Sex Ratio of Reported Births between 1910 and 1969 in China
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Sex Ratio of Reported Births between 1910 and 1969 in China,

By Yun Zhou[1] and Zhenzhen Zheng[2]

Abstract

Sex ratio at birth (SRB) in China seems alarming high since 1980s, the period that China started population control policy or the one-child policy.   The high SRB has attracted Chinese public's attention.   Scholars (domestic as well international) and policymakers have been trying to understand, explain, and even balance the high ratio.   Our paper, however, analyzes changes of SRB among a group of births between 1910-1969 and explores possible relationship between SRB and mother's age at the births as well as birth order.   Data used for this analysis comes from the Healthy Longevity Survey in China in 1998 and 2000.   General conclusion from the analysis are that SRB among children born to women aged 80+ years in 1998 and 2000 shows a high level by the international standard.   SRBs calculated by periods, parity, and mother's age at birth also are higher than the upper limit of the international standard.   There is a tendency that SRB declines with mother's age at births and with parity.   The general trend of high SRB among the reported births is consistent with and even higher than that since 1980+.   We accept the phenomenon of high SRB in China since 1980s and understand that there are human-made effects on the ratio.   However, we want to argue that the phenomenon is not new to China and exists long before 1980s.   What needed in researches on SRB in China are to study the general level of SRB, analyze its trend, and evaluate historical SRB by a standard of SRB suitable for Chinese population.

[1] Yun Zhou, Institute of Population Research, Peking University, Beijing, China, 100871;e-mail: zhouyun@pku.edu.cn
[2] Zhenzhen Zheng, Institute of Population and Labor Economics, China Academy of Social Science (CASS), Beijing, China,; e-mail: zhengzz@cass.org.cn

I. Introduction

Sex Ratio at Birth (SRB) of human population has been an interesting and serious topic to scholars due to variations among different populations and even within a population at different time period.   Normal and well accepted SRB is 103-107 and any variation beyond the range is considered abnormal. The abnormal SRB may affect a society in different ways.   The most immediate effects of it may be marriage squeeze when individuals in the cohort(s) reach marriageable ages, residence rule, and even pattern of old-age care for the generations' parents as well as their own.   For example, based on three possible causes of high SRB in 1980's, Hull discusses implications of a rising SRB, such as level of birth and infant mortality rates in China, future growing number of celibacy, friction between parents and their only son or sons, and a further status loss among females (1990: 77-79).   Hudson and Boer predict that a society with high sex-ratio in the age group 15-34, caused by high sex ratio at births, will experience instability and conflict and the government will be a authoritarian instead of a demographic type (2002).   These are just few aspects that an abnormal SRB may affect and causes as well as consequences of abnormal SRB deserve serious consideration.

SRB in China seems alarming high since 1980s, the period that China started population control policy or the one-child policy.   The high SRB has attracted Chinese public's attention.   Scholars (domestic as well international) and policymakers have been trying to understand, explain, and even balance the high ratio. Researches on the issue represent different concerns, such as relationship between SRB and geographical locations, residence (urban and rural), parental educational attainment, number of previous live births, and sex differential in infant morality. Major findings are that since 1980's, SRB in rural area and township is higher than that in urban area, the ratio is increasing with birth order, and SRB of second and higher births is negatively correlated with number of previous live male births (e.g. Gao, 1993; Li, 1993; Li, 1994; Liu, 1988; Tu, 1993; Zeng and Gu, 1993).   Direct causes of the abnormal SRB are explained by the scholars as underreport of female babies; prenatal sex identification by ultra-sound B technology (a modern medical technology and pulse diagnosis (through feeling of pulse, a traditional Chinese medical practice) followed by sex selective induced abortion (e.g. Chu, 2001; Peng and Huang, 1999); female infanticide and female babies abandonment (e.g. Johnson, Huang, Wang, 1998[3]).   Coale and Banister (1994) believes that the excess female mortality and the excess mortality occur in infancy (especially due to female infanticide) and childhood, or underreporting female (due to death or adopting out) are the proper interpretation for the high SRB.   Johansson and Nygren examine the effect of adoption on the "missing" girls in China and conclude that "adding the

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[3] In their study of abandoned children in a sample of 237 abandonning families, about 25 (10.5%) were boys, indicating the practice is not only but mainly to female babies.   Most of the abandoned boys (15 boys, about 60%) were disabled or severely ill.   The other 10 healthy boys abandoned for reasons as born to unwed mothers and death of the fathers, and being a third son with no sisters (Johnson, Huang, Wang, 1998:476-477) .

adopted children to live births reduces the number of missing girls by about half". Based on data adjusted for adopted children, the SRB for 1980-1987 are much closer to normal range (1991: 146). Others explain the causes as "limited choice of reproduction and male preference" in China (e.g. Mu, 1995). Or, because of the strict population policy, individuals are not able to achieve the goal of ideal number of children. As a result, they trade the number of children for the preferred sex of children, basically male children. However, Coale and Banister (1994: 476) and Smith (1994: 481) did not believe that the population policy is the direct cause of the high sex ratio at birth.

Reviewing researches on the topic, we find that there are several issues left out of the discussions. First, not much data, especially historical, are available for SRB analysis. Before 1949, there was no official national data to calculate SRB because there was no modern population census covering all parts of China. The first and second census (1953 and 1964) did not publish detailed information regarding SRB. Data from the third and forth census (1982 and 1990) indicated a high SRB, however, the result cannot be explained as the ratio was higher than that from previous years, since we do not have reference year to refer to. Peng and Huang claim "the real magnitude of the abnormality has been exaggerated by statistical error (1999:500). We may interpret the statement as that current SRB is not as high as the number shows or the number is not too high from the historical data.

Also, we have several doubts about some data used for SRB analysis. If the one child population policy was very strict that people had to trade number of children for the preferred sex of children, how do we explain the second, third and even higher orders of births in the data. If the policy is strict and individuals have means (e.g. ultra-sound B technology) to achieve their goal of having a son, then why they did not select the sex of the first child and underreport the first born for a chance to have second child (though some use this strategy). By this way, they will be guaranteed to have two instead of possibly just one child. Actually, some scholars have noticed the problem of underreport of girl babies and estimated about two third of the underreported babies in 1989 was girls (Gao, 1993:1), and about 50-75% of the abnormal SRB was due to the underreporting of girl babies (Zeng and Gu, 1993). If this is the case, we then have to think twice about researches of SRB based on census or survey data. When births or number of children is a very sensitive issue, we would expect some if not many individuals try to report births falsely during a census or survey interview, especially a survey carried out by family planning or related organizations.

Second, there appear to be incomplete explanations of SRB based on the available data. Some researches emphasized more on the high SRB yet ignored low SRB with different births orders or sex of previous babies in the same data set. Same problem happens when analyzing sex ratio of induced abortion (e.g., Gu and Xu, 1994: 45[4]) and different sex ratio among different birth orders (Li, 1993[5]). There

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[4] In the research, the sex ratio of the induced abortion among the first order of pregnancy was 108.6 and that of second pregnancy was 69.96, while the average sex ratio of the induced abortion in 1993 in part of Zhejiang

were evidence of male preference and female infanticide[6] which are used to explain the high SRB, but hardly have any information indicating "male infanticide" in China. Thus, it is a puzzle of low SRB in some cases, e.g. different birth orders as well as history of number and sex of previous babies.

And third, SRB seems a problem (unusual high) since 1980's and was studied intensively since then. By that time, there was an "international scientific standard" of SRB already, based on researches world-wide. This standard was very helpful for China to evaluate her SRB. However, at the same time, we do not doubt the validity of the standard to Chinese population. It is possible that SRB in China has a tendency to deviate from the standard historically. Coale and Banister also noticed this problem that out of 50 cohorts in their data, only 3 have a SRB within 107 (1961-1963 birth cohorts) (1994:465). Data of 1930s and 1940s from Zhejiang and Yunnan provinces show a variation from the international standard of SRB (Chen[7]). Result of calculated SRB (1930-1981) in China, however, is rather normal (108.4) by the standard (Li and Duan, 1986), which is contradict to the result of Table 1.

Table 1　Sex ratio at birth (SRB) and TFR in China, 1940-1987

Year	SRB	TFR	Year	SRB	TFR
1940	112.1	5.3	1955	107.0	6.3
1941	110.5	5.3	1960	110.3	4.0
1942	119.3	5.3	1965	106.1	6.1
1943	110.3	5.3	1970	105.9	5.8
1944	113.3	5.2	1975	106.5	3.6
1945	113.5	5.3	1980	107.4	2.2
1946	107.8	5.5	1985	111.3	2.2
1947	108.5	5.8	1987	111.0	2.6
1950	112.2	5.8			

Source:　Zhong, et al., 1993: 197.
Note: data before 1950 was yearly data and after 1959, most data are classified under 5 year group.

A small-scale study in rural central China indicates the prevalence of persistence of son preference, the use of ultrasound and sex-selective abortions followed by ultrasound determination of sex of fetus (Chu, 2001). The author calculated that if all the aborted fetuses had been born, the sex ratio of children ever born to the women interviewed would be reduced from 125.9 to 108.7 (p.278). However, looking closely at the data in the paper (Table 5, p.274), we found that among those with clear

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Province was 86.7.

[5] For example, his study shows that when the first birth was a boy, then the SRB of the 2nd birth was 102.3 (rather normal). When the 1st birth was a girl, then the SRB of the 2nd birth was 146.9. The SRB changed to 75.8 if births before this order were at least 2 boys; the ratio changed to 215.6 if birth before this order were at least 2 girls.

[6] 3,000 more men from Peking in a study of family history by Lennox in 1910's clearly stated that they had not disposed of any of his children either by killing or selling and there was no evidence of outright killing of girl babies in Beijing then. However, Lennox wrote that reports of doing away girl babies usually come from south of China (1919: 337).

[7] According to Chen's data, SRB in Jurong county was 115 in 1943 and 123.3 in Zhengjiang Lanxi County in 1936 (1981: 123).

information of sex of the fetus, sex ratio is 128.6 for the first pregnancy, 127.6 for second pregnancy and 385.2 for the last pregnancy (the author defined "last" as "last among 3rd or higher-order pregnancies). These figures show that SRB prior practice of sex-selective abortion is already higher than the standard if we count the number and sex of the aborted fetus. Similar findings exist in another study in 1991, sex ratio at birth among first births is 117, though the ratio of second birth is even higher, 141 (Qian, 1997:222).

There was other evidence that SRB was high in China in the past. For example, in 1930, Xu noticed that SRB in China is high and it is different from the normal standard. Evidences are that among siblings of 473 males and females interviewed in Shanghai, SRB was 115.5; among babies born to 1,000 women interviewed at British Charitable Hospital in Beijing, the SRB is 117.7; and SRB calculated from a survey by Singapore government indicates clearly that it is higher than the European Population there (115.1±0.4 to 107.0) (Xu, 1930:66-67). Other evidence are that among 9,566 births in Beijing, SRB is 118.5 in 1917 (Gamble, 1921: 417), 119.1 among 8,468 births in another study by Lennox (1919: 334), and 110.8 among births of 485 students at Yenching University (Xu, 1933:304).

Because of these puzzles, variation in level of SRB and higher level of SRB by international standard and lack data without effect of fertility limitation, we intend to explore SRB based on a historical fertility data in China. Reviewing early studies of SRB internationally, explanations for the abnormal SRB generally fall into the following categories: behavioral factors (e.g. coital frequency, physical stress, tobacco smoking), environmental factors (radiation damage, trace elements of minerals and chemical in local water supply), or social and demographic characteristics (such as socioeconomic status, birth order, and parental age) (Chahnazarian, 1988). Of those explanations, demographic characteristic is of this paper's interest, since we have data on reported births between 1910 and 1969 in China.

Regarding demographic characteristics, early researches show that most studies found an effect of maternal as well as paternal age on the SRB (Chahnazarian, 1988), and majority of the works find a negative effect of maternal age on the SRB. Studies on Guatemalan national data and Cuyonon lowland Filipino data are consistent with this pattern (Eder, 1988). When considering relationship between SRB and birth order, most studies found that birth order affects the SRB negatively (Chahnazarian, 1988; Eder, 1988; Martin, 1994). This paper analyzes changes of SRB over the years and possible relationship between SRB and mother's age at the births as well as birth order. We accept the phenomenon of high SRB in China since 1980s and understand that there are human-made effects on the ratio. However, we want to argue that the phenomenon is not new to China and exists long before 1980s. What needed in researches on SRB in China are to study the general level of SRB, analyze its trend, and evaluate historical SRB in 1980's by a standard of SRB suitable for Chinese population.

II. Data

Data for this analysis comes from the healthy longevity survey in China in 1998 and 2000. The survey interviewed elderly aged 80+ years in 22 provinces in China and includes various topics, such as general demographic and economic information of the elderly, self evaluation of life and personality, orientation, life style, physical condition and personal background. From the survey, we obtain a rich and valuable data for examining SRB of reported births. It is valuable because the years the data covered and the size of the reported births. It is also valuable because that during the period, there was no family planning program[8] in China and fertility then was under a rather natural environment. The dataset provides age information of the mothers as well as age and parity of their children; therefore it is possible to analyze SRB among the births and relationship between parity, maternal age at birth and SRB. 9,154 interviewed female elderly reported 39,732 births with gender information, and

39,732 births with gender information involved in this analysis are births reported by 9,154 female elderly. We relied on reported births by female elderly instead of male elderly, to prevent the possibility of remarriage of male elderly and confusion of children from different marriages. Variables we need for this analysis are gender, age, parity, and cohort period. SRB by period, parity, and age of mother giving the births are calculated. To calculate SRB by parity, we depend on the reported age to rank the birth order, instead of taking the reported birth order as it is. This is an effective way to crosscheck and determine the data of parity since birth order is actually determined by age of individuals.

Quality of this dataset is one concern of our analysis. Evaluating by training the interviewers received, quality of interviewers[9], and the way the survey carried out[10], the quality of the survey is guaranteed. There are researches evaluating the data itself and result of the evaluation is positive (Zeng, et al. 2001). Therefore, we are confident in general quality of the survey and survey data.

III. Analysis:

1. SRB of own children and by period:

According to age of mother at the survey and sex of their children, the calculated SRB is high by the international standard (Table 2). Among 39,372 children born to elderly women aged 80-105+ at the survey, SRB is almost all above 120. Considering years that these births happened and classifying births into 10 years period, the calculated SRB varies with different periods, but most of them are high (Table 3). Average SRB between 1910-1969 is 122, which is 15 points higher than

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[8] Family planning program started in China in 1950s, but spread nation-wide after 1970s.
[9] In 1998, interviewers are basically individuals working in aging related fields. Their job is to help elderly and to do research on aging. They are familiar with local social and cultural environment and understand how to get information needed. In 2000, interviewers are individuals working on data collection for different purposes. Although they do not work in the field of aging, their professional skill in surveys guarantee the quality of the survey.
[10] The surveys are very well organized. There are supervisors for the survey. They answer possible questions from interviewers and evaluate quality of each questionnaire. Questionnaire checking in the field is required; special data entry and checking procedures are developed for the survey.

the upper limit (107) of the accepted range of SRB.   SRB of 5 out of 6 ten-year periods are high and that of period 1960-1969 is lower than 100.   The ratio remains high after 1949 (the establishment of People's Republic of China), until 1960s.   High SRB seems a normal phenomenon during the period according to this historical data.

Table 2   SRB by mother's age at survey

Mother's age	SRB	SD*	# of births
80-84	120.6	2.7	6208
85-89	120.1	2.7	6030
90-94	123.7	2.5	7019
95-99	124.5	2.9	5502
100-104	119.4	1.9	12268
105+	128.3	4.4	2345
Total	121.7	1.1	39372

* Estimated as 2.12/SQRT(N) (Hull, 1990).

Table 3   SRB by period of births

Period of the births	SRB	SD	# of births
1910-19	141.1	5.3	1584
1920-29	122.0	2.4	8129
1930-39	126.2	1.9	12227
1940-49	120.0	2.2	9435
1950-59	112.0	3.3	4139
1960-69	90.0	10.3	420
Total	122.0	1.1	35934

This level of SRB is unexpected by many researchers in SRB studies, also much higher than the international standard.   We also calculated standard deviation using Hull's formula to evaluate SRB among the reported births by the international standard.   Hull explains that "the magnitude of the standard deviation is an indication of the degree of confidence that a particular estimate is similar to or different from an assumed standard sex ratio (1990: 66).   The calculated values of standard deviation are presented in Table 2 and Table 3.   It is obvious that SRBs among the births in the period are considerable higher than norms of 106, even 108.

2. SRB by parities and period:

SRB of own children and SRB by period (Table 3) provide a general picture of high SRB between 1910-1969.   Here we further our study to examine the effect of parity on SRB.   SRB in Table 4 is classified by parity or birth order.   By TFR of the period[11], we classify births into 5 parities, i.e. parity 1, 2, 3, 4, and 5+.   The trend shows a declined tendency as birth order increases.   SRB of first birth is 137.5 and it declines to 109.8 at 5+ birth order.   It seems that the higher the birth order, the lower the SRB.   SRB at higher parities is closer to but still higher than the standard.   The

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[11] TFR in 1940's was a little over 5 (Yao and Yin, 1994: 144).

standard deviation in the table shows that other than SRB among births of 5+ parity, SRBs of parity 1 through 4 are higher than the norm (106 or 108).   About that of 5+ parity, SRB (109.8) is higher than 106 standard, but lower than 108 standard.

Table 4   SRB by parity

Parity	SRB	SD	# of births
1	137.5	2.3	8499
2	126.7	2.5	7458
3	120.4	2.7	6245
4	115.7	3.0	4843
5+	109.8	2.2	8889
Total	122.0	1.1	35934

3. SRB by parity and period:

Because those births occurred between 1910-1969, we furthered our analysis to check if the declining trend is constant over the period.   Table 5 breaks births into different period and parity.   According to fertility data in Table 3, births in 1960-69 were too few to break them by parity.   Here, we only consider 5 periods, that is 1910-19, 1920-29,1930-39,1940-49, and 1950-59.   SRB in all 5 periods indicate a high level of the ratio, but a declining trend, similar to the trend in Table 4.   Rank of SRB, according to their values, shows that SRB of first birth in all year period (except 1950-59) is the highest and that of last order in different periods is almost (except that of 1940-1949) the lowest.   The highest SRB, or that of first birth order, is much higher than the normal acceptable high range of the ratio.   Considering the value of standard deviation, SRB of the first 3 birth orders are rather high.   The lowest, existing among births of higher order, are closer to or fall into normal range.

By this point, we have to consider not only SRB in different period, but also one characteristic of the data.   These births come from a group of women who were 80-105 years old at the time of survey.   These births represent much more a cohort fertility of the women, rather than period fertility.   Fertility among this group of

women changes with time dramatically.   In early period （1910-1919）, women of

the oldest age group interviewed in this survey were in their late 10s and early 20s, and ready to have children, while women of the youngest age-group in the survey was just born.   By year1950-1959, women of the youngest age-group almost ended their reproduction.   Therefore, 1910-1959 witnessed the starting and ending reproduction of the women interviewed.   In general, in 1910-1919, births are few and most of them come from low parity (Table 5).   As time passes, we find an increase in number of births in higher birth orders while fertility level at low parities is still high (e.g. in 1930-1939).   In 1950s, women in the survey are in their 30s-50s and are having fewer births at low parities and most births come from higher parities.

Table 5   SRB by parity and period of births

Period of births	Parity	SRB	SD	# of births
-1919	1	149.6	6.3	1148
	2+	121.3	10.2	436
1920-29	1	132.8	3.8	3170
	2	116.4	4.4	2359
	3	121.7	5.6	1423
	4+	107.6	6.2	1177
1930-39	1	138.8	3.9	2920
	2	131.7	4.1	2716
	3	124.2	4.5	2253
	4	124.8	5.2	1693
	5+	111.3	4.1	2645
1940-49	1	135.6	6.4	1105
	2	131.0	5.1	1707
	3	116.5	4.9	1864
	4	114.0	5.3	1609
	5+	114.7	3.8	3150
1950-59	1	132.8	17.8	142
	2	133.3	11.7	329
	3	122.4	8.8	587
	4	110.7	7.6	769
	5+	105.8	4.4	2307

Fertility in this data shows a change in total number of births over the periods as well as a change in number of births in each parity. For example, high SRB in 1910-1919 (141.1 in Table 3) is a result of births coming mainly from first and second births which constitute most births in the period (Table 5). A little low SRB in 1930-39 (126.2 in Table 3) is a result of relative evenly distributed births over parities (Table 5).

The above analysis indicates that under a condition that parity may affect SRB, SRB of a population may be influenced by the number of births in each parity. If SRB declines with parity as it shown in Table 4, then SRB may be high if most births come from lower parity and it may be more balanced as births spread or concentrate on higher parity. Therefore, parity effect on SRB should be examined more

carefully.

3. SRB by mother's age at births and parity:

In a natural fertility environment, we expect that women will start their reproduction in late 10s and early 20s.   There may be a relationship between mother's age at births and SRB.   To examine the relationship, we only consider women in reproductive age, or 15-49 years old.   Table 6 expresses that most births born   to women surveyed come from age group of 25-29, followed by age groups of 30-34, 20-24, 35-39, 40-44, 15-19 and 45-49 in order.   It indicates that women in their 20-39 (20 years) are the major reproductive forces and births from these age groups constitute about 80% of the total births.   Calculated SRB by mother's age at births represents a declining trend, or younger mothers tend to have more male babies. The highest SRB (146) comes from mothers in 15-19 years old; the lowest one (114, though still high by any standard) comes from mothers in 45-49 years old.   The difference in SRB between these two age groups is 32 points.   SRBs among women in the most reproductive age groups (20-39) are rather stable but high, ranging from 118-125.

Table 6   SRB by mother's age at birth

Mother's age at births	SRB	SD	# of births
-19	146.4	4.7	2055
20-24	124.7	2.5	7304
25-29	124.4	2.4	7923
30-34	118.3	2.5	7421
35-39	118.5	2.7	6050
40-44	117.1	3.5	3614
45-	113.5	5.4	1567
Total	122.0	1.1	35934

Table 6 shows a declining trend of SRB with mother's age at birth.   As mothers aging, their chance to have girl baby seems increasing.   Table 7 examines the relationship between a declining trend of SRB with mother's age at birth and parity. In the table, we omitted the parities with births less than 1600 and truncate births born to women aged 40+ into one category (40+).   By doing so, we will have a general picture of the trend of SRB in different age group and different parity.   The general trend in Table 7 shows that SRB of parity 1 declines with mother's age at birth. Level of SRB in parity 2 to 4+ in all age groups of mother is lower than that of parity 1.   There is a tendency that within one age group of mother, SRB declines with parity (20-29 and 30-39).   This declining trend in parity is consistent with that shown in Table 4 and only varies with degree.   It is not clear that the high SRB among births from younger mother is a result of concentration of births at lower parity (SRB among lower parity is general higher than that of higher parity), or a result of declining trend of SRB with mother's age at birth.   The biological and physiological reasons of this trend are not a topic of this paper.   All clear now is that there is a

trend or tendency that SRB among births during the years is high by the international standard and it declines with mother's age at births as well as with parity.

Table 7 SRB by mother's age at birth and parity

Mother's age at birth	SRB			
	Parity 1	Parity 2	Parity 3	Parity 4+
12~19	151	-	-	-
20~29	133	123	123	108
30~39	139	130	116	114
40+	-	-	-	110

4 Discussion:

General conclusion: SRB among children born to women aged 80+ years in 1998 and 2000 shows a high level by the international standard. SRBs calculated by periods, parity, and mother's age at birth also are higher than the upper limit of the international standard. There is a tendency that SRB declines with mother's age at births and with parity. The general trend of high SRB among the reported births is consistent with and even higher than that since 1980+ (e.g., figures in Table 1). Before 1949, China did not have national statistics on fertility, even on population. Since 1949, China had 5 censuses, 1953, 1964, 1982, 1990 and 2000. The first two censuses did not publish data that could evaluate SRB of the time. SRB published after third through fifth censuses represent level of SRB in the 20 years (1980 through 2000), but they may not be interpreted as high in China, since there is no Chinese reference to refer to or no Chinese historical data for comparison. The value is only judged by international standard. Fertility data from the elderly aged 80+ years served our purpose of digging historical SRB in China.

Data Issues: There are several issues related to the data. It is possible that underreporting of births exists due to sex preference in reporting male births than female births among infants. There is sex preference of children in parts of China and among certain segments of the population. However, when there is no limitation of fertility from a power outside of families, the preference may not affect reporting of birth and death of infants since there is no benefit or penalty for the reporting, thus no need to hide the event when the report is required. We consider that the possible underreporting of births and deaths among this group of elderly will not be sex and parity selective and thus should be treated as a constant factor, affecting both sexes and different parities. If it is treated as a constant factor, it can be neglected for the purpose of this study.

Age is another issue which was treated carefully in this study. There may be some doubts on age of the interviewees (80+) themselves as well as age of their children, since the elderly are old and their memories on the ages that we interested may not be accurate. However age is a more if not one of the most important individual identity among Chinese. It is a determinant factor for many family as well as social issues. For example, age will determine one's status within a family. According to their relative ranks in a family, they will have different responsibilities and obligations to their nuclear as well as extended family. In Chinese kinship

system, the classification of different kin is not only based on gender, generation, lineal as well as collateral, age is an important basis for the classification.   For example, in Chinese kinship terminology, different terms are used for older and younger brothers at ego generation ("xiong" for older brother and "di" for younger brother), for older and younger uncles from father side ("bofu" for uncles older than ego's father and "shu" for uncles younger than ego's father).   Age or birth rank (or parity which is determined by age) within a family is very important for Chinese.   Age is also one criterion that people evaluate one's rank or status in work units, seniority or juniority.   Many social roles will be assigned by seniority or juniority of an individual.   Considering these factors, we believe that the age report of the elderly for themselves is relative accurate.   For the age of children born to the elderly, we also have reasons to believe that it should be accurate.   Children are the center for Chinese family now and in the past.   Although total fertility rate was high in the period we studied which translate as more children born to a family, this should not affect the memories of older women to remember their children's age. There are different ways to remember age of their own and their children, such as Western calendar year (to be used only by part of the population who were influenced by the Western culture), Chinese calendar year, as well as the popular animal year.   In the survey, interviewers have a conversion formula or guideline for calculate or evaluate the age reported.

We also considered the effect human manipulation of SRB through means such as female infanticide but found that this should not be a problem for this study.   There were cases of female infanticide in China.   However, nobody has ever evaluated the magnitude of the practice but only cited cases.   We believe that there must be isolated cases of female infanticide during the period but should not affect the overall data quality of this survey.   Families preferred to have a son or sons could achieve the goal by having more children when fertility was not strictly limited by the society.   There are cases that families have few sons or daughters first and finally have a daughter or a son at the end of family fertility reproduction.   And we heard many cases that someone (a male or female) is extra to the family because an accident (an unexpected pregnancy).   He or she was born but not aborted or be killed after birth.   The isolated cases of female infanticide cannot prove that Chinese do not like or need daughters.   Daughters play very important, but different from sons, role in a family, such as helping mothers with family chores before marriage, increasing wealth of a family when get married, extending alliance of a family through marriage, and spiritually comforting of their own parents[12].   Therefore, there is no reason to believe that during the period the elderly lived through their reproductive age, girls were so hated or not welcomed by Chinese families and many of them were killed after they were born which could distort the quality of this data.

Implications of this analysis: The analysis indicates that SRB among this group of births is high by the international standard, and high by the high level of current SRB.

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[12]   There are says that "daughters are "cotton jacket (xiao mianao)" to parents" (keep parents warm emotionally); "sons for faces (to show to others), and daughters for heart (to be very close to the family)".

Because fertility among this surveyed elderly is a completed fertility (cohort fertility) during a specified period, it enables us to examine the effect of period, parity, and mother's age at birth on SRB.   The general results of the trend of SRB is that SRB stays high over the period we examined, declines with parity and decreases with mother's age at birth.   These results are consistent with many earlier studies on different population and bring up some points for evaluation on SRB.

Even though we believe that SRB in China is a little higher than the international standard, how much higher it is than the standard is a serious issue.   More studies on historical demographic data are needed to explore or to determine a rather true and acceptable SRB in China in the past.   This will help to interpret the current high SRB in China and determine different reasons of it.   However, the trend that SRB declines with parity and age of mothers giving births is a very important factor to analyze SRB. This trend is very hard to manipulate in the period we studies since there were no modern medical technologies to examine the sex of fetus and to have sex-selective induced abortion, the reasons well cited for high SRB in China now.   Practice of infanticide, especial female infanticide is very unlikely to affect the pattern, since too many "killings" would be involved.   Also, to achieve the tendency shown, practice of infanticide has to be used by families wanting to have sons at early parities.   There is no literature on this point, but only literature that many families want to have a son or sons no matter which birth order.

When evaluating SRB, we need to consider the effect of cohort fertility and period fertility.   Period fertility will generate a "period SRB" and cohort fertility will produce "cohort SRB".   Different fertility schedule will produce different period as well as cohort SRB, if the trends of SRB discussed in this paper holds.   For example, when fertility is rather natural (not rigorously controlled) and spread over different age groups of mother, period SRB might be lower than the fertility is controlled purposely at individual level.   Under a natural fertility schedule, period SRB is a result of SRB among births from different parities and from mothers giving births at different ages.   It is balanced between high SRB among lower parities and lower SRB among higher parities or births, or is balanced among higher SRB among babies born to younger mothers and lower SRB among babies born to older mothers.   If fertility stays stable over a time period, then the period SRB and cohort SRB will be very close to each other.   If fertility declines over a rather short time period, then the period SRB may be higher than the cohort SRB under the reasons that less births come from higher parities and born to women at older ages.   SRB among those births is generally lower according to data analysis in this paper.   To study SRB in China, only when we have a rather clear picture of the trend of SRB over a rather long period (for example 100 years, as the international standard indicates), we are able to evaluate the level of current SRB.   When mortality level is rather stable, parity, mother's age at births, as well as fertility level, schedule, and events that influence fertility are very important demographic and social variables to analyze SRB in China.

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