An Analysis of Recent Data on the Population of China

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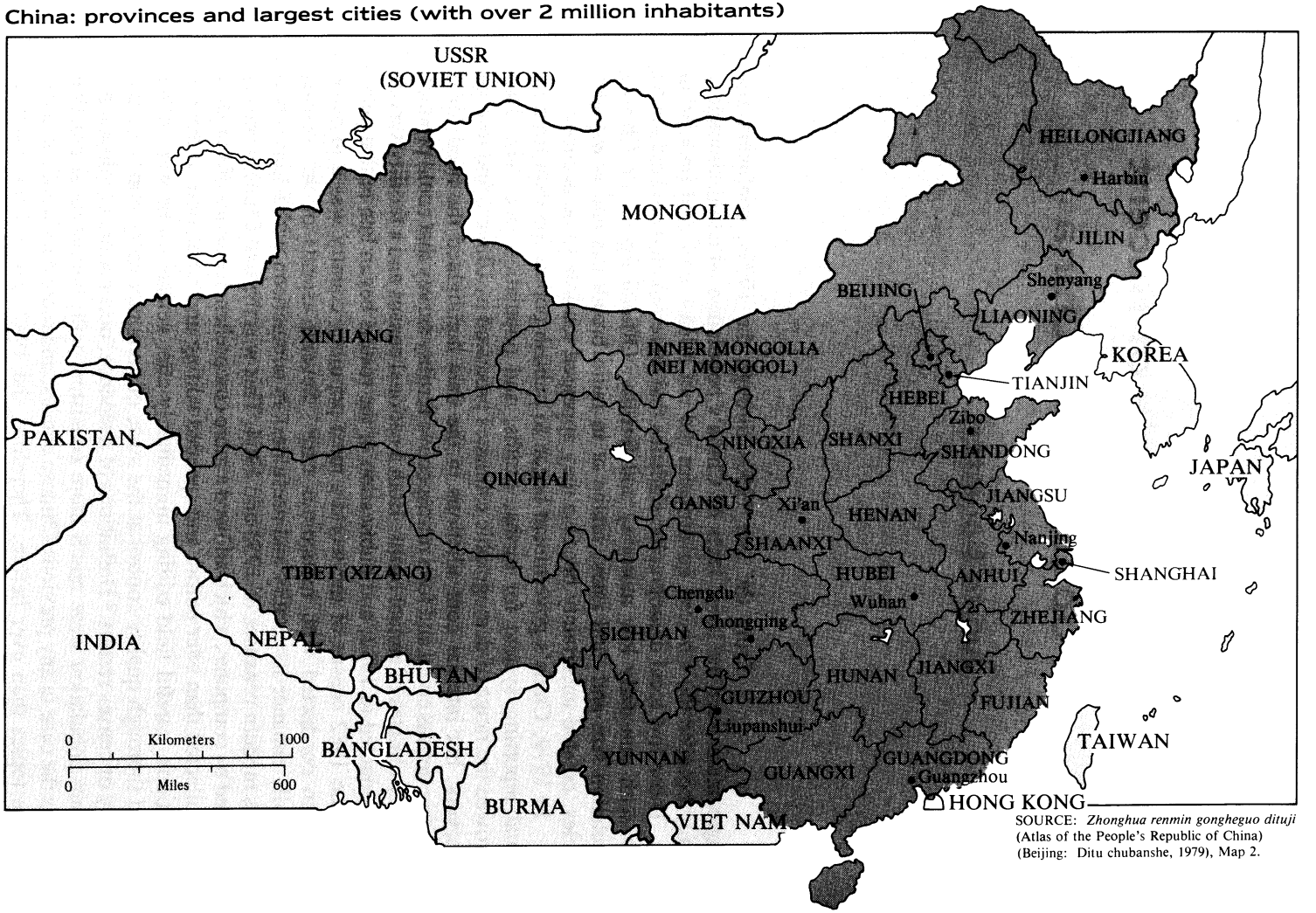
From the late 1950s through the 1970s, confusion and disagreement over the basic facts of China's population situation abounded, largely because the Chinese government did not release collected population data. Those few local demographic statistics that were reported covered model units with unusually low mortality and fertility. Official figures on China's population size and vital rates, hinted at in radio broadcasts and newspaper articles, created uncertainty because they appeared too low to be accurate.

In 1979, China's government began to publish population data from its annual reporting system for births, deaths, and population size. This step narrowed the range of demographic estimates produced by Chinese and foreign observers, but internal contradictions in the data highlighted the need for a definitive census count and for a retrospective fertility survey that could produce accurate estimates of annual births. Both a national census and a fertility survey were conducted in 1982, and publication of the results began late in that year.

The 1982 census of the world's most populous country was a massive operation conducted with meticulous care.[1] Several aspects of this census potentially enhance its quality and usefulness in comparison with China's two previous modern censuses of 1953 and 1964. This was the first Chinese census processed by computer, which allowed a more comprehensive series of statistics to be collected than ever before and speeded editing and tabulation. Intensive preparations, careful field editing immediately after census forms were filled out, and thorough quality control at the stage of computer entry improved the accuracy of census results.[2] Definitions of residence, occupation, employment, and urban population were much more consistent with international practice than was the case in any previous Chinese census, and more data were collected on these topics than ever before. Therefore, the 1982 census lends itself to meaningful international comparisons far more than China's two earlier censuses.

China: provinces and largest cities (with over 2 million inhabitants)



SOURCE: *Zhonghua renmin gongheguo dituji*
(Atlas of the People's Republic of China)
(Beijing: Ditu chubanshe, 1979), Map 2.

Evaluation of the results suggests that the 1982 census overcame many of the problems and weaknesses characteristic of China's earlier demographic, social, and economic data. What is surprising is that in some crucial ways the more rudimentary censuses of 1953 and 1964 almost matched the quality of the 1982 census. Analysis of data recently published from all three censuses, together with data from the 1982 fertility survey, provides the best picture of Chinese demographic trends ever available.

For several years, Chinese statistics officials had discussed the possibility of using the World Fertility Survey standard questionnaire modules to conduct a fertility survey of China. This was not done for a variety of reasons: the World Fertility Survey was already winding down; Chinese leaders objected to some of the WFS questions on attitudes toward family planning methods and ideal family size; and the WFS questionnaires were so long that resource constraints would have kept the sample size small. To meet these objections, China's statistical personnel designed a streamlined version of a questionnaire on retrospective marriage and fertility experience, sought international advice on how to make the sample fully representative of all China, and selected a huge sample of just over one million people, equivalent to one-thousandth of the total population. This survey provided the first reasonable estimates of age at marriage, age-specific fertility rates, and total fertility rates for the three-decade history of the People's Republic of China.[3]

Age-sex structure and completeness of the counts

In 1982 the age distribution data by single years of age and sex were published from the 1953 and 1964 censuses, and in 1983 from a 10 percent sample of 1982 census questionnaires.[4] Care is required in the analysis of these statistics because each single-year age distribution is missing part of the population. The data on single year of age published for 1953 sum to 567.4 million compared with the official census count of 582.6 million. Not included are the ages of 8.4 million people "indirectly surveyed" in inaccessible areas and the ages of 5.6 million men and 1.2 million women in the military.[5] The reported age distribution from the 1964 census excludes 4.9 million people whose ages were unknown. The age data so far available from the 1982 census exclude about 4.1 million men and 170,000 women in the military. Some of these problems can be minimized. In particular, the 1953 single-year data can be adjusted to the total count using 1953 census data by broad age group and sex independently reported in the 1950s.[6]

Table 1 presents the age-sex distribution of the 1982 civilian population in five-year age groups, based on the 10 percent sample tabulation of the census. The table also gives the estimated age-sex distribution for the total population, by imputing an age structure for the military population based on the intercensal reconstruction described below.

TABLE 1 Age-sex distribution of China's 1982 census population

Age group	Civilian population based on 10 percent sample of census returns			Age structure extrapolated to total population		
	Total	Male	Female	Total	Male	Female
0–4	94,716,640	48,992,340	45,724,300	94,716,640	48,992,340	45,724,300
5–9	110,731,630	57,040,700	53,690,930	110,731,630	57,040,700	53,690,930
10–14	131,802,210	67,861,520	63,940,690	131,802,210	67,861,520	63,940,690
15–19	125,312,480	63,747,990	61,564,490	126,322,929	64,697,275	61,625,654
20–24	74,312,110	37,855,290	36,456,820	75,829,995	39,261,100	36,568,895
25–29	92,591,020	47,781,440	44,809,580	93,582,215	48,772,635	44,809,580
30–34	72,957,770	37,906,430	35,051,340	73,283,162	38,231,822	35,051,340
35–39	54,203,370	28,545,980	25,657,390	54,488,812	28,831,422	25,657,390
40–44	48,381,030	25,792,360	22,588,670	48,635,505	26,046,835	22,588,670
45–49	47,364,000	25,046,990	22,317,010	47,364,000	25,046,990	22,317,010
50–54	40,850,780	21,560,990	19,289,790	40,850,780	21,560,990	19,289,790
55–59	33,909,310	17,499,710	16,409,600	33,909,310	17,499,710	16,409,600
60–64	27,382,530	13,714,630	13,667,900	27,382,530	13,714,630	13,667,900
65–69	21,267,130	10,175,000	11,092,130	21,267,130	10,175,000	11,092,130
70–74	14,348,950	6,439,050	7,909,900	14,348,950	6,439,050	7,909,900
75–79	8,608,540	3,497,630	5,110,910	8,608,540	3,497,630	5,110,910
80+	5,050,950	1,763,720	3,287,230	5,050,950	1,763,720	3,287,230
Total	1,003,790,450	515,221,770	488,568,680	1,008,175,288	519,433,369	488,741,919

NOTE: The unreported age structure of the military was estimated from the computer reconstruction of China's demographic trends presented in this article, using age-specific sex ratios in military ages as of 1982. Military personnel reportedly constituted 4,238,210 out of the total population of 1,008,175,288, so the civilian population should total 1,003,937,078. The differences between the two sets of column totals in Table 1 therefore do not accurately reflect the numbers of males and females in the military. Allocating the military total by the proportions shown here results in estimates of 4,070,763 men and 167,447 women in the military.
SOURCES: State Council and SSB (1982), cited in note 4, pp. 1–2; and State Council and SSB (1983), cited in note 4, pp. 264–273.

The reporting of age in all three censuses conducted by the People's Republic of China has been extraordinarily accurate. Analysis of these age distributions clarifies historical as well as recent trends in fertility and mortality. Some slight age-reporting errors can be detected in the 1953 data. There was a small preference for reporting infants as age one or two, because of the Chinese system of age reckoning in which a baby is called age "one" at birth and age "two" at its first Chinese New Year. But these errors were overcome in 1964 and 1982. In 1953 also, ages 15, 16, and 17 were underreported whereas age 18 was overreported for both sexes. This tendency is not seen in the next two censuses. The 1953 census data by single year of age also display some heaping at ages 55, 60, and 70. Neither the 1964 nor the 1982 census shows any significant age preference problems. Minor age heaping in the 1982 data included an apparent preference by both sexes for reporting age 52 and a female preference for ages 20 and 22.

Calculating the survival ratios of persons in each age-sex group from one census to the next helps to detect undercounts or overcounts that are age-sex selective.[7] Analysis of these survival ratios indicates that some males within the age range 15–25 were undercounted in both 1953 and 1964. This conclusion is reached after the military and the "indirectly surveyed" population are put back into the 1953 age-sex distribution, based on the age and sex structure of the total 1953 census population as reported in the 1950s. For 1964, the apparent undercount of young adult males may be spurious if the military were excluded or partially excluded from the reported single-year age structure and relegated to the "age unknown" category. Because military personnel are still missing from the 1982 age data, it is not yet possible to determine whether the tendency to undercount men in the most mobile age groups was overcome by improved 1982 census procedures.

Except for undercounting of young adult men in the first two censuses, which could be illusory if the military age structure were incorrectly estimated, no other instances of age-sex selective undercounting or overcounting are clearly detectable. It is possible that females within the age range 10–19 were undercounted in 1953, but one can argue convincingly that the favorable survival ratios of these girls from 1953 to 1964 were genuine and do not indicate an undercount. An overcount of both sexes at ages 49 and 52 in the 1982 census is also possible but not provable. Because only males appear undercounted in any of the three censuses, this implies that the actual sex ratio of China's population could have been higher than reported by the 1953 and 1964 censuses.[8] The directly surveyed population of 1953, including the military, had a high sex ratio of 107.6 males per hundred females. Indeed, an even higher sex ratio would have been expected, in light of the male and female patterns of mortality detected by a reanalysis of data from a 1929–31 survey of rural agricultural families in many provinces of China, showing lower female life expectancy than male and higher female mortality at ages 0–4 and 15–39.[9] The 1964 census population had a reported sex ratio of 105.5 males per hundred females. After adjusting to include missing men, the estimated sex

ratio is at least 105.8. The 1982 census also detected a preponderance of males, 106.3 males per hundred females. This sex ratio can be accepted, reflecting a male mortality advantage in the past.

Because of the high degree of consistency among the age-sex structures of the three censuses, with plausible survival patterns by age from one census to the next, there is no strong evidence showing that any of the censuses was significantly undercounted relative to any other, with the exception of the possible young adult male undercounts of 1953 and 1964. It is surprising that China's three censuses appear to be almost equally complete. One would have expected that the first two counts missed many people, since they were conducted in less than ideal circumstances. The 1953 enumeration was China's first modern census, taken with only six months of preparation soon after the State Statistical Bureau was established. The actual enumeration took about one year to complete.[10] The 1964 census was taken in great secrecy without publicity in the national media, and included a question on people's class origins or "personal class status" that might have prompted some to avoid being counted. Preparation began only nine months before the census date.[11] In contrast, the 1982 census benefited from greater awareness by census planners of the likely sources of omission and duplication, and from greater attention to overcoming these pitfalls.[12]

The high level of agreement between the population totals from China's 1982 census and from the permanent population registration system is also somewhat puzzling, because of known or suspected errors in the registers. In China, each person is supposed to be registered at his or her permanent residence. Those who are born should be promptly added, those who die should be soon deleted, and those who migrate to a new permanent residence are supposed to register there and be deleted from the register at their former home. Registration is closely tied to rationing of grain, cotton cloth, and other scarce items. China's media have mentioned certain common types of errors in the registers. Deletion of the names of deceased persons may be delayed because of the family's desire to retain the rations of the deceased. Persons who move to an urban area without government approval may be refused permanent registration in the city, but may stay there for years as temporary residents with their location of permanent registration still in the countryside or nowhere. Most serious, in the 1970s and 1980s, as cadres have attempted to enforce strict limits on the number of children couples are allowed to bear, many localities have reportedly refused permanent registration to children whose birth constituted a violation of government restrictions and have frequently delayed the registration even of children whose birth was authorized. Some sources cited these accumulated errors in the registers as one reason why a census was needed in the early 1980s.

Yet the agreement between the totals from the two data sources is almost perfect. The permanent registration system reported a year-end 1981 population total of 996,220,000, excluding the military. If the military population of 4,238,000 as counted in the census were added, China's year-end 1981 total

population based primarily on reporting from the permanent registration system would have been 1,000,460,000. If it is assumed that the population was growing at about 1.46 percent annually as estimated by the census, then the registered population of year-end 1981 would have grown to about 1,007,740,000 by midyear 1982. The census counted 1,008,175,288 persons at that date. The discrepancy is negligible.

A possible explanation for this surprising degree of consistency is that the errors in the registration system, whatever their magnitude, may be to a great extent compensating errors. While some people are counted twice, or still listed after death, others are not counted at all or are excluded for periods of time. The cleanup of registers in the year prior to the census deleted many of the duplications and names of the deceased. The design of the census questionnaire was adjusted after the first large pretest to permit enumeration of persons registered nowhere in the category of persons "whose residence registration status is still pending."[13] This adjustment surely helped minimize omissions in the count. In addition, census instructions and procedures emphasized, with some success, the importance of discovering and counting children who were not registered. Therefore, the census appears to have improved on the registration system, but the overcounts and undercounts from the registers that were corrected in the census largely cancelled each other out, leaving the estimated population size the same.[14]

So far there is no convincing evidence that the 1982 census undercounted or overcounted the population as a whole or particular age-sex groups. The 1982 census total is consistent with the two previous census counts after they are adjusted for males missing from ages 15–25, and with the total from the registers. Therefore, based on the information presently available, this analysis makes no adjustment in China's 1982 census count.

Marriage and fertility

The 1982 census asked all persons age 15 years and over their marital status—that is, whether they were currently single, married, widowed, or divorced. The census also asked how many births occurred in the household in calendar year 1981, and asked of women ages 15–49 the birth order of any child born in 1981. But during census planning, it became clear that the census would not and could not provide enough information on the mean age at marriage, trends in marriage age, yearly age-specific fertility rates and total fertility rates, contraceptive use, and other measures crucial for monitoring the success of the family planning program. So a nationwide retrospective fertility survey was conducted in September 1982 using the same reference date as the census, to supplement census data on marriage and fertility.

The combined data from the census and fertility survey have vastly improved the quantity and quality of statistics available on nuptiality and fertility in China. With regard to age at marriage, for example, data from the marriage registration system were suspect because many marriages were un-

recorded, particularly those in which the bride or groom was below the minimum age allowed in relevant regulations. To circumvent late marriage requirements, some couples would report their ages in the Chinese traditional manner, while others persuaded local leaders to falsify age data for the couple. In other cases, couples would marry in a traditional ceremony, begin childbearing, and later register the marriage when they reached the government's target marriage ages.[15] Therefore, marriage registration data might exaggerate the success of China's late marriage policy and inflate the "late marriage rates" used to monitor the success of the policy.

Data from the fertility survey showed that the mean age at first marriage for women in China, calculated in completed years of age rather than by Chinese traditional reckoning, rose gradually from 18.9 years in 1950 to 19.2 years in 1958, then more steeply to 19.8 years in 1961.[16] The average age at first marriage for women stabilized at 19.8 years through 1964, then rose to 20.6–20.7 during the late Cultural Revolution years 1969–71, and increased sharply throughout the 1970s to 23.0 years in 1979. With the passage of the new Marriage Law, which took effect in January 1981, average first marriage age for females dropped to 22.7 years in that year because the law invalidated the regulations of the 1970s that had mandated high minimum marriage ages. Of course, it is prudent to remember that any error in marriage data from the fertility survey or the census would probably have the effect of exaggerating age at first marriage and underestimating the proportions married below the new legal minimum marriage ages of 20 for women and 22 for men.

Data from the 1982 census reveal that marriages for women in China are heavily concentrated in the ages 20–25. In the age group 15–19 only 4 percent of women have been married. As shown in Table 2, the proportion ever-married rises to 25 percent of women at age 20, 51 percent at age 22, 67 percent at age 23, 79 percent at age 24, and 88 percent at age 25. Marriage remains "universal" for women, as it was in the China of 1929–31.[17] At age 29, 99 percent of women have married, and the proportion is 99.7 percent or higher in all age groups 35–39 and above.

As in the past, men marry later than women, members of each male cohort get married more gradually than women, and more men never marry. Of men aged 15–19, only 1 percent have married. At age 22, 24 percent have married, and at age 24, 49 percent. In their early 20s, men marry women about two years younger than themselves. At age 27, 79 percent of men have married, the same proportion as for women three years younger. But in the age group 30–34, 9 percent of men have never married, in contrast to only 1 percent of women. At higher ages the remaining single men marry very gradually, perhaps because of the high sex ratios and the corresponding shortage of women in all marriageable age groups up through 55–59.

Table 2 shows as well the percent of each age-sex group currently divorced. In all age groups, at most only 2 percent of men and 0.5 percent of women are divorced. These data reflect the unpopularity of divorce in Chinese culture and the government practice of refusing to grant divorce to most of

TABLE 2 Marital status of China's 1982 population, by age and sex

Age	Percent never married		Percent currently married		Percent widowed		Percent divorced	
	Male	Female	Male	Female	Male	Female	Male	Fe
15–19	99.1	95.6	0.9	4.3	0.0	0.0	0.0	0.(
20	93.4	75.1	6.5	24.7	0.0	0.0	0.1	0.1
21	87.1	62.5	12.7	37.3	0.0	0.0	0.1	0.1
22	76.2	48.6	23.6	51.1	0.0	0.0	0.1	0.2
23	63.6	33.2	36.2	66.6	0.1	0.0	0.2	0.2
24	51.0	21.0	48.7	78.8	0.1	0.0	0.2	0.2
25	38.5	12.0	61.0	87.7	0.1	0.1	0.3	0.2
26	28.6	6.8	70.8	92.9	0.2	0.1	0.3	0.2
27	21.0	3.7	78.3	95.9	0.2	0.2	0.4	0.2
28	16.2	2.2	82.9	97.4	0.3	0.2	0.5	0.3
29	12.9	1.4	86.1	98.1	0.4	0.2	0.6	0.3
30–34	8.9	0.7	89.7	98.6	0.6	0.5	0.8	0.3
35–39	6.8	0.3	90.8	98.2	1.3	1.2	1.2	0.3
40–44	5.7	0.2	90.5	96.6	2.3	2.9	1.5	0.3
45–49	4.4	0.2	89.7	93.3	4.0	6.2	1.9	0.3
50–59	3.0	0.2	86.5	82.2	8.5	17.2	2.0	0.5
60–79	2.5	0.3	70.6	44.2	25.3	55.1	1.6	0.4
80+	2.5	0.3	37.2	7.1	59.5	92.5	0.8	0.1

SOURCE: State Council and SSB (1983), cited in note 4, pp. 400–403.

those petitioning for it. This restrictive policy has apparently been relaxed under the new Marriage Law. The number of divorces granted jumped from 187,000 in 1981 to 427,000 in 1982, equivalent to 5 percent of the number of 1982 marriages.[18] There may also be a tendency for people to remarry as quickly as possible after divorce. In the latter case, persons divorced and remarried would be listed as "currently married" in Table 2, so these data understate the prevalence of divorce.

Widowhood is fairly rare until the upper ages in China. At ages 45–49, 4 percent of men and 6 percent of women are widowed. At higher ages the proportion rises far more steeply for women than men, reflecting better female survival at higher ages and perhaps a tendency for women to avoid remarriage if they are widowed after the childbearing ages. The historical prohibition of remarriage by widows may still have an effect on people's decisions. Furthermore, if a widow remarries, she is thought to have left the family of her deceased husband and joined the family of her new husband—a step that would inject further discontinuity into her life. Of course, Table 2 underestimates the prevalence of widowhood because anyone who remarried after the death of a spouse would be listed as "currently married."

The census and the fertility survey provide valuable data of unprecedented quality on fertility in China; no previous reliable data on age-specific and total fertility rates existed, and birth rates from vital registration were known to be underreported. For almost every year from 1950 through 1981, total fertility rates from the retrospective fertility survey produce a higher birth rate than had been reported from the registration system. In all cases, birth rates derived from the fertility survey are more plausible than those from vital

registration. Of course this does not guarantee that the fertility survey achieved complete reporting of fertility.

For calendar year 1981, answers to the census question on births agree closely with results of the fertility survey. Age-specific fertility rates from the fertility survey produce a 1981 crude birth rate of 20.6 births per thousand population, while the census reported 20.9. Both sources achieved far more complete reporting of births than the vital registration system, which recorded only 84 percent of the 1981 births reported by the census and gave an official birth rate of 17.6 per thousand population. The census count of children is consistent with the series of birth rates derived from the fertility survey, given possible levels of infant and early childhood mortality. This consistency strengthens the argument that children were well counted in the census and that the fertility survey achieved full reporting of births.

TABLE 3 Total fertility rate and distribution of births by birth order for women of childbearing age in 1981, by province

	Total fertility rate	Distribution of births by order (percent)		
		First born	Second born	Third or above
Shanghai	1.32	87.0	12.0	0.9
Beijing	1.59	85.1	12.0	2.9
Tianjin	1.65	78.5	16.2	5.3
Liaoning	1.77	71.5	19.2	9.3
Jilin	1.84	60.2	25.3	14.6
Zhejiang	1.98	54.1	26.8	19.1
Heilongjiang	2.06	54.1	26.7	19.2
Jiangsu	2.08	61.1	26.1	12.8
Shandong	2.10	60.6	24.5	14.9
Shanxi	2.39	47.7	27.8	24.5
Shaanxi	2.39	49.6	26.3	24.1
Sichuan	2.43	56.6	24.2	19.3
Hubei	2.45	50.3	27.7	22.0
Inner Mongolia	2.62	44.2	26.4	29.4
Hebei	2.65	52.3	27.5	20.2
Henan	2.65	44.6	27.9	27.6
Fujian	2.72	40.9	30.0	29.1
Gansu	2.73	43.4	24.9	31.8
Jiangxi	2.79	36.6	28.2	35.2
Anhui	2.80	37.4	28.6	34.0
Hunan	2.83	43.3	30.8	25.9
Guangdong	3.28	37.0	27.9	35.1
Yunnan	3.81	28.3	22.7	48.1
Xinjiang	3.88	27.1	18.2	54.7
Qinghai	3.93	26.6	19.8	53.6
Guangxi	4.10	31.1	23.9	45.0
Ningxia	4.12	30.4	20.5	49.1
Guizhou	4.36	23.9	20.4	55.7
Average	2.58	47.3	25.7	27.0

SOURCE: Statistics from the 10 percent sample of 1982 census questionnaires, excluding Tibet. "Birthrate of women of child-bearing age," *Beijing Review* 27, no. 11 (12 March 1984): 22–23.

With regard to birth order, statistics from the 10 percent sample of census questionnaires show that of 1981 births, 47.3 percent were first births, 25.7 percent were second births, and 27.0 percent were third or higher order births.[19] Fertility survey results were in substantial agreement. The survey found that 46.6 percent of 1981 births were first births, 25.4 percent were second order, and 28.1 percent were third or higher order births. The fertility survey highlighted the change from the previous decade in this fertility measure. In 1970, 20.7 percent of the births had been first births, while 62.2 percent were third or higher order. By 1977, these proportions had shifted to 30.9 percent for first births and 44.6 percent for third or higher order births.[20] The radical transition in birth parities from 1970 to 1977 and the even sharper shift toward first births and away from third or higher order births by 1981 demonstrate the success of China's fertility control policies.

Regional variations in fertility patterns shown by the census are given in Table 3. Total fertility rates in 1981 range from well below replacement levels to above four children per woman among different provinces. The distribution of births by order reflects this variation: in Shanghai nearly nine out of ten births in 1981 were first births; in Guizhou more than half were third or higher order births.

Mortality

Prior to late 1982, the only usable data on mortality were crude death rates from the vital registration system and life tables applicable to 1973–75 from the nationwide Cancer Epidemiology Survey of 1976. It was obvious that deaths were underreported by the annual reporting system, but it was difficult to estimate the extent of underreporting. The vital registration system was and is useful for showing trends in mortality even if the levels were underestimated. The Cancer Survey, a monumental undertaking, included an attempt to record every death in China for three years by cause of death. Over 18 million deaths were so documented. This survey provided reasonably accurate life tables applicable to all of China for the first time in the history of the People's Republic. One analysis, using indirect demographic techniques, concluded that death reporting above early childhood was 80–90 percent complete in the Cancer Survey, and estimated that expectation of life at birth in China as of 1973–75 was in the range of 61.7–64.4 years.[21]

With the release of age structures from China's three censuses, it is now possible to estimate levels and patterns of intercensal mortality. Mortality in the 1953–64 intercensal period was high, especially for men above age 30, and also high but not quite as high for women above age 35. The pattern of mortality matches no model life tables but is plausible.[22] The pattern of survival for 1964–82 shows relatively low mortality for a developing country and is reasonably consistent with Cancer Survey life tables, except that completeness of death reporting in the Cancer Survey differed by age.[23]

Infant mortality has been the hardest component of mortality to measure in China. The registration of infant deaths is so incomplete that infant mortality

rates officially reported from this system, usually about 20–25 infant deaths per thousand live births for China as a whole, are substantially lower than the true rates.[24] The Cancer Survey, for the first time and as a result of special effort, achieved a believable level of reporting of infant deaths. Unadjusted life tables from the Cancer Survey show an infant mortality rate of 49 deaths per thousand live births for boys and 43 for girls, applicable to 1973–75.[25] A correction for possible reporting of some infant deaths by Chinese ages, a distortion apparent in the life tables, can raise the estimated infant mortality rates to as high as 63 for boys and 56 for girls.[26]

The 1982 fertility survey attempted to measure infant mortality for 1980 and 1981, but the results have not yet been reported.[27] Meanwhile it is possible to indirectly estimate the levels and trends of China's national infant mortality rate from census data, using a technique refined by Griffith Feeney from pioneering work by William Brass.[28] The Feeney method uses data on children ever born and children surviving by age of woman to estimate the infant mortality rate at different points in time. It is assumed that younger women have lost children in recent years, while older women have experienced child deaths at earlier dates. The results for China, illustrated in Table 4, show a decline in the infant mortality rate from 80 per thousand live births in late 1968 to 68 at the end of 1971 to 57 in late 1974—the last figure being fairly consistent with Cancer Survey results for the same period, as discussed above. The results according to the Feeney method show China's infant mortality rate falling to a low point at the beginning of 1979 at 45 infant deaths per thousand live births.[29]

By late 1980, according to use of the Feeney method, China's infant mortality rate had risen to 53 deaths per thousand live births. Caution is required in interpreting this latest estimate because it may be biased. The estimate of 53 is based on the proportion dead of children born to women aged 20–24. Sometimes the infant mortality rate estimated from this age group is higher than the rate for the whole population, because the experiences of the youngest married women are somewhat atypical. In 1982, fewer than half the women aged 20–24 had borne a child. The infant mortality experience of their children would not be fully representative of all China, for women who bear children before age 25 are disproportionately rural and of minority nationalities. Urban women marry and bear children later than rural women, and Han Chinese women delay their first and subsequent births in comparison to the minorities. Infant mortality rates are reported to be much higher in rural areas, and it is likely that minority group infant mortality rates are higher than Han rates, so the extent of the rise in infant mortality estimated in Table 4 may be exaggerated by selectivity bias.

There is an inconsistency between the results of the Feeney infant mortality technique and the levels of fertility estimated by the national fertility survey. If both sets of estimates were assumed correct, then there would be too few survivors at each age in 1982. The census counted more children at each age, which implies that either the fertility survey underestimated fertility

for most of the 15 years prior to 1982, or the Feeney technique results shown in Table 4 are all overestimates of infant mortality. Both types of error are possible. Further information and analysis will be needed to pinpoint the source or sources of this discrepancy.

TABLE 4 Indirect estimation of infant mortality from China's 1982 census data

Age of woman	Number of women (thousands)	Number of children born (thousands)	Children born per woman	Children surviving (thousands)	Children surviving per woman	Proportion dead	Estimated infant mortality rate	Reference dat for estimate
20–24	36,378	15,292	0.420	14,343	0.394	0.062	53	1980.8
25–29	44,745	71,272	1.593	66,731	1.491	0.064	45	1979.1
30–34	34,996	96,685	2.763	89,394	2.554	0.075	48	1977.2
35–39	25,605	97,358	3.802	87,865	3.431	0.098	57	1974.8
40–44	22,540	104,671	4.644	91,780	4.072	0.123	68	1971.9
45–49	22,272	119,535	5.367	100,790	4.525	0.157	80	1968.7

NOTE: Estimation using Feeney technique (see text).
SOURCE of underlying data: State Council and SSB (1983), cited in note 4, pp. 438–439.

Reconstruction of population growth and dynamics

Table 5 presents a computer reconstruction of China's changing population from 1953 to 1982. The reconstruction assumes that the census age-sex structures and census counts are correct, except that a small adjustment is made to include men aged 15–25 not counted in the first two censuses. The annual age-specific and total fertility rates from the 1982 fertility survey are utilized as reported, except for a slight adjustment upward in 1981 based on birth reporting by the census.[30] Use of fertility survey estimates of each year's fertility level forces down the estimates of infant mortality below the Feeney method results, described above.

In this reconstruction of China's population trends, population growth from 1953 to 1964 and from 1964 to 1982 was obtained by accepting the census counts for all three years with only slight adjustments. Fertility data were obtained from the annual age-specific fertility rates from the 1982 nationwide fertility survey. International migration was assumed negligible. Therefore, the only residual variable was mortality. The total numbers of deaths during 1953–64 and 1964–82 were determined by the data on fertility and population growth. The only questions remaining were how to allocate the deaths from year to year and how to allocate deaths by age. Our reconstruction used trends in China's official death rates to model trends in the estimated death rates. Analysis of survival ratios by age and sex for the two intercensal periods provided evidence on the age pattern of mortality for use in the reconstruction. Age-specific central death rates were then estimated for 11 specific years, and the computer interpolated mortality for the intervening years.

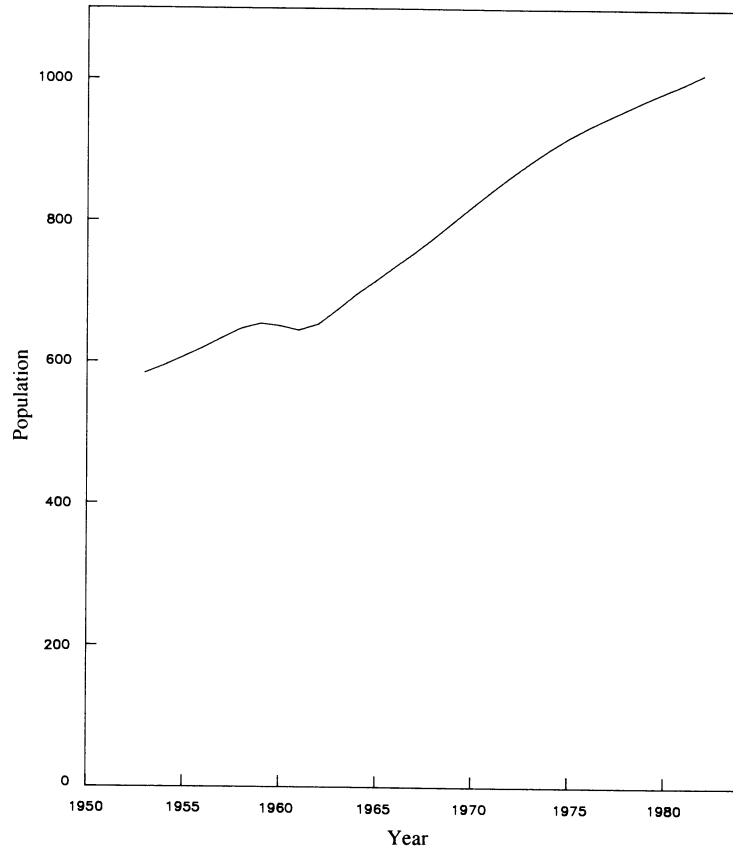
The estimates presented in Table 5 and plotted in Figures 1–6 are fairly reliable. The reconstruction produces 1964 and 1982 age-sex distributions in approximate agreement with the reported age structures of the two censuses. The population totals in the reconstruction are close to the official series based on censuses and population registers, but not in exact agreement. The reconstructed totals are consistent with the vital rates in Table 5, whereas the official totals do not agree with the official vital rates. On grounds of internal consistency alone, this series of totals is preferred to the official series. Birth rates in Table 5 are higher in most years than those in official data. These birth rates derived from the nationwide fertility survey are more plausible than birth rates from vital registration and should now be used in preference to the annual official birth rates.

TABLE 5 Reconstruction of population dynamics for China

Year	Midyear population, in millions	Crude birth rate (per thousand)	Crude death rate (per thousand)	Rate of natural increase (per thousand)	Total fertility rate	Expectation of life at birth (years)	Infant mortality rate (per 1,000 births)
1953	584.2	42.2	25.8	16.47	6.06	40.3	175
1954	594.7	43.4	24.2	19.24	6.28	42.4	164
1955	606.7	43.0	22.3	20.71	6.26	44.6	154
1956	619.1	39.9	20.1	19.78	5.86	47.0	143
1957	633.2	43.3	18.1	25.13	6.40	49.5	132
1958	646.7	37.8	20.7	17.11	5.68	45.8	146
1959	654.3	28.5	22.1	6.47	4.31	42.5	160
1960	650.7	26.8	44.6	−17.84	4.02	24.6	284
1961	644.8	22.4	23.0	−0.58	3.29	38.4	183
1962	653.3	41.0	14.0	27.00	6.03	53.0	89
1963	674.2	49.8	13.8	35.98	7.51	54.9	87
1964	696.1	40.3	12.5	27.84	6.18	57.1	86
1965	715.5	39.0	11.6	27.37	6.07	57.8	84
1966	735.9	39.8	11.1	28.71	6.26	58.6	83
1967	755.3	33.9	10.5	23.44	5.32	59.4	82
1968	776.2	41.0	10.1	30.88	6.45	60.3	81
1969	798.6	36.2	9.9	26.31	5.73	60.8	76
1970	820.4	37.0	9.5	27.44	5.82	61.4	70
1971	842.5	34.9	9.2	25.63	5.45	62.0	65
1972	863.4	32.5	8.9	23.60	4.99	62.3	60
1973	883.0	29.9	8.9	21.27	4.54	63.0	56
1974	901.3	28.1	8.3	19.76	4.17	63.4	52
1975	917.9	24.8	8.1	16.72	3.58	63.8	49
1976	932.7	23.1	7.8	15.21	3.23	64.2	45
1977	946.1	21.0	7.7	13.39	2.85	64.6	41
1978	958.8	20.7	7.5	13.21	2.72	65.1	37
1979	971.9	21.4	7.6	13.76	2.75	65.0	39
1980	983.4	17.6	7.7	9.98	2.24	64.9	42
1981	994.9	21.0	7.7	13.31	2.69	64.8	44
1982	1,008.2	21.1	7.9	13.20	2.71	64.7	46

SOURCE: Author's estimates based on the three censuses and the 1982 fertility survey. For further detail on the derivation of the reconstruction, comparisons with official data, and the breakdown by sex of the total population and mortality estimates, see Banister, cited in note 6.

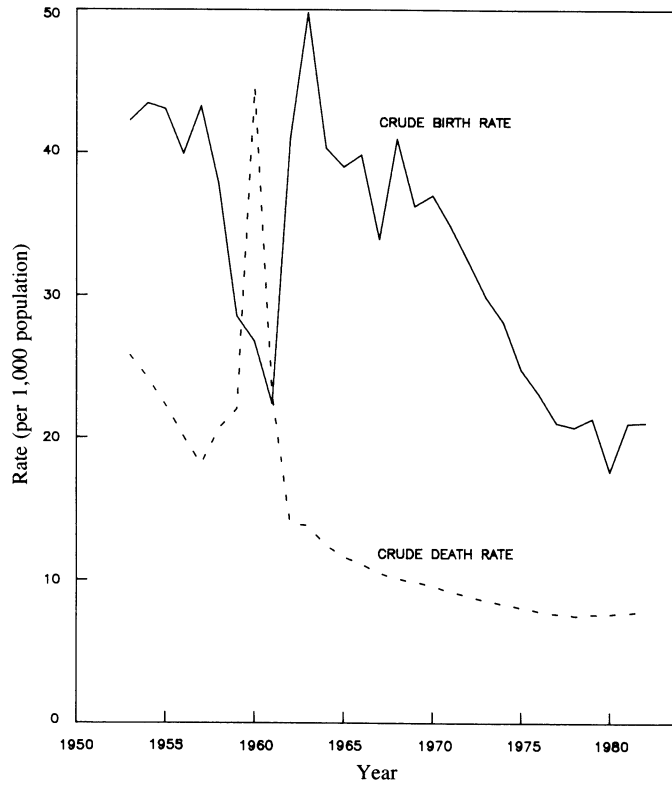
FIGURE 1 Midyear population of China, 1953–82 (millions)



For every year, the reconstructed death rate is higher than the official death rate. If one accepts the census counts and the fertility estimates from the nationwide fertility survey, then one must conclude that for most years since 1964, the death reporting system has achieved completeness of reporting in the range of 79–90 percent. Based on the reconstructed series in Table 5, the Cancer Survey attained about 88 percent completeness of death reporting, which is consistent with the 80–90 percent completeness estimate derived by Banister and Preston (cited in note 21, p. 104). The 1982 census also appears to have recorded less than 85 percent of the 1981 deaths, if this reconstruction is correct. In January 1983, the government conducted a vital events survey in order to correct for underreporting from the regular reporting system,[31] but the resulting 1982 death rate estimate of 6.60 appears to be under 90 percent complete. Some of the deaths in China each year seem to have eluded all the varied attempts to obtain complete reporting of mortality.

The reconstruction indicates that expectation of life at birth for China had risen to 40 years by 1953, from an estimated 24 years in 1929–31.[32] A

FIGURE 2 Estimated birth and death rates, China, 1953–82



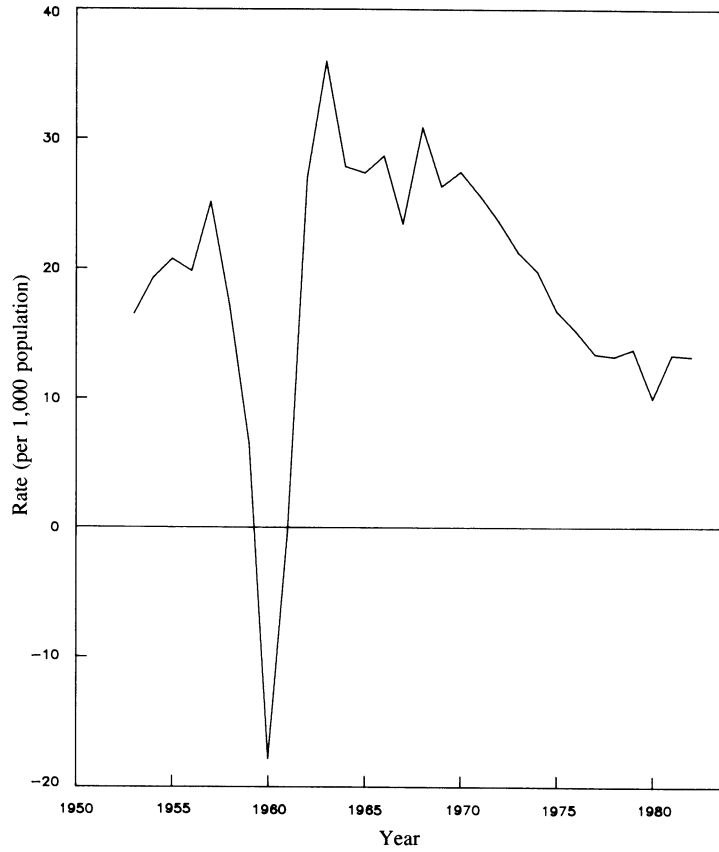
life expectancy of 50 years was achieved by 1957, but this was reversed by the Great Leap Forward famine that peaked in 1960. Mortality conditions quickly improved in the early 1960s. A life expectancy of 61 years was attained by 1970, rising further to 65 years by 1980.

If the census and the fertility survey achieved almost complete reporting of births while deaths have been underreported by all sources, it follows that recent estimates of China's rate of natural increase have been too high. The census reported a natural increase rate of 14.55 per thousand population for 1981, while the fertility survey produced a rate of 14.49 for 1982. The reconstruction shows a rate of natural increase, assumed to be the same as the population growth rate, of 13 per thousand in those years.

Employment and occupation

The 1982 census data on occupation, industry, and employment are unprecedented in China in terms of the quantity and quality of information being tabulated and reported. In August 1981, the Population Association of China held a conference in Beijing on how to define and classify the employed

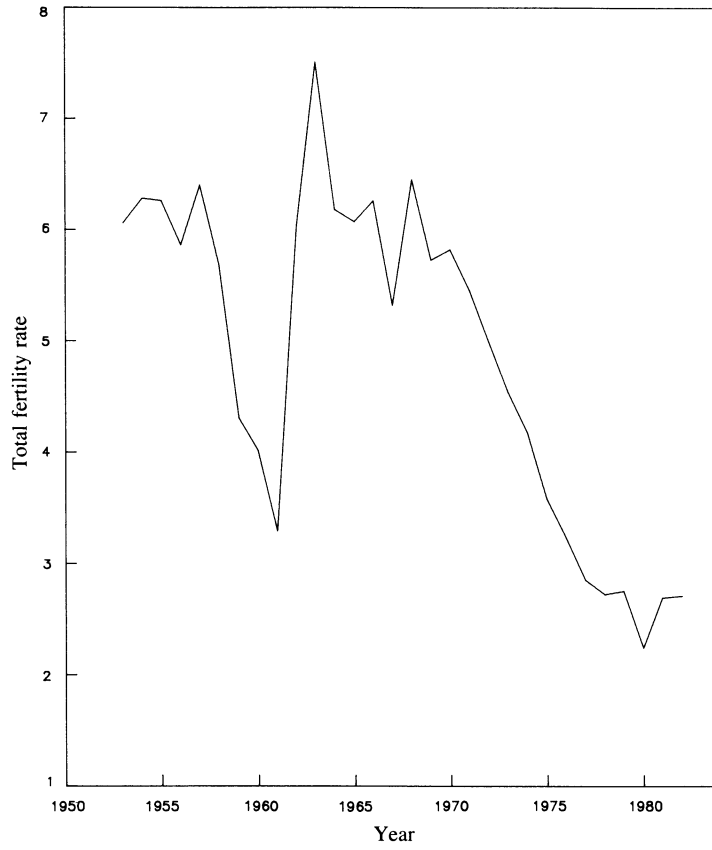
FIGURE 3 Rate of natural increase, China, 1953–82



population for the census.[33] They noted some confusion in the reporting of the employed population and of those "waiting for employment." They pointed out that the category "peasant" was an umbrella term encompassing 800 million people whose households were called "agricultural" because they were not entitled to commercial grain rations. This inflated the "agricultural" population by including many people who worked in collective industries, public health, and educational work. The conference noted, "There is no accurate figure for the number of people who are actually performing farm labor in China."[34] Similarly, the government had figures on the number of persons employed by state and collective industrial establishments but did not classify and report the work force by occupational category. Thus the census questions were designed to fill an informational vacuum with data useful for economic planning.

In the census, each individual aged 15 and above was categorized as "employed" if he or she had been working for 16 days or more in June 1982, the month before the census.[35] The working population was defined as those who derive an income from their labor, including persons engaged in household

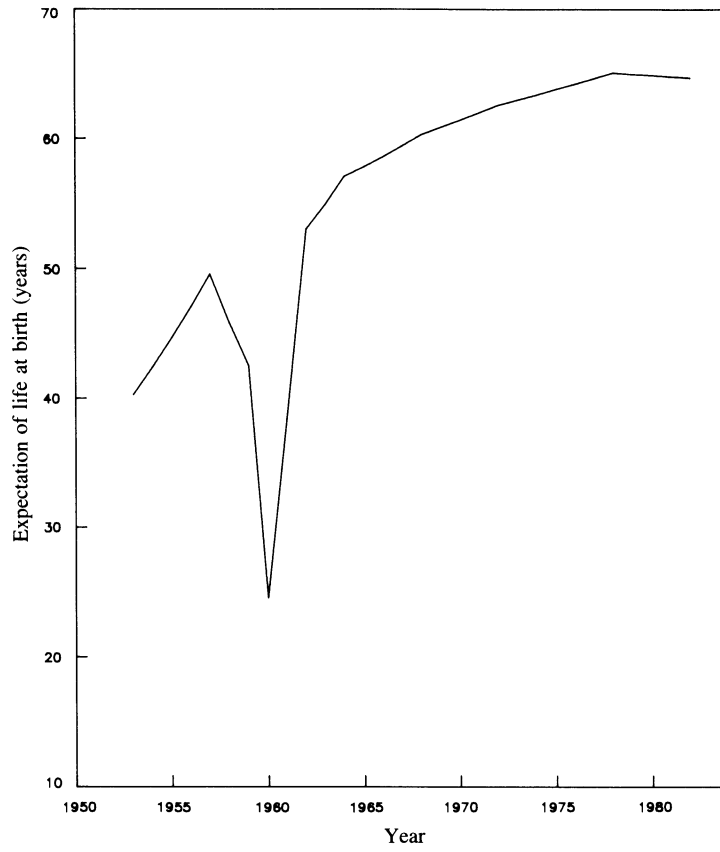
FIGURE 4 Total fertility rate, China, 1953–82



sideline production, those working at a temporary job, retired annuitants who continue to work for additional income, and self-employed persons, as well as those holding a regular job. The census counted 521.4 million employed workers, of whom 293.5 million were men and 227.8 million were women.[36] Of the total, 360.1 million persons, or 69 percent of the employed working population, were engaged in "farming," including 188.9 million men and 171.2 million women.[37] The rest of the employed population was classified by detailed occupational categories, and all data on occupational groups were cross-tabulated by age, sex, educational attainment, and location (city, town, or rural, and by province).

Table 6 shows the size of the working population by sector of the economy from census data and from regularly reported workplace statistics. The percentages of the working population in all economic sectors are in fairly close agreement in the two sources of information, but the census counted 81 million more workers than are included in the year-end reporting system. The discrepancy is composed of differences of 68 million workers in "Agriculture, forestry, water conservancy, and meteorology" and 13 million in "Industry."

FIGURE 5 Expectation of life at birth, China, 1953–82, based on author's reconstruction



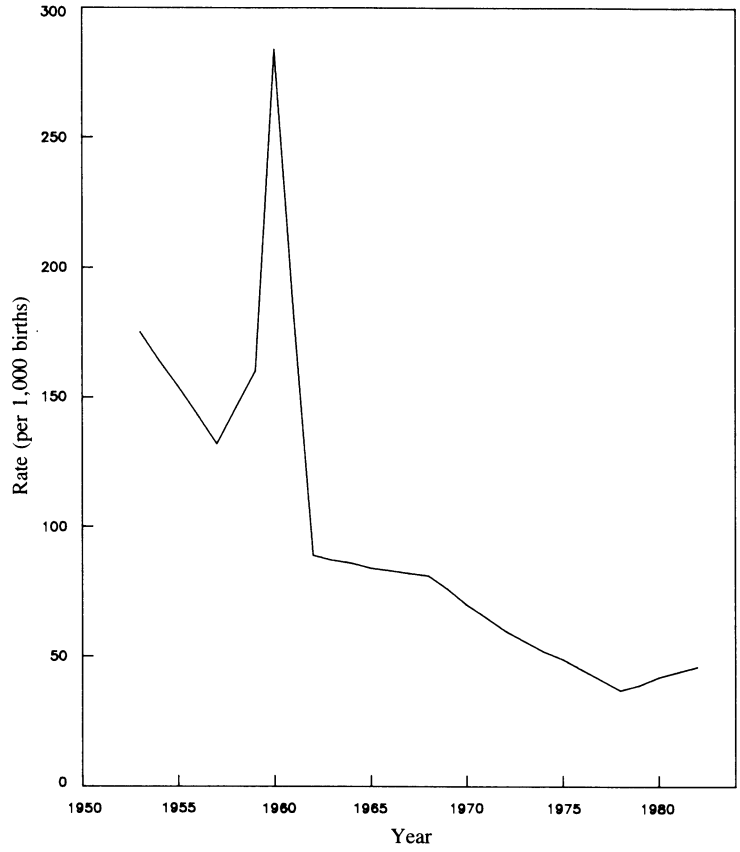
The source of this discrepancy is unclear. Who are these persons who qualify as employed workers according to the census results, but who continue to be excluded from the regular economic reporting system? Perhaps many are women, youths, and older people who work and earn income when they can but are not recognized as employees of any industrial work unit or as productive members of rural production brigades. Many also may be temporary or contract laborers or self-employed workers missed by the regular reporting system. It is also possible that the census questions on work have somehow exaggerated the size of the working population. For instance, some rural residents may participate in farm labor only in peak agricultural seasons and be without remunerative work for the rest of the year. Nevertheless, the census would have included them as employed farm workers, because the census did not attempt to estimate underemployment or seasonal unemployment. Another reason for possible inflation of the rural working population was the census questionnaire design, which required all persons 15 and older to be categorized

TABLE 6 China's working population by sector: data from the 1982 census and from annual workplace statistics compared

		Workplace statistics				Percentage composition of the working population	
	Midyear 1982 census, 10% sample (millions)	Year-end 1981 (millions)	Year-end 1982 (millions)	Midyear 1982 derived total	Absolute difference, census compared to workplace statistics (millions)	Census, 10% sample	1981–82 workplace statistics
Total working population	521.38	432.80	447.06	439.94[c]	+81.44	100	100
Economic sector							
Industry	71.45	57.96	59.30	58.63	+12.82	13.7	13.3
Construction and resources prospecting	11.71[a]	12.74	13.40	13.07	−1.36	2.2	3.0
Agriculture, forestry, water conservancy, and meteorology	384.34[b]	311.71	320.13	315.92	+68.42	73.7	71.8
Transport, posts, and telecommunications	9.02	8.33	8.50	8.42	+0.60	1.7	1.9
Commerce, catering service, service trade, and supply and marketing of materials	17.00	17.22	18.20	17.71	−0.71	3.3	4.0
Scientific research, culture, education, public health, and social welfare	17.70	16.45	16.46	16.46	+1.24	3.4	3.7
Government agencies and people's organizations	8.01	5.55	6.11	5.83	+2.18	1.5	1.3
Others	2.15	2.84	4.96	3.90	−1.75	0.4	0.9

[a] Includes census workers.
[b] Excludes meteorology.
[c] Sum of components.
SOURCE: Data and table compiled by Jeffrey R. Taylor and analyzed in his *Occupation and Employment in China* (Washington, D.C.: US Bureau of the Census, forthcoming).

FIGURE 6 Infant mortality rate, China, 1953–82, based on author's reconstruction



as either "working" or "nonworking," but provided no clear category for the rural unemployed under "Status of nonworking person." Many rural residents may have categorized themselves as farmers or household handicraft workers, for example, rather than as nonworking persons with status of "Other."

The categories under "Status of nonworking person" had an urban orientation. For instance, the census counted 3.4 million persons "awaiting job assignment in city or town," of whom 1.8 million were females and 1.6 million were males.[38] The vast majority of these were young people aged 15–19, most looking for their first job.[39] These figures are compatible with an official report of May 1982 that enumerated, as of year-end 1981, 3.05 million unemployed persons in urban areas.[40] The census data also confirm previous reports that most people "waiting for employment" in cities and towns are recent middle school graduates and that more girls than boys are unemployed.[41] This definition of "waiting for employment" might be a narrower concept of unemployment than is in use in other countries. In China there may be many persons in urban and rural areas who want paid work but who are excluded from even applying for jobs because their household registration location or status or some other restriction makes them ineligible to apply.

Minority nationalities

The 1982 census also broke new ground in the collection and cross-tabulation of statistics on China's 55 officially recognized minority nationalities. Because of the computerization of census operations, it was possible to derive 1982 statistics on the geographical distribution, age structure, educational level, literacy, occupational categories, fertility, and child survival levels of each minority group. The nationwide fertility survey also emphasized the estimation of the fertility and marriage patterns of the minority population as a whole compared with the Han Chinese population.[42] These statistics filled a near-void of data on minority nationalities prior to 1982.

The first two censuses had counted China's minority groups. The 1953 census, emphasizing the complete coverage of minority groups, produced a minority nationality count of 35.32 million persons, or 6.06 percent of China's mainland population.[43] The 1964 census counted 39.99 million members of minority groups, constituting only 5.76 percent of the population.[44] Little has been reported on whether the 1964 census gave as close attention as the earlier census to the reporting of minority nationality status. If not, perhaps many minority group individuals reported themselves to be Han Chinese, leading to an underestimate of minority group size as compared with the 1953 and 1982 censuses. Even so, a reduction of the minority nationality proportion of China's population from 1953 to 1964 is plausible, and would primarily reflect lower rates of natural increase among the minorities than among the Han in the intercensal period.

Between 1964 and 1982, it is apparent that little usable information was systematically collected on the minority groups. An attempt in 1978 to compile figures on the population of each minority group produced confusing results. By that time, the Han population had greatly reduced its fertility, while the minority groups had all been exempted from the family planning program and were reported to have early marriage and high fertility. Yet the 1978 minority group figures totaled only 55.8 million persons, constituting 5.8 percent of the total population, the same proportion as in 1964.[45]

In preparation for the 1982 census, members of minority groups were admonished not to report themselves as Han.[46] The process of straightening out the household registration records before the census included attempts to correct the nationality status of those whose nationality was misreported in the registers.[47] Complete self-definition of ethnic identity had been allowed for China's 1953 census, but in 1982 persons were required to be included in the same nationality group as their parents. Only in the case of mixed marriages was the family permitted to choose one of the two parental nationalities for the children. If both one's parents have been classified as "Han," one may not claim to be a member of the "Hui" minority, for example. Similarly, if both parents were listed as "Manchu," one cannot claim to be "Han." Yet, in the case of both of these minority group categories, Hui and Manchu, the potential for genuine assimilation is great. The Manchus no longer have a

language or culture distinct from the Han, and the Hui live among the Han in many parts of the country, with the only difference being the Hui's continuing adherence to Islam. Results of the 1982 census therefore maximized the minority group figures by minimizing the possibility of assimilated individuals identifying themselves as Han Chinese. The Manchu total, for instance, had been reported as 2.7 million in both 1964 and 1978, but jumped to 4.3 million in 1982.[48]

The 1982 census counted 67.23 million persons in the minority nationalities, or 6.67 percent of the total population.[49] The numbers are given in Table 7. Only one group, the Zhuang, made up more than one percent of the total population. The Zhuang and four other minority groups (Hui, Uygur, Yi, Miao) each exceeded 5 million persons, and these five groups account for over half of the total minority population. The increase from the 1978 estimate to the 1982 count was great for most of the 55 minority groups. According to one official report, "Many of the minority nationality people who did not register themselves as minority nationalities have now done so. This has also

TABLE 7 Ethnic groups of China, 1982 census

Ethnic group	Census count, 1982	Percent of total civilian population	Primary location
Han Chinese	936,703,824	93.30	The majority in all provinces except Xinjiang and Tibet
Zhuang	13,378,162	1.33	Guangxi
Hui	7,219,352	0.72	Widespread, primarily Ningxia, Gansu, and Henan
Uygur	5,957,112	0.59	Xinjiang
Yi	5,453,448	0.54	Yunnan and Sichuan
Miao	5,030,897	0.50	Guizhou, Hunan, and Yunnan
Manchu	4,299,159	0.43	Liaoning, Heilongjiang, and Jilin
Tibetan	3,870,068	0.39	Tibet, also Sichuan and Qinghai
Mongolian	3,411,657	0.34	Inner Mongolia
Tujia	2,832,743	0.28	Hubei, Hunan, and Sichuan
Bouyei	2,120,469	0.21	Guizhou
Korean	1,763,870	0.18	Jilin and Heilongjiang
Dong	1,425,100	0.14	Guizhou
Yao	1,402,676	0.14	Guangxi
Bai	1,131,124	0.11	Yunnan
Hani	1,058,836	0.11	Yunnan
Kazak	907,582	0.09	Xinjiang
Dai	839,797	0.08	Yunnan
Li	817,562	0.08	Guangdong
Lisu	480,960	0.05	Yunnan
She	368,832	0.04	Fujian and Zhejiang
Lahu	304,174	0.03	Yunnan
34 other minority groups	2,275,631	0.23	—
Unknown	879,201	0.09	—
Acquired Chinese citizenship	4,842	—	Fujian, Heilongjiang, Guangxi

NOTE: The ethnic composition of the 4.24 million military personnel has not been reported.
SOURCES: State Council and SSB (1982), cited in note 4, pp. 23–24; and State Council and SSB (1983), cited in note 4, pp. 212–225.

contributed to the relatively big increase in the minority nationality population.''[50] The wealth of data collected on these nationalities will be a gold mine for ethnographic studies of each minority, and will be used in the formulation and implementation of economic and social policies directed toward them.

The urban population

There is worldwide interest in the size of China's urban population, particularly the population in China's largest cities because they rank with the world's large cities. Before the 1982 census, attempts to estimate the urban population, even in China's large municipalities, met with frustration. From the early 1960s through 1981, a narrow definition of ''urban population'' was in use, but the functional definition was not publicized. It was clear that the reported urban population size in those decades was not comparable to urban data from the 1950s, but the reason for the apparent underreporting was unclear. China's urban population had reportedly increased from 77.3 million in the 1953 census, 13.3 percent of the total population, to a peak of 130.7 million in 1960, 19.8 percent of that year's official total population. After the collapse of the Great Leap Forward, the government relocated millions of people to the countryside, but the extent of this ruralization process was surely exaggerated by figures showing an urban population of only 97.9 million in 1964, 14.1 percent of the 1964 census count.[51] The official urban population was given as 101.7 million at year-end 1965 (14.0 percent of the total population), 102.3 million in 1970 (12.4 percent), 111.7 million in 1975 (12.1 percent), 128.9 million in 1980 (13.2 percent), and 138.7 million at year-end 1981 (13.9 percent).[52] Although these urban figures were comparable neither to the 1953–60 urban data nor to the 1982 census urban data, the trends shown in the 1964–81 statistics were probably real. In other words, China held down its urban population size and reduced the urban proportion of its total population during 1964–75, by means of reducing urban natural population increase, preventing most rural-to-urban migration, and relocating millions of urban-born young adults in rural and border areas. The increasing urban proportion after 1975 reflected the return to cities of many persons previously sent to the countryside.[53]

It has now been reported that the low urban population figures used after 1963 were based on the following narrow definition of ''urban'': the urban population included only those people living within city district boundaries and town boundaries, and of those, only persons entitled to commercial grain rations.[54] Usually, only those with permanent resident status in a city or town were included. People granted ''temporary'' permission to reside in a city, even if living there for many years, were not considered part of the urban population.

The 1982 census used a new, more realistic definition of the urban population that makes Chinese data more comparable to urban data in other countries. For the census, China's urban population included all persons who had resided for a year or more within the boundary of a city or a town recognized

by the State Council as an "urban place." The urban population included long-term "temporary" residents of a city, persons who lived in urban areas but were legally registered nowhere, and persons classified as "agricultural" for purposes of grain distribution but who were located within the urban boundaries. The census definition of the urban population is therefore based entirely on the location of a person's actual residence inside the boundaries of a designated urban place.

Relying on this definition, the 1982 census counted an urban population of 206.6 million, equivalent to 20.5 percent of the total count or 20.6 percent of the total civilian population.[55] The absolute urban total is on the low side because no military personnel are included in the urban count, even though some are probably located in cities and towns. Of the urban total, 144.7 million lived in 236 cities, and 61.9 million in 2,664 towns. In order to compare the urban population of the 1964 and 1982 censuses, the State Statistical Bureau adjusted 1964 census data in an unknown manner to derive an urban total for 1964 roughly comparable to the 1982 census definition. This raised the 1964 estimated urban population to 127.1 million, and indicated that the urban fraction of China's population had dropped to 18.3 percent in 1964 from the 1960 peak, then increased to only 20.5 percent by 1982. These figures show that China's population remains largely rural, and that the government has succeeded in controlling rural-to-urban migration over the decades.

Since the 1982 census, some year-end population data have been reported based on the census definition. The 1982 year-end urban population was reported to be 211.5 million persons, or 20.8 percent of the population, and an official urban series was created for the years 1949–82, using the pre–1964 urban data without adjustment but adjusting 1964–82 year-end figures to accord with the 1982 census definition.[56] This leaves a problematic discontinuity between the year-end 1963 population, shown as 16.8 percent urban, and the year-end 1964 population, estimated at 18.4 percent urban.

Actually, the census definition of "urban" has not fully replaced the definition in use during 1964–81. Both definitions are currently in use. The restrictive definition that includes only persons entitled to commercial grain living within urban boundaries is still used for some purposes, which means that any generalizations made about urban–rural distinctions should specify which urban definition is meant. In one example, a 1984 Chinese journal published a "Table of cities and their populations" that uses the precensus urban definition and is not comparable with census data.[57] In another instance, the nationwide retrospective fertility survey of 1982, though linked to the 1982 census, did not use the new definition of the urban population. Therefore, the extensive tables showing the differences between urban and rural fertility or urban and rural marriage patterns do not refer to the same urban and rural populations as do the census tables. Users of these two valuable data sets must avoid equating the census "urban" population, equivalent to 20.5 percent of the total, with the fertility survey "urban" population, only 14.6 percent of China's population.[58]

Census data for the population of the three largest cities, Shanghai, Beijing, and Tianjin, are given in Table 8. Equivalent data, giving totals for city proper, total urban population, and municipality population, are not yet available for the remaining 233 cities. However, urban population figures based on the 10 percent sample tabulation of census questionnaires, which do not deviate greatly from the full census count of city populations, are available. Table 8 gives these numbers for cities exceeding 2 million.

TABLE 8 China's largest cities, 1982 census populations

City and province	City proper population	Total urban population	Municipality population
Shanghai	6,320,872	6,975,179	11,859,748
Beijing	5,597,972	5,970,227	9,230,687
Tianjin	5,142,565	5,333,622	7,764,141
Shenyang, Liaoning	3,944,240		
Wuhan, Hubei	3,287,720		
Guangzhou, Guangdong	3,181,510		
Chongqing, Sichuan	2,673,170		
Harbin, Heilongjiang	2,519,120		
Chengdu, Sichuan	2,499,000		
Zibo, Shandong	2,197,660		
Xi'an, Shaanxi	2,185,040		
Liupanshui, Guizhou	2,107,100		
Nanjing, Jiangsu	2,091,400		

NOTES AND SOURCES: Figures for the total urban population within municipal boundaries, including the city proper and suburban township populations, are available only for the three leading municipalities from census data. See State Council and SSB (1982), cited in note 4, pp. 16–17. Data on the other city populations are not the exact totals from their count, but rather are extrapolated from the 10 percent sample of their census questionnaires. See State Council and SSB (1983), cited in note 4, pp. 28–211.

Conclusion

The wealth of good quality data now available on the demography of China provides much more reliable estimates of the country's population size and growth rate, its patterns of nuptiality, fertility, mortality, and urban–rural residence, and its labor force characteristics than ever before. This paper has begun the task of drawing out the most important implications of the 1982 census and fertility survey data in combination with other Chinese statistics. In addition, the foregoing analysis has pinpointed areas where further research is needed:

— If it becomes possible to include the single-year age structure of the 1982 military population in published census data, this could aid in the derivation of a 1964–82 intercensal life table for males. The currently available female age structures for the two censuses are already usable for this purpose with very little adjustment.

— Research is needed to determine how the 1953–63 definition of "urban" differed from the 1982 census definition, in order to adjust the earlier

urban figures and to correct for the 1964 discontinuity in the historical urban series. Use of the census definition of "urban" for all purposes would greatly simplify analysis of urban population trends in China.

— Infant mortality data by sex from the 1982 nationwide fertility survey could be utilized for reverse surviving the youngest children counted in the 1982 census to their births and comparing the expected births with the number of births derived from fertility survey age-specific fertility rates. These infant mortality rates should also be compared with the results of the Brass, Feeney, Sullivan, and Trussell indirect techniques for estimating infant mortality.

— Fertility based on the fertility survey and population growth derived from the census counts together imply that 10–20 percent of deaths in China have been missed by the vital registration system, by surveys, and by the census. Research is needed to determine the categories of deaths undetected by these data-gathering methods and how such underreporting can be overcome or adjusted for.

— To analyze the size and characteristics of China's working population, it would be helpful to investigate and explain the discrepancy between census figures and routine workplace statistics on the number of employed persons in industry and agriculture.

China's population constitutes about 22 percent of the world's total. The considerable uncertainty that plagued previous estimates of China's demographic characteristics necessarily also affected estimates of world demographic levels and trends. Now that the validity of Chinese population data and their inherent errors can be assessed with some confidence, a fairly reliable reconstruction of China's demographic trends such as that outlined in Table 5 can be used to reassess world population trends and describe the current global demographic situation.

Notes

An earlier version of this paper was presented by Louis Kincannon, Deputy Director, US Bureau of the Census, and the author to the International Seminar on China's 1982 Population Census, Beijing, 26–31 March 1984.

1 China's latest population census was conducted after unusually thorough preparation. The original schedule called for a tentative census date of midyear 1980; however, preparation time was too short, and census officials wisely postponed the date, first to 1981 and later to midyear 1982. This gave the census planners time for a careful pretest of the original questionnaire, adjustment of the census design in light of pretest results, and extensive pilot censuses nationwide using the final questionnaire. For the first time, the census planners considered the experiences of large numbers of nonsocialist as well as socialist countries in the design and conduct of their censuses, and adapted many foreign census practices for use in the Chinese context. For details on the preparations, see Li Chengrui, "On the results of the Chinese census," *Population and Development Review* 9, no. 2 (June 1983): 326–344. See also John S. Aird, "The preparations for China's 1982 census," *The China Quarterly*, no. 91 (September 1982): 375; and "China," *Asian and Pacific Census Forum* 6, no. 4 (May 1980): 3.

2 Li Chengrui, "Renkou pucha gongzuo yiding yao dadao gao zhiliang" ("Population

census work must achieve high quality''), *Renmin ribao* (*People's Daily*), 22 June 1982, p. 5. See also Li Chengrui, cited in note 1; Li Chengrui, ''The quality control of the 1982 population census of China,'' presented at the annual meeting of the International Statistical Institute, Madrid, September 1983, p. 17; and Zhu Wei, ''Weishenme yong dianzi jisuanji chuli renkou pucha ziliao haiyao liangnian caineng wancheng?'' (''Why does it still take two years to complete census data processing with the use of computers?''), *Tongji* (*Statistics*), no. 1 (17 January 1983): 14–15.

3 Results of the nationwide fertility survey were published in ''Quanguo qianfenzhiyi renkou shengyulü chouyang diaocha fenxi'' (''Analysis of the nationwide one per thousand population sample fertility survey''), special issue of *Renkou yu jingji* (*Population and Economy*), 1983.

4 People's Republic of China, State Council Population Census Office and State Statistical Bureau (SSB) Department of Population Statistics, *The 1982 Population Census of China (Major Figures)* (Hong Kong: Economic Information and Agency, 1982), pp. 37–42, and People's Republic of China, State Council Population Census Office and SSB Department of Population Statistics, *Zhongguo 1982-nian renkou pucha 10% chouyang ziliao de zhuyao shuzi (Major Figures from the Ten Percent Sample Tabulation of China's 1982 Population Census)* (Beijing, 1983), pp. 264–273.

5 People's Republic of China, State Statistical Bureau, ''Communique on the results of census and registration of China's population,'' Xinhua, Beijing radio, 1 November 1954, in *Current Background*, no. 301 (1 November 1954): 1–2.

6 For this adjustment, see Judith Banister, *China's Changing Population* (Stanford, Calif.: Stanford University Press, forthcoming). For the data on which the adjustment is based, see Dai Shiguang, ''1953 population census of China,'' presented at the meeting of the Indian Statistical Institute of Calcutta, 20 December 1956, Calcutta, p. 21; Chen Da, ''New China's population census of 1953 and its relations to national reconstruction and demographic research,'' presented at the meeting of the International Statistical Institute, Stockholm, 8–15 August 1957, p. 23; Tian Fengtiao, ''Woguo jihua shengyu he renkou zengzhi wenti'' (''The problem of planned births and population increase in China''), *Renmin baojian* (*People's Health*) 1, no. 5 (May 1959): 462–463; and John S. Aird, *The Size, Composition, and Growth of the Population of Mainland China* (Washington, D.C.: US Bureau of the Census, 1961), International Population Statistics Reports, Series P-90, no. 15, pp. 65–77.

7 For detailed analysis of intercensal survival ratios for 1953–64 and 1964–82, see Banister, cited in note 6.

8 For data and discussion concerning the sex ratio at birth, by age, and for the whole population of China over time, see Banister, cited in note 6.

9 This analysis is found in Banister, cited in note 6; based on George W. Barclay, Ansley J. Coale, Michael A. Stoto, and T. James Trussell, ''A reassessment of the demography of traditional rural China,'' *Population Index* 42, no. 4 (October 1976): 606–635.

10 Information about the 1953 census is found in Chen Da, cited in note 6; Bi Shilin, ''Woguo 1953-nian de renkou diaocha shi kexuede'' (''China's 1953 population census is scientific''), *Tongji gongzuo* (*Statistical Bulletin*), no. 27 (1957): 15–18; S. Krotevich, ''Vsekitayskaya perepis naseleniya 1953 g.'' (''The all-China population census of 1953''), in Moscow Institute of Economics and Statistics, *Poslevoennye perepisi naseleniya* (*Postwar Population Censuses*) (Moscow: State Statistical Publishing House, 1957), pp. 80–122; Aird, cited in note 6; and Li Chengrui, *Population Censuses in China* (Beijing: State Statistical Bureau, 1981).

11 The 1964 census is discussed in Sun Jingxin, ''Dierci quanguo renkou pucha jianjie'' (''A brief introduction to the second nationwide population census''), *Tongji* (*Statistics*), no. 5 (10 December 1981): 31–33; and Li Chengrui, cited in note 10.

12 Li Chengrui, cited in note 3.

13 Li Chengrui, cited in note 10, pp. 18–20; and Vaino Kannisto and Y. C. Yu, ''Plans and preparations for the 1982 population census of China,'' presented at the meeting of the

International Union for the Scientific Study of Population, Manila, December 1981, pp. 4–5.

14 The census attempt to count unregistered persons did not solve the problem of the large number of persons in rural and urban areas who had been refused registration or whose registration had been withdrawn. See "Guowuyuan pizhuan gonganbu guanyu jiejue youguan nongcun luohu wenti de qingshi de tongzhi" ("State Council circular approving the request of the Public Security Ministry for instructions concerning solving the problem of registering households in rural areas"), State Council release no. 148, 17 December 1982, *Zhonghua renmin gongheguo guowuyuan gongbao* (*PRC State Council Bulletin*), no. 21 (12 February 1983): 1026–1028.

15 These ways of circumventing the late marriage requirements are documented in Marinus J. Meijer, *Marriage Law and Policy in the Chinese People's Republic* (Hong Kong, 1971), p. 164; "Xizang drafts national Marriage Law modifications," Xinhua, Beijing radio, 30 April 1981, in *Foreign Broadcast Information Service Daily Report—PRC*, no. 84 (1 May 1981): Q 5; Tan Manni, "Why new Marriage Law was necessary," *China Reconstructs* 30, no. 3 (March 1981): 20; and Wang Deyi, "Xin hunyinfa yu jihua shengyu" ("The new Marriage Law and family planning"), *Zhongguo funü* (*Women of China*), no. 11 (15 November 1980): 42–43.

16 Calculated from "Quanguo qianfenzhiyi renkou shengyulü chouyang diaocha fenxi," cited in note 3, pp. 167–169.

17 For comparison with marriage data from 1929–31, see Barclay et al., cited in note 9, pp. 609–611, 632–633.

18 *Zhongguo baike nianjian 1982* (*Encyclopedic Yearbook of China 1982*) (Beijing: China Great Encyclopedia Publishing House, 1982), p. 644; and SSB, *Statistical Yearbook of China 1983* (Hong Kong: Economic Information and Agency, 1983), p. 5.

19 State Council and SSB (1983), cited in note 4, pp. 438–439.

20 Song Yuanjie, Shi Yulin, and Zhang Guichao, "Funü shengyu taici zhuangkuang" ("Women's birth parity"), *Renkou yu jingji* (*Population and Economy*) (1983, special issue): 56–61.

21 Judith Banister and Samuel H. Preston, "Mortality in China," *Population and Development Review* 7, no. 1 (March 1981): 98–110.

22 For a detailed analysis see Banister, cited in note 6.

23 Banister, cited in note 6.

24 Reported infant mortality rates, 1949 to the present, for China and populous subunits are compiled and analyzed in Banister, cited in note 6.

25 Rong Shoude et al., "Woguo 1973–1975–nian jumin pingjun qiwang shouming de tongji fenxi" ("Analysis of life expectancy in China, 1973–1975"), *Renkou yu jingji* (*Population and Economy*), no. 1 (25 February 1981): 17, 24–30.

26 Adjusted life tables appear in Banister, cited in note 6.

27 "Quanguo qianfenzhiyi renkou shengyulü chouyang diaocha xunwen tigang" ("Questions for interviews in the nationwide one per thousand population sample fertility survey"), nationwide sample fertility survey material, no. 3, 1 September 1982; and "Tianbiao ji huizong shuoming" ("Explanation of how to fill out and tabulate the questionnaires"), nationwide sample fertility survey material, no. 7, 1 September 1982, description of Table 17.

28 Griffith Feeney, "Estimating infant mortality trends from child survivorship data," *Population Studies* 34, no. 1 (1980): 109–128; Griffith Feeney, "Addendum to estimating infant mortality trends from child survivorship data," 19 April 1982, unpublished; and Griffith Feeney, "Mortality estimation from child survivorship data: A review," in *The Survey Under Difficult Conditions*, ed. Thomas M. McDevitt, forthcoming.

29 Results from other variations of Brass's model were also explored. Techniques devised by Trussell produce a time series of infant mortality estimates considerably higher than the Feeney series. Brass and Sullivan also give higher figures. Any of these techniques could be used as alternatives to the Feeney version, which is preferred here because the levels and trends in infant mortality appear most reasonable for China.

30 Births in 1981 reported in the 1982 census had a sex ratio at birth of 108.5 males per hundred females, which is too high to be correct. A slight upward adjustment was made in the number of 1981 births to give a plausible sex ratio at birth.

31 " 'Text' of PRC 1982 Economic Plan Communique," Xinhua, Beijing radio, 29 April 1983, in *Foreign Broadcast Information Service Daily Report—PRC*, no. 85 (2 May 1983): K 16.

32 Barclay et al., cited in note 9, p. 620.

33 "Zaiye renkou huafen biaozhun taolunhui" ("A conference on the classification of the employed population"), *Renmin ribao* (*People's Daily*), 3 October 1981, p. 5.

34 See source cited in note 33 and "Jushi zhumu de woguo disance renkou pucha" ("The eyes of the world are on China's third nationwide population census"), *Fujian ribao* (*Fujian Daily*), 19 June 1982, p. 2.

35 State Council Population Census Leading Group, *Instructions for Filling out the Questionnaire of the Third National Population Census* (Beijing, n.d.), pp. 23–26.

36 State Council and SSB (1983), cited in note 4, pp. 324–325.

37 State Council and SSB (1983), cited in note 4, pp. 350–351.

38 State Council and SSB (1983), cited in note 4, p. 13.

39 State Council and SSB (1983), cited in note 4, pp. 394–395.

40 "Urban unemployed only three million, six million placed in '81," *The Asia Record* 3, no. 2 (May 1982): 18.

41 See John Philip Emerson, "Urban school-leavers and unemployment in China," *The China Quarterly*, no. 93 (March 1983): 1–16.

42 State Council and SSB (1983), cited in note 4, pp. 212–263; Yu Wang and Xiao Zhenyu, "Quanguo qianfenzhiyi renkou shengyulü chouyang diaocha gaikuang he youguan shuju chuxi" ("A general introduction to the nationwide one per thousand population sample fertility survey and a preliminary analysis of the survey data"), *Renkou yu jingji zhuankan* (*Population and Economy*) (1983, special issue): 7; Xiao Zhenyu and Chen Shengli, "Cong quanguo renkou shengyulü chouyang diaocha jieguo kan dangqian jihua shengyu gongzuo renwu" ("The present task in family planning work in terms of the findings of the national sample fertility survey"), *Renkou yanjiu* (*Population Research*), no. 4 (29 July 1983): 22.

43 SSB (1954), cited in note 5, p. 2.

44 Sun Jingxin, cited in note 11, Appendix.

45 See *Beijing Review* 23, no. 9 (3 March 1980): 17; and Zhang Tianlu, "You jihuade fazhan woguo shaoshu minzu renkou cujin minzu fanrong" ("Develop the population of China's minority nationalities in a planned way to promote their prosperity"), *Renkou yu jingji* (*Population and Economy*), no. 1 (1980): 29.

46 See, for example, "Liaoning census circular," Shenyang Liaoning provincial radio, 15 August 1981, in *Foreign Broadcast Information Service Daily Report—PRC*, no. 168 (31 August 1981): S 1.

47 State Council, cited in note 35, p. 22.

48 Data on each minority group are compiled and analyzed in Banister, cited in note 6.

49 State Council and SSB (1982), cited in note 4, p. 2.

50 State Council and SSB, "Analysis of population figures," *Summary of World Broadcasts—Weekly Economic Report*, FE/W1214/A/2-6 (8 December 1982): 4–5.

51 Shen Yimin, "Woguo renkou tongji de lishi yange he xin zhongguo de renkou pucha" ("The history of Chinese population statistics and the population censuses of new China"), in *Renkou pucha qianshuo* (*A Brief Discussion of Population Censuses*) (Beijing: Zhongguo tongji chubanshe, 1982), p. 25.

52 Compiled and discussed in Leo A. Orleans, "China's urban population: Concepts, conglomerations, and concerns," in US Congress, Joint Economic Committee, *China under the Four Modernizations, Part I* (Washington, D.C.: US Government Printing Office, 1982), pp. 268–302.

53 Documentation of this reversal and analysis of the reasons for it are found in Banister, cited in note 6.

54 Li Chengrui, cited in note 1, p. 332.

55 State Council and SSB (1982), cited in note 4, p. 3.

56 SSB, *Statistical Yearbook of China 1983*, cited in note 18, p. 103.

57 ''Quanguo chengshi ji qi renkou yilanbiao'' (''Table of cities and their populations''), *Liaowang* (*Outlook*), no. 2 (9 January 1984): 24.

58 Xiao Zhenyu, ''Chouyang diaocha de fangan sheji'' (''The design of the sample survey program''), *Renkou yu jingji* (*Population and Economy*) (1983, special issue): 20; and Li Bohua, ''Chouyang diaocha zhunquexing de pingjia'' (''An evaluation of the accuracy of the sample survey''), *Renkou yu jingji* (*Population and Economy*) (1983, special issue): 23.