently greater than that of females, and consequently, the sex ratios of infant mortality declined, too. Obviously, compared with most other countries, the current low sex ratios of infant mortality and their changes since the 1970's in China are unusual. Johansson's study result, derived from China's two-per-thousand fertility survey in 1988, also suggested a downward trend of sex ratios in infant deaths during the last decades (12). The sex ratios calculated by Johansson are not based on mortality rate, but defined as the number of male infant deaths per 100 female infant deaths. The methods of calculation of sex ratio in the two studies are different, but the results are similar. The possible explanations for this decreasing sex ratio could be unreliability of the data, female infanticide and abandonment, and inequal treatment of male and female babies.

The unreliability of the data

The two censuses of 1982 and 1990 in China were complete and in high-quality, but there were still some problems in counting the child population and the number of children's deaths (9, 13). According to the study by Banister (9), the births of both sexes were underreported at the age of 0–6 in the 1982 census. Infant deaths were severely underreported in China's 1990 census, especially for the periods remote to the census date, i.e., the first half of 1989 and the second half of 1989 (14). Banister (14) claimed that the urban infant mortality trends were underestimated mainly because of the tendency of parents not to register the birth of their newborn baby until after they return home from the hospital. Thus if the child dies prior to the mother's discharge, the parents often fail to report both the birth of the baby and its death (14). Infant mortality data from rural areas are probably no better than those from urban areas, and these problems are due to either a gross underregistration of infant deaths or miscalculations based on inadequate data (14).

Some scholars have made different adjustments of the data using different methods. Poston (15) recalculated the infant mortality in China in 1981 after rejecting the counties and cities whose data on infants' births and deaths were considered unbelievable or questionable, and obtained figures of infant mortality of 42.4 and 51.5 per thousand, respectively, instead of the previous figure 39.1. According to Zhou (16), the infant mortality in the cities in 1981 should be increased by 4% and that of counties by 44%, which means that the reasonable rate would be 55.2 per thousand. Using the adjusted life tables made by Banister (17), lower sex ratios of infant mortality could be calculated than those presented in Table III. The previous unadjusted figures ranged from 1.15 to 1.00 in 1970's, from 1.06 to 0.72 in 1981 and from 0.86 to 0.46 in 1990.

Any evaluation of the adjustment methods is beyond the scope of this paper. Using the materials available, we were able to infer that the real infant mortality rates in China were probably higher than the ones that have been calculated from census or survey data, and the real sex ratios of infant mortality are likely to be even lower than those calculated from the original materials.

Female infanticide and abandonment

There was a traditional practice of female infanticide and abandonment in China before the foundation of the People's Republic in 1949 (18). The existence of infanticide in the past was reflected in high sex ratios (over 110) for the cohorts born in the 1930's and

1940's observed in the 1990 census data. No reliable information is available, but it was estimated that prior to 1949 the level of female infanticide in China may have been about 2.5% (19). The practice of infanticide was largely abandoned in the 1950's, 1960's and 1970's, and the normal sex ratios at the age of 0 in China's 1953 and 1964 censuses (104.9 and 103.8) provide strong evidence for this change (3). However, there have been persistent reports of the reasumption of female infanticide in some rural areas (20–22). To what extent this may influence the sex ratios of infant mortality in China is not clear (3, 17, 23). Infanticide does exist in China but it is unlikely to be a common cause influencing the sex ratios of mortality.

Inequal treatment of males and females

Sexual equality in the political, socio-economic, and cultural spheres of life is guaranteed in China's constitution, but patriarchal attitudes and a preference for sons over daughters are still prevalent, particularly in the countryside (24). Traditionally, sons in China were considered advantageous for the following two financial reasons: Firstly, support of the parents in old age is still an important consideration in China, despite the recent introduction of some forms of social security. Residents in state-owned institutions receive an annual pension ranging from 75 to 100% of the wage they were earning at the time of retirement, although this policy is to undergo some changes because of an economic reform being carried out throughout the country. In collectively owned enterprises in urban areas, it is difficult for retirees to obtain a stable pension, let alone farmers in rural areas. Although the Marriage Law of 1980 makes both sons and daughters liable for the support of their parents in old age, sons are still preferred as providers of old-age security. Secondly, most of the work available in the rural areas of China is manual labour. Therefore, the productive utility of sons is also an important factor underlying the preference for sons in the countryside (25). From the viewpoint of the traditional culture, sons are preferred for the performance of ancestral rites, family propagation, and so on (22, 26). According to a traditional notion in China, if a couple fails to have a son, they are considered as having broken off the line of inheritance in the family even though they may have one or more daughters.

Owing to the reasons mentioned above, sons are favored over daughters in the allocation of household tasks, duration of academic career; access to private tutors; demands for remittances; and distribution of family property. Parental discrimination is echoed by community, school, and work unit discrimination in the selection for special training and assignment to preferred occupations (27). For example, in 1982, even though 42.4% of all students in China were females, the imbalance was considerably greater at the higher levels of education. Overall, 43.7% of primary school students were females compared with 39.2% of the students in regular secondary schools, and only 26.2% of the students in institutions of higher learning (7). As to male and female infants, inequal parental treatment might take the form of providing, intentionally or unintentionally, less nutrition, improper care and feeding, to female infants' or to delay or refuse to seek medical attention, or to obtain the required immunizations. It is not difficult to understand that all this might lead to excess mortality and morbidity in female infants and young children.

The results of this study indicated that while infant mortality in China has been decreasing since the 1970's the decrease has been higher for males. The increase in the sex differences of mortality in favour of males coincided with the announcement of the beginning of the family planning project in the 1970's. The coalition of present socio-economic environment, traditional culture and the ongoing family planning project may have led to the unintentional consequence of decreasing the sex ratios of infant and early child mortality. Some regulations derived from the family planning project have affected the idea of sex preference in China. In some areas, a slightly larger monetary bonus is allowed if the couples' first child is a girl instead of a boy. In the rural areas of many provinces, couples can have two children if their first child is a girl (25). These regulations implicitly recognize that there is a preference for sons and provide a pratical way of dealing with its implications. Through its influence on sex preference, the family planning project might partly be an explanation of the declining trend of the sex ratios of infant mortality since the 1970's. But more detailed investigations would be required to determine the degree to which the family planning project has affected the sex ratios. The family planning project is one of the fundamental state policies in China, and it has played an important role in controlling the population explosion. To eliminate this unintentional consequence of the lowered sex ratios in infant and early childhood mortality in China, the policy-makers should pay more attention to the effect of the policy on the sex preference and to give the parents, community and society more education on the equal treatment of male and female infants.

In conclusion, the infant and early child mortality in China has decreased remarkably since the 1970's, but the degree of decline has been greater for males than for females. Consequently, unlike in most other countries, the sex ratios of mortality have also decreased, which is an unusual phenomenon, moreover, the real sex ratios of infant mortality are likely to be even lower than those calculated from the material available so far. The possible explanations for the current low sex ratios of mortality are, as explained for the high sex ratios at birth by others, unreliability of the data, the contemporary unequal treatment of males and females and the phenomenon, though not common, of female infanticide and abandonment.

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